

82nd ANNUAL WESTERN SECTION MEETING
SEPTEMBER 22-24, 1986

INSPECTOR FIELD PROBLEMS

1. 318-12. Has U.L. listed any single conductor and multiple conductor cables specifically for cable tray use? If so, what types and how are they identified?

Answer: Yes. They are marked "cable tray use" and are available in sizes 250MCM and larger single conductor and all sizes of multi-conductor types RHH, RHW, XHHW, THW, THWN, and THHN.

2. May fire pumps be connected to the load size of the building disconnecting means or is a separate service required? If separate service, must it come from a separate transformer?

Answer: Fire pump power sources are regulated by NFPA No. 20 and not the NEC. The power source shall be a separate service or one of the utility service main disconnects. If connected to the normal utility service, the point of connection and fire pump main should be remote from the normal service equipment enclosure(s).

3. A building's service is grounded to the metallic underground water piping and effectively grounded structural steel. Is a supplemental ground rod also required?

Answer: No. NEC 250-81(a) requires a metal underground water pipe to be supplemented by an electrode specified in 250-81 or 250-83. The effectively grounded structural steel qualifies as the supplemental electrode.

4. Section 331-4 does not specifically prohibit electrical nonmetallic tubing in assembly halls. Section 518-3 which specifies wiring methods for assembly halls, however, does not recognize ENT even though Exception No. 1 permits nonmetallic-sheathed cable in non-fire-rated construction. Would ENT be acceptable under 518-3 Ex No.1?

Answer: No. ENT is not acceptable in any Article 518 occupancy and specifically in Wisconsin is not permitted in Chapter ILHR 55 occupancies. See ILHR 16.26, Electrical Code, Vol. 2.

5. 430-86. The motor disconnecting means consists of a circuit breaker in a panelboard. Where the C/B and motor starter are out-of-sight of the motor, may the locking requirements of 430-86(a) be satisfied if only the panel door is capable of being locked? Locking this door renders other C/B's not accessible.

Answer: No. NEC 430-107 requires the disconnecting means to be readily accessible. "Readily accessible" means not within a panelboard having doors equipped with locks or locking arrangement.

6. A 200 ampere, 1-phase meter socket and service disconnecting means are located 75 feet away from a commercial building. For a direct burial installation from the service to the building, are 4 conductors required or may 3 conductors be used with the building entrance grounded like a service?

Answer: See NEC 230-84 and 250-24. The building could be treated similar to a separate building. Either method is acceptable.

7. Is the 30 inch wide work space required by 110-16(a) required to be centered on a panel or could it be measured starting at one side so a panel could be mounted tight to a corner with excess space all on one side?

Answer: The work space is not required to be centered. A panel may be mounted tight to corner with excess space on one side.

8. Is electrical nonmetallic tubing listed for use in wet locations such as supplying an outside central A/C?

Answer: No. Wet location use is not permitted by NEC 331-3.

9. 700-16 specifies that the burning out of a light bulb cannot leave in total darkness any space requiring emergency illumination. Does this require exit lights to always have 2 lamps? Also, would this Section require exit lights to be left on 24 hours a day even if the building was not occupied?

Answer: Answer depends on number and location of exit lights. One lamp fixtures are acceptable only if more than one fixture are normally visible. NEC 700-16 does not require exit lights to be left on 24 hours a day. That should be determined by Building Codes.

10. 250-81(b). How do you determine if a metal frame of a building is effectively grounded?

Answer: This is a judgment question depending upon type and length of anchors, re-bars, etc. If in doubt, require supplemental rod to ground frame of building.

11. May Type UF cable be used as a wiring method overhead from a house to a garage? What if a messenger and rings are used per Article 321?

Answer: Type UF cable is not permitted as an overhead span wiring method unless it is used as part of a messenger supported system as permitted by NEC 321-3(4).

12. A panelboard inside a dwelling has a 30 ampere C/B which supplies No. 12 wire extending outside to a disconnect switch with 20 ampere fuses. This disconnect and fuses feed an adjacent central A/C having a branch circuit selection current of 11.6 amperes. Are the No. 12 conductors acceptable?

