NORTH ORANGE COUNTY COMMUNITY COLLEGE DISTRICT
SECTION 27 05 26 – GROUNDING AND BONDING FOR COMMUNICATION SYSTEMS
SAMPLE SPECIFICATION

RELATED SECTIONS:

Section 27 00 00 General Requirements
Section 27 02 00 Communication General Requirements
Section 27 05 28 Pathways for Communications Systems
Section 27 05 37 Fire-Stopping for Communication Systems
Section 27 10 00 Structured Cabling testing
Section 27 11 00 Communication Equipment Room Fittings
Section 27 12 00 Communication Requirements for (RF) CATV System
Section 27 13 00 Communications Backbone Cabling
Section 27 13 23 ABF Fiber Optic Cabling
Section 27 15 00 Communications Horizontal Cabling
Section 27 16 00 Communications Connection Cords

PART 1 – GENERAL

1.1 WORK INCLUDED
Provide all labor, materials, and equipment for the complete installation of work called for in the Contract Documents.

1.2 SCOPE OF WORK
A. This section includes the minimum requirements for the equipment and cable installations in communications equipment rooms (Telecommunications Closets).
B. Included in this section are the minimum composition requirements and installation methods for the following:
   1. Grounding Electrode System
   2. Busbars
   3. Bonding accessories

1.3 QUALITY ASSURANCE
A. All cable and equipment shall be installed in a neat and workmanlike manner. All methods of construction that are not specifically described or indicated in the contract documents shall be subject to the control and approval of the Owner or Owner Representative. Equipment and materials shall be of the quality and manufacture indicated. The equipment specified is based upon the acceptable manufacturers listed. Where "approved equal" is stated, equipment shall be equivalent in every way to that of the equipment specified and subject to approval.
B. Strictly adhere to all Building Industry Consulting Service International (BICSI), Electronic Industries Alliance (EIA) and Telecommunications Industry Association (TIA) recommended installation practices when installing communications/data cabling.
C. Material and work specified herein shall comply with the applicable requirements of the current revision of the following:
ANSI/TIA – 568 Commercial Building Telecommunications Cabling Standard
TIA – 569 Commercial Building Standard for Telecommunications Pathways and Spaces

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ANSI/TIA – 606 Administration Standard for the Telecommunications Infrastructure of Commercial Buildings
ANSI-J-STD – 607 Joint Standard for Commercial Building Grounding (Earthing) and Bonding Requirements for Telecommunications
NFPA 70 – National Electric Code
BICSI – Telecommunications Distribution Methods Manual

1.4 SUBMITTALS

A. Provide product data for the following:
Manufacturers cut sheets, specifications and installation instructions for all products (submit with bid).

PART 2 – PRODUCTS

2.1 Grounding Electrode System

A. Grounding Electrode System
1. When required the Grounding Electrode System shall meet the following
   a. Active grounding system constantly replenishing moisture into the soil
   b. Provide low resistance to ground
   c. Provide season to season stability
   d. Be maintenance-free for 30 years
   e. Contain no hazardous materials or chemicals
2. Approved Manufacturer
   a. Lyncole Grounding Solutions
      i. Lyncole XIT Grounding System
      ii. K2-10CS
      iii. K2-20CS
      iv. K2L-10CS
      v. K2L-20CS

2.2 WALL-MOUNT BUSBARS

A. Telecommunications Main Grounding Busbar (TMGB)
1. Telecommunications Main Grounding Busbar (TMGB) shall be constructed of .25” (6.4 mm) thick solid copper bar.
2. The busbar shall be 4” (100 mm) high and 20” (510 mm) long and shall have 30 attachment points (two rows of 15 each) for two-hole grounding lugs.
3. The hole pattern for attaching grounding lugs shall meet the requirements of ANSI-J-STD – 607-A and shall accept 27 lugs with 5/8” (15.8 mm) hole centers and 3 lugs with 1” (25.4) mm) hole centers.
4. The busbar shall include wall-mount stand-off brackets, assembly screws and insulators creating a 4” (100 mm) standoff from the wall.
5. The busbar shall be UL Listed as grounding and bonding equipment.
6. Design Make shall be:
Chatsworth Products, Inc. (CPI),Telecommunications Main Grounding Busbar:
Part Number 40153-020, 20” x 4” (510 mm x 100 mm) Telecommunications Main Grounding Busbar, UL Listed.

