

IOWA CHAPTER

INTERNATIONAL ASSOCIATION OF ELECTRICAL INSPECTORS

2010 SPRING CODE PANEL QUESTIONS

1. Can a receptacle for a TV that is placed on a shelf above the kitchen countertop (part of the upper cabinets) be installed using 14AWG NM cable, supplied by a 15 ampere rated circuit breaker? The receptacle will be located approximately 6 feet above the finished floor.

Code Ref. [210.52\(4\)](#), [210.52\(C\)\(5\)](#), [210.8\(A\)\(7\)](#), [210/12\(B\)](#)

The receptacle is located more than 5.5 feet above the floor so does not comply with the general provisions of 210.52. The receptacle does not qualify as a countertop receptacle since it exceeds 20 inches above the countertop. Therefore, the TV receptacle is not part of the small-appliance branch circuit requirement and would be allowed to be a 15 amp circuit fed with a 14 AWG NMB cable. If within a 6' radius of the sink, the receptacle would be required to be GFCI protected. Otherwise, I would consider it part of the "similar room or area" requirement to 210.12 and require AFCI protection.

2. I am wiring a single family dwelling. It has a full kitchen and then there is another space in a separate room (12' X 12') with a permanent range, sink, refrigerator, and countertop. Would this require the 2 small appliance circuits? This does not appear to be a bar area which would be part of a large room.

Code Ref.

Yes, the definition of Kitchen in article 100 is "An area with a sink and permanent facilities for food preparation and cooking." The separate room would meet that definition and would be considered a second kitchen. Therefore, 210.52(B)(1) and 210.52(B)(3) requires the two small appliance branch circuits serve the kitchen receptacles. 210.52(B)(3) also requires that No small-appliance branch circuit shall serve more than one kitchen.

3. When installing the wiring to a hanging gas furnace or radiant tube heaters, can I use a rubber cord with a cap and plug it into a receptacle?

Code Ref. [110.3\(B\)](#) – pg 32; [400.7](#) parts (6), (7), and (8) – pg 247

Rubber cord is understood to mean flexible cord or cable. [Article 400]

Plug-and-cord cap are covered in Article 406.

Central heating systems are covered by Section 422.12, which requires they be on separate circuits.

Use of flexible cords and cables covers permitted usages in Section 400.7 and not permitted usages are covered in Section 400.8.

This equipment is not considered as subject to frequent interchange, there is little likelihood of noise or vibration transmission, and these would not have quick disconnecting features. Only if these are intended or identified for use with flexible cord connection would this be acceptable. [400.7(6) & (7) & (8)] In all cases manufacturer's instructions provided with the equipment or appliance would have to be followed.

4. While inspecting a gas furnace installation, the electrician had installed a 4" square box with the GFCI, the switch disconnect for the furnace, and the doorbell transformer on the separate branch circuit to the furnace. The GFCI receptacle is to satisfy the maintenance receptacle within 25' requirement. Is this correct?

Code Ref. [422.12, 210.63, Article 100.](#)

Section 422.12 generally requires an individual branch circuit for the space heating equipment. The term "individual branch circuit is defined as "a branch circuit that supplies only one utilization equipment." Based on the information in the question, this circuit supplies more than one utilization equipment. Only equipment noted in the exception to 422.12 is permitted. Section 210.63 provides the requirement for the service receptacle for heating, air-conditioning, and refrigeration equipment. The receptacle has to be on the same level and within 25 feet of the equipment it supplies and cannot be on the load side of the equipment disconnecting means.

5. A client wants to light the flag overnight. Can an additional spot light be installed on an existing parking lot light pole as long as the ampacity is sufficient?

Code Ref. [410.10](#)

Yes, so long as the luminaire is suitable for a wet location (410.10(A)). If the pole is used as a raceway, it must have a handhole (410.30(B)(1)), unless it has a hinged base (Ex. 2).

6. If the GFCI protection for the hydro-massage tub is not readily accessible under the tub and it is installed on the bathroom wall, does the GFCI protection have to be a faceless GFCI or can a GFCI duplex receptacle be used? It is supposed to have a separate circuit to the tub.

Code Ref. [680.2, 680.71, Article 100-Definition of Individual Branch Circuit, 210.20\(B\)\(1\), 210.23\(A\).](#)

By definition, this is a Hydromassage Bathtub and regulated by Part VII of Article 680. Here it states that the hydromassage bathtubs and their associated components shall be on an individual branch circuit and protected by a readily accessible ground-fault circuit interrupter. By definition, an individual branch circuit is one that supplies only one utilization equipment. Therefore a duplex style GFCI receptacle may not be used and the single receptacle that supplies this connection shall have an ampere rating equal or greater to that of the branch circuit. If this hydromassage is cord-and-plug connected, its rating shall not exceed 80% of the branch circuit rating. A GFCI breaker is also an option.

7. Many people are buying CFL's (compact fluorescent) to replace their existing lamps. Are CFL's listed for use in recessed luminaires, enclosed luminaires, and other applications?

Also, many of the luminaires sold at the big box stores have a warning label that "90 degree C supply wire required" are being purchased by homeowners and installed on older wiring systems. Are there lots of problems ahead?

Code Ref. [110.3\(B\)](#)

For the question on CFL's the answer is yes, you have to look at the Guide Information and the markings on the CFL.

These products are Listed under the product category Lamps, Self-Ballasted and Lamp Adapters, (OOLR) located on page 262 of the 2010 UL White Book.

These products have been investigated for use in the smaller of a 6- or 8-in. diameter recessed luminaire, if they will physically fit, and are intended for use in totally enclosed, recessed luminaires unless marked and stated not for such use.

The wattage rating on compact fluorescent lamps is typically much less than the incandescent lamp they are replacing. A compact fluorescent lamp rated 13 watts emits the equivalent light output of a 60-watt incandescent lamp and a 42-watt compact fluorescent has the equivalent output of a 150-watt incandescent lamp with a fraction of the heat that is generated from the incandescent lamps.

As long as the wattage on the compact fluorescent lamp is equal to or less than the re-lamping marking on the luminaire that the lamp is going into, then the compact fluorescent lamp can be used in the luminaire, provided all the markings on the compact fluorescent lamp are complied with. Compact fluorescent lamps run much cooler than incandescent lamps and do not present a heat issue with recessed luminaires.

Part 2 of the question- Also, many of the luminaries sold at the big box stores have a warning label that “90 degree C supply wire required” are being purchased by homeowners and installed on older wiring systems. Are there lots of problems ahead?

