

## University of Houston Master Specification

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<Insert U of H Proj #>

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<Insert Issue Date>

### SECTION 27 0526 - GROUNDING AND BONDING FOR COMMUNICATIONS SYSTEMS

Revise this Section by deleting and inserting text to meet Project-specific requirements.

Maintain Section format, including the UH Master spec designation and version date in bold in the center columns in the header and footer. Complete the header and footer with Project information

Designer is required to adhere to the University's "Network Infrastructure Design Standards" and "Electronic Access Control Design Guide" available in Owner's Design Guidelines on the University's Facilities Planning and Construction web site.

This Section uses the term "Architect" or "Engineer." Change this term to match that used to identify the design professional as defined in the General and Supplementary Conditions.

Verify that Section titles referenced in this Section are correct for this Project's Specifications; Section titles may have changed.

Delete hidden text after this Section has been edited for the Project.

#### PART 1 - GENERAL

##### 1.1 RELATED DOCUMENTS

- A. Drawings and General Provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification sections, apply to work of this Section.
- B. The Contractor's attention is specifically directed, but not limited, to the following documents for additional requirements:
  - 1. The current version of the *Uniform General Conditions for Construction Contracts*, State of Texas available on the web site of the Texas Facilities Commission.
  - 2. The University of Houston's *Supplemental General Conditions and Special Conditions for Construction*.

##### 1.2 SUMMARY

- A. Section Includes:
  - 1. Grounding electrodes and conductors.
  - 2. Equipment grounding conductors.
  - 3. Bonding for communications equipment.
  - 4. Communications system grounding.
  - 5. Electrical equipment and raceway grounding and bonding.
  - 6. Control equipment grounding.
- B. Work covered by this Section consists of furnishing labor, equipment, supplies, materials, and testing unless otherwise specified, and in performing the following operations recognized as necessary for the installation, termination, and labeling of grounding and bonding infrastructure for non-electrical power as described on the Drawings and/or required by these Specifications.

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- C. This Section pertains only to communications equipment installations. For electrical systems, refer to Section 26 0526 "Grounding and Bonding for Electrical Systems."

Revise subparagraph(s) below to suit Project.

### 1.3 REFERENCES

- A. American Society for Testing and Materials (ASTM):
1. B3-13(2018) — Soft or Annealed Copper Wire
  2. B8-11(2017) — Concentric-Lay-Stranded Copper Conductors, Hard, Medium-Hard, or Soft
  3. B33-10(2020)e1 — Tin-Coated Soft or Annealed Copper Wire for Electrical Purposes
- B. Institute of Electrical and Electronics Engineers (IEEE):
1. 142-2007 Recommended Practice for Grounding of Industrial and Commercial Power Systems
  2. 1100-2005 Recommended Practice for Powering and Grounding Electronic Equipment
- C. Underwriters' Laboratories (UL):
1. 83 Thermoplastic Insulated Wire and Cables
  2. 96 Lightning Protection Components
  3. 96A System Installation
  4. 467 Grounding and Bonding Equipment
- D. National Fire Protection Association (NFPA):
1. 780 Lightning Protection Code
  2. 70 National Electrical Code (NEC)
    - a. NEC Article No. 250 - Grounding
- E. American National Standards Institute/Telecommunications Industry Association/Electronic Industries Alliance (ANSI/TIA/EIA):
1. J-STD-607-C Commercial Building Grounding and Bonding Requirements.
  2. Telcordia – Network Equipment Building Systems (NEBS) GR-1275.
- F. Building Industry Consulting Services International (BICSI):
1. Telecommunications Distribution Methods Manual
  2. Customer Owned Outside Plant Design Manual
- G. Comply with local, county, state and federal regulations and codes in effect as of date of "Notice to Proceed."

### 1.4 SUBMITTAL ADMINISTRATIVE REQUIREMENTS

- A. Follow requirements as stated in Section 01 3300 "Submittal Procedures." Use electronic format only.

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### 1.5 ACTION SUBMITTALS

- A. Shop drawings
- B. Product data
- C. Qualification data for installers

### 1.6 INFORMATIONAL SUBMITTALS

- A. Qualification data for testing agency (if applicable)
- B. Field quality control reports in native format

## PART 2 - PRODUCTS

### 2.1 PARTS AND MANUFACTURERS

- A. Refer to Section 01 2500 "Substitution Procedures" for variations from approved manufacturers or parts. Obtain prior written approval for substitutions from both the Owner's Project Manager and the UIT Project Manager.