Answer: The 20 ampere fuses are the branch circuit overcurrent devices and comply with the 175% sizing specified in NEC 440-22(a). The 30 ampere C/B is a feeder overcurrent device supplying a single branch circuit and is acceptable based on NEC 430-62(a) which is used for sizing A/C feeders since Article 440 does not cover feeders.

13. 410-31. Are switch legs permitted to feed through a row of fluorescent fixtures which has 3-way switches located at each end?

Answer: Yes, if the conditions of any of the 3 exceptions to NEC 410-31 are met.

14. May panelboards be located within public restrooms of commercial buildings if the clearances of 110-16 are met? May the panel be located such that the entrance door could swing into the 110-16 space?

Answer: The panel may be located in a restroom if it is judged to be a dry location and readily accessible. Normally, this would be the case. The entrance door may swing into the NEC 110-16 workspace. Note that the 1987 NEC will require that the panel door be capable of opening 90 degrees.

15. Are wire connectors (wire nuts) listed for use outdoors where exposed to the weather?

Answer: No, where exposed to the weather. They are acceptable within a weatherproof box, however.

16. May an unfused manual transfer switch be located on the line side of a dwelling's service panel? If so, are there any special requirements for this transfer switch? May the service entrance neutral conductor be run straight through the transfer switch without means of disconnection?

Answer: An unfused manual transfer switch may be located on the line side of the service panel providing it is marked "Suitable for use as Service Equipment." The switch is required to have suitable interrupting capacity and withstand ratings. The S.E. neutral conductor may run through the transfer switch without means of disconnection.

17. A service consists of 3 raceways, each containing 3-400 MCM copper phase conductors and 1 - No. 0 copper neutral conductor. The respective phase and neutral conductors in the 3 raceways are paralleled. What is the minimum size grounding electrode conductor? Assuming that it is adequate for the unbalanced load, are the No. 0 neutrals permitted or does 250-23(b) require the neutral in each raceway to be sized per the grounding electrode conductor size?

Answer: Based on Table 259-94 for 3-400 MCM conductors paralleled, the grounding electrode conductor is required to be a No. 3/0 copper. NEC 250-23 requires the grounded conductor to be sized per Table 250-94 so ~~the neutral in each raceway shall be minimum of a No. 3/0 copper.~~

Since phase conductors greater than 1100 MCM, figure 12 1/2 % and divide by 3 for 3 conductors or 50,000 cm neutral in each. Min of 1/0

18. May a meter socket and service disconnect be located on the side of a double wide mobile installed on a foundation and having a basement? If *paralleled* not, could the meter socket be mounted separate from the home with the service disconnect mounted inside on the basement wall?

Answer: No, if the unit is labeled as a mobile home. The service disconnect may be located on the inside of the basement wall since the basement is not considered to be in or on the manufactured mobile home.

19. 424-3(b). Four 7.5 KW, 208 volt electric heaters are supplied through one raceway (total of 8 conductors). What minimum size THHN conductors are permitted to supply these heaters?

Answer: Assuming 1 phase heaters, 7,500 watts @ 208 volts = 36 amps. Per 424-3(b), 125% x 36 = 45 amps. Applying the 70% derating of Note 8 to Tables 310-16 thru -19, 45 amps divided by 0.7 = 62 amps. Use No. 6 THHN copper.

20. Does 605-8(d) which prohibits multiwire circuits in wall partitions only apply to cord- and plug-connected partitions or permanently connected partitions as well? May multiwire circuits be installed in partitions connected with liquidtight metal conduit which is permanently connected to a building outlet on one end and utilizes a special plug-in connector (similar to manufactured wired systems) to connect at the partition? What is the reason for 605-8(d)?

Answer: NEC 605-8(d) only prohibits multiwire circuits in cord-and plug-connected partitions, not in permanently connected partitions. The multiwire circuit in the liquidtight conduit is acceptable if the special connector is listed for application with partitions. NEC 605-8(d) is based on cord- and plug-connected partitions being 1 phase, 2-wire with ground units.