This marking has been around for a long time at least 10 years, so I don't know if this is a problem or not. However, you have to install a Listed product in accordance with the instructions and hopefully it will be inspected

8. Explain the reasoning behind a 4 wire in simple terms so we can explain the reason for 4-wire to the customer?

Code Ref. 215.6 – pg 57; 250.32(B) – pg 103

2008 NEC Analysis of Changes – pages 114 & 115; ROP 5-119 and ROC 5-58

1. Follows trend of past several Code cycles starting in mid-1980's to eliminate neutral earthing on the load side of the service entrance disconnecting means.
2. Reduce designs that allow inappropriate “N – Grd” contact.
3. Eliminate one source of varying “N” currents in earth.

9. Can a service be mounted on a mobile home or manufactured home?

Not on a mobile home, yes on a manufactured home provided all the conditions of 550.32(B) are met. To determine whether it is considered a mobile home or manufactured home, refer to the definition in 550.2 and the nameplate on the structure. 1976 is the date where the term “manufactured home” was first used. Before this date it was referred to as a mobile home.

550.32 Service Equipment.

(A) Mobile Home Service Equipment. The mobile home service equipment shall be located adjacent to the mobile home and not mounted in or on the mobile home. The service equipment shall be located in sight from and not more than 9.0 m (30 ft) from the exterior wall of the mobile home it serves. The service equipment shall be permitted to be located elsewhere on the premises, provided that a disconnecting means suitable for use as service

equipment is located within sight from and not more than 9.0 m (30 ft) from the exterior wall of the mobile home it serves and is rated not less than that required for service equipment per 550.32(C). Grounding at the disconnecting means shall be in accordance with 250.32.

(B) Manufactured Home Service Equipment. The manufactured home service equipment shall be permitted to be installed in or on a manufactured home, provided that all of the following conditions are met:

- (1) The manufacturer shall include in its written installation instructions information indicating that the home shall be secured in place by an anchoring system or installed on and secured to a permanent foundation.
- (2) The installation of the service shall comply with Part I through Part VII of Article 230.
- (3) Means shall be provided for the connection of a grounding electrode conductor to the service equipment and routing it outside the structure.
- (4) Bonding and grounding of the service shall be in accordance with Part I through Part V of Article 250.
- (5) The manufacturer shall include in its written installation instructions one method of grounding the service equipment at the installation site. The instructions shall clearly state that other methods of grounding are found in Article 250.
- (6) The minimum size grounding electrode conductor shall be specified in the instructions.
- (7) A red warning label shall be mounted on or adjacent to the service equipment. The label shall state the following:

WARNING
DO NOT PROVIDE ELECTRICAL POWER
UNTIL THE GROUNDING ELECTRODE(S)
S INSTALLED AND CONNECTED
(SEE INSTALLATION INSTRUCTIONS).

10. Intersystem bonding. I have been making them put the bar near the meter on the outside of the house. Out in the rural area, the meter is on a pole or structure. I recommend we have them put it in the house next to the panel in this situation. Code issues?

Code Ref. 250.94

The intersystem bonding may be located near the service equipment enclosure, service conductor raceway or grounding electrode conductor and must be connected to an equipment grounding conductor or the grounding electrode conductor with a minimum 6 AWG copper conductor.

11. Is NM cable that is installed on the top of a ceiling joist or drilled in a floor truss considered supported?

Code Ref. 334.30, 334.15(C), 334.23, 320.23(A), 334.30(A), 300.4(A) (1)&(2)

Non-metallic sheathed cable shall be supported and secured (defined as “free from danger or harm, safe”) by staples, cable ties, straps, hangers, or similar fittings. This support is required on top of ceiling joists, under floor joists on running boards, or alongside vertical framing members.

If installed in an attic accessible by permanent stairs or ladder, the NM Cable installed across the top of floor joists or across the face of rafters or studding within 7’ of the floor joists shall be protected by guard strips at least as high as the cable. If the attic is not accessible by permanent stairs or ladders, this protection shall be required within 6’ of the nearest edge of

the scuttle hole or attic entrance.

Horizontal runs through holes or notches shall be considered supported and secured where such support does not exceed 4.5. These holes or notches must comply with 300.4 and care must be taken not to weaken the building structure.

12. If the counter top extends more than 6 inches all the way around a kitchen island or 6" past the end of the peninsula counter top does this require an outlet? Can it be installed under the countertop (upside down) within 6" of the edge?

Code Ref. 210.52(C)(2) and (3)

I would say no, I would say it has to be located above the countertop, perhaps you need to put in a doghouse or shorten the overhang. 210.52(C)(2) and (3) requires a receptacle for an island and a peninsula counter. 210.52(C)(5) Exception doesn't permit the receptacle below the counter where....

Exception to (5): To comply with the conditions specified in (1) or (2), receptacle outlets shall be permitted to be mounted not more than 300 mm (12 in.) below the countertop. Receptacles mounted below a countertop in accordance with this exception shall not be located where the countertop extends more than 150 mm (6 in.) beyond its support base.

(1) Construction for the physically impaired

(2) On island and peninsular countertops where the countertop is flat across its entire surface (no backsplashes, dividers, etc.) and there are no means to mount a receptacle within 500 mm (20 in.) above the countertop, such as an overhead cabinet

13. What would the proper procedure be to test an arc fault protected circuit? Consult instructions

Code Ref. 110.3(B)

Follow the AFCI manufacturer provided instructions. [110.3(B) – pg 32]

14. In a new structure where the rebar was covered before the electrician was on site, what would be some other options to provide a Ufer ground that would be acceptable?

Code Ref. Section 250.50 Exception and 250.52(A)

Ufer is the slang term for the NEC term concrete-encased electrode. It is named after its founder, Herbert G. Ufer.

Section 250.50 Exception provides a relaxation of the requirement for using an existing concrete-encased electrode. The key is to determine if the building is existing or not. The exception is clear that it is not intended that existing footings or foundations be disturbed to establish a concrete-encased grounding electrode, but this does not give any relaxation of the general requirement to plan for, and coordinate its installation with the builder. The other electrodes listed in Section 250.52(A) can be used to form the grounding electrode systems. It is also a good idea to check with the AHJ if the installation of a concrete-encased electrode is missed when the building is first constructed. They may have specific requirements to comply with in such situations.

15. Would grouping of conductors as stated in 210.4 (D) be necessary in a romex installation provided the romex met termination requirements?

Code Ref. 210.4(D) Exception

No. The exception to 210.4(D) states, "The requirement for grouping shall not apply if the circuit enters from a cable or raceway unique to the circuit that makes the grouping obvious."

