NEC CODE QUESTIONS

Western Section IAEI 103rd Annual Meeting
September 17-19, 2007

1. Can a fire pump controller be fed from a UPS? Or is a separate service and separate transfer switch required?

2. Section 518.4(B) of the NEC permits NM cable to be installed in buildings or portions of buildings that are not required to be fire rated construction. If only the exterior walls are fire rated, how do we determine where NM can be installed?

3. Can a #6 AWG grounding electrode conductor be run through bored holes in the basement joists?

4. During an inspection of a new restaurant located in a mall, there is a shaft for rooftop equipment and there is no way to enter the shaft for installation of raceways. The contractor wants to install five runs of ½" flexible metal conduit with a maximum of four # 12 AWG conductors. Section 348.30(A) Exception permits flex to be unsupported where fished. Do product standards limit the maximum weight a flex connector can withstand and is this installation permitted? If permitted is there a maximum vertical length flex can be fished?

5. At a 4-story hotel, we are installing 480-volt feeders up to each floor and the design calls for the grounding electrode for the transformers to be installed in the power wiring conduit that feeds the into the transformer disconnect at each floor. The bonding is done in the transformer. The building is poured concrete so the grounding electrode system consists of the underground water piping and the concrete encased electrode. The power wiring is installed in PVC conduit with an equipment-grounding conductor. Doesn't the NEC require the GEC to be run separately?

6. Does Section 240.24(D) absolutely prohibit a panelboard from being located within a closet? The installation is a large, 6-foot by 8-foot closet with shelving and clothes rods on three sides. The panel is on the "blank" wall and there is adequate working clearance around it.

7. A contractor installed a new 2000-amp service into a building, using Type MC Cable approved for direct burial. The cables leave the utility transformer at the far side of the parking lot, extend under the parking lot and then 35-feet under the building before entering the bottom of the switchgear. Isn't this prohibited by Section 300.5 that requires a raceway for cables installed under a building?

8. What are the electric code requirements for serving a small cabin with a propane-operated generator? The cabin has a small kitchen with a microwave, fridge and sink, a bedroom, and a bathroom.

9. I need to supply four 40-amp, 3-phase, 120/208 receptacle openings. These openings are all adjacent to one another but the supply panel is quite some distance away. There is an existing unused 90-amp (#4's & #8 ground.) set of feeders less than 10 ft. from the proposed new openings. The nameplate ampacity rating for each appliance is 25 amps (ovens). Am I correct in understanding that the 10 ft. tap rule can be used to supply the new openings provided that the tap conductor's ampacity is not less than the combined calculated loads of the tap feeder? If the tap conductors are individually routed properly, do I need to provide an additional disconnecting means for these individual openings other than the receptacles themselves? These commercial ovens are considered to be non-continuous loads.

10. I am wiring a hot tub on my deck at home and an electrician told me I cannot use nonmetallic-sheathed cable (NM) to wire it. The salesman at Swimming Pools and Tubs said it was acceptable. Who is correct?

11. I ran a raceway (tucked in a corner) up the entire length of a stairwell in a five-story building. The raceway was for some new signs on the outside of the building. The Building Inspector red-tagged it without leaving any explanation. Is this a violation of the NEC? If not, what code is it from?

12. 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 used for an electrode) Can the #4 grounding electrode conductor be run through bored holes in the 2x10's to the panel?

13. I have a 200-amp, 120/240 volt, single-phase service, grounded to earth from the meter enclosure, that is bonded to the neutral buss. Then neutral buss is bonded to enclosure of service disconnecting means. PVC connectors are installed between the enclosures (two males back to back). The inspector made me run a separate EGC from the meter base to main breaker panel. What for? Isn't the neutral already doing this? I could understand four wires if they were leaving the main panel and going to a subpanel but from a meter enclosure to the main panel?

14. Section 314.23(H) requires a box supported by a multi-conductor cord or cable pendant to also protect the conductors against strain, and suggests a strain relief connector threaded into a box with a hub, but stops short of requiring a connector threaded into a box with a hub. Does this mean a strain relief connector installed with a locknut into a standard box would be acceptable?

