General Notes:

1. *This guide specification is intended to provide the Design Professional with a basic guideline of suggested materials and installation requirements for a data-com grounding and bonding system.*
2. *The guide specification shall be carefully reviewed and edited with respect to application-specific project requirements. Proposed modifications shall be reviewed by Harger Lightning and Grounding.*
3. *The finalized version shall be included in the project contract documents.*

*Editing Notes:*

1. *This specification section must only be altered by notation (i.e. deleted text with strikethrough and additional text with double underline). This shall be accomplished by using Tools / Track Changes / Highlight Changes, and select “Track changes while editing” in MS Word or equivalent.*
2. *The Review Submittal Specification section shall be provided in electronic form for Harger Review.*
3. *Leave the following note (“For Construction Document Review, Design Submittal”) as part of the review submittal to aid any reviewer to understand WHY there are strikeouts and underlines.*
4. *After comments are received from Harger and incorporated, the strikeouts, underlines and reviewer notes are to be deleted before the spec is issued for Bidding.*

SECTION 27 05 26

GROUNDING AND BONDING FOR COMMUNICATIONS SYSTEMS

1. GENERAL
	1. SUMMARY
		1. Provide all labor, materials, tools, installation equipment, and test equipment required for the complete installation of grounding and bonding for communications systems within the structure.
	2. RELATED REQUIREMENTS
		1. Section 01 33 00 – Submittal Procedures
		2. Section 26 05 26 – Grounding and Bonding for Electrical Systems
	3. REFERENCES
		1. ANSI/TIA 607-C – Generic Telecommunications Bonding and Grounding (Earthing) for Customer Premises (Current Edition)
		2. ATIS 0600333-2013 – Grounding and Bonding of Telecommunications Equipment
		3. NFPA 70 – National Electrical Code (Current Edition)
	4. ADMINISTRATIVE REQUIREMENTS
		1. Sequencing: Coordinate installation of communications grounding and bonding with installation of other building systems and components, including electrical wiring, supporting structures and building materials, and building finishes.
	5. SUBMITTALS
		1. Product Data: Manufacturer’s descriptive and technical literature or catalog cuts.
		2. Shop Drawings:
			1. Layout of the communications grounding and bonding system, specifically for the building(s) or structures included in the contract drawings.
			2. Installation details of the products to be used in the installation.
		3. Manufacturer’s Instructions: Installation instructions shall be provided for communications grounding and bonding components which require field assembly or fabrication.
		4. Qualification data for firms or persons specified in “Quality Assurance” Article to demonstrate their capabilities and experience. Include data on listing or certification by a National Recognized Testing Laboratory (NRTL).
	6. CLOSEOUT SUBMITTALS

*While highly suggested, remove paragraph 1.06.A if a maintenance contract is not desired.*

* + 1. Maintenance Contracts: Installing contractor shall provide building owner with pricing for yearly system inspections. Building owner is under no obligation to have yearly inspections performed, however any changes to the equipment installed within a structure could render the grounding and bonding system ineffective.
		2. Warranty Documentation: The completed installation shall carry a one-year guarantee against defects in material or installation.
			1. Exclusions: Routine preventative maintenance, accidental or intentional damage shall not be included as part of the warranty service.
		3. Record Documentation: Installing contractor shall provide building owner (3) full-size plots of accurate, as-built shop drawings.
	1. EXTRA STOCK MATERIALS
		1. Provide extra stock materials to building owner in a single, durably packed container labeled with “27 05 26 – Telecom Grounding and Bonding”, installing contractor contact information, date and complete listing of contents.
			1. (10) #GECLB62A, Two-hole compression lugs for #6 AWG conductor
			2. (20) #CS46S, 1/4” x 3/4” Stainless steel hex head cap screw
			3. (20) #W4S, 1/4” Stainless steel flat washer
			4. (10) #BW4S, Bonding lug washer
			5. (20) #N420S, 1/4” Stainless steel hex nut
			6. (100’) #67G, #6AWG Green insulated copper conductor
			7. (5) #HCAJC1/2, 1/2 oz. Antioxidant
	2. QUALITY ASSURANCE
		1. Qualifications:
			1. Manufacturer shall maintain current electrical grounding material listings with a National Recognized Testing Laboratory (NRTL).
1. PRODUCTS
	1. APPROVED MANUFACTURER
		1.  301 Ziegler Drive, Grayslake IL 60030