16. Are the receptacles installed on porches and landings counted as the required receptacles for the front and back of the residence if they can't be accessed at grade level? Is a 24" elevation of the deck or landing still at grade level?

Code Ref. 210.52(E) (1), (2), & (3)

No. The required receptacles at the front and back of a one or two-family dwelling must be accessible while standing at grade level and located not more than 6.5' above grade. The 24" elevation of the deck or landing would be 24" above grade level.

All balconies, porches, and decks accessible from the inside of the dwelling shall have one receptacle located within the perimeter and located not more than 6.5' above the balcony, porch, or deck

17. NEC 334.80 requires de-rating for NM, NMC & NMS cables when more than 2 cables are run through wood framing and foamed or caulked in place. Does this requirement also need to be enforced when multiple conductors are run into the back of a panel in a 2" nipple and sealed with duct-seal or foam used for a thermal seal from an outside wall panel?

I would say yes, even though the requirement talks about a hole in wood framing. However, if you are foaming it, then it is essentially the same thing. I would also say that the foams have not been evaluated on cables or wires and may have a deleterious effect on the insulation of the cable. However, it is up to the AHJ.

18. A pool contractor installed non-metal fiber mesh around the deck of a pool. He claims that it does not need bonding because it is not metal. The inspector is requiring a # 8 bare copper wire to be run around the perimeter of the pool before the concrete can be poured. Is the inspector correct? **Partially YES.**

Code Ref. 680.26(B) – pg 566

1. Conductive shells with un-encapsulated reinforcing steel or mesh are to have the reinforcing steel extend not less 36 inches out from the inside walls of the shell at not less than four points uniformly spaced around the pool perimeter.
2. Encapsulated steel in conductive shells must have a copper mesh formed in a 12 inch X 12 inch grid embedded in the poured concrete and this formed mesh extend 36 inches out from the inside walls of the shell at not less than four points uniformly spaced around the pool perimeter.
3. Nonconductive pool shells are not required to provide the minimum four points for bonding to the perimeter surface.
4. The perimeter surface for non-conducting pool shells shall have a minimum 8 AWG solid bare copper conductor secured within the perimeter surface material, or under the perimeter surface material from 4 inches to 6 inches below grade, encircling and following the pool contour and placed 18 inches to 24 inches from the inside walls of the pool.
5. Perimeter surfaces raised above grade must have an encircling minimum 8 AWG solid bare copper conductor secured to the underside of the pool perimeter material.

19. Does Section 230.82 allow transfer switches to be connected to the supply side of the service disconnecting means? If so, would a transfer switch then become the service disconnecting means? Would it be required to be marked "suitable for use as service equipment" and to contain the service overcurrent device?

Code Ref. 230.82 Exceptions, 110.3(B)

No, Section 230.82 does not recognize transfer equipment for being installed on the supply side of the service disconnect.

However, where transfer equipment that is listed as suitable for use as service equipment is provided as or with the service disconnecting means can be used. This is a listing requirement and 110.3(B) would apply. The transfer switch would not have to contain overcurrent protection but would be required downstream per 230.90. Note that contactor based automatic transfer switches have a short-circuit current rating dependent upon a specific type of overcurrent device AHEAD of the automatic transfer switch. This could be an issue if overcurrent protection is not provided ahead of the transfer switch.

Section 700.6, 701.7, and 702.6 provide additional requirements for transfer switches and equipment.

20. We have a "temporary" concrete plant coming to our city. Would Tray Cable (Art. 336) be an accepted wiring method for this installation?

Code Ref. 336.10 and 12

Maybe. 336.10(7) states that TC cable may be used where only qualified persons will service the installation and where the cable is continuously supported and protected, except for distances up to 6 ft. where it will not be subject to physical damage. Assuming it will be installed outdoors, it will need to be moisture (336.10(8)) and sunlight (336.12(3)) resistant.

21. Is PVC conduit allowed in to be installed in a concrete brick wall in a commercial garage if the conduit is below 18 inches?

Code Ref. 511 Definitions of Major and Minor Repair Garages, 511.3(C)(1), 511.3(D)(1), 501.10(B), 511.3(D)(3)

In Article 511, we must determine if the occupancy is a Major Repair Garage or a Minor Repair Garage with the main difference being that there may be body work, painting, or draining of fuel tanks in a Major Repair Garage. Additionally, it needs to be determined if ventilation equivalent to no less than four air changes per hour or one cubic foot/minute for each square foot of floor area is provided.

In a Major Repair Garage, if such ventilation is provided, the floor area is unclassified. If such ventilation is not provided, the floor area up to a level of 18" above the floor shall be classified as Class 1, Division 2 and PVC conduit is not allowed in that area.

In a Minor Repair Garage, floor areas without pits, below grade work areas, or subfloor work areas shall be unclassified and PVC conduit is allowed. If such ventilation is provided, the entire floor area shall be unclassified and PVC conduit is allowed. If such ventilation is not provided, the floor level up to a level of 18" above and extending 3' horizontally from the pit,

below grade work area, or subfloor work area shall be classified as Class 1, Division 2 and PVC conduit is not allowed in that area.

Any pit areas in lubrication or service room are unclassified if the ventilation above is provided and classified as Class 1, Division 2 up to floor level in the ventilation above is not provided.

22. A High-leg system is added to an elevator and the panel is marked as per code. A pipe run containing three ungrounded conductors only is run to a disconnect by a hopper tank motor. Does this disconnect need to be labeled also?

Code Ref. 110.15

No, 110.15 reads High-Leg Marking.

On a 4-wire, delta-connected system where the midpoint of one phase winding is grounded, only the conductor or busbar having the higher phase voltage to ground shall be durably and permanently marked by an outer finish that is orange in color or by other effective means. Such identification shall be placed at each point on the system where a connection is made if the grounded conductor is also present. Since you are not pulling the grounded conductor to the disconnect, then the high leg at the disconnect doesn't have to be marked.

23. 352.10(A) states that PVC conduit shall be permitted in walls, floors, and ceilings, and 352.10(F) states PVC conduit shall be permitted for exposed work with PVC conduit used exposed in areas of physical damage being identified for the use. It would appear that anywhere PVC conduit is utilized exposed it would be subject to physical damage. **Not really.**

Does this mean that Schedule 80 should always be utilized where PVC conduit is exposed?
Not really.

