

NEC CODE QUESTIONS

With answers as given by Alan Nadon*

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INDIANA CHAPTER MEETING

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1. A building has 277-volt lighting and 120 volt receptacles. None of the circuits share the same raceways or junction boxes. Do the neutrals have to be identified by different colors, stripes, etc.?

Yes 210.5C see also 200.6 D

2. For a big house I am installing a 600-amp service. It needs a Current Transformer (C.T.) cabinet. The conduit to it and the panel is rigid non-metallic. Can I use the # 6 Cu from the panel to the C.T. cabinet and then to the ground rod to bond everything together?

**No # 6 to rod (250.66 A) CT cab 250.66 table 600 Amp (3x36km= 167.8kcm)
Need 1/0 Cu for 500 Kcmil**

3. Can I use EMT thin wall conduit in a free stall barn?

Yes 358.10 B & 12 Watch for corrosion and damage.

4. The number four, bare, stranded, copper, from the concrete encased electrode to the panel is too big to fit in one of the lugs on the ground bar. Is it O.K. to put five strands in one terminal and four in the other?

No listed product & table Chp 9, strands.

5. Are all vending machines that don't have built-in GFCI protection required to plug into a GFCI receptacle?

Yes 422.51

6. I have a water heater located next to the furnace. The water heater has a booster fan for the exhaust. There is a duplex receptacle on the furnace for the electronic filter is it permissible to plug the water heater fan into this receptacle?

No 422.12

7. Can pipe be used as a made electrode? And if so are there any size requirements?

Yes ---yes 250.52 A 5 3/4 inch min

8. In a general care patient room bed location is there a minimum number of receptacles required? And do these receptacles require separate circuits?

517.18 A & B -- 2 circuits 1 emergency + 1 normal check exceptions. Single or

duplex.

9. A new manufacturing building has 12 lighting circuits. The panel directory list them as LIGHTS, GENERAL AREA. The inspector marked it as a violation. I say it complies with 110.22 who is right?

See 408.4 must be distinct.

10. Do I have to adjust conductor ampacity per NEC table 310.15(B)(2)(a) for more than 3 current-carrying conductors in a raceway service mast? This mast is on the line side of the utility meter.

Yes 310.15.B4

11. Is it required to have a gem box inside of a wall for a battery back up fixture on a wall, or can it be directly wired with flexible metal conduit?

110.3B--410.16 box--314.23 support-- 700.12 F

12. Are vending machines that are not refrigerated required to be GFCI protected?

Yes 422.51 no exceptions for refrigeration.

13. I installed a lug screwed to the disconnect with the mounting screw that holds the disconnect to the wall. I attached the G.E.C. to the lug. Is this a violation if the lug is UL listed for Cu & Aluminum?

Yes, 250.8

14. Can a receptacle be placed directly behind a stove or sink that has only two inches of space between it and the wall?

Yes, Must GFI protect, may not count as required countertop receptacle. Design consideration. 21.52

15. Most cell towers have one or more modular equipment buildings. These buildings are grounded to the cell tower ground ring. The building has an insulated floor between it and the concrete slab it sits on. I have never seen any slab where the rebar in this slab is grounded. Should this rebar be bonded to the ring?

Yes or use 3/8 rod see 250.12

16. Do the rules protecting NM cable in unfinished basement Art.334.15(C) apply to the metal flex (Greenfield) as well as EMT?

No see 348.12(7) physical damage & 358.12 Severe Phys Damage.

17. In a new house the toilet stool is in an alcove just past the sink. The owner wants a receptacle near the stool for a portable heater. If I put it on a separate circuit does it have to be GFI protected?

Yes 210.8 A1

18. Portable MRI trailers are traveling from location to location. The electric services

to power these machines are all different. Are there any proposals for the 2008 code cycle to standardize configurations?

No

19. I am currently designing an electrical system for a funeral home that also contains living quarters. The chapel is designed to hold more than 100 people, and is not divided from the rest of the building by fire-rated walls; the construction material is wooden studs. The NEC prohibits the use of romex, but I am unclear as to whether I can install non-metallic flexible conduit. It is also unclear if the entire building will need to be run in conduit or just the chapel area.

Article 518.4 B RTFM

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

No 400.8 (5)

21. In a commercial building the owner wants to place a sub panel at the end of the sink. It will only have 6 inches of clearance from the end of the sink to the panel. Would this comply with the Code?

Yes 110.26

22. Is there a section of any code (NEC, Life Safety etc.), which would require mandatory night lighting? Not emergency lighting, but general-purpose night lighting in commercial & industrial applications.

No

23. When a UFER ground is installed, is a supplemental electrode required? If one is required do I need 2 rods and do they have to be 6' min. away from each other and the foundation? (Since this is also used as an electrode) Can the #4 grounding electrode conductor be run through bored holes in the 2x10's to the panel?

NO, 250.64 B (250.52A3Ufer) 250.53D2 Supplemental water pipe.

24. There are facilities where you can go and prepare a meal and then take them home and cook them. Do these fall under Article 210.8(B)(2) Commercial kitchens?

Yes, Check definition of Kitchen in 210.8 Is there cooking ?

25. I need to splice a 2-wire #18 thermostat wire. Does this splice need to be accessible? This is in a garage that is going to have a fire rated ceiling installed over the splice.

No class 2--(725.3) 314.29

26. When a utility company such as AT&T or DTE energy install equipment on the ground on public/easement, should the AHJ be enforcing the National Electric Code or does the utility enforce the NESC and “self police” their work?

Depends.....Chapter 90 application & state law

27. In NEC Art. 514 PVC conduit is run under 2’ of cover to the dispenser location with the transition to rigid conduit at the last 2’ of underground. Is there anything special that has to be done at the transition point? Is the required equipment grounding conductor all that is required? ***No fitting required underground above ground Seal off, depth of burial 2 feet. EGC, OK***

28. Record-keeping computer stations are being installed within patient bedrooms at a large hospital. There is a PC, a monitor, and a printer all connected to a listed, re-locatable power tap with surge protection for the electronics. The UL white book states that re-locatable power taps have not been investigated for use in patient care areas. What are we supposed to do?

No White Book P 280 Listing of unit.

29. In a residential garage, on a sub-panel installation of 4- two wire branch circuits I say that the minimum feeder ampacity should be 60Amps, based on the fact that the disconnecting means must be rated at 60 Amps by code. My co-worker says that it is based on the computed load and could be 40Amps or 50Amps.

225.5 & 39 D rating not OCD 215.2

30. Does an outdoor hot tub need a disconnect as per 680.12? Does it need a general-purpose receptacle as per 680.22(3)? This is to be installed at a single-family residence outside on a deck. Also this is a manufactured home, if that makes a difference.

No 680.40 Part 1 & 4

31. Art. 250.66(B) says grounding electrode conductor for a UFER ground shall not be required to be larger than a #4 copper wire. We often see design engineers spec larger than #4 copper. Does this additional sizing improve the grounding capabilities or is this just wasted wire?

Minimum improvement in grounding, waste of material.

32. Can someone clarify code section 200.7© (2)? Does this mean that the white conductor in a 14/3 Romex cannot be used for the return conductor to the light? I see this used all the time for the return conductor. It is typically not re-identified and usually at the end of the line (single gang box with a 3-way switch installed) where the feed is on the opposite end and the light feed is in the same junction box (in the middle of the run) as the 14/3 to the switch. If it can’t be used as the return, can it be used as a traveler instead and re-identified to meet code?

White cannot be used as the traveler but, can be the return

33. I noticed that my Dentist’s exam rooms have hospital grade receptacles. Are they

required?

No, 517.18 B Dentist chair is not a table or bed. Check Mnfr listing

34. Art. 230 of the NEC only allows one service drop to a building. If the service size is large and the installer decides to parallel conductors and use the 6-disconnect rule do the conductors have to be joined at the weather head on the building? The two or more service drops are joined at the utility pole load end. If they are not electrically joined at the building end could this be considered more than one service to the building?

Maybe...Utility company splices. 310.4 also 230.71 & 72

35. Where in the 2005 code does it state that romex cannot directly feed the dishwasher (romex in wall wired directly to the dishwasher junction box) or is it just a protection issue and needs to be sleeved in flex from wall to the dishwasher junction box?

334.15 to follow the surface of the building. 422.15B4

36. The local sheet metal shop fabricates pull and junction boxes as well as wireways for us. Can we use a non-listed J-box, wireway or auxiliary gutter for equipment grounding? Are wireways listed for grounding?

AHJ.....376.10 - 12 not listed for grounding.

37. Is it acceptable to splice equipment grounding conductors together in a service panel and then pigtail one conductor to connect to them to the neutral bar?

Yes, 250.130 & 148

38. Can you explain Figure 210.52 of the NEC? Is an additional receptacle required in the space behind the appliance if the distance is greater than the X dimension or can the receptacle(s) close to the appliance serve the space?

Yes and maybe, may not count as counter top required. 2 ft spacing 210.52 C 1

39. A flexible gas line manufacturer wants the gas line bond wire to be "at a minimum the full amperage available through the electrical service." Should this wire be sized from table 250.66 or 250.122 ?