<http://www.harger.com> | [hargersales@harger.com](file:///%5C%5Cdronebee%5Csys%5CShared%5CLP%20Product%20Development%5CSpecifications%5Chargersales%40harger.com)

* 1. primary bonding busbar (pbb)
		1. Basis of Design: Subject to compliance with requirements, provide Harger Lightning and Grounding “[TMGB](http://www.harger.com/products/idx.cfm?subc4id=173&p=1&thid=532&footid=0&footinfoid=0&oiid=746)” series; Part No. Choose a Value.
		2. Substitution Limitations: Project conditions may dictate the use of an alternate PBB, installing contractor shall coordinate with Harger Lightning and Grounding to determine proper material selection.
		3. Product Options:
			1. The PBB Shall be predrilled with holes for use with standard sized lugs.
			2. The PBB shall be listed and meet the requirements of ANSI/TIA 607-C.
			3. The PBB length shall be sized with consideration for future growth.
			4. The PBB shall have a minimum thickness of 1/4” (6mm) and height of 4” (100mm).
	2. Secondary bonding busbar (Sbb)
		1. Basis of Design: Subject to compliance with requirements, provide Harger Lightning and Grounding “[TGB](http://www.harger.com/products/idx.cfm?subc4id=175&p=1&thid=534&footid=0&footinfoid=0&oiid=748)” series; Part No. Choose a Value.
		2. Substitution Limitations: Project conditions may dictate the use of an alternate SBB, installing contractor shall coordinate with Harger Lightning and Grounding to determine proper material selection.
		3. Product Options:
			1. The SBB Shall be predrilled with holes for use with standard sized lugs.
			2. The SBB shall be listed and meet the requirements of ANSI/TIA 607-C.
			3. The SBB length shall be sized with consideration for future growth.
			4. The SBB shall have a minimum thickness of 1/4” (6mm) and height of 2” (50mm).
	3. Rack bonding busbar (RBB)
		1. Basis of Design: Subject to compliance with requirements, provide Harger Lightning and Grounding Part No. [RGBHKIT14119.25](http://www.harger.com/products/idx.cfm?subc4id=179&p=1&thid=525&footid=0&footinfoid=0&oiid=752), horizontal rack bonding busbar or Part No. [RGBVKIT145872A](http://www.harger.com/products/idx.cfm?subc4id=181&p=1&thid=536&footid=0&footinfoid=0&oiid=754), vertical rack bonding busbar.
		2. Substitution Limitations: Project conditions may dictate the use of an alternate RBB, installing contractor shall coordinate with Harger Lightning and Grounding to determine proper material selection.
		3. Product Options:
			1. The RBB Shall be predrilled with holes for use with standard sized lugs.
			2. The SBB shall be listed and meet the requirements of ANSI/TIA 607-C.
			3. The SBB length shall be sized per the horizontal width or vertical height of the rack.
			4. The SBB shall have a minimum thickness of 1/4” (6mm) and height of 5/8” (16mm).
	4. Bonding network (mesh-bn)
		1. Basis of Design: Subject to compliance with requirements, provide Harger Lightning and Grounding series [SRG](http://www.harger.com/products/idx.cfm?subc4id=230&p=1&thid=571&footid=2&footinfoid=368&oiid=784).
		2. Substitution Limitations: Project conditions may dictate the use of an alternate mesh-BN, installing contractor shall coordinate with Harger Lightning and Grounding to determine proper material selection.
	5. Conductors
		1. Conductors shall be stranded copper and may be insulated.
			1. Conductors shall be rated for the environment where it is to be installed.
			2. Conductors shall be a minimum of 6 AWG and should sized at 2 kcmil per linear foot of conductor length. Refer to the table below conductor sizing.

|  |  |
| --- | --- |
| TBB/BBC linear length ft (m) | Conductor Size (AWG) |
| Less than 13 ft (4m) | 6 |
| 14 – 20 ft (4 – 6m)  | 4 |
| 21-26 ft (6 – 8m)  | 3 |
| 27 – 33 ft (8 – 10m) | 2 |
| 34 – 41 ft (10 – 13m) | 1 |
|  42 – 52 ft (13 – 16m) | 1/0 |
|  53 – 66 ft (16 – 20m) | 2/0 |
|  67 – 84 ft (20 – 26m) | 3/0 |
|  85 – 105 ft (26 – 32m) | 4/0 |
|  106 – 125 ft (32 – 38m) | 250 kcmil |