Why isn't this requirement written better? **Make proposed text for 2014 NEC cycle by October 2012.**

Code Ref. NONE

24. An electrician installed Type NM cable under a kitchen cabinet for under-cabinet fluorescent fixtures and the installation was rejected as the NM cable was deemed subject to physical damage by the inspector. What do you think without stating "the inspector is always right?"

Code Ref. Section 90.4, 334.15(B)

Section 90.4 indicates that the inspector has the interpreting and approving authority. Section 334.15 (B) indicates that cable shall be protected from physical damage where necessary by rigid metal conduit, intermediate metal conduit, electrical metallic tubing, Schedule 80 PVC conduit, or other approved means.

If the cable is judged to be subject to physical damage, it needs to be protected. Difficult to tell based on the limited information in the question. It is best to reach a reasonable compromise with the approving authority, or his or her supervisor if it is felt to be unreasonable.

25. I have an aboveground gas tank with the fuel dispenser mounted on the tank. Am I still required to install a boundary seal leaving the ground feeding the dispenser even if the dispenser pump motor is factory sealed? Is this boundary seal required to be the first fitting emerging from grade?

Code Ref. [501.15\(A\)\(4\) and 514.8](#)

This application meets the definition of a Class I Division I location per 500.5(B)(1). A conduit seal is required per 501.15(A)(4). This is a motor fuel dispensing facility and thus Article 514 also applies. 514.8 requires a seal as well. Sealing is required to prevent the passage of explosive vapor out of the Class I Division I location. The fact that the pump motor is sealed is irrelevant as explosive vapors will be present when the fuel is dispensed from the storage tank into a vehicle or container.

26. A neon sign transformer is located above a suspended ceiling on the interior of an outside wall. The transformer housing has an external switch to disconnect the supply conductors. The sign is on the exterior of the same wall but does not have an additional disconnect switch. Does this installation satisfy the NEC?

Code Ref. [600.6\(A\)\(1\) & \(2\)](#)

No. The general rule is that a disconnect shall be located within sight of the sign that it controls. If the disconnecting means is out of sight of any section of sign that it controls, it shall be capable of being locked in the open position. The disconnecting means may also be within sight of the controller or in the same enclosure as the controller as long as it is capable of being locked in the open position. The provision for locking or adding a lock to the disconnecting means must remain in place at the switch or circuit breaker whether the lock is installed or not. Portable means for adding a lock to the switch or circuit breaker shall not be permitted.

27. Are connections and splices required to be accessible in low-voltage, 12-volt lighting system installations (for example, puck lights for under cabinet lighting)?

Code Ref. [411.5\(D\)](#)

The installation described would fall under NEC 411.5(D) which says that Chapter 3 wiring methods must be applied. These wiring methods would specify that any connections or splices would have to be accessible. The listing under UL Product Category Low Voltage Lighting Systems (IFDR) on page 170 in the 2010 UL White Book indicates that the manufacturer's instructions are to be followed for the installation and wiring method applied.

28. Can a PVC conduit be installed in a slab-on-grade dentist's office to supply power to an exam room and patient's chair if it contains an equipment grounding conductor? **NO**

Code Ref. [517.2 – pg 426; 517.12 & 517.13\(A\) & \(B\) – pg 428](#)

[517.2 Definition of Health care and definition of patient care – pg 426](#)

[517.12 states wiring methods of Chapters 1 through 4 apply unless modified in this Article.](#)

[517.13\(A\) requires the branch circuits be installed in metal raceway system or metallic armor or metallic sheath assembly. The metallic methods qualify as an equipment grounding conductor.](#)

[517.13\(B\) requires an insulated copper equipment grounding conductor sized in accordance with Table 250.122.](#)

29. Why does the NEC limit the length of liquidtight (sealtight) to 6' for a hot tub?

Code Ref. 680.42(A)(1) modifies 680.25(A), 350.60, 250.118(6)(d)

Section 680.42 indicates that the installation of a hot tub has to meet the requirements in Parts I and II of Article 680. Section 680.25(A) indicates that wiring methods shall be installed in rigid metal conduit, intermediate metal conduit, liquidtight flexible nonmetallic conduit, rigid polyvinyl chloride conduit, or reinforced thermosetting resin conduit. Electrical metallic tubing shall be permitted where installed on or within a building, and electrical nonmetallic tubing shall be permitted where installed within a building. Aluminum conduits shall not be permitted in the pool area where subject to corrosion.

Exception: An existing feeder between an existing remote panelboard and service equipment shall be permitted to run in flexible metal conduit or an approved cable assembly that includes an equipment grounding conductor within its outer sheath. The equipment grounding conductor shall comply with 250.24(A)(5).

The use of liquidtight flexible metal or nonmetallic conduit in a length not to exceed 6 ft is permitted by 680.42(A)(1) as a wiring method to supply control panels or panelboards installed by the manufacturer in packaged or self-contained spas and hot tubs. This provision modifies the requirement of 680.25(A) covering the wiring methods permitted for feeder conductors supplying swimming pool equipment.

See also 350.60 & 250.118(6)(d) for additional grounding requirements that limit the length of liquidtight flexible metal conduit to 6 ft.

30. In rural areas, large structures called “barns” are to be used for storage of tractors, recreation vehicles, and all-terrain vehicles. If they are called “barns”, do they need to meet the requirements for an agricultural building if no animals are going to be housed inside them?

Code Ref. 547.1

What folks call such a building is irrelevant. The only thing that counts is the NEC definition of an agricultural building. The structure described does not meet the definition of an agricultural building as defined in 547.1.

31. A contractor has run rigid conduit under a commercial garage floor. His outlet boxes are located 48 inches above the concrete floor. Are any seals required?

Code Ref. 511.3(C)(1), 511.3(D)(1), 501.15(B)(2) Exception No. 1

No. The floor area of an unventilated Major Repair Garage or the area 18” above an unventilated pit, below grade or subfloor work area in a Minor Repair Garage shall be classified as Class 1, Division 2.

“Metal conduit that contains no unions, couplings, boxes, or fittings, and passes completely through a Class 1, Division 2 location with no fittings less than 12” beyond each boundary, shall not be required to be sealed if the termination points of the unbroken conduit are in unclassified locations.”

32. HDPE pipe is to be listed per code. The wholesale houses are only stocking the unlisted product. All of the installations in adjacent areas are non-compliant installations. Shouldn't the inspectors be asking for the correct material? The utilities also use the unlisted product. Am I missing something?

Code Ref. [NEC 353.6](#)

Requires all HDPE and Fittings to be Listed. I would say yes, if the AHJ's are enforcing the code then it should be Listed. UL Lists HDPE under the category RIGID NONMETALLIC UNDERGROUND CONDUIT, PLASTIC (EAXX) on page 116 in the 2010 White Book.