15. We have quite a bit of abandoned low-voltage communication cable in our facilities. Where are the requirements in the NEC to remove this cable?

16. A contractor installed several three-phase circuits from a 480-volt panel board. He installed the first 3-phase circuit with 3 red conductors, the second with 3 blue conductors, another with 3 black conductors, etc. It appears that Section 210.5(C) in the 2005 NEC allows this, as conductors need only be identified by system, not by phase as in previous editions. Is this correct?

17. 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 matters.

18. Can we use 16 inches of NM cable from a box to the garbage disposal where we tape the cable to the drainpipe for support?

19. Do panels located under a porch cover in a damp location require sealing locknuts for conduits?

20. If service drop conductors are increased in size due to voltage drop, is it required to increase the size of the grounding electrode conductor?

21. Are hot and cold water pipes required to be bonded at water heaters?

22. I recently installed a 45-KVA transformer, 480-volt primary and 120/208Y secondary. The secondary conductors are # 2 THHN copper with an ampacity of 115 amperes. The calculated load is 102 amperes. Using Section 240.21(C) (2) the secondary conductors supply a MLO 42-circuit lighting and appliance branch circuit panel. The inspector rejected the installation citing 240.4(F), requiring a main breaker. Is the installation in compliance? Will the 2008 change in 408.34 deleting the classification of panel boards have an effect on this installation?

23. A traffic detection loop consisting of several "turns" of wire is laid out in a circular pattern under a street to activate a traffic signal. Is that wiring, which extends from the controller, subject to the regulations of the NEC? If so, which article should be used?

24. Can molded-case circuit breakers with “SWD” markings be used to switch HID (high-intensity) lighting fixtures?

25. Is there a requirement in the code similar to the one in Article 550 that addresses a maximum distance from the building a disconnecting means can be located? 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 closet to the point of entrance inside the building. Basically service on pole and feeder to building, service at building treated as sub-panel with isolated neutral, 4 conductors and also a GEC. Or in other words. how far can the service disconnecting means be from the building?

26. Do you need to staple NMB within 8” of a non-metallic box if it is supported by the hole in the stud within 8” of the box?

27. Is a refrigerator receptacle located within 6’ of a bar sink required to be GFCI protected if it is only accessible by pulling out the refrigerator?

28. Is a clamp required where a grounding electrode conductor goes through the weep hole in the bottom of an electrical panel?

29. A 13,200-volt, 3-phase/4 wire system is supplied from the local utility company. The service point is on the load side of cutouts at the top of a pole, located at the edge of the property. Customer-owned primary is then run down the pole (3-#2 copper, shielded, 133 percent insulation, Type MV-105 (this cable does not have a "concentric neutral)) to a listed disconnect rated 600 amps and fused at 125 amps. The disconnect feeds a 2500 KVA delta/wye pad mount transformer which steps the voltage down to 480/277 to feed the building. Since the system supplied by the utility company is a 4-wire system, is it required to run a grounding conductor with the MV cable from the top of the pole to the disconnect and transformer? I can't find anything in Article 250 that REQUIRES a grounded or grounding conductor to be run with the ungrounded conductors. Part X of Art 250 covers grounding for systems over 1000 volts and it only addresses grounding requirements if the system IS grounded. Section 250.24 clearly requires it, but that section doesn't apply to this system. Or, since the "service point" is at the top of the pole, can the contractor elect to go with the proposed shielded cable (cable specs reflect use for an ungrounded system) and supply the premises with an ungrounded system (all three shields are connected together at both ends) and derive a grounded conductor/neutral at the pad mounted delta/wye transformer?

30. Can ½ inch stainless steel rods be used for grounding electrodes?

31. If a piece of Type NM cable is run down the side of a 1X2 wood stud in a residence, and the 1-1/4" clearance is not possible from the front edge of the stud, does the mechanical protection have to be a continuous piece of metal that complies with the construction requirements in Section 300.4(D), or could I stack standard "nailer plates" end to end the length of the run to protect it?

