

PART 1 - GENERAL**1.1 RELATED REQUIREMENTS**

- .1 Section 26 05 00 - Common Work Results for Electrical.
- .2 Section 26 05 28 - Grounding - Secondary.

1.2 REFERENCE STANDARDS

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

1.4 QUALITY ASSURANCE

- .1 Health and Safety Requirements: do construction occupational health and safety in accordance with Section 01 35 29.06 - Health and Safety Requirements.

1.5 DELIVERY, STORAGE AND HANDLING

- .1 Waste Management and Disposal:
- .2 Separate waste materials for reuse and recycling in accordance with Section 01 74 19 - Waste Management and Disposal.

PART 2 - PRODUCTS**2.1 TELECOMMUNICATIONS GROUNDING BUSBAR (TGB)**

- .1 Predrilled copper busbar, electrotin plated with holes 8 mm diameter for use with standard-sized lugs to: ANSI J-STD-607-A.
- .2 Dimensions 6 mm thick, 50 mm wide, 300 mm long to: ANSI J-STD-607-A.

2.2 BONDING CONDUCTOR FOR TELECOMMUNICATIONS

- .1 3/0 AWG copper conductor, green insulated in accordance with Section 26 05 28 - Grounding - Secondary.

2.3 WARNING LABELS

- .1 Non-metallic warning labels in English and French to: in accordance with Section 26 05 00 - Common Work Results for Electrical.
- .2 Identify labels with wording "If this connector is loose or must be removed, please call the building telecommunications manager".

PART 3 - EXECUTION**3.1 TELECOMMUNICATIONS GROUNDING BUSBAR (TGB)**

- .1 Install TGB in main terminal/equipment room and each telecommunications room.
- .2 Install 3/0 AWG copper bonding conductor from TGB to alternating current equipment ground (ACEG) of serving electrical power panel (panelboard).

3.2 BONDING CONDUCTORS GENERAL

- .1 When placed in ferrous metallic conduit or EMT longer than 1 m, bond to each end of conduit or EMT using grounding bushing 6 AWG copper conductor.

3.3 BONDING CONDUCTOR FOR TELECOMMUNICATIONS

- .1 Install bonding conductor for telecommunications from TMGB to service equipment (power) ground.
- .2 Use exothermic welding, approved 2 hole compression lugs lugs 1 hole non-twisting lugs for connection to TMGB.

3.4 BONDING TO TGB

- .1 Bond metallic raceways in to TGB using 3/0 AWG green insulated copper conductor.

- .2 For cables within telecommunications room having shield or metallic member, bond shield or metallic member to TGB using 3/0 AWG green insulated copper conductor.
- .3 Bond equipment rack located in telecommunications room to TGB using 3/0 AWG green insulated copper conductor.

3.5 LABELLING

- .1 Apply warning labels to telecommunications bonding and grounding conductors.
- .2 Apply additional administrative labels to: TIA/EIA-606.

END OF SECTION

PART 1 - GENERAL**1.1 RELATED REQUIREMENTS**

- .1 Section 26 05 31 - Splitters, Junction, Pull Boxes and Cabinets.
- .2 Section 26 05 34 - Conduits, Conduit Fastenings and Conduit Fittings.
- .3 Section 26 05 36 - Cable Trays for Electrical Systems.
- .4 Section 26 27 23 - Indoor Service Poles or J-hooks.

1.2 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Submit in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Product Data:
 - .1 Submit manufacturer's instructions, printed product literature and data sheets for communication raceway systems and include product characteristics, performance criteria, physical size, finish and limitations.

1.3 DELIVERY, STORAGE AND HANDLING

- .1 Delivery and Acceptance Requirements: deliver materials to site in original factory packaging, labelled with manufacturer's name and address.
- .2 Storage and Handling Requirements:
 - .1 Store materials indoors and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.
 - .2 Store and protect communication raceway systems from nicks, scratches, and blemishes.
 - .3 Replace defective or damaged materials with new.
- .3 Packaging Waste Management: remove for reuse and return by manufacturer of packaging materials as specified in Construction Waste Management Plan, Waste Reduction Workplan in accordance with Section 01 74 19 - Waste Management and Disposal.

