

SECTION 16450

GROUNDING

PART 1 GENERAL

1.1 SUMMARY

- A. Description Of Systems
 - 1. Provide grounding system as indicated or specified.
 - 2. Grounding Conductors:
 - a. For General Use Above and Below Grade: Bare.
 - b. For General Use Below Grade: Bare.
 - c. In Ducts in Duct Banks: Insulated.
 - d. In Conduit with Phase Conductors: Insulated.
 - e. For Isolated Grounding Systems: Insulated.
 - 3. Grounding Connections:
 - a. In Earth or Inaccessible Locations. Exothermic welded type.
 - b. To Structural Steel Used for Main Building Framing. Exothermic welded type.
 - c. To Non-Permanently Fixed Equipment. Lugs bolted to the equipment.

1.2 QUALITY ASSURANCE

- A. Requirements Of Regulatory Agencies
 - 1. Ground electrical system neutrals and noncurrent carrying parts of electrical equipment per the requirements of the National Electrical Code, except where additional requirements are indicated or specified.

1.3 SUBMITTALS

- A. Furnish submittals for items that are identified in this SECTION by a different typeface and a bracketed code (e.g., *Item [L]*). Refer to SECTION 01340 for definition of codes for types of submittals and the administrative requirements governing submittal procedure. Additional submittal requirements pertaining to this SECTION are specified herein under this Article.
- B. Include complete data on each item. Coordinate the items, as they relate to the work, prior to submittal.

PART 2 PRODUCTS

2.1 GROUND RODS

- A. Ground Rods: Copperweld or copper-clad steel, 3/4 inch in diameter, 10 foot minimum installed length for individual rod installation.
 - 1. Blackburn
 - 2. Joslyn

2.2 GROUNDING CONDUCTORS

- A. Bare Grounding Conductors: stranded annealed copper.
- B. Insulated Grounding Conductors: stranded annealed copper insulated with a heat and moisture resistant polyvinyl chloride compound and meeting UL Requirements for Type [THWN] [or] [XHHW], 75 degC, rated 600 volts, color-coded green. Conductor No. 10 AWG and smaller may be solid in lieu of stranded. Refer to SECTION 16120 for manufacturers.

2.3 GROUNDING CONNECTIONS

- A. Exothermic Welding Connection Materials:
 - 1. Erico Products “Cadweld”
- B. Copper Compression Grounding:
 - 1. Anderson
 - 2. Burndy
 - 3. IlSCO
 - 4. Panduit
 - 5. Penn Union
 - 6. Thomas & Betts
- C. Grounding Fittings for Connecting to Water Pipe:
 - 1. Burndy GD or GG
 - 2. Thomas & Betts Series 2818 to 3821, 3824 and 3890
 - 3. Anderson Type GC
- D. Grounding Fittings for Bonding a Ground Conductor to Its Own Conduit:
 - 1. Appleton Type GIB
 - 2. Burndy NE
 - 3. Penn Union BD
 - 4. O-Z Type GB
 - 5. Thomas & Betts Type TIG or 3800 Series
- E. Grounding Fittings for Connection of Grounding Conductor to Fencing:
 - 1. Burndy GL or GD
 - 2. Penn Union GU or GH
 - 3. Anderson GC-110 or GC-143
- F. Other Grounding Connectors and Lugs: Compression type as specified in SECTION 16120.

2.4 MARKERS AND IDENTIFIERS

- A. Underground Hazard Tape. Non-adhesive, vinyl or polyester, 3-inch wide, black letters on yellow background “CAUTION-BURIED GROUND WIRE”.
 - 1. Panduit
 - 2. Stranco Products, Inc.
 - 3. Thomas & Betts

PART 3 EXECUTION

3.1 INSTALLATION

- A. Install conductors of size required by the NEC, except that where larger sizes are indicated, provide these sizes. Install ground rods at locations indicated, and where shown in multiple, separate rods by at least 10 feet. Locate top of rod not less than 12 inches below finish grade. Ground structural steel building framing by making connections in the web of the columns.
- B. Thoroughly clean all bonding surfaces of non-conducting materials. Where bolted connections are used, treat surfaces with a corrosion-inhibiting compound.
- C. Where insulated conductors are used, thoroughly tape all exposed splices and connections. Encapsulate below grade splices and connections so that bare conductors are not in contact with earth.
- D. Where metallic conduit is used for mechanical protection of a ground conductor, bond conductor to the conduit at each end.
- E. For electrical system neutral grounding, do not use conductor sizes smaller than No. 8 AWG.
- F. Ground the enclosures of all heavy duty equipment, such as switchgear, substations, transformers, motor control centers, and motors above 50 horsepower, with a separate grounding conductor connected to the nearest ground electrode conductor or ground bus comprising a part of the electrical system grounding. Provide equipment grounding conductors in electrical substation room floor slabs. Coordinate locations for terminations on equipment before concrete is poured.
- G. Any cable passing through the lowest floor or foundation walls below grade shall be sealed by exothermic weld or solder dipping, embedded in the wall or floor, to prevent water seepage through the interstices of the cable.
- H. Where non-metallic conduit is used, install an equipment grounding conductor in the conduit with the circuit conductors. The grounding conductor may be a separate conductor, a conductor of a multi-conductor cable, or wires in the interstices of cabled circuit conductors. Size the grounding conductors per NEC requirements except where noted otherwise.
- I. Lighting branch circuits in EMT or flexible conduit and lighting fixture cord and plug assemblies shall have an equipment grounding conductor.
- J. Provide an equipment grounding conductor, within the raceway along with phase conductors, for all feeders and branch circuits.
- K. Provide an equipment grounding conductor within all flexible conduits.
- L. An equipment grounding conductor shall be installed within the raceway along with the phase conductors for all electrical equipment and devices located in Health Care Facilities, Clinics and Medical Areas.

- M. The metallic enclosures and exposed noncurrent-carrying metal parts of all electrical equipment shall be grounded by connection with an equipment grounding conductor. This includes boxes, panels, lighting fixtures, ballasts and poles, receptacles, etc.
- N. Lighting poles and luminaries shall be grounded with a #6 bare, stranded copper cable exothermically welded to a ground rod adjacent to the pole. An equipment grounding conductor shall be installed with the phase conductors.
- O. In manholes, install grounding as indicated, and ground all steel and equipment. Minimum size bare copper conductor is #4/0. Cadweld all connections.
- P. Install hazard warning tape 12 inches below grade at locations of all underground grounding cables.

END OF SECTION

Revision History	
Date	Rev. No.
A	0
B	0
D	0
E	0
F	0
02-19-09	0

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