250.66

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

AHJ 230.71

41. Can a 20-ampere single receptacle be installed on a 15-ampere circuit?

Yes 210.21 B1 & B2

42. When a local utility sells it's high voltage lines and substation to a holding company from out of state, are they considered a utility and then exempt under Section 90.2(B)(5)?

Yes Check with Utility Regulatory Commission.

43. We have a 3-foot section of EMT between two cabinets. Is additional support required on the raceway?

No 358.30 AHJ may consider cabinets as support. Change in 2008 Code to 18"

44. I was told that I could not plug one extension cord into another on a construction site. The NEC does not seem to prohibit this practice. Where do I find such information?

UL 817.14 NFPA 1

45. Why are some panelboards listed for tandem (mini) breakers and some are not? Can you explain the listing requirements or testing that is done for the panelboards in order for them to be acceptable to have tandem breakers installed?

Mfgr UL 67

46. Can the required disconnecting means for a 120V air handler / remote AC be a 15A single pole switch mounted to the unit as in furnace applications? Or do I need a disconnecting means on the unit if the panel is in sight of the unit?

Hp. Rated switch. 422.31 B

47. There is a lot of resistance in using a Ufer ground because many believe if there is a lightning strike or power surge it will crack the concrete. Is there any way to prevent this?

Bond Ufer to rebar. Cracking occurs usually when not bonded.

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

Check with architect or engineer. Only a certain amount of ceiling can be fixtures and maintain rating.

49. Does the metal faucet on a hydromassage tub need to be bonded the same as the circulating pump motor when the tub is supplied with plastic water pipes?

Maybe....680.74 piping & shower yoke Yes.

50. We see a few liquid gas storage tanks that hold about 500 gallons of gas and have an electric pump mounted on the top. Inquiring minds want to know how this pump is to be wired. This is usually considered a temporary installation and sometimes is relocated to a new site. The pump has a 6-foot cord on it and will occasionally be plugged into an existing outlet via an extension cord.

Keep cords & plugs above or out of the zone.

51. Section 334.10 allows NM cable in multifamily dwellings and other structures of any height provided they are of Types III, IV, and V. construction. How many floors or how high can these Types of construction go?

Look at Annex E Type II 12 stories others 5 or less.

52. I noticed that the speaker wire they sell at the hardware store comes with and without listings although they appear to be the same wire. What is the difference?
Cost.

53. I was told, "When wiring transfer switches, the utility conductors must go on top and the generator conductors on the bottom". I searched and searched but could not find anywhere in the NEC that made this statement. It would seem to me that it is a matter of personal preference and/or popular consensus but not an NEC requirement. This person made the comparison of a disconnect switch with a transfer switch and added "by the NEC, a disconnect must have its line on top and load at bottom, because the handle must be in the up position." One cannot rely on a transfer switch as a means of disconnect. This is why there must be a disconnect on both the utilities line and the generators line before the transfer switch.

POCO rules.404.6C

54. Can I use the same conductor for the equipment grounding conductor and the grounding electrode conductor to the waterline located near a sub panel for a feeder? I believe you must install a separate conductor for the grounding electrode conductor as this serves a much different purpose than does the equipment grounding conductor and this should not be installed with the feeder conductors.

Connection to service GEC 250.66 -- EGC 250.122 See 250.104A2 for an exception

55. Can a grounding electrode conductor be run through the small 1/4 inch hole in a service panel without being clamped?

Yes, It is bonded to the enclosure

56. I would like to know if I could use 14/2 NM cable for the switch leg of a furnace safety switch, which also will include the fire-o-matic fused safety? These will be wired in series with the white feeding the fire-o-matic first then the safety switch. I will re-identify the white wires as hot conductors with black tape.

Yes. 200.7C2

57. Is it allowed by code in a residential setting with a 200A panelboard to measure the required 30" from the right side of the panelboard edge facing you and be 30" from the wall to the left of the panelboard?

Yes 110.26

58. I have a 4 unit apartment building, I am planning on installing 4 service disconnect switches with a 400 ampere service. Can I install 2 disconnect switches below the meters and install the other 2 service disconnects inside the apartment units? I have been told this is not acceptable and that all 4 service disconnects must be grouped together outside at the meter location or that all the

service disconnects must be located in each unit.
See **230.72 & 70A1 & exception to 71**

59. Can I secure NM cable with bent-over nails?
334.30 designed NOT to cause damage.

60. A shopping complex is receiving a facelift with new sheetrock and stucco for the front surfaces supporting the existing signs, some of which do not have listing labels. The signs are removed and re-installed. Do the non-labeled signs need to be replaced or re-evaluated and relabeled?

AHJ

61. Section 450.13 (B) of the NEC allows dry-type transformers 600 volts nominal or less and not exceeding 50 KVA to be installed in hollow spaces of buildings not permanently closed in by structure, provided they meet the ventilation requirements of 450.9 and separation from combustible material requirements of 450.21(A). Does this change if the space is above a suspended ceiling and used for return air on the heating and ventilation system of the building? How does Section 300.22(C)(2) of the NEC relate to this type of installation when the metal enclosure for the transformer is ventilated?

Maybe, must not add to products of combustion, plenum area, 300.22.C.2

62. A doublewide mobile home has a 7.7 KW rated cook top fed with 10/2 Romex and a 20A 2-pole breaker. The calculation came up with 32.83A, 7700W divided by 240V=32.8A. I also did it like this: 7000.7W divided by 240V=29.16A. What is the correct way to do this calculation?

7.7 KW = 7,700 Watts NOT 7000.7 Watts. First answer

63. I would like someone to clarify Art. 250.52 the different methods of grounding structural steel in buildings.

RTFM ---10 minute class.

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

No , protect from physical damage. No breakers, OK.

65. When facing the bathroom sink, the receptacle is on the wall to your right less than three feet from the sink but physically behind you. Does this comply with Section 210.52 (D) of the NEC?

L shaped wall -----]..... yes

66. Is it permissible by code to use an undersized neutral (#4) in a feeder for a mobile home? The reason I ask is because the supply house gave me #2-2-4-6 cable instead of the usual #2-2-2-4 and I didn't notice it until the cable was pulled in to

the conduit.

Yes refer to 550.10 A 310.15 and 220.160 ground from 250.122

67. Electrical nonmetallic tubing (ENT) can be installed for service entrance conductors for services 600-volt or less. Is there a maximum length permitted?
No. restrictions on length in buildings. Service conductor restrictions 230.43.6 & 230.70 A

68. A single, GFCI protected, grounding-type, twist-lock receptacle for a swimming pool pump is located between 5 and 10 feet from the inside wall of the pool, as allowed by 680.22(A)(1). The listed pool pump motor comes with a 2 ½ -foot cord and a standard, straight-blade 120v 15A cord cap. Is it permissible to cut off the molded cord cap to install a twist-lock male cord end?
check with mfr 110.3 B storable or permanent. Locking 5' non locking 10'

69. A 600-amp service is being installed. The installer has chosen to use a self-contained meter base with parallel conductors. He has provided multi-barrel lugs for the load side. Is this considered a tap? If so do the new “can’t round up” rules apply?
Service conductors cannot be tapped.. check 240.2 is it a tap.

70. I have a customer that wants to switch a paddle fan/light combo with 2 switches at each entrance to the room (so that the fan or light can be switched separately at each entrance). If I use a 14/2 and 14/3 for travelers and neutral between switch boxes and feed one end and take a 14/3 to the fan/light combo does this meet code? The 14/3 will be used for travelers and neutral and the 14/2 for the other set of travelers.
No 300.3 B Neutral not in 14/2

71. When sizing the GEC to bond a transformer to building steel should it be sized based on the primary or the secondary? Example Breaker in service = 100 A 480 volt / to 200 A 240 Volt lighting panel. Number eight Cu or number six Cu?
250.66 # 4 Cu.

72. Why does the new exception to NEC Section 210.63 eliminate the requirement for a 15-or 20- ampere- rated receptacle within 25-feet of air conditioning equipment at one- and two- family dwellings?
Exception refers to evaporators they are not AC compressors etc. In state rule. 210.52 E

73. Where a grounding electrode conductor is connected to a concrete-encased electrode, what is the minimum size conductor that may be used?
Based on service #8 Cu minimum #4 Cu maximum. All NOT allowed

74. I have a building with a utility-supplied 1200-ampere electrical service, 277/480 volt, 3-phase, 4-wire. This same building has a separate feeder from another building on the same property, which is supplied through an optional standby generator and appropriate transfer switch. Is it allowable to have these two different power supplies to the same building? They need the optional standby system for reliability of computer systems when normal power is interrupted.

Yes 230.2 Plaque, or permanent directory

75. Does PVC conduit have to be a certain length before an expansion joint is required in a horizontal run of 2" PVC under a mobile home?

See 352.44 temperature change

76. Are the splice plates on aluminum cable tray required to have an anti-oxidant such as Penetrox applied to them in a Class 1 Division 2 area?

Yes manufacturer.

77. The disconnect for the elevator controller must be capable of being locked in the open position. Can this be a circuit breaker with a breaker lock installed?