- B. GROUNDING BUSBARS

- 1. Chatsworth

- a. Telecommunications Main Grounding Busbar (TMGB) - #40158-020 ground busbar with #10622-000 busbar insulators or equivalent
    - b. Telecommunications Grounding Busbar (TGB) - #40156-012 ground busbar with #10622-000 busbar insulators or equivalent

- C. GROUNDING JOINTS AND SPLICES

- 1. Grounding conductor joints/splices: mechanical type, copper alloy, with a minimum of two bolts and a separate section for each conductor

- a. Burndy

- 1) QPX

- b. OZ/Gedney

- 1) XTP

- 2) PMX

- c. Penn-Union

- 1) VX

- 2. Grounding conductor joints/splices: copper compression type with two (2) indents

- a. Burndy

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- b. T&B
- c. Blackburn
- 3. Grounding conductor terminations (lugs): single barrel, mechanical screw type, copper alloy with machined contact surfaces
  - a. OZ
  - b. SL
  - c. T&B
  - d. Burndy
- 4. Grounding conductor terminations (lugs): copper compression type with two (2) indents
  - a. Burndy
  - b. T&B
  - c. Blackburn

**D. BONDING CONDUCTORS**

- 1. Cable Tray Bonding Conductor: green #8 AWG insulated bonding jumper (12 inch max) with appropriate lugs or manufactured braided copper grounding jumper
  - a. B-Line
    - 1) #CAM-GJ
  - b. T&B
    - 1) #BD12
  - c. OZ/Gedney
    - 1) type "FB"
  - d. Mono-Systems
- 2. Equipment Frame Bonding Conductor: green #8 AWG insulated bonding jumper
- 3. Telecommunications Bonding Backbone (TBB)
  - a. Green insulated copper conductor, minimum size of No. 6 AWG
    - 1) Match the insulation fire rating to that of its pathway
    - 2) Size the TBB at 2 kcmil per linear foot of conductor length up to a maximum size of 3/0 AWG.

TBB length (feet)	TBB Size (AWG)
<13	6
14-20	4
21-26	3
27-33	2
34-41	1
42-52	1/0

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53-66	2/0
> 66	3/0

- 4. Bonding Conductor (BC)
  - a. Green insulated copper bonding conductor
    - 1) Minimum size is the same size as the TBB

PART 3 - EXECUTION

3.1 TELECOMMUNICATIONS INSTALLATION

A. Grounding — General

- 1. Bond and ground equipment racks, cable trays, housings, messenger cables, raceways and rack-mounted conduit.
- 2. Connect cabinets, racks, cable trays and frames to single-point ground that is connected to building ground system or NF grounding bar using #6 AWG green insulated copper grounding conductor.

B. Bonding — General

- 1. Use low-impedance bonding to assure electrical continuity between bonded elements.
- 2. Mechanically fasten all conduits that terminate to cable trays, wire ways and racks. When connected to a cable tray or rack, connect conduits with ground bushings, wire bonded to the tray or rack, and grounded to the main building grounding system or NF grounding bar using #6 AWG copper.

C. Installation of the TMGB

- 1. Install the TMGB at the bottom of plywood backboard near the outside plant entrance conduits in the BDF.
- 2. Install the TMGB so that the BC for telecommunications is as short and straight as possible.
- 3. Use continuous ¾-inch conduit for the conductor.

D. Installation of the TGB

- 1. Install the TGB at the bottom of plywood backboard near the copper riser terminations in each IDF.
- 2. Install the TGB so that the TBB for telecommunications is as short and straight as possible.

E. Installation of the TBB

- 1. Install Green insulated copper grounding conductor from the TMGB to each TGB.

F. Installation of Grounding Conductor Joints/Splices

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1. Install mechanical type, copper alloy, with a minimum of two bolts and a separate section for each conductor or copper compression type with two (2) indents.
2. Install manufactured insulating cover or heavy tape insulation over joints/splices.

### G. Grounding of Cable Tray

1. Install grounding at each cable tray joint.
2. Install grounding from side of cable tray down to TMGB or TGB. Drill and tap side of cable tray (for appropriate size bolt, 1/4 inch x 20 min.), making sure that bolt does not extend into wire management part of tray.

### H. Grounding of Equipment Frame

1. Install grounding for the Equipment Frame.

### I. Grounding for Inter-building Copper Cable

1. Use a two-foot fuse link between outside plant cable plant splice and the protector module for building entrance protection of copper cabling:
  - a. IDC-type input and output terminals
  - b. 100 pair-pair capacity
  - c. Female mounting base, equipped with 230 volt, solid state protector modules
  - d. Provide enough protector modules to completely populate all building entrance terminals.
2. Bond the shield of all inter-building backbone cables to the ground lug on the primary protector panel.
3. Bond the protector panel to the TMGB.
4. Bond the shield of all intra-building backbone cables to the TMGB.

### J. Lightning Protection for Copper Data Cabling

1. Furnish and install a building entrance terminal with a two-foot fuse link between the outside cable plant splice and the protector module, IDC-type input and output terminals, 100-pair capacity and female mounting base, equipped with 230-volt, solid-state protector modules. Provide sufficient protector modules to completely populate all building entrance terminals.
2. Furnish and install lightning arrestors rated for 1 Gbps on copper cabling that exits a building and feeds outdoor APS, cameras or other network equipment.

## 3.2 CLOSE OUT DOCUMENTS

- A. As-Built Drawings in .dwg, .rvt and .pdf formats showing locations of telecommunications infrastructure

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