

SECTION 26 05 26.00 - GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS**PART 1 - GENERAL****1.1 QUALITY ASSURANCE**

- A. Provide Electrical Components, Devices, and Accessories listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application. Comply with UL 467 for grounding and bonding materials and equipment. Comply with ANSI/TIA/EIA-607, "Commercial Building Grounding and Bonding Requirements for Telecommunications. Comply with NFPA 70.

PART 2 - PRODUCTS**2.1 MATERIALS**

- A. General: Except as otherwise indicated, provide copper electrical grounding and bonding systems and materials with assembly of materials including but not limited to cables/wires, connectors, solderless lug terminals, grounding electrodes and plate electrodes, bonding jumper braid, and additional accessories needed for a complete installation. Where materials or components are not indicated, provide products that comply with NEC, UL, and IEEE requirements, and with established industry standards for those applications indicated. Utilize compatible metallic materials throughout system to eliminate galvanic action.
- B. Acceptable Manufacturers: Subject to being equivalent and subject to compliance with requirements, provide conductors and connectors as specified in Section 260519. Subject to being equivalent and subject to compliance with requirements, provide other grounding related materials by Erico (as a standard of quality), or other equivalent available manufacturers where not otherwise specified in Division 26.

2.2 CONDUCTORS AND CONNECTORS AND ELECTRODES

- A. For insulated conductors, provide copper or tinned-copper wire or cable insulated (green-colored) conductors, insulated for 600 V unless otherwise required by applicable Code or authorities having jurisdiction. For bare copper conductors, provide: Solid Conductors, ASTM B 3; Stranded Conductors, ASTM B 8; Tinned Conductors, ASTM B 33.
- B. Provide connectors listed and labeled by an NRTL acceptable to authorities having jurisdiction for applications in which used and for specific types, sizes, and combinations of conductors and other items connected. Provide copper or copper alloy bolted connectors for conductors and pipes, pressure type with at least two bolts. Provide clamp

type pipe connectors, sized for pipe. Use exothermic-welding kits of types recommended by kit manufacturer for materials being joined and installation conditions.

- C. Provide copper-bonded steel (copper molecularly bonded to nickel-sealed high-strength steel core) ground rods, 3/4 inch in diameter by 10 feet in length (sectional rods may be used when rods are longer than 10 feet). Provide sheet copper plate electrodes that are 20-gage by 36" by 36", made from high-conductivity sheet, with cable attachments (minimum quantity of 2), sized for cables as necessary to fulfill project grounding requirements, where ground rods cannot or should not be used.

PART 3 - EXECUTION

3.1 APPLICATIONS

- A. Provide green-colored insulation, unless indicated otherwise. Provide solid conductors for No. 8 AWG and smaller, and stranded conductors for No. 6 AWG and larger unless otherwise indicated. Provide bare copper conductors below grade, No. 2/0 AWG minimum. Provide tinned conductors in corrosive areas. Where to be installed underground, bury at least 36 inches below grade.

3.2 EQUIPMENT GROUNDING

- A. Install insulated equipment grounding conductors as required by NFPA 70 and as otherwise required. Install insulated equipment grounding conductors with the following items, in addition to those required by NFPA 70: all feeders; all branch circuits; expansion couplings; flexible raceway runs.
- B. Air-Duct Equipment Circuits: Install insulated equipment grounding conductor to duct-mounted electrical devices operating at 120 V and more, including air cleaners, heaters, dampers, humidifiers, and other duct electrical equipment. Bond conductor to each unit and to air duct and connected metallic piping.

3.3 INSTALLATION

- A. Grounding Conductors: Route along shortest and straightest paths possible unless otherwise indicated or required by Code. Avoid obstructing access or placing conductors where they may be subjected to strain, impact, or damage.
- B. Bonding Straps and Jumpers: Install in locations accessible for inspection and maintenance except where routed through short lengths of conduit. Bond straps directly to basic structure, taking care not to penetrate any adjacent parts. Install bonding so vibration is not transmitted to rigidly mounted equipment. Use exothermic-welded connectors for outdoor locations; if a disconnect-type connection is required, use a bolted clamp.

- C. Conductor Terminations and Connections:
 - 1. Pipe and Equipment Grounding Conductor Terminations: Bolted connectors.
 - 2. Underground Connections: Welded connectors except if otherwise indicated.
 - 3. Connections to Structural Steel: Welded connectors.
- D. Bonding Interior Metal Ducts: Bond metal air ducts to equipment grounding conductors of associated fans, blowers, electric heaters, and air cleaners. Install bonding jumper to bond across flexible duct connections to achieve continuity.
- E. Grounding Requirements for Adjoining and Adjacent Structures
 - 1. This subsection applies for any building structure of any kind that adjoins another in any way, including portions of common buildings that “adjoin” via expansion joints, as well as adjacent abutting structures.
 - 2. Bond new concrete columns using minimum #3/0 AWG below-grade copper conductors. For steel construction, bond together every other steel perimeter column to those of adjacent and adjoining structures. Provide minimum surface contact area of eight square inches, welded securely to clean areas of the steel, for structural steel bonding plates (equivalent bolting methods are acceptable only if means and methods are in strict compliance with directives obtained from the project Structural Engineer). Provide minimum #3/0 AWG copper bonding jumper between bonding plates with sufficient slack to allow for building expansion and movement. Install this work above accessible ceilings or in other accessible non-public areas.
 - 3. Provide an earth ground at every other new column in all directions. Adjacent columns may be earth-grounded at one of the columns instead of both, at column groups that are bonded together.

3.4 LABELING

- A. Install labels at the telecommunications bonding conductor and grounding equalizer and at the grounding electrode conductor where exposed. The labels or text shall be green. Label Text: "GROUND SYSTEM - If this connector or cable is loose or if it must be removed for any reason, notify the facility manager."

3.5 FIELD QUALITY CONTROL

- A. Tests and Inspections:
 - 1. Inspect, test and adjust components, assemblies, and equipment installations, including connections. After installing grounding system but before permanent electrical circuits have been energized, test for compliance with requirements.
 - 2. Inspect physical and mechanical condition. Verify tightness of accessible, bolted, electrical connections with a calibrated torque wrench according to manufacturer's written instructions.

3. Test continuity of each conductor. Test completed grounding system at service disconnect enclosure grounding terminal/bar, and at each location where a maximum ground-resistance level is specified or as required to verify integrity of grounding electrode system. Make tests at ground rods before any conductors are connected.
4. Installed components will be considered defective if it does not pass tests and inspections. Correct malfunctioning work on-site, where possible, and retest to demonstrate compliance; otherwise, replace with new work and retest. Prepare test and inspection reports. Include notation of deficiencies detected, remedial action taken, and observations after remedial action.

END OF SECTION 26 05 26.00