

**Michigan Chapter IAEI
Summer Meeting in Thompsonville, Michigan
Code Panel Questions June 18th and 19th, 2009**

1. May MC Cable be installed in PVC buried under a concrete slab?

Answer: 330.10 Uses Permitted.

(A) General Uses. Type MC cable shall be permitted as follows:

- (1) For services, feeders, and branch circuits
- (2) For power, lighting, control, and signal circuits
- (3) Indoors or outdoors
- (4) Exposed or concealed
- (5) To be direct buried where identified for such use
- (6) In cable tray where identified for such use
- (7) In any raceway
- (8) As aerial cable on a messenger
- (9) In hazardous (classified) locations as permitted
- (10) In dry locations and embedded in plaster finish on brick or other masonry except in damp or wet locations
- (11) In wet locations where any of the following conditions are met:
 - a. The metallic covering is impervious to moisture.
 - b. A lead sheath or moisture-impervious jacket is provided under the metal covering.
 - c. The insulated conductors under the metallic covering are listed for use in wet locations and a corrosion-resistant jacket is provided over the metallic sheath.

AFC Cable Company produces a MC cable that has a PVC jacket over the metal sheath and is rated to be installed in wet locations.

2. Can a split-bolt be used to connect the grounding electrode to a concrete encased re-bar?

Answer: The 2009 UL White Book lists them in category Grounding and Bonding Equipment (KDER) Page 194-195. "Ground clamps and other connectors suitable for use where buried in earth or embedded in concrete are marked for such use. The marking may be abbreviated "DB" for Direct Burial".

"Ground clamps intended for use with re-bar are marked with the size of re-bar with which the clamp is intended".

Yes, Burndy makes a "KS" split-bolt that is rated to be used for direct burial and concrete encasement and for the connection to a rebar.

3. How do I know if a recessed luminaire can be installed in an hourly fire-rated assembly?

Answer: A hole cut in a fire rated assembly, such as for a recessed luminaire, may compromise the fire rating of the ceiling.

There are two ways recessed luminaires may be used in fire rated ceiling assemblies:

1. When the UL Classified fire rated ceiling assembly may incorporate ordinary Listed fluorescent or incandescent recessed luminaires as part of the design, the fire rated ceiling assembly specifies fire resistance protection to be provided for the luminaire, such as tenting or boxing and luminaire spacing limitations, to maintain the hourly fire rating of the ceiling. You have to follow the fire rated ceiling assembly design. UL Fire resistive designs can be found in the UL Fire Resistance Directory, Volume one under the Category Code (BXUV) or be seen on UL's Online Certification Directory at www.ul.com/database.

2. Fluorescent and incandescent recessed luminaires that have been classified for use in UL Classified Fire Resistive Ceiling Designs have the fire resistance protection built into the luminaire to maintain the fire resistance rating of the floor/ceiling or roof/ceiling assemblies. These luminaires are classified under the category of Luminaires Classified for Fire Resistance (IFDL), located on page 164 of the 2009 White Book. The category also appears under (CDHW) located on page 84 of the 2009 UL White Book. The luminaires are marked with the Underwriters Laboratories Classification Mark and the UL Fire Resistive Design Numbers that they were classified.

4. Are Type NM cables allowed to be routed through a 2 inch PVC stub out of the top of a panel surface mounted on a wall to an attic?

Answer: No, the raceway cannot penetrate a structural ceiling. 312.5(C) Exception, E3807.8 Exception

5. Can any part of the allowed 1.8 m (6 ft) length of Type MC cable that is unsupported, touch, lie on, or otherwise come in contact with the suspended ceiling grid or lift out panels?

Answer: Probably not. The important part is whether or not the placement of the cable would "inhibit access" and there are several Code sections related to this:

Article 330.30 (D)(2)

Unsupported Cables

Type MC cable shall be permitted to be unsupported where the cable:

- 2) Is not more than 1.8m (6 ft) length from the last point of cable support to the point of connection to a luminaire (lighting fixture) or other piece of electrical equipment and the cable and the point of connection are within an accessible ceiling..."