* + - 1. Where structural metal of a building is bonded to the building’s grounding electrode system, the structural metal may be used in lieu of a TBB, a BBC, or both. Structural metal shall be electrically continuous; either through construction or the use of jumpers. Concrete reinforcing steel shall not be used in lieu of a TBB, a BBC, or both.
	1. Connections to pbb or sbb
		1. Mechanical connections to the PBB or SBB shall be made with; listed, two-hole, long barrel, electro tin-plated compression lugs with inspection port. The following part numbers shall be used:

|  |  |
| --- | --- |
| Conductor Size (AWG) | Part Number |
| 6 | [GECLB62A](http://www.harger.com/products/idx.cfm?subc3id=95&p=1&thid=669&footid=0&footinfoid=0&oiid=805) |
| 4 | [GECLB42A](http://www.harger.com/products/idx.cfm?subc3id=95&p=1&thid=669&footid=0&footinfoid=0&oiid=805) |
|  3 | [GECLB32A](http://www.harger.com/products/idx.cfm?subc3id=95&p=1&thid=669&footid=0&footinfoid=0&oiid=805) |
| 2 | [GECLB22C](http://www.harger.com/products/idx.cfm?subc3id=95&p=1&thid=669&footid=0&footinfoid=0&oiid=805) |
| 1 | [GECLB12C](http://www.harger.com/products/idx.cfm?subc3id=95&p=1&thid=669&footid=0&footinfoid=0&oiid=805) |
| 1/0 | [GECLB1/02C](http://www.harger.com/products/idx.cfm?subc3id=95&p=1&thid=669&footid=0&footinfoid=0&oiid=805) |
| 2/0 | [GECLB2/02C](http://www.harger.com/products/idx.cfm?subc3id=95&p=1&thid=669&footid=0&footinfoid=0&oiid=805) |
| 3/0 | [GECLB3/02C](http://www.harger.com/products/idx.cfm?subc3id=95&p=1&thid=669&footid=0&footinfoid=0&oiid=805) |
| 4/0 | [GECLB4/02C](http://www.harger.com/products/idx.cfm?subc3id=95&p=1&thid=669&footid=0&footinfoid=0&oiid=805) |
| 250 kcmil | [GECLB2502C](http://www.harger.com/products/idx.cfm?subc3id=95&p=1&thid=669&footid=0&footinfoid=0&oiid=805) |

* + 1. Exothermic connections to the PBB or SBB should be made to the sides (top, bottom or vertical) of the busbars. The following Ultraweld® series shall be used; [BD](google.com), [BE](google.com), or [BU](google.com).
	1. Connections from equipment to the rbb
		1. Equipment mounted in a rack or cabinet shall be bonded to the RBB with Harger Lightning and Grounding [UBC](http://www.harger.com/products/idx.cfm?subc2id=6) series bonding jumpers.
	2. antioxidants
		1. Bonding surfaces shall be cleaned to bare metal by removing all paint, protective coverings, oxidation, etc. The contact area shall be protected from corrosion using an approved antioxidant joint compound.
			1. Copper (including tinned) to copper (including tinned) connections – Part No. [HCAJC](http://www.harger.com/products/idx.cfm?subc4id=296&p=1&thid=727&footid=0&footinfoid=0&oiid=843)
			2. Copper (including tinned) to aluminum (including tinned) connections – Part No. [HAAJC](http://www.harger.com/products/idx.cfm?subc4id=295&p=1&thid=726&footid=0&footinfoid=0&oiid=842)
			3. Copper (including tinned) to other metals – Part No. [NOOXCLR](http://www.harger.com/products/idx.cfm?subc4id=297&p=1&thid=728&footid=0&footinfoid=0&oiid=844)
	3. bonding to MISCELLANEOUS systems
		1. Metallic conduits and piping
			1. Metallic conduits or piping less than 1” (25mm) in diameter shall be bonded with no. [TBGC4SCS\*](http://www.harger.com/products/idx.cfm?subc4id=8&p=1&thid=693&footid=0&footinfoid=0&oiid=942), electro-tin plated copper pipe clamp.
			2. Metallic conduits or piping greater than 1” (25mm) in diameter shall be bonded per the table below.