PART 2 - PRODUCTS**2.1 SYSTEM DESCRIPTION**

- .1 Empty telecommunications raceways system consists of outlet boxes, cover plates, service fittings, concrete encased ducts.
- .2 Overhead cable tray distribution system.

2.2 MATERIAL

- .1 Conduits: EMT type, in accordance with Section 26 05 34 - Conduits, Conduit Fastenings and Conduit Fittings.
- .2 Cable trays: Wire baskettype, in accordance with Section 26 05 36 - Cable Trays for Electrical Systems.
- .3 Overhead distribution system: J-hooks.
- .4 Junction boxes, cabinets type: in accordance with Section 26 05 31 - Splitters, Junction, Pull Boxes and Cabinets.
- .5 Outlet boxes galvanized metal type, conduit boxes double gang size, and fittings: in accordance with Section 26 05 31 - Splitters, Junction, Pull Boxes and Cabinets.
- .6 Indoor service poles: in accordance with Section 26 27 23 - Indoor Service Poles.
- .7 Fish wire: polypropylene type.

PART 3 - EXECUTION**3.1 EXAMINATION**

- .1 Verification of Conditions: verify that conditions of substrate previously installed under other Sections or Contracts are acceptable for communication raceway systems installation in accordance with manufacturer's written instructions.
 - .1 Visually inspect substrate in presence of Departmental Representative.
 - .2 Inform Departmental Representative of unacceptable conditions immediately upon discovery.
 - .3 Proceed with installation only after unacceptable conditions have been remedied and after receipt of written approval to proceed from Departmental Representative.

3.2 INSTALLATION

- .1 Install empty raceway system, including underflooroverhead distribution system, fish wire, terminal cabinets, outlet boxes, floor boxes, pull boxes, cover plates, conduit, sleeves and caps, cable tray, service poles, miscellaneous and positioning material to constitute complete system.

3.3 CLEANING

- .1 Progress Cleaning: clean in accordance with Section 01 74 00 - Cleaning.
 - .1 Leave Work area clean at end of each day.
- .2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 00 - Cleaning.
- .3 Waste Management: separate waste materials for reuseandrecycling in accordance with Section 01 74 19 - Waste Management and Disposal01 35 21 - LEED Requirements.
 - .1 Remove recycling containers and bins from site and dispose of materials at appropriate facility.

3.4 PROTECTION

- .1 Protect installed products and components from damage during construction.
- .2 Repair damage to adjacent materials caused by pathways for communications systems installation.

END OF SECTION

PART 1 GENERAL**1.1 RELATED REQUIREMENTS**

- .1 Section Includes: Sound masking systems (SMS).
- .2 Related Requirements:
 - .1 Section 26 05 00 – COMMON WORK RESULTS FOR ELECTRICAL.
 - .2 Section 26 05 21 – WIRES AND CABLES (0-1000V).
 - .3 Section 26 05 29 – HANGERS AND SUPPORTS FOR ELECTRICAL SYSTEMS
 - .4 Section 26 05 32 – OUTLET BOXES, CONDUIT BOXES AND FITTINGS