Also

Article 300.4 (C) Cables Through Spaces Behind Panels Designed to Allow Access
Cables or raceway-type wiring methods, installed behind panels designed to allow access, shall be supported according to their applicable articles

300.11 (A)

Secured in Place

"Raceways, cable assemblies, boxes, cabinets and fittings shall be securely fastened in place...."

300.23 Panels Designed To Allow Access

Cables raceways and equipment installed behind panels designed to allow access, including suspended ceiling panels, shall be arranged and secured so as to Allow the removal of panels and access to the equipment

6. How do you define what the cross-sectional area is of a panelboard?

Answer: To find the Cross Sectional area find the width times the dept equals the CSA. There is no definition for cross sectional area in the code. It is a calculated area of an object.

7. I am getting ready to wire a number of roof top units. The disconnects are on the ends of the units, however the enclosures where the control relays and motor starters are located only have about 18 inches clearance to work on the equipment. Isn't this a violation of the clearance requirements?

Answer: 110.26 Spaces About Electrical Equipment.

Sufficient access and working space shall be provided and maintained about all electrical equipment to permit ready and safe operation and maintenance of such equipment.

(A) Working Space. Working space for equipment operating at 600 volts, nominal, or less to ground and likely to require examination, adjustment, servicing, or maintenance while energized shall comply with the dimensions of 110.26(A)(1), (A)(2), and (A)(3) or as required or permitted elsewhere in this Code.

8. Do the requirements of 300.11 for "independent support" apply to data and communication cables when installed above a suspended ceiling? These cables don't weigh anything, and to require contractors to install separate wires for a few telephone cables seems a bit excessive

Answer: *300.11 Securing and Supporting. (A) Secured in Place. Raceways, cable assemblies, boxes, cabinets, and fittings shall be securely fastened in place. Support wires that do not provide secure support shall not be permitted as the sole support. Support wires and associated fittings that provide secure support and that are installed in addition to the ceiling grid support wires shall be permitted as the sole support. Where independent support wires are used, they shall be secured at both ends. Cables and raceways shall not be supported by ceiling grids.*

Section 800.24 for Communication Circuits, 820.24 Community Antenna Television and Radio Distribution Systems, 830.24 for Network-Powered Broadband Communications Systems.

800.24 Mechanical Execution of Work. Communications circuits and equipment shall be installed in a neat and workmanlike manner. Cables installed exposed on the surface of ceilings and sidewalls shall be supported by the building structure in such a manner that the cable will not be damaged by normal building use. Such cables shall be secured by hardware, including straps, staples, cable ties, hangers, or similar fittings designed and installed so as not to damage the cable. The installation shall also conform to 300.4(D) and 300.11.

Section 800.24 provides definitive requirements for workmanship. Cable must be attached to or supported by the structure by cable ties, straps, clamps, hangers, and the like. The installation method must not damage the cable. In addition, the location of the cable must be carefully evaluated to ensure that activities and processes within the building do not damage the cable. Although this requirement does not contain specific supporting and securing intervals, it does reference 300.11 as a general rule on securing equipment and cables.

9. The plumbers installed a small water heater above the lay-in ceiling in the bathrooms of a strip mall. The heaters are UL listed and are cord connected. Can they be plugged in above the ceiling?

Answer: No, Section 400.8(5) prohibits cords where concealed by a dropped ceiling.

10. There is a stairway up to a 12' x 12' loft area and a guardrail along the edge of the room leading to another room. Would the space along the guardrail be considered wall space of that room or a hallway leading to the other room?

Answer: If the 12'x12' area is considered to be a room, receptacles would be required to be spaced according to code, guard rails are to be considered wall space according to the code. 210.52(A)(1) and (2). E3801.2, E3801.2.2

11. I am roughing in a new office building and have placed the receptacles 12 inches off the floor. The inspector stopped by and told me that the receptacle outlets were too low. I can't find that in the code anywhere. What is he talking about?

