

**SECTION 26 05 26**  
**GROUNDING**

**PART 1 - GENERAL**

**1.1 SECTION INCLUDES**

- A. Section includes:
  - 1. Conductors
  - 2. Connectors
  - 3. Grounding Electrodes
  - 4. Bonding
  - 5. Electrical Room Grounding
  - 6. Transformer Grounding
  - 7. Generator Grounding
  - 8. Telecommunications System Grounding
- B. Meet the following performance requirements:
  - 1. Unless specified elsewhere, the ohmic values for grounds and grounding systems shall be as follows:
    - a. For grounding metal enclosures and frames for electrical and electronically operated equipment--5 ohms maximum.
    - b. For grounding systems to which electrical utilization equipment and appliances are connected--5 ohms maximum. To MGB.
    - c. For grounding secondary distribution systems, neutrals, noncurrent carrying metal parts associated with distribution systems, and enclosures of electrical equipment not normally within reach of other than authorized and qualified electrical operating and maintenance personnel -- 5 ohms maximum. To MGB.
    - d. All Telecom Ground Busbars' resistance must be under 3 ohms to the MGB.
    - e. MGB to earth – 5 ohms maximum
    - f. Ground well/rod to earth – 5 ohms maximum.
    - g. Power and Lighting Equipment or System with Capacity 500 kVA and Less 5 ohms.
    - h. Power and Lighting Equipment or System with Capacity 500 to 1000 kVA: 5 ohms.
    - i. Power and Lighting Equipment or System with Capacity More Than 1000 kVA: 3 ohms.
    - j. Power Distribution Units or Panelboards Serving Electronic Equipment: 1 ohms.
    - k. Substations and Pad-Mounted Equipment: 5 ohms.
    - l. Manhole Grounds: 10 ohms.
- C. System Description:
  - 1. Grounding and Bonding for safety and performance
- D. Definitions:
  - 1. MGB- Main Ground Bar
  - 2. TMGB- Telecommunications Main Ground Bar
  - 3. SRG- Signal Reference Grid
  - 4. PANI- 'P' surge producers; 'A' surge absorbers (Grounding Electrode System, Building Structure Ground and Metallic Pipe Water System) 'N' non-isolated equipment frames, 'I' isolated equipment frames.

**1.2 RELATED WORK**

- A. Section 26 00 10 - Basic Electrical Requirements, is an integral part of this section. Requirements and work indicated in 26 00 10 are not repeated in this section.

- B. Section 27 05 26 – Grounding and Bonding for Communications Systems.

### **1.3 COORDINATION**

- A. Coordinate work under provisions indicated in Section 26 00 10.

### **1.4 QUALIFICATIONS/QUALITY ASSURANCE**

- A. Conform to requirements indicated in Section 26 00 10.
- B. Grounding System Resistance: 5 ohms.

### **1.5 REGULATORY REQUIREMENTS AND STANDARDS**

- A. Conform to requirements indicated in Section 26 00 10.
- B. Codes and Standards in addition to Section 26 00 10:
  - 1. ANSI/IEEE C2 - National Electrical Safety Code.
  - 2. ANSI/IEEE 80 - Guide for Safety in Substation Grounding.
  - 3. ANSI/IEEE 81 - Guide for Measuring Earth Resistivity, Ground Impedance, and Earth Surface Potentials of a Ground System.
  - 4. ANSI/IEEE 1100 - Power and Grounding Electronic Equipment

### **1.6 SUBMITTALS**

- A. Submit as required herein and under Section 26 00 10.
- B. Product Data: Provide data for grounding electrodes and connections.
- C. Written test results.
- D. Manufacturer's Instructions: Include instructions for storage, handling, protection, examination, preparation and installation of exothermic connectors.

### **1.7 EXTRA MATERIALS**

- A. Furnish under provisions indicated in Section 26 00 10.

### **1.8 PROJECT RECORD DOCUMENTS**

- A. Submit under provisions indicated in Section 26 00 10.
- B. Accurately record actual locations of grounding electrodes and buried grounding conductors.
- C. Submit test reports of service ground resistance and resistance readings from ground bar to ground bar and from SRG to raised floor.

### **1.9 OPERATION AND MAINTENANCE DATA**

- A. Submit under provisions indicated in Section 26 00 10.

### **1.10 WARRANTY**

- A. Provide under provisions indicated in Section 26 00 10.

### **1.11 LEED / SUSTAINABILITY**

- A. Conform to requirements indicated in Section 26 00 10.

## **PART 2 - PRODUCTS**

### **2.1 ROD ELECTRODE**

- A. Manufacturers:
  - 1. A.B. Chance.
  - 2. Copperweld Bimetallics Div.
  - 3. National Ground Rod.
  - 4. Substitutions: Or equal, under provisions of Section 26 00 10.
- B. Material: Copper or Copper-clad steel.
- C. Diameter: 3/4 inch (19 mm).
- D. Length: 10 feet (3 m).