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B. Telecommunications Grounding Busbar (TGB)
   1. Telecommunications Grounding Busbar (TGB) shall be constructed of .25" (6.4 mm) thick solid copper bar.
   2. The busbar shall be 2" (50 mm) high and 12" (300 mm) long and shall have 9 attachment points (one row) for two-hole grounding lugs.
   3. The hole pattern for attaching grounding lugs shall meet the requirements of ANSI-J-STD – 607-A and shall accept 6 lugs with 5/8" (15.8 mm) hole centers and 3 lugs with 1" (25.4 mm) hole centers.
   4. The busbar shall include wall-mount stand-off brackets, assembly screws and insulators creating a 4" (100 mm) standoff from the wall.
   5. The busbar shall be UL Listed as grounding and bonding equipment.
   6. Design Make shall be: Chatsworth Products, Inc. (CPI),Telecommunications Grounding Busbar:
      Part Number 13622-012, 12" x 2" (300 mm x 50 mm) Telecommunications Grounding Busbar, UL Listed.

2.3 BONDING ACCESSORIES

A. Two Mounting Hole Ground Terminal Block
   1. Ground terminal block shall be made of electroplated tin aluminum extrusion.
   2. Ground terminal block shall accept conductors ranging from #14 AWG through 2/0.
   3. The conductors shall be held in place by two stainless steel set screws.
   4. Ground terminal block shall have two 1/4" (6.4 mm) holes spaced on 5/8" (15.8 mm) centers to allow secure two-bolt attachment to the rack or cabinet.
   5. Ground terminal block shall be UL Listed as a wire connector.
   6. Design Make shall be: Chatsworth Products, Inc. (CPI),
      Two Mounting Hole Ground Terminal Block: Part Number 40167-001,
      Two Mounting Hole Ground Terminal Block, 1 each

B. Compression Lugs
   1. Compression lugs shall be manufactured from electroplated tinnedcopper.
   2. Compression lugs shall have two holes spaced on 5/8" (15.8 mm) or 1" (25.4 mm) centers, as stated below, to allow secure two bolt connections to busbars.
   3. Compression lugs shall be sized to fit a specific size conductor, sizes #6 to 4/0, as stated below.
   4. Compression lugs shall be UL Listed as wire connectors.
   5. Design Make shall be: Chatsworth Products, Inc. (CPI), Compression Lugs:
      Part Number 40162-901, Compression Lug, #6 Awg, 5/8" (15.8 mm) hole spacing, 1 each.
      Part Number 40162-903, Compression Lug, #6 Awg, 1" (25.4 mm) hole spacing, 1 each.
      Part Number 40162-904, Compression Lug, #2 Awg, 5/8" (15.8 mm) hole spacing, 1 each.
      Part Number 40162-907, Compression Lug, #2 Awg, 1" (25.4 mm) hole spacing, 1 each.
      Part Number 40162-909, Compression Lug, 2/0 Awg, 1" (25. 4 mm) hole spacing, 1 each
      Notes: Other sizes are available.