Yes 621.51A

78. We are finding air-conditioners installed that do not have the maximum rating of the branch-circuit short-circuit and ground-fault protective device on the nameplate. What should we do with these units?

Contact manufacturer or listing agency.

79. Is a bonding bushing required to be installed on an offset nipple where one end is screwed into a Myers hub mounted on the main disconnect enclosure and the other end installed into the bottom of a meter socket? These are service entrance conductors from the bottom of the meter to the top of the main disconnect (line side).

No the neutral is bonded.....offset nipples with straight threads have not been evaluated for weather proof.

80. When did grounded 3-prong receptacles become required by code?

My research shows sometime about 1945 ...section 2545 of the Code at that time Mike says 1956.

81. Is it permissible to switch a receptacle in the dining room?

Yes. Must be in addition to required & supplied from General purpose circuit.

82. A 480v 3 ϕ generator is installed as a standby source for a 4160 v service. When selecting the maximum overcurrent protection for the 480 to 4160 step-up transformer, which table applies? 450.3(A) is for transformers over 600 volts and 450.3(B) is for transformer 600 volts and less.

Protection may be in the primary or the secondary or both.

83. NM cables in a residential occupancy are run on top of the trusses. They are considered supported but do they still need to be stapled every 5'?

The difference between support and secure. See 334.30 note; 4 1/2 feet.

84. If a fusetrone-type fuse is installed to properly protect a refrigeration compressor in a grocery store, am I required to install a fusestat adapter to protect against possible over-fusing in the future?

Yes 240.52

85. I can use a little help with the NEC 25' tap rule. A licensed engineer is telling me that the tap conductors can enter an ATS on the normal side and continue from the load side to the fused disconnect. I feel this is a violation to section 240-21(B)(2)(b) due to the fact that the tap conductors will terminate in the ATS, not in the fused disconnect. Am I off base?

Must be adjacent to the transfer Switch.

86. I inspect an auto salvage parts business; the building they use to dismantle the automobiles has the auto lifts and other typical tools you would find in an automotive repair facility. In this facility the vehicle's gas tanks are removed before they are brought into the building. Would this area still need to be classified as a hazardous location in accordance with NEC 511.3? Would the 120-volt, 15 and 20-ampere receptacles need GFCI protection in accordance with 511.12?

No 511.3.....Maybe if still considered a garage 511.12

87. Where service conductors are increased in size due to voltage drop, is the grounding electrode conductor required to be increased in size?

EGC 250.122 Yes 250.66

88. What is the code on low bay lighting? Is it required to have a cord and plug or is this an option? If I use a cord (or if one is required) what is the min./max. length and does it have to be hard usage and terminate in a male plug cap, or can I hard wire and daisy chain? Also does it need to be a single receptacle?

See 410.30 .C

89. Are HVAC rooftop units considered electrical equipment? Would they require 3 feet of clearance on all sides of the unit? Where in the code would I find this?

Disconnect Only 110.26

90. When you have several separately derived systems entering a building at different locations around that building, do you have to identify each disconnect as it enters that premise, and post notification of the presence and location of all service entrances?

Yes, 230.2 & 225.7

91. We are using ENT on a job and pulling multiple 20-Ampere circuits in each raceway. Do we need a separate equipment-grounding conductor for each circuit?
Not necessarily 362.60 & 250.122 C

92. What does a 15-minute finish rating mean when applied to 518.4C? Does the 15-minute finish rating only apply to wood construction? Do the walls, floors and ceilings all need the 15-minute finish rating before ENT or RNC can be used?
See FPN /Doesn't apply to only wood. Applies to all parts of the construction.

93. For a service, is there a maximum number of sub panels and maximum size (amperage) of each? Example: 200A service and client wants 2-100A subs off of this. Can this be done this way and meet code?
Yes, Mfgr 110.3 B

94. Has 8/2 Romex with a #10 bare ground wire ever been allowed to feed a range receptacle? I saw this installation today, in a modular home that was built in 1979 and the manufacturer of the home installed the Romex. Isn't this supposed to be a 4-wire circuit? Was this ever allowed in a regular stick built house? All I have seen in my area is SEU used for this purpose and the neutral is bare. Bottom line this is installed and they need to replace the range with a new one. So can this be used with a 3-wire cord with the stove ground link attached to the range and the bare #10 used as the neutral and ground for the circuit?
See 250.140 Not included in exceptions to 250.140.

95. Is the steel beam supporting the wooden floor joists in a residence required to be bonded?
No see 250.104C

96. Is a closet located within a bedroom considered a separate room or does it need to be protected by the bedroom AFCI device? Would a door separating the closet from the bedroom make any difference in the ruling?
Closet serves the bedroom it is not the bedroom....2008 ALL circuits AFCI Indiana Exceptions

97. An island in a kitchen is not fastened to the structure and could be moved. Does it require a receptacle?
NO 210.52 C

98. Is each pedestal (containing a 30 and 20-ampere receptacle) in a RV facility required to have a ground rod installed? Are these pedestals classified as structures?
No .No

99. Can Romex be installed in outdoor conduit when its ambient is not exceeded? Does it comply with 334.10(A) when it is normally dry 95% of the time in most geographic locations?

No.....5 % wet

100.Has anyone heard of SER being listed as not needing to be protected from physical damage?

NO

101.Is there a requirement in the code like in Article 550 that addresses a maximum distance from the building to have a disconnect? I would like to have a pole-mounted service and then feed the building, which is 200' away. There will be a main breaker in the panel closest to the point of entrance inside the building. The service is on the pole and a feeder to the building. The service at the building is treated as a sub-panel with isolated neutral, 4 wires and also a grounding electrode system. Or in other words how far can the service disconnecting means be from the building?

Unspecified.....Logic would be for it to be in line of sight .

102.The local high school is making their swimming pool deeper by cutting the bottom out, including the bonding grid, thus increasing the depth and creating a diving well to comply with new swimming pool codes. The contractor says they will be using non-conductive, encapsulated (epoxy coated) steel rebar and it does not require connection to the bonding grid. I believe it must still be bonded. Who is correct?

680.26.B.1Do not bond to insulated rebar

103.We installed the wiring to a hot tub that is located three feet from the aluminum siding on a house. How can we bond the metal siding as required by Section 680.26?

Lug ...if needed

104.Is a mobile home feeder assembly required to be 4/0-4/0-4/0-2/0 Aluminum or is 4/0-4/0-2/0-2 aluminum permitted? They are both rated at 200A. I thought you needed a full size neutral and grounding conductor for a mobile home? Is there ever a reason when you are allowed to downsize a neutral and grounding conductor? If there isn't why do they make this cable combination?

See 550.10 A.....250.160.....& 310.15

105.When extending an existing bedroom circuit are we required to now protect the existing circuit with an AFCI?

Yes

106.What is the difference between a "Non-Incendive circuit" and an "Intrinsically Safe" circuit?

Non flammable and not capable of producing sparks or heat. FPNs use diferent references See 504 apparatus compared to circuits.

107.Can plastic boxes be used in a fire-rated ceiling?

Yes .check listing

108.A NEMA 3R panelboard is used for a temporary service. There are open knockouts on the side. Can a standard knockout closure be used to close this opening?

Yes

109.Is it acceptable to terminate two circuits on a single circuit breaker?

Yes .check listing

110.The condominium project we are wiring has utility closets that contain the central heating gas furnaces for the respective dwelling unit. A person cannot enter the closet and service work is done through the doorway. Is an additional lighting outlet required in these closets, or are the bedroom lighting outlets adequate?

Light & receptical to be able to service the unit. Does not need to be in the room. 210.63 & 210.70.3

111.Is a supplemental electrode required when you establish a Grounding Electrode System at another building like a detached garage? Does it need a 2nd ground rod if the 25 ohms is not met?

Yes 250.32

112.I have been seeing a standard residential-grade light switch used in a handy box for the furnace disconnect in place of the SSU-type device. Are there any rules for the switch such as motor-rated or heavy duty?

Hp rated. ? 422.32 & 430.109C.2

113.Are residential stairways required to contain lighting fixtures?

Yes Building Code.

114.I am using an old service panel as a splice box for the existing circuits. New phase conductors will be installed from the new panel to the old for each circuit. Can I use a # 3 AWG conductor as a common neutral for the five 20-Ampere circuits in this old 100-ampere panel now used as a splice box?

Yes & no box may not be accepted by AHJ . Neutral must be able to handle 60 amp. single ground OK

115.Can luminaires be mounted to nonmetallic device boxes?

On walls if listed for weight.

116.Why does listed and labeled electrical equipment come from the manufacturer with grounding lugs installed on painted surfaces which must be removed and cleaned to meet NEC compliance?

Threaded holes for grounding screws

117.Can an air conditioner be supplied from the panelboard in a mobile home?

Maybe not usually

118. Some rural utilities require the main disconnects on their poles. Are two ground rods required when one has a resistance greater than 25 ohms? Does the service equipment at the house also require ground rods?

Yes Yes 110.3B 550.20.B

119. I have a situation where an EGC will not fit on the neutral bar in the service equipment. I have tried to find a listed and same manufacturer add-on grounding lug kit to no avail. Except for the Article 110 listing requirement issue, is there anything wrong with installing a bolt-on lug of proper size and bolting it to the side of the panel with a nut and bolt?