32. Many fast-food restaurants and convenience stores have backroom areas meeting the definition of a kitchen in Section 210.8(B)(2), but how far does that extend into the rest of the store? If there are dispensers for carbonated drinks, food heaters, etc. on 15- or 20-ampere, 125-volt receptacles that the general public use, are those required to be ground-fault protected?

33. My builder used ½ inch plywood corner bracing with 1 inch foam insulation on an addition. I installed outdoor receptacles using siding boxes fastened to the plywood. The inspector required the builder to install 2X4's behind the plywood to comply with NEC Section 314.23 (B)(2) which says wood braces shall have a cross section not less than a nominal 1X 2 inch. Are these blocks required behind the plywood when they allow a panel to be supported by ½ or ¾ inch plywood?

34. Why does the NEC limit the length of sealtight to 6' for a hot tub?

35. Can a duplex receptacle, with the tab removed so that only one side is energized, satisfy the single non-GFCI receptacle requirement for a freezer located in a garage?

36. I looked at an electrical panel where the electrician used green feed-through wire nuts to splice the equipment grounds together and make 4 terminations to the ground bar. Is this allowed in the code?

37. What is the maximum length of an equipment-bonding conductor installed on the outside of a raceway?

38. Which code takes precedent when the requirements are different from the electrical, building, mechanical, plumbing for the manufacturer specifications for the equipment installation?

39. A large trailer-mounted portable generator is being used for the temporary power at a construction site. The electrical contractor argues that since the generator has no provisions for a grounding electrode that the generator is isolated from ground and so does not need GFCI protection for personnel for 125-volt, 15- 20- and 30-ampere receptacles. Is he correct?

40. The new 2008 NEC will require AFCI protection on all 15 and 20 amp circuits. What will become of the panels that accommodate mostly thin breakers?

41. An electrician installed Type NM cable under a kitchen cabinet for under-cabinet fluorescent fixtures. Is this cable subject to physical damage?

42. Do cord & plug-connected vending machines need GFCI protection?

43. Is the inside of a raceway using all watertight fittings and installed on the outside of a building considered a wet location? Does it make a difference if it is installed vertically or horizontally?

44. Is it permissible to use cellular metal floor raceways in a commercial garage?

45. The NEC requires conductors that are run through bored holes and foamed-in to be de-rated. Do the wires that are run through a nipple in the back of a panel and are foamed-in to prevent temperature migration need to be de-rated also?

46. I am wiring a remote cabin and using an outdoor generator with a factory-installed main. It is located 35' away and is the cabin's sole source of power. Do I need a main in the panel at the cabin or does the main at the generator satisfy the requirement?

47. Is there any chemical reaction between EMT and copper water pipe, which are in contact with each other?

48. Would a series-rated system protect the equipment as well as a fully rated system when the fault current is over 60K AIC?

49. What does AICS mean in note 1 below Table 9 in Chapter 9?

50. Can a reducing bushing be used in the middle of a pipe run to reduce the size of a conduit run from 2" to 1 ½"?

51. Does the receptacle located behind a small floor refrigerator count as one of the required outlets for a hotel guest room?

52. EMT is allowed as a means of grounding. What if the EMT is encased in concrete where the integrity of the connections may deteriorate over time?

53. A meter hub comes with setscrews. If these screws are lost is it permissible to use substitute screws without violating the listing?

54. Is it legal to install a non-fused disconnect next to a meter, run 20' on the outside of a building, then into the back of a main breaker panel?

55. Is the 1 ¼" required distance from the edge of the wood stud to the NMC measured to the edge of the staple or to the NMC?

56. NEC 408.36 seems to apply the definition of a lighting and appliance panel board to a power panel board. Why is it defined this way?

57. The NEC allows seven different feeders/branch circuits and seven different services to a building. This would allow 84 different handles to throw, all at different locations in the building. Is the general rule that only one service is allowed to a building still valid or is it an overlooked section of the NEC?

