

# SECTION 270526- GROUNDING AND BONDING FOR TELECOMMUNICATION SYSTEMS

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### PART 1 – GENERAL

#### 1.1 GROUNDING AND BONDING DESCRIPTION

- A. Connecting the communications system and permanently joining all that metal conducting portions of the communications pathway to earth in such a manner as to prevent potential electrical loops and transients that can cause damage to telecommunications equipment, networks and personnel. The intent is to effectively and safely neutralize the potential differences between two metallic items within the Telecom Rooms.

#### 1.2 RELATED DOCUMENTS

- A. BICSI Telecommunications Distribution Methods Manual (TDMM), Thirteenth Edition.
- B. LSU's Policy Statement – PS114.
- C. Section 270528 – “Pathways for Communications Systems.”
- D. Section 271300 – “Communications Backbone Cabling.”
- E. Section 271500 – “Communications Horizontal Cabling.”
- F. Appendix A Figures 7 & 8.

#### 1.3 DEFINITIONS AND ACRONYMS

- A. BICSI: A professional association supporting the information technology systems (ITS) industry.
- B. RCDD: Registered Communications Distribution Designer
- C. TMGB: Telecommunications Main Grounding Busbar
- D. TGB: Telecommunications Grounding Busbar
- E. TBC: Telecommunications Bonding Conductor.
- F. NRTL: National Recognized Testing Laboratory.

#### 1.4 INFORMATIONAL SUBMITTALS

- A. Informational Submittals: Plans showing as-built locations of grounding features specified in "Field Quality Control" Article, including the following:
  - 1. Grounding arrangements and connections for separately derived systems.
  - 2. Grounding for sensitive electronic equipment.

#### 1.5 QUALITY ASSURANCE

- A. Testing must be done to verify that the Telecommunications system is properly grounded and bonded to protect all equipment and personnel.

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- B. Testing Agency Qualifications: Member Company of NRTL.
  - 1. Testing Agency's Field Supervisor: Currently certified by current a member company of NRTL to supervise on-site testing.
- C. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
  - 1. Comply with UL 467 for grounding and bonding materials and equipment.

### PART 2 - PRODUCTS

#### 2.1 GENERAL

- A. All bonding and grounding components shall be listed for the purpose intended and approved by a National Recognized Testing Laboratory (NRTL).
- B. All bonding and grounding components shall comply with EIA/TIA standard 607-C.

#### 2.2 CONDUCTORS

- A. Insulated Conductors: No. 6 AWG green THHN insulated stranded conductors rated for 600 V unless otherwise required by applicable Code or authorities having jurisdiction.

#### 2.3 CONNECTORS

- A. Listed and labeled by an NRTL acceptable to authorities having jurisdiction for applications in which used and for specific types, sizes, and combinations of conductors and other items connected.
- B. Bolted Connectors for Conductors and Pipes: Copper or copper alloy, pressure type with at least two bolts.
  - 1. Pipe Connectors: Clamp type, sized for pipe.
  - 2. These connectors are to be used for bonding only.
- C. Welded Connectors: Exothermic-welding kits of types recommended by kit manufacturer for materials being joined and installation conditions.
- D. Bus-bar Connectors: Mechanical type, cast silicon bronze, solderless compression-type wire terminals, and long-barrel, two-bolt connection to ground bus bar.

#### 2.4 GROUNDING BUSBARS:

- A. Grounding Busbars shall be electro tin plated copper ¼" thick and shall be U.L. listed and manufactured for this purpose. Busbars shall be installed on insulators and stainless steel standoff brackets.
- B. Bus bars shall be as follows:
  - 1. Telecommunications Main Grounding Busbar (TMGB): Shall be a minimum of 4" high x 24" long. The TMGB shall be equipped with a minimum of 28 pairs of pre-drilled 5/16" diameter holes and 5 pairs of 7/16" diameter holes. The 5/16" hole

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spacing shall be 5/8" on center and the 7/16" hole spacing shall be 1" on center. The busbar shall meet EIA/TIA 607 standard.

2. Telecommunications Grounding Busbar (TGB): Shall be a minimum of 2" high x 12" long. The TMGB shall be equipped with a minimum of 6 pairs of pre-drilled 5/16" diameter holes and 3 pairs of 7/16" diameter holes. The 5/16" hole spacing shall be 5/8" on center and the 7/16" hole spacing shall be 1" on center. The busbar shall meet EIA/TIA 607 standard.

### PART 3 - EXECUTION

#### 3.1 HARDWARE:

- A. No building steel or pipes are to be used for grounding purposes.
- B. Conductors: No. 6 AWG green insulated stranded conductors will be installed and routed according to Appendix A Figures 7 & 8.
- C. Grounding Bus: Provide in telecommunication rooms, in rooms housing service equipment, and elsewhere as indicated.
  1. Provide bus on insulated spacers 2 inches minimum from wall, 6 inches above finished floor unless otherwise indicated.
  2. Where needed on both sides of doorways, route grounding conductor up to top of door frame, across top of doorway, and down to specified height above floor; connect to horizontal bus.
- D. Conductor Terminations and Connections:
  1. Pipe and Equipment Grounding Conductor Terminations: Bolted connectors.
  2. Underground Connections: Welded connectors
  3. Connections to Structural Steel: For Telecommunications it is not allowed.
  4. The Telecommunications Grounding system shall remain separate and shall connect to the electrical grounding system at the main building ground.