1.2 REFERENCES

- .1 Reference Standards:
 - .1 Underwriters Laboratories (UL)
 - .1 UL6500 – Standard for Audio/Video and Musical Instrument Apparatus for Household, Commercial and Similar General Use
 - .2 UL 2043 – Standard for Fire Test for Heat and Visible Smoke Release for Discrete Products and Their Accessories Installed in Air-Handling Spaces; 1996
 - .2 ASTM International
 - .1 ASTM E 1374-06(2011) – Standard Guide for Open Office Acoustics and Applicable ASTM Standards
 - .2 ASTM E 1573-09 – Standard Test Method for Evaluating Masking Sound in Open Office Using A-Weighted and One-Third Octave Band Sound Pressure Levels
 - .3 ASTM E 1130-16 – Standard Test Method for Objective Measurement of Speech Privacy in Open Offices Using Articulation Index
 - .4 ASTM E 2638-10 – Standard Test Method for Objective Measurement of the Speech Privacy Provided by a Closed Rooms
 - .3 American National Standards Institute (ANSI)
 - .1 ANSI S1.13-05 Measurement of Sound Pressure Levels in Air
 - .2 ANSI S12.2-08 Criteria for Evaluating Room Noise

- .4 CSA Group
 - .1 CSA C22.2 No. 241-17 Communications cables
 - .1 CSA CMP 75C FT6 Plenum rated cabling

1.3 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Submit in accordance with Section 01 33 00 – Submittal Procedures.
- .2 Product Data: submit manufacturer's instructions printed product literature and data sheets for sound masking systems including:
 - .1 Product characteristics, performance criteria, physical size, finish and limitations.
 - .2 Preparation instructions and recommendations.
 - .3 Delivery, storage and handling requirements and recommendations.
 - .4 Installation instructions.
- .3 Shop Drawings: submit shop drawings including schematics of the system showing quantity and location of components and related cabling and accessories, clearly identifying the speaker locations, groups and zones matching the requirements of 2.4.
- .4 Test and Evaluation Reports:
 - .1 System Reports: submit reports and include:
 - .1 Inventory list of system components including model number, serial number and firmware version.
 - .2 System settings and measurement results.
 - .3 Testing and commissioning data.

1.4 QUALITY ASSURANCE

- .1 Obtain required permits and follow applicable codes, including regulatory testing and certification.
- .2 Qualifications:
 - .1 Manufacturer qualifications: Qualified manufacturer in sound masking systems.
 - .2 System design: to be confirmed by authorized manufacturer's representative.
 - .3 Installer qualifications: approved by manufacturer representative and are trained with the specified products or have demonstrated experience with the installation of similar products to those specified.
- .3 System adjustment: performed by an approved manufacturer representative or trained contractor.

- .4 Commissioning: configured and commissioned by authorized manufacturer's representative or approved contractor, certified commissioning agent or qualified acoustic Departmental Representative.
- .5 Source electronic masking components, loudspeakers, wall controls and cables from a single manufacturer.

1.5 CLOSEOUT SUBMITTALS

- .1 Submit in accordance with Section 01 78 00 – CLOSEOUT SUBMITTALS.
- .2 Warranty:
 - .1 Provide warranty documents covering the system components for defects in parts or assembly for 12 month period from date of system startup.
 - .2 Provide 12 months installation warranty.
- .3 Record Documentation: provide as built schematics of system design floor plan showing:
 - .1 Quantity, type and location of components, cabling and accessories.
 - .2 Identification of groups and zones after commissioning.

1.6 DELIVERY, STORAGE AND HANDLING

- .1 Deliver, store and handle materials in accordance with Section 01 00 10 – General Instructions and manufacturer's instructions.
- .2 Delivery and acceptance requirements: deliver materials to site in original factory packaging, labelled with module sizes and with manufacturer's name and address.
- .3 Storage and handling requirements:
 - .1 Store materials off ground, indoors in a dry location and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.
 - .2 Store and protect components from breakage, nicks, scratches and blemishes.
 - .3 Replace defective or damaged materials with new.
- .4 Packaging Waste Management: remove for reuse and as specified in accordance with Section 01 74 19 – Waste Management and Disposal and Section 01 47 15 – Sustainable Requirements Construction.
- .5 Inspect manufacturer's packages upon receipt.

PART 2 PRODUCTS**2.1 MANUFACTURERS**

- .1 Acceptable manufacturers are those able to meet this SMS specification section.