33. A 100 amp, 8-pole space panelboard is installed in a detached garage. The feeder wires are # 4 AWG copper [100 ampere per 310.15(B)(6)] with a #8 equipment grounding conductor and only four 20 amp, 120-V circuits are installed. All will be fed by a 100 amp breaker from the home service panel. Is this installation code compliant? **NO**

Code Ref. [310.15\(B\)\(6\) – pg 147](#)

1. 310.15(B)(6) applies only where the main power from the utility source passes through.
2. 310.15(B)(6) provides conductor size reduction from Table 310.16 for single phase 120/240 V 3-wire service conductors and for "main power feeders" from the required service entrance disconnect.

34. Is EMT allowed to be encased in concrete and still be allowed as a means of providing an equipment-grounding conductor path? If yes, is there any concern about the EMT being encased in concrete where the integrity of the connections may deteriorate over time such as die-cast fittings?

Code Ref. [358.10\(B\), 300.6, 110.3\(B\)](#)

Yes. Per NEC 358.10(B), "Ferrous or nonferrous EMT, elbows, couplings, and fittings shall be permitted to be installed in concrete, in direct contact with the earth, or in areas subject to severe corrosive influences where protected by corrosion protection and judged suitable for the condition." The FPN in this section, indicates see also 300.6 for information on protection against corrosion. If there are concerns about the long-term integrity of the EMT performing as an effective ground-fault current path, install a wire-type equipment grounding conductor.

Based upon the listing of EMT, according to the UL Guide Information for Electrical Equipment — The White Book-2010, category FJMX, galvanized steel electrical metallic tubing (EMT) installed in concrete, on grade or above, generally requires no supplementary corrosion protection. Galvanized steel EMT in concrete slab below grade level may require supplementary corrosion protection. In general, galvanized steel EMT in contact with soil requires supplementary corrosion protection. Where galvanized steel EMT without supplementary corrosion protection extends directly from concrete encasement to soil burial, severe corrosive effects are likely to occur on the metal in contact with the soil.

35. In a new home, a central vacuum cleaner system was roughed in but the actual machine was not installed. The electrician installed a separate dedicated 20amp circuit and a 20amp rated GFCI receptacle. Shouldn't the electrician have installed a single 20amp rated receptacle and a GFCI 20 amp breaker?

Code Ref. [210.23\(A\)\(2\)](#)

Maybe. 210.23(A)(2) states that, "The total rating of utilization equipment fastened in place, other than luminaires, shall not exceed 50 percent of the branch-circuit ampere rating where lighting units, cord-and-plug-connected utilization equipment not fastened in place, or both, are also supplied." So the answer depends on the ampere rating of the central vac. If it is 10A or less, a duplex receptacle is ok. If it is more than 10A, then a single receptacle would be required. While many models on the market draw more than 10A, there are models available that draw less than 10A.

36. 600.5(A) requires "Each commercial building and each commercial occupancy accessible to pedestrians shall be provided with at least one outlet in an accessible location at each entrance to each tenant space for sign or outline lighting system use. The outlet(s) shall be supplied by a branch circuit rated at least 20 amperes that supplies no other load." A retail store has 9 such entrances to the business and the electrical contractor looped one 20-ampere, 120-volt circuit in ½ -inch EMT with 10 AWG THWN copper conductors to 9 individual 4 square boxes with blank covers set above each entrance and says this meets minimum code. I say 600.5(A) requires each of the outlet(s) to be served by an individual 20-ampere circuit. What do you think?

Code Ref. 600.5(A)

"The outlet(s) shall be supplied by a branch circuit rated at least 20 amperes that supplies no other load." "Outlet(s)" is plural so more than one can be on the circuit designated for sign or outline lighting system use. Contractor has met the minimum standards.

37. When using stranded conductors, what are the approved methods of connecting stranded conductors to a receptacle? Are all receptacles rated for connection to stranded conductors? Is a pigtail using a solid conductor to the receptacle allowed for stab-in connections? Are crimp rings over stranded conductors permitted to be secured under a receptacle screw terminal or should forked terminal be used instead?

Code Ref. NEC 110.3(B).

Neither should be used

Receptacles are Listed under the product category Receptacles for Plugs and Attachment Plugs (RTRT) located on page 340 in the 2010 UL White Book The Guide Information for (RTRT) states under the heading of Terminals, "Terminals of the wire-binding screw, setscrew, or screw-actuated back wired clamping types are suitable for use with both solid and stranded building wires. Screwless terminal connectors of the conductor push-in type (also known as "push-in-terminals") are restricted to 15 A branch circuits and are for connection with 14 AWG solid copper wire only." They are not intended for use with aluminum or copper-clad aluminum wire, 14 AWG stranded copper wire, or 12 AWG solid or stranded copper wire.

Receptacles are not evaluated for terminating a spade terminal or crimp ring under any of the terminals on these types of wiring devices. While this may be a common practice in the electrical trade when using stranded conductors, this would be a violation of *NEC* 110.3(B) as these wiring devices are not Listed for that application.

38. We are working on the design of a new assisted living building. The owner would like the emergency egress lighting on an emergency generator...along with some misc. loads such as coolers and freezers, etc. I know and believe I need two transfer switches for two branches of emergency power. One for life safety and one for equipment. The owner stated they just completed a new building about a year ago that only has one transfer switch and life safety lighting as well as equipment loads are on the same transfer switch. My question is has anything changed lately...? I believe I need two transfer switches, am I correct? **YES & NO**

Code Ref. 700.5 – pg 596; 700.6 – pg 597 In addition, consult Iowa Inspections and Appeals because they have requirements that may pertain to this.

1. Yes if generator has adequate capacity to supply the total emergency, legally required standby and optional standby loads contemplated.
2. No if the non-emergency loads must be shed due to insufficient total generator capacity.

39. Is it permissible to install PVC (used as a sleeve) under an interior concrete floor and pull MC cable through it to a commercial island counter?

Code Ref. 330.10(A)

Section 330.10(A) provides the uses permitted for Type MC cable. The answer is yes, 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.

40. A single-phase, 20 kW, central electrical space heating unit with ¾ hp multi-speed blower motor, both rated 240-volt, 1-phase is installed in a residence attic. The unit has two 60-ampere circuit breakers used as supplementary overcurrent protection but the devices are marked "Not a Disconnecting Means" inside the unit. The contractor ran a 2 AWG SE cable to the unit terminal lugs but did not install a disconnect within sight of the motor controller at the unit. The contractor claims that a change in 424.19 allows him to place a lock-off on the 125-ampere circuit breaker serving the unit and that a disconnect at the unit is not required. Is that what the new wording to 424.19 means?

