SECTION 27 05 26

GROUNDING ANd BONDING FOR COMMUNICATION SYSTEMS

Notes to the Specification Writer:

This Section has been written to cover most, but not all, project conditions that you will encounter. Depending on the project, you may need to add material, delete items, or modify what is currently written. Editing instructions are included throughout the document. (If this document is viewed or printed in color, these instructions appear in red italic text.)

Review this entire specification Section and edit it to meet the requirements of the specific project. Options or items where the specification writer’s input is needed are enclosed in <<karets>>.

Before publishing your final version of this specifications, remove all placeholders / instructions in red text.

1. GENERAL
   1. SUMMARY

### Section Includes:

#### Commercial building grounding and bonding requirements for telecommunications infrastructure.

#### Requirements for bonding and communications cabling, equipment, pathways, spaces, and mounting equipment.

### Related Sections:

#### Section 01 00 00 – General Requirements

#### Section 26 05 26 – Grounding and Bonding for Electrical System

#### Section 27 05 39 – Surface Raceway for Communications Systems

#### Section 27 05 53 – Identification for Communication Systems

#### Section 27 06 28 – Pathways for Communication Systems

#### Section 27 06 36 – Cable Trays for Communication Systems

#### Section 27 11 16 – Communications Cabinets, Racks, Frames and Enclosures

#### Section 27 11 19 – Communications Termination Blocks and Patch Panels

#### Section 27 11 26 – Communications Rack Mounted Power Protections and Power Strips

#### Section 27 13 23 – Communications Fiber Backbone Cabling

#### Section 27 15 13 – Communications Copper Horizontal Cabling

#### Section 27 15 43 – Communications Faceplates and Connectors

* 1. Definitions

### AWG – American Wire Gauge – The standardized system for gauging the diameter of round, solid, non–ferrous, electrically–conducting wire.

### BBC – Bonding Backbone Conductor – A telecommunication bonding connection which interconnects telecommunications bonding backbones. Formerly known as the grounding equalizer.

### BN – Bonding Network – A set of interconnected conductive structures that provides a low impedance path for the associated telecommunications infrastructure.

### EF – Entrance Facility – An entrance to a building for both public and private network service cables, including wireless, that includes the entrance point of the building and continues to the entrance room or space.

### ESD – Electro Static Discharge – The sudden flow of electricity between two electrically–charged objects caused by contact, an electrical short, or dielectric breakdown.

### Mesh–BN – Mesh Bonding Network – A bonding network to which all associated equipment, such as cabinets, frames, racks, trays, and pathways, are connected using a bonding grid that is connected to multiple points on the common bonding network.

### PBB – Primary Bonding Busbar – A busbar placed in a convenient and accessible location and bonded, by means of the Telecommunications Bonding Conductor (TBC), to the building’s service equipment (power) ground. Formerly known as the Telecommunications Main Grounding Busbar (TMGB).

### RBB – Rack Bonding Busbar – A busbar within a cabinet, frame, or rack.

### RBC – Rack Bonding Conductor – A bonding conductor from the rack or Rack Bonding Busbar (RBB) to the Telecommunications Equipment Bonding Conductor (TEBC).

### SBB – Secondary Bonding Busbar – A common point of connection for telecommunications system and equipment bonding to ground, located in the distributor room. Formerly known as the Telecommunications Grounding Busbar (TGB).

### TBB – Telecommunications Bonding Backbone – The conductor that interconnects the Primary Bonding Busbar (PBB) to the Secondary Bonding Busbar (SBB).

### TBC – Telecommunications Bonding Conductor – A conductor that interconnects the telecommunications bonding infrastructure to the building's service equipment (power) ground. Formerly known as the bonding conductor for telecommunications.

### TEBC – Telecommunications Equipment Bonding Conductor – A conductor that connects the Primary Bonding Busbar (PBB) or Secondary Bonding Busbar (SBB) to equipment racks or cabinets.

### TR – Telecommunications Room – An enclosed space for housing telecommunications equipment, cable terminations, and cross–connect cabling. It is the recognized location of the cross–connect between the backbone and horizontal facilities.

### UBC – Unit Bonding Conductor – A bonding conductor from equipment or a patch panel to a Rack Bonding Conductor (RBB) or a Rack Bonding Busbar (RBB).

* 1. SUBMITTALS

### Make submittals in accordance with Section 01 33 00, Submittal Procedures.

### Action Submittals:

#### Product Data for each type of product.

##### PBB

##### SBB

##### RBB

##### H–Taps

##### C–Taps

##### 2–Hole Lugs

##### Etc.

#### Shop Drawings for communications equipment room signal reference grid. Include plans, elevations, sections, details, and attachments to other work.

* 1. CLOSEOUT DOCUMENTS

### As–Built Data: Plans showing as–built locations of grounding and bonding infrastructure, including the following:

#### PBB, SBB, RBB and routing of their bonding conductors

### Field quality–control reports.

* 1. QUALITY ASSURANCE

### Installer Qualifications: Cabling Installer must have personnel certified by BICSI on staff.

#### Installation Supervision: Installation shall be under the direct supervision of an ITS Installer 2, who shall be present at all times when Work of this Section is performed at the Project site.

#### Field Inspector: Currently registered by BICSI as a registered communications distribution designer (RCDD) to perform the on–site inspection.

1. PRODUCTS
   1. GENERAL

### Comply with TIA 607 – latest revision.

### Conductors shall comply with UL 486A–486B.

### The part numbers and sizes listed are a small subset of the number available. For additional information, contact Panduit customer service or refer to the current parts catalog.

* 1. Conductors

### The Telecommunications Bonding Conductor (TBC) shall be a UL listed, stranded conductor insulated with a green jacket. The TBC shall be equal in size to the TBB specified elsewhere in this Section.

### The Telecommunications Bonding Backbone (TBB) Grounding Conductors shall be:

#### To be bare or insulated copper, of minimum conductor size #6 AWG and sized at 2 kcmil per linear foot up to a maximum size of 750 kcmil. (For details on TBB sizing see "Execution" section at end of this document).

#### Where un–insulated, to be identified with green tape at termination location.

#### Labeled in accordance with recommendations set forth in ANSI/TIA–606 Administration Standard for Telecommunications Infrastructure.