58. Is Type NMC cable allowed to be run perpendicular through the open studs of an unfinished garage 48” above the finished floor without protection? The old 8’ above the floor rule that required mechanical protection seems to have gone away.

59. NEC 410.8 does not specify AFCI protection for closet lighting. The closets are usually located within bedrooms, which require AFCI protection for all outlets. Do these closet lights require AFCI protection?

60. What loads are considered diversified loads regarding NEC 310.15 (B) (2) FPN # 1? How and when is this applied to table B 310.11 in Annex B?

61. We are being asked to wire a baptism tank where the people will be submerged. It is in the front of a church. What rules should we use for wiring this equipment?

62. Are in-wall mounted ovens required to be hard-wired or can they be cord & plug connected?

63. A new contractor has been wiring residential air conditioning units. He is mounting the disconnect switch on the exterior of the house and using a FNMC whip to the outdoor compressor. He has also installed the class 2 wiring for the relay in Type UF cable, inside the FNMC whip. Does the jacket of the UF provide the “barrier” required by 725.55(B)?

64. A large grocery store chain in our city is installing "minute clinics" at each retail location. A nurse who can take a person’s temperature, prescribe medications and give injections staffs these. Although there is a waiting area and two "exam rooms" the only electrical equipment being used is a cash register. Would the receptacle outlets in these "exam rooms" require redundant grounding per Article 517?

65. Is a supplemental electrode required when you establish a GES at another building like a detached garage? Does it need 2 ground rods like at a house if the 25 ohms is not met?

66. What is the defining difference between a damp and a wet location?

67. At my local pharmacy they have a fancy blood pressure machine where you sit down and stick your upper arm into a cuff or sleeve. After you deposit a quarter, the machine automatically inflates the arm cuff and measures your blood pressure. Is this a vending machine requiring GFCI protection? If there was an electrical problem with this unit, GFCI protection would be more important here than on a Pepsi vending machine?

68. As an inspector I was on a job where the electrician (?) had Type NM cable running in all directions like a spider web. I was always told parallel and perpendicular. Can cables be installed at all different angles?

69. My question concerns duplex receptacles and cords above a suspended drop ceiling. Over the years, we are asked to wire projectors, cameras, and intercom systems. Most of the power supplies or equipment are cord connected with a 5-15R. The cord is normally installed up through a large conduit used to support the equipment. The 2" conduit has a hole bored out of the side, which the cord passes through, and now is above the drop ceiling. Most inspectors quote NEC 400.8, *Uses Not Permitted*, and then end up allowing the installation. Section 400.8(5) is not very clear where it states: Unless specifically permitted in 400.7, flexible cords shall not be used where located above suspended ceilings. Section 400.7 specifically permits flexible cord to be used in many installations but does not say where located above suspended ceilings. My interpretation is that flexible cords cannot be used above suspended ceilings. A hard-wired system must be used. Section: 400.7, 400.8(5). Am I correctly interpreting this question?

70. Can SER be run from a main residential panel to a disconnect that has conduit to a swimming pool panel and satisfy the NEC?

71. Can the disconnect for a 120-volt air handler / remote AC be a 15A single-pole switch mounted to the unit as in furnace applications? Or do I need a disconnect on the unit if the panel is in sight of the unit?

72. Section 517.17(B) prohibits secondary ground-fault protection on the load side of the essential system transfer switch, and 517.17(C) requires the system to be fully selectively coordinated. This is literally impossible if ground-fault protection is provided (as required) on a solidly grounded wye system of more than 150-volts to ground. Has CMP 15 looked into this?

73. Is it necessary to bond natural gas or LP gas lines to the electrical service?

74. Can a 10.5-amp, 120-volt rated fan-light-heat unit be installed and supplied from the same 20-amp circuit supplying the bathroom receptacle?

75. On a sub panel installation in a residential garage of 4 two-wire branch circuits I say that the minimum feeder ampacity should be 60-Amp, based on the fact that the disconnecting means must be rated at 60-Amp by code. The inspector says that it is based on the computed load and could be 40Amp or 50Amp. Who is correct?