Code Ref. 424.19(A)

If the supplementary protectors in a heater are fuses, a disconnecting means within sight is required by Section 424.19(A). But since the supplementary protectors in the heater in question are circuit breakers, the remote 125A circuit breaker can serve as the disconnecting means so long as it has a permanently installed locking provision per 424.19(A)(2).

41. I've got a contractor in my area that wants to install the disconnect for the air conditioner compressor units, inside the control panel instead of on the outside. He wants to install a 2 pole disconnect in a handy box. Normally we see a weatherproof disconnect on the outside where anyone servicing the unit can shut it off before servicing the unit. Would the NEC allow the disconnect inside of the control panel? Nec 440.14 says the disconnect needs to be in a readily accessible location. Is the inside of the control panel, readily accessible? Is the inside of the panel considered a wet location?

Code Ref. 440.14, Page 54 of the UL White Book "Air Conditioning Equipment (AAYZ)"

The disconnecting means shall be located within sight from and readily accessible from the equipment and shall be permitted to be installed on or within the equipment. The disconnecting means shall not be installed on panels designed to allow access or to obscure the equipment nameplate.

Information concerning field wiring connections, mounting location, installation clearances, etc., is marked on the accessory, and/or in detailed installation instructions accompanying each accessory.

42. I recently finished wiring a new home and I was called for a code violation in regards to walk in closet lights. When I did the rough in, I installed (4) 6" IC rated recessed cans, which would have been fine except the homeowner decided to put 24" wide shelves in instead of 12" as shown on the print. I don't dispute this violation, however, I called the inspector and asked if I could remove the 65 watt lamps, and install 40 watt A-19 lamps with shower trims. Right now, the cans are 9-10" away from the nearest point of storage space. What are my options?

Code Ref. _____

43. I am upgrading an electrical service panel from 100 amp to 200 amp. I located the single ground rod from the 1975 original installation and intended on extending the ground from this first rod, to an additional rod that I will install. The electrical inspector said that ground rods need to be replaced as they do not meet code. **Impossible to verify the original rods meet requirements.**

Evidently, UL studies show that ones that are only a few years old, aren't thick enough to meet current codes

UL studies reflect tests at selected sites affect both the diameter and length of various electrodes.

He can't be right can he? **Yes**

Why can't I use an existing ground rod? **Impossible to verify the original rods meet NEC requirements.**

Code Ref. 250.52(A)(5)(a) – pg 105

44. Does a business such as a massage therapy fall under Article 517 and require the redundant grounding in the areas where the actual treatment is taking place?

Code Ref. 517.2, 517.13

The definition of the term patient care areas provides the guidance necessary. It is important to understand that the governing body of the facility has to disclose accurate information about the type of treatment being administered. Some physical therapy is provided with electro-medical equipment connected to the patient to stimulate nerves and muscles in the body.

Information from the NEC Handbook: The Code assigns responsibility for the designation of

the types of patient care areas to the governing body of the health care facility. Both the design and the inspection of a patient care area, therefore, must be based on the governing body's designation rather than the superficial appearance of the area.

If the locations described in the question are judged by the governing body of the health care facility to be a patient care area, then they have to be wired according to the requirements in 517.13 which typically requires two equipment grounding conductor paths.

45. Is it required to have 120-volt, 15- and 20-ampere receptacles GFCI protected in an agricultural shop building where tractors and other farm machinery are repaired? If any of these receptacles are outdoors and used to work on equipment, are in-use covers required on the outdoor receptacle outlets?

Code Ref. 210.8(B), 511.12, 547.5(G)(2)

Article 511 applies as the description of this building fits the scope as stated in Section 511.1. 511.12 requires that "All 125-volt, single-phase, 15- and 20-ampere receptacles installed in areas where electrical diagnostic equipment, electrical hand tools, or portable lighting equipment are to be used shall have ground-fault circuit-interrupter protection for personnel."

120-volt, 15- and 20-ampere outdoor receptacles must be GFCI protected per Sections 210.8(B) and 547.5(G)(2). In-use covers would be required per 406.8(B).

46. At a single family residence with a 200A service I added a 100A sub panel using #4 AWG copper conductors. I was told they needed to be #3 AWG conductors when using a 100A breaker to protect the feeder wires.

Code Ref. 110.14(C)(1)(a), 240.4(B), 240.6(A), T310.16, 310.15(B)(6)

Circuits rated 100 amperes or less shall conductors rated for 60°C. If the ampacity of the conductors does not correspond with a standard ampere rating, the next higher standard rating may be used as long as it does not exceed 800 amperes. In the 60°C column, #3 Cu is rated for 85 amperes which may be protected by the next higher standard size of 90 amperes. You need a #2 CU conductor that is rated at 95 amperes which can be protected by the next higher standard size of 100 amperes.

Do not confuse this feeder for a portion of the house with one that supplies all loads associated with the house (T310.15(B)(6)).

47. Can a GFCI receptacle be installed above a bathtub if it is outside of the 3' X 8' zone?

Code Ref. 406.8(C)

No, see which states C) Bathtub and Shower Space. Receptacles shall not be installed within or directly over a bathtub or shower stall.

48. I have installed liquidtight metal flexible conduit to several RTU's (rooftop units). The space above the ceiling is used for environmental air return. The inspector has asked me to replace it. Can it not be used in this application? **YES, it cannot be used as described.**

Code Ref. 300.22(C)(1) – pg 135

300.22(C)(1) listed the permitted wiring methods exposed to environmental air.

49. Most of the sealtite (liquidtight metal flexible conduit) installed in the field does not have a listing mark stamped on it. Is this an inferior product? Why do inspectors allow it to be used if it is not listed as asked for in 350.6?

Code Ref. 350.6

Section 350.6 requires this wiring method to be listed. Only the AHJ can approve other materials that are not listed. It is their approving responsibility. Most AHJs use listing as a basis for approvals as indicated in 90.7, which is the most conservative approach. Most wiring methods covered in the NEC are now required to be listed by a qualified electrical testing laboratory which ensures that the product has been evaluated to appropriate safety standards.

50. When stubbing up underground conduits into open-bottomed electrical equipment, is there a certain height the conduits should be above the floor? Should the conduits be sealed?

