

**PART 1 - GENERAL****1.1 REFERENCE STANDARDS**

- .1 Telecommunications Industries Association (TIA)/Electronic Industries Alliance (EIA)
  - .1 TIA/EIA-606-C-17, Administration Standard for the Commercial Telecommunications Infrastructure.
  - .2 TIA 607-15 (R2017), Generic Telecommunications Bonding and Grounding (Earthing) for Customer Premises.

**1.2 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.

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

- .1 Predrilled copper busbar, approved by NRTL, electrotin plated with holes 8 mm diameter for use with standard-sized lugs to: TIA 607.
- .2 Dimensions 6 mm thick, 50 mm wide, 600 mm long to: TIA 607.

**2.2 BONDING CONDUCTOR FOR TELECOMMUNICATIONS**

- .1 3/0 AWG copper conductor, green insulated marked to: TIA 607.

**2.3 TELECOMMUNICATIONS BONDING BACKBONE (TBB)**

- .1 3/0 AWG copper conductor, green insulated marked to: TIA 607.

**2.4 GROUNDING EQUALIZER (GE)**

- .1 3/0 AWG copper conductor, green insulated marked to: TIA 607.

**2.5 WARNING LABELS**

- .1 Non-metallic warning labels in English and French to: TIA 607.

- .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 6 AWG copper bonding conductor from TGB to enclosure 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 or approved 2 hole compression lugs lugs for connection to TMGB.

#### **3.4 TELECOMMUNICATIONS BONDING BACKBONE (TBB)**

- .1 Install TBBs from TMGB to each TGB as indicated.
- .2 Use exothermic welding or approved 2 hole compression lugs for connection to TMGB and TGBs.

#### **3.5 GROUNDING EQUALIZER (GE)**

- .1 Install GE between TBBs in multi-storey building by bonding TGBs with GE on top floor and every third floor in between top and bottom floors.

#### **3.6 BONDING TO TGB**

- .1 Bond metallic raceways in telecommunications room to TGB using 6 AWG green insulated copper conductor.
- .2 For cables within telecommunications room having shield or metallic member, bond shield or metallic member to TGB using 6 AWG green insulated copper conductor.
- .3 Bond equipment rack located in telecommunications room to TGB using 6 AWG green insulated copper conductor.

3.7 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 34 - Conduits, Conduit Fastenings and Conduit Fittings.

**1.2 REFERENCE STANDARDS**

- .1 SSC Standards.

**PART 2 - PRODUCTS****2.1 SYSTEM DESCRIPTION**

- .1 Empty telecommunications raceways system consists of outlet boxes, conduits, cable trays, pull boxes, sleeves and caps, fish wires, service fittings.
- .2 Cable tray distribution system.

**2.2 MATERIAL**

- .1 Conduits: EMT type, in accordance with Section 26 05 34 - Conduits, Conduit Fastenings and Conduit Fittings.

**2.3 CONSOLIDATION BOX**

- .1 Plenum rated zone cabling box with plenum rated foam kit included. The foam kits shall be utilized to fill unused cable space of two rectangular openings. The two rectangular openings shall be in the form of two metallic extensions on either side of the enclosure for the sole purpose of cable drops to the work areas.
- .2 The consolidation box shall be UL and CSA approved for its application.
- .3 The plenum rated box shall be of aluminum construction and manufactured by an established production facility that has existing models market ready in compliance with these specifications.
- .4 The volume of the box for cable entry, termination, egress as well as wire management shall have the minimum dimensions: 610 mm long, 610 mm wide and 250 mm deep.
- .5 The box shall have mounting hardware at four corners of the box for direct connection of box to underside of concrete slab above a T-bar ceiling in a plenum space.
- .6 Mounting hardware shall be compatible with aluminum chassis of consolidation box such that there shall be no possibility of galvanic reaction between dissimilar metals.
- .7 The access cover to the plenum rated box shall be hinged on both sides of the door opening with heavy duty mechanisms.

- .8 The access cover shall have two heavy duty keyed locks and corresponding latching mechanisms. The lock and latch shall be heavy duty and secured with positive latching in a consistent manner such that the keyed and turning operation is consistent amongst all boxes that will be specified under this contract. The boxes associated with each floor shall be keyed distinct from boxes on other floors. There shall be a keyed locking mechanism on each side of the door opening. The locks and keys themselves shall be substantive in nature to ensure that the keys are large enough to permit easy handling of the key.
- .9 The box shall be supplied with a 482 mm mounting rack and must be capable of accepting 5 rack units.
- .10 Rack units and category 6 modules shall be specified and supplied as part of SSC/GMCS cabling contract.
- .11 The rack assemblies shall be mounted on the hinged door such that upon opening of the door the rack assemblies are brought down out of the box interior for easy access.