2.2 SYSTEM COMPONENTS

- .1 General System Overview: The sound masking system shall be a networked system with complete digital control down to individually addressable networked masking devices.
- .2 The system shall be comprised of a selection of
 - .1 Distributed networked masking devices.
 - .2 Loudspeakers.
 - .3 Computer software.
 - .4 Optional control panels.
 - .5 Cable assemblies.
 - .6 Power supplies.

2.3 REGULATORY TESTING AND CERTIFICATIONS

- .1 The system components shall conform to:
 - .1 Safety and Electrical: IEC 60065 – Standard for Audio, Video and Similar Electronic Apparatus - Safety Requirements. Products shall be labelled accordingly.
 - .2 Electromagnetic Interference (EMI): ICES-003 (Industry Canada) – Interference-Causing Equipment Standard.
 - .3 Plenum Rated Cabling: CSA CMP 75C FT6, UL CL3PCMP 75C. Products shall be labelled accordingly.
 - .4 Heavy Metals: UL1310, Standard for Class 2 Power Units. Products shall be labelled accordingly.
 - .5 Low Voltage Power Supplies: UL1310, Standard for Class 2 Power Units. Products shall be labelled accordingly.

2.4 DESIGN AND PERFORMANCE REQUIREMENTS

- .1 System Architecture:
 - .1 The system shall be of a networked architecture with addressable masking devices distributed throughout the installation area.
 - .2 All speakers to be located above ceiling tile in the plenum and oriented towards the slab unless otherwise noted.

- .2 System Design: design system according to manufacturer's specifications and match layout and group plan as per supplied drawings.
 - .1 Conform to the speaker layout as per the project drawings.
- .3 Masking Sound Generation:
 - .1 The system shall provide an independent sound masking generator for each masking control zone. A zone is comprised of an independently addressable electronic module capable of generation and control (level and spectrum) of a sound masking signal and one or more loudspeakers.
 - .2 The masking sound shall be random and provide no noticeable repetitive pattern. Pseudo-random generation cycles shall exceed 24 hours. One minute time-averaged sound pressure level of any 1/3 octave band of masking sound from 160 to 5,000 Hz remains constant in any space to within a standard deviation of 1 dB when measured over a 30-minute period .
 - .3 The masking system must include an automated spectrum and level calibration process.
 - .4 The system shall provide a function to allow a gradual ramp up of masking volume each time power is applied
 - .1 This functionality shall have a programmable ramp up rate, as well as enabled/disabled feature, controlled from central control device.
- .4 System Control & Grouping
 - .1 The system must include a software control interface capable of making and displaying all sound masking and sound masking timer settings.
 - .2 All system settings shall be digital and adjusted via the software control interface and control panel.
 - .3 The software control interface shall be capable of monitoring and reporting on all system settings affecting masking performance.
 - .1 Masking level controls shall be limited to a software control interface and/or control panel(s) located in a locked mechanical room, electrical room or IT room local to the area being controlled, accessible only by authorized personnel.
 - .2 Location of the control panel if supplied is to be confirmed with Departmental Representative.

