

**Michigan Chapter IAEI
Annual Meeting in Troy, Michigan
Code Panel Answers December 4th and 5th, 2008**

1. Where is AFCI protection required in an efficiency apartment?

Answer: NEC 210.12(B) (MRC 3802.12) require AFCI protection:

(B) Dwelling Unit Bedrooms All 120-volt, single phase, 15- and 20-ampere branch circuits supplying outlets installed in dwelling unit bedrooms shall be protected by a listed arc-fault circuit interrupter, combination type installed to provide protection of the branch circuit.

Neither the NEC or the MRC or the IBC have a definition of “Bedroom”, making this part of the Code difficult to comply in those situations where there may not be discrete “rooms for sleeping”

Loft apartments or studio apartments typically do not have bedrooms, but rather “sleeping areas”, determined only by where the bed happens to be placed. There may or may not be half- walls or room dividers, but no full walls or partitions.

There may be only platforms for sleeping.

In this case it appears to be judgment call, but if there is no “bedroom”, I think there is no requirement to comply.

2. Article 210-12(B) in the 2005 NEC (c) requires AFCI protection for circuits supplying outlets in bedrooms. I can not find a definition of a bedroom and am unsure how to apply the AFCI requirements to an efficiency apartment containing a bed and cooking facilities in the same room.

Answer: YES

Article 210.52 (B)(1) describes the use of the small appliance circuits :

Receptacle Outlets Served In the kitchen, pantry, breakfast room, dining room, or similar area of a dwelling unit, the two or more 20-ampere small-appliance branch circuits required by 210.11(C)(1) shall serve all wall and floor receptacle outlets covered by 210.52(A), all countertop outlets covered by 210.52(C), and receptacle outlets for refrigeration equipment.

210.52(B)(2) Prohibits the use for this purpose

No Other Outlets The two or more small-appliance branch circuits specified in 210.52(B)(1) shall have no other outlets.

3. I am building a 480/277 volt service. This building will have no neutral loads. Am I still required to supply an ungrounded conductor to the main service disconnects ? What about the feeders?

Answer: I am sure the question was to reference a grounded conductor to the service disconnect not an ungrounded conductor as listed in the question.

If the utility service feeding the building is a grounded system the grounded conductor is required to be brought to the service equipment 250.24(C) and (C)(1).

250.24(C) Grounded Conductor Brought to Service Equipment Where an ac system operating at less than 1000 volts is grounded at any point, the grounded conductor(s) shall be run to each service disconnecting means and shall be bonded

to each disconnecting means enclosure. The grounded conductor(s) shall be installed in accordance with 250.24(C)(1) through (C)(3).

250.24(C)(1) Routing and Sizing This conductor shall be routed with the phase conductors and shall not be smaller than the required grounding electrode conductor specified in Table 250.66 but shall not be required to be larger than the largest ungrounded service-entrance phase conductor. In addition, for service-entrance phase conductors larger than 1100 kcmil copper or 1750 kcmil aluminum, the grounded conductor shall not be smaller than 12 1/2 percent of the area of the largest service-entrance phase conductor. The grounded conductor of a 3-phase, 3-wire delta service shall have an ampacity not less than that of the ungrounded conductors.

For feeder installations the code does not require you to route a grounded conductor if it is not required.

4. Are energy management and communication cables (CL 2 cable) required to be plenum rated when installed inside a listed, nonmetallic, plenum-rated signaling raceway in the space over a return-air (plenum) ceiling?

Answer: Yes, 2005 NEC 725.61(A) that states: Cables installed in ducts, plenums, and other spaces used for environmental air shall be Type CL2P or CL3P. Listed wires and cables installed in compliance with 300.22 shall be permitted. Listed plenum signaling raceways shall be permitted to be installed in other spaces used for environmental air as described in 300.22(C). Only Type CL2P or CL3P cable shall be permitted to be installed in these raceways.

UL Lists these raceways under the product category OPTICAL FIBER/COMMUNICATIONS/SIGNALING/COAXIAL Cable (QAZM) located on page 254 of the 2008 White Book. The Guide Information states A raceway marked "Plenum" is suitable for use in ducts, plenums or other spaces used for environmental air in accordance with the NEC when used to enclose optical fiber cable marked "OFNP" or "OFCP", communications cable marked "CMP" or "CMP-OF," signaling cable marked "CL2P" or "CL3P," and coaxial cable marked "CATVP". So this would also be a NEC 110.3(B) issue.

