
Part 1 General

1.1 RELATED SECTIONS

- .1 Division 01- General Requirements.
- .2 Section 26 05 00 – Common Work Results for Electrical.

1.2 REFERENCES

- .1 American National Standards Institute:
 - .1 ANSI J-STD-607-A-2002, Joint Standard - Commercial Building Grounding (Earthing) and Bonding Requirements for Telecommunications.
- .2 Telecommunications Industries Association (TIA)/Electronic Industries Alliance (EIA):
 - .1 TIA/EIA-606-2002, Administration Standard for the Commercial Telecommunications Infrastructure.
- .3 U.S. Department of Labor/Occupational Safety and Health Administration (OSHA):
 - .1 Nationally Recognized Testing Laboratory (NRTL).

1.3 SYSTEM DESCRIPTION

- .1 Telecommunications grounding and bonding system consisting of grounding busbars, bonding backbones, and other bonding conductors.
- .2 Provides ground reference for telecommunications systems within building and bonding to ground of equipment in telecommunications rooms.
- .3 Metallic pathways, cable shields, conductors, and hardware within telecommunications spaces are bonded to telecommunications grounding and bonding system.

Part 2 Products

2.1 BONDING CONDUCTOR FOR TELECOMMUNICATIONS

- .1 Copper conductor, green insulated, size as indicated to: ANSI J-STD-607-A.

Part 3 Execution

3.1 MANUFACTURER'S INSTRUCTIONS

- .1 Compliance: comply with manufacturer's written recommendations or specifications, including product technical bulletins, handling, storage and installation instructions, and datasheets.

3.2 BONDING CONDUCTORS GENERAL

- .1 When placed in ferrous metallic conduit or EMT, bond one end of conduit or EMT using grounding bushing.

3.3 BONDING TO TELECOMMUNICATIONS GROUNDING BUSBAR

- .1 Bond metallic communications raceways to the existing TGB in room 3354 using #6 AWG green insulated copper conductor.
- .2 For communications cables within Server/Telephone Room having shield or metallic member, bond shield or metallic member to the TGB.
- .3 Bond equipment racks and cabinets as indicated to the existing TGB using #6 AWG green insulated copper conductor.

END OF SECTION

Part 1 General

1.1 RELATED SECTIONS

- .1 Division 01 – General Requirements.
- .2 Section 26 05 00 – Common Work Results for Electrical.
- .3 Section 26 05 31 – Splitters, Junction and Pull Boxes and Cabinets.
- .4 Section 26 05 32 – Outlet Boxes, Conduit Boxes and Fittings.
- .5 Section 26 05 34 - Conduits, Conduit Fastenings and Conduit Fittings.

1.2 SYSTEM DESCRIPTION

- .1 Raceway system for communications systems consisting of outlet boxes, cover plates, conduits, pull boxes, fish wires, cable tray and overhead J-hook distribution system.

Part 2 Products

2.1 MATERIAL

- .1 Conduits: In accordance with Section 26 05 34 - Conduits, Conduit Fastenings and Conduit Fittings.
- .2 Non-metallic raceway:
 - .1 Multiple channel non-metallic raceway base
 - .2 103mm x 45mm Supplied with pre-punched mounting holes.
 - .3 CSA 22.2 No.62-93
 - .4 Compatible with NEMA standard 70mm faceplates.
 - .5 PVC construction in Off White to be field painted match supplied REL
- .3 Raceways: In accordance with Section 26 05 34 - Conduits, Conduit Fastenings and Conduit Fittings.
- .4 Junction and pull boxes: in accordance with Section 26 05 31 – Splitters, Junction and Pull Boxes and Cabinets.
- .5 Outlet boxes, conduit boxes and fittings: in accordance with Section 26 05 32 – Outlet Boxes, Conduit Boxes and Fittings.
- .6 Fish wire: polypropylene type.
- .7 J-hooks:
 - .1 Finish: Pre-galvanized.
 - .2 Sized to suit communications cabling supported.
 - .3 Cable retainer clips.