Maybe.....Paint and corrosion need for finishing.

120. After I enter a rated elevator equipment room with low voltage fire alarm cable, do I have to run the cable in conduit?

? Yes 620.21

121. What is the height of the dedicated space above the panelboard in the basement of a dwelling?

Height of the equipment.....110.26 .3 E

122. Which code section covers direct burial phone and cable lines for a residential application? What is minimum burial depth?

300.5

123. If an appliance garage is installed on a counter top is a receptacle required in the garage?

No

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

Maybe IF listed for DB AND concrete 250.70 MOST are not listed.

125. What is the difference between a surge arrester and a transient voltage surge suppressor? What are the applications for each device?

??? 10 minute class for those that care.

126. What are the requirements for fluorescent fixtures in a commercial woodworking shop?

***maybe Class I, II, and III depending on sawing, sanding and coating or spraying
Maybe all three.***

127. Does the code allow a service-supplied AC system to be grounded at more than one accessible point on the line side of the service disconnect using separate grounding electrode conductors and rods? An example would be a connection at

the meter base and the service disconnect. Code reference is 250.24 (a) (1).
OK....GEC 250.24 A 5

128.Can a main disconnect for elevator power be locked in the “on” or closed position? Before rescuing stranded riders, firefighters have to open the main disconnect. If an elevator is malfunctioning causing an emergency, it might be necessary to open the disconnect quickly and the key might not be readily available. Does the NEC address this?

?620.51 Do not lock on Fire Dept. use Knox Box.

129.Section 410-8(d) (3) allows recessed incandescent fixtures to be installed in clothes closets, provided the lamp is completely enclosed and a minimum clearance of 6 inches between the fixtures and the nearest point of a storage space. Can a recessed incandescent fixture be installed without being completely enclosed in a clothes closet, such as a large closet where the clothes are at least 8 feet away from the fixture?

NO....410.8B.

130.Does the individual occupant of a multi-family dwelling have to have access to all the branch circuit overcurrent devices in the dwelling or just those for his own unit? What about common-area circuits?

See 240.24

131.What types of wiring methods are acceptable for use in a animal facility (horses, cows, pigs). Can UF cable be used in areas not accessible to the animals? Can EMT be used in these types of facilities or is PVC conduit and nonmetallic boxes the required wiring method?

See 110.11 corrosion See also 547 ag. buildings State rules exempting same.

132.Can listed fire alarm systems be installed in standard EMT now that red-colored EMT is available?

Yes..must be identified. May use red paint, etc. in the field.

133.Section 680.72 of the NEC says that if a hydromassage bathtub is installed in a bedroom, the bedroom is considered a bathroom for the installation of luminaires (lighting fixtures), switches, receptacles and other electrical equipment not directly associated with the hydromassage bathtub. Does this mean that all receptacles in the bedroom are required to be GFCI-protected and fed from a 20-ampere branch circuit?

Yes to GFI.210.8.no to all on 20 A circuit.....may also mean AFCI

134.Can intrinsically-safe conductors be installed in the same raceway with non-intrinsically safe wiring?

No 504.30

135.Are grounding electrode conductors permitted to be paralleled? Could two No.

1/0 copper conductors be used in place of a 3/0 for the grounding electrode conductor of a service over 1100 kcmil?

May parallel BUT each must be the full size per 250.66 That is you may parallel 2 # 3/0

136. We installed the duplex receptacle in the pit of an elevator as required. We also installed a single receptacle on the same circuit ahead of the GFCI protection for the sump pump located in the elevator pit. Is this acceptable?

Yes. 620.85

Panel Members and Assignments:

Jerry Blair	1, 9,17,25,33,41,49,57,65,73,81,89,97,105,113,121,129
Charlie Eldridge	2,10,18,26,34,42,50,58,66,74,82,90,98,106,114,122,130,
David Kendall	3,11,19,27,35,43,51,59,67,75,83,91,99,107,115,123,131
Tom Lichtenstein	4,12,20,28,36,44,52,60,68,76,84,92,100,108,116,124,132
Alan Manche	5,13,21,29,37,45,53,61,69,77,85,93,101,109,117,125,133
Alan Nadon	6,14,22,30,38,46,54,62,70,78,86,94,102,110,118,126,134
Phil Simmons	7,15,23,31,39,47,55,63,71,79,87,95,103,111,119,127,135
Bud Swathwood	8,16,24,32,40,48,56,64,72,80,88,96,104,112,120,128,136

Iaei questions 2 07 Charlie Eldridge

NEC CODE QUESTIONS

INDIANA CHAPTER MEETING

February 7– 9, 2007

1. A building has 277-volt lighting and 120 volt receptacles. None of the circuits share the same raceways or junction boxes. Do the neutrals have to be identified by different colors, stripes, etc.?

2. For a big house I am installing a 600-amp service. It needs a Current Transformer (C.T.) cabinet. The conduit to it and the panel is rigid non-metallic. Can I use the # 6 Cu from the panel to the C.T. cabinet and then to the ground rod to bond everything together?

Since the CT cabinet should be bonded to the neutral; a bonding or grounding jumper is not required from the CT cabinet to the service equipment. A #6 GEC “shall be made at any accessible point from the load end of the service drop or service lateral to and including the terminal or bus to which the grounded service conductor is connected at the service disconnecting means.”

References: 250.142(A)(1), 250.24(A)(1), and 250.66(A).

250.142 Use of Grounded Circuit Conductor for Grounding Equipment

(A) Supply-Side Equipment A grounded circuit conductor shall be permitted to ground non-current-carrying metal parts of equipment, raceways, and other enclosures at any of the following locations:

- (1) On the supply side or within the enclosure of the ac service-disconnecting means

250.24 Grounding Service-Supplied Alternating-Current Systems

(A) System Grounding Connections

- (1) General The connection shall be made at any accessible point from the load end of the service drop or service lateral to and including the terminal or bus to which the grounded service conductor is connected at the service disconnecting means.

250.66 Size of Alternating-Current Grounding Electrode Conductor

(A) Connections to Rod, Pipe, or Plate Electrodes Where the grounding electrode conductor is connected to rod, pipe, or plate electrodes as permitted in 250.52(A)(5) or (A)(6), that portion of the conductor that is the sole connection to the grounding electrode shall not be required to be larger than 6 AWG copper wire or 4 AWG aluminum wire.

3. Can I use EMT thin wall conduit in a free stall barn?
4. The number four, bare, stranded, copper, from the concrete encased electrode to the panel is too big to fit in one of the lugs on the ground bar. Is it O.K. to put five strands in one terminal and four in the other?
5. Are all vending machines that don't have built-in GFCI protection required to plug into a GFCI receptacle?
6. I have a water heater located next to the furnace. The water heater has a booster fan for the exhaust. There is a duplex receptacle on the furnace for the electronic filter is it permissible to plug the water heater fan into this receptacle?
7. Can pipe be used as a made electrode? And if so are there any size requirements?
8. In a general care patient room bed location is there a minimum number of receptacles required? And do these receptacles require separate circuits?

9. A new manufacturing building has 12 lighting circuits. The panel directory list them as LIGHTS, GENERAL AREA. The inspector marked it as a violation. I say it complies with 110.22 who is right?

10. Do I have to adjust conductor ampacity per NEC table 310.15(B)(2)(a) for more than 3 current-carrying conductors in a raceway service mast? This mast is on the line side of the utility meter.

Yes, these conductors are part of the Premises Wiring (System) which is on the load side of the Service Point.

References: the definitions of Premises Wiring (System) and Service Point.

Premises Wiring (System). That interior and exterior wiring, including power, lighting, control, and signal circuit wiring together with all their associated hardware, fittings, and wiring devices, both permanently and temporarily installed, that extends from the service point or source of power, such as a battery, a solar photovoltaic system, or a generator, transformer, or converter windings, to the outlet(s). Such wiring does not include wiring internal to appliances, luminaires (fixtures), motors, controllers, motor control centers, and similar equipment.

Service Point. The point of connection between the facilities of the serving utility and the premises wiring.

11. Is it required to have a gem box inside of a wall for a battery back up fixture on a wall, or can it be directly wired with flexible metal conduit?
12. Are vending machines that are not refrigerated required to be GFCI protected?
13. I installed a lug screwed to the disconnect with the mounting screw that holds the disconnect to the wall. I attached the G.E.C. to the lug. Is this a violation if the lug is UL listed for Cu & Aluminum?
14. Can a receptacle be placed directly behind a stove or sink that has only two inches of space between it and the wall?
15. Most cell towers have one or more modular equipment buildings. These buildings are grounded to the cell tower ground ring. The building has an insulated floor between it and the concrete slab it sits on. I have never seen any slab where the rebar in this slab is grounded. Should this rebar be bonded to the ring?

16. Do the rules protecting NM cable in unfinished basement Art.334.15(C) apply to the metal flex (Greenfield) as well as EMT?