21. Is the "exclusively dedicated space" specified in 384-2 required above transformers, individual switches or breakers, or motor control centers? Could ducts be run above a main disconnect or transformer section of a substation?

Answer: NEC 384-2 does not apply to transformers or individual switches or breakers. Motor control centers are considered to be distribution boards so 384-2 applies to them.

22. When using twist-on wire connectors (wirenuts), are the wires required to be twisted before installing the connector or may they be left straight before twisting on the connector?

Answer: Generally, the wires are to be left straight except for special crimping twist type where manufacturers instructions require twisting.

23. Although local ordinances may prohibit connection ahead of the service disconnect as an emergency source, does NEC 700-12(e) permit tapping ahead of the service disconnect within the same switchboard? What if the tap point is barriered off from the service disconnect?

Answer: NEC 700-12(e) can be utilized only if acceptable to the authority having jurisdiction. NEC 700-12(e) does not permit tapping ahead of service disconnect within same switchboard even if tap point is barriered off.

24. Are metal covers on nonmetallic outlet boxes required to be grounded?

Answer: Yes, if any of the conditions of NEC 250-42 apply. One condition requiring grounding is if the metal cover is located within 8 feet vertically or 5 feet horizontally of grounded metal objects and subject to contact by persons.

25. A service drop terminates on the outside of a dwelling. It is desired to locate one service disconnect on the outside to feed other buildings and also extend S.E. conductors inside to the dwelling service disconnect. Is this acceptable or must the service disconnects be grouped?

Answer: This arrangement is not acceptable per NEC 230-72(a). The service disconnects shall be grouped unless the disconnect is for a water pump per 230-72(a) exception.

26. A lighting track is supplied from a 20 ampere branch circuit. Is it acceptable to use a fixture whip with No. 18 wire from an outlet box to the track?

Answer: No. No. 18 is not recognized by either Article 410 part S or NEC 210-19.

27. 370-6. Do the locknut and bushing or EMT locknut inside a box count as one conductor in determining box fill?

Answer: No.

28. In the case of a duplex with a 2-gang meter socket on the outside, is it acceptable to locate the service disconnect for one unit on the outside and service disconnect for the other unit on the inside?

Answer: Yes. NEC 230-40 EX No. 1 permits S.E. conductors to run to each occupancy of a multi-occupancy building. The disconnects for each occupancy should be grouped.

29. Wireways are not specifically recognized for equipment grounding under 250-91(b). 250-91(b)(10) recognizes other electrically continuous metal raceways approved for grounding. Has U.L. investigated wireways for grounding?

Answer: No, although U. L. has assumed wireways to be acceptable for grounding. NEC 250-91(b)(10) of the 1987 NEC will require wireways to be listed for grounding.

30. Is a 120 volt damper or door closer circuit permitted to be installed in the same raceway with a low-voltage fire alarm circuit?

Answer: No, if a class 2 or 3 circuit. Yes, if a class 1 circuit.

31. Is a Meyers Hub recognized under 250-72 for bonding between a service raceway and service equipment enclosure?

Answer: The standard Meyers Hub is not listed for bonding service raceways. Meyers does have a special approved hub, however, with set screws which is acceptable for bonding.

32. 370-13. Is it acceptable to mount a box on a single EMT extending down 18" to a false ceiling? There is no box support other than the EMT.

Answer: No, per NEC 370-13.

33. 410-30(c). Is flexible cord permitted to drop down and feed a row of attached fluorescent fixtures or is it intended to only supply a single fixture?

Answer: No, the use of flexible cord is intended to only supply one fixture.

34. 370-10. Is drywall installed on wood studs considered to be a wall of combustible material such that outlet boxes must be flush or project therefrom? If considered to be noncombustible, then 370-11 Exception would appear to prevent repairing gaps.

Answer: Drywall installed on wood studs is considered to be a wall of combustible material.

35. A service is located on a dwelling garage. Overcurrent devices located at the service supply load within the garage. A feeder extends from the garage service location to a panel located within the dwelling. May Note 3 to Tables 310-16 thru 310-19 be used for the feeder to the dwelling since it does not carry the total load of the service?