- .8 Cable tray: (Wire Basket):
 - .1 Carbon steel wire, ASTM A 510, Grade 1008. Wire welded, bent, and surface treated after manufacture.
 - .2 Finish for Carbon Steel Wire after welding and bending of mesh to be Electrodeposited Zinc Plating: ASTM B 633, Type III, SC-1.
 - .3 Cable tray will consist of continuous, rigid, welded steel wire mesh cable management system, to allow continuous ventilation of cables and maximum dissipation of heat, with UL Classified splices where tray acts as Equipment Grounding Conductor (EGC).
 - .4 Provide splices, supports, and other fittings necessary for a complete, continuously grounded system.
 - .5 Mesh: 2 x 4 inches (50 x 100 mm).
 - .6 Straight Section Lengths: 118 inches (3,000 mm).
 - .7 Fittings: Wire mesh cable tray fittings are field-fabricated from straight tray sections, in accordance with manufacturer's instructions and Item 2.3.
 - .8 CF Series Cable Tray Size:
 - .9 Depth: Cable tray depth will be (unless otherwise shown on drawings) 105 mm
 - .10 Width: Cable tray width will be (unless otherwise shown on drawings) 600 mm
 - .11 Length: Cable tray length will be 118 inches (3000 mm) unless otherwise shown on drawings.
 - .12 Fill Ratio: Cable tray may be filled to (40%) of total fill capacity. Size cable tray to accommodate future cabling changes or additions.

Part 3 Execution

3.1 MANUFACTURER'S INSTRUCTIONS

- .1 Compliance: comply with manufacturer's written recommendations or specifications, including product technical bulletins, handling, storage and installation instructions, and datasheets.

3.2 INSTALLATION

- .1 Install fish wire, outlet boxes, pull boxes, coverplates, conduit, cable tray, J-hooks, miscellaneous and positioning material to constitute a complete system, in preparation for cable installation under this contract.
- .2 Cable Tray (Wire Basket):
 - .1 Supply and install wire basket for conveyance of communications system cabling within communications rooms.
 - .2 Maximum length of unsupported communications wire basket shall be 1500 mm.
 - .3 Coordinate locations of wire basket supports with other trades to ensure that they are easily accessible.
 - .4 Ground cable trays at end of continuous run.
- .3 J-Hooks:
 - .1 Not Applicable.

- .4 Conduits:
 - .1 Provide conduits for conveyance of communications system cabling as follows:
 - .1 In ceiling spaces that are not accessible (i.e. above gypsum board ceilings).
 - .2 In public areas that have exposed (open) ceilings.
 - .3 For all fiber optic cables.
- .5 All conduits for voice/data outlets shall be stubbed to cable tray.

END OF SECTION

Part 1 General

1.1 RELATED SECTIONS

- .1 Section 26 05 00 - Common Work Results for Electrical.
- .2 Section 27 05 26 - Grounding and Bonding for Communications Systems.
- .3 Section 27 05 28 – Pathways for Communications Systems.

1.2 REFERENCES

- .1 ASTM E1130-08, Standard Test Method for Objective Measurement of Speech Privacy in Open Plan Spaces Using Articulation Index.
- .2 Telecommunications Industry Association (TIA)/Electronic Industries Alliance (EIA):
 - .1 TIA/EIA-568-C.1 (2009), Commercial Building Telecommunications Cabling Standard, Part 1: General Requirements.
 - .2 TIA/EIA-568-C.2 (2009), Commercial Building Telecommunications Cabling Standard, Part 2: Balanced Twisted-Pair Cabling Components.
 - .3 TIA/EIA-606-A (2007), Administration Standard for the Commercial Telecommunications Infrastructure.
- .3 BICSI Telecommunications Distribution Methods Manual (TDMM) 13th Edition.

1.3 SYSTEM DESCRIPTION

- .1 The sound masking system will cover open plan office areas of the facility as indicated on the Contract Drawings. Each floor will be equipped with a one (1) zone sound masking networkable controller.
- .2 Sound emitters will be placed on 3m grid through the facility using a daisy chain distribution method.
- .3 The work of this Section consists of the provision of materials, labour, and equipment for the complete installation of the sound masking system.
- .4 Functional Requirements of Systems:
 - .1 Distribute sound masking to areas as indicated on the drawings.
 - .2 Mute sound masking system upon fire alarm initiation.
 - .3 Auxiliary inputs as indicated on the drawings.
- .5 Active electronic components shall be accessible for service. Systems using above-ceiling active electronics are not permitted.
- .6 Definitions:
 - .1 Privacy Index: According to American Society of Testing and Materials (ASTM) Standard E1130.
 - .2 Octave and 1/3-Octave Bands: Centered on ANSI/ISO preferred frequencies.

- .3 Sound Level Meter and Filter Set: Calibrated ANSI Type 1 or Type 2.
- .4 Pink Noise: Constant energy in constant percentage (e.g. 1/1 or 1/3 octave) frequency bands, random or pseudo-random noise.
- .5 SPL: sound pressure level in dB re 0.00002 Pa (0.0002 microbar).

1.4 QUALITY ASSURANCE

- .1 To be considered qualified for this work, the contracting firm must be experienced in the provision of sound systems similar in complexity to those required for this project and be an authorized installer for the major product components furnished.