#### <<ClientName>> approved Manufacturer:

##### General Cable

##### Southwire

### The Equipment Bonding Conductors (EBCs)

#### shall be #12AWG or larger stranded conductor with a green insulating jacket

#### <<ClientName>> approved Manufacturer:

##### Panduit

#### <<ClientName>> approved Equipment Bonding Conductors (EBCs):

##### RGEJ1024URT – #10 AWG (6mm²) jumper, 24 in. (61 mm²) L, pre–terminated with one #10 (5.3mm) and one 1/4" (6.4mm) stud hole ring terminals to provide a bolt–on solution for grounding network equipment

##### RGEJ Series

### Bonding Conductor (BC): BC shall be #6 insulated (green) stranded copper conductor.

### Rack Bonding Conductor Kits (RBC):

#### Bonds the rack or cabinet to the telecommunications grounding busbar (TGB or TMGB).

#### Jumper kits available with both ends factory terminated to provide a bolt–on solution.

#### Jumper kits available with one end factory terminated to attach to the rack or cabinet; free end accommodates unique length requirements.

#### Engineered to comply with US and international grounding requirements.

#### <<ClientName>> approved Manufacturer:

##### Panduit

#### <<ClientName>> approved rack jumper (RBC) kits:

##### GJ672UH – Terminated on both ends for smaller telecommunications rooms where racks have individual connections directly to the TMB. One 72" length #6 AWG green wire with yellow horizontal stripe. Jumper is pre–terminated on one end with LCC6–14JAWH–L and the other end with LCC6–14JAW–L. Comes in lengths 72", 96", 120", 144", 168", 192:", 216", 240", 264", and 288". For other lengths substitute "72" in part number with desired length

##### GJS6120U – Terminated on one end for larger telecommunications rooms where racks are individually bonded to underfloor or overhead bonding backbone with an HTAP connection. One 120" length #6 AWG green wire with yellow horizontal stripe. Jumper is pre–terminated on one end with LCC6–14JAW–L. For 180" length substitute "120" in part number with "180"

### Equipment Jumper Kits (Unit Bonding Conductor or "UBC"):

#### Used to ground large, chassis–style rack mounted equipment that have built–in grounding pads or terminals.

#### Bond network equipment to grounding strip or grounding busbar.

#### Jumper kit available with both ends factory terminated to provide a bolt–on solution.

#### Jumper kit available with one end factory terminated to attach to the grounding strip or grounding busbar; free end accommodates unique equipment terminations.

#### Use jumpers with 90° bent lug, on grounding strip side, for high density grounding requirements up to one ground point per RU.

#### Use jumpers with 45° bent lugs on grounding strip side, for improved cable management.

#### Engineered to comply with US and International grounding requirements.

#### <<ClientName>> approved Manufacturer:

##### Panduit

#### <<ClientName>> approved equipment jumper (UBC) kits:

##### GJS6 series – #6 equipment jumper factory terminated on one end for switches, cabinets and 4 post racks. Exact part number depends on length

##### RGE series – Factory terminated jumpers that are terminated on both ends. Exact part number depends on AWG size, length and angle of two–hole lugs

### Surge Suppressor Jumper Kit:

#### Bonds power or data line surge suppressor to grounding strip or grounding busbar.

#### Both ends factory terminated to provide a bolt–on solution.

#### Engineered to comply with US and International grounding requirements.

#### <<ClientName>> approved Manufacturer:

##### Panduit

#### <<ClientName>> approved surge suppressor jumper kits:

##### SSGK–1 – #10 AWG (6mm²) jumper; 24" (.61m) length; factory terminated on both ends; one–hole lug on surge suppressor to two–hole lug on grounding strip/busbar side; provided with .16 oz. (5cc) of antioxidant and two each #12–24 x 1/2", M6 x 12mm, #10–32 x 1/2" and M5 x 12mm thread–forming screws

### Armored Cable Grounding Kit:

#### Provides a secure bond to the armor sheath on indoor and indoor/outdoor fiber optic cables at both cassette and enclosure ends.

#### Worm–gear design evenly distributes forces across the armor.

#### Made from steel and aluminum material is compatible with common armor for long term reliability.

#### Black insulating cover protects and hides the connection for an aesthetically pleasing work area.

#### Complies with industry requirements ensuring a high level of reliability and safety.

#### <<ClientName>> approved Manufacturer:

##### Panduit

#### <<ClientName>> approved armored cable grounding kits:

##### ACG24K – #6 AWG (16mm2) jumper for armored cable diameter up to 0.84" (21.3mm); 24" (609.6mm) length; factory terminated on one end with LCC6 two–hole copper compression lug and the other end with grounding terminal; provided with two each #12–24 and M6 thread–forming screws and a black polypropylene terminal cover

##### ACG24K–500 – #6 AWG (16mm2) jumper for armored cable diameter 0.85" (21.6 mm) to 1.03" (26.2mm); 24" (609.6mm) length; factory terminated on one end with LCC6 two–hole copper compression lug and the other end with grounding terminal; provided with two each #12–24 and M6 thread–forming screws and a black polypropylene terminal cover

##### ACGK – Armored cable grounding kit. Contains one grounding terminal for #6 AWG grounding conductor, and one #10 mechanical clamp for cable diameters in 9/16" – 1 1/16" diameter range

* 1. Connectors

### Irreversible connectors listed for the purpose. Listed by an NRTL as complying with NFPA 70 for specific types, sizes, and combinations of conductors and other items connected. Comply with UL 486A–486B

### Compression Wire Connectors: Crimp–and–compress connectors that bond to the conductor when the connector is compressed around the conductor. Comply with UL 467.

### Code/Flex Conductor H–TAPs

#### Used as a splice, or to tap smaller (pigtail) conductors into larger continuous conductors.

#### Each HTAP terminates a wide range of conductor sizes and combinations of code and flex conductors Class G, H, I and Locomotive to suit a variety of applications.

#### Slotted design allows quick and easy assembly of conductor to HTAP using

#### Three Panduit 94V–0 cable ties (supplied).

#### Tap grooves are separated from one another, allowing them to function independently so HTAP can be used with single or multiple conductors, providing maximum design and installation flexibility.

#### Color coded and marked with Panduit die index numbers for proper crimp die selection.

#### UL Listed and CSA Certified, with wide size range of conductor sizes and rated for applications up to 600 V when crimped with Panduit tools and dies, or with other specified manufacturers' crimping tool and dies.