Answer: No. Note 3 cannot be applied since it does not carry the total load.

36. 110-14(a). How does one determine how many conductors a specific lug or terminal is suitable for?

Answer: Assume only one wire per terminal is acceptable unless the box the terminal comes in is marked otherwise or if the wiring diagram on the equipment shows greater than one.

37. 336-6. Is nonmetallic sheathed cable permitted to be run above a suspended ceiling and secured to the ceiling T-bars?

Answer: No. NEC 336-6(a) requires the NM cable to closely follow the surface of the building finish or running boards. Ceiling T-bars are not considered building finish nor running boards.

38. 430-34 permits an overload relay to be increased in size when the relay selected by 430-32 is not sufficient to start or carry the load. There appears to be no similar allowance for fuses. Does this mean that fuses used for overload protection cannot exceed the ratings of 430-32(a)(1) and (c)(1)?

Answer: Yes, but since fuses are 110% rated devices while overload devices are 100% rated, the end result is about the same.

39. Is it acceptable to use the ratings in Note 3 to Tables 310-16 thru-19 when applying the demand factors of Note 8. As an example, if 2 sets of No. 2 Type THW Copper, 3-wire S.E. conductors for dwelling occupancies are installed in one 2" conduit, can the 80% derating factor required by Note 8 be applied to the 125 ampere rating of No. 2 copper as given in Note 3 or must it be applied to the 115 ampere rating of Table 310-16?

Answer: Under the 1984 NEC, it is acceptable to apply the 80% derating to the Note 3 125 ampere rating.

40. Would 210-8(2) Exception No. 2 require the non-GFCI receptacle for a dedicated appliance to be a single receptacle (single contact device)?

Answer: Yes, unless there are 2 dedicated appliances physically in place.

41. 517-11. Are separate insulated equipment grounding conductors required in metal raceways supplying receptacles in patient rooms of nursing homes?

Answer: Yes, including rigid metal conduit.

42. 336-6. May NM cable be run across the underside of floor joists above a family room suspended ceiling with lift-out panels? Since this area is "exposed" by definition, 336-6(a) would appear to prohibit this practice. Would the cable be required to be run on running boards or through board holes in the joists?

Answer: Since the area above a suspended ceiling is not an unfinished basement nor an accessible attic, NEC 336-6(a) requires running the NM cable along the surface of the building finish or running boards.

43. Is a permanently connected heater for a spa or hot tub required to be GFCI protected? We are having trouble purchasing 40 and 50 ampere 240 volt, 2-pole GFCI breakers.

Answer: ^{No}~~Yes~~. One large manufacturer has 40, 50 and 60 ampere, 2-pole GFCI breakers available.

44. Is it permissible to run NM cable along a building surface and then drop it down unsupported from 2-4 feet to feed a fluorescent fixture (similar to a fixture whip)?

Answer: No, NEC 336-6(a) requires exposed NM cable to closely follow the surface of the building finish and 336-5 requires it to be secured within 12" of the fixture.

45. What is the minimum permitted size of Type THHN copper conductors supplying a 10hp, 230 volt, 3 phase motor with all terminations suitable for 75 degrees C? Does the obelisk Note below Table 310-16 apply to motor circuits?

Answer: The obelisk Note below Table 310-16 does not apply to motor circuits. The full load current is 28 amps. Minimum conductor ampacity is $125\% \times 28 = 35$ amps. If all terminations are marked for 75 degrees C, No. 10 THHN is acceptable. If not marked for 75 degrees C, No 8 is required.

46. 310-3. Is it acceptable to run a single solid No. 8 grounding electrode conductor in conduit for grounding a 100 ampere service?

Answer: Yes. The conduit is being used for mechanical protection, not as a wiring method.

47. A grounding type receptacle is installed under a carport of a single-family dwelling. Would this receptacle be required to be GFCI protected? If yes, would 210-52(d) require another outdoor GFCI protected receptacle? Would a receptacle on a screened-in porch require GFCI protection? Do receptacles for car headbolt heaters located at parking lots of apartment buildings require GFCI protection? Would a non-GFCI protected receptacle permitted for a dedicated appliance under 210-8(a)(2) Ex No. 2 qualify as the garage receptacle required by 210-52(f)?

