

Michigan Chapter IAEI
Spring Meeting in Holland, Michigan
Code Panel Answers March 6th and 7th, 2008

Dave Williams

1. In healthcare facilities, do the emergency panel and normal power panel feeding the same area have to be bonded together?

Answer: Yes, They are required to be bonded together so there is no difference of potential. This was changed in the 2005 code to require two or more panels instead of more than two as written in the 2002 NEC.

517.14 Panelboard Bonding

The equipment grounding terminal buses of the normal and essential branch-circuit panelboards serving the same individual patient vicinity shall be bonded together with an insulated continuous copper conductor not smaller than 10 AWG. Where two or more panelboards serving the same individual patient vicinity are served from separate transfer switches on the emergency system, the equipment grounding terminal buses of those panelboards shall be bonded together with an insulated continuous copper conductor not smaller than 10 AWG. This conductor shall be permitted to be broken in order to terminate on the equipment grounding terminal bus in each panelboard.

Patient Vicinity. In an area in which patients are normally cared for, the patient vicinity is the space with surfaces likely to be contacted by the patient or an attendant who can touch the patient. Typically in a patient room, this encloses a space within the room not less than 1.8 m (6 ft) beyond the perimeter of the bed in its nominal location, and extending vertically not less than 2.3 m (7 1/2 ft) above the floor.

Jeff Fecteau

2. I am building an 800-amp service and have been told I must size the equipment for the available fault current. How do I determine what the available fault current is?

Answer: The initial information must be provided by the serving Utility Company. For example APS delivers 65K AIC for an 800 amp service fed from a 120/208 volt 3-phase 300 KVA transformer, however for an 800 amp service fed from a 277/480 volt 3-phase 750 KVA transformer it is only 30K AIC. Another utility SRP is 42K AIC and 22K AIC respectively. Once you have the information from the serving utility, depending on local requirements, usually an electrical engineer must provide fault current calculations for all panels and large equipment so that it can be verified proper equipment has been installed to comply with code requirements. Remember this is a dynamic system and there are many variables such as transformer size and impedance, conductor size, type and length, whether it is installed in a magnetic or non-magnetic raceway.

The requirements for sizing equipment for available fault current can be found in sections 110.9, 110.10, 110.22, 240.86 and 409.10

Phil Clark

3. The energy code requires local control of lighting in each space. If I have occupancy sensors in each room, am I still required to have a local override switch in each area?

Answer: **9.2 Mandatory Provisions**

9.2.1 Lighting Control

9.2.1.1 Automatic Lighting Shutoff. Interior lighting in buildings larger than 5000 ft² shall be controlled with an automatic control device to shut off building lighting in all spaces. This automatic control device shall function on either (a) a time-of-day operated control device that turns lighting off at specific programmed times—an independent program schedule shall be provided for areas of no more than 25,000 ft² but not more than one floor—or (b) an occupant sensor that shall turn lighting off within 30 minutes of an occupant leaving a space or (c) by occupant intervention.

Exception to 9.2.1.1: Lighting intended for 24-hour operation shall not require an automatic control device.

9.2.1.2 Space Control. Each space enclosed by ceiling height partitions shall have at least one control device to independently control the general lighting within the space. Each control device shall be activated either manually by an occupant or automatically by sensing an occupant. Each control device shall

(a) control a maximum of 2500 ft² area for a space 10,000 ft² or less and a maximum of 10,000 ft² area for a space greater than 10,000 ft²,

(b) be capable of overriding the shutoff control required in 9.2.1.1 for no more than four hours, and

(c) be readily accessible and located so the occupant can see the controlled lighting.

Exception to 9.2.1.2: Remote location shall be permitted

Dan Radecki

4. A hydro-massage tub is installed in a master bedroom. There is no stool or sink. Does the dedicated 20-amp GFCI circuit for the tub require AFCI protection?

Answer: *Yes, if you consider the outlet for the tub motor to be in the bedroom*
Article 210.12(B), 90.4, E3802.11

Tom Lichtenstien

5. Are track lights permitted to be used above a suspended ceiling?

Answer: *No, NEC 410.101(C)(6), locations not permitted for track lighting says it cannot be installed where concealed. If it is above a suspended ceiling it is concealed.*

UL Lists track lighting under the product category Track lights (IFFR), located on page 148 in the 2007 White Book. The guide information states that we do List some track for recessed installation, which would be marked to identify it's suitability such as Track systems that are intended for recessed installation are marked "Suitable for Use in Poured Concrete," or "For use in " if intended to be an integral part of a suspended ceiling grid. The blank space is filled in with the manufacturer's name and catalog number or product description of the structural building system with which the track system is to be used.