#### Tin plated to inhibit corrosion.

#### Available with an assortment of clear covers with integrated label fields.

#### <<ClientName>> approved Manufacturers for HTAPs and clear covers:

##### Panduit

#### <<ClientName>> approved parts for HTAPs:

##### HTCT series – Panduit HTAPs. Must be selected according AWG size of run and tap conductors.

##### CLRCVR series – Panduit clear covers for HTAPs. Must be selected according to HTAP being covered.

### Code Conductor, Thin Wall, Tin–plated C–TAP (splice)

#### For copper–to–copper splicing or pigtail tap splicing.

#### Wide wire range–taking capability minimizes inventory requirements.

#### Color–coded for proper crimp die selection.

#### Ribbed design provides high strength.

#### Made from high conductivity wrought copper.

#### Tin–plated to inhibit corrosion and oxidation.

#### UL Listed and CSA Certified with AWG conductor to 600 V and temperature rated to 90°C when crimped with Panduit and specified manufacturers' crimping tools and dies.

#### <<ClientName>> approved Manufacturer for C–TAPs:

##### Panduit

#### <<ClientName>> approved parts for C–TAPs:

##### CTAPF series – Panduit C–TAPs. Must be selected according AWG size of conductors being spliced.

### Two–hole, Long–barrel Compression Lugs for Grounding Conductors

#### Meets TIA–607 requirements for network systems grounding applications.

#### Tested by Telcordia – meets NEBS Level 3 with AWG conductor.

#### UL Listed and CSA Certified with AWG conductor for use up to 35 KV\*\* and temperature rated 90°C when crimped with Panduit and specified manufacturers' crimping tools and dies.

#### Color–coded barrels marked with Panduit and specified manufacturers' die index numbers for proper crimp die selection.

#### Have long barrel to maximize number of crimps and provides premium wire pull–out strength and electrical performance.

#### Have "inspection window" over tongue to visually assure full conductor insertion.

#### Be tin–plated to inhibit corrosion

#### Available with NEMA and BICSI hole–sizes and spacing

#### <<ClientName>> approved Manufacturers for lugs:

##### Panduit

#### <<ClientName>> approved parts for two–hole compression lugs:

##### LCC series – Panduit two–hole compressing lugs for code conductors in BICSI hole spacing.

* 1. Grounding Busbars

### The Primary Bonding Busbar (PBB) shall be:

#### A solid, tinned copper bar, 4 inches wide by 20 inches long by 1/4 inch thick.

#### Meet BICSI and TIA–607 requirements for network systems grounding applications.

#### Employ BICSI hole spacing to fit LCC series 2–hole lugs.

#### Be made of high conductivity copper and tin–plated to inhibit corrosion.

#### Come pre–assembled with brackets and insulators attached for quick installation.

#### Use Panduit component labels, sold separately, to identify busbars to meet TIA–606.

#### <<ClientName>> approved Manufacturer:

##### Panduit

#### <<ClientName>> approved Primary Bonding Busbar (PBB):

##### GB4B0624TPI–1 – Grounding Busbar, BICSI 1/4" x 4" x 20" – 24 number of mounting positions with 1/4" stud hole with 5/8" hole spacing, and 6 number of positions with 3/8" stud hole with 1" hole spacing.

### The Secondary Bonding Busbar (SBB) shall be:

#### A solid, tinned copper bar, 2 inches wide by 10 inches long by 1/4 inch thick.

#### Meet BICSI and TIA–607 requirements for network systems grounding applications.

#### Employ BICSI hole spacing to fit LCC series 2–hole lugs.

#### Be made of high conductivity copper and tin–plated to inhibit corrosion.

#### Come pre–assembled with brackets and insulators attached for quick installation.

#### Use Panduit component labels, sold separately, to identify busbars to meet TIA–606.

#### <<ClientName>> approved Manufacturer:

##### Panduit

#### <<ClientName>> approved Secondary Bonding Busbar (SBB):

##### GB2B0306TPI–1 – Grounding Busbar, BICSI 1/4" x 2" x 12" – 3 number of mounting positions with 3/8" stud hole with 1" hole spacing, 6 number of mounting positions with 5/16” stud hole with 5/8” spacing and 3 number of mounting positions with 7/16” hole with 1” spacing.

##### GB4B0612TPI–1 – Grounding Busbar, BICSI 1/4" x 4" x 12" – 6 number of mounting positions with 3/8" stud hole with 1" hole spacing, 12 number of mounting positions with 5/16” stud hole with 5/8” spacing and 6 number of mounting positions with 7/16” hole with 1” spacing.

##### GB2B0304TPI–1 – Grounding Busbar, BICSI 1/4" x 2" x 10" – 3 number of mounting positions with 3/8" stud hole with 1" hole spacing, 4 number of mounting positions with 5/16” stud hole with 5/8” spacing and 3 number of mounting positions with 7/16” hole with 1” spacing.

### Grounding Busbar for Racks and Enclosures

#### With each enclosure and rack, provide a tinned copper busbar to serve as an extension of the PBB or SBB for the equipment in the cabinet.

#### Shall be manufactured from copper alloy.

#### Horizontal Busbars shall be at least .75 inches (19 mm) wide, 19 inches (483 mm) long, and 0.1875 inches (5 mm) thick.

#### Have at least 14, factory–provided #12–24 threaded holes.

#### Have pre–punched EIA 310 D mountings, which match that of the vertical rail, for attachment to the mounting rail.

#### Vertical Busbars shall be at least 0.67 inches (17 mm) wide, 78.65 inches (2 m) long, and 0.05 inches (1.27 mm) thick and come in threaded rail and cage nut versions.

#### Include a hardware kit with rack installation hardware and with screws for bonding equipment to the busbar.

#### <<ClientName>> approved Manufacturer:

##### Panduit

#### <<ClientName>> approved rack and cabinet mount horizontal busbars:

##### RGRB19Y – Rack Grounding Busbar Kits, 19" (483mm) Length, 14 mounting holes, 1/2" (12.7mm) Hole Spacing.

##### RGRB19U – Rack Grounding Busbar Kits, 19" (483mm) Length, 20 mounting holes, 5/8" (15.9mm) Hole Spacing.

##### RGRKCBNJY – Rack grounding kit to ground the rack; includes one RGRB19U busbar, one HTCT250–2–1 HTAP, and one RGREJ696Y grounding jumper.

##### CGR630U – Complete Grounding Kit for new installations on cabinets with, threaded #12–24 or M6 rail fasteners and rail depth up to 30" (0.75m).

##### CGR630UB – Complete Grounding Kit for new installations on cabinets with cage nut rail fasteners and rail depth up to 30" (0.75m).