76. We always are stumped when asked to install a telephone line or cable TV to a detached garage or workshop. Can we use listed low voltage or communication cable such as CAT 5 for the underground run to these buildings?

77. There is always a lot of discussion on the use of Relocatable Power Taps. Where can I find the requirements or limitations on their use?

78. Does the NEC require a drip loop on coaxial cable?

79. Is it acceptable to connect the dishwasher and garbage disposal on the same circuit?

80. A builder is putting up a limited care facility, classified by the building code as an I-2 occupancy. This is a single story building of wood-frame construction with the walls and ceilings sheet-rocked (no suspended ceilings.) Can Type NM cable be used in this building?

81. Can ¾ inch rigid metal conduit be used as a made electrode?

82. Is it permitted to install a hasp on the cover of the panel containing the breakers for the motors of the fuel-dispensing pump to satisfy the requirements of 514.13?

83. I am installing a ceiling paddle fan on a porch. Are there any restrictions on the installation? The porch has a roof but is open on the sides.

84. We installed a separately derived system (transformer) at the far end of a large warehouse. We proposed to use a primary equipment ground on the circuit that would be sized based on the required grounding electrode conductor size. This would have one conductor serve as both the equipment grounding and grounding electrode conductor. The inspector said no they are separate conductors but cannot point to a code requirement. Is there a prohibition on this type of installation?

85. We've seen these "pop-up" receptacle towers that are mounted in a countertop or a similar surface. These towers are connected to the electrical system by a 6-8 foot grounded cord. Are these acceptable as required receptacles under Section 210.52? Are these listed for use in kitchen countertops where they may be subject to liquid spillage?

86. I am working on a project started by an owner. He has a business that spreads straw for use as erosion control for highway/construction sites. At his mixing site, all of the motors are hydraulic, and all the electric pumps are in a different building. When in production the dust form the straw gets quite thick, and they have a hard time seeing. What type of wiring method, lights, and boxes are acceptable?

87. An air-conditioner consisting of two separate units is installed in a residence. The self-contained fan unit is inside the house and a hermetic refrigerant unit outside. Is it permitted to use the supplied five-conductor (with ground) cable between the two units? The conditions and materials are: a 15-amp, two-pole circuit feeds the unit outside and the cable between the units is a CSA listed# 14 AWG rated 600 volts TC cable. The cable is sunlight resistant and suitable for a wet location. The cable is tie wrapped to the insulated Freon lines between the two units and runs through the wall of the house with them. Is this cable a proper one to use, considering it is rated only as Type TC cable?

88. An outpatient clinic for eating disorders is being built in my jurisdiction. Part of the therapy includes having the patients prepare meals in a large kitchen area. Since this is an outpatient clinic, does Article 517 apply? If so, does it apply to the entire building?

89. Are wireways listed for grounding? We constructed one of 16-gauge steel and want to use it as the equipment-grounding conductor.

90. I can't find Code section that gives the ampacity of copper bus bars size 4" x 1/2" copper bus bars. Can you help me to find it?

91. If there is electrical power in a detached residential garage, and an electric garage-door opener has a light with a wall-mounted control for the light in the unit, does this count as the required lighting outlet in Section 210.70?

92. We installed two feeders in a raceway. Does each circuit need an equipment-grounding conductor?

93. A company advertises a "Romex 3 Conductor Splice Kit" which has been used in the past for connecting power in sections of a modular home. This company is now also claiming that these splice kits can be used in remodeling work in an existing house and be buried in the wall per "Article 334-40b" (their exact terminology). The UL listing category appears to be QAAV, which in the brief description in the White Book indicates that these must be capable of withstanding"... mechanical shock that might occur while transporting the units in which they are used." which would seem to indicate their use is for the modular home connections and not for burial in a wall. Is this the correct listing for the product? Can they be buried in a wall?

94. When installing a stand-by generator being fed with 4 wires, is it required to drive a ground rod at the generator to bond the metal frame? We are not using the generator as a separately derived system.