Dave Williams

6. A Mechanical contractor is installing CSST (Corrugated Stainless Steel Tubing) in a building and has told the electrician that he is required to bond it. Where can I find the requirement for that and how do I bond it?

Answer: Bonding of gas piping systems are found in 250.104(B) and can be accomplished by the equipment grounding conductor that could energize the piping system. Due to class action lawsuits of these products due to lightning in the surrounding area producing tiny holes in the flexible gas piping system, which could lead to an explosion. here are six manufacturers to my knowledge: Diamondback™, Gastite™, ParFlex™, TracPipe™, Tru-Flex™, and WardFlex™. As a result every manufacturer has updated their installation instructions or have added Technical Bulletins to require bonding of the CSST in excess of the National Electrical Code. This information is available on the Michigan Chapter website under Product Information. Of the six manufacturers, three require 6 AWG as the bonding conductor and the other three require the conductor to be sized based on 250.66. The three that require it to be sized based on 250.66 are ParFlex, TracPipe, and TruFlex. Who does this and who inspects this bonding? Bonding is an electrical function and needs to be performed by the electrical contractor and inspected by the electrical inspector.

Jeff Fecteau

7. I am designing a power distribution system for a health care facility. I was told that I have to co-ordinate the ground fault protection for the service and the feeders. What does that mean?

Answer: What this means is where ground fault protection is required by 230.95 and 215.10, it must be designed with a minimum 6 cycle separation between the feeder protective GFP and the Service Main GFP to achieve 100% selectivity. This is so if there is a ground fault on the load side of the feeder, only the feeder GFP is tripped and the rest of the electrical system remains operational. The requirements for selective coordination of ground fault protection of a health care facility are found in section 517.17(C)

Phil Clark

8. How much do I have to de-rate the conductors running across a flat roof to a roof top unit for ambient temperature?

Answer: NEC 310.10 FPN No. 2: Conductors installed in conduit exposed to direct sunlight in close proximity to rooftops have been shown, under certain conditions, to experience a temperature rise of 17°C (30°F) above ambient temperature on which the ampacity is based.

+ 17 degrees Celsius temp above ambient (30 celsius) would be, per table 310.16

90 degree wire=.82 ampacity

75 degree wire= .75 ampacity

Dan Radecki

9. Can a 10.5A 120V rated fan-light-heat unit be installed in a bathroom and be supplied from the same 20Amp circuit supplying the bathroom receptacle?

Answer: No, the total rating of utilization equipment fastened in place other than luminaires shall not exceed 50% of the branch circuit ampere rating where lighting units, cord and plug connected utilization equipment not fastened in place, or both, are also supplied. 210.23(A)(2). E3602.3

Tom Lichtenstien

10. When permanently installed, does a 240-volt baseboard heater need to be “Listed”?

Answer: Yes, NEC 424.6 requires Electric baseboard heaters, heating cables, duct heaters, and radiant heating systems shall be listed and labeled.

UL Listed electric baseboard heaters under the category Baseboard Heaters (KLDL), located on page 178 in the 2007 White Book.

Dave Williams

11. If the grounding electrode conductor is attached to the rebar in the footings of a building and the water service, are ground rods still required ?

Answer: No, 250.50 Grounding Electrode System

All grounding electrodes as described in 250.52(A)(1) through (A)(6) that are present at each building or structure served shall be bonded together to form the grounding electrode system. Where none of these grounding electrodes exist, one or more of the grounding electrodes specified in 250.52(A)(4) through (A)(7) shall be installed and used.

If the metal water service is a grounding electrode 250.53(D)(2) requires the metal water system to be supplemented by an additional electrode referenced in 250.52(A)(2)-(A)(7).

If you have just a concrete encased electrode no additional electrodes are required, unless they are present.

Jeff Fecteau

12. The 2005 Michigan electrical code seems to require a disconnect on fluorescent fixtures. Does this mean that I have to put a switch on each fixture?

Answer: Not if you can comply with the exceptions of section 410.73(G)

Exception No. 1: A disconnecting means shall not be required for luminaires (fixtures) installed in hazardous (classified) location(s).

Exception No. 2: A disconnecting means shall not be required for emergency illumination required in 700.16.

Exception No. 3: For cord-and-plug-connected luminaires, an accessible separable connector or an accessible plug and receptacle shall be permitted to serve as the disconnecting means.

Exception No. 4: A disconnecting means shall not be required in industrial

establishments with restricted public access where conditions of maintenance and supervision ensure that only qualified persons service the installation by written procedures.