5. Does Section 210.8(A) (7) apply to receptacles in dedicated spaces, such as the laundry receptacle if it's behind the clothes washer or dryer?

Answer: Yes, Any 125 volt, 15 and 20amp receptacles installed within 6ft of a wet bar, laundry or utility sink is required to be GFCI protected.

6. I have a range hood only over my range with a 1/3-horse power motor. I am aware that I cannot share this load with the small appliance branch circuits. May I share this range hood appliance load with a 15-amp general lighting branch circuit serving the living room?

Answer: Yes, per 210.52(B) (1)

This section requires the required 20 ampere small appliance circuits supply power for the required receptacles in the kitchen. both wall and countertops. There is no prohibition on using general lighting branch circuits for these types of loads

7. Is an aluminum grounding electrode conductor permitted to be encased in concrete to a concrete encased electrode at the bottom of a footing in a building? The conductor is insulated and does not touch the earth where it is connected to the reinforcement steel.

Answer: Section 250.52(A)(3) explains that a concrete encased electrode consists of at least 20 feet of rebar ½" or greater installed near the bottom of the footings or foundation. It also references a copper conductor not smaller than 4 AWG at least 20 feet long is also permitted to be a concrete encased electrode.

Section 250.66(B) The portion connected to the concrete encased electrode does not have to be larger than a 4 AWG copper conductor.

Section 250.64(A) States:

(A) Aluminum or Copper-Clad Aluminum Conductors. Bare aluminum or copper-clad aluminum grounding conductors shall not be used where in direct contact with masonry or the earth or where subject to corrosive conditions. Where used outside, aluminum or copper-clad aluminum grounding conductors shall not be terminated within 450 mm (18 in.) of the earth.

The answer is no Section 250.64(A).

8. Does the NEC permit Type MC and/or Type AC cable to be installed in a raceway? If so, are the support and securing requirements omitted since the cable would be within the raceway? What types of fittings are available to effectively ground the cable armor?

Answer: 2005 NEC 330.10(A)(7) in Uses permitted for MC cable, specifically permits MC cable in any raceway, while Article 320 for Armored cable is silent on the issue, both uses permitted and not permitted, so I would say unless the article for the raceway specifically prohibits it. However, 300.10 requires the cable armor to be electrically continuous and metallically connected between boxes and 300.12 requires the cable armor to be mechanically continuous between boxes. To my knowledge there is no fitting that will connect to the armor and provide the bonding and grounding connection while the cable is installed inside another raceway. In addition you would also have supporting issues in a vertical application and securing issues to the box.

9. Can the legally required emergency stand-by generator with a single transfer switch supply non required loads such as food freezers, computer outlets and gas furnace controls or is this emergency generator limited to only such things as artificial illumination for safe exiting of a building?

Answer: Yes- 701.6 You must have second transfer switch.

10. When using the exception for an individual 15 ampere branch circuit for refrigeration equipment in a dwelling unit kitchen, can this 15 ampere branch circuit supply other refrigeration equipment such as a wet bar regenerator in the living room.

Answer: NO 210.52(B) EX 2:

Exception No. 2: The receptacle outlet for refrigeration equipment shall be permitted to be supplied from an individual branch circuit rated 15 amperes or greater.

Per Article 100, Branch Circuit, Individual. A branch circuit that supplies only one utilization equipment.

11. Is the crawl space of a pier-and-beam dwelling unit considered to be a damp or dry location? If this is a damp location, can Type NM cable be used in this crawl space?

Answer: Location, Damp. Locations protected from weather and not subject to saturation with water or other liquids but subject to moderate degrees of moisture. Examples of such locations include partially protected locations under canopies, marquees, roofed open porches, and like locations, and interior locations subject to moderate degrees of moisture, such as some basements, some barns, and some cold-storage warehouses.

If this is a damp location, can Type NM cable be used in this crawl space?

Section 334.10(A)(1) states that NM Cable is permitted

334.10(1) For both exposed and concealed work in normally dry locations except as prohibited in 334.10(3)

Remember that with the change in the code the uses permitted .10 section is not an all inclusive list and the .12 uses not permitted is an all inclusive list.

The 2005 NEC states in the 334.12(B)(4)

Where exposed or subject to excessive moisture or dampness.

