SECTION 26 05 26
GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes methods and materials for grounding systems and equipment.

B. Grounding system shall be in compliance with all requirements of the National Electrical Code.

1.2 SUBMITTALS

A. Product Data: For each type of product indicated.

B. Field quality-control test reports.

1.3 QUALITY ASSURANCE

A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.

B. Comply with UL 467 for grounding and bonding materials and equipment.

PART 2 - PRODUCTS

2.1 CONDUCTORS

A. Insulated Conductors: Copper wire or cable insulated for 600 V unless otherwise required by applicable Code or authorities having jurisdiction.

B. Bare Copper Conductors:

1. Solid Conductors: ASTM B 3.
2. Stranded Conductors: ASTM B 8.
3. Tinned Conductors: ASTM B 33.
4. Bonding Cable: 28 kcmil, 14 strands of No. 17 AWG conductor, 1/4 inch (6 mm) in diameter.
5. Bonding Conductor: No. 4 or No. 6 AWG, stranded conductor.
6. Bonding Jumper: Copper tape, braided conductors, terminated with copper ferrules; 1-5/8 inches (41 mm) wide and 1/16 inch (1.6 mm) thick.
7. Tinned Bonding Jumper: Tinned-copper tape, braided conductors, terminated with copper ferrules; 1-5/8 inches (41 mm) wide and 1/16 inch (1.6 mm) thick.

2.2 CONNECTORS

A. Listed and labeled by a nationally recognized testing laboratory acceptable to authorities having jurisdiction for applications in which used, and for specific types, sizes, and combinations of conductors and other items connected.

PART 3 - EXECUTION

3.1 APPLICATIONS

A. All new work requiring the pulling of wire through conduit shall include at least one equipment grounding conductor.

B. Conductors: Install solid conductor No. 8 AWG and smaller, and stranded conductors No. 6 AWG and larger, unless otherwise indicated.

3.2 EQUIPMENT GROUNDING

A. Install insulated equipment grounding conductors with the following items, in addition to those required by NFPA 70:

1. Feeders and branch circuits: see below.
2. Lighting circuits see below.
3. Receptacle circuits: see below. In addition, a wired ground shall be provided for continuity of ground path from the device-grounding pole. Provide ground fault interrupter receptacles in wet conditions and where required by NEC and other related codes.

A wire equipment ground shall be installed within the branch circuit conduit and shall be grounded to the cabinet of the panelboard to an uninsulated ground bus. The neutral bar of the panel shall not be used for equipment grounds.

Equipment grounds and the identified neutral shall not be electrically interconnected on the building side of the service ground.

B. Use of water, natural gas, air, steam or any other metal piping lines for equipment grounding is prohibited.

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. Grounding conductors shall be installed in rigid PVC or rigid galvanized conduit. No metal parts such as locknuts shall surround the ground conductor. If metal is used, protective conduits for ground conductors shall be bonded at both ends to reduce impedance in the ground path under fault current flow. All conduit connections shall be threaded and then welded.

B. All connections to the grounding system shall be clamped, exothermic welded, cad weld or equivalent.

C. Direct electrical connections between electrical grounds and water, natural gas, air, steam, or any other metal piping are prohibited except connections as defined in NEC Art. 250.

D. Welding shall be performed such that electrical current shall not pass through any electrical conduit, motor, bearing or other electrical component. Damage caused by improper welding return will be the responsibility of the contractor.

3.4 FIELD QUALITY CONTROL

A. Perform the following tests and inspections and prepare test reports:

1. After installing grounding system but before permanent electrical circuits have been energized, test for compliance with requirements.
2. Test completed grounding system at each location where a maximum ground-resistance level is specified, at service disconnect enclosure grounding terminal, and at ground test wells.

    a. Measure ground resistance not less than two full days after last trace of precipitation and without soil being moistened by any means other than natural drainage or seepage and without chemical treatment or other artificial means of reducing natural ground resistance.
    b. Perform tests by fall-of-potential method according to IEEE 81.

B. Report measured ground resistances that exceed the following values:

1. Power and Lighting Equipment or System with Capacity 500 kVA and Less: Less than 5 ohms.
2. Power and Lighting Equipment or System with Capacity 500 to 1000 kVA: Less than 5 ohms.
3. Power and Lighting Equipment or System with Capacity More Than 1000 kVA: 3 ohms.
4. Power Distribution Units or Panelboards Serving Electronic Equipment: 3 ohm(s).

C. Earth ground grids shall be installed and tested, and shall be less than 25 ohms. Additional rods or deeper installation depth shall be utilized if required to bring the grid impedance to 25 ohms.

D. Excessive Ground Resistance: If resistance to ground exceeds specified values, notify Engineer promptly and include recommendations to reduce ground resistance.

END OF SECTION 26 05 26