17. In a new house the toilet stool is in an alcove just past the sink. The owner wants a receptacle near the stool for a portable heater. If I put it on a separate circuit does it have to be GFI protected?

18. Portable MRI trailers are traveling from location to location. The electric services to power these machines are all different. Are there any proposals for the 2008 code cycle to standardize configurations?

Not that I know of but someone else may know.

19. I am currently designing an electrical system for a funeral home that also contains living quarters. The chapel is designed to hold more than 100 people, and is not divided from the rest of the building by fire-rated walls; the construction material is wooden studs. The NEC prohibits the use of romex, but I am unclear as to whether I can install non-metallic flexible conduit. It is also unclear if the entire building will need to be run in conduit or just the chapel area.

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

21. In a commercial building the owner wants to place a sub panel at the end of the sink. It will only have 6 inches of clearance from the end of the sink to the panel. Would this comply with the Code?

22. Is there a section of any code (NEC, Life Safety etc.), which would require mandatory night lighting? Not emergency lighting, but general-purpose night lighting in commercial & industrial applications.

23. When a UFER ground is installed, is a supplemental electrode required? If one is required do I need 2 rods and do they have to be 6' min. away from each other and the foundation? (Since this is also used as an electrode) Can the #4 grounding electrode conductor be run through bored holes in the 2x10's to the panel?

24. There are facilities where you can go and prepare a meal and then take them home and cook them. Do these fall under Article 210.8(B)(2) Commercial kitchens?
25. I need to splice a 2-wire #18 thermostat wire. Does this splice need to be accessible? This is in a garage that is going to have a fire rated ceiling installed over the splice.

26. When a utility company such as AT&T or DTE energy install equipment on the ground on public/easement, should the AHJ be enforcing the National Electric Code or does the utility enforce the NESC and “self police” their work?

DTE energy was Detroit Edison, AT&T was SBC . . . UH . . . IBT . . . UH . . . make that AT&T or Ma Bell. Actually in 1910, it was the Central Union Telephone Company and we were Indianapolis Light and Heat.

Due to the provisions of 90.2(B)(4) and (5), utilities are “generally” exempted from the requirements of the Indiana Electrical Code but are “generally” covered by the requirements of the National Electrical Safety Code. The courts will enforce the requirements of the National Electrical Safety Code and is the AHJ. The National Electrical Safety Code is adopted into law just like the National Electrical Code is adopted. Whenever we are working in the public rights-of-way in the state of Indiana, a registered professional engineer is required to be responsible for the engineering. The standards are all signed by a PE at IPL and, I assume, the same is done at other utilities. As long as the work orders meet the standards, the PE has signed off on the work. Anything that is done outside of the standards must be checked and signed by a PE.

In utility buildings that are accessible to the public and are considered to be Class 1 or 2 structures are covered by the Indiana Electrical Code. Examples are our office and maintenance buildings but not buildings where we generate power or in the central office of a telephone company.

References: 90.2(B)(4) and (5)

90.2 Scope

(B) Class 1 and Class 2 structures covered by the Indiana Residential Code shall be made to comply with the provisions of this code or the electrical provisions of the Indiana Residential Code (675 IAC 14).

Not covered. This code does not cover:

- (4) Installations of communication equipment under the exclusive control of communication utilities, located outdoors or in building spaces used exclusively for such installations.
- (5) Installations, including associated lighting under the exclusive control of electric utilities for the purpose of communication, or metering; or for the generation, control, transformation, transmission, and distribution of electric energy located in buildings used exclusively by utilities for such purposes or located outdoors on property owned or leased by the utility or on public highways, streets, roads, etc., or outdoors on private property by established rights such as easements.

27. In NEC Art. 514 PVC conduit is run under 2' of cover to the dispenser location with the transition to rigid conduit at the last 2' of underground. Is there anything special that has to be done at the transition point? Is the required equipment grounding conductor all that is required?
28. Record-keeping computer stations are being installed within patient bedrooms at a large hospital. There is a PC, a monitor, and a printer all connected to a listed, re-locatable power tap with surge protection for the electronics. The UL white book states that re-locatable power taps have not been investigated for use in patient care areas. What are we supposed to do?
29. In a residential garage, on a sub-panel installation of 4- two wire branch circuits I say that the minimum feeder ampacity should be 60Amps, based on the fact that the disconnecting means must be rated at 60 Amps by code. My co-worker says that it is based on the computed load and could be 40Amps or 50Amps.
30. Does an outdoor hot tub need a disconnect as per 680.12? Does it need a general-purpose receptacle as per 680.22(3)? This is to be installed at a single-family residence outside on a deck. Also this is a manufactured home, if that makes a difference.
31. Art. 250.66(B) says grounding electrode conductor for a UFER ground shall not be required to be larger than a #4 copper wire. We often see design engineers spec larger than #4 copper. Does this additional sizing improve the grounding capabilities or is this just wasted wire?
32. Can someone clarify code section 200.7(C)(2)? Does this mean that the white conductor in a 14/3 Romex cannot be used for the return conductor to the light? I see this used all the time for the return conductor. It is typically not re-identified and usually at the end of the line (single gang box with a 3-way switch installed) where the feed is on the opposite end and the light feed is in the same junction box (in the middle of the run) as the 14/3 to the switch. If it can't be used as the return, can it be used as a traveler instead and re-identified to meet code?

33. I noticed that my Dentist's exam rooms have hospital grade receptacles. Are they required?

34. Art. 230 of the NEC only allows one service drop to a building. If the service size is large and the installer decides to parallel conductors and use the 6-disconnect rule do the conductors have to be joined at the weather head on the building? The two or more service drops are joined at the utility pole load end. If they are not electrically joined at the building end could this be considered more than one service to the building?

310.4 gives the requirements for paralleling conductors and they are not paralleled if they are not connected together at both ends. You are indeed permitted more than one service drop in one location. 230.2 gives you a list of acceptable reasons to have multiple service drops or service laterals (large services is one of them). Going to 230.71, you find that you are permitted up to six disconnecting means for each service permitted in 230.2. 230.72 requires each set of up to six disconnecting means for each service to be grouped.

The answer to the first question is yes if the conductors are to be paralleled. The answer to the second question is yes

References: 310.4, 230.2, 230.71, and 230.72

35. Where in the 2005 code does it state that romex cannot directly feed the dishwasher (romex in wall wired directly to the dishwasher junction box) or is it just a protection issue and needs to be sleeved in flex from wall to the dishwasher junction box?

36. The local sheet metal shop fabricates pull and junction boxes as well as wireways for us. Can we use a non-listed J-box, wireway or auxiliary gutter for equipment grounding? Are wireways listed for grounding?

37. Is it acceptable to splice equipment grounding conductors together in a service panel and then pigtail one conductor to connect to them to the neutral bar?

38. Can you explain Figure 210.52 of the NEC? Is an additional receptacle required in the space behind the appliance if the distance is greater than the X dimension or can the receptacle(s) close to the appliance serve the space?

39. A flexible gas line manufacturer wants the gas line bond wire to be “at a minimum the full amperage available through the electrical service.” Should this wire be sized from table 250.66 or 250.122 ?

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

41. Can a 20-ampere single receptacle be installed on a 15-ampere circuit?

42. When a local utility sells its high voltage lines and substation to a holding company from out of state, are they considered a utility and then exempt under Section 90.2(B)(5)?

Maybe. If the buyer is an electric utility, as determined by the state of Indiana, then 90.2(B)(5) would apply. However, if the buyer is a utility customer that has just purchased the billing inventory, the service location has just moved to the property line and the downstream facilities are covered in Article 225.

References: 90.2(B)(5), 90.2(B)(5) FPN, and Article 225

43. We have a 3-foot section of EMT between two cabinets. Is additional support required on the raceway?

44. I was told that I could not plug one extension cord into another on a construction site. The NEC does not seem to prohibit this practice. Where do I find such information?

45. Why are some panelboards listed for tandem (mini) breakers and some are not? Can you explain the listing requirements or testing that is done for the panelboards in order for them to be acceptable to have tandem breakers installed?

46. Can the required disconnecting means for a 120V air handler / remote AC be a 15A single pole switch mounted to the unit as in furnace applications? Or do I need a disconnecting means on the unit if the panel is in sight of the unit?

47. There is a lot of resistance in using a Ufer ground because many believe if there is a lightning strike or power surge it will crack the concrete. Is there any way to prevent this?
48. How do I know if a recessed luminaire can be installed in an hourly fire-rated assembly?
49. Does the metal faucet on a hydromassage tub need to be bonded the same as the circulating pump motor when the tub is supplied with plastic water pipes?
- 50. We see a few liquid gas storage tanks that hold about 500 gallons of gas and have an electric pump mounted on the top. Inquiring minds want to know how this pump is to be wired. This is usually considered a temporary installation and sometimes is relocated to a new site. The pump has a 6-foot cord on it and will occasionally be plugged into an existing outlet via an extension cord.**

I am assuming this is a gasoline storage tank. My first thought is to go to Article 590 and look at the scope. “The provisions of this article apply to temporary electrical power and lighting installations.” If this is for a construction site, this Article does apply. 590.2(A) directs you to the requirements of the Code “except as specifically modified in this article”.