1.5 SHOP DRAWINGS AND PRODUCT DATA

- .1 Submit shop drawings and product data in accordance with Division 01 – General Requirements.
- .2 Shop drawings to include wiring and interconnection diagrams and installation and configuration instructions.

1.6 QUALITY ASSURANCE SUBMITTALS

- .1 Submit the following in accordance with Section 01 33 00 - Submittal Procedures.
 - .1 Test Reports: Submit certified test reports.
 - .2 Instructions: Submit manufacturer's installation instructions.
 - .3 Manufacturer's Field Services: Submit copies of manufacturer's field reports and test results.

1.7 CARE, OPERATION AND START-UP

- .1 Provide these services for such period, and for as many visits as necessary to put equipment into full operation, and ensure that operating personnel are conversant with all aspects of its care and operation.

Part 2 Products

2.1 SOUND MASKING CONTROLLER

- .1 The sound masking controller shall include the following features:
 - .1 Sound masking emitters shall be directly powered and managed by a controller.
 - .2 Have button controls and LCD readout of system settings on front panel.
 - .3 Provide DSP-based sound generation with four (4) uncorrelated masking signal output channels per zone.
 - .4 Capability of controlling background sound and paging for up to three separate zones of sound masking with paging selectable by zone, and from one to 120 emitters per zone.
 - .5 Have built in signal logic for sequential channel operation by adjacent emitters.
 - .6 Provide pre-set industry standard frequency equalization, specifically tailored to the operating characteristics of the emitters provided and requiring no frequency equalization during the commissioning process.

- .7 Provide separate level controls for masking and paging/music adjustable in 1 dB steps over a minimum range of 30 decibels, and off.
- .8 Rack mountable.
- .9 Network capable management of system acoustic output of zones through pre-installed control software accessible via any standard browser from a computer resident on the network.
- .10 Capable of automatic background sound level adjustment (ramping) based on time of day and day of week.
- .11 Time source provided by integrated Real Time Clock with battery backup or user selectable SNTP server. Field adjustable using provided network connection and factory installed software.
- .12 Dedicated 1/3 octave equalizer covering ISO bands from 200 Hz to 5,000 Hz for background sound spectrum, preset at factory for recommended operation. Field adjustable using provided network connection and factory installed software.
- .13 Dedicated 1/1 octave equalizer covering ISO bands from 250 Hz to 8000 Hz for paging input. Field adjustable using provided network connection and factory installed software.
- .14 Loudspeaker network fault detection capability.
- .15 Two audio inputs (A and B) on rear panel operable in balanced or single ended configuration for distribution of externally generated signals via 4 terminal compression type connectors.
- .16 Two contact closure interfaces on rear panel: one turns off masking on closure; one turns off Audio B on closure. May be used to duck masking and/or Audio B during emergency situations.
- .17 Complete with manufacturer's cUL listed 120 volt power supply sized as required for quantity of devices controlled.

2.2 SOUND MASKING EMITTERS

- .1 Miniature self-contained ceiling mounted loudspeaker/enclosure/baffle system:
 - .1 Designed specifically for distributing background masking, music, and paging.
 - .2 Ultra wide dispersion to maximize spatial uniformity.
 - .3 All connections via modular RJ45 connectors for plug-and-play installation.
 - .4 Eye loop for securing unit with safety wire.
 - .5 cUL certified for plenum installation.
 - .6 Colour white.
 - .7 Complete with manufacturer's mounting and hardware for installation in ceiling type as shown.

2.3 EMITTERS CABLING

- .1 Four-pair, 100 ohm balanced unshielded non-bonded twisted-pair (UTP) cable, flame test classification FT4 to: CSA-C22.2 No. 214, Category 5 to: TIA/EIA-568-C.2.
- .2 Cables terminated with RJ45 modular connectors.

- .3 Colour shall be verified by Departmental Representative during shop drawing review.
- .4 Standard of Acceptance: As per Manufacturer.

Part 3 Execution

3.1 MANUFACTURER'S INSTRUCTIONS

- .1 Comply with manufacturer's written data, including product technical bulletins, product catalogue installation instructions, product carton installation instructions, and datasheets.

3.2 INSTALLATION

- .1 Install controllers in telecommunications room racks as indicated. Coordinate final location and requirements with Departmental Representative.
- .2 Attach line level and loudspeaker cables connecting to controllers securely with strain-relief clamps.
- .3 Identify loudspeaker home run wires and cables at termination and connection points. Label each cable with cable marker keyed to a wiring schedule indicating the corresponding area of building served. Designate building floor level and zone.