#### <<ClientName>> approved rack and cabinet mount vertical busbars:

##### RGS134–1Y – Grounding strip for threaded rails; 78.65" (2m) length; .67" (17mm) width; .05" (1.27mm) thickness; provided with .16 oz. (5cc) of antioxidant, one grounding sticker and three each #12–24 x 1/2" and M6 x 12mm thread–forming screws.

##### RGS134B–1 – Grounding strip for use with cage nut rail fasteners; 78.70" (2m) length; .67" (17mm) width; .05" (1.27mm) thickness; provided with .16 oz. (5cc) of antioxidant, one grounding sticker, three cage nut bonding studs, eight #12–24 bonding nuts and three strip clips.

* 1. SHIELDED CABLE SYSTEMS BONDING

### Patch panels for use with shielded cabling in cabinets and racks shall be bonded to the supplemental telecommunications bonding system. When using Panduit racks and/or cabinets, and installed per Panduit installation instructions, the racks and cabinets are continuously bonded. Use a thread forming screw when, mounting the patch panels. This will create the bond to the already properly grounded rack and/or cabinet.

#### Install at least one screw per patch panel

#### <<ClientName>> approved Manufacturer:

##### Panduit

#### <<ClientName>> approved thread forming/bonding screws:

##### RGTBSG–C – For threaded rail racks, specially shaped thread–forming shanks make a bond without causing metal shavings, serrations under the head removes paint or oxidation.

##### CNBK – For square–hole mounting racks, Bonding cage nuts have teeth that cut into paint when installed.

### Sheathed cable that does not have a metal jack, or a means of electrically–continuous connection to the patch panel or equipment, must have an individual jumper to tap into the sheathing and to properly bond it to the supplemental telecommunications bonding system.

### Sheathed cable with a metal jack or means of electrically–continuous connection to the patch panel or equipment, does not need to be individually bonded. However, the equipment must then be properly bonded back to the PBB or SBB via one of the following methods:

#### Bond a jumper from the equipment or cable, via an irreversible compression connection, to a Rack Bonding Conductor (RBC) that is connected to the Telecommunications Equipment Bonding Conductor (TEBC) that is bonded to the PBB or SBB.

#### Bond equipment via a jumper, with a 2–hole grounding lug, to a Rack Bonding Busbar (RBB) (vertical or horizontal) that is properly bonded to the TEBC and to the PBB or SBB.

#### If the equipment is electrically continuous and the rack is electrically continuous and bonded back to the TEBC or directly to the PBB or SBB, bond equipment to the rack via bonding hardware.

#### If the equipment has a 2–hole grounding lug landing area, then to comply with equipment manufacturers’ warranties, the landing area must be properly bonded back to the busbar.

#### <<ClientName>> approved Manufacturer:

##### Panduit

#### <<ClientName>> approved shielded cable parts:

##### RBC parts listed in this document to bond patch panels.

##### CJSGK–XY – Kit used to ground enhanced Giga–TX™ Style Shielded Jack Modules to another ground wire in shielded applications, when using non–Panduit racks and cabinets.

* 1. Other Grounding and Bonding Products

### Pipe Clamps:

#### Used to ground copper code conductor to water pipe or copper tubing.

#### Cast from high strength, electrolytic bronze to provide reliable grounding connections.

#### Plated steel screws provide high strength and inhibit corrosion.

#### Accommodates a wide range of pipe, tube, rod and conductor sizes – minimizes inventory.

#### cULus 467 Listed for grounding and bonding with AWG conductor.

#### <<ClientName>> approved manufacturer:

##### Panduit

#### <<ClientName>> approved bronze grounding pipe clamps:

##### GPC2–1–Q – pipe range ½” – 1" and conductor size range #10 SOL – #2 STR.

##### GPC2–2–L – pipe range 1 ¼” – 2” and conductor size range #10 SOL – #2 STR.

##### GPC2–4–X – pipe range 2 ½” – 4” and conductor size range #10 SOL – #2 STR.

### Bronze Grounding Clamps for Conduit:

#### Used to ground copper conductor parallel to, or at a right angle to a rod, tube, or pipe.

#### Made from high strength, electrolytic cast bronze.

#### High strength silicon bronze hardware provides long term reliable assembly.

#### Accommodates a wide range of pipe, tube, rod and conductor sizes – minimizes inventory.

#### cULus 467 Listed for grounding and bonding with AWG conductor and suitable for direct burial in earth or concrete.

#### <<ClientName>> approved manufacturer:

##### Panduit

#### <<ClientName>> approved bronze grounding conduit clamps:

##### GPL–22–X – pipe size inches 1 ¼” and conductor size range AWG 2/0 SOL – 250 kcmil.

##### GPL–28–X – pipe size inches 1 ½” and conductor size range AWG 2/0 SOL – 250 kcmil.

##### GPL–34–3 – pipe size inches 2” and conductor size range AWG 2/0 SOL – 250 kcmil.

### Copper and Aluminum One–Hole Grounding Lay–in Lug for bonding ladder rack

#### Used for quick installation of a continuous grounding conductor.

#### cULus 467 Listed for grounding and bonding, copper lugs. UL Listed for direct burial in earth or concrete.

#### cULus Listed for use up to 600 V and temperature rated 90°C

#### <<ClientName>> approved manufacturer:

##### Panduit

#### <<ClientName>> approved one–hole grounding lay–in lug:

##### LICC4–22–C – Copper body, 0.22 inch stud hole, conductor size range AWG #14 SOL – #4 STR.

##### LICC4–22TP–C – Tin plated copper body, 0.22 inch stud hole, conductor size range AWG #14 SOL – #4 STR.

##### LIAC4–22–C – Tin plated aluminum body, 0.22 inch stud hole, conductor size range AWG #14 SOL – #4 STR.

##### LIAS250–56–Q – Tin plated aluminum body, 0.33 inch stud hole, conductor size range AWG #6 SOL – 250 kcmil STR.

### Communication Grounding Rods

#### Material: Copper–clad steel.

#### Size: 3/4–inch by 8 feet long.

#### Standards: Meet requirements of ANSI®/UL 467–1984, CSA, and ANSI/NEMA GR–1.

#### <<ClientName>> approved manufacturer:

##### <<EnterManufacturer>>

#### <<ClientName>> approved communication grounding rods:

##### <<EnterPart#>>

### Access Floor Grounding Clamps

#### Bonds crossed grid conductors to each other, and bonds the access floor pedestals to the conductors.

#### Specifically designed to bond perpendicular Mesh–BN (a.k.a. MCBN or Mesh Common Bonding Network) conductors per TIA–942 and TIA–607.