Now we go to 514.3(B)(1) which then refers you to Table 515.3 for the purpose of delineating and classifying aboveground tanks. After going to Table 515.3 and looking at the part of the table that covers Tank – aboveground, the engineer will determine if the electric pump is inside a classified area or if it is to be considered to be in an unclassified area. The AHJ nor the electrician has any business trying to determine the classification of the area but 500.4(A) is to be followed and it requires locations be properly documented.

References: Article 590, 514.3(B)(1), Table 515.3, and 500.4(A)

500.4 General

(A) Documentation All areas designated as hazardous (classified) locations shall be properly documented. This documentation shall be available to those authorized to design, install, inspect, maintain, or operate electrical equipment at the location.

51. Section 334.10 allows NM cable in multifamily dwellings and other structures of any height provided they are of Types III, IV, and V. construction. How many floors or how high can these Types of construction go?

52. I noticed that the speaker wire they sell at the hardware store comes with and without listings although they appear to be the same wire. What is the difference?
53. I was told, "When wiring transfer switches, the utility conductors must go on top and the generator conductors on the bottom". I searched and searched but could not find anywhere in the NEC that made this statement. It would seem to me that it is a matter of personal preference and/or popular consensus but not an NEC requirement. This person made the comparison of a disconnect switch with a transfer switch and added "by the NEC, a disconnect must have its line on top and load at bottom, because the handle must be in the up position." One cannot rely on a transfer switch as a means of disconnect. This is why there must be a disconnect on both the utilities line and the generators line before the transfer switch.

End of the day 2/7/07

2/8/07 By Associated Press, DECATUR, Ill. - Scott Wiese, a die-hard Chicago Bears fan, will legally change his name to that of Indianapolis Colts quarterback Peyton Manning after signing a pledge in front of a crowd at a Decatur bar last Friday night. He vowed to adopt Manning's name if the Bears lost Sunday's Super Bowl.

The final score was Colts 29, Bears 17.

So on Tuesday, Wiese went to the Macon County Courts Facility and started the process of changing his name.

53A (Hand in question). Where are two phase motors used as per table 430.249?

A two phase system is the original multiphase system designed by Nikola Tesla and did not do well over long distances. The Scott transformer connections are used to interconnect three phase systems and two phase systems. A Scott connected teaser transformer has an 86.6% tap. The main transformer has a center tap. When converting from three phase systems to two phase, the connection is made from the center tap to the 86.6% tap on the secondary side. The remaining 13.4% of the teaser coil is wasted. The vector diagram will look like a T and the voltages will be taken from the ends of the teaser and the main transformer as a delta configuration to run motors. This configuration is not used much anymore. The last places I have heard that uses it much is in the

New York State and Philadelphia areas.

54. Can I use the same conductor for the equipment grounding conductor and the grounding electrode conductor to the waterline located near a sub panel for a feeder? I believe you must install a separate conductor for the grounding electrode conductor as this serves a much different purpose than does the equipment grounding conductor and this should not be installed with the feeder conductors.
55. Can a grounding electrode conductor be run through the small 1/4 inch hole in a service panel without being clamped?
56. I would like to know if I could use 14/2 NM cable for the switch leg of a furnace safety switch, which also will include the fire-o-matic fused safety? These will be wired in series with the white feeding the fire-o-matic first then the safety switch. I will re-identify the white wires as hot conductors with black tape.
57. Is it allowed by code in a residential setting with a 200A panelboard to measure the required 30" from the right side of the panelboard edge facing you and be 30" from the wall to the left of the panelboard?

58. I have a 4 unit apartment building, I am planning on installing 4 service disconnect switches with a 400 ampere service. Can I install 2 disconnect switches below the meters and install the other 2 service disconnects inside the apartment units? I have been told this is not acceptable and that all 4 service disconnects must be grouped together outside at the meter location or that all the service disconnects must be located in each unit.

You may install the first two disconnecting means grouped at the meter location and the remaining disconnecting means inside where up to six means of disconnecting may be used at each location. This is assuming that the service disconnecting means is installed at a readily accessible location either outside of the building or inside nearest the point of entrance of the service conductors.

References: 230.70(A)(1), 230.40 Exception 1, and 230.72

230.70 General (A) Location

- (1) Readily Accessible Location** The service disconnecting means shall be installed at a readily accessible location either outside of a building or structure or inside nearest the point of entrance of the service conductors.

230.72 Grouping of Disconnects

(A) General The two to six disconnects as permitted in 230.71 shall be grouped.

230.40 Number of Service-Entrance Conductor Sets

Each service drop or lateral shall supply only one set of service-entrance conductors.

Exception No. 1: A building shall be permitted to have one set of service-entrance conductors for each service, as defined in 230.2, run to each occupancy or group of occupancies.

59. Can I secure NM cable with bent-over nails?
60. A shopping complex is receiving a facelift with new sheetrock and stucco for the front surfaces supporting the existing signs, some of which do not have listing labels. The signs are removed and re-installed. Do the non-labeled signs need to be replaced or re-evaluated and relabeled?
61. Section 450.13 (B) of the NEC allows dry-type transformers 600 volts nominal or less and not exceeding 50 KVA to be installed in hollow spaces of buildings not permanently closed in by structure, provided they meet the ventilation requirements of 450.9 and separation from combustible material requirements of 450.21(A). Does this change if the space is above a suspended ceiling and used for return air on the heating and ventilation system of the building? How does Section 300.22(C)(2) of the NEC relate to this type of installation when the metal enclosure for the transformer is ventilated?
62. A doublewide mobile home has a 7.7 KW rated cook top fed with 10/2 Romex and a 20A 2-pole breaker. The calculation came up with 32.83A, 7700W divided by 240V=32.8A. I also did it like this: 7000.7W divided by 240V=29.16A. What is the correct way to do this calculation?
63. I would like someone to clarify Art. 250.52 the different methods of grounding structural steel in buildings.
64. A sprinkler pipe has been installed above the meter stack in an eight unit multifamily dwelling. There is a 100-Ampere breaker located beneath each meter. Does the pipe violate the dedicated equipment space requirement of NEC Section 110.26 (F)? What if there were no breakers in the meter stack?
65. When facing the bathroom sink, the receptacle is on the wall to your right less than three feet from the sink but physically behind you. Does this comply with Section 210.52 (D) of the NEC?

66. Is it permissible by code to use an undersized neutral (#4) in a feeder for a mobile home? The reason I ask is because the supply house gave me #2-2-4-6 cable instead of the usual #2-2-2-4 and I didn't notice it until the cable was pulled in to the conduit.

550.33 has no requirements for a full size neutral conductor; therefore, 220.61 must be followed. However, I can't imagine an installation where the reduced neutral size would be a problem for a mobile or manufactured home but the manufacturer's instructions must be followed if such instructions are included. Alan Nadon is the acknowledged expert on manufactured housing and I will defer to him for clarification.

References: 550.33 and 220.61

67. Electrical nonmetallic tubing (ENT) can be installed for service entrance conductors for services 600-volt or less. Is there a maximum length permitted?
68. A single, GFCI protected, grounding-type, twist-lock receptacle for a swimming pool pump is located between 5 and 10 feet from the inside wall of the pool, as allowed by 680.22(A)(1). The listed pool pump motor comes with a 2 ½ -foot cord and a standard, straight-blade 120v 15A cord cap. Is it permissible to cut off the molded cord cap to install a twist-lock male cord end?
69. A 600-amp service is being installed. The installer has chosen to use a self-contained meter base with parallel conductors. He has provided multi-barrel lugs for the load side. Is this considered a tap? If so do the new "can't round up" rules apply?
70. I have a customer that wants to switch a paddle fan/light combo with 2 switches at each entrance to the room (so that the fan or light can be switched separately at each entrance). If I use a 14/2 and 14/3 for travelers and neutral between switch boxes and feed one end and take a 14/3 to the fan/light combo does this meet code? The 14/3 will be used for travelers and neutral and the 14/2 for the other set of travelers.
71. When sizing the GEC to bond a transformer to building steel should it be sized based on the primary or the secondary? Example Breaker in service = 100 A 480 volt / to 200 A 240 Volt lighting panel. Number eight Cu or number six Cu?

72. Why does the new exception to NEC Section 210.63 eliminate the requirement for a 15- or 20- ampere rated receptacle within 25-feet of air conditioning equipment at one- and two- family dwellings?

73. Where a grounding electrode conductor is connected to a concrete-encased electrode, what is the minimum size conductor that may be used?

74. I have a building with a utility-supplied 1200-ampere electrical service, 277/480 volt, 3-phase, 4-wire. This same building has a separate feeder from another building on the same property, which is supplied through an optional standby generator and appropriate transfer switch. Is it allowable to have these two different power supplies to the same building? They need the optional standby system for reliability of computer systems when normal power is interrupted.

Two sources of supply in this case are permitted by 225.30(A) in either (2), (3), or (4). Additionally, a permanent plaque or directory shall be installed at each feeder and branch-circuit disconnect location denoting all other services, feeders, or branch circuits supplying that building.

