

**SECTION 26 05 26****GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS****PART 1 - GENERAL****1.1 REFERENCED DOCUMENTS**

- A. Comply with Division 1 - General Requirements and related documents.
- B. Comply with all other Division 26 sections as applicable.
- C. Refer to other Divisions for coordination of work with other portions of work.

**1.2 DESCRIPTION**

- A. Provide connections from the existing grounding electrode system to:
  - 1. The electric power system grounded circuit conductor (neutral).
  - 2. The electric power system non-current carrying enclosures and equipment ground conductors (equipment ground).
- B. Provide connections from the existing grounding electrode system to auxiliary ground conductors for data and voice communication systems.
- C. Repair or replace existing service entrance grounding electrode system if required for proper operation of electrical equipment per Code.

**1.3 QUALITY ASSURANCE**

- A. The equipment supplied and installed shall meet the requirements of the National Electrical Code and all applicable local codes and ordinances.
- B. All equipment supplied shall be Underwriter's Laboratories Inc. listed and so labeled.

**1.4 REFERENCED STANDARDS**

- A. National Electrical Code, NFPA 70.
- B. EIA/TIA Standard 607
- C. IEEE - Standard 142 - Recommended Practice for Grounding of Industrial and Commercial Power Systems.
- D. IEEE Standard 81 - Guide for Measuring Earth Resistivity.

**1.5 SUBMITTALS**

- A. Submit manufacturer's product literature completely describing conductors and cable assemblies and evidence of U.L. Listing.

**1.6 DELIVERY, STORAGE AND HANDLING**

- A. Deliver conductors and cable assemblies to the project in the manufacturer's standard reels or boxes marked with conductor material, insulation type, conductor size and U.L. Label.
- B. Store conductors and cable assemblies in a clean, dry location to prevent damage from moisture, dust, personnel and equipment.
- C. Handle conductors and cables in a manner to prevent damage to conductor, insulation, jackets, and identifying markings.

**1.7 MANUFACTURERS**

- A. The materials shall be the products of a manufacturer with a minimum of ten years' experience in the manufacture of similar material.
- B. Acceptable manufacturers shall be as listed with the material descriptions.

**1.8 WARRANTY**

- A. The material shall be warranted to be free from defect and in proper working order for a period of one year following the date of final acceptance.

**PART 2 - PRODUCTS****2.1 GROUND RODS**

- A. Standard ground rods shall be 3/4-inch diameter, 10-foot length, copper clad steel, equal to Thompson Company.

**2.2 CONDUCTORS**

- A. Conductors buried in contact with the earth shall be bare copper, solid for sizes up to No. 6 AWG, concentric lay strand for sizes No. 8 AWG and larger.
- B. Conductors for installation below raised access floor systems shall be bare copper, solid for sizes up to No. 6 AWG, concentric lay strand for sizes No. 8 AWG and larger.
- C. All other grounding conductors shall be copper conductor, Type THWN 600 volt 90 Deg.C. thermoplastic insulation, green color where available.

## **2.3 CONNECTIONS**

- A. All connections made below grade, in inaccessible locations, and all connections and splices in the grounding electrode conductor system shall be made by exothermic weld process equal to Cadweld. Provide polyethylene inspection well covers and lids equal to Erico #T416B.
- B. All other connections shall be hydraulically crimped irreversible connectors equal to Thomas and Betts 54000 Series.
- C. Connections to raised access floor system pedestals shall be Thomas and Betts 38268 malleable iron mechanical clamp.
- D. Connections to cable trays shall be Thomas and Betts 10105 malleable iron mechanical clamp.
- E. Connections to domestic cold-water piping shall be Thomas and Betts GUV Series copper alloy U-bolt and mechanical clamp.
- F. Connections to building structural steel shall be exothermic weld equal to Cadweld.
- G. Connections which require flexibility for movement, expansion, or vibration shall be made with flexible flat conductor, multiple strands of 30-gauge copper conductors or equivalent circular mil area to the primary ground conductor. Protect ends with copper bolt hole end pieces.