#### Bonds to the pedestal with a single bolt to simplify installation.

#### Accommodates conductor sizes from #6 – 1/0 AWG, minimizing inventory requirements.

#### Bonds both round and square access floor pedestals for greater flexibility.

#### Crossing grounding conductors affixed and bonded using a split bolt quad clamp which requires only one nut to install.

#### Split bolt design allows easy insertion of perpendicular conductors speeding installation and is UL 467 Listed and CSA.

#### Split bolt is UL Listed and CSA Certified for use up to 600 V and temperature rated 90°C.

#### Each clamp accepts up to two conductors for a high–performance bond with faster installation.

#### Wide wire range–taking capability minimizes inventory requirements.

#### Split–bolt made from high strength, electrolytic bronze to provide reliable grounding connections.

#### <<ClientName>> approved Manufacturer for Access Floor Grounding Clamps:

##### Panduit

#### <<ClientName>> approved parts for access floor grounding clamps:

##### GPQC07–1/0 – MCBN conductor range #6 SOL to 1/0 STR for pedestal diameter 3/4" to 7/8" round.

##### GPQC10–1/0 – MCBN conductor range #6 SOL to 1/0 STR for pedestal diameter 1" to 1 1/8" round and 7/8" square.

### Universal Beam Grounding Clamp

#### Used to for bonding structural steel (ex: I–beams) into bonding network.

#### Universal, fits on a wide range of standard (angled) and wide flange (parallel) structural steel beams.

#### Provide a mounting pad suitable for a two–hole compression lug.

#### Installs quickly and easily with standard 1/4" key hex wrench tooling.

#### UL 467 Listed and CSA 22.2 Certified for grounding and bonding suitable for direct burial in earth or concrete.

#### Comply with vibration tests per MIL–STD–202G (METHOD 201A).

#### <<ClientName>> approved Manufacturer for beam grounding clamps:

##### Panduit

#### <<ClientName>> approved parts for beam grounding clamps:

##### GUBC500–6 – Universal Beam Grounding Clamp for copper conductor sizes ranging from #6 AWG to 500 kcmil and flange thickness from .25" to .675". Stud size is 1/2" with hole spacing for two–hole lug being 1.75" and thread size from 1/2 to 13.

### Split Bolt for Bonding Cable Trays

#### Made from high strength copper alloy to resist corrosion and provide premium electrical and mechanical performance.

#### Wire range–taking capability minimizes inventory requirements.

#### Nut hex provides correct fit with socket, box, or open–end wrenches resulting in proper torqueing of electrical connection.

#### Pressure bar provides secure connection on a full range of conductor combinations used with each connector assuring premium wire pull–out strength.

#### UL Listed and CSA Certified with AWG conductor for use up to 600 V and temperature rated 90°C.

#### Available in tin–plated version for bonding to galvanized wire baskets.

#### <<ClientName>> approved Manufacturer:

##### Panduit

#### <<ClientName>> approved parts for split lugs to bond wire basket tray:

##### SBC3–C – Split lug for #8 AWG to #4 AWG code conductors..

### Auxiliary Cable Brackets (Conductor Pathway)

#### Used for mounting telecommunications bonding conductors outside of cable tray.

#### Maintain minimum 2" separation between bonding conductors and all other types of cabling per TIA 607.

#### Bonds ladder rack, wire basket sections together without drilling holes or applying other split–bolt clamps.

#### Supports grounding conductors in the telecommunications room, allows separation of grounding conductors from other cables.

#### Holds up to four conductors in sizes up to 750 kcmil.

#### Bonds to all 1" and 2" ladder rack rails.

#### Paint piercing teeth provide electrical continuity between cable pathway sections while minimizing debris.

#### Front and back mounting screw options allow easy installation and visual inspection.

#### Can be mounted above or below the cable pathway system for flexibility.

#### Meet requirements TIA–607.

#### Have available bonding jumper kits to bond sections of basket tray or ladder rack.

#### <<ClientName>> approved Manufacturer:

##### Panduit

#### <<ClientName>> approved brackets for running bonding backbones parallel to ladder rack or basket tray:

##### GACB–2– Auxiliary cable bracket; 1.63" (41.4mm) width, 3.95" (100.3mm) height, 5.22" (132.6mm) depth; provided with one mounting screw.

##### GACBJ612U – Auxiliary cable bracket jumper for bonding pathway sections; #6 AWG (16mm²); 12.0" (305mm) length; factory terminated on both ends with straight, two–hole, long barrel compression lugs; provided with .16 oz. (5cc) of antioxidant and four mounting screws.

### Electrostatic Discharge (ESD) Port Kits and Wrist Strap

#### Used for dissipating electro–static buildup prior to maintenance work on network equipment.

#### Accommodate standard ESD wrist strap 4mm plug.

#### Wrist strap provides rapid and continuous drain of electrostatic charge between a person and the surface to which the wrist strap is bonded, thus preventing damaging static discharge into equipment.

#### Can be mounted to front or back of rack or cabinet for convenient access.

#### Bent 45° to act as a hook to hold wrist strap when not in use.

#### Two–hole configuration provides anti–rotation and prevents loss of bond.

#### Barrel permanently marked with the protective earth (ground) symbol.

#### Engineered to comply with US and International grounding requirements.

#### Versions for threaded racks rails or cabinet cage nuts.

#### <<ClientName>> approved Manufacturer:

##### Panduit

#### <<ClientName>> approved ESD port kits:

##### RGESD2–1 – Includes #12–24 and M6 rail fasteners: Two–hole ESD port with 5/8" hole spacing; provided with an ESD protection sticker, .16 oz. (5cc) of antioxidant, and two each #12–24 x 1/2" and M6 x 12mm thread–forming screws.

##### RGESD2B–1 – Cage nut rail fasteners: Two–hole ESD port with 5/8" hole spacing; provided with an ESD protection sticker, .16 oz. (5cc) of antioxidant, two cage nut bonding studs and two #12–24 bonding nuts.

##### RGESDWS – Adjustable fabric ESD wrist strap with 6' coil cord, banana plug, 1 megaohm resistor and 4mm snap.

### Miscellaneous Bonding Accessories

#### Anti–oxidation Paste (contact aid) For Copper to Copper and Copper to Steel Connections.

#### Anti–oxidation Paste (contact aid) For Aluminum Pad–to–Pad or Thread–to–Thread Aluminum Connections.

#### Green thread–forming bonding screws for bonding smaller equipment on threaded rack rails through the equipment mounting flange.