Code Ref. 230.8, 408.5, Chapter 5

Section 408.5 states that, "The conduit or raceways, including their end fittings, shall not rise more than 75 mm (3 in.) above the bottom of the enclosure." The Code does not specify a minimum height, although common sense would suggest that they be high enough so that water or foreign materials would not enter the conduit, and of course high enough so that a bonding bushing could be installed on metal conduit in accordance with Article 250.

230.8 states that, "Where a service raceway enters a building or structure from an underground distribution system, it shall be sealed in accordance with 300.5(G). Spare or unused raceways shall also be sealed. Sealants shall be identified for use with the cable insulation, shield, or other components." Sealing may be required if the conduits serve a hazardous location as required in Chapter 5.

51. Many of the new dishwashers do not have an "off" setting. Some LED lights are always on. If the dishwasher is direct wired with nonmetallic cable, can the breaker in the panelboard in the basement be considered the disconnect in a single family dwelling?

Code Ref. 422.31(A) & (B)

422.31 Disconnection of Permanently Connected Appliances.

(A) Rated at Not over 300 Volt-Amperes or 1/8 Horsepower. For permanently connected appliances rated at not over 300 volt-amperes or 1/8 hp, the branch-circuit overcurrent device shall be permitted to serve as the disconnecting means.

(B) Appliances Rated over 300 Volt-Amperes or 1/8 Horsepower. For permanently connected appliances rated over 300 volt-amperes or 1/8 hp, the branch-circuit switch or circuit breaker shall be permitted to serve as the disconnecting means where the switch or circuit breaker is within sight from the appliance or is capable of being locked in the open position. The provision for locking or adding a lock to the disconnecting means shall be installed on or at the switch or circuit breaker used as the disconnecting means and shall remain in place with or without the lock installed.

52. Is there any additional temperature rise requirement for the conductors in metal conduits versus PVC conduits running across a roof?

Code Ref. 310.15(B)(2)(c)

No, See 310.15(B)(2)(c) doesn't differentiate between metallic and nonmetallic conduits. The same requirements apply to both

53. How many AC-powered residential smoke detectors are allowed to be interconnected? Most of the instructions I have read say a maximum of 12. I have a residential plan showing 18; is there an approved way to interconnect detectors fed from different circuits?

Code Ref. 90.2(A) – pg 21; 110.2 – pg 32; 110.3(B) – pg 32

This is a product question and not a Code installation question.

1. Manufacturer's information would indicate the design interconnections.

2. NRTL markings would indicate the designed product meets applicable requirements.

3. UL product code UTLQ – pg 345 White Book states that ANSI/NFPA 72 Fire Alarm Code Chapter 2 is to be consulted for installation of "Household Warning System Units."

54. Our local cooperative is setting 500 gallon gasoline tanks around various sites. They are installing a cord and cap onto the pump which is located on top of the tank. Some of these are on construction sites, but a few appear to be permanent in nature. I assume the tanks that appear to be permanent would need to be wired per Chapter 500.

Code Ref. 500.4, 500.5, 500.8, 514.4, 514.7, 514.8, 515.4, 515.7, 515.8

You're thinking is correct, the installation should meet the applicable requirements in Articles 500, 514, or 515 as applicable. There is not enough specific information provided in the question to be thoroughly accurate, so here is the general response that should provide direction.

If the pump mentioned in the question is for dispensing purposes, then Article 514 applies. The wiring methods for dispensing equipment are provided in Section 514.4 which reads as follows:

All electrical equipment and wiring installed in Class I locations as classified in 514.3 shall comply with the applicable provisions of Article 501.

The tanks sound like above ground fuel storage tanks, based on the information provided in the question. Article 515 may apply here. The wiring methods for pumps and equipment associated with fuel storage tank installations are provided in Section 515.4, 515.7, and 515.8.

The other issue is related to the pump being used. This equipment is generally required to be suitable for use in hazardous (classified) locations.

55. Are recessed fixtures, installed in a pitched ceiling 45 degrees from the horizontal, required to be listed for that slope and orientation?

Code Ref. [110.3\(B\)](#), [410.6](#)

Section 410.6 requires luminaires to be listed and 110.3(B) requires listed equipment to be installed per the manufacturer's installation instructions. Not all listed recessed luminaires are suitable for use in sloped ceilings.

There are UL listed luminaires specifically designed for use in sloped ceilings. They are constructed with the recessed housing mounted at an angle to the mounting frame. There are no special markings required on these luminaires since the intended use and mounting orientation is obvious. They are tested with the lamp pointing straight down during the normal temperature test of UL 1598. "Standard" flat ceiling type recessed luminaires, without the sloped recessed housing, are typically not evaluated for use in a sloped ceiling, unless specifically requested by the manufacturer. This orientation option would also be outlined in the installation instructions.

There are several "standard" flat ceiling type recessed luminaires that have been evaluated for use in a sloped ceiling and are marked as being suitable for use in sloped ceilings when used with specific trims.

Dwight Kramer.....	1, 6, 11, 16, 21, 26, 31, 36, 41, 46, 51,
Tom Lichtenstein.....	2, 7, 12, 17, 22, 27, 32, 37, 42, 47, 52
Mel Sanders.....	3, 8, 13, 18, 23, 28, 33, 38, 43, 48, 53
Daniel Neeser.....	4, 9, 14, 19, 24, 29, 34, 39, 44, 49, 54
Ed Larsen.....	5, 10, 15, 20, 25, 30, 35, 40, 45, 50, 55

EXTRA QUESTIONS

1. Cables and raceways need to be approved when used in directional boring. What cables are approved? Is PVC conduit approved?

Code Ref. [300.5\(K\)](#)

300.5(K) requires for Directional Boring. Cables or raceways installed using directional boring equipment shall be approved for the purpose. UL doesn't approve, we List products, the AHJ approves, so it could be up to the AHJ, however, there are no cables Listed for directional boring.

Is PVC conduit approved for directional boring. Ditto about approved, however for PVC Conduit it is Listed for directional boring see the product category **RIGID NONMETALLIC SCHEDULE 40 AND SCHEDULE 80 PVC CONDUIT (DZYR)**, located on page 116 in the 2010 UL White Book. The Guide Information for (DZYR) states that Schedule 40 conduit is suitable for underground use by direct burial or encasement in concrete. Schedule 40 conduit marked "Directional Boring" (or "Dir. Boring") is suitable for underground directional boring applications

2. Can a 3/8 inch flexible metal conduit that is less than 6 foot long be used to feed a receptacle box from a junction box?