The wording is changed in the 2008 NEC to: In wet or damp locations.

This is a judgment call for the AHJ to make.

12. If equipment for a commercial kitchen comes with a cord that has a 15-amp, 120 volt three wire twist lock connector, does it need to be GFCI protected?

Answer: Yes, NEC 210.8(B)(2) requires GFCI protection for 125V, 15 and 20A receptacles in commercial kitchens with no exception for twist lock plugs and receptacles.

13. In a typical computer room, under a raised floor, do the electrical branch circuits (such as liquidtight flexible metal conduit) need to be secured to the concrete floor?

Answer: If you look at Art: 645.5(D)(2) talks about field wired equipment shall be installed in accordance with the requirements of 300.11.

14. A contractor installed conduit below the slab in a commercial garage. If he runs the conduit up the walls beyond the 450 mm (18 in.), does he have to install seal-offs? The garage floor tapers to a drain in the center of the floor. Is the lowest elevation of the floor used for the 450 mm (18 in.) height rule or is it measured at the walls?

Answer: NO In the 2002 and previous editions of the Code, raceways installed under the Class I, Division 2 areas of a commercial garage were considered to be in that classified location if the raceway penetrated through the slab or floor and extended into the classified location, even if the extension passed unbroken (without any fittings less than 12 in. from the boundary) through the classified location and into an unclassified location. This below-floor classification is no longer required based on the substantiation that there is typically a very low volume of air in the underground locations and the air-fuel mixture is below the lower flammable limit (LFL), in other words, too lean to burn or ignite.

(4) Class I, Division 1 Boundary In each conduit run leaving a Class I, Division 1 location. The sealing fitting shall be permitted on either side of the boundary of such

location within 3.05 m (10 ft) of the boundary and shall be designed and installed so as to minimize the amount of gas or vapor within the Division 1 portion of the conduit from being communicated to the conduit beyond the seal. Except for listed explosionproof reducers at the conduit seal, there shall be no union, coupling, box, or fitting between the conduit seal and the point at which the conduit leaves the Division 1 location.

Exception No. 1: Metal conduit that contains no unions, couplings, boxes, or fittings, and passes completely through a Class I, Division 1 location with no fittings less than 300 mm (12 in.) beyond each boundary, shall not require a conduit seal if the termination points of the unbroken conduit are in unclassified locations.

On the drain...YES 511.3 calls for the 18" dimension on the wall

15. What is the correct method for making taps to the grounding electrode conductor when applying the requirements of Section 250.64(D)? This Section seems silent as to the tap method to be used, if I'm making taps to a grounding electrode conductor for something such as multiple separately derived systems, would this require irreversible compression connectors or exothermic welds.

Answer: The 2005 NEC does not specify how that connection had to be made. The 2008 NEC does and it has been clarified in 250.64(D)(1) to say:

The tap conductors shall be connected to the common grounding electrode conductor by exothermic welding or with connectors listed as grounding and bonding equipment in such a manner that the common grounding electrode conductor remains without a splice or joint.

The irreversible compression connectors or exothermic welds that were required for a common grounding electrode tap conductor were removed in the 2005 NEC.

In the 2002 code it required it for a separately derived system and not for a service, which didn't make sense and now they are the same and permit a listed connector for this connection.

16. Can a medium base screw-in fluorescent bulb replace an incandescent bulb in a keyless luminaire for a clothes closet and count as a fluorescent fixture for the 150 mm (6 in.) clearance to a shelf?

Answer: No, a keyless luminaire in a closet is not a luminaire it is a lamp holder and does not meet the requirements of a fluorescent luminaire in accordance with 410.8 (B). The screw in fluorescent bulbs are Listed as Self-Ballasted Lamp adapters under the category Code of OOLR on page 232 in the 2008 White Book.

17. Does communication wiring installed in a residence have to meet the same requirements as Type NM cable regarding notched or drilled holes plate protection and installations for protection from nails or screws?

Answer: Yes-Art 800.24(Mechanical Execution of work) It talks about, it shall be installed in neat workman like manner. The last sentence "it shall also conform with Art 300.4(D) and 300.11 (Wiring Methods).

