The answers to these questions are the opinion of the person that answered the question. They are not the position of the IAEI, IAEI Michigan Chapter, NFPA or a code making panel.

1. In a five story building can I run a new emergency circuit up through the elevator shaft from the basement to the top level?

Don Iverson-

Answer: NO Article 620.37

620.37 Wiring in Hoistways, Machine Rooms, Control Rooms,Machinery Spaces, and Control Spaces.

(A) Uses Permitted. Only such electrical wiring, raceways, and cables used directly in connection with the elevator or dumbwaiter, including wiring for signals, for communication with the car, for lighting, heating, air conditioning, and ventilating the elevator car, for fire detecting systems, for pit sump pumps, and for heating, lighting, and ventilating the hoist way, shall be permitted inside the hoist way, machine rooms, control rooms, machinery spaces, and control spaces

2. Does a receptacle in a multi-family dwelling unit require gfci protection if within 6' of a sink but in another room, such as around a corner or through a doorway?

George Little-

Answer: NEC 210.8 (A)(7) 2014 Edition the answer is yes. Answer: NEC 210.8 2017 Edition, the answer is no. If the installation comes under the 2015 MRC it would require GFCI E3902.7

3. Is a supplemental grounding electrode required at an RV pedestal? If so is it required to comply with 250.53(A)(2)

Tony Tomasin-

Maybe: It depends if the pedestal is fed by a single branch circuit and qualifies for the exception of 250.32(A), then no grounding electrode is required. Otherwise, a grounding electrode is required for the pedestal, as it is considered a *structure* per article 100 and required per 551.75. If a **Rod, Pipe or Plate Electrode** is the grounding electrode of choice per 250.(A)(1), then a **supplemental electrode** would be required per **250.53(A)(2)**. **Supplemental Electrode Required.** A single rod, pipe, or plate electrode shall be supplemented by an additional electrode of a type specified in 250.52(A)(2) through (A)(8). The supplemental electrode shall be permitted to be bonded to one of the following:

(1) Rod, pipe, or plate electrode
(2) Grounding electrode conductor
(3) Grounded service-entrance conductor
(4) Nonflexible grounded service raceway
(5) Any grounded service enclosure

551.75 Grounding. All electrical equipment and installations in recreational vehicle parks shall be grounded as required by Article 250.
Informational Note: See 250.32 (A), *Exception, for single branch circuits.*

250.32(A)Exception: *A grounding electrode shall not be required where only a single branch circuit, including a multiwire branch circuit, supplies the building or structure and the branch circuit includes an equipment grounding conductor for grounding the normally non–current-carrying metal parts of equipment.*

Reference: 551.75,551.76 & 250.32(A)*Exception*

4. I am reviewing plans for some Photo-voltaic systems. During my review I am noticing some literature for inverters and solar cells that use the term certified instead of listed. Should I be concerned?

Tom Lichtenstein-

Answer: If it is UL Certified I would say no. If it is a different NRTL, maybe, I do not know how they would mark their products and what certification services they have.
In general, certified is more generic term for Listed. At UL, we introduced a new certification mark in 2013 called the UL Enhanced Certification Mark, that has a UL in a circle and the word Certified under it. Then there are additional modules next to it that identify what attribute it was evaluated for such as safety, a country code such as the US and some of the marks also include an identification number which is the companies file number that can be looked up on UL's Online Certifications directory at www.ul.com/database. The UL Certification mark can be used in lieu of a UL Listing or Classification Mark on products. The Certification Mark complies with the definition of Listed in the NEC and all model codes.

5. My customer has told me I have to wire for carbon monoxide detectors in his home I can't seem to figure out where they are required to be.

Dan Radecki-

This would be a building code requirement. MRC R315 addresses carbon monoxide alarms but does not list a location. 1972 PA 230 4f, MCL 125.1504f does specify the location. They are required to be located within the vicinity of the bedrooms, in areas within the dwelling adjacent to an attached garage, and in areas adjacent to any fuel burning device.

6. I am installing a roof mounted photo-voltaic system. The plans call for the wiring method to be open cable tray with TC type cable. The engineer sized the conductors for free air. Is this correct ??