#### Green bonding cage nuts from bonding smaller equipment on cage nut rails through the equipment mounting flange.

#### Thread forming screws for bonding two–hole lugs to vertical busbars on threaded rack rails.

#### Green paint piercing grounding washers for assuring electrical continuity between painted parts of equipment racks, as described in TIA 607 Standard.

#### Bonding hardware kits (studs) for forming low–resistance bond between the rack or cabinet and painted rack mounted appliances and equipment.

#### <<ClientName>> approved Manufacturer:

##### Panduit

#### <<ClientName>> approved miscellaneous bonding/grounding components and accessories:

##### CMP–300–1 – Contact aid (anti–oxidant paste) for copper–to–copper and copper–to–steel connections in 8 oz. container. Operating temperature range –40°F (–40°C) to 350°F (177°C). Good for all voltages and suitable for grounding. Also, may be used for anti–seizing thread lubricant.

##### CMP–100–1 – Contact aid (anti–oxidant paste) for pad–to–pad or thread–to–thread aluminum connections made on aluminum conductor in 8 oz container. Operating temperature range –40°F (–40°C) to 400°F (204°C).

##### RGTBSG–C – Green thread–forming bonding screw, #12–24 x 1/2" for mounting smaller equipment and bonding to rack/cabinet racks through equipment mounting flange.

##### RGTBS1032G–C – Green thread–forming bonding screw, #10–32 x 1/2" for mounting smaller equipment and bonding to rack/cabinet racks through equipment mounting flange.

##### CNB4K – Green bonding cage nut, includes 4 #12–24 bonding cage nuts (.06 – .11 thick panel) and 4 #12–24 x 1/2" bonding screws with #2 Phillips/slotted combo hex head (use 5/16" or 8mm socket). Ideal for patch panel applications.

##### CNBK – Green bonding cage nut, includes 50 #12–24 bonding cage nuts (.06 – .11 thick panel) and 50 #12–24 x 1/2" bonding screws with #2 Phillips/slotted combo hex head (use 5/16" or 8mm socket).

##### RGW–100–1Y – 100 paint piercing bonding washers for 3/8" (M8) stud size; .875" (22.2mm) O.D.; provided with .16 oz. (5cc) of antioxidant.

##### TRBSK – Bonding stud kit for threaded #12–24 rail fasteners; includes 25 bonding studs and 50 bonding nuts for bonding painted equipment and appliances to rack/cabinet rails and vertical busbars.

##### CGNBSK – Bonding stud kit for cage nut rail fasteners; includes 25 bonding studs and 50 bonding nuts for bonding painted equipment and appliances to rack/cabinet rails and vertical busbars.

##### CJSGK–XY – Kit used to ground enhanced Giga–TX™ Style Shielded Jack Modules to another ground wire in shielded applications.

## LABELING

### Comply with TIA–606 and UL 969 for a system of labeling materials, including label stocks, laminating adhesives, and inks used by label printers.

### Adhesive Film Label with Clear Protective Overlay: Machine printed, in black, by thermal transfer or equivalent process. Minimum letter height shall be 3/8 inch. Overlay shall provide a weatherproof and UV–resistant seal for label.

### <<ClientName>> approved Manufacturer:

#### Panduit

### <<ClientName>> approved labeling components, listed for each printer type – Laser/Inkjet, LS8Q or Desktop Thermal:

#### S100X075YAJ/S100X075VAC/S100X075VAT – 18–14 AWG conductor labels.

#### S100X125YAJ/ S100X125VAC/S100X125VAT – 12–10 AWG conductor labels.

#### S100X225YAJ/ S100X225VAC/S100X225VAT – 8–4 AWG conductor labels.

#### S100X400YAJ/ S100X400VAC/S100X400VAT – 2–1 AWG conductor labels.

#### S100X650YAJ/ S100X650VAC/S100X650VAT – 1/0–250 MCM conductor labels.

#### C400X200YJJ/C200X100YPC/C400X200YPT – PBB and SBB labels.

#### Refer to Section 27 05 53 IDENTIFICATION FOR COMMUNICATION SYSTEMS for more detail.

1. EXECUTION
   1. GENERAL

### EXAMINATION

#### Examine the ac grounding electrode system and equipment grounding for compliance with requirements for maximum ground–resistance level and other conditions affecting performance of grounding and bonding of the electrical system.

#### Inspect the test results of the ac grounding system measured at the point of BCT connection.

#### Prepare written report, endorsed by Installer, listing conditions detrimental to performance of the Work.

#### Proceed with connection of the BCT only after unsatisfactory conditions have been corrected.

### INSTALLATION

#### This Specification document describes a generic enterprise communications bonding and grounding system for the construction of a complete and functioning grounding system without prior knowledge of the particular facilities where it will be used. It is the responsibility of the installing contractor to adapt these general guidelines and principles to the requirements of the actual environments where the systems are to be implemented.

#### System shall provide equipment ground connections (bonds) from the premises entrance facility and outside–plant earthing system to each telecommunication room telecommunication ground busbar, through the racking systems to bond the network equipment.

#### Entire grounding link from equipment to earth should be visually verifiable except where hidden by walls, conduit or pathways.

#### Installing contractor shall label all elements of the communications bonding network according to guidelines defined in TIA–607–B and ANSI/TIA 606–B.

#### It is the responsibility of the installer to be knowledgeable of all previously cited Standards and Codes and to bring to the attention of <<ClientName>> any conflicts or discrepancies to achieve a fully functioning, standards–compliant earthing system.

#### Contractors working around or adding to existing legacy systems shall bring to the attention of <<ClientName>> previously installed network elements that may not comply with modern grounding requirements for possible remediation.

### Telecommunications Bonding Backbone (TBB):

#### Bonding and grounding conductors may be insulated or un–insulated and shall not decrease in size as the grounding path moves closer to earth.

#### Connections (bonds) between the telecommunications grounding network and associated electrical panels shall be done by a qualified electrician in accordance with guidelines in TIA 607–B and applicable electrical codes.

#### Bonding Conductors should be continuous and routed in the shortest possible straight–line path, avoiding changes in elevation and sharp bends.

#### TBB conductors shall be protected from mechanical damage and built to minimize splicing. Where splicing is unavoidable they shall be done using irreversible compression splices (C–TAPS) built to that purpose. See the "Materials" section of this document for appropriate compression splices.

