

SECTION 26 05 26
GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS

PART 1 GENERAL

1.01 REFERENCE STANDARDS

- A. IEEE 81 - IEEE Guide for Measuring Earth Resistivity, Ground Impedance, and Earth Surface Potentials of a Grounding System; 2012.
- B. NECA 1 - Standard for Good Workmanship in Electrical Construction; 2023.
- C. NEMA GR 1 - Grounding Rod Electrodes and Grounding Rod Electrode Couplings; 2022.
- D. NETA ATS - Standard for Acceptance Testing Specifications for Electrical Power Equipment And Systems; 2025.
- E. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- F. NFPA 70B - Recommended Practice for Electrical Equipment Maintenance; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- G. NFPA 99 - Health Care Facilities Code; 2024, with Errata.
- H. UL 467 - Grounding and Bonding Equipment; Current Edition, Including All Revisions.

1.02 SECTION INCLUDES

- A. Grounding and bonding requirements.
- B. Conductors for grounding and bonding.
- C. Connectors for grounding and bonding.
- D. Ground bars.

1.03 RELATED REQUIREMENTS

- A. Section 260519 - Low-Voltage Electrical Power Conductors and Cables: Additional requirements for conductors for grounding and bonding, including conductor color coding.
 - 1. Includes oxide inhibiting compound.
- B. Section 260553 - Identification for Electrical Systems: Identification products and requirements.

1.04 REFERENCE STANDARDS

- A. [NECA 1](#) - Standard for Good Workmanship in Electrical Construction; 2015.
- B. [NEMA GR 1](#) - Grounding Rod Electrodes and Grounding Rod Electrode Couplings; 2007.
- C. [NETA ATS](#) - Acceptance Testing Specifications for Electrical Power Equipment and Systems; 2017.
- D. [NFPA 70](#) - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- E. [UL 467](#) - Grounding and Bonding Equipment; Current Edition, Including All Revisions.

1.05 ADMINISTRATIVE REQUIREMENTS

- A. Coordination:
 - 1. Verify exact locations of underground metal water service pipe entrances to building.
 - 2. Notify Architect/Engineer of any conflicts with or deviations from Contract Documents. Obtain direction before proceeding with work.

1.06 SUBMITTALS

- A. Product Data: Provide manufacturer's standard catalog pages and data sheets for grounding and bonding system components.
- B. Shop Drawings:
 - 1. Indicate proposed arrangement for signal reference grids. Include locations of items to be bonded and methods of connection.
- C. Manufacturer's Instructions: Indicate application conditions and limitations of use stipulated by product testing agency. Include instructions for storage, handling, protection, examination, preparation, and installation of product.
- D. Field quality control test reports.
- E. Project Record Documents: Record actual locations of grounding electrode system components and connections.

1.07 QUALITY ASSURANCE

- A. Comply with requirements of NFPA 70B. Maintain at the project site a copy of each referenced document that prescribes execution requirements.
- B. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years documented experience.
- C. Product Listing Organization Qualifications: An organization recognized by OSHA as a Nationally Recognized Testing Laboratory (NRTL) and acceptable to authorities having jurisdiction.

1.08 DELIVERY, STORAGE, AND HANDLING

- A. Receive, inspect, handle, and store products in accordance with manufacturer's instructions.

PART 2 PRODUCTS

2.01 GROUNDING AND BONDING REQUIREMENTS

- A. Existing Work: Where existing grounding and bonding system components are indicated to be reused, they may be reused only where they are free from corrosion, integrity and continuity are verified, and where acceptable to the authority having jurisdiction.
- B. Do not use products for applications other than as permitted by [NFPA 70](#) and product listing.
- C. Unless specifically indicated to be excluded, provide all required components, conductors, connectors, conduit, boxes, fittings, supports, accessories, etc. as necessary for a complete grounding and bonding system.
- D. Where conductor size is not indicated, size to comply with [NFPA 70](#) but not less than applicable minimum size requirements specified.
- E. Grounding System Resistance:
 - 1. Achieve specified grounding system resistance under normally dry conditions unless otherwise approved by Architect/Engineer. Precipitation within the previous 48 hours does not constitute normally dry conditions.
 - 2. Grounding Electrode System: Not greater than 5 ohms to ground, when tested according to [IEEE 81](#) using "fall-of-potential" method or alternate test described in [IEEE 81](#).
 - 3. Between Grounding Electrode System and Major Electrical Equipment Frames, System Neutral, and Derived Neutral Points: Not greater than 0.5 ohms, when tested using "point-to-point" methods.
- F. Grounding Electrode System:

1. Metal Underground Water Pipe(s):
 - a. Provide connection to underground metal domestic and fire protection (where present) water service pipe(s) that are in direct contact with earth for at least 10 feet at an accessible location not more than 5 feet from the point of entrance to the building.
 - b. Provide bonding jumper(s) around insulating joints/pipes as required to make pipe electrically continuous.
 - c. Provide bonding jumper around water meter of sufficient length to permit removal of meter without disconnecting jumper.
 2. Metal In-Ground Support Structure:
 - a. Provide connection to metal in-ground support structure that is in direct contact with earth in accordance with [NFPA 70](#).
 3. Ground Rod Electrode(s):
 - a. Terminate to existing Ground Rod Electrode at electrical service entrance. Where location is not indicated, locate electrode(s) at least 5 feet outside building perimeter foundation as near as possible to electrical service entrance; where possible, locate in softscape (uncovered) area.
 4. Provide additional ground electrode(s) as required to achieve specified grounding electrode system resistance.
 5. Ground Bar: Provide ground bar, separate from service equipment enclosure, for common connection point of grounding electrode system bonding jumpers as permitted in [NFPA 70](#). Connect grounding electrode conductor provided for service-supplied system grounding to this ground bar.
 - a. Ground Bar Size: As shown on detail drawings unless otherwise indicated or required.
 - b. Where ground bar location is not indicated, locate adjacent to Access Control Equipment.
 - c. Ground Bar Mounting Height: As per detail drawings.
 6. Ground Riser: Provide common grounding electrode conductor not less than 3/0 AWG for tap connections to multiple separately derived systems as permitted in [NFPA 70](#).
- G. Bonding and Equipment Grounding:
1. Provide bonding for equipment grounding conductors, equipment ground busses, metallic equipment enclosures, metallic raceways and boxes, device grounding terminals, and other normally non-current-carrying conductive materials enclosing electrical conductors/equipment or likely to become energized as indicated and in accordance with [NFPA 70](#).
 2. Provide insulated equipment grounding conductor in each feeder and branch circuit raceway. Do not use raceways as sole equipment grounding conductor.
 3. Where circuit conductor sizes are increased for voltage drop, increase size of equipment grounding conductor proportionally in accordance with [NFPA 70](#).
 4. Unless otherwise indicated, connect wiring device grounding terminal to branch circuit equipment grounding conductor and to outlet box with bonding jumper.
 5. Terminate branch circuit equipment grounding conductors on solidly bonded equipment ground bus only. Do not terminate on neutral (grounded) or isolated/insulated ground bus.
 6. Provide bonding jumper across expansion or expansion/deflection fittings provided to accommodate conduit movement.
 7. Provide bonding for interior metal piping systems in accordance with [NFPA 70](#). This includes, but is not limited to:
 - a. Metal water piping where not already effectively bonded to metal underground water pipe used as grounding electrode.
 - b. Metal gas piping.
 - c. Metal process piping.
 8. Provide bonding for interior metal air ducts.
 9. Provide bonding for metal building frame.

10. Provide bonding for metal siding not effectively bonded through attachment to metal building frame.
11. Provide bonding and equipment grounding for pools and fountains and associated equipment in accordance with [NFPA 70](#).
12. Provide redundant grounding and bonding for patient care areas of health care facilities in accordance with [NFPA 70](#) and [NFPA 99](#).