Code Ref. No, NEC 348.20(A) does not permit it for receptacles

3. Can the factory listed surface mounted ground bar used for intersystem bonding be used to terminate the conductors to the grounding electrodes (water, ground rods, water pipe) and the panel? What if there are no other wires beside the electrode conductors and the panel terminated to this bar.

Code Ref. 250.94

No, NEC 250.94 requires this intersystem bonding bar for bonding of other systems, not for bonding the service. The GEC has to be installed in accordance with 250.64.

4. A 200A service to a residence is using a combination meter socket/disconnect with a 200A main disconnect and feed through lugs. A 100A breaker feeds a panel in the attached garage. Another 100A feeder is terminated to the feed through lugs. This feeder is installed in a conduit that runs through a crawl space to a panel in the basement with a 100A main breaker. Is this feeder tap allowed when the conduit runs through a crawl space?

Code Ref. 110.14(C)(1) – pg 34 ; 240.21(B)(1) & 240.21(B)(2) – pg 87; Table 310.16 – pg 148

1. If the tap conductor length does not exceed 10 feet and is 1 AWG or larger, any approved raceway is permitted.
2. Where the tap conductor exceeds 10 feet but not more than 25 feet, any approved raceway or other approved methods are permitted.

5. In the above installation the feeder to the house is in a PVC conduit. In this conduit a #4 copper wire is installed and terminated at the feeder panel from the meter/disconnect.

6 AWG is the minimum equipment grounding conductor (EGC) per Table 250.122. 4 AWG is fine.

The water pipe ground is a #4 copper wire and is also terminated at the feeder panel.

NO. 4 AWG grounding electrode conductor (GEC) must terminate in service entrance panels. [250.24]

Can the equipment ground and the grounding electrode conductor (gec) in the feeder conduit be the same wire?

NO. GEC are not permitted to terminate to a feeder panel

Does the splice in the panel to the ground bar satisfy the requirement for the gec to be continuous?

NO. They must be continuous or spliced via irreversible compression-type connectors listed as grounding and bonding equipment or spliced via exothermic welding process.

Code Ref. 250.24 – pg 98; 250.62(C) – pg 107 ; Table 250.122 – pg 117

6. A 240V tray cable leaves the tray into a conduit that terminates at a piece of equipment. Is a connector required at the open end of the conduit? Does the conduit need to be attached to the tray?

Code Ref. 300.4(G), 342.46, 344.46, 352.46, 353.46, 355.46, 342.30, 344.30, 350.30, 352.30, 355.30, 336.10(7)

Yes, a bushing may be required per 300.4(G), 342.46, 344.46, 352.46, 353.46, 355.46.

Yes, the conduit must be secured & supported if required per 342.30, 344.30, 350.30, 352.30, 355.30 unless the

Yes, the conduit must be attached to the tray unless the conditions of 336.10(7) are met.

7. Is more than one tray cable allowed in a conduit? What kind of connector; if any; is required for more than one tray cable in a conduit?

Code Ref. 300.17, 342.22, 344.22, 352.22, 353.22, 355.22, 300.4(G), 342.46, 344.46, 352.46, 353.46, 355.46

Yes, 300.17 addresses the number of conductors permitted in a raceway. Per the FPN in 300.17, it must be determined what type of conduit is being used: Intermediate metal conduit, 342.22; rigid metal conduit, 344.22; PVC conduit, 352.22; HDPE conduit, 353.22; and RTRC, 355.22.

A bushing may be required per 300.4(G), 342.46, 344.46, 352.46, 353.46, 355.46.

8. The exception to 336.10(7) requires the tray cable to be mechanically supported when leaving the tray for the maximum 6 foot distance allowed without continuous support. What kind of mechanical support is this requiring?

Code Ref. 336.10(7)

The tray cable must be securely fastened by mechanical means at each end to ensure the minimum bend radius is maintained. Some manufacturers offer a fitting to assure this minimum bend radius is maintained. If not used, this may be subjective by the AHJ.

9. A 1200 Amp 480V generator has a factory installed disconnect in the generator enclosure. There are two of these generators that feed directly to a bypass switch and then to two transfer switches. Is the factory disconnect considered the required disconnect? Is ground fault protection required at this disconnect? Are the working spaces required in article 110 applied to the location of the factory installed disconnect?

Code Ref. 445.18, 230.66, 230.95, 10.26, 700.26, 701.17

Generators shall be equipped with disconnect(s), lockable in the open position, by means of which the generator and all protective devices and control apparatus are able to be disconnected entirely from the circuits supplied by the generator. Service equipment rated at 600 volts or less shall be marked to identify it as being suitable for use as service equipment.

Ground-fault protection of equipment shall be provided for solidly grounded wye electric services of more than 150 volts to ground but not exceeding 600 volts phase-to-phase for each service disconnect rated 1000 amperes or more. There is an exception for a continuous industrial process where a nonorderly shutdown would introduce an additional or increased

hazard. GFPE is not required on emergency systems or legally required standby systems.

Minimum working clearances are not required if the equipment is such that it is not likely to require examination, adjustment, servicing, or maintenance while energized. However, "sufficient" access and working space are still required by the opening paragraph of 110.26.

10. NM cable is installed on the top of trusses and rafters in the basement and ceilings. The cables are secured as they leave a box with a staple. The cables are supported by the rafters and joists. Are the cables required to be secured every 4 ½ foot also? How many inspectors are requiring this cable to be secured?

Code Ref. [334.30](#)

Same as Question # 11 above

11. Are equipment grounds required in a conduit from a generator to the load?

Code Ref. [Article 250 Parts VI and VII](#)

Is the equipment required to be grounded in accordance with Article 250 Part VI? If so, what kind of conduit is being used? According to 250.118, some types of conduit may be suitable as an equipment grounding conductor. If an equipment grounding conductor is required but the conduit cannot be considered the equipment grounding conductor, then a separate equipment grounding conductor will have to be run in the conduit with the circuit conductors (250.134(B)).

12. A commercial building has a conduit from a basement location stubbed into a 15 minute rated wall. The conduit is not continuous to a box in the wall. A NM cable is installed into this conduit and is terminated to an outlet box that is in the wall. Is this allowed?

Code Ref. [Article 334](#)

Yes, if the building is of Types III, IV or V construction (334.10(3)), if the location is dry (334.10(A) and 334.12(B)(4)) and noncorrosive (334.12(B)), if the location is not a commercial garage having a hazardous location or a theater or a motion picture studio or a battery storage room or a hoistway (334.12(A)). A fitting must be on the end of the conduit to prevent the NM from being damaged (300.4).