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Grounding and Bonding for Electrical Systems

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A. General:

1. All grounding conductors shall be insulated copper and enclosed in a raceway.
2. All ground conductors shall be "GREEN".
3. The use of bare conductors is not permissible except where located in building footings, buried ground rings or specified in Job Scope.

B. Feeder Conduits:

1. Provide a separate, insulated, "GREEN", equipment grounding conductor in each feeder conduit, Bond conductor to each end of enclosing metal raceway.

C. Branch Circuit Conduits:

1. Provide a separate, insulated "GREEN", equipment grounding conductor in each branch circuit conduit. #14 and larger shall be stranded.

D. Panelboards:

1. All panel boards and switchboards shall have equipment grounding bus.

E. Separately derived systems shall be grounded per NEC.

1. Where a neutral conductor is derived a grounding electrode conductor shall be routed to one of the following:
 - The building grounding electrode system bus bar.
 - A common electrode grounding conductor designed as described in 2008 NEC 250.30(A)(4) for such applications.
 - The nearest available effectively grounded structural metal member.
 - Metal water pipe grounding electrode as specified in 2008 NEC 250.52(A)(1). Note: This grounding method must be approved by Ball State on a case-by-case basis.

The grounding electrode conductor shall be routed from the Xo of the transformer in the derived system.

F. Grounding Electrode System

1. Within the building main electrical room, install a copper bus bar, ¼" by 2 inches of sufficient length (two feet minimum) to act as the grounding electrode system termination point for all grounding electrodes as described in 2008 NEC 250.52 A. This shall be called the building grounding electrode system bus bar.
2. All terminations shall be by exothermic welding "Cadweld" or Burndy irreversible crimp on connectors.
3. Ground rods shall be ten feet in length by ¾" diameter.



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G. Transformers serving buildings on main campus

1. Note the transformers serving the buildings of the main campus are considered separately derived systems. The secondary conductors are considered feeders, not services. The bonding of the neutral will take place at the transformer. A system-bonding jumper will be run from the Xo of the building transformer to the ground bar of the building disconnect. Do not install a main bonding jumper in the "service disconnect", MDP or MSB etc. This conductor will be continuous and one piece of wire with no intermediary splices. Size to be based on table 250.66 of the 2008 NEC or 12.5 percent of the largest phase conductor whichever is larger as referenced in 2008 NEC 250.28 (D).
2. Some existing pad mounted transformers are wired like a service entrance with no equipment grounding conductors run from the transformer to the main switchboard and with a main bonding jumper in the main switchboard. In those instances, maintain the existing configuration if you are otherwise not altering this feeder or "service".

H. Building Grounding:

1. Buildings shall be encircled with an appropriately sized (per NEC) bare, stranded copper conductor. Conductor shall be buried outside the building foundation and below possible frost line. All exposed building columns shall be bonded to this ground loop. Concealed building columns shall be grounded at 50 to 75 foot intervals around building. A (10') ten-foot copper-weld ground rod shall be installed at each corner and at 100 to 150 foot intervals along building walls. All grounds shall be bonded to the ground loop. The ground loop shall be connected to the main building-grounding electrode system bus bar. All connections of grounding conductors to columns, ground rods, etc., shall be by exothermic welding "Cadweld" or approved for the purpose irreversible mechanical crimp splices such as those by Burndy.

I. Ufer Grounding:

1. An Ufer grounding system is acceptable in place of ground rods. An Ufer grounding systems shall be per 2008 NEC Article 250.52(A)(3). The foundation rebar shall be connected to the building column and the ground loop. The ground loop shall be connected to the main building-grounding electrode. All connections of grounding conductors to columns, foundation rebar, other ground conductors etc., shall be by exothermic welding "Cadweld" or approved for the purpose irreversible mechanical crimp splices such as those by Burndy.
2. An external electrode shall always be present to prevent foundation damage that can result from high fault currents.

J. Triad and Other Ground Rod Arrangements

1. Where two or more ground rods are installed, spacing shall be a minimum of twice the rod length between any two adjacent ground rods.

K. Fire Alarm Control Panel:

1. Provide an insulated, isolated, grounding conductor, in conduit from the identified grounding terminal in the Fire Alarm Control Panel (FACP) to the ground bar in the main building disconnect.