Don Iverson-

Answer: NO

392.80 Ampacity of Conductors.
(A) Ampacity of Cables, Rated 2000 Volts or Less, in Cable Trays.

Informational Note: See 110.14(C) for conductor temperature limitations due to termination provisions.

(1) Multiconductor Cables. The allowable ampacity of multiconductor cables, nominally rated 2000 volts or less, installed according to the requirements of 392.22(A) shall be as given in Table 310.15(B)(16) and Table 310.15(B)(18), subject to the provisions of (A)(1)(a), (b), (c), and 310.15(A)(2).

You will notice that it allows for use of 310.15(B)(16) as it would for any ampacity calculation (with the understanding that adjustments and corrections apply where applicable) as well as 310.15(B)(18) which is for special types of cables and insulations. You will notice that 310.15(B)(17) deals with “single-insulated” conductors to which Type TC is not so the Free Air would not apply.

Single conductor applications can use 310.15(B)(17) as allowed in 392.80(A)(2). Remember to remind everyone the rules in 392.22(A) in terms of layers and spacing in Cable Trays.

336.12 Uses Not Permitted. Type TC tray cable shall not be installed or used as follows
(1) Installed where it will be exposed to physical damage
(2) Installed outside a raceway or cable tray system, except as permitted in 336.10(4) and 336.10(7)
(3) Used where exposed to direct rays of the sun, unless identified as sunlight resistant
(4) Direct buried, unless identified for such use

7. Does MC or AC have any limit for the number of bends or length between boxes?

George Little-

Article 320, AC Cable and Article 330, MC Cable have no limits on the number of bends or the length of cable runs. You can have as many bends as you need as long as the inner radius of each bend is not less than shown in Articles 320 and 330.

8. Why does the equipment grounding conductor in a feeder to a mobile home have to be insulated?

Tony Tomasin-

550.16 Grounding. Grounding of both electrical and nonelectrical metal parts in a mobile home shall be through connection to a grounding bus in the mobile home panelboard and shall be connected through the green-colored **insulated** conductor in the supply cord or the feeder wiring to the grounding bus in the service-entrance equipment located adjacent to the mobile home location. Neither the frame of the mobile home nor the frame of any appliance shall be connected to the grounded circuit conductor in the mobile home.

(A) Grounded Conductor.

(1) Insulated. The grounded circuit conductor shall be insulated from the grounding conductors and from equipment enclosures and other grounded parts. The grounded circuit conductor terminals in the panelboard and in ranges, clothes dryers, counter-mounted cooking units, and wallmounted ovens shall be insulated from the equipment enclosure. Bonding screws, straps, or buses in the panelboard or in appliances shall be
(Cont.)

removed and discarded. Where the panelboard is the service equipment as permitted by 550.32(B), the neutral conductors and the equipment grounding bus shall be connected.

Has this been addressed by the code writing panel. Yes

From the 1989 ROP For 1990 Code
Log # 1214-2
19-46-(550-24, Exception-(New): Reject
SUBMITTER: Bill . Shanks, Perrysburg, OH
RECOMMENDATION: Add:
Exception: Aluminum or copper-clad aluminum without individual insulation where part of a cable assembly, or bare copper, shall be permitted for the equipment grounding conductor, when installed in a raceway for permanent installation.
SUBSTANTIATION: As an inspector, I see this all the time in mobile home parks. I feel this is just as safe as an installation. The integrity of the equipment ground is still maintained and protected from physical damage. It's very hard to tell an owner to take this out and put in an INSULATED equipment ground when it serves the same purpose.
PANEL ACTION: Reject.
PANEL COMMENT: A bare equipment conductor would provide multi paths for fault currents. Ground continuity is very critical because of nature of structure.

Insulation reduces arcing between equipment grounding conductor and other grounded equipment during a fault condition. Integrity of grounding conductor is preserved by being insulated.

VOTE ON PANEL ACTION: Unanimously Affirmative.