95. Is the same working clearances required for air conditioning disconnects with fuses and those without fuses?

96. What determines the grounding conductor size for a satellite dish or a communication system antenna?

97. Why are bonding bushings required on ringed knockouts in panels or cabinets for 277/480-volt wiring systems, but not for 120/240-volt wiring systems?

98. I have a question on renewable-link fuses. I was taught for years that renewable-link fuses aren't legal, but can't find a good Code reference for that.

99. A break room in an office has a sink and receptacles above a countertop surface. There is a dedicated circuit and receptacle for a microwave that is set on the countertop. Does this qualify as the permanent facilities for cooking in Section 210.8(B)? If there is a stove plugged into a 50-ampere receptacle, is this "permanent"?

100. For a hydromassage tub, do the metallic faucets need to be bonded when the piping is all non-metallic?

101. The manufacturers of recessed light fixtures list the type of light bulbs that are approved to be installed within their fixtures. The newer type of medium base fluorescent light bulb is not listed for use in these recessed cans. Many people are buying them to conserve energy and are installing them in the recessed cans. Is this permissible?

102. There is a 14/3 wire from the switch box in a bedroom run up to the light box in the bedroom. The extra wire is there for a future paddle fan. Does the light box have to be a fan rated box?

103. What working clearances are required for in-duct-heater disconnects, fused or non-fused, located above a t-grid ceiling and accessible only by a ladder? Would NEC 110.26 (a) 1 condition 3 apply?

104. Can a single-pole switch control the emergency lighting on the critical branch for a nurse’s station?

105. Why do the ground fault requirements for services over 1000 amps only apply when voltages are over 250 volts?

106. Is an EMT strap suitable for strapping 6/3 romex?

107. Is it permissible to install a non-GFCI receptacle in a crawl space for a sump pump if it labeled properly?

108. If you have 4/0, 4/0, 2/0 SER cable run into a panel and use a Romex connector on the cable, are you required to have a plastic bushing on the Romex connector?

109. What is the required clearance to combustible materials for all recessed parts of a recessed luminaire that is not identified for contact with insulation?

110. When romex is run in a bundle, when do you have to start derating the wires and is each hot and neutral conductor in the cable assembly counted individually or is the whole cable assembly counted as one wire?

111. A new swamp cooler is installed on a residential roof. Can FLNC be run from the attic into and through the short piece of ductwork into the swamp cooler?

112. I have a 4 square box that has three pipes coming into it that are strapped within 3 feet. Is this considered a securely mounted box, or does the box have to be physically secured to something?

113. Who is qualified to perform a GFP test of a GFP main breaker service?

114. Do I have to have GFCI protected receptacles in a farm shop?

115. Does the receptacle located behind a small floor refrigerator count as one of the required outlets for a hotel guest room?

116. In an indoor pool at a hotel, a new piece of metal pool playground equipment was added. Is there any bonding requirement?

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

118. Can I feed a permanently connected microwave with a nameplate current of 9 Amps from one of my two required kitchen countertop circuits? How about a refrigerator?

119. In determining the proper feeder conductor size and overcurrent protection where the feeder supplies several variable frequency drives for several motors I believe 430.122(A) applies. Under a condition where not all motors run at the same time would you still take the sum of all the power conversion equipment x 125%, or, base it on the largest load at any one time (x 125%)?

120. I have an EMT with an equipment-grounding conductor feeding receptacles. If an EGC is pulled with the circuit, do you need to bond the metal boxes to the EGC or will a self-grounding receptacle take care of that?

121. The 2006 International Residential Code requires the electrical panels mounted within outside walls to have an “R” rating. Is there an “R” rated panel made?

122. There is a lot of confusion on the requirements and the construction of an equipotential plane for a swimming pool. Can we use the rolled reinforcing steel as the structural reinforcing steel required in Section 680.26 (C)(1) of the NEC?

123. Are residential stairways required to contain luminaires? Would a single pole switch at the top controlling one light and another switch at the bottom controlling another light satisfy the requirement?

124. Can I run one #4 from the rebar and tap off of it to a second 200 amp panel?