3.3 EMITTER INSTALLATION

- .1 Install emitter in ceiling tiles in accordance with manufacturer's requirements.
- .2 Secure loudspeaker to building or ceiling suspension structure using safety wire and eye loop on loudspeaker in accordance with Authority having Jurisdiction.
- .3 Connect cabling to loudspeakers with system live, starting at controller end of distribution lines. Connect line from output of operating controller set to maximum output to socket designated as input on loudspeaker. Verify operation of each loudspeaker by listening before tile is installed in ceiling. If loudspeaker does not operate, fault may be in lines or defective loudspeakers upstream of inoperative unit: correct before continuing. Note that inadvertent connection of line to output of loudspeaker rather than to input will cause some downstream loudspeakers (up to 4 loudspeakers after misconnected unit) to be rendered inoperative.

3.4 CABLE INSTALLATION

- .1 Wires installed shall be contained in properly mounted conduit or raceways. Where none of these distribution mediums exist, the individual plenum cables will be formed into cable harnesses, neatly run, properly dressed, supported and secured with appropriate J-hooks in accessible ceilings only. If cable trays are used, the UTP plenum cables will be partitioned from each other and neatly bundled with Velcro ties.
- .2 Wires and cables shall be placed and protected to avoid contact with rough surfaces or sharp edges. Where wires or cables run through holes in metal, they shall be protected by suitable grommets or bushings.

- .3 Cabling exiting the cable tray downward from the bottom, sides or ends shall be supported by a waterfall attached to the cable tray to maintain the minim cable bend radius.
- .4 Connect no more than 60 loudspeakers/home run.
- .5 Install no more than 300 m of cable between Generator/Controller unit and last emitter on each home run.
- .6 Test cables:
 - .1 To Category 5 to TIA/EIA-568-C.2. Submit test results in accordance with Division 01 – General Requirements.
 - .2 Testing equipment shall have been calibrated within one (1) year prior to the test date and updated with the latest testing standards. The calibration date and testing standards used shall be included with each test result.
 - .3 Deficiencies shall be corrected at the expense of the Contractor prior to acceptance by the Departmental Representative.

3.5 TESTING AND VERIFICATION

- .1 Provide for a qualified manufacturer's representative to fully verify the system prior to energizing the system.
- .2 The contractor shall provide, at the Owner's facility, training to familiarize the Owner's personnel with the operation, use, adjustment, and problem solving diagnosis of the system.
- .3 The Contractor shall commission and test complete system and all devices. This shall include, but not be limited to, adjustment of all components for correct functionality, verification of operation of each device
- .4 Loudspeaker Operation: Near field output of each loudspeaker shall match the zone average within +/- 1.5 decibels. Listen directly below each installed emitter to confirm correct operation. Emitters found to be inoperative, or operating at an incorrect level, use a sound level meter set to A-weighting and slow response to verify output. Place the microphone so as to contact each grille.
- .5 Replace defective emitters or cabling, or otherwise correct cause for emitters found to be operating outside this range.
- .6 With system operating at maximum level, listen for buzzes, rattles, and objectionable distortion in areas covered. Identify and correct causes of these defects.
- .7 Adjust spectrum and level controls for normal operation. Measure the A-weighted sound pressure level using a sound level meter set to A-weighting and slow response at representative locations within each zone. Adjust average initial levels in open plan areas to 45 to 48 dBA at normal occupants' locations.
- .8 Demonstrate to the Departmental Representative that the system is fully operable and installed in compliance with the terms of specifications.

- .9 Test the system to demonstrate that the design goal of Privacy Index (PI) = 80% to 95% (Normal Privacy) or better is met between representative workstations. For this test, select adjacent workstation pairs without direct line of sight or significant sound reflecting ceiling or wall elements between, and with a ceiling material rated at NRC of 0.85 or higher. Tests shall be in accordance with ASTM Standard E1130 except that the octave band calculation method of ANSI Standard S3.5 may be used.
- .10 Test the system in each open plan area zone served to demonstrate that the design goal for spatial uniformity is met. Tests shall be carried out per ASTM Standard E1573 as measured in the 2,000 Hz octave band. At each location, the average sound pressure levels shall be measured over an interval of at least 4 seconds at four positions at 90° intervals around a circle of 0.3 m radius centered on the location. The arithmetic mean sound pressure level shall be calculated from the four measured values. For at least 75% of the test locations, the arithmetic mean sound pressure level in the 2,000 Hz octave band shall not vary by more than 1 dB from the average of the arithmetic mean sound pressure levels measured at all locations.

END OF SECTION