References: 225.30 and 225.37

225.30 Number of Supplies

Where more than one building or other structure is on the same property and under single management, each additional building or other structure that is served by a branch circuit or feeder on the load side of the service disconnecting means shall be supplied by only one feeder or branch circuit unless permitted in 225.30(A) through (E). For the purpose of this section, a multiwire branch circuit shall be considered a single circuit.

(A) Special Conditions Additional feeders or branch circuits shall be permitted to supply the following:

- (1) Fire pumps
- (2) Emergency systems
- (3) Legally required standby systems
- (4) Optional standby systems
- (5) Parallel power production systems
- (6) Systems designed for connection to multiple sources of supply for the purpose of enhanced reliability

(B) Special Occupancies By special permission, additional feeders or branch circuits shall be permitted for either of the following:

- (1) Multiple-occupancy buildings where there is no space available for supply equipment accessible to all occupants
- (2) A single building or other structure sufficiently large to make two or more supplies necessary

(C) Capacity Requirements Additional feeders or branch circuits shall be permitted

where the capacity requirements are in excess of 2000 amperes at a supply voltage of 600 volts or less.

(D) Different Characteristics Additional feeders or branch circuits shall be permitted for different voltages, frequencies, or phases or for different uses, such as control of outside lighting from multiple locations.

(E) Documented Switching Procedures Additional feeders or branch circuits shall be permitted to supply installations under single management where documented safe switching procedures are established and maintained for disconnection.

225.37 Identification

Where a building or structure has any combination of feeders, branch circuits, or services passing through it or supplying it, a permanent plaque or directory shall be installed at each feeder and branch-circuit disconnect location denoting all other services, feeders, or branch circuits supplying that building or structure or passing through that building or structure and the area served by each.

Exception No. 1: A plaque or directory shall not be required for large-capacity multibuilding industrial installations under single management, where it is ensured that disconnection can be accomplished by establishing and maintaining safe switching procedures.

Exception No. 2: This identification shall not be required for branch circuits installed from a dwelling unit to a second building or structure.

75. Does PVC conduit have to be a certain length before an expansion joint is required in a horizontal run of 2" PVC under a mobile home?
76. Are the splice plates on aluminum cable tray required to have an anti-oxidant such as Penetrox applied to them in a Class 1 Division 2 area?
77. The disconnect for the elevator controller must be capable of being locked in the open position. Can this be a circuit breaker with a breaker lock installed?
78. We are finding air-conditioners installed that do not have the maximum rating of the branch-circuit short-circuit and ground-fault protective device on the nameplate. What should we do with these units?
79. Is a bonding bushing required to be installed on an offset nipple where one end is screwed into a Myers hub mounted on the main disconnect enclosure and the other end installed into the bottom of a meter socket? These are service entrance conductors from the bottom of the meter to the top of the main disconnect (line side).

Lunch

80. When did grounded 3-prong receptacles become required by code?

81. Is it permissible to switch a receptacle in the dining room? yes, 210.52(B) Exc.1

82. A 480v 3 ϕ generator is installed as a standby source for a 4160 v service. When selecting the maximum overcurrent protection for the 480 to 4160 step-up transformer, which table applies? 450.3(A) is for transformers over 600 volts and 450.3(B) is for transformer 600 volts and less.

I believe 450.3(B) is to be used since the primary of this transformer is 600 Volts and Less. After looking at the transformer protection, the secondary conductors will need protection in accordance with Article 240. Overcurrent protection in this section could also satisfy Article 240 for overcurrent protection of the secondary conductors but the requirements are different, so the overcurrent device may not protect the secondary conductors.

References: 450.3(B), 240.4, 240.21, 240.100, and 240.101

83. NM cables in a residential occupancy are run on top of the trusses. They are considered supported but do they still need to be stapled every 5'?

84. If a fusetrion-type fuse is installed to properly protect a refrigeration compressor in a grocery store, am I required to install a fusestat adapter to protect against possible over-fusing in the future?

85. I can use a little help with the NEC 25' tap rule. A licensed engineer is telling me that the tap conductors can enter an ATS on the normal side and continue from the load side to the fused disconnect. I feel this is a violation to section 240-21(B)(2)(b) due to the fact that the tap conductors will terminate in the ATS, not in the fused disconnect. Am I off base?

86. I inspect an auto salvage parts business; the building they use to dismantle the automobiles has the auto lifts and other typical tools you would find in an automotive repair facility. In this facility the vehicle's gas tanks are removed before they are brought into the building. Would this area still need to be classified as a hazardous location in accordance with NEC 511.3? Would the 120-volt, 15 and 20-ampere receptacles need GFCI protection in accordance with 511.12?

87. Where service conductors are increased in size due to voltage drop, is the grounding electrode conductor required to be increased in size?

88. What is the code on low bay lighting? Is it required to have a cord and plug or is this an option? If I use a cord (or if one is required) what is the min./max. length and does it have to be hard usage and terminate in a male plug cap, or can I hard wire and daisy chain? Also does it need to be a single receptacle?
89. Are HVAC rooftop units considered electrical equipment? Would they require 3 feet of clearance on all sides of the unit? Where in the code would I find this?

90. When you have several separately derived systems entering a building at different locations around that building, do you have to identify each disconnect as it enters that premise, and post notification of the presence and location of all service entrances?

Yes

Reference: 225.37

225.37 Identification

Where a building or structure has any combination of feeders, branch circuits, or services passing through it or supplying it, a permanent plaque or directory shall be installed at each feeder and branch-circuit disconnect location denoting all other services, feeders, or branch circuits supplying that building or structure or passing through that building or structure and the area served by each.

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91. We are using ENT on a job and pulling multiple 20-Ampere circuits in each raceway. Do we need a separate equipment-grounding conductor for each circuit?
92. What does a 15-minute finish rating mean when applied to 518.4(C)? Does the 15-minute finish rating only apply to wood construction? Do the walls, floors and ceilings all need the 15-minute finish rating before ENT or RNC can be used?
93. For a service, is there a maximum number of sub panels and maximum size (amperage) of each? Example: 200A service and client wants 2-100A subs off of this. Can this be done this way and meet code?

94. Has 8/2 Romex with a #10 bare ground wire ever been allowed to feed a range receptacle? I saw this installation today, in a modular home that was built in 1979 and the manufacturer of the home installed the Romex. Isn't this supposed to be a 4-wire circuit? Was this ever allowed in a regular stick built house? All I have seen in my area is SEU used for this purpose and the neutral is bare. Bottom line this is installed and they need to replace the range with a new one. So can this be used with a 3-wire cord with the stove ground link attached to the range and the bare #10 used as the neutral and ground for the circuit?
95. Is the steel beam supporting the wooden floor joists in a residence required to be bonded?
96. Is a closet located within a bedroom considered a separate room or does it need to be protected by the bedroom AFCI device? Would a door separating the closet from the bedroom make any difference in the ruling?
97. An island in a kitchen is not fastened to the structure and could be moved. Does it require a receptacle?

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

In my opinion, no and no. I look at these as distribution panelboards but not individual structures since it is not built or constructed in the field. 551.75 doesn't make a statement about a grounding electrode so you are left with the question of the definition of structure.

References: Article 100 and 551.75

Structure. That which is built or constructed.

99. Can Romex be installed in outdoor conduit when its ambient is not exceeded? Does it comply with 334.10(A) when it is normally dry 95% of the time in most geographic locations?
100. Has anyone heard of SER being listed as not needing to be protected from physical damage?
101. Is there a requirement in the code like in Article 550 that addresses a maximum distance from the building to have a disconnect? I would like to have a

pole-mounted service and then feed the building, which is 200' away. There will be a main breaker in the panel closest to the point of entrance inside the building. The service is on the pole and a feeder to the building. The service at the building is treated as a sub-panel with isolated neutral, 4 wires and also a grounding electrode system. Or in other words how far can the service disconnecting means be from the building?

102. The local high school is making their swimming pool deeper by cutting the bottom out, including the bonding grid, thus increasing the depth and creating a diving well to comply with new swimming pool codes. The contractor says they will be using non-conductive, encapsulated (epoxy coated) steel rebar and it does not require connection to the bonding grid. I believe it must still be bonded. Who is correct?

103. We installed the wiring to a hot tub that is located three feet from the aluminum siding on a house. How can we bond the metal siding as required by Section 680.26?

104. Is a mobile home feeder assembly required to be 4/0-4/0-4/0-2/0 Aluminum or is 4/0-4/0-2/0-2 aluminum permitted? They are both rated at 200A. I thought you needed a full size neutral and grounding conductor for a mobile home? Is there ever a reason when you are allowed to downsize a neutral and grounding conductor? If there isn't why do they make this cable combination?

105. When extending an existing bedroom circuit are we required to now protect the existing circuit with an AFCI?

106. What is the difference between a “Non-Incendive circuit” and an “Intrinsically Safe” circuit?

The key difference is a nonincendive circuit is designed to not produce energy levels sufficient enough to cause an explosion under normal operating conditions, on the hand an Intrinsically Safe Circuit is designed to not produce energy levels sufficient for and explosion under normal “or” abnormal conditions.

Subsequently, in order to qualify for either of the prescribed systems, compliance with the applicable requirements in the respective articles must be adhered to.