Exception No. 5: Where more than one luminaire is installed and supplied by other than a multiwire branch circuit, a disconnecting means shall not be required for every luminaire when the design of the installation includes locally accessible disconnects, such that the illuminated space cannot be left in total darkness.

Phil Clark

13. If I am installing a transfer switch on a service ahead of the load center located in the building, is it required to have overcurrent protection integral part or adjacent to as required in Article 250.91?

*Answer: First, define a transfer switch:
Art 100*

Switch, Transfer: An automatic or non-automatic device for transferring one or more load conductor connections from one power source to another.

Service disconnect:

230.66 Marking: Service equipment rated at 600 volts or less shall be marked to identify it as being suitable for use as service equipment. Individual meter socket enclosures shall not be considered service equipment.

VII. Service Equipment — Overcurrent Protection

230.90 Where Required: Each ungrounded service conductor shall have overload protection.

230.91 Location

The service overcurrent device shall be an integral part of the service disconnecting means or shall be located immediately adjacent thereto.

Dan Radecki

14. Is it acceptable to bury electrical non-metallic tubing under a concrete floor?

Answer: No, Article 362.12(5), uses not permitted, does not allow ENT to be direct earth burial

Tom Lichtenstien

15. May I use Tray Cable, as feeder conductors for a residence, from the main disconnect to the panelboard? It would be concealed through wall studs.

Answer: Yes, only if you install it in a raceway. NEC 336.10(3) permits its use in a raceway. NEC 336.12. The only way you could install outside of a cable tray or a raceway would be in an industrial establishment and meeting the criteria of NEC 336.10(7). UL Lists type TC tray cable under the category, POWER AND CONTROL TRAY CABLE (QPOR), located on page 265 in the white book.

Dave Williams

16. A metal well casing that supplies water to a building through plastic pipe is now considered a grounding electrode. Am I required to bond it to the service grounding electrode system?

Answer: 250.52(A) has added a new subsection that would include a metal well casing. 250.52(A)(7) Other Local Metal Underground Systems or Structures Other local metal underground systems or structures such as piping systems, underground tanks, and underground metal well casings that are not effectively bonded to a metal water pipe.

250.50 Grounding Electrode System All grounding electrodes as described in 250.52(A)(1) through (A)(6) that are present at each building or structure served shall be bonded together to form the grounding electrode system. Where none of these grounding electrodes exist, one or more of the grounding electrodes specified in 250.52(A)(4) through (A)(7) shall be installed and used.

This is a new change for the 2005 edition of the code. By the wording in 250.50 it is not required to be used when present as it is with A2-A6.

Jeff Fecteau

17. The well driller supplied a twisted cable containing 4#10 conductors. The individual conductors are marked "Pump Cable". Can this cable be direct buried from the residence to the wellhead?

Answer: Not unless the cable has a dual rating that is recognized by the NEC for direct buried conductors such as UF or USE. 300.1 Scope identifies this article covers all wiring methods unless modified by other articles. 300.5(B) requires cables and insulated conductors installed underground must be listed for a wet location. Otherwise the AHJ may allow through written special permission 90.4 and 110.3(A)

Phil Clark

18. Article 240.21(B) allows tap conductors up to 25ft long if the ampacity of the tap conductor is not less than 1/3 the rating of the overcurrent device protecting the feeder conductor. The tap conductors are THHN and they terminate in a device rated 70 C. Which temperature rating will I use to determine the ampacity of the tap conductors?

Answer: 110.14 Electrical Connections.

(C) Temperature Limitations. The temperature rating associated with the ampacity of a conductor shall be selected and coordinated so as not to exceed the lowest temperature rating of any connected termination, conductor, or device. Conductors with temperature ratings higher than specified for terminations shall be permitted to be used for ampacity adjustment, correction, or both.

The determination of termination provisions of equipment shall be based on 110.14(C)(1)(a) or (C)(1)(b). Unless the equipment is listed and marked otherwise, conductor ampacities used in determining equipment termination provisions shall be based on Table 310.16 as appropriately modified by 310.15(B)(1) through (6).