## **2.4 CONDUITS**

- A. Provide malleable iron conduit grounding bushings where:
  - 1. Metallic raceways terminate at metal housings without mechanical and electrical connection to housing.
  - 2. At each end of metallic conductors for grounding conductors where conduits are electrically non-continuous.
  - 3. At the ends of service entrance conduit.

## **PART 3 - EXECUTION**

### **3.1 GROUNDING ELECTRODE**

- A. Grounding electrode shall be tested and certified to provide five ohms or less Earth resistivity.
- B. If necessary, provide one, or more, driven solid ground rods to serve as the grounding electrode for the facility. Additional rods shall be driven at not less than ten-foot separation and connected together until the specified resistance testing criteria can be met.

### **3.2 SUPPLEMENTARY GROUND ELECTRODES**

- A. The following items, where they exist on the project, shall be bonded together with the main grounding electrode described above:
  - 1. Domestic cold water service entrance.
  - 2. Building structural steel frame.
  - 3. Minimum twenty feet of bare copper conductor, minimum No. 4 AWG, encased in a concrete footing along the exterior perimeter edge of the building.
  - 4. Lightning Protection System.
- B. Ground Electrode Bus:
  - 1. All grounding electrode conductors shall be the same size and shall be not less than the size required by NEC or the size shown on the Drawings.
  - 2. Connect the grounding electrode system to the main ground connection in the U.L. Listed Service Disconnecting means in the main switch or switchboard.

### **3.3 GROUNDED CIRCUIT CONDUCTOR**

- A. Bond the grounding electrode system to the grounded circuit conductor (neutral conductor) at one location only, on the supply side of the service disconnecting means, with a neutral disconnecting link as required by the NEC.

### **3.4 EQUIPMENT GROUNDING CONDUCTORS**

- A. Bond the non-current carrying parts of the electric power system to the grounding electrode conductor at the service disconnecting means. From this point forward, all non-current carrying parts of the electric power system shall be electrically connected and continuous by means of:
  - 1. Electrically continuous equipment enclosures, metallic boxes and metallic raceways connected with U.L. Listed connectors and couplings.
  - 2. Equipment grounding conductors supplementary to metallic raceway systems where shown on the Drawings.
  - 3. Equipment grounding conductors in non-metallic raceway systems and in flexible metal conduit systems.
  - 4. Where permitted under other sections of the Specification, the insulated grounding conductor provided in Type MC cable will be considered an acceptable equipment grounding conductor.
  - 5. Uninsulated grounding strips and spiral wrap provided in Type AC cable is not an acceptable grounding conductor.

### **3.5 SEPARATELY DERIVED SYSTEMS**

- A. Separately derived systems include:
  - 1. Secondaries of dry type power transformer.

2. Outputs of uninterruptible power systems.
  3. Outputs of motor generator sets or frequency convertors.
- B. These systems shall be grounded in accordance with the NEC, similar to the service disconnecting means discussed above, and as shown on the Drawings.
- C. The grounding electrode conductor from a separately derived system shall be connected to the main ground electrode bus described above, or to one of the secondary ground electrode busses, if present.
- D. A second grounding electrode conductor shall connect to building structural steel frame at the nearest available location, if available.

### **3.6 TESTING**

- A. Grounding Electrode:
1. The earth resistance of the main ground electrode shall be not more than 5 ohms.
  2. Perform a measurement of ground resistance by one of the means described in IEEE Standard 81, Guide for Measuring Earth Resistivity.
  3. Provide written certification of the ground resistance measurements upon request.
- B. Grounding Continuity:
1. Provide continuity tests and checks of equipment grounding and isolated grounding conductor systems to ensure electrical continuity.
  2. Provide written certification of continuity checks upon requests.

**END OF SECTION**