#### 3.2 GROUNDING UNDERGROUND DISTRIBUTION SYSTEM COMPONENTS

- A. Grounding Manholes and Handholes: Provide a driven ground rod through manhole or handhole floor, close to wall, and set rod depth so 4 inches will extend above finished floor. If necessary, provide ground rod before manhole is placed and provide No. 1/0 AWG bare, tinned- copper conductor from ground rod into manhole through a waterproof sleeve in manhole wall. Protect ground rods passing through concrete floor with a double wrapping of pressure-sensitive insulating tape or heat-shrunk insulating sleeve from 2 inches above to 6 inches below concrete. Seal floor opening with waterproof, nonshrink grout.
- B. Grounding Connections to Manhole Components: Bond exposed-metal parts such as inserts, cable racks, pulling irons, ladders, and cable shields within each manhole or handhole, to ground rod or grounding conductor. Make connections with No. 6 AWG minimum, stranded, copper bonding conductor. Train conductors level or plumb around corners and fasten to manhole walls. Connect to cable armor and cable shields according to written instructions by manufacturer of splicing and termination kits.

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### 3.3 EQUIPMENT GROUNDING

A. Signal and Communication Equipment: In addition to grounding and bonding required by NFPA 70, provide an additional grounding system complying with requirements in TIA/ATIS J-STD-607-A.

1. For telephone, voice, data, and other communication equipment, provide No. 6 AWG minimum green insulated grounding conductor from main building grounding electrode system to each service location, terminal cabinet, wiring closet, and central equipment location.
2. Service and Central Equipment Locations and Wiring Closets: Terminate grounding conductor on a grounding busbar. For the Service Entrance Telecommunications Room (TR) provide a TMGB (section 2.4.B.1) and for all other Telecommunications Rooms provide a TGB (section 2.4.B.2).
3. In the Entrance TR all of the following must be bonded with a No. 6 AWG Bonding Conductor back to the TMGB:
  1. The vault splice closure for the entrance telephone cable
  2. The telephone building protectors
  3. All metallic conduits
  4. All data relay racks

In all TRs the following must be bonded with a BC back to the TGB:

1. All metallic conduits
2. All data relay racks

### 3.4 INSTALLATION

A. Busbars:

1. Every TR shall be equipped with its own Busbar. No TR will share a grounding busbar with any other room.
2. Regardless of the current use or lack of use of a TR, all TRs shall have a busbar installed and grounded in that room.
3. Install the busbar horizontally where shown on Drawings. Mount busbars at 18" above finished floor.

B. Grounding Conductors:

1. This is the conductor that connects Busbar to grounding electrode or Busbar to Busbar.
2. This conductor shall have NO splice points.
3. 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. When routing on TR backboards (walls) the grounding conductors shall adhere to the same routing requirements as all other conductors within the TR.

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- C. Bonding Conductors:
  - 1. This is the conductor that connects the Busbar in each TR to the telecom equipment (racks, ladder tray, voice building protectors, etc.) in that TR.
  - 2. No bonding conductor shall leave the TR that it is servicing.
- D. Grounding to Steel Building Structure: The Telecommunications grounding system shall NOT be grounded using steel building structure.

### 3.5 LABELING

- A. Comply with requirements in Section 260553 "Identification for Electrical Systems" for instruction signs.
- B. Provide labels at the telecommunications bonding conductor and grounding equalizer and at the grounding electrode conductor where exposed.

### 3.6 TESTING

- A. Testing must be done to verify that the Telecommunications system is properly grounded and bonded to protect all equipment and personnel.
- B. Testing Agency: Engage a qualified testing agency to perform tests and inspections.
- C. Testing and Inspection
  - 1. Inspect physical and mechanical conditions. Verify tightness of accessible, bolted, electrical connections with a calibrated torque wrench according to manufacturer's written instructions.
  - 2. Testing methods:
    - a. True Root Mean Square (rms) Alternating Current Measurements:
      - 1) Measure the ac current on any bonding conductor for Telecommunications and that reading should be 0 amperes (A), but must be less than 1A.
    - b. Two-Point Bonding Measurement:
      - 1) Test the bonding connectors of the system using an AC earth ground-resistance tester.
      - 2) This test is performed by connecting the meter leads between the nearest available grounding electrode and the busbar in the Telecom Room. The recommended maximum value for the bonding resistance between these two points is 0.1 ohms (100 milliohms)
- D. Grounding system will be considered defective if it does not pass tests and inspections.
- E. Prepare test and inspection reports.

END OF SECTION 260526