Answer: Receptacle under carport requires GFCI protection. This receptacle can serve as the outdoor receptacle. A receptacle on a screened in porch requires GFCI. Receptacles at parking lots of apartments require GFCI. Non-GFCI receptacle for dedicated appliance does not qualify as garage receptacle.

48. Are separate transfer switches required for the critical and life safety branches in nursing homes? What is considered to be a small facility under 517-44(b)?

Answer: Yes, unless the nursing home is considered to be a small facility. The 1987 NEC permits one transfer switch in nursing homes with a maximum demand on the essential system of 150 KVA.

49. Is derating required for 12 current carrying conductors comprising a 6% conduit fill of a 4 inch EMT raceway, 10 feet in length, installed between a panelboard and ceiling junction box? Is derating required for 24 current carrying conductors comprising less than 20% fill of a 4 inch square wireway, 10 feet in length, installed between a panelboard and ceiling junction box? If the answers differ, please explain why.

Answer: Derating is required for the EMT raceway but not the wireway. No reason was given for the difference.

50. Does U.L. list recessed type fluorescent fixtures suitable for installation where thermal insulation is in direct contact with sides and top of the fixture? If yes, how are they identified?

Answer: All recessed fluorescent fixtures are suitable for use with thermal insulation in direct contact with sides and top of fixture. This fact is reflected in the U.L. Marking Guide for Fixtures.

51. A. If a system is to comply with NEC 110-10, should the meter device, whether it is self-contained or instrument rated, also be rated for short-circuit fault currents?

Answer: U.L. requires these devices to be marked with their short circuit withstand current rating.

- B. These meter fittings and current transformer panels are components in the circuit and must be able to withstand the available fault currents. True or False?

Answer: True.

- C. Should the metering current transformer cabinet supplied by the building owner and installed by the electrical contractor be tested and listed by U.L. in order to comply with NEC 110-10 since it is a component within the possible fault circuit?

Answer: Although marking is required for meter sockets, there appears to be no similar requirement for C.T. cabinets.

52. In the 1987 NEC, Article 331-3 requires that ENMT be protected by a thermal barrier with a 15-minute finish rating as listed in a directory of fire resistive materials.

A. Does this mean ENMT can be used only in fire-resistive construction?

Answer: No.

B. How can one assume that requirements for a code-complying installation have been met?

Answer: One method is to determine if the material is listed with at least a 15 minute finish rating in the U.L. Fire Resistance Directory.

53. Can the demand factors of 220-18 apply to 5 dryers in a common public area laundry room of an apartment building or are they intended to apply only when the dryers are located in the individual dwelling units?

Answer: The demand factors of Table 220-18 are based on dryers located in each dwelling unit and the resulting diversity of use. Assuming that the building has significantly more than 5 units, it is likely all 5 dryers may be used at one time. As a result, Table 220-18 is not applicable.

54. A plug-in device rated 15 amperes connects to a 100 ampere bus duct. Flexible cord drops down from the device to a small machine with proper overcurrent protection on the machine. The 15-ampere plug-in device does not include any overcurrent protection. Is this a violation of 364-12 or does 364-12 Ex No. 1 permit this arrangement?

Answer: NEC 364-12 requires the plug-in device to have overcurrent protection. Exception No. 1, however, recognizes taps as permitted in 240-21 Ex. No. 2 d. The use of cord for the tap is in violation of Section 240-21 Ex. No. 2 d.

55. Is a window air conditioner considered to be fastened in place under 210-23(a) and limited to 50% of the branch circuit rating when plugged into a general residential lighting and outlet circuit, or may it be rated 80% of the circuit rating?

Answer: NEC 440-62 is the applicable section. When the window air conditioner is plugged into a circuit having other outlets, 440-62(c) limits the rating to 50% of the branch circuit rating regardless of whether or not the unit is fastened in place.