18. A 15 or 20 ampere, 125-volt receptacle is required within 7.5 m (25 ft) of all HVAC equipment. If a receptacle is installed in a crawl space, within 7.5 m (25 ft) of an attic

fan-coil unit, is that receptacle permitted to also serve the outside air conditioner unit, if it is within the 7.5 m (25 ft) limit, or does an additional receptacle have to be provided on the outside of the building?

Answer: NO 210.63 requires the receptacle at an “accessible location A 125-volt, single-phase, 15- or 20-ampere-rated receptacle outlet shall be installed at an accessible location for the servicing of heating, air-conditioning, and refrigeration equipment. The receptacle shall be located on the same level and within 7.5 m (25 ft) of the heating, air-conditioning, and refrigeration equipment. The receptacle outlet shall not be connected to the load side of the equipment disconnecting means.

19. Can I use Type UF cable in PVC conduit to feed an outdoor hot tub?

Answer: No, 680.40 **General. Electrical installations at spas and hot tubs shall comply with the provisions of Part I and Part IV of this article.**

680.21 Motors (A)(1) General The branch circuits for pool-associated motors shall be installed in rigid metal conduit, intermediate metal conduit, rigid nonmetallic conduit, or Type MC cable listed for the location. Other wiring methods and materials shall be permitted in specific locations or applications as covered in this section. Any wiring method employed shall contain an insulated copper equipment grounding conductor sized in accordance with 250.122 but not smaller than 12 AWG.

680.21(A)(2) On or Within Buildings Where installed on or within buildings, electrical metallic tubing shall be permitted.

680.42 Outdoor Installations. A spa or hot tub installed outdoors shall comply with the provisions of Parts I and II of this article, except as permitted in 680.42(A) and 680.42(B), that would otherwise apply to pools installed outdoors.

680.42(C) Interior Wiring to Outdoor Installations In the interior of a one-family dwelling or in the interior of another building or structure associated with a one-family dwelling, any of the wiring methods recognized in Chapter 3 of this Code that contain a copper equipment grounding conductor that is insulated or enclosed within the outer sheath of the wiring method and not smaller than 12 AWG shall be permitted to be used for the connection to motor, heating, and control loads that are part of a self-contained spa or hot tub or a packaged spa or hot tub equipment assembly. Wiring to an underwater light shall comply with 680.23 or 680.33.

The table E4102.1 in the MRC has a row for outdoor hot tubs with and one without luminaires.

Packaged or self-contained outdoor spas and hot tubs with underwater luminaire: from branch circuit to spa or hot tub. Does not allow UF cable.

Packaged or self-contained outdoor spas and hot tubs without underwater luminaire: from branch circuit to spa or hot tub. Does allow UF cable limited to use within buildings.

20. In a residential occupancy where a lighting system of 30 volts or less is installed, is it permissible to use 12 AWG, two-conductor Type TC cable assembly concealed within the walls from the transformer to the luminaire (light fixture)?

Answer: NO, NEC 336.12(2) under uses not permitted states that TC cable should not be installed outside a raceway or cable tray system, except as permitted in 336.10(7). 336.10(7) addresses industrial installations under specific conditions.

21. From time to time, I have seen cement dyed red being placed over buried electrical lines. Obviously this is a warning to future diggers that electrical lines are nearby. Is this an NEC requirement or just an industry practice? If it is in the code where can I find it?

Answer: In Art 300.5(D)(3) it refers to service conductors. **Underground Service conductors that are not encased in concrete and that are buried (18 inches) or more below grade shall have their location identified by a Warning ribbon that is placed in the trench at least (12 inches) above the Underground installation.**

22. Are 3-wire dryer cords and receptacles allowed as the disconnecting means for electric water heater when the cord is sized properly for the load?

Answer: NO Article 422.33 would permit this practice generally, but 110.(3) (B) must also be considered. The UL White book does not currently list any water tanks available as cord and plug connected

23. When two separate circuits are run into a two-gang box such as for a switch for a kitchen sink luminaire (light fixture) and a kitchen countertop receptacle outlet, do both circuit equipment grounding conductors need to be commonly tied together or just the equipment grounding conductors of each circuit?

Answer: All equipment grounding conductors entering a box need to be connected together even if from different circuits.

250.148 Continuity and Attachment of Equipment Grounding Conductors to Boxes Where circuit conductors are spliced within a box, or terminated on equipment within or supported by a box, any equipment grounding conductor(s) associated with those circuit conductors shall be spliced or joined within the box or to the box with devices suitable for the use in accordance with 250.148(A) through (E).