|  |  |
| --- | --- |
| Nominal Pipe Size | Part Number |
| 1” – 1-1/4” (25 – 30mm) | [CPC1/1.25](http://www.harger.com/products/idx.cfm?subc4id=222&p=1&thid=601&footid=0&footinfoid=0&oiid=792) |
| 1-1/2” – 2” (38 – 50mm) | [CPC1.5/2](http://www.harger.com/products/idx.cfm?subc4id=223&p=1&thid=602&footid=0&footinfoid=0&oiid=793) |
| 2-1/2” – 3” (64 – 76mm) | [CPC2.5/3](http://www.harger.com/products/idx.cfm?subc4id=355&p=1&thid=830&footid=0&footinfoid=0&oiid=919) |
| 3-1/2” – 4” (89 – 100mm) | [CPC3.5/4](http://www.harger.com/products/idx.cfm?subc4id=355&p=1&thid=830&footid=0&footinfoid=0&oiid=919) |
| 5” – 6” (127 – 150mm) | [CPC5/6](http://www.harger.com/products/idx.cfm?subc4id=355&p=1&thid=830&footid=0&footinfoid=0&oiid=919) |
| 8” (203mm) | [UPC8C](http://www.harger.com/products/idx.cfm?subc4id=355&p=1&thid=830&footid=0&footinfoid=0&oiid=919) |
| 10” (254mm) | [UPC10C](http://www.harger.com/products/idx.cfm?subc4id=378&p=1&thid=698&footid=15&footinfoid=379&oiid=833) |

* + 1. Metallic Raceways
			1. Metallic cable trays or raceways shall be bonded with no. [TBCTC](http://www.harger.com/products/idx.cfm?subc5id=46&p=1&thid=691&footid=0&footinfoid=0&oiid=825), electro-tin plated copper cable tray bonding clamps.
		2. Access Floor
			1. Bonding of pedestals utilized in raised access floors shall be made with [GPC](http://www.harger.com/products/idx.cfm?subc4id=220&p=1&thid=574&footid=0&footinfoid=0&oiid=790) series, pedestal clamps.
		3. Structural Steel Framework
			1. Mechanically bonded connections to the building steel shall be made with either Part No. [217](http://www.harger.com/products/idx.cfm?subc4id=361&p=1&thid=836&footid=4&footinfoid=413&oiid=925), tinned copper bonding plate or Part No. [223T](http://www.harger.com/products/idx.cfm?subc4id=364&p=1&thid=839&footid=3&footinfoid=414&oiid=928), tinned copper flange bonding plate.
			2. Exothermic connections to the building steel shall be made with one of the following series of Ultraweld®; [VU](http://www.harger.com/products/idx.cfm?subc2id=33&p=1&oiid=0&thid=0&footid=0&footinfoid=0), [VD](http://www.harger.com/products/idx.cfm?subc2id=33&p=1&oiid=0&thid=0&footid=0&footinfoid=0), or [VA](http://www.harger.com/products/idx.cfm?subc2id=33&p=1&oiid=0&thid=0&footid=0&footinfoid=0).
	1. GROUND aCCESS WELLS
		1. Basis of Design: Subject to compliance with requirements, provide Harger Lightning and Grounding Part No. [GAW121212HD](http://www.harger.com/products/idx.cfm?subc4id=148&p=1&thid=503&footid=16&footinfoid=353&oiid=497), ground access well.
		2. Substitution Limitations: Project conditions may dictate the use of an alternate access well, installing contractor shall coordinate with Harger Lightning and Grounding to determine proper material selection.
1. EXECUTION
	1. INSTALLATION
		1. Install grounding and bonding for communications systems as indicated on approved shop drawing, according to manufacturer’s written instructions.
		2. Ground conductors and grounding connections shall be installed in a neat and workmanlike manner.
		3. Installation shall comply with all aspects of ANSI/TIA 607-C.
	2. CORROSION PROTECTION
		1. Do not combine materials that can form an electrolytic couple that will accelerate corrosion in the presence of moisture, unless moisture is permanently excluded from the junction of such materials.
		2. Use conductors with protective coatings where conditions would cause deterioration or corrosion of conductors.

END OF SECTION

*REMOVE IF AN EVEN NUMBER OF PAGES EXIST AFTER EDITING.*

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