2.02 GROUNDING AND BONDING COMPONENTS

- A. General Requirements:
 1. Provide products listed, classified, and labeled as suitable for the purpose intended.
 2. Provide products listed and labeled as complying with [UL 467](#) where applicable.
- B. Conductors for Grounding and Bonding, in Addition to Requirements of Section 260526:
 1. Use insulated copper conductors unless otherwise indicated.
 - a. Exceptions:
 - 1) Use bare tinned copper conductors where installed underground in direct contact with earth.
 - 2) Use bare tinned copper conductors where directly encased in concrete (not in raceway).
 2. Factory Pre-fabricated Bonding Jumpers: Furnished with factory-installed ferrules; size braided cables to provide equivalent gage of specified conductors.
- C. Connectors for Grounding and Bonding:
 1. Description: Connectors appropriate for the application and suitable for the conductors and items to be connected; listed and labeled as complying with [UL 467](#).
 2. Unless otherwise indicated, use mechanical connectors, compression connectors, or exothermic welded connections for accessible connections.
 3. Manufacturers - Mechanical and Compression Connectors:
 - a. Advanced Lightning Technology (ALT); _____: [www.altfab.com/#sle](#).
 - b. Burndy LLC; _____: [www.burndy.com/#sle](#).
 - c. Harger Lightning & Grounding; _____: [www.harger.com/#sle](#).
 - d. Thomas & Betts Corporation; _____: [www.tnb.com/#sle](#).
 4. Manufacturers - Exothermic Welded Connections:
 - a. Burndy LLC; _____: [www.burndy.com/#sle](#).
 - b. Cadweld, a brand of Erico International Corporation; _____: [www.erico.com/#sle](#).
 - c. thermOweld, subsidiary of Continental Industries; division of Burndy LLC; _____: [www.thermoweld.com/#sle](#).
- D. Ground Bars:
 1. Description: Copper rectangular ground bars with mounting brackets and insulators.
 2. Size: As indicated.
 3. Holes for Connections: As indicated or as required for connections to be made.
 4. Manufacturers:
 - a. Advanced Lightning Technology (ALT); _____: [www.altfab.com/#sle](#).
 - b. Erico International Corporation; _____: [www.erico.com/#sle](#).
 - c. Harger Lightning & Grounding; _____: [www.harger.com/#sle](#).
 - d. thermOweld, subsidiary of Continental Industries; division of Burndy LLC; _____: [www.thermoweld.com/#sle](#).
- E. Ground Rod Electrodes:
 1. Comply with [NEMA GR 1](#).
 2. Material: Copper-bonded (copper-clad) steel.
 3. Size: 3/4 inch diameter by 10 feet length, unless otherwise indicated.
 4. Manufacturers:

- a. Advanced Lightning Technology (ALT); _____: www.altfab.com/#sle.
 - b. Erico International Corporation; _____: www.erico.com/#sle.
 - c. Galvan Industries, Inc; _____: www.galvanelectrical.com/#sle.
 - d. Harger Lightning & Grounding; _____: www.harger.com/#sle.
- F. Oxide Inhibiting Compound: Comply with Section 260519.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that work likely to damage grounding and bonding system components has been completed.
- B. Verify that field measurements are as indicated.
- C. Verify that conditions are satisfactory for installation prior to starting work.

3.02 INSTALLATION

- A. Install products in accordance with manufacturer's instructions.
- B. Perform work in accordance with [NECA 1](#) (general workmanship).
- C. Make grounding and bonding connections using specified connectors.
 - 1. Remove appropriate amount of conductor insulation for making connections without cutting, nicking or damaging conductors. Do not remove conductor strands to facilitate insertion into connector.
 - 2. Remove nonconductive paint, enamel, or similar coating at threads, contact points, and contact surfaces.
 - 3. Exothermic Welds: Make connections using molds and weld material suitable for the items to be connected in accordance with manufacturer's recommendations.
 - 4. Mechanical Connectors: Secure connections according to manufacturer's recommended torque settings.
 - 5. Compression Connectors: Secure connections using manufacturer's recommended tools and dies.
- D. Identify grounding and bonding system components in accordance with Section 260553.

3.03 FIELD QUALITY CONTROL

- A. See Section 014000 - Quality Requirements, for additional requirements.
- B. Inspect and test in accordance with [NETA ATS](#) except Section 4.
- C. Perform inspections and tests listed in [NETA ATS](#), Section 7.13.
- D. Investigate and correct deficiencies where measured ground resistances do not comply with specified requirements.
- E. Submit detailed reports indicating inspection and testing results and corrective actions taken.

END OF SECTION 26 05 26 26 05 26