24. An inspector had me remove a screw in a lug that came installed on a pump for a pool and replace the screw with a stainless steel screw. He said the screw had to be stainless steel or brass per code. What exactly does the code require for these screws to be made of?

Answer: The Code in article 680 is silent on the screws in connectors and if the swimming pool pump was Listed by changing the screw you have modified a Listed product and we no longer know if the pump still complies with the Listing Requirements unless the product is re evaluated by UL.

25. An in-ground sewer grinder container has a sealed junction box with compression type cord connectors for the motor and float cables. From the j-box to the outside hub is PVC conduit with a short plumbing (white) elbow. How is this approved and what constitutes which grinder stations require seal offs?

Answer: The grinder pumps for ordinary locations are permitted for Use in "Individual Residential Unit", then it must meet the applicable hazardous

location requirements as a Class 1, Div 1, group D, or Class 1, Div 2 Group D if proper mechanical ventilation is provided. Typical Class 1, Div 1 applications include explosion proof pump motors, Non-sparking rails to raise and lower pumps, UL 698-A control panels That include IS relays that power control circuits for the float switches.

26. When spacing the wall receptacles in a dwelling unit, is the wall space located behind the door counted as wall space or do we start our measurement at where the door stops against the wall when open?

Answer: Yes, the space behind an open door is considered part of the wall space. Art 210.52(A) (2) (1) describes wall space as “Any space 600mm (2ft) or more in width(including space measured around corners and unbroken along the floor line by door ways fire places and similar openings”

27. An underground feeder installed in rigid nonmetallic conduit penetrates a floor slab and enters a metal pull box. The conductors pass through this box into grounded EMT conduit. Does the NEC require the circuit equipment-grounding conductor to be bonded to the metal box or is it bonded by the grounded EMT conduit connection?

Answer: If the equipment grounding conductor is spliced within that box it is required to be bonded to that enclosure, otherwise the metal raceway is permitted to be the equipment grounding conductor.

250.148 Continuity and Attachment of Equipment Grounding Conductors to Boxes Where circuit conductors are spliced within a box, or terminated on equipment within or supported by a box, any equipment grounding conductor(s) associated with those circuit conductors shall be spliced or joined within the box or to the box with devices suitable for the use in accordance with 250.148(A) through (E).

28. Article 210-63 provides the requirement for a receptacle for servicing heating, air conditioning and refrigeration equipment within 25 ft of the equipment. There is an exception for evaporative coolers at one and two family dwellings. What is an evaporative cooler ?

Answer: Evaporative coolers also called swamp coolers are used in dry arid climates such as Arizona and rely on evaporation of water to condition the air instead of refrigeration to cool. Basically the only electrical parts are a blower and a recirculation pump, there is no need for vacuum pumps and the like for serving that would require a receptacle there for servicing.

29. What is the reason for requiring abandoned fire alarm and communication cables to be removed above a removable grid ceiling?

Answer: Abandoned cables increases fire loading unnecessarily, and, where installed in plenums, it can affect airflow.

30. Is all of the metal gas piping in a residence considered bonded by the fact that the piping is connected to a gas appliance (water heater, etc.) that is grounded by an equipment grounding conductor of the appliance branch circuit?

Answer: Yes, if it sized based on the circuit that is likely to energize the piping.
Section 250.104(B) Reads as follows:

(B) Other Metal Piping Where installed in or attached to a building or structure, metal piping system(s), including gas piping, that is likely to become energized shall be bonded to the service equipment enclosure, the grounded conductor at the service, the grounding electrode conductor where of sufficient size, or to the one or more grounding electrodes used. The bonding jumper(s) shall be sized in accordance with 250.122, using the rating of the circuit that is likely to energize the piping system(s). The equipment grounding conductor for the circuit that is likely to energize the piping shall be permitted to serve as the bonding means. The points of attachment of the bonding jumper(s) shall be accessible.

**Annual Meeting in Troy, Michigan
Code Panel Questions December 4th and 5th, 2008**

Phil Clark	(1,2,6,10,14,18,22,26)
David Williams	(3,7,11,15,19,23,27,30)
Tom Lichtenstein	(4,8,12,16,20,24,28)
Don Iverson	(5,9,13,17,21,25,29)

Don LaBrenz, Moderator