19- 47 - (550-24): Accept
SUBMITTER: CMP 19
RECOMMENDATION: Revise Section 550-24 to read:
"Mobile home feeder conductors shall consist of EITHER a listed cord, factory-installed in accordance with Section 550-5(b) or a permanently installed feeder consisting of four continuous, insulated, color-coded conductors which shall be identified by the factory or
field marking of the conductors in compliance with Section 310-12. "Equipment grounding conductors shall not be identified by stripping the insulation." (Added material in quotations.)
SUBSTANTIATION: To clarify that the feeder to a mobile home is intended to be either a listed supply cord or a permanently installed feeder and not both, Also to clarify that it is not the Panel's intent to permit bare equipment grounding conductors or to have the insulation stripped to identify the conductor.
PANEL ACTION: Accept.
VOTE ON PANEL ACTION; Unanimously Affirmative.

9. During inspections, I occasionally see electrical equipment that has been modified in the field. Are there any guidelines for when this equipment should be required to be field evaluated?

Tom Lichtenstein-

Answer: The UL Mark on the product means that the product complied with all UL requirements in effect at the time of manufacture. If that product was modified after it left the factory, UL no longer knows it the product is still in compliance with the Listing requirements unless we do a field evaluation on the modified product.
That being said, a lot of electrical equipment may need minor modification to install the equipment such as punching a knock out in an enclosure. It is up to the AHJ if the modification is serious enough that it may need a field evaluation to evaluate the modification. If the AHJ is unsure, they can contact UL (me) and we can assist in helping with that decision. Phone number is 847-664-2160 or my email thomas.r.lichtenstein@ul.com.

10. Can intrinsically safe conductors be installed in the same raceway with non-intrinsically safe wiring?

Dan Radecki-

Generally, no unless it meets four exceptions. 504.30(A)

11. I am working in a small office building. The owner wants me to relocate the lighting in the basement to accommodate his new drop ceiling, so they can hide all the NM cables. Doesn't this create a new code violation that would have to be corrected?

Don Iverson-

Answer: Yes. Art. 334.12

334.12 Uses Not Permitted.
(A) Types NM, NMC, and NMS. Types NM, NMC, and NMS cables shall not be permitted as follows:

(1) In any dwelling or structure not specifically permitted in 334.10(1), (2), (3), and (5)

(2) Exposed in dropped or suspended ceilings in other than one- and two-family and multifamily dwellings

12. May I install a self contained pool heater with a 240v /single phase/ 50amp circuit without GFCI Protection?

George Little-

2014 NEC Article 680.9 and NEC 2017 680.10 covering electric pool water heaters does not ask for GFCI protection. 2015. MRC does not require GFCI for pool water heaters. E4206.13. Check for manufacturer's specs.

13. Is each pedestal in a RV facility required to have a ground rod installed? If so, do they have to have a supplemental electrode that complies with 250.53.

Tony Tomasin-

Maybe: It depends if the pedestal is fed by a single branch circuit and qualifies for the exception of 250.32(A), then no grounding electrode is required. Otherwise, a grounding electrode is required for the pedestal, as it is considered a *structure* per article 100 and required per 551.75. If a **Rod, Pipe or Plate Electrode** is the grounding electrode of choice per 250.(A)(1), then a **supplemental electrode** would be required per 250.53(A)(2). through (A)(8). The supplemental electrode shall be permitted to be bonded to one of the following:
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Reference: 551.75,551.76 & 250.32(A)*Exception*

14. Why does listed and labeled electrical equipment come from the manufacturer with grounding lugs installed on painted surfaces which must be removed and cleaned to meet NEC compliance?

Tom Lichtenstein-

Answer: If a Listed piece of equipment comes from the manufacturer with a grounding lug installed, you do not have to remove the lug and remove the paint. It was evaluated with lug in place on the equipment. Typically it would be required that the lug was secured to the enclosure with a screw or bolt that engages a minimum of two full threads and then a test conducted to verify continuity or grounding impedance.

15. I was planing on installing an electrical panel in a storage area used for cleaning supplies. However the inspector insists that I can not because I might store paper products in the space. I can not seem to find this in the code.

Dan Radecki-

110.26 of the code requires that specific spaces around electrical; equipment be maintained but does not prevent those spaces being in a room used for other things. 240.24(D) does not allow OCDP's to be located within the vicinity of easily ignitable materials. Clearances must be maintained.

16. Can MC cable that is marked HC be be used in a wet location (PVC conduit buried under the floor of a dentist office)?