C. Antioxidant Joint Compound
   1. Oxide inhibiting joint compound for copper-to-copper, aluminum-to-aluminum or aluminum-to-copper connections.
   2. Design Make shall be: Chatsworth Products, Inc. (CPI),

Antioxidant Joint Compound:
Part Number 40168-101, Antioxidant Joint Compound, Copper-to-Copper Connections, .5 oz, 1 each.
Part Number 40168-801, Antioxidant Joint Compound, Copper-to-Copper Connections, 8 oz, 1 each.
Part Number 40166-101, Antioxidant Joint Compound, Aluminum-to-Aluminum or Aluminum-to-Copper Connections, .5 oz, 1 each
Part Number 40166-801, Antioxidant Joint Compound, Aluminum-to-Aluminum or Aluminum-to-Copper Connections, 8 oz, 1 each
Part Number 40168-150, Antioxidant Joint Compound, Copper-to-Copper Connections, .5 oz, 50 each.
Part Number 40168-812, Antioxidant Joint Compound, Copper-to-Copper Connections, 8 oz, 12 each.
Part Number 40166-150, Antioxidant Joint Compound, Aluminum-to-Aluminum or Aluminum-to-Copper Connections, .5 oz, 50 each
Part Number 40166-812, Antioxidant Joint Compound, Aluminum-to-Aluminum or Aluminum-to-Copper Connections, 8 oz, 12 each

D. C-Type, Compression Taps
   1. Compression taps shall be manufactured from copper alloy.
   2. Compression taps shall be C-shaped connectors that wrap around two conductors forming an irreversible splice around the conductors; installation requires a hydraulic crimping tool
   3. Compression taps shall be sized to fit specific size conductors, sizes #2 AWG to 4/0, as stated below.
   4. Compression taps shall be UL Listed.
   5. Design Make shall be: Chatsworth Products, Inc. (CPI), Compression Taps:
      Part Number 40163-001, Compression Tap, #6 AWG Solid Run to #6 AWG Solid Tap, 1 each.
      Part Number 40163-007, Compression Tap, 2/0 Stranded Run to 2/0 Stranded Tap, 1 each.
      Notes: Other sizes are available.

E. Pedestal Clamp With Grounding Connector
   1. Pedestal clamp shall be made from electroplated tinned copper or bronze. Installation hardware will be stainless steel.
   2. Pedestal clamps shall be sized to fit a specific size conductor, size #6 and/or 2/0, as stated below.
   3. Pedestal clamp installation hardware shall be sized to attach to round and/or square raised access floor pedestals that are 1-1/8” to 1-3/4” in diameter, as stated below.
   4. Pedestal clamp shall provide straight (in-line) or cross (intersection) support for up to two conductors.
   5. Pedestal clamp shall be UL Listed as grounding and bonding equipment.
   6. Design Make shall be: Chatsworth Products, Inc. (CPI), Pedestal Clamps:
      Part Number 40169-001, Pedestal Clamp, Cross Connector, for 1-1/8” Square Pedestals, with (2) #6 AWG conductors per side, 1 each.
      Part Number 40169-002, Pedestal Clamp, Cross Connector, for 1-1/8” to 1-3/4” Round Pedestals, with (1) #6 AWG and (1) 2/0 conductors per side, 1 each.

F. Pipe Clamp With Grounding Connector

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1. Pipe clamp shall be made from electroplated tinned bronze. Installation hardware will be stainless steel.
2. Pipe clamp shall be sized to fit up to two conductors ranging in size from #6 to 250 MCM; conductors must be the same size.
3. Pipe clamp installation hardware shall be sized to attach to pipes, sizes 1" to 6" (.75" to 6.63" in diameter), as stated below.
4. Pipe clamp shall be UL Listed as grounding and bonding equipment.
5. Design Make shall be: Chatsworth Products, Inc. (CPI), Pipe Clamps:
   Part Number 40170-002, Pipe Clamp, for 1" to 1-1/4" pipe, 1 each.
   Part Number 40170-003, Pipe Clamp, for 1-1/2" to 2" pipe, 1 each.
   Part Number 40170-004, Pipe Clamp, for 2-1/2" to 3" pipe, 1 each.
   Part Number 40170-005, Pipe Clamp, for 3-1/2" to 4" pipe, 1 each.
   Part Number 40170-006, Pipe Clamp, for 5" to 6" pipe, 1 each.

