

**SECTION 16760
TELECOMMUNICATIONS GROUNDING AND BONDING**

PART 1 - GENERAL

1.1 SECTION INCLUDES

- A. Related Sections
- B. Applicable Publications
- C. Work Sequencing and Coordination
- D. Telecommunications Submittals
- E. Quality Assurance
- F. Project Record Documents
- G. Qualifications
- H. Regulatory Requirements
- I. Performance Requirements
- J. Materials
- K. Execution

1.2 RELATED SECTIONS

- A. Division 16 Electrical Sections apply to this Section with the additions and modifications specified herein.
- B. Section 16710 - Telecommunications General Requirements
- C. Section 16715 - Telecommunications Acceptance Testing
- D. Section 16720 - Telecommunications Basic Materials and Methods
- E. Section 16725 - Telecommunications Cable
- F. Section 16730 - Underground Structures - Telecommunications

1.3 APPLICABLE PUBLICATIONS

- A. American National Standards Institute (ANSI) Publication: C2-93 National Electrical Safety Code
- B. Electronic Industries Alliance and Telecommunication Industries Association (EIA/TIA) Publications:
 - 1. EIA/TIA 568A - Commercial Building Telecommunications Wiring Standard
 - 2. EIA/TIA 569 - Commercial Building Standard for Telecommunications Pathways and Spaces
 - 3. EIA/TIA 607 - Commercial Building Grounding and Bonding Requirements for Telecommunications

- C. Institute of Electrical and Electronic Engineers (IEEE) Publication: 142-1991 Recommended Practice for Grounding of Industrial and Commercial Power Systems
- D. National Fire Protection Association (NFPA) Publication: 70-96 National Electrical Code (NEC) article 800.
- E. The California State University (CSU), Office of the Chancellor, Publication: Telecommunications Infrastructure Planning Guidelines, including any supplements
- F. Underwriters Laboratories, Inc. (U.L.) Publication:
 - 1. 83-1983 Thermoplastic Insulated Wires
 - 2. 467-84 (R86) Grounding and Bonding

1.4 SUBMITTALS

The Engineer of Record shall receive the following Contractor submittals:

- A. Product data for:
 - 1. Ground bus bars
 - 2. Conductors
 - 3. Connections (all types)
- B. Test Reports for point-to-point resistance tests.
- C. Manufacturer's Instructions: include instructions for storage, handling, protection, examination, preparation and installation of exothermic connectors.

1.5 QUALITY ASSURANCE

- A. All grounding and bonding system work shall be tested and documented as defined in Section 16715 - Telecommunications Acceptance Testing.
- B. For products or workmanship specified by association, trade, Federal, or State Standards, the Contractor shall comply with the requirements of the standard, except when more rigid requirements required by applicable codes or University standards shall apply.
- C. The Contractor shall conform to reference standard by date of issue current on final design documents.

1.6 PROJECT RECORD DOCUMENTS

- A. The Contractor shall accurately record and submit to the Engineer of Record complete data regarding signal ground wire pathways, points of bonding, and point of connection to building grounds.

1.7 QUALIFICATIONS

- A. Products specified in this Section shall be manufactured by a company with a minimum of three years' documented experience specializing in manufacturing such products.
- B. The contractor shall provide the Engineer of Record with a letter or product specification catalog from the manufacturer as evidence of the three years of documented experience listed above.

1.8 REGULATORY REQUIREMENTS

- A. Telecommunications grounding and bonding shall conform to requirements of NFPA 70 and ANSI C2.
- B. The Contractor shall furnish products listed and classified by Underwriters Laboratories, Inc. or testing firm acceptable to the Engineer of Record as suitable for purposes specified and shown.

1.9 PERFORMANCE REQUIREMENTS

- A. Point-to-Point Resistance: 0.5 ohms or less.