- .4 The system shall use digital signal processing (DSP) technology for masking sound generation and adjustment of masking signals.
- .5 The sound masking system shall be arranged into groups of zones and individual zones of loudspeakers based on common installation conditions and each zone shall not exceed two (2) loudspeakers in size.
 - .1 Divide each group into zones of one or two loudspeakers.
 - .2 Each zone shall be individually addressable and controllable for both volume and spectrum in 1/3 octave bands for fine tuning of the system.
 - .3 Each group of zones shall be individually addressable and controllable for volume for fine tuning of the system.
- .6 The speakers shall be independently controllable through a network device with the following capabilities:
 - .1 A 1/3 octave band equalizer with adjustment capabilities for a minimum of 16 1/3 octave bands for the masking signal, capable of equalizing the masking signal output to the loudspeakers within the corresponding area within plus or minus 1 dB in each 1/3 octave band.
 - .2 Equalizers shall provide a minimum adjustment range of 160 to 5,000 Hz.
 - .3 The masking volume shall be adjustable within each area in 0.5 dBA increments over a range of 35 dBA to 85 dBA at a distance of 1m.
 - .4 All output adjustments shall be implemented via control panel or software control interface.
- .7 Consider each closed office, boardroom or meeting room as separate zones.
- .8 For open office close to glazed areas align zones comprised of two speakers such that both speakers are the closest speakers to the glazing.
- .9 For acoustic privacy, locate individual zones in front of doors in the corridor/open areas for closed offices and meeting rooms.
- .10 Locate speakers within 500 mm of the location in the design drawing to ensure optimum masking and speech privacy control.

- .5 Acoustical Performance Requirements: in accordance with ASTM E1573.
 - .1 Areas to conform to masking levels as defined in sound spectrum in Table D.9 below.
 - .1 Speakers should still be installed in these areas.
 - .2 Sound Quality: No audible hum or noise, other than masking noise, from this system in masked spaces should be detected.
 - .3 Uniformity in any 1/3 octave band shall vary no more than +/- 2 dB from the NRC Canada optimum spectrum in table D.9 when adjusted by the vendor.
 - .1 Variations of more than +/- 2 dB in any 1/3 octave band of measurements provided by the vendor shall be corrected by vendor at the vendor's expense.
 - .1 This may include that vendor modify system design to provide additional zones through software control, additional wiring and/or sound sources.
 - .2 Masking sound level:
 - .1 42 dBA in meeting rooms & quiet rooms (S5, S6)
 - .2 43 dBA in private offices & closed rooms (S4, S7)
 - .3 45 dBA for acoustic privacy (S3 – beside doors)
 - .4 45 dBA in open plan areas (S1 & S2) verified and adjusted accordingly in every zone.
 - .3 The target spectrum of 45 dBA in table D.9 shall be maintained for each defined volume by subtracting 3dB in each 1/3 octave band for meeting rooms, 2 dB for private offices to obtain the specified dBA levels.
 - .4 For any acoustic privacy group identified on the project drawings, tune all loudspeakers in those groups before turning on any other loudspeakers to ensure that the level and spectrum in the areas requiring acoustic privacy is determined from loudspeakers from that group rather than from any other group.
 - .1 Once the acoustic privacy group tuning is complete proceed to tuning for other groups.

- .5 After adjustment, the system shall provide spatial uniformity of ± 1 dBA for the combined mechanical and sound masking sound level within each zone.
- .6 The system shall provide a 1/3 octave band equalizer for smooth and seamless adjustability of the sound spectrum within the preferred spectral curve, as shown below and in Acoustical Design of Conventional Open Plan Offices, Canadian Acoustics, vol. 27, no. 3, 2003 for each zone.

1/3 Octave Frequency	NRC Canada Optimum Spectrum
Nominal dBA	45.0
160	41.5
200	41.5
250	41.0
315	40.5
400	39.5
500	38.5
630	37.5
800	37.0
1,000	35.5
1,250	33.5
1,600	31.0
2,000	28.5
2,500	26.5
3,150	23.5
4,000	21.5
5,000	19.5

Table D.9 – NRC Canada Optimum Sound Masking Spectrum

- .1 The measured spectrum should be verified and adjusted to match spectrum in Table D.9 for every zone.
- .6 Optional Features: masking system may include option to allow music and paging through the system's speakers.
 - .1 Additional cost for this feature to be identified separately.
- .7 Timer Performance
 - .1 The system shall provide a timer function allowing masking volume levels to be automatically adjusted according to a programmed schedule.
 - .2 The system shall provide a calendar-based programmable timer function. Timer schedules shall be assigned to an individual or group of primary network devices.