Thanks to Mike Forister for providing the correct answer for this question.

References: 500.2 and 504.2

500.2 Definitions

Nonincendive Circuit. A circuit, other than field wiring, in which any arc or thermal effect produced under intended operating conditions of the equipment is not capable, under specified test conditions, of igniting the flammable gas–air, vapor–air, or dust–air mixture.

FPN: Conditions are described in ANSI/ISA 12.12.01-2000, Nonincendive Electrical Equipment for Use in Class I and II, Division 2, and Class III, Divisions 1 and 2 Hazardous (Classified) Locations.

504.2 Definitions

Intrinsically Safe Circuit. A circuit in which any spark or thermal effect is incapable of causing ignition of a mixture of flammable or combustible material in air under prescribed test conditions.

FPN: Test conditions are described in ANSI/UL 913-1997, Standard for Safety, Intrinsically Safe Apparatus and Associated Apparatus for Use in Class I, II, and III, Division 1, Hazardous (Classified) Locations.

107. Can plastic boxes be used in a fire-rated ceiling?
108. A NEMA 3R panelboard is used for a temporary service. There are open knockouts on the side. Can a standard knockout closure be used to close this opening?
109. Is it acceptable to terminate two circuits on a single circuit breaker?
110. The condominium project we are wiring has utility closets that contain the central heating gas furnaces for the respective dwelling unit. A person cannot enter the closet and service work is done through the doorway. Is an additional lighting outlet required in these closets, or are the bedroom lighting outlets adequate?
111. Is a supplemental electrode required when you establish a Grounding Electrode System at another building like a detached garage? Does it need a 2nd ground rod if the 25 ohms is not met?
112. I have been seeing a standard residential-grade light switch used in a handy box for the furnace disconnect in place of the SSU-type device. Are there any rules for the switch such as motor-rated or heavy duty?

113. Are residential stairways required to contain lighting fixtures?

114. I am using an old service panel as a splice box for the existing circuits. New phase conductors will be installed from the new panel to the old for each circuit. Can I use a # 3 AWG conductor as a common neutral for the five 20-Ampere circuits in this old 100-ampere panel now used as a splice box?

There is no prohibition to that type of installation as long as the neutral is routed with the phase conductors. This is going to require all of the conductors to be installed in the same conduit and adjusted (cables would have to be bundled and taken through the same knockout so that would not be an option). The question I have is why so large? I would assume that the maximum unbalanced load would be three circuits so a #6 Cu. would be sufficient.

References: 300.3, 220.61, and 310.15(B)(2)(a)

300.3 Conductors

(B) Conductors of the Same Circuit All conductors of the same circuit and, where used, the grounded conductor and all equipment grounding conductors and bonding conductors shall be contained within the same raceway, auxiliary gutter, cable tray, cablebus assembly, trench, cable, or cord, unless otherwise permitted in accordance with 300.3(B)(1) through (B)(4).

220.61 Feeder or Service Neutral Load

(A) Basic Calculation The feeder or service neutral load shall be the maximum unbalance of the load determined by this article. The maximum unbalanced load shall be the maximum net calculated load between the neutral and any one ungrounded conductor.

115. Can luminaires be mounted to nonmetallic device boxes?

116. Why does listed and labeled electrical equipment come from the manufacturer with grounding lugs installed on painted surfaces which must be removed and cleaned to meet NEC compliance?

117. Can an air conditioner be supplied from the panelboard in a mobile home?

118. Some rural utilities require the main disconnects on their poles. Are two ground rods required when one has a resistance greater than 25 ohms? Does the service equipment at the house also require ground rods?

119. I have a situation where an EGC will not fit on the neutral bar in the service equipment. I have tried to find a listed and same manufacturer add-on grounding lug kit to no avail. Except for the Article 110 listing requirement issue, is there anything wrong with installing a bolt-on lug of proper size and bolting it to the side of the panel with a nut and bolt?

120. After I enter a rated elevator equipment room with low voltage fire alarm cable, do I have to run the cable in conduit?

121. What is the height of the dedicated space above the panelboard in the basement of a dwelling?

122. Which code section covers direct burial phone and cable lines for a residential application? What is minimum burial depth?

Assuming this is part of the premises wiring system, Article 800 covers the installation of telephone lines. 800.47(A) does not address either the depth requirements or 300.5. Therefore, since 90.3 states that Article 800 is a stand alone Article, no depth requirements exist.

If this is not part of the premises wiring system, the National Electrical Safety Code covers the installation.

References: Article 800, 800.47(A), 90.3

90.3 Code Arrangement

Chapter 8 covers communications systems and is not subject to the requirements of Chapters 1 through 7 except where the requirements are specifically referenced in Chapter 8.

123. If an appliance garage is installed on a counter top is a receptacle required in the garage?

End of the day 2/8/07

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

125. What is the difference between a surge arrester and a transient voltage surge suppressor? What are the applications for each device?

126. What are the requirements for fluorescent fixtures in a commercial woodworking shop?
127. Does the code allow a service-supplied AC system to be grounded at more than one accessible point on the line side of the service disconnect using separate grounding electrode conductors and rods? An example would be a connection at the meter base and the service disconnect. Code reference is 250.24 (a) (1).
128. Can a main disconnect for elevator power be locked in the “on” or closed position? Before rescuing stranded riders, firefighters have to open the main disconnect. If an elevator is malfunctioning causing an emergency, it might be necessary to open the disconnect quickly and the key might not be readily available. Does the NEC address this?
129. Section 410.8(d) (3) allows recessed incandescent fixtures to be installed in clothes closets, provided the lamp is completely enclosed and a minimum clearance of 6 inches between the fixtures and the nearest point of a storage space. Can a recessed incandescent fixture be installed without being completely enclosed in a clothes closet, such as a large closet where the clothes are at least 8 feet away from the fixture?

130A (Hand in question) During a conversation last night we discussed the required depth under a building that service entrance conductors had to be installed.

Table 300.5 gives the general requirements for depths under a building. The required depth is zero inches under a building and requires the installation to be in a raceway only. However, 230.6 requires the depth to be under two inches of concrete or 18 inches of earth in a raceway to be considered to be outside of the building. It is not permitted to direct bury conductors or a cable under a building under any circumstances.

References: 300.5(A), Table 300.5, 230.6(1), and 230.6(4)

- 130. Does the individual occupant of a multi-family dwelling have to have access to all the branch circuit overcurrent devices in the dwelling or just those for his own unit? What about common-area circuits?**

Yes, all overcurrent devices that feed an individual unit have to be accessible to the occupants unless there is continuous building management. The common area circuits do not feed the dwelling unit and are not required to be accessible to the occupants.

References: 240.24(B)

240.24 Location in or on Premises

(B) Occupancy Each occupant shall have ready access to all overcurrent devices protecting the conductors supplying that occupancy.

Exception No. 1: Where electric service and electrical maintenance are provided by the building management and where these are under continuous building management supervision, the service overcurrent devices and feeder overcurrent devices supplying more than one occupancy shall be permitted to be accessible to only authorized management personnel in the following:

(1) Multiple-occupancy buildings

131. What types of wiring methods are acceptable for use in a animal facility (horses, cows, pigs). Can UF cable be used in areas not accessible to the animals? Can EMT be used in these types of facilities or is PVC conduit and nonmetallic boxes the required wiring method?
132. Can listed fire alarm systems be installed in standard EMT now that red-colored EMT is available?
133. Section 680.72 of the NEC says that if a hydromassage bathtub is installed in a bedroom, the bedroom is considered a bathroom for the installation of luminaires (lighting fixtures), switches, receptacles and other electrical equipment not directly associated with the hydromassage bathtub. Does this mean that all receptacles in the bedroom are required to be GFCI-protected and fed from a 20-ampere branch circuit?
134. Can intrinsically-safe conductors be installed in the same raceway with non-intrinsically safe wiring?
135. Are grounding electrode conductors permitted to be paralleled? Could two No. 1/0 copper conductors be used in place of a 3/0 for the grounding electrode conductor of a service over 1100 kcmil?
136. We installed the duplex receptacle in the pit of an elevator as required. We also installed a single receptacle on the same circuit ahead of the GFCI protection for the sump pump located in the elevator pit. Is this acceptable?

Panel Members and Assignments:

Jerry Blair	1, 9,17,25,33,41,49,57,65,73,81,89,97,105,113,121,129
Charlie Eldridge	2,10,18,26,34,42,50,58,66,74,82,90,98,106,114,122,130
David Kendall	3,11,19,27,35,43,51,59,67,75,83,91,99,107,115,123,131
Tom Lichtenstein	4,12,20,28,36,44,52,60,68,76,84,92,100,108,116,124,132
Alan Manche	5,13,21,29,37,45,53,61,69,77,85,93,101,109,117,125,133
Alan Nadon	6,14,22,30,38,46,54,62,70,78,86,94,102,110,118,126,134
Phil Simmons	7,15,23,31,39,47,55,63,71,79,87,95,103,111,119,127,135
Bud Swathwood	8,16,24,32,40,48,56,64,72,80,88,96,104,112,120,128,136