PART 2 - MATERIALS

2.1 MATERIALS AND EQUIPMENT

- A. Materials and equipment shall conform to the respective standards and to the specifications stated herein. Electrical ratings shall be as indicated. Except where specifically indicated otherwise, the Contractor shall provide only new materials having all legally required approvals and/or labels. Materials shall conform to the requirements of UL 467 where applicable.

2.2 CONDUCTOR, UL 83

- A. Ground and bonding conductors shall be green-insulated, soft-drawn stranded copper conductors, unless otherwise indicated, installed with sufficient slack to avoid breaking due to settlement and movement of conductors or attached points.
- B. System grounding conductors shall be minimum of 3 Ø AWG bare copper, unless otherwise indicated, and shall be continuous with no joints or splices and placed in a 1" conduit.

2.3 CONNECTORS AND TERMINALS

- A. Wire Connectors and Terminals for use with Copper Conductors: UL 486A.

2.4 GROUND BUS BARS

- A. The Contractor shall provide ground bar with tapped standard NEMA bolt holes for 2-hole compression connectors, mounting brackets and insulators, sizes as indicated:
 - 1. 1/4" x 4" x 12", Lyncole XIT or approved equal in the BDF.
 - 2. 1/4" x 4" x 5.25", Lyncole XIT or approved equal in all other telecommunication spaces.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. The Contractor shall provide grounding and bonding in accordance with the requirements of NFPA 70, IEEE 142, EIA/TIA 568, EIA/TIA 607, state and local codes, the campus standards and to requirements specified herein. Codes shall be complied with as a minimum requirement, with these specifications prevailing when they are more stringent.

3.2 BONDING

- A. Metallic conduits, wireways, metal enclosures of busways, cable boxes, equipment housings, cable racks and all non-current carrying metallic parts of the installed telecommunications services shall be grounded with #6 AWG insulated copper wire. The metallic conduit system shall be used for equipment and enclosure grounding but not as a system ground conductor.

- B. All metallic conduit stub-ups shall be grounded, and where multiple stub-ups are made within an equipment enclosure, they shall be equipped with grounding bushings and bonded together and to the enclosure and the enclosure ground bus.
- C. Each metallic raceway, pipe, duct and other metal object entering the buildings shall be bonded together. The Contractor shall use #6 AWG bare copper conductors.
- D. The Contractor shall bond telecommunications equipment and busbars separately.

3.3 SIGNAL REFERENCE GROUNDING AND BONDING

- A. Each identified telecommunications space within a building shall have a common signal reference ground. The signal reference ground shall conform to the following:
 - 1. Within the building, all communication spaces shall be separately bonded to each other and connected to the primary building ground in accordance with the provisions of EIA/TIA 607. The communication ground shall not ground any other equipment or be connected to any potential high voltage source. All racks, frames, drain wires, and all installed communication equipment shall only be grounded to this common reference ground with a minimum size #6 AWG copper wire.
 - 2. The Building Distribution Frame (BDF) shall be equipped with a telecommunications main grounding bus bar (TMGB) of minimum 1/4" x 4" x 12" dimensions mounted on the telecommunications backboard 6 inches above finished floor. This point of single reference shall be grounded with a minimum #3 Ø AWG ground conductor in a 1 inch diameter conduit to the main building ground. The building ground for signal reference shall be the building service entrance ground.

3.4 FIELD TESTS

- A. As an exception to requirements that may be stated elsewhere in these documents, the Inspector of Record shall be given five (5) working days notice prior to each test. The Contractor shall provide all test equipment and personnel and shall provide written copies of all test results.
- B. Grounding and bonding system conductors and connections shall be inspected for tightness and proper installation.
- C. The Contractor shall provide personnel and test equipment for point-to-point resistance tests before connecting equipment. Perform point-to-point tests to determine the resistance between the main grounding system and the BDF ground bus bar. Investigate and correct point-to-point resistance values that exceed 0.5 ohm. The Contractor shall record resistance measurements at all test point locations.

END OF SECTION