G. Equipment Ground Jumper Kit
1. Kit includes one 24"L insulated ground jumper with a straight two hole compression lug on one end and an L-shaped two hole compression lug on the other end, two plated installation screws, an abrasive pad and a .5 once tube of antioxidant joint compound.
2. Ground conductor is an insulated green/yellow stripe #6 AWG wire
3. Lugs are made from electroplated tinned copper and have two mounting holes spaces .5" to .625" apart that accept 1/4" screws.
4. Jumper will be made with UL Listed components
5. Design Make shall be: Chatsworth Products, Inc. (CPI), Equipment Ground Jumper Kit:
   Part Number 40159-010, Equipment Ground Jumper Kit, 1 each.

PART 3 – EXECUTION

3.1 INSTALLATION

A. Outdoor grounding and bonding connections.
1. All outdoor grounding and bonding (earthing) connections shall be accomplished using exothermic welding.

B. Wall-Mount Busbars
1. Attach busbars to the wall with appropriate hardware according to the manufacturer's installation instructions.
2. Conductor connections to the TMGB or TGB shall be made with two-hole bolt-on compression lugs sized to fit the busbar and the conductors.
3. Each lug shall be attached with stainless steel hardware after preparing the bond according to manufacturer recommendations and treating the bonding surface on the busbar with antioxidant to help prevent corrosion at the bond.
4. The wall-mount busbar shall be bonded to ground as part of the overall Telecommunications Bonding and Grounding System.

C. Rack-Mount Busbars and Ground Bars
1. When a rack or cabinet supports active equipment or any type of shielded cable or cable termination device requiring a ground connection, add a rack-mount horizontal or vertical busbar or ground bar to the rack or cabinet. The rack-mount busbar or ground bar provides multiple bonding points on the rack for rack and rack-mount equipment.
2. Attach rack-mount busbars and ground bars to racks or cabinets according to the manufacturer's installation instructions.

3. Bond the rack-mount busbar or ground bar to the room's TMGB or TGB with appropriately sized hardware and conductor.

D. Ground Terminal Block
   1. Every rack and cabinet shall be bonded to the TMGB or TGB.
   2. Minimum bonding connection to racks and cabinets shall be made with a rack-mount two-hole ground terminal block sized to fit the conductor and rack and installed according to manufacturer recommendations.
   3. Remove paint between rack/cabinet and terminal block, clean surface and use antioxidant between the rack and the terminal block to help prevent corrosion at the bond.

E. Pedestal Clamp
   1. At minimum, bond every sixth raised access floor pedestal with a minimum #6 AWG conductor to the TMGB or TGB using a pedestal clamp sized to fit the pedestal and the conductor and installed according to the manufacturer's recommendations.
   2. If pedestal clamps are used to construct a signal reference grid, bond the signal reference grid to the TMGB or TGB and bond each rack and/or cabinet to the signal reference grid using a compression tap or similar non-reversible bonding component sized to fit both conductors.
   3. Remove paint between the pedestal and pedestal clamp, clean surface and use antioxidant between the pedestal and the clamp to help prevent corrosion at the bond.
   4. Remove insulation from conductors where wires attach to the pedestal clamp.

F. Pipe Clamp
   1. Bond metal pipes located inside the data center computer room with a minimum #6 AWG conductor to the TMGB or TGB using a pipe clamp sized to fit the pipe and the conductor and installed according to the manufacturer's recommendations.
   2. Remove paint between the pipe and pipe clamp, clean surface and use antioxidant between the pipe and the clamp to help prevent corrosion at the bond.
   3. Remove insulation from conductors where wires attach to the pipe clamp.

G. Equipment Ground Jumper Kit
   1. Bond equipment to a vertical rack-mount busbar or groundbar using ground jumper according to the manufacturer's recommendations.
   2. Clean the surface and use antioxidant between the compression lugs on the jumper and the rack-mount busbar or groundbar to help prevent corrosion at the bond.

END OF SECTION

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