- .3 The system shall provide automatic daylight saving time adjustments.
- .4 The system shall provide an acclimatization (level ramp-up) process that automatically increases the masking volume over a period of time according to a programmed schedule. The system should allow for independent acclimatization schedules for each timer zone.
- .5 The system shall allow for up to eight independent timer zones.
- .6 The system shall allow independent timer schedules for each day of the week.
- .7 The system shall allow variable rates of volume adjustment.
- .8 Diagnostic Performance: the system shall be capable of identifying electronic components that are not functioning via a diagnostics function and reporting the result of the diagnostics.
- .9 Reporting Performance
 - .1 The software shall be capable of reading and displaying the current settings for all masking and timer zones.
 - .2 The system shall be capable of generating detailed reports of all system settings down to the level of each masking and timer zone.
- .10 Security Performance
 - .1 The below-ceiling electronic components shall be contained in a locked metal enclosure or cabinet.
 - .2 Access to the control functions shall be password protected.
 - .3 The system shall allow for all settings to be backed up on an electronic storage medium.

PART 3 EXECUTION**3.1 EXAMINATION**

- .1 Verification of Conditions: ensure that facility build out is at a stage suitable for the system installation in accordance with manufacturer's instructions.
 - .1 Visually inspect work area in presence of Departmental Representative/DCC Representative.
 - .2 Inform Departmental Representative/DCC Representative of unacceptable conditions immediately upon discovery.
 - .3 Proceed with installation only after unacceptable conditions have been remedied after receipt of written from Departmental Representative/DCC Representative.

3.2 PREPARATION

- .1 Ensure that facility is constructed according to plans including wall and door locations, ceiling types and plenum barriers.
- .2 Ensure that the plenum height is appropriate as per manufacturer's recommendations and as per plan.
- .3 Ensure power requirements have been provided as per plan.
- .4 Ensure sufficient space for centrally located components is available as per plan and manufacturer's specifications.
- .5 Ensure any third-party components required to be interfaced with the system have been provided.

3.3 INSTALLATION

- .1 Follow all applicable codes for the area
- .2 Follow manufacturer's recommendations regarding installation as found in the manufacturer's installation manual.
- .3 Support all cabling and masking system components on their own dedicated suspension and mounting systems independent of the ceiling grid, and ensure the support system meets seismic requirements for the building.
- .4 Follow the system design for location of loudspeakers and control panels.
- .5 Record any necessary changes to the system design on the plan.
- .6 Ensure that supplementary materials used meet applicable safety standards.

3.4 STARTUP AND COMMISSIONING

- .1 Perform system startup in accordance with manufacturer's instructions.

- .2 Commissioning Agency to be Sound Masking Vendor or qualified Acoustical Representative hired by the vendor.
- .3 Commissioning conditions:
 - .1 Proceed when ceilings fully installed and furnishings in place.
 - .2 Ensure mechanical systems are operating at normal daytime levels.
 - .3 Ensure no occupant noise during measurements.
- .4 Timing: commissioning to begin after final tuning of system.
- .5 Conduct 1/3 octave sound measurement samples from 160 Hz to 5,000 Hz shall be taken throughout the facility in each 100 m2.
 - .1 Provide separate readings for every speaker at 1.2 m from floor using a moving microphone technique with a minimum 15 second Leq, keeping at least 1m away from any reflecting surface.
 - .1 When it is not possible to be at least 1 m from any reflecting surface, measure as far away as possible from any sound reflecting surface.
 - .2 Sound level meter: to ANSI S1.13
 - .1 Sound field inside a room is a diffuse field; therefore preference shall be given to a random incidence microphone. Microphone manufacturer's correction may be applied if using a free-field microphone.
 - .2 The sound level meter must be a ANSI calibrated Type 1 with a microphone frequency response uniformity of plus or minus 1 dB from 160 to 5000 Hz.
 - .3 Must be mounted or held in such a way that there are no sound reflections from the operator or any part of the measuring instrument affecting its response.
 - .4 The sound level meter is to be held away from the body of the operator and vertical and horizontal surfaces.
 - .5 Mount microphone on tripod or stand and connect via extension cable to sound level meter.
 - .3 Calibrate the sound level meter every two hours using a calibrated sound level calibrator.

