

University of Houston Master Specification

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<Insert Issue Name>

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SECTION 28 0526 - GROUNDING AND BONDING FOR ELECTRONIC SAFETY AND SECURITY

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

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.

Designer is required to adhere to the University's "Network Infrastructure Design Standards," "UH System IT Facilities: Baseline Standards," and "Electronic Access Control Design Guide" available in Owner's Design Guidelines on the University Information Technology and Facilities Planning and Construction web sites.

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 security equipment.
 - 4. Security 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 as described on the Drawings and/or required by these specifications.

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- C. This Section pertains only to electronic safety and security systems installations. For electrical systems, refer to Section 26 0526 "Grounding and Bonding for Electrical Systems." For communications systems, refer to Section 27 0526 "Grounding and Bonding - Communications Systems."

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-D 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 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. Qualifications data for Installers

1.6 INFORMATIONAL SUBMITTALS

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

PART 2 - PRODUCTS

2.1 GENERAL

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

2.2 GROUNDING BUSBARS

- B. Primary Bonding Busbar(PBB)
 - 1. Chatsworth #40158-020 ground busbar with Chatsworth #10622-000 busbar insulators or equivalent.
- C. Secondary Bonding Busbar (SBB)
 - 1. Chatsworth #40156-012 ground busbar with Chatsworth #10622-000 busbar insulators or equivalent.

2.3 GROUNDING JOINTS AND SPLICES

- A. Use mechanical type, copper alloy grounding conductor joints/splices with a minimum of two bolts and a separate section for each conductor.
 - 1. Burndy
 - a. QPX
 - 2. OZ/Gedney

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- a. XTP
- b. PMX
- 3. Penn-Union
 - a. VX
- B. Use copper compression type grounding conductor joints/splices with two indents.
 - 1. Burndy.
 - 2. T&B.
 - 3. Blackburn.
- B. Use mechanical screw type, copper alloy grounding conductor terminations (lugs) with machined contact surfaces.
 - 1. OZ type.
 - 2. SL
 - 3. T&B.
 - 4. Burndy.
- C. Use copper compression type grounding conductor terminations (lugs) with two indents.
 - 1. Burndy.
 - 2. T&B.
 - 3. Blackburn.

2.4 TELECOMMUNICATIONS BONDING CONDUCTORS

- A. Telecommunications Bonding Conductor:
 - 1. Green # 8 AWG insulated bonding jumper (12 inch maximum) with appropriate lugs or manufactured braided copper grounding jumper. Acceptable products:
 - a. B-Line
 - (1) #CAM-GJ.
 - b. T&B
 - (1) #BD12.
 - c. OZ/Gedney
 - (1) type "FB."
 - d. Mono-Systems.
- B. Equipment Frame Bonding Conductor: green #8 AWG insulated bonding jumper.
- C. Backbone Bonding Conductor (TBB):

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1. Green insulated copper conductor, minimum size of No. 6 AWG. Size the TBB at 2 kcmil per linear foot of conductor length up to a maximum size of 3/0 AWG. Use insulation that meets fire ratings of its pathway.

TBB length (feet)	TBB Size (AWG)
<13	6
14-20	4
21-26	3
27-33	2
34-41	1
42-52	1/0
53-66	2/0
> 66	3/0

D. Telecommunications Bonding Conductor (TBC)

1. Green insulated copper bonding conductor.
 - a. Minimum size is the same size as the TBB.

PART 3 - EXECUTION

3.1 SECURITY 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 security room secondary bus bar using #6 AWG green insulated copper grounding conductor at minimum.

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 security room secondary bus bar using #6 AWG copper.

C. Installation of the SBB

1. Install the SBB at the bottom of plywood backboard near the copper riser terminations in each Security Room.
2. Install the SBB so that the BBC for telecommunications is as short and straight as possible.

D. Installation of the BBC

1. Install Green insulated copper grounding conductor from the PBB to each SBB.

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- E. Installation of Grounding Conductor Joints/Splices
 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.
- F. Grounding of Cable Tray
 1. Install grounding at each cable tray joint.
 2. Install grounding from side of cable tray down to PBB or SBB. 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.
- G. Grounding of Equipment Frame
 1. Install grounding for the Equipment Frame.
- H. 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 PBB.
 4. Bond the shield of all intra-building backbone cables to the PBB.
- I. 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. Provide As-Built Drawings in .rvt, .dwg and .pdf formats showing locations of telecommunications infrastructure.

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