#### TBB in multi–story buildings with multiple risers (multiple TBBs) shall employ a grounding equalizer (GE) between vertical grounding backbones at the top floor of the building and minimally at every third floor in between to the lowest floor level. The GE shall be no smaller than the largest sized TBB.

#### Routing grounding conductors through ferrous metal conduit should be avoided, but if it is necessary due to building constraints, any grounding conductor running through ferrous conduit longer than 3 feet shall be bonded at the end using appropriately sized HTAP and Conduit grounding clamps as described TIA 607 using appliances described for that purpose in the "Materials" section of this document.

#### Conductors used to bond TBB to conduit ends shall be of #6 AWG size or larger.

#### Conductor sizing shall be based upon project specification (drawings and notes) for that installation. These sizes are based on TBB length per TIA 607 recommendations. Contractor shall bring to the attention of <<ClientName>> anywhere TBB project specified sizing appears insufficient per the Table below:

| **Sizing of the TBB** | |
| --- | --- |
| **TBB Length in Linear  Meters (Feet)** | **TBB Size (AWG)** |
| Less than 4 (13) | 6 |
| 4-6 (14-20) | 4 |
| 6-8 (21-26) | 3 |
| 8-10 (27-33) | 2 |
| 10-13 (34-41) | 1 |
| 13-16 (42-52) | 1/0 |
| 16-20 (53-66) | 2/0 |
| 20-26 (67-84) | 3/0 |
| 26-32 (85-105) | 4/0 |
| 32-38 (106-125) | 250 kcmil |
| 38-46 (126-150) | 300 kcmil |
| 46-53 (151-175) | 350 kcmil |
| 53-76 (176-250) | 500 kcmil |
| 76-91 (251-300) | 600 kcmil |
| Greater than 91 (301) | 750 kcmil |

### Entrance Facilities and Primary Bonding Busbar (PBB), [old terminology – Telecommunications Main Grounding Busbar (TMGB)]:

#### PBB shall be located in the entrance facility, near the electrical panel to which it will be bonded but installed to maintain clearances required by applicable electrical codes.

#### PBB shall be sized according to the anticipated number of bonded connections needed.

#### PBB shall have tinned surface to restrain oxidation and be cleaned and antioxidant paste applied prior to fastening conductors.

#### Connectors on TBB which attach to PBB shall be of two–hole, long–barrel compression lugs of the LCC series as specified in the "Materials" section of this document.

#### Building steel within six feet of the communications grounding system should be bonded into the system with appropriate hardware listed in "Materials" section of this document.

#### All cables containing a metallic shield or armor shall have that shield properly bonded into the communications grounding system using the appropriately sized Armored Cable Grounding Kit listed in the "Materials" section of this document.

#### The illustration below depicts for reference the general location and layout of the PBB and associated grounding elements in a typical entrance facility.

#### 

### Telecommunications Rooms and Secondary Bonding Busbar (SBB), [Old terminology Telecommunications Grounding Busbar (TGB)]:

#### Each telecommunications room shall have its own SBB to which equipment and dead steel (building steel and support structures) in that room are bonded.

#### The SBBs shall have a tinned surface to inhibit oxidation and be sized according to the anticipated number of bonded connections that will be needed.

#### SBBs shall be sized according to the anticipated number of bonded connections needed.

#### SBBs shall have tinned surfaces to restrain oxidation and shall be cleaned and have an antioxidant paste applied to both bonding surfaces prior to fastening conductors.

#### Connectors on backbone and rack/cabinet bonding conductors which attach to SBB shall be of two–hole, long–barrel compression lugs of the LCC series as specified in the "Materials" section of this document.

#### Building steel within six feet of the communications grounding system should be bonded into the system with beam clamps and other hardware appropriate to that purpose listed in "Materials" section of this document.

#### Racks and cabinets shall have **individual** Rack Bonding Conductors (RBC) bonding to the Telecommunications Equipment Bonding Conductor (TEBC) or underfloor "Supplemental Bonding Grid – DAISY CHAINING OR SERIAL CONNECTIONS OF ONE RACK OR CABINET TO ANOTHER WILL NOT BE ACCEPTED.

#### In smaller Telecommunications Rooms (3–5 racks) it is acceptable to have telecommunications equipment bonding conductors (TEBC) that go directly from each individual rack to the SBB. DAISY CHAINING OF RACKS WILL NOT BE ACCEPTED.

#### Rack Bonding Conductors (RBC) or above rack row grounds (TEBC) shall be installed to maintain a minimum of 2" separation from all other types of cable – power or communications.

#### To maintain this segregation of cables some telecommunications rooms may lend themselves to the installation of Auxiliary Conductor Brackets for routing bonding conductors outside of, yet parallel to ladder rack or basket tray. See "Auxiliary Brackets" in "Materials" section of this document.

#### Bonding conductor support systems like auxiliary brackets shall be spaced no further apart than three–foot intervals.

#### All cables containing metallic shielding or armor shall be properly bonded into the communications grounding system using the appropriately sized Armored Cable Grounding Kit listed in the "Materials" section of this document.

#### The illustration below depicts for reference the general location and layout of a typical telecom room and associated bonding connections into the SBB.

#### 

*Telecommunications Grounding in Small TR****Note****: In this illustration individual Telecommunications Equipment Bonding Conductors (TEBC)   
go direct from each rack to the SBB.*

### Supplemental Bonding Grid (SBG) (a.k.a. Underfloor Grounding Grids):

#### Large Equipment Rooms and Data Centers may have Mesh Bonding Network or Mesh–BN which consist of the information technology equipment (ITE), racks and cabinets, underfloor supplemental bonding grids (SBG, a.k.a. underfloor bonding grids), and pathways.

#### Flooring system must be made electrically continuous, with the grid bonded a minimum of every fifth pedestal in each direction as per TIA 607 Standard, using a minimum size #6 AWG stranded copper conductor and the pedestal clamps listed in the "Materials" section of this document. Specifications for individual <<ClientName>> projects requiring larger conductor sizes or greater clamp density shall take precedent over these guidelines.

#### Underfloor SBG shall bond to the PBB or SBB in the computer room with a conductor of 1/0 AWG or larger.

#### Racks and cabinets shall bond to the SBG with a conductor size of #6 AWG or larger.

#### Each rack or cabinet will have individual bonding conductors into the grounding grid. Serial connections (or "daisy–chaining") between communications bays is strictly forbidden and will not be accepted.

