Department of LABOR AND INDUSTRIES

ELECTRICAL CURRENTS

Code guidance from the Department of Labor and Industries
Office of the Chief Electrical Inspector

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Our 5th month! Electrical code issues and answers.

● Wiring modular office furnishings or relocatable wired partitions

When manufactured office partitions contain an electrical distribution system (including switches, receptacles, flexible cable assemblies with quick-connect electrical interconnections, and branch circuit conductors to the premises wiring), all electrical equipment and conductors must be installed by properly certified electricians and licensed electrical contractors. Uncertified individuals may assemble the panels, work surfaces, cabinets, shelves, and structural elements of the partitions.

Electrical inspection and permit fees for added, altered, or extended office furnishing circuit installations will be based on WAC 296-46-910(2)(c) along with the note. (Currently, the first five circuits per panel at $52; plus $5 for each additional circuit; not to exceed the cost of a new feeder to a panel of equivalent rating.)

● Overcurrent protection for transformer installations

There are always two issues to be considered when sizing overcurrent protection for transformer installations: overcurrent protection for the transformer and overcurrent protection for the primary and secondary conductors. Transformer protection is addressed in NEC 450-3 and conductor protection is covered by NEC 240-3. Both must be properly protected.

NEC 450-3 will allow a transformer to be protected by an overcurrent device that exceeds the rated full load amps of the transformer. However, the primary and secondary circuit conductors must be protected at a value no greater than allowed by NEC 240-3. Where more than one calculated ampacity could apply to conductors and equipment, the lowest value shall be used.

● Transformer taps NEC 240-21(d)

When using the tap rule for transformers in NEC 240-21(d) [Primary Plus Secondary Not Over 25 Feet], it is permissible to exclude from the 25 foot measurement any portion of the primary conductors that are protected at their allowable ampacity. This exclusion can be applied to transformer primary conductors that are tapped from a feeder, such as a radial loop feeder, or originate directly from an overcurrent device. This would allow the entire 25 feet to be measured from the load terminals of the transformer to the secondary overcurrent protection if the overcurrent device is a single circuit breaker or set of fuses that limit load current to not more than the conductor ampacity. Additionally, all of the conditions (1) through (5) in NEC 240-21(d) must be met.

● Electrical wiring in conduit on or below grade

All conduit installed underground or in concrete on or below grade is classified as a wet location as defined in Article 100 of the National Electrical Code. Any wiring method used under these conditions must be a type that is approved for a wet location. This prohibits the use of type NM cable and other wiring approved for use in normally dry locations only.

● Electrical inspection of prefabricated buildings classified by an accredited electrical product testing laboratory

The department retains the right to do the electrical inspections of prefabricated buildings (factory-assembled structures) that will be sited in Washington. These buildings must comply with the requirements of RCW 19.28, Electricians and Electrical Installations; WAC 296-46, Safety Standards-Installing Electric Wires and Equipment-Administrative Rules; NFPA 70, The National Electrical Code; and when the structures are of "closed construction" with WAC 296-150F, Factory-built Housing and Commercial Structures.

Classification and labeling of a factory-assembled structure by an electrical products testing laboratory is not a substitute for field electrical inspection. An electrical work permit must be purchased and an electrical inspection is required to insure compliance with all of the appropriate standards listed above. The electrical contractor

purchasing the permit will be responsible for the installation of all of the electrical equipment. Permit fees will be based upon the number of services, feeders, and circuits installed per WAC 296-46-910.

● Gaps around boxes - NEC 370-20 and 370 21

Boxes are permitted to be set back no more than ¼ in. (635mm) in walls and ceilings of concrete, tile, or other noncombustible material. In walls or ceilings constructed of wood or other combustible materials, the box must be flush with or project from the finished surface of the wall. Boxes that recess, so that the cover for the box does not fit against the face of the box in noncombustible material must also provide no more than a 1/8 in (318mm) gap at the edge of the box.

● Grounding manhole, vault, or handhole covers

Metal covers installed on concrete manholes, vaults, or handholes that contain electrical conductors or equipment must be grounded to ensure electrical continuity and the capacity to conduct safely any fault current likely to be imposed. Metal covers on any nonmetallic box require a bonding jumper to assure proper grounding of the cover. NEC 370-28(c) requires that covers on boxes meet the grounding requirements of NEC 250-42.

● Bonding jumpers for raised cover devices

NEC 250-74 states: *"An equipment bonding jumper shall be used to connect the grounding terminal of a grounding-type receptacle to a grounded box."* Article 410-56(i) requires that receptacles be secured to a raised cover with more than one screw. Two-screw attachment does not satisfy equipment grounding requirements for the receptacle installed in the raised cover, unless the cover and box combination are clearly identified as listed for equipment grounding. The department is unaware of any raised cover/box combinations identified in this manner; therefore, bonding jumpers from a raised cover supported receptacle to a metal box will be required.

At the present time there are no similar requirements for switches mounted in raised covers. Switches are not devices that are relied upon to provide an equipment grounding path for downstream equipment. NEC 380-12 requires that metal faceplates be effectively grounded. Raised covers that support switches will be considered effectively grounded when properly secured to a grounded metal box with the provided mounting screws.

It should be noted that the 1998 NEC Committee Report on Proposals included a requirement that *"snap switches, including dimmer switches, shall be effectively grounded and shall provide a means to ground metal faceplates, whether or not a metal faceplate is installed."* An equipment grounding terminal on a snap switch and a bonding jumper to a metal box will be required by the 1999 NEC if this proposal survives the NFPA 1998 general meeting.

● Ground Rods

NEC 250-83 (c) (3) requires that ground rods *"be driven to a depth of not less than 8 feet (2.44m) except that, where rock bottom is encountered, the electrode shall be driven at an oblique angle not to exceed 45 degrees from the vertical or shall be buried in a trench that is at least 2 ½ ft. (762mm) deep."*

The requirement is that the rod be driven to a depth of 8 feet. If the rod cannot be driven then there is a choice of either driving it at a 45-degree angle or laying it in a trench that is no less than 2 ½ feet deep.

● Two or more services installed for capacity requirements in excess of 2000 amps

NEC 230-2(a) Exception No.4 permits two or more services *"where the capacity requirements are in excess of 2000 amperes at a supply voltage of 600 volts or less."* NEC 230-71(a) states *"There shall be no more than six disconnects per service grouped in any one location."* There is no requirement for "grouping" the additional service(s) together. These services are required to be located in compliance with WAC 296-46-23040 and permitted to be located where necessary to serve the loads. NEC 230-2(b) requires that *"a permanent plaque or directory shall be installed at each service disconnect location denoting all other services, feeders, and branch circuits supplying that building or structure and the area served by each."*

● Electrical section website is a source of information for our stakeholders

RCW 19.28-Electricians and Electrical Installations, WAC 296-46-Safety Standards-Installing Electric Wires and Equipment-Administrative Rules, WAC 296-401-Certification of Competency for Journeyman Electricians, a summary of the most recent proposed WAC rules and fee changes, and all the back issues of this publication are available at the website. Future plans include adding Plan Review Guidelines and Electrical Section Policies.

Electrical Section Internet Address: **www.wa.gov/lni/electrical**