Don Iverson-

Answer: Maybe. Article 517.13/330.10 MC Cable Uses Permitted

517.13 Grounding of Receptacles and Fixed Electrical Equipment in Patient Care Areas.

Wiring in patient care areas shall comply with 517.13(A) and (B).

(A)Wiring Methods. All branch circuits serving patient care areas shall be provided with an effective ground-fault current path by installation in a metal raceway system, or a cable having a metallic armor or sheath assembly. The

metal raceway system, or metallic cable armor, or sheath assembly shall itself qualify as an equipment grounding conductor in accordance with 250.118.

MC Cable cannot be installed in a wet location such as installed in PVC conduit buried in a slab.

HCF Cable with a PVC jacket (which would be a special order) would be an accepted installation.

17.1 have a 3 adjoining townhouses, each with a back door. Can I use a dusk to dawn (farm type) light mounted on a pole by the garage as my required light outside the back door?

George Little-

My answer would be yes based on the wording in the 2014 NEC 210.70(A)(2)(b) Ex. Same wording in 2017 NEC and 2015 MRC E3903.3

18. Can bonding jumpers be installed daisy chain style? (IE one bonding jumper serving 5 conduits from sized 3/4 inch to size 2 inch) IF permissible, how would I size the jumper?

Tony Tomasin-

The answer is yes.
Because the question lists multiple conduits of various sizes we will eliminate the possibility that these are supply side raceways with bonding jumpers sized per table 250.102(C)(1).
Section **250.102(D) Size-Equipment Bonding Jumper on Load Side of an Overcurrent Device** *states*: The equipment bonding jumper on the load side of an overcurrent device(s) shall be sized in accordance with 250.122. A single common continuous equipment bonding jumper shall be permitted to connect two or more raceways or cables if the bonding jumper is **sized** in accordance with 250.122 for the **largest overcurrent device** supplying circuits therein.
This also means if several of the conduits in that group are in parallel fed by a single overcurrent device, the size of the largest overcurrent device feeding all of the paralleled conductors will determine the size of the bonding jumper for all conduits per 250.122. Please note that the requirement for sizing an equipment grounding or bonding for paralleled conductors will be per 250.122(F) where the equipment grounding conductor size for each set of paralleled conductors in separate conduits must be selected for the **largest overcurrent device** supplying the paralleled conductors.

Reference: 250.102(D), 250.122, 250.122(F) & 250.118 for raceway use as an equipment grounding conductor.

19. Article 695.3 seems to require a "reliable source of power" for an electric motor driven fire pump. What is a "reliable source of power"?
Tom Lichtenstein-

Answer: That is up to the AHJ to determine a reliable source of power. In the 2017 NEC, the informational note provides guidance on that and refers to : See Sections 9.3.2 and A.9.3.2 from NFPA
20-2013, Standard for the Installation of Stationary Pumps for Fire Protection, for guidance on the determination of power source reliability.
Here is a short summary of some of those things to be considered. See NFPA 20 for the specifics.
A.9.3.2 A reliable power source possesses the following characteristics:
(1) The source power plant has not experienced any shutdowns longer than 4 continuous hours in the year prior to plan submittal.
(2)Power outages have not routinely been experienced in the area of the protected facility caused by failures in generation or transmission .
(3) T he normal source of power is not supplied by overhead conductors outside the protected facility.
(4) Only the disconnect switches and overcurrent protection devices permitted by 9.2.3 are installed in the normal source of power. Power disconnection and activated overcurrent protection should only occur in the fire pump controller

20.1 need to add a plug across a room. Do I have to run my conduit above the drop ceiling, are can I just install it on the bottom of the ceiling grid?

Dan Radecki-

If there is a proper support for the wiring method it is not prohibited. But 300.11 states that cables and raceways shall not be supported by ceiling grids.

Code Panel:

Don Iverson- NEMA
George Little- Inspector, Past President, IAEI Michigan Chapter
Tony Tomasin- Inspector, Rochester Hills - NEC Code Panel #13
Tom Lichtenstein- Underwriters Laboratory
Dan Redecki- Inspector- Holland Twp, Treasurer IAEI, Michigan Chapter

Code Panel Chairperson:

Don Labrenz- Inspector, Osceola County

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