Answer: I could find *NOTHING* in Article 210 or in Article 406 which would dictate mounting height for receptacles in an office building. There are restrictions on receptacle mounting height in Class I locations in Article 501, and in barrier-free construction, but that's all

12. What is the voltage limitation that can be applied to a network-powered broadband communications systems conductor?

Answer: 830.15 Power Limitations and Table 830.15 Low = 0-100 volts Medium = 0-150 volts

13. 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. 800.24 Mechanical Execution of Work.

Communications circuits and equipment shall be installed in a neat and workmanlike manner. Cables installed exposed on the surface of ceilings and sidewalls shall be supported by the building structure in such a manner that the cable will not be damaged by normal building use. Such cables shall be secured by hardware, including straps, staples, cable ties, hangers, or similar fittings designed and installed so as not to damage the cable. The installation shall also conform to 300.4(D) and 300.11.

14. Is each pedestal (containing a 30 and 20-ampere receptacle) in a RV facility required to have a ground rod installed? Are these pedestals classified as structures?

Answer: Ground rods are required, the pedestals are considered as structures. After a majority of disagreements an email from Jeff Sargent, NFPA confirmed with code panel documentation that these are considered as structures as defined by the code and ground rods are required

551.75 Grounding. All electrical equipment and installations in recreational vehicle parks shall be grounded as required by Article 250.

551.76 Grounding — Recreational Vehicle Site Supply Equipment.(A) Exposed Non-Current-Carrying Metal Parts. Exposed non-current-carrying metal parts of fixed equipment, metal boxes, cabinets, and fittings that are not electrically connected to grounded equipment shall be grounded by an equipment grounding conductor run with the circuit conductors from the service equipment or from the transformer of a secondary distribution system. Equipment grounding conductors shall be sized in accordance with 250.122 and shall be permitted to be spliced by listed means.

The arrangement of equipment grounding connections shall be such that the disconnection or removal of a receptacle or other device will not interfere with, or interrupt, the grounding continuity.

(B) Secondary Distribution System. Each secondary distribution system shall be grounded at

the transformer.

(C) Grounded Conductor Not to Be Used as an Equipment Ground. The grounded conductor shall not be used as an equipment grounding conductor for recreational vehicles or equipment within the recreational vehicle park.

(D) No Connection on the Load Side. No connection to a grounding electrode shall be made to the grounded conductor on the load side of the service disconnecting means except as covered in 250.30(A) for separately derived systems, and 250.32(B) Exception for separate buildings.

Structure. That which is built or constructed.

250.32 Buildings or Structures Supplied by Feeder(s) or Branch Circuit(s)(A) Grounding Electrode Building(s) or structure(s) supplied by feeder(s) or branch circuit(s) shall have a grounding electrode or grounding electrode system installed in accordance with 250.50. The grounding electrode conductor(s) shall be connected in accordance with 250.32(B) or (C). Where there is no existing grounding electrode, the grounding electrode(s) required in 250.50 shall be installed.

15. I found a sign with the listing inside the sign and not on the outside. Is this ok to approve this way?

Answer: Signs are Listed under the Category of Signs (UXYT) located on page 365 in the 2009 UL White Book. Listing marks are supposed be placed on the signs where visible after installation, which usually means on the outside of the sign. I would suggest filing a Product Incident Report (formerly called Field Report) on this sign. You can access that link by going to www.ul.com/regulators and click on the AHJ Product Incident Report form on the left side of the screen.

16. Can a dishwasher be direct-wired with nonmetallic cable (romex)? Is an additional disconnect required?

Answer: Yes, to part one and yes to part two unless the unit has a switch that has a marked off position and disconnects all ungrounded conductors. 334.10, 422.34

17. Can I use the light on a cord and plug connected garage door opener to satisfy the requirements in 210.70 for a light, the class two controller by the door has a switch to turn the light on and off?

Answer: No, the Code calls for a switch-controlled outlet in a detached garage with power, and a light integral to a garage door opener would not meet the definition.

Art 210. 70 (A) (2)

Additional Locations Additional lighting outlets shall be installed in accordance with (A)(2)(a), (A)(2)(b), and (A)(2)(c).

- (a) At least one wall switch-controlled lighting outlet shall be installed in hallways, stairways, attached garages, and detached garages with electric power.

Article 100 defines lighting outlet: an outlet intended for the direct connection of a lampholder, a luminaire, or a pendant cord terminating in a lampholder

So, the “plug-in” light source could not be accepted as the required lighting outlet because it is part of the utilization equipment, not part of the permanent wiring

18. At a local restaurant there are computer screens mounted on the ceiling in the kitchen at 7 feet with a 120-volt, 20-amp isolated ground receptacle with a twist lock. Would GFCI protection be required?

Answer: 210.8 Ground fault circuit interrupter protection for personnel (B) Other than dwelling units. (2) Commercial and institutional kitchens. Yes it would be required.

19. Can Allied type fiberglass boxes be used in cold air returns without being panned off?

Answer: 300.22 Wiring in Ducts, Plenums, and Other Air-Handling Spaces.

(2) Equipment. Electrical equipment with a metal enclosure, or with a nonmetallic enclosure listed for the use and having adequate fire-resistant and low-smoke-producing characteristics, and associated wiring material suitable for the ambient temperature shall be permitted to be installed in such other space unless prohibited elsewhere in this Code.

Electrical equipment with metal enclosures is allowed within spaces used for environmental air. However, nonmetallic enclosures must be specifically listed for this use.

20. Are grounding electrode conductors permitted to be paralleled? Could two No. 1/0 copper conductors be used in place of a 3/0 for the grounding electrode conductor of a service over 1100 kcmil?

Answer: We size the grounding electrode conductor based on 250.66

250.66 Size of Alternating-Current Grounding Electrode Conductor. The size of the grounding electrode conductor at the service, at each building or structure where supplied by a feeder(s) or branch circuit(s), or at a separately derived system of a grounded or ungrounded ac system shall not be less than given in Table 250.66, except as permitted in 250.66(A) through (C).

Section 310.4 Conductors in Parallel. (A) General. Aluminum, copper-clad aluminum, or copper conductors of size 1/0 AWG and larger, comprising each phase, polarity, neutral, or grounded circuit conductor shall be permitted to be connected in parallel (electrically joined at both ends).

Section 250.64 provides the Grounding Electrode Conductor (GEC) Installation requirements which allow you some options for installing the grounding electrode conductor. In 250.64(D) dealing with services with multiple enclosures the code allows you to run one conductor from each disconnect or make taps to a single grounding electrode conductor sized based on the accumulated sizes of the service conductors.

No, Section 250.63(D) and 310.4.

21. A local store removed a number of existing signs, sent them out to be refurbished and installed in a new location on the site. These signs do not have listing labels. Do the non-labeled signs need to be replaced or re-evaluated and relabeled?

Answer: NEC Section 600.3 requires signs to be Listed. Since these signs are not Listed they would need to be replaced with Listed signs or have them Field Evaluated. If you need a Field Evaluations you can contact UL's Customer Service at 877-854-3577, prompt #2.

22. Romex be installed in outdoor conduit? Does it comply with 334.10(A) when it is normally dry 95% of the time in most geographic locations?

Answer: Yes, in such a geographic location. Where that would be ????. No if the conduit is in a wet location, NM cable is listed for dry locations. Article 110.3, 334.10(A) *The 2008 Code specifically addresses this issue with Section 300.9 Interiors of raceways installed in wet locations above grade are considered to be a wet location. Conductors and cables shall comply with 310.8C (conductors must be listed for wet locations)*

23. A sprinkler pipe has been installed above the meter stack in an eight unit multifamily dwelling. There is a 100-Ampere breaker located beneath each meter. Does the pipe violate the dedicated equipment space requirement of NEC Section 110.26 (F)? What if there were no breakers in the meter stack?

Answer: Per Article 100, a switchboard is defined as:

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

The equipment as described would meet the definition of a switchboard, and so would fall under 110.26(F)

110.26

(F) Dedicated Equipment Space All switchboards, panelboards, distribution boards, and motor control centers shall be located in dedicated spaces and protected from damage. Exception: Control equipment that by its very nature or because of other rules of the Code must be adjacent to or within sight of its operating machinery shall be permitted in those locations.