### **2.2 ACTIVE ELECTRODES (NOT USED)**

### **2.3 MECHANICAL CONNECTORS**

- A. Manufacturers:
  - 1. O.Z. Gedney.
  - 2. Burndy.
  - 3. A.B. Chance.
  - 4. Erico
  - 5. Substitutions: Or equal, under provisions of Section 26 00 10.
- B. Material: Bronze.
- C. NRTL listed for grounding.

### **2.4 EXOTHERMIC CONNECTIONS**

- A. Manufacturers:
  - 1. Caldweld.
  - 2. Thermoweld.
  - 3. Substitutions: Or equal, under provisions of Section 26 00 10.

### **2.5 WIRE**

- A. Material: Stranded copper.
- B. Grounding Electrode Conductor: Size to meet Electrical Code requirements. No 4/0 AWG minimum for incoming service.
- C. Ground grid and loop electrode: No. 4/0 AWG.

### **2.6 GROUNDING WELL COMPONENTS**

- A. Well Pipe: 8 inch (200 mm) diameter by 24 inch (600 mm) long concrete pipe with belled end.
- B. Well Cover: Cast iron with legend "GROUND" embossed on cover.

### **PART 3 - EXECUTION**

#### **3.1 EXAMINATION**

- A. Verify that final backfill and compaction has been completed before driving rod electrodes.

#### **3.2 INSTALLATION**

- A. Install Products in accordance with manufacturer's instructions.
- B. Install rod electrodes at locations indicated. Install ground rods 30 inches (750 mm) minimum below grade and from foundation and locate outside of roof drip line.
- C. Provide ground loop as indicated on Drawings; install 30 inches (750 mm) below grade and 30 inches (750 mm) minimum from foundation unless otherwise indicated.
- D. Provide grounding well pipe with cover at rod locations where indicated (minimum of 1). Install well pipe top flush with finished grade.
- E. Provide grounding electrode conductor and connect to reinforcing steel in foundation footing. Bond steel columns and rebar together.
- F. Provide bonding to meet Electrical Code requirements. Bond all systems together with #410 copper cable, including ground ring, transformer generator, and primary equipment ground systems.
- G. Bond together metal siding not attached to grounded structure; bond to ground.
- H. Install ground to access floors. Use bare copper, hollow braided conductor (60A ampacity), Belden 8669 or equal. Bond to building steel, transformer and panelboards serving area.
- I. Signal Reference Ground (SRG) – Refer to Drawings.
- J. Bond together each metallic raceway, pipe, duct and other metal object entering space under access floors. Bond to underfloor ground grid and single point ground. Use bare copper, hollow braided, conductor (Belden 8669 or equal).
- K. Equipment Grounding Conductor: Provide separate, insulated conductor within each feeder and branch circuit raceway. Terminate each end on suitable lug, bus, or bushing.
- L. Provide grounding as required by the lightning protection system, including bonding all metallic objects within six feet of down conductors.
- M. Bond metal fences and gates around the transformers and generators to the transformer/generator grounding system.

#### **3.3 PRIMARY/SUBSTATION GROUNDING**

- A. Provide ground loop around primary voltage equipment. Refer to Drawings.

#### **3.4 TRANSFORMER GROUNDING**

- A. Provide grounding of transformers as separately derived systems, as required by the Electrical Code. Ground to the nearest building steel frame or code-approved grounding electrodes.
- B. Bond neutral, equipment grounding conductor, transformer case and the grounding electrode at the transformer.

- C. Provide grounding at utility transformers in accordance with utility company requirements.

### **3.5 GENERATOR GROUNDING**

- A. Provide grounding of the generators as separately derived systems, as required by the Electric Code.
- B. Bond the generator neutral and generator frame together and to the grounding electrode conductor.

### **3.6 TELECOMMUNICATIONS SYSTEM GROUNDING**

- A. Provide a copper ground bus in the computer room.
- B. Connect the ground bus to building steel.
- C. Ground bars in consecutive Telecommunication Rooms and conduits and cable tray entering the room shall be bonded together using a hollow braided, bare copper conductor.

### **3.7 GROUND ROD ALTERNATE**

- A. Where it is not possible install ground rods vertically due to rock or other obstructions, Install Three #4/0 bare copper conductors of length equal to the ground rod (10 Ft minimum) radiating out from the proposed ground rod location. Conductors shall be equally spaced in the direction away from the building or ground loop the proposed ground rod is connected to. Install conductors 30 inches below grade.

### **3.8 FIELD QUALITY CONTROL**

- A. Field inspection and testing will be performed under provisions indicated in Section 26 00 10.
- B. Inspect grounding and bonding system conductors and connections for tightness and proper installation.
- C. Use suitable test instrument to measure resistance to ground of system. Perform testing in accordance with test instrument manufacturer's recommendations using the fall-of-potential method.
- D. Test resistance-to-earth grounding connections in accordance with ANSI/IEEE 81. Perform 4 point fall-of-potential test on main system. Use two-point method test to determine resistance between main system and neutral.
- E. Minimum Acceptable Ground Resistance: Notify Architect of ground resistance tested. Notify in time for corrective action to be taken if necessary.

**END OF SECTION**