SECTION 26 0526

GROUNDING AND BONDING

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Grounding and bonding electrical systems and equipment.

B. Ground system test.

1.2 RELATED SECTIONS

A. Gas flexible pipe connector:

1. Liquified-petroleum gas piping: Section 23 1126.

1.3 REFERENCES

A. IEEE STD 142

B. NFPA 70

C. ASTM F467 and F468

D. UL 467

1.4 DEFINITIONS

A. Area served by a separately-derived system: The area within the building that contains any part of a circuit of the system.

1.5 SUBMITTALS

A. Product data: Ground rods and connections.

B. Certifications: System test.

PART 2 - PRODUCTS

2.1 MANUFACTURED UNITS

A. Ground conductor, unless specifically noted otherwise, shall be copper, 98 percent conductivity, solid for No. 10 AWG and smaller and stranded for No. 8 AWG and larger.

B. Ground rods:

1. Copper bonded steel, 0.75 inch diameter by 10 feet long, one end pointed and the other end tinned,
2. Basis of design: Erico International Corporation.

C. Mechanical type ground connectors:

1. Connectors:

a. IEEE 837 and UL 467 compliant, listed for use for specific types, sizes, and combinations of conductors and connected items.
b. Basis of design: FCI Burndy G Series.

2. Nuts, bolts, and washers: Silicon bronze alloy type B per ASTM F467 and F468.

D. Exothermic type ground connections:

1. Exothermic welding systems.
2. Basis of design: “Cadweld,” manufactured by Erico International Corporation.

E. Lugs:

1. Lugs shall be two- or four-hole.
2. Basis of design: Burndy Hylug series.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

A. Provide the complete grounding of conduit systems, electrical equipment, conductor and equipment enclosures, motors, transformers, and neutral conductors in accordance with applicable codes. Grounded phase and neutral conductors shall be continuously identified. Continuity of metal raceways shall be insured by double locknuts.

B. Furnish and install main grounds for secondary electrical service to cold water main in accordance with NEC requirement. In addition to the cold water ground. Provide ground rods as indicated or as required by NEC and applicable codes.

C. Install copper grounding jumpers of 3/0 copper cable around each main water valve in the building. Install copper grounding jumpers around conduit expansion fittings. Jumpers shall be of adequate current carrying capacity corresponding to size of conduit.

D. Ground system connections which are beneath the floor and in a concealed or inaccessible location shall be brazed or welded. Brazing and welding shall be “CADWELD.”

E. Separately-derived 120/208-volt three phase wye electrical systems originating in transformers shall be grounded at the transformer neutral terminal:

1. The grounding electrode for the system shall be whichever one of the following that is closest to the transformer:

a. Building’s grounding electrode.
b. Steel structural member of the building conforming to NEC requirements for grounding electrodes.
c. First five feet of the water service piping to the building.

F. Separately-derived three phase wye electrical systems originating in generators shall be grounded at the generator neutral terminal:

1. The grounding electrode for the outdoor generator shall be a ground rod.
2. The grounding electrode for the indoor generator shall be whichever one of the following that is closest to the generator:

a. Building’s grounding electrode.

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b. Steel structural member of the building conforming to NEC requirements for grounding electrodes.
c. First five feet of the water service piping to the building.

G. Bonding separately-derived systems:

1. Each metal water piping system, not used as the electrical system's grounding electrode, in the area served by the electrical system shall be bonded to the electrical system's neutral by a system bonding jumper.
2. If exposed structural metal is not used as the grounding electrode for the system, bond exposed structural metal in the area served by the electrical system to the system's neutral by a system bonding jumper.
3. If a metal water piping system in the area served by the electrical system is bonded to exposed structural metal by a NEC-compliant bonding jumper, then only one of the two (piping or structure metal) need to be bonded to the electrical system's neutral.

H. Bonding straps and jumpers: Install in locations accessible for inspection and maintenance except where routed through short lengths of conduit.

1. Bonding to structure: Bond straps directly to basic structure, taking care not to penetrate any adjacent parts.
2. Bonding to equipment mounted on vibration isolation hangers and supports: Install bonding so vibration is not transmitted to rigidly mounted equipment.
3. Use exothermic-welded connections for outdoor locations; if a disconnect-type connection is required, use a bolted clamp secured with a minimum of two bolts and lock washers.

I. Ufer ground (concrete-encased grounding electrode): Fabricate according to NFPA 70; use a minimum of 20 feet (6 m) of bare copper conductor not smaller than No. 4 AWG.

1. If concrete foundation is less than 20 feet (6 m) long, coil excess conductor within base of foundation.
2. Bond grounding conductor to reinforcing steel in at least four locations and to anchor bolts. Extend grounding conductor below grade and connect to building's grounding grid or to grounding electrode external to concrete.

3.2 EQUIPMENT GROUNDING AND BONDING

A. Provide insulated equipment grounding conductors with feeders and branch circuits.

B. Gas piping:

1. Comply with NFPA 54.
2. Provide bonding jumpers for each length of corrugated stainless-steel tubing (CSST).

a. Jumpers shall be No. 6 AWG or the same size as the equipment grounding conductor serving the equipment served by the CSST, whichever is larger.
b. Install in accordance with CSST manufacturers' instructions and NFPA 54.

3.3 APPLICATIONS

A. Underground grounding conductors: Install bare copper conductor, No. 2/0 AWG minimum.

1. Bury at least 24 inches (600 mm) below grade.

3.4 IDENTIFICATION

A. Comply with requirements in Section 26 0553, Identification for Electrical Systems, for instruction signs. The label or its text shall be green.

3.5 GROUNDING SYSTEM TEST

A. Ensure that grounding system is continuous and that resistance to earth is not more than 10 ohms.

B. Test each ground rod for resistance to earth before making connections to rod; tie grounding system together and test for resistance to earth.

1. Make resistance measurements in dry weather, not earlier than 48 hours after rainfall.

C. Submit written results of each test including location of rods as well as resistance and soil conditions at time measurements were made.

END OF SECTION

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