- (a) Termination provisions of equipment for circuits rated 100 amperes or less, or marked for 14 AWG through 1 AWG conductors, shall be used only for one of the following:*

- (1) *Conductors rated 60°C (140°F)*
 - (2) *Conductors with higher temperature ratings, provided the ampacity of such conductors is determined based on the 60°C (140°F) ampacity of the conductor size used*
 - (3) *Conductors with higher temperature ratings if the equipment is listed and identified for use with such conductors*
 - (4) *For motors marked with design letters B, C, D, or E, conductors having an insulation rating of 75°C (167°F) or higher shall be permitted to be used provided the ampacity of such conductors does not exceed the 75°C (167°F) ampacity.*
- (c) *Termination provisions of equipment for circuits rated over 100 amperes, or marked for conductors larger than 1 AWG, shall be used only for one of the following:*
- (1) *Conductors rated 75°C (167°F)*
 - 1) *Conductors with higher temperature ratings, provided the ampacity of such conductors does not exceed the 75°C (167°F) ampacity of the conductor size used, or up to their ampacity if the equipment is listed and identified for use with such conductors*

There is no information in the question about the size of the conductors or the rating of the circuit, only the temp rating of the termination device. The device being rated at 70degrees, the final ampacity of the conductors must be chosen from the 60 degree chart of 310.16. The 90 degree chart (which includes THHN) would be used for ampacity adjustment (# of conductors), ampacity correction (ambient temp) or both, then the 60 degree chart would be used.

Dan Radecki

19. I have a network server located in the closet by my office. I am installing a UPS (Uninterruptible Power Supply). Does it have to meet the requirements of Article 645.11?

Answer: No, Unless the closet meets all the requirements of Article 645.4, the rules of 645.11 do not apply.

Tom Lichtenstien

20. A sign contractor is installing new letters on a building that are illuminated by LED's (light emitting diodes). What are the acceptable wiring methods permitted in the concealed space behind the sign?

Answer: I would refer to the installation instructions with the Listed sign to see what they say and see if the secondary wiring methods are provided as part of the Listed sign. NEC 600.12 states that you have to use NEC 600.31 for the field installed secondary wiring of the sign. 600.31(A) requires a Chapter 3 wiring method.

Dave Williams

21. Is wiremold™ acceptable as a grounding conductor without adding a bonding jumper between sections?

Answer: Yes, 250.118 references the types of materials and raceways that are considered as an equipment grounding conductor. There is a change for the 2005 NEC by adding a new sub-section (14) Surface metal raceways listed for grounding. UL White Book 2007 edition on Page 280 Surface Metal Raceways (RJBT) Surface Metal Raceway Fittings (RJPR) Surface Metal Raceways and fittings are considered suitable for grounding for use in circuits over and under 250 volts and where installed in accordance with the NEC.

Jeff Fecteau

22. Can I use non-metallic ridged conduit exposed on the wall at an indoor water park with an occupancy load of 325?

Answer: This would depend on if the building is required by the building code to have a fire rated construction. Based on the 06 IBC with this occupant load, this building is going to be roughly 16250 square feet. This is typically going to be a Type I B unless fire sprinklers are installed then a 200% area increase is permitted. In this case this could be a Type V B and allowed to be up to 18000 square feet.

518.4(B) for non rated construction or portions of buildings not required to be of rated construction, rigid non-metallic conduit is a permitted wiring method.

518.4(C) allows some limited applications where concealed behind building materials with a minimum 15 minute finish rating.

352.10(F) allows rigid non-metallic conduit exposed provided not subject to physical damage and identified for the use.

IBC Section 303.1 would identify this occupancy as an A3. See IBC Table 503 construction types are based on area and height of the building based on the occupancy of the building. See IBC Section 602 for construction classification. Typically Type I and Type II structures are considered rated construction. However the only structure of complete non rated construction is a Type V B. All other types of construction have some type of rated construction requirements.

Phil Clark

23. Where apartments share a common hallway, is a house panel required?

Answer: Per 2005 NEC

210.25 Common Area Branch Circuits.

Branch circuits in dwelling units shall supply only loads within that dwelling unit or loads associated only with that dwelling unit. Branch circuits required for the purpose of lighting, central alarm, signal, communications, or other needs for public or common areas of a two-family or multifamily dwelling shall not be supplied from equipment that supplies an individual dwelling unit.

A house panel is required for “common area circuits”

Dan Radecki

24. A ship that is permanently moored requires a power, what is an acceptable wiring method for the feeder from the ship to the service on shore?

Answer: Article 553 covers floating buildings, permanently moored meets definition of Article 553.2 Liquid tight flexible metal or liquid tight flexible nonmetallic conduit with approved fittings, Extra hard usage portable power cable listed for both wet and sunlight resistance, where flexibility is required. Other raceways suitable for the location where flexibility is not require. Article 553.7(B).

Tom Lichtenstien

25. I have a two-wire extension cord that needs a new attachment plug. Can I replace the plug with a three-wire plug?

Answer: I would say no. You would need to follow the installation instructions that come with the Listed plug. UL Lists assembled on plugs under the product category Attachment Plugs Fuseless, (AXUT), located on page 62 in the UL White Book. You would also alter a Listed product of the Listed cord set.