#### Power Distribution Units (PDU) shall bond into the Mesh–BN per requirements of NEC 250.122 and per manufacturers' recommendations.

#### Heating, ventilating and air–conditioning (HVAC) shall have bonding conductors into the underfloor grid of #6 AWG or larger.

#### Each HVAC unit shall have its own connection and may not be daisy–chained or attached serially.

#### Each steel column in the communications room shall bond into the Mesh–BN with a conductor of minimum size #4 AWG.

#### All metal cable trays shall be bonded into the grid with a minimum conductor size of #6 AWG or larger. These may be bonded in series.

#### All metallic conduits, water pipes and air ducts shall be bonded to the grid with a minimum conductor size of 6 AWG or larger. These may be bonded in series.

#### The following graphic illustrates for reference a typical underfloor SBG and the bonds made to it.

#### 

### Bonding within Racks and Cabinets:

#### Racks and Cabinets shall be bonded into the communications bonding network with conductors of #6 AWG or larger.

#### Depending on size of the telecommunications room, Rack Bonding Conductors (RBC) may tap into underfloor or overhead grounding conductors, or for smaller TRs (3–5 racks or cabinets), may go directly from the rack to the wall mounted busbar.

#### Racks, cabinets and similar enclosures **shall not be attached serially, (daisy–chained)** but must have individual RBC into the grounding system.

#### Newly installed racks and cabinets shall have vertical grounding busbars installed along one rail to provide clean bonding landing point for all rack mount equipment. For part numbers vertical busbars see "Materials" section of this document. Grounding busbars shall not be isolated from the rack or cabinet.

#### All painted components of racks/cabinets shall be assembled using serrated grounding washers and thread–forming screws to ensure electrical continuity between the different structural components of the rack/cabinet.

#### Larger equipment (chassis switches) with integral grounding terminals or pads shall be bonded to the vertical busbar with equipment grounding kits attached to those terminals and bonding them to the rack–mounted busbars. For kit part numbers see the "Materials" section of this document.

#### Anywhere two metallic surfaces are to be bonded, contractor shall clean the contact areas of paint or oxidation using abrasive pads and apply film of anti–oxidation compound between surfaces prior to bonding.

#### All cable fittings shall be of two–hole (LCC series) compression–type. Mechanical screw–lugs on racking systems will not be accepted and must be removed and replaced at contractor's expense.

#### All screws used to affix compression lugs to rack–mounted vertical busbars shall be of the thread forming type made specifically for electrical bonding.

#### Smaller equipment (servers, TOR switches) not having integral grounding pads must be bonded to the rack through the equipment mounting flanges using green thread–forming grounding screws with serrations under the head to cut through paint, coatings and oxidation that may be present on the equipment flange. Such equipment shall have minimally one grounding screw per piece of equipment.

#### Existing (installed) racking systems containing live active equipment may be retrofitted for Standards–compliant bonding using rack retrofitting kits listed in the "Materials" section of this document.

#### ESD (electro–static discharge) ports and wrist straps shall be provided minimally every other rack or bay to be within reach of any active equipment. On larger 4–post racks or cabinets – ESD ports and wrist straps shall be installed on the front and back to be accessible when servicing any active equipment.

#### As a condition of employment, any internal or contracting technicians servicing active equipment must be wearing a properly grounded wrist strap to dissipate ESD charges prior to touching any <<ClientName>> active equipment.

#### The following illustration demonstrates how the racks shall be bonded:

#### 

* 1. FIELD QUALITY CONTROL

### On installations confined to a single telecommunications room, the installing contractor shall visually verify continuity of communications bonding system from equipment, through racking systems, to overhead or underfloor backbone to the wall mounted busbar in that telecommunications room.

### Contractor shall further verify the use of all appropriate bonding accessories in the racking systems such as grounding washers, thread–forming grounding screws and the presence of electro–static discharge ports and wrist straps within reach of all equipment to be maintained.

### On greenfield (new) projects involving installation of a building–wide telecommunications backbone, installing contractor is further responsible for visually verifying sizing and sound installation of the telecommunications bonding backbone including presence of properly sized and installed grounding equalizer conductors between backbones contained in separate risers.

### Inspecting Contractor shall verify that any conduit longer than 3 feet through which a grounding conductor passes is properly bonded to the grounding conductor as described in this document.

### During inspections contractor shall verify compliance with all stipulations specified in this document and compliance with all regulatory references (Standards and Codes) cited.

### All opens or gaps in the bonding system during final inspections will be recorded in the inspection report and remedied.

### During inspections, contractor shall check all grounding and bonding system conductors and connections for tightness and proper installation, including checking proper dies were used on compression taps and fittings by checking embossed die numbers on those connections.

### <<ClientName>> may request a test of 10% of bonded connections within the grounding system with a volt–ohm meter. Resistance tests taken on either side of a compression or exothermic bond shall be less than .2 (2/10) of one ohm in resistance.

### Bonded joints to be tested may be random or individually tagged by a representative of <<ClientName>>.

### Contractor shall Test system at bonded points indicated and provide results in report form.

### Based upon test results, <<ClientName>> reserves the right to request testing on 100% of exothermic and compression bonds within the installed grounding system.

### All bonded connections failing the test described above shall be remedied and retested by the installation contractor at contractor's expense.

* 1. IDENTIFICATION AND ADMINISTRATION

### Provide labeling according to the requirements of:

#### ANSI/TIA/EIA–606.

#### Section 27 05 53 Identification for Communications Systems.

### Primary Bonding Busbar (PBB): Label with “PBB”.

### Secondary Bonding Busbar (SBB): Label with “SBB”.

### Telecommunications Bonding Backbone (TBB): Label with “WARNING! TELECOMMUNICATIONS BONDING BACKBONE. DO NOT REMOVE OR DISCONNECT” Labels shall be affixed at both ends and at accessible intermediate points.

### Grounding Equalizer (GC): “WARNING! TELECOMMUNICATIONS INTERCONNECTING BONDING CONDUCTOR. DO NOT REMOVE OR DISCONNECT” Labels shall be affixed at both ends and at accessible intermediate points.

### Bonding Conductor (BC): Label with “WARNING! TELECOMMUNICATIONS BONDING CONDUCTOR. DO NOT REMOVE OR DISCONNECT!” Labels shall be affixed at both ends and at accessible intermediate points.

END OF SECTION 27 05 26