- .1 Microphone calibrator must have been calibrated within 2 calendar years and be within 0.5 dB of its stated calibration on its calibration certificate.
- .6 With masking off and mechanical system on, conduct third-octave sound level measurements in all commission locations to document existing conditions.
 - .1 Identify third-octave sound band in existing conditions, including excessive mechanical noise, which exceeds the target volume and spectrum levels, and shall be noted and included in the submission to the Departmental Representative/DCC Representative.
 - .2 This does not preclude the responsibility of the vendor to ensure that the target levels are met outside of the immediate area affected by the mechanical noise.
- .7 Verify specified sound volume and spectrum with mechanical system on to conform to sound masking curve.
 - .1 Volume or 1/3 octave spectrum levels which cannot be fine-tuned by the vendor to meet the specified requirements, will be the basis for additional speakers to be provided at the vendor's expense.
- .8 Calibration reports of the vendor's measuring equipment must be made available upon request.
- .9 Report: provide a printed report identifying all system settings and measurement results to Departmental Representative/DCC Representative.
 - .1 The report must include in a spreadsheet format file the measured results with speaker ID, the dBA and 1/3 octave band measured levels for each speaker, the target dBA level for the area, and individual and maximum deviations from the target dBA and spectrum levels for each 1/3 octave band.
 - .1 All deviations must be clearly identified for both dBA and individual 1/3 octave bands.
 - .2 Vendor to provide as-built drawings showing the schematic of the system and the final loudspeaker and equipment locations after commissioning including any changes that were required during commissioning.
- .10 Commissioning During Warranty
 - .1 Prior to occupancy and with all furnishings in place, and the HVAC system operating normally, a third party acoustical

representative may be retained at the client's expense to measure the performance of the masking system and submit a report. Vendor will be liable at their own expense to correct any non-compliant performance identified by third party acoustical representative.

- .2 Acoustical representative to provide a printed report detailing system settings and measurement results.
- .3 Testing must occur within 6 weeks after vendor commissioning. Vendor to supply report provided in section 3.4.9 to acoustical representative before testing.

3.5 FIELD QUALITY CONTROL

- .1 Ensure that plenum heights meet the minimum recommended by the manufacturer for the loudspeakers
- .2 Ensure that distance between the top of the loudspeaker and the slab or deck meets manufacturer's minimum specifications
- .3 Ensure that loudspeakers are suspended in a level manner
- .4 Ensure that loudspeakers are not obstructed as much as possible
- .5 Ensure cables are properly supported in the ceiling
- .6 Ensure cables are securely terminated

3.6 NETWORK CONFIGURATION AND ADJUSTMENT

- .1 Follow manufacturer's recommendations for system settings as found in the system's user manual.
- .2 Follow masking tuning requirements as per Section 2.5.6.

3.7 CLEANING

- .1 In accordance with Section 01 74 00 – Cleaning
 - .1 Ensure that empty packaging is removed.
 - .2 Ensure that any material waste is removed.
 - .3 Ensure the product is clean and presentable.
 - .4 Progress cleaning: leave work area clean at the end of each day.
 - .5 Final cleaning: upon completion remove surplus materials, rubbish, tools and equipment.

3.8 DEMONSTRATION AND TRAINING

- .1 Demonstrate operational system to customer by walking the space.
- .2 Demonstrate functionality of the system to the customer or customer's representative.
- .3 Train customer employee to maintain system as required.

3.9 PROTECTION

- .1 Protect installed projects and components from damage during construction.
- .2 Repair damage to adjacent materials caused by work when required.

END OF SECTION