#### 2.4 LADDER TRAYS

- .1 Ladder trays are required to assist in routing cables within the Telecom Room as shown on drawings. Rack rungs shall be on 150mm space. Racks shall have low profile sides. All hardware must be OEM. Wall height of cable tray shall be 150 mm.
- .2 Ladder racks shall be installed a minimum of 2.6 m above finished floor.
- .3 Ladder trays are to be securely attached to the ceiling slab. No other equipment is to be supported from ladder trays.
- .4 Ladder tray shall be mounted with all sections on the same horizontal plane. All intersections of trays shall have curved mating at all intersections such that cables can be routed unobstructed from one section of the tray to another and with no sharp bends or surfaces.
- .5 Ladder rungs at 150 mm spacing shall be such that the all edges of each rung are curved and smooth such that vertical cable drops between rungs are not subjected to sharp bends or edges.
- .6 Ladder rungs shall be a minimum of 50 mm wide per rung.
- .7 Ladder tray widths shall be 300 mm and 600 mm as per drawings.
- .8 Horizontal Tee sections shall be supplied as per layout and width requirements.
- .9 Horizontal elbows with appropriate 90 degree bends shall be supplied as required.
- .10 Horizontal crosses shall be supplied as per layout requirements.
- .11 90 degree vertical outside elbows shall be supplied to be mounted over each vertical wire manager of the 483 mm rack assemblies. The 90 degree vertical elbows shall be 300 mm in width and mounted in the 600 mm ladder tray that runs directly above the 483 mm racks such that the 600 mm ladder tray run above the rack is continuous. There shall be three 90 degree vertical elbows for each of the two 483 mm racks. Each vertical elbow shall be aligned with the respective vertical wire managers at each end and centre of the two 483 mm racks.
- .12 Where there are any areas of the ladder tray with sharp edges they shall be grommeted with materials specifically designed for ladder trays. Where applicable all grommeted materials shall be supplied by the ladder tray manufacturer of a supplier recommended by the ladder tray manufacturer.

- .13 Waterfalls shall be provided for all vertical cable drop locations from the cable tray for all cables dropping to racks and BIX mount fields to ensure smooth radii bend of all cables such that pinching of cables is avoided. A minimum of 14 waterfalls shall be supplied and installed.

### **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 underfloor overhead 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.
- .2 Install consolidation boxes as shown on contract drawings and details.
- .3 Install boxes directly to the underside or the concrete slab but in no case above 150 mm above the T-Bar ceiling.
- .4 Coordinate location of the consolidation boxes with the T-Bar location to ensure that the door can be fully open without interference from the T-Bar.
- .5 Typically one 63 mm EMT conduits terminate into each and every consolidation box (reference drawing details for conduit entry locations). This conduit originates from the Telecom room.
- .6 All boxes shall be reviewed by the Departmental Representative for compliance with the specifications and for quality assurance.
- .7 Remove peripheral excessive sheet metal around consolidation box housing prior to mounting in ceiling. The contractor shall ensure that there are no sharp or abrasive edges as a result of the removal of the excessive sheet metal.

#### **3.3 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 26 05 29 – Hangers and Supports for Electrical Systems and Seismic Restraint Systems (SRS).

**1.2 REFERENCE STANDARDS**

- .1 Acoustical Society of America (ASA)
  - .1 ASA S1.13-2005 (R2010), American National Standard Methods for the Measurement of Sound Pressure Levels in Air.
- .2 American Society for Testing and Materials (ASTM)
  - .1 ASTM E1573-18, Standard Test Method for Evaluating Masking Sound in Open Office Using A Weighted and One-Third Octave Band Sound Pressure Levels.
- .3 Canadian Standards Association (CSA International).
  - .1 CSA CMP 75C FT6 Plenum rated cabling.
- .4 International Electrotechnical Commission (IEC)
  - .1 IEC 60065:2014 – Standard for Audio, Video and Similar Electronic
- .5 National Research Council Canada (NRC)
  - .1 The Acoustical design of conventional open plan Offices, Canadian Acoustics, v.31, no. 2, June 2003, pp. 23-31.
- .6 Underwriters Laboratories (UL)
  - .1 UL 1310-18, Standard for Class 2 Power Units.

**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 and provide schematics of system design on floor plan showing quantity, type and location of components, cabling and accessories, clearly identifying groups, and zones.
- .4 Test and Evaluation Reports:
  - .1 System Reports: submit electronic form 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 certifications.
- .2 Qualifications:
  - .1 Manufacturer qualifications: minimum of 5 years manufacturing sