

**Michigan Chapter IAEI**  
**Summer Meeting in Bellaire, Michigan**  
**Code Panel Questions June 19<sup>th</sup> and 20<sup>th</sup>, 2008**

1. Why are we limited on the number of overcurrent protection devices on the supply side of a lighting and appliance branch circuit panel board to not more than two main circuit breakers or fuses?

**Answer:** (2005 NEC Reference: 404.36(A)) The purpose of this requirement is to protect the busing of the panelboard against overloading and the origination of this requirement can be traced back to the 1935 edition of the NEC. From 1935 to 1965 the general requirement was to provide individual overcurrent protection not greater than the rating of the panelboard if the supply circuit was greater than 200 amperes. In 1947 a rule was added requiring panelboards containing snap switches rated 30 amperes or less to be provided with overcurrent protection not exceeding 200 amperes. In the 1965 edition the provision for a panelboard to be protected by not more than two main circuit breakers or two sets of fuses was added to permit for “split bus” panelboard construction. This requirement became specific to what was referred to as a “lighting and appliance branch circuit panelboard” and the designation as to the type of panelboard application was based on total number of lighting and appliance branch circuit overcurrent protective devices installed in the panelboard. The 2008 NEC has been revised to require that all panelboards be protected by an overcurrent protective device having a rating not greater than that of the panelboard. There are still allowance for the two main approach or for a six overcurrent protective device installation where the panelboard is used as service equipment.

2. In the past, any splices in the grounding electrode conductor(s) had to be done by some type of irreversible splice. If you use the busbar connection point now allowed by Section 250.64(C), do these conductors have to be permanently attached to the busbar, or is bolting connectors acceptable? If bolted are acceptable, then can the connectors themselves be of the “set screw” type, or must they be compression type?

**Answer:** 2005: Section 250.64(C)(3) allows connections of grounding electrode conductors or bonding jumpers to be made with a “listed connector or by the exothermic welding process.” These connectors are permitted to be of the “ordinary” listed type [See “WIRE CONNECTORS AND SOLDERING LUGS (ZMVV) in the UL White Book] or listed as “grounding and bonding equipment [See (KDER) in the UL White Book.

Obviously, the wire connector must be suitable for the size and type of conductor material as well as for the material of the bus bar.

2008: Same answer. The provision has been moved to 250.64(F)(3).

3. A new repair garage is being built and the owner is not sure if he will be working on vehicles powered by CNG, LNG or LPG. Does the area within 450 mm (18 in.) of the ceiling need to be considered a Class 1, Division 2 location?

**Answer:** I believe the AHJ has to identify ways to have the owner declare the use of the building. When we do that, we realize that some owners will not provide accurate information. I

believe we should obtain that information during the plan review part of the project. If they required that information before the permit was issued, the owner would provide the information. I don't think we are responsible where owners are not truthful. If we don't ask about the material, we could be considered negligent.

511.3(C)(2) Ceiling Areas. Where lighter-than-air gaseous fueled vehicles, such as vehicles fueled by natural gas or hydrogen, are repaired or stored, the area within 450 mm (18 in.) of the ceiling shall be considered for classification in accordance with (a) and (b).

(A) Ventilation Provided. The ceiling area shall be unclassified where ventilation is provided, from a point not less than 450 mm (18 in.) from the highest point in the ceiling, to exhaust the ceiling area at a rate of not less than 0.3 m<sup>3</sup>/min/m<sup>2</sup> (1 cfm/ft<sup>2</sup>) of ceiling area at all times that the building is occupied or when vehicles using lighter-than-air gaseous fuels are parked below this area.

(B) Ventilation Not Provided. Ceiling areas that are not ventilated in accordance with 511.3(C)(2)(a) shall be classified as Class I, Division 2.

4. Can I use three single pole breakers to feed permanently connected free standing type office partitions with three #12 ungrounded conductors, a #12 equipment grounding conductor and a #10 common neutral all in liquid-tight flexible metal conduit?

**Answer:** NEC 605.7 – This is a multi-wire branch circuit and there must be a common disconnecting means for a multi-wire branch circuit feeding a office partitions. No three pole handle ties available, must use three pole breaker.

5. Is GFCI protection required for a 125-volt, single-phase, 15 amp receptacle, installed outdoors at a place of business that is normally not open to the general public? The company has multiple employees, but there are no gates or fences to preventing access to the building.

**Answer:** I would say yes, 2005 NEC 210.8(B)(4) requires GFCI protection Outdoors in public spaces—for the purpose of this section a public space is defined as any space that is for use by, or is accessible to, the public. Unless it can be determined that the location of outdoor receptacles restricts access to only authorized personnel (such as employees or maintenance personnel of a particular facility), GFCI protection of all 125-volt, 15- and 20- ampere receptacle(s) installed outdoors is required if they can be accessed by the general public. Since there is no fences to restrict access I would say yes they need GFCI protection.

6. I have a dock over a river. I want to install a receptacle, switch and light on my dock over the water. How high must these devices be mounted?

**Answer:** Two feet above the highest water level. 682.10, 682.2 definition of datum plane

7. How much detail is required to comply with the requirement in 408.4 to fill out the panel directory? Could each of the two-kitchen appliance circuits be identified simply as “appliance”? Could each of the two bedroom AFCI breakers be simply marked “bedrooms 1 & 2” “bedrooms 3 & 4”?

**Answer:** (2005 NEC Reference: 404.4) The 2005 NEC was revised by adding the provision that “the identification shall include sufficient detail to allow each circuit to be distinguished from all others”. Therefore, simply identifying circuits as “lights” and “plugs” is not sufficient to comply with this condition. The information in the directory has to be explicit enough to distinguish the

outlets or equipment supplied by one circuit from the outlets or equipment supplied by another. This can be accomplished by referring to room numbers or names (i.e. "Boardroom receptacles") or by using directional identification such as "Receptacles in northwest and northeast bedrooms". The 2008 NEC further enhances this requirement by not permitting identification that is based on "transient conditions of occupancy" such as "Bill's room" or "Jim's office".

8. What are the exit requirements for a room containing a 2,000-ampere switchboard that is 5' high and 3' wide? If a door was on the wall opposite the switchboard, and you had to go partially around a column to get to the door, would that qualify as an "unobstructed exit"?

**Answer:** It seems the question relates to Working Space About Electrical Equipment. Rules are found in 110.26 of the 2005 and 2008 NEC.

2005: The electrical equipment is considered "Large Equipment" by 110.26(C) and the working space must comply with this section. ("Large Equipment" is classified as equipment rated 1200 amperes or greater irrespective of physical size.) Options include"

1. The general rule is access to the working space is required from both ends.
2. Doubling the depth of working space required in Table 110.26(A)(1). Access is then required at only one end.
3. (a) Unobstructed Exit. Where the location permits a continuous and unobstructed way of exit travel, a single entrance to the working space shall be permitted.

The term "continuous and unobstructed way of exit travel" is not defined so the term is subject to local interpretation.

Merriam-Webster

"OBSTRUCTION: 1 a: the state of being obstructed; especially : a condition of being clogged or blocked

OBSTRUCT: "to hinder from passage, action, or operation : IMPEDE"

2008: This rule is quite similar to the 2005 rule. The 6-ft physical size has been restored in describing "large equipment."

(A) Unobstructed Egress. Where the location permits a continuous and unobstructed way of egress travel, a single entrance to the working space shall be permitted.

The bottom line is to use this provision, nothing can prevent a person from accessing and escaping from the working space. The AHJ will have to determine if the obstacle is significant enough to require remediation.

9. Are seal offs required in a Class 1 Division 1 location on raceways that contain service laterals that are installed by the utility? The location of the CT compartment is located less than 450 mm (18 in.) off the floor. The utility refuses to let the electrician install these seals claiming they are exempt from the requirements of the NEC. All of the above equipment is owned by the owner of the property but initially is being installed by the utility. The equipment is located within the footprint of the building.

**Answer:** I believe the seals are required. The service location could be relocated. The NESC includes information related to hazardous locations I Section 127. It requires NESC installations to comply with the requirements in NEC Articles 500 through 517.

10. Why doesn't my brand-new, expensive AFCI tester always trip AFCI breakers? If it doesn't trip, is the breaker faulty?

**Answer:** These "testers" are actually listed as indicators. The device attempts to mimic an arcing condition. The AFCI actually undergoes days of testing for UL compliance, so to believe that a hand-held device will "test" the product to ensure it is appropriate working is not likely. These devices are actually serving as a "tripping" device to understand if the circuit is protected by AFCI. Just because the AFCI doesn't trip does not make the AFCI faulty. The only means to perform diagnostics is to push the "push-to-test" button.

11. Has any manufacturer come out with the thinner, stronger nail plate that is now allowed in Section 300.4(A)(1) Ex.2? Is there a UL standard for such a product?

**Answer:** There are no Listed thinner nail plates. UL 2239, the standard for Hardware for the Support of Conduit, Tubing, and Cable, however, once a product is submitted for a Listing of less than 1/16 in., we will develop requirements to evaluate the thinner plates..

12. An inspector has told me to seal the openings around conduits that I drilled through a fire-rated wall. Is it the electrical contractor or the general contractor's job to seal these openings?

**Answer:** It is in both the MRC and MEC that they be sealed, 300.21, E3302.2. It is also a building code requirement. Who does the work is up to contract.

13. What is the difference between a separate branch circuit, a dedicated circuit, and an individual branch circuit? All three terms are used in the NEC, but only one seems to be defined in the NEC.

**Answer:** (2005 NEC References: Article 100, 210.8(A)(3) & 620.22(A)&(B)) Of these three terms the only one defined in Article 100 is individual branch circuit which is defined as: A branch circuit that supplies only one utilization equipment. Based on the fact that this is the only defined term it can be concluded that the use of the terms dedicated branch circuit and separate branch circuit in NEC requirements is not intended to mean that such circuits are limited to supplying one piece of utilization equipment. Therefore the application of requirements in which the terms are used has to be based on the common definitions of dedicated and separate and also the context in which the term is used. For example, Section 210.8(A)(3) Exception states: Receptacles that are not readily accessible and are supplied by a dedicated branch circuit for electric snow-melting or deicing equipment shall be permitted to be installed in accordance with 426.28. Based on the context in which dedicated branch circuit is used in this exception it is clear that the branch circuit can supply only electric snow-melting or deicing equipment but it is not limited to supply a single piece of this equipment.

Another example in the NEC of where the terms dedicated branch circuit and separate branch circuit are used is Section 620.22 that states: 620.22 Branch Circuits for Car Lighting, Receptacle(s), Ventilation, Heating, and Air Conditioning.

(A) Car Light Source. A separate branch circuit shall supply the car lights, receptacle(s), auxiliary lighting power source, and ventilation on each elevator car. The overcurrent device protecting the branch circuit shall be located in the elevator machine room or control room/machinery space or control space.

Required lighting shall not be connected to the load side of a ground-fault circuit interrupter.

(B) Air-Conditioning and Heating Source. A dedicated branch circuit shall supply the airconditioning and heating units on each elevator car. The overcurrent device protecting the

branch circuit shall be located in the elevator machine room or control room/machinery space or control space.

In this requirement the use of the term separate branch circuit means that the circuit is separate from others used to supply the same equipment in other locations. It is not dedicated in the context that the circuit is not limited to supplying only one specific type of utilization equipment as is the case in the following paragraph (B) where a dedicated branch circuit is used to supply only air-conditioning and heating equipment on each elevator car. The use of dedicated branch circuit in this provision is consistent with the use of the term in the Article 210 requirement.

14. Service equipment installed for a retail lease space has spaces available for eight circuit breakers. The electrical contractor installed only six overcurrent devices and blanked off the other two available spaces within the switchgear. Is this type installation acceptable by code for the maximum number of disconnects?

**Answer:** Yes. The Code does not expect the electrical inspector to be an electrical expert! Not more than 6 disconnects is permitted in 230.71(A).

15. In an industrial warehouse area we have a room where paint is stored. There are provisions to shake the paint cans but not mixed. The room next to this room is where the paint is mixed. The room is classified as Class I, Division 1. What provisions would need to be done to change the room classification to Class I, Division 2?

**Answer:** Unless the paint cans are opened, the area should not be classified. Flammable liquids can be stored in closed containers without classifying the area as long as the quantities are not excessive.

516.3(E) Adjacent Locations. Adjacent locations that are cut off from the defined Class I or Class II locations by tight partitions without communicating openings, and within which flammable vapors or combustible powders are not likely to be released, shall be unclassified.

16. What minimum size conductors with a rating of THHN/THWN are required to a panelboard with a 400 amp main breaker? Note: The panelboard is fed from a transformer with a secondary voltage of 120/208 three phase wye, with secondary conductors 20 feet long. The primary is 480 volts three phase protected at 200 amps with 3/0 wire.

**Answer:** NEC 240.21(C)6 Points out that you can't round up overcurrent protection for a 500kcmil from 380A to 400A. Must either moved to a 600kcmil or (2) – 3/0 conductors per phase.

17. 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 243 of

the 2007 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.

18. A set of plans calls for a facility where drug testing will be administered and people sometimes sleep overnight for evaluation. On the prints, some rooms are labeled "Exam Rooms". The facility is not licensed as a healthcare facility. Do the requirements of Article 517 need to be addressed in these exam rooms?

**Answer:** No, it does not meet the definition of a health care facility, 517.2

19. The electrical contractor on a large commercial jobsite placed several signs at all the temporary construction receptacles that states, "All workers shall provide their own personal portable GFCI devices". Does this meet the requirements of Section 527.6(A)?

**Answer:** (2005 NEC Reference: 590.6(A)) Section 590.6(A) requires GFCI protection for all 125 volt, single phase, 15-, 20-, and 30-ampere receptacle outlets that are used to supply power as part of a temporary wiring installation. In lieu of GFCI protection at the receptacle outlet the NEC permits listed portable GFCI devices or listed cord sets with GFCI protection incorporated. This section does not include any provision indicating that the use of a sign mandating the use of portable GFCI is required or can be approved as a means of compliance. This question is one in which the authority having jurisdiction has to make their approval based on the knowledge (and perhaps supporting documentation) that portable GFCI devices will be used as the means to comply with 590.6(A).

20. If an isolated ground receptacle is used in a health-care facility, does the isolated ground conductor count as one of the two redundant ground paths for the receptacle?

**Answer:** The short answer is "Yes." An additional or third ground-fault return path is not required. The NEC (in 517.13) does not use the term "redundant ground path." Two independent ground-fault return paths are required in 517.13, one by the wiring method and a second by an insulated equipment grounding conductor.

517.16 mentions isolated ground receptacles.

517.16 Receptacles with Insulated Grounding Terminals.

Receptacles with insulated grounding terminals, as permitted in 250.146(D), shall be identified; such identification shall be visible after installation.

FPN: Caution is important in specifying such a system with receptacles having insulated grounding terminals, since the grounding impedance is controlled only by the equipment grounding conductors and does not benefit functionally from any parallel grounding paths. This type of installation is typically used where a reduction of electrical noise (electromagnetic interference) is necessary and parallel grounding paths are to be avoided.

The concept of isolated ground receptacles in 250.146(D) is that two independent ground-fault return paths are provided. The path from the isolated grounding terminal on the receptacle is

required to be isolated. The isolation is accomplished by an insulated equipment grounding conductor.

21. A gas station/convenience store includes two gas tanks with a pump in each tank and 16 gas dispensers. The electrical system has a panelboard (located in an equipment room in the back of the store) that is supplied from the service equipment through a contactor. The contactor includes contacts for the grounded and ungrounded conductors supplying the panel. The coil for the contactor is controlled through an emergency switch located at the cash register for the store. The panelboard supplies the pump motors in the gas tanks, the circuits for each dispenser and the circuit that supplies power to the source for the dispenser data circuits. Does this arrangement, with no other disconnects, meet the requirements in NEC 514.11(A) & (B) and also 514.13?

**Answer:** I believe the only additional issue that should be considered is to verify the disconnect can be locked in the open position. 514.11 Circuit Disconnects.

(A) General. Each circuit leading to or through dispensing equipment, including equipment for remote pumping systems, shall be provided with a clearly identified and readily accessible switch or other acceptable means, located remote from the dispensing devices, to disconnect simultaneously from the source of supply, all conductors of the circuits, including the grounded conductor, if any.

Single-pole breakers utilizing handle ties shall not be permitted.

514.13 Provisions for Maintenance and Service of Dispensing Equipment.

Each dispensing device shall be provided with a means to remove all external voltage sources, including feedback, during periods of maintenance and service of the dispensing equipment. The location of this means shall be permitted to be other than inside or adjacent to the dispensing device. The means shall be capable of being locked in the open position.

22. Section 110.26(A)(1) requires the depth of the working space to be in accordance with Table 110.26(A)(1), when the equipment is likely to require servicing, maintenance, etc, while energized. If a 480-volt panel board was located on a wall on the one side of the room and a 208-volt panel board was located directly across the room, at a distance of 1.5 m (5 ft) measured from the removable fronts of both enclosures, would this be a Condition 1 or a Condition 3 application? It seems that either panel board would actually be located out of the maximum space that could be required by the table for the other.

**Answer:** NEC 110.26(A)(1) – Each panel is outside the working space of the other and therefore is Condition 1. The panels could not be closer than 4ft if they are the aisle is reduced between the panels as they will become a condition 3 when the aisle is reduced to 4ft.

23. A luminaire is listed for use in a Class 1, Zone 0 location. Can this luminaire be used in a Class 1, Zone 2 location instead?

**Answer:** Yes, 2005 NEC 505.9(B)(1) states Equipment that is listed for a Zone 0 location shall be permitted in a Zone 1 or Zone 2 location of the same gas or vapor, provided that it is installed in accordance with the requirements for the marked type of protection

24. A master bedroom has a wet bar with a small sink. What would apply to this receptacle outlet, GFCI, AFCI, or both?

**Answer:** It has to be both, MEC 210.8(A)(7), 210.12. MRC E3202.7, E3802.11

25. Can I install a three-phase overcurrent device on a single-phase service installation and still be code compliant? Assume that the three-phase equipment comes with an approved neutral kit. Everything being the same between the two except for the extra phase.

**Answer:** (2005 NEC Reference: 110.3(B)) There is no specific NEC requirement either permitting or prohibiting the use of a three-phase overcurrent device in a single-phase system. However, as is the case with many equipment application questions, Section 110.3(B) is the relevant NEC requirement. In the case of molded-case circuit breakers (UL product category code: DIVQ) the UL White Book contains the following statement: “3-pole circuit breakers are suitable for use only on 3-phase systems unless marked to indicate otherwise”. In reviewing the White Book information on enclosed switches (UL product category code: WIAX) there is not a similar restriction. Therefore proper application of a 3-pole fusible switch is a function of the installation and use instructions provided by the switch manufacturer.

26. An existing building has the entrance door to the equipment room swing into the equipment room. The service equipment is being changed from 800 ampere to 1600 ampere. The new service equipment is 2.5 m (8 ft) long. Is it required to change the hardware on the door to panic hardware and have the door swing out to be code compliant?

**Answer:** This issue is covered in 110.26(C) in the 2005 and 2008 NECs. This section was revised for the 2008 edition with a new subsection (C) covering personnel doors.

(3) Personnel Doors. Where equipment rated 1200 A or more that contains overcurrent devices, switching devices, or control devices is installed and there is a personnel door(s) intended for entrance to and egress from the working space less than 7.6 m (25 ft) from the nearest edge of the working space, the door(s) shall open in the direction of egress and be equipped with panic bars, pressure plates, or other devices that are normally latched but open under simple pressure.

The AHJ has the final word but usually, the installation must comply with the edition of the Code in effect at the time the installation is made

27. The 2005 NEC Article 511 refers to when Class I liquids or gaseous fuels are transferred. What does this mean? Would it be removing a fuel tank or fuel filter in an Article 511 area?

**Answer:** I believe the text originated to deal with situations where fuel tanks were removed. The fuel is typically transferred to a storage container

Section 511.3 uses the term transferred in place of the terminology dispensing in determining the requirements for classifying locations where a significant quantity of flammable or gaseous liquids are exposed to the atmosphere by a motor vehicle repair operation (e.g., major engine overhauls or repairs that require draining of the motor vehicle fuel tank). Minor repair garages, by definition under NFPA 30A, Code for Motor Fuel Dispensing Facilities and Repair Garages, would not be permitted to conduct such types of repair operations involving the transfer of flammable or gaseous liquids and thus would not require a classified location designation.

28. NEC 450.21 states that dry type transformers must be separated from combustibles by a fire resistant, heat insulated barrier. Does a standard gypsum sheetrock wall meet the barrier requirement?

**Answer:** No. Would suggest concrete rock board “Durarock.”

29. An information monitor requires an isolated ground receptacle and is installed in a commercial kitchen 2.5 m (8 ft) above the floor. Is this 120-volt, 15-amp receptacle required to be GFCI protected? Do manufactures make a GFCI-IG receptacle?

**Answer:** 210.8(B)(2) requires GFCI protection of 15 and 20A 125V receptacles. Do manufacturers make a GFCI-IG receptacle, nothing restricts them in the UL standard from making a GFCI like that, however, last I heard, I don't believe any mfr was making a GFCI-IG receptacle because of the low demand. If a GFCI receptacle isn't available for this application you would need to use a GFCI circuit breaker or a feed through connection from a GFCI receptacle.

30. 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, Definition of individual branch circuit. 210.52(B)(1),Ex2, ART 100, E3801.3Ex2, E3401 Definitions.

31. 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:** (2005 NEC Reference: 250.24(C)) The grounded (neutral) conductor is required to be run to each service disconnecting means where the supply is a grounded AC systems of less than 1000 volts. Although the grounded (neutral) conductor is not a normal circuit conductor for this particular installation, it does serve the function of providing an effective path for ground-fault current from the service equipment to the utility transformer or other utility source equipment. Under ground-fault conditions within the premises wiring, the ground-fault current is imposed on premises equipment grounding conductors which connect to the service grounded conductor at the service equipment via the main bonding jumper. In the case of a feeder circuit, Section 250.142 does not permit the grounded (neutral) conductor to be used for grounding load-side equipment, therefore an equipment grounding conductor is installed with the circuit conductors per 250.130. The equipment grounding conductor is sized per 250.122. The feeder circuit does not have to include a grounded (neutral) conductor as there are no line-to-neutral loads and the equipment grounding conductor provided the effective ground-fault current path. Not having a neutral in this circuit precludes loads requiring a line-to-neutral connection from being connected in this equipment.

32. 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:** The automatic transfer switch is permitted to supply only emergency loads. 700.6(D). Other loads such as legally required standby systems or optional systems are permitted to be supplied by the emergency system so long as the emergency system has capacity for all the loads supplied and priority is given to the emergency system. See 700.5. Separation of different systems is covered in 700.9.

33. Gas pump installers want me to route power and low-voltage control cable in the same conduit to gas pumps. Is this right to allow this?

**Answer:** UL did list some dispensers with a single conduit entry. The instructions required all the conductors to have Class 1 wiring throughout, so it doesn't matter if some is Class 2. They all have to be treated the same as Class 1 wiring and methods and then can be in the same conduit..

34. Can a ventilated opening transformer be located in an environmental air-space? Section 450.13(B) allows a transformer in hollow spaces provided they are fire-resistant and ventilated and they are less than 600 volts and 50 kVA but does not say they may be located in an environmental air-space or plenum. If yes, why and are there any transformers listed for this use?

**Answer:** NEC 300.22(C) – Permitted in 300.22(C) “Other Space Used for environmental air” not permitted in 300.22(A) or (B) spaces. They are not permitted in a plenum.

35. In recent years, we have been seeing more and more Type NM cable with color-coated sheathing jackets (yellow for 12 AWG, orange for 10 AWG, etc

**Answer:** Is this colored sheathing a code requirement?

The color code is neither a NEC requirement nor a UL requirement.

Is this an industry standard or what?

This is what is referred to as a de facto industry standard. This color code scheme is now what the industry expects to be able to easily identify the wire size.

Can a 12/2 Type NM cable be colored another color than yellow?

Yes it can be colored another color. I have not seen any other color code use for size identification for NM-B cables. You should rely on the on the cable should be used to confirm the wire size and not the color of the sheath.

Industry guides, such as NEMA, are working on including the present color code system in new guides. These guides will most likely not require color-coding. The intent of the guides will be to provide the colors to use if color-coding is used.

This is a convenience item therefore if the conductor size is in question; the print should be used to confirm wire size.

36. Many builders and designers are using rope lights for accent lighting in residential kitchens and bathrooms. Can this rope lighting be installed through holes in cabinets?

**Answer:** No.

Can it be installed through the ceiling or wall to get from one cabinet to another?

**Answer:** No.

Where are the installation requirements for rope lighting; support requirements, termination requirements, separation requirements from combustibles, etc?

**Answer:** UL listing as Flexible lighting product (ILGJ) and with the instructions that come with the product.

Can receptacles be installed inside kitchen cabinets and supplied from a 15- ampere, 120-volt general lighting circuit (non-GFCI protected) to supply this rope lighting?

**Answer:** Yes. 110.2 and 110.3.