(1) Indoor Indoor installations shall comply with 110.26(F)(1)(a) through (F)(1)(d).

(a) Dedicated Electrical Space. The space equal to the width and depth of the equipment and extending from the floor to a height of 1.8 m (6 ft) above the equipment or to the structural ceiling, whichever is lower, shall be dedicated to the electrical installation. No piping, ducts, leak protection apparatus, or other equipment foreign to the electrical installation shall be located in this zone.

Exception: Suspended ceilings with removable panels shall be permitted within the 1.8-m (6-ft) zone.

(b) Foreign Systems. The area above the dedicated space required by 110.26(F)(1)(a) shall be permitted to contain foreign systems, provided protection is installed to avoid damage to the electrical equipment from condensation, leaks, or breaks in such foreign systems.

In this case, to meet the requirements, if the sprinkler pipe is intended to provide protection for the room, it would be located OUTSIDE of the dedicated space (footprint of the equipment, extending to 6' above) If the sprinkler pipe does not serve the room, it would have to be either be outside of the dedicated space, or protected.

24. The 6-disconnect rule for services require that the disconnects be grouped. Is there any maximum distance between disconnects?

Answer: 230.71 maximum number of disconnects. Code doesn't state a distance between disconnects but they have to be grouped in any one location.

25. I used flexible metal conduit to connect to a sign outdoors in front of a shop and I'm being told I can't use flex outdoors. Is this correct? I'm using THWN wire, which is good for wet locations.

Answer: Yes-Under the 2005 NEC. Art.348.12(1) Uses not Permitted it states; In wet locations **unless** the conductors are approved for the specific conditions and the installation is such that liquid is not likely to enter raceways or enclosures to which the conduit is connected. Basically, this means that if the conductors are listed for wet locations then you can use it. **Until Michigan Adopts the 2008 NEC.**

26. Is the steel beam supporting the wooden floor joists in a residence required to be bonded?

Answer: No, *250.104(C) Structural Metal. Exposed structural metal that is interconnected to form a metal building frame and is not intentionally grounded and 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 the one or more grounding electrodes used.*

27. Can I use Type NM cable to connect recessed fluorescent fixtures in a suspended lay-in ceiling in a retail store? Section 334.30(B)(2) seems to permit this.

Answer: No, Section 334.12(A)(2) prohibits NC cable exposed in dropped or suspended ceilings in other than one and two family and multifamily dwellings. Because the ceiling is a lay in suspended ceiling it is considered exposed per the definition of exposed (as applied to wiring methods) in article 100, that is defined as "On or attached to the surface or behind panels designed to allow access."

28. Do field cut conduit threads for outdoor installations need any special coating applied to them?

Answer: Yes, 300.6(A) requires that where corrosion protection is necessary and the conduit is field threaded, the threads shall be protected with an approved electrically conductive, corrosion resistant coating.

29. When wiring an RV park where does it tell me I need to establish one service? Am I allowed to have multiple service locations and what would be the guidelines to use?

Answer: First, Article 551 is the controlling Code language for this application, per Scope

551.1 Scope

The provisions of this article cover the electrical conductors and equipment other than low-voltage and automotive vehicle circuits or extensions thereof, installed within or on recreational vehicles, the conductors that connect recreational vehicles to a supply of electricity, and the installation of equipment and devices related to electrical installations within a recreational vehicle park.

The article is silent on installation requirements for services other than this language : 551.73

(B) Transformers and Secondary Distribution Panelboards For the purpose of this Code, where the park service exceeds 240 volts, transformers and secondary distribution panelboards shall be treated as services.

In my opinion then, requirements for services, including permitted NUMBER of services would be covered by the general requirements contained in 230. 2

30. I am inspecting a doctor's office where they are planning to have a permanent generator. The plans show that the disconnect is integrated into the generator as allowed in Section 702.11. How does this affect the overcurrent coordination required in 701.18?

Answer: 702.2 definitions This is a optional standby system. Coordination is only required for legally required standby systems. Life safety does not depend on the performance of the optional standby system