

Michigan Chapter IAEI
Summer Meeting in Bay City, Michigan
Code Panel Questions June 30th, 2021

1. Is it required that 'reconditioned' equipment now be 'listed' or only marked?

Answer: In the 2020 NEC each CMP reviewed equipment in their respective articles to determine if equipment under their purview could be reconditioned. In some articles they identified equipment that could not be reconditioned such as molded case circuit breakers and in other sections in the Code they required reconditioned equipment to be Listed as reconditioned or field evaluated such as Switchboards and Switchgear in NEC 408.8. The requirements in NEC 110.21(A)(2) require Reconditioned equipment shall be marked with the name, trademark, or other descriptive marking by which the organization responsible for reconditioning the electrical equipment can be identified, along with the date of the reconditioning. Reconditioned equipment shall be identified as "reconditioned" and the original listing mark removed. Approval of the reconditioned equipment shall not be based solely on the equipment's original listing.

The only way to identify a piece of equipment has been Listed as reconditioned is if the UL Listing or Certification Mark identifies it as Listed rebuilt, reconditioned or remanufactured. For more information on Reconditioned equipment go to ul.com/inspectionresources and click on reconditioned equipment.

2. Is it permissible to install LFNC underground for a feeder raceway from one structure to another such as a house to a detached garage?

Answer: Yes, if the LFNC is listed and marked for direct burial. 356.10(4) Uses Permitted

3. Is it a permissible to hang a 10' stick of rigid conduit to a 4" square box that an exit sign is attached to without supporting the box at the exit sign?

Answer: Sorry, but that is not a compliant installation. 314.23 describes the minimum supports for boxes, enclosures, etc. 314.23(F) specifically addresses "raceway supported enclosures with devices, luminaires or lampholders. The basic rule is that the enclosure have a minimum of 2 conduit entries threaded into the enclosure or into threaded hubs. And be secured within 18" of the enclosure. Exception No. 2 gives some relief but with several conditions must be met, primarily that the conduit must be secured within 36" of the enclosure.

4. An electrical contractor installed 6 feeders without equipment grounds in PVC 20ft to from a service to a pull box in a lower level of a building. He wants to resolve this issue by installing one equipment ground outside the raceways from the service to the pull box. Is this code compliant?
5. I have a 4160V feeder supplying a 4160V/480V oil filled transformer that is being installed inside a building to supply a single fire pump, is the transformer permitted to be installed in the same room as the fire pump? What are the requirements for the room?

Answer: Yes, depending on the KVA of the transformer. First, take the general rule in Article 450 concerning oil-filled transformers:

450.26 Oil-Insulated Transformers Installed Indoors. Oil insulated transformers installed indoors shall be installed in a vault constructed as specified in Part III of this article. Exception: Where transformers are protected with automatic sprinkler, water spray, carbon dioxide, or halon, construction of 1-hour rating shall be permitted. Then, take the exception:

Exception No. 1: Where the total capacity does not exceed 112-1/2 kVA, the vault specified in Part III of this article shall be permitted to be constructed of reinforced concrete that is not less than 100 mm (4 in.) thick. Calculate the secondary amps of the 112-1/2 transformer = 134 amps

According to Article 430-250, This would be large enough for a 100hp motor, which is a pretty good size motor for a fire pump.

What about Article 695?

Article 695 does not require a separate "room" for installation of a fire pump. NFPA 20 specifies a suitable space for fire pump equipment. This space must be free from hazards that could impair the operation of the fire pump. Neither the NEC nor NFPA 20 mandates a dedicated room for the fire pump, only that the controller must be "within sight" of the equipment it drives.

The answer to this question then is that an oil-filled transformer at 4160/480, can be installed in a room as described in 450.26 Exception 1, and the fire pump can be installed in the same room.

6. Is a servicing disconnect required on the side of a furnace in a house, even if it is in the same room as the panel?

Answer: No, Table E4101.5 from the 2015 MRC and the 2017 NEC Art 422.31 however the MMC art 301.10.1 does require an electrical disconnect on or immediately adjacent to the equipment.

7. My local inspector says I can't use SER cable from the combination meter socket disconnect to the sub-panel?

Answer: I am going to assume that a "combination meter socket disconnect" would be a service disconnecting means and that the SER cable is a feeder. 338.10(B) covers the installation of SER cable as feeders and branch circuits. 338.10(B)(4)(a) covers the requirements for interior installations of SER cable for a feeder. This section requires that SER cable used as interior wiring comply with Part II of Article 334 excluding 334.80. So as long as it is installed in accordance with Article 338 and the applicable parts of Article 334 it should be good to go.

8. Does a walk way that overlooks a family room and is 25 feet long require a receptacle? It is open on both sides.

Answer: There is no definition or wording in the code for walkway, hallways/halls are mentioned. The code recognizes the space along railings as wall space. I would consider this a hallway and require a receptacle because it is over 10' in length. It does not have to be installed along the railing it, could be at either end where the railing starts. E3904.10/210.52(H)

9. What are the requirements for identifying the raceways and cables used for emergency wiring?

Answer: See 700.10(A) Emergency circuits shall be permanently marked so they will be readily identified as a component of an emergency circuit or system by the following methods:

- (1) All boxes and enclosures (including transfer switches, generators, and power panels) for emergency circuits shall be permanently marked so they will be readily identified as a component of an emergency circuit or system.
- (2) Where boxes or enclosures are not encountered, exposed cable or raceway systems shall be permanently marked to be identified as a component of an emergency circuit or system, at intervals not to exceed 7.6 m (25 ft).

There is no requirement in the code as to how this identification is to be accomplished. Labeling? Color code? Magic marker? Color coded steel raceways and cables are available.

10. A church undergoes a service change, the previous gear was rated at 800a and was replaced with the same size gear, and the personnel doors to the area do not comply with Article 110.26(C)(3), should the doors be updated to panic hardware and egress door swing?
11. If I have a switchboard/ panelboard or MCC and the label on the front says 480 volt 3 phase 4 wire, am I required to install a feeder with a grounded conductor to the switchboard/panelboard or MCC if I will not have any line to neutral loads supplied by the equipment?

Answer: If the switchboard/panelboard MCC is installed as SERVICE equipment, the answer is yes, per Article 250-184

A) Systems with a Grounded Conductor at the Service Point.

Where an ac system is grounded at any point and is provided with a grounded conductor at the service point, a grounded conductor(s) shall be installed and routed with the ungrounded conductors to each service disconnecting means and shall be connected to each disconnecting means grounded conductor(s) terminal or bus. A main bonding jumper shall connect the grounded conductor(s) to each service disconnecting means enclosure.

The grounded conductor(s) shall be installed in accordance with 250.186(A)(1) through (A)(4). The size of the solidly grounded circuit conductor(s) shall be the larger of that determined by 250.184 or 250.186(A)(1) or (A)(2).

Exception: Where two or more service disconnecting means are located in a single assembly listed for use as service equipment, it shall be permitted to connect the grounded conductor(s) to the assembly common grounded conductor(s) terminal or bus.

The assembly shall include a main bonding jumper for connecting the grounded conductor(s) to the assembly enclosure.

If the switchboard/panelboard/MCC is installed on the load side of the service disconnect, meaning fed by a feeder, there is no Code requirement for the installation of a grounded conductor if there are no line to neutral loads, but there may be a listing requirement on the specific equipment.

12. Can a receptacle behind a TV (below 5.5 feet) count for wall space above a work area/counter or is it considered not accessible?

Answer: Yes, As long as it meets the requirements of 210.52 in the 2017 NEC, there is no reference in the 2015 MRC.

210.52 Dwelling Unit Receptacle Outlets. This section provides requirements for 125-volt, 15- and 20-ampere receptacle outlets. The receptacles required by this section shall be in addition to any receptacle that is:

- (1) Part of a luminaire or appliance, or*
- (2) Controlled by a wall switch in accordance with 210.70(A)(1), Exception No. 1, or*
- (3) Located within cabinets or cupboards, or*
- (4) Located more than 1.7 m (5 1/2 ft) above the floor*

Permanently installed electric baseboard heaters equipped with factory-installed receptacle outlets or outlets provided as a separate assembly by the manufacturer shall be permitted as the required outlet or outlets for the wall space utilized by such permanently installed heaters. Such receptacle outlets shall not be connected to the heater circuits. Informational Note: Listed baseboard heaters include instructions that may not permit their installation below receptacle outlets.

(A) General Provisions. In every kitchen, family room, dining room, living room, parlor, library, den, sunroom, bedroom, recreation room, or similar room or area of dwelling units, receptacle outlets shall be installed in accordance with the general provisions specified in 210.52(A)(1) through (A)(4).

(1) Spacing. Receptacles shall be installed such that no point measured horizontally along the floor line of any wall space is more than 1.8 m (6 ft) from a receptacle outlet.

(2) Wall Space. As used in this section, a wall space shall include the following: (1) Any space 600 mm (2 ft) or more in width (including space measured around corners) and unbroken along the floor line by doorways and similar openings, fireplaces, and fixed cabinets that do not have countertops or similar work surfaces (2) The space occupied by fixed panels in walls, excluding sliding panels

(3) The space afforded by fixed room dividers, such as free-standing bar-type counters or railings (3) Floor Receptacles. Receptacle outlets in or on floors shall not be counted as part of the required number of receptacle outlets unless located within 450 mm (18 in.) of the wall.

(4) Countertop and Similar Work Surface Receptacle Outlets. Receptacles installed for countertop and similar work surfaces as specified in 210.52(C) shall not be considered as the receptacle outlets required by 210.52(A).

13. I was asked to bring power to a control box for a certain piece of equipment. The inspector told me it is not listed. I do see a UL mark on all the parts including the enclosure that they are in and that UL sticker reads “Industrial Panel Enclosure”. What is up with this?

Answer: It appears that the assembly is not Listed as an industrial control panel, it is only a Listed industrial control panel enclosure. Industrial control panels are Listed under the product category Industrial Control Panels (NITW) on UL Product iQ at UL.com/piq . The guide information for NITW states:

An enclosed industrial control panel is comprised of the enclosure, all components located within the enclosure, and all components mounted to the walls of the enclosure.

An open industrial control panel is comprised of a mounting sub-panel and all components mounted to the sub-panel, and is intended for installation into an enclosure in the field.

This category also covers industrial control panel enclosures. Industrial control panel enclosures are intended to house open-type industrial control panels or individual items of industrial control equipment installed in the field.

Under the UL Mark section states:

The "Enclosed Industrial Control Panel" Listing Mark covers both the enclosure and the provided panel. Open panels employ the "Open Industrial Control Panel" Listing Mark. The "Industrial Control Panel Enclosure" Listing Mark covers only the enclosure; the compatibility of the enclosure and the installed equipment and associated wiring has not been investigated unless an "Enclosed Industrial Control Panel" Listing Mark is also present.

14. When I am wiring a house that has been moved from one address to another address is it required to install tamper-resistant receptacles and install ground-fault protection?

Answer: If by wiring it is the installation of new circuits and outlets for receptacles and luminaires then yes, those new receptacles installed must meet the requirements for new installations as required by 80.9. and Appendix J of the MRC, section AJ501.5.1. To paraphrase those sections, newly installed electrical equipment shall meet the requirements of the code, MEC 80.9, MRC AJ501.5.1 also E4002.16 and 404.6(D) for replacement of receptacles.

15. 110.16 (B) requires a label on 1200 Amp or more service equipment. Where do I get the 'Clearing Time' information if the Utility doesn't have it?

Answer: The utility will generally not have this information. The clearing time refers to the service overcurrent protection, which is installed by the electrician. The clearing time should have been determined by the electrical engineer/designer before the equipment was even ordered. All manufacturers publish the clearing time curves of the breakers or fuses that they manufacture, and these can generally be found on-line or in printed materials from the manufacturer. The manufacturer will generally be able to answer this question with a quick phone call, but the available fault current must be known because the amount of fault current can affect how quickly the overcurrent device will operate.

16. Why are the bathroom, garage, and outside excluded from AFCI protection?

17. I was called to do a service change on an older apartment building. I have to move the panel about 10 feet to get my working clearances. Am I required to install AFCI breakers in this new panel?

Answer: Yes rules that apply.

NEC 210.12 Arc-Fault Circuit-Interrupter Protection. Arc-fault circuit-interrupter protection shall be provided as required in 210.12(A), (B), (C), and (D). The arc-fault circuit interrupter shall be installed in a readily accessible location.

(D) Branch Circuit Extensions or Modifications — Dwelling Units and Dormitory Units.

In any of the areas specified in 210.12(A) or (B), where branch-circuit wiring is modified, replaced, or extended, the branch circuit shall be protected by one of the following:

- (1) A listed combination-type AFCI located at the origin of the branch circuit
- (2) A listed outlet branch-circuit-type AFCI located at the first receptacle outlet of the existing branch circuit

Exception: AFCI protection shall not be required where the extension of the existing conductors is not more than 1.8 m (6 ft) and does not include any additional outlets or device

18. 410.36(B) requires luminaires installed in suspended ceilings to be attached to the ceiling members. Some jurisdictions require independent support wires instead. Are the wires allowed and/or required?

Answer: 2017 NEC Art 436.36 (B) does not require separate wires, the wires are allowed and if installed must be separate from the grid wires.

B) Suspended Ceilings. Framing members of suspended ceiling systems used to support luminaires shall be securely fastened to each other and shall be securely attached to the building structure at appropriate intervals. Luminaires shall be securely fastened to the ceiling framing member by mechanical means such as bolts, screws, or rivets. Listed clips identified for use with the type of ceiling framing member(s) and luminaire(s) shall also be permitted.

19. Separate structures require a grounding electrode. Since this conductor does not go to the grounded conductor is it legal to simply install a lug in the panel and use the panel as a conductor to the ground bar?

Answer: Section 250.32 (A) requires a grounding electrode system and grounding electrode conductor to be installed at building(s) or structure(s) supplied by a feeder(s) or branch circuit(s). 250.30(B)(1) covers grounded systems and requires an equipment grounding conductor, as described in 250.118, to be run with the supply conductors and be connected to the building or structure disconnecting means and to the grounding electrode(s). The cabinet or cutout box is not listed in 250.118 as a type of equipment grounding conductor so the grounding electrode conductor should terminate to the equipment grounding bus where the equipment grounding conductor is terminated.

20. Do the switches in a screen porch need a weatherproof cover? The inspector seems to think so.

Answer: The definition of damp location from E3501, or Article 100 is a location protected from weather and not subject to saturation with water or other liquids but subject to moderate degrees of moisture. If the inspector thinks that the area meets that definition then switches installed in a damp location require a weatherproof cover according to E4001.7/404(A) or (B). R104.1, 90.4

21. I installed a main disconnect on the outside of a single-family dwelling, but the UFER is stubbed up in the basement

Answer: 250.24(A)(1) The grounding electrode conductor to the concrete-encased electrode (UFER), like all available electrodes, must terminate in the main service disconnect. The grounding electrode conductor must be unspliced or spliced using non-reversible means and sized per Table 250.66. 250.24(A)(5) states that the GEC shall not be connected to normally non-current carrying parts of equipment, to equipment grounding conductors, or be reconnected to the ground on the load side of the service disconnecting means except as

otherwise permitted in this article. near the sub-panel location. Where do I connect the grounding electrode conductor from that UFER?

22. In the construction of a swimming pool, a connection between the building steel and the reinforcing rod in the pool casing is prohibited. Does it create a hazard if they are connected and the building steel and the reinforcing is common to each other?
23. Does a receptacle installed near the roof for snow melting and de-icing heat cables required to be GFCI protected?

Answer: Yes

Article 426 Fixed Outdoor Electric Deicing and Snow-Melting Equipment

426.28 Ground-Fault Protection of Equipment. Ground-fault protection of equipment shall be provided for fixed outdoor electric deicing and snow-melting equipment

This is indirect personnel protection. The GFCI protection is to limit the possibility of fire from low-level arcing.

The real protection for personnel comes from the Code limitation on the voltage level of the transformer secondary conductors.

426.32 Voltage Limitations. The secondary winding of the isolation transformer connected to the impedance heating elements shall not have an output voltage greater than 30 volts a

24. Is an individual branch circuit required for cord-connected range hood? If not, than what circuits can serve this range hood?

Answer: Yes, 2015 MRC E4101.3 and 2017 NEC 422.16.B.4.5

101.3 Flexible cords. Cord-and-plug-connected appliances shall use cords suitable for the environment and physical conditions likely to be encountered. Flexible cords shall be used only where the appliance is listed to be connected with a flexible cord. The cord shall be identified as suitable in the installation instructions of the appliance manufacturer. Receptacles for cord-and-plug-connected appliances shall be accessible and shall be located to avoid physical damage to the flexible cord. Except for a listed appliance marked to indicate that it is protected by a system of double-insulation, the flexible cord supplying an appliance shall terminate in a grounding-type attachment plug. A receptacle for a cord-and plug-connected range hood shall be supplied by an individual branch circuit. Specific appliances have additional requirements as specified in Table E4101.3 (see Section E3909). [422.16(B)(1), (B)(2)]

422.16 Flexible Cords

(B)

(4) Range Hoods. Range hoods shall be permitted to be cord-and-plug-connected with a flexible cord identified as suitable for use on range hoods in the installation instructions of the appliance manufacturer, where all of the following conditions are met:

(1) The flexible cord is terminated with a grounding-type attachment plug. Exception: A listed range hood distinctly marked to identify it as protected by a system of double insulation shall not be required to be terminated with a grounding-type attachment plug.

(2) The length of the cord is not less than 450 mm (18 in.) and not over 1.2 m (4 ft).

(3) Receptacles are located to protect against physical damage to the flexible cord.

(4) *The receptacle is accessible.*

(5) *The receptacle is supplied by an individual branch circuit.*

25. I am remodeling a building that an optometrist will be doing Laser Surgery for correcting vision among other services that they offer. My question is does the part of the building that will be part of the laser surgery need to meet the requirements of 517 of the NEC? I do not see where the optometrist needs to meet the requirement.

Answer: In the 2020 NEC, If the optometrist office was doing exclusively optometrist work without laser surgery I would say it would fall under NEC 517.10(B)(3) that would indicate Part II of Article 517 would not apply. However since they are doing laser surgery that meets the definition of invasive procedure and a patient care space and would then comply with NEC 517.10(A) and would apply to that patient care space.

26. Can the receptacle on the front porch that has 3 steps of a single family dwelling also be the receptacle for the front of the house?

27. I am using the tap rules allowed in NEC Article 240.21(B)(5). I am tapping off the load side of the 400 amp service disconnect with #2 CU cables that feed a 100 amp main breaker CB panel. When sizing the equipment grounding conductor, do I size it for a 400 amp breaker or can I size it for 100 amp breaker?

Answer: See the heading over the list of overcurrent devices in Table 250.122: The equipment grounding conductor for the tap must be sized based on the rating of the overcurrent device AHEAD of the of the equipment, conduit, etc. In this case the EGC would need to be 3 AWG copper or 1 AWG aluminum per the table. 250.122(A) states that the EGC does not need to be larger than the circuit conductors which in this example would likely be 3 AWG copper or 1 AWG AL, so the EGC will be the same size as the circuit conductors.

28. How often does the ground-fault protection for equipment need to be tested? 230.95(C) states when it is installed a performance testing is required but after that it is not clear when it needs to be tested after that.

Answer: Code requires that not less than one receptacle outlet that is *readily accessible from* grade level and located not more than 6 1/2' above grade shall be installed front and back of each dwelling unit having direct access to grade. The receptacle in question would comply with the code. E3901.7/210.52(E)(1).

29. A 200-amp circuit is increased from 3/0 copper to 500 kcmil copper to compensate for voltage drop. What size copper equipment grounding conductor would be required for this circuit?

Answer: **250.122 Size of Equipment Grounding Conductors**

(A) General. Copper, aluminum, or copper-clad aluminum equipment grounding conductors of the wire type shall not be smaller than shown in Table 250.122, but in no case shall they be required to be larger than the circuit conductors supplying the equipment. Where a cable tray, a raceway, or a cable armor or sheath is used as the equipment grounding conductor, as provided in 250.118 and 250.134(A), it shall comply with 250.4(A)(5) or (B)(4).

Equipment grounding conductors shall be permitted to be sectioned within a multiconductor cable, provided the combined circular mil area complies with Table 250.122.

(B) Increased in Size. Where ungrounded conductors are increased in size from the minimum size that has sufficient ampacity for the intended installation, wire-type equipment grounding conductors, where installed, shall be increased in size proportionately, according to the circular mil area of the ungrounded conductors.

According to Table 250.122, the proper size copper equipment grounding conductor for a 200 amp circuit is #6. CU. If we increase the size of the ungrounded conductors from 3/0 to 500 kcmil... that is about a 3x increase. 3/0 CU has a cmil of 167,800. 500 kcmil has 500,000.

30. Is it required to have a bonding bushing in a 208v disconnect when a reducing washer is used and all of the rings were not removed?

Answer: Yes,

UL Product IQ

UL Category QCRV

Metal reducing washers are considered suitable for grounding for use in circuits over and under 250V and where installed in accordance with ANSI/NFPA 70, "National Electrical Code," for raceways containing other than service conductors. Reducing washers are intended for use with metal enclosures having a minimum thickness of 0.053 in. Reducing washers may be installed in enclosures provided with concentric or eccentric knockouts, only after all of the concentric and eccentric rings have been removed. However, those enclosures containing concentric and eccentric knockouts that have been certified for bonding purposes may be used with reducing washers without all knockouts being removed.

31. In article 404.2.(C) where a grounded conductor is needed in a switch box, do you need a grounded conductor for each circuit in the box? If not, will the arc-fault device still work?

Answer: I would say you only need a grounded conductor for the controlled lighting circuit that will be controlled by the control device (e.g. motion sensor). The first sentence in 404.2(C) specifically states grounded conductor for the controlled light circuit. So in the event another circuit is running to or through the switch box, unless that other circuit is controlling lighting in that space, I say it's not required to have an additional grounded conductor just because it's run through or to that box.

404.2(C) Switches Controlling Lighting Loads.

The grounded circuit conductor for the controlled lighting circuit shall be installed at the location where switches control lighting loads that are supplied by a grounded general-purpose branch circuit serving....

Regarding the second question and whether an AFCI will work – it does require a grounded conductor (neutral) for an AFCI device (or circuit breaker) to work. However, 404.2(C) is not the section that requires a grounded conductor to supply the AFCI device. 404.2(C) only relates to switches.

32. In a home remodel, does an existing receptacle that is in the kitchen area need to be re-supplied in order to connect it to one of the small appliance branch circuits? The receptacle is not otherwise part of the remodel.

33. The design professional told us he wanted a lock on the main disconnect for a commercial building. We told him we couldn't do that because in case of an emergency, the disconnect could not be shut off. He is pretty sure it is alright. What do you say?

Answer: There is no prohibition about locking a main overcurrent device. The automatic functions of the device will be unaffected: overload, short-circuit, and ground fault. Emergency personnel will be able to cut the lock if necessary. This was discussed by CMP-10 when deliberating the residential outside disconnect rule.

34. Are the branch circuit conductors feeding an EV Charger, rated 80 Amps on the Nameplate, required to be full sized? Even though the installer/ owner can internally select a lesser ampacity charging output based on the vehicle charging requirements.

35. I have a contractor that places his floor boxes and conduit on top of vapor barrier for the slab on grade pour. He states this installation is not in contact with the earth and therefore is not defined as a wet location do you concur.

Answer: Per Article 100

Location, Damp. Locations protected from weather and not subject to saturation with water or other liquids but subject to moderate degrees of moisture. (CMP-1) Informational Note: 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.

Location, Dry. A location not normally subject to dampness or wetness. A location classified as dry may be temporarily subject to dampness or wetness, as in the case of a building under construction.

Location, Wet. Installations underground or in concrete slabs or masonry in direct contact with the earth; in locations subject to saturation with water or other liquids, such as vehicle washing areas; and in unprotected locations exposed to weather.

36. Does the coffee maker and the roller dog machines require GFCI protection on the serving counter of a convenience store?

Answer: No. 2017 NEC 210.8.B.2 Other than dwelling units.

2021 NEC will if the area has a sink.

Tom Lichtenstein	1	7	13	19	25	31
Dan Radecki	2	8	14	20	26	32
Joe Andre	3	9	15	21	27	33
Tim Mc Clintock	4	10	16	22	28	34
Phil Clark	5	11	17	23	29	35

Scott Weaver 6 12 18 24 30 36

The Code Panel Questions and Answers will be posted on the
Chapter Website when available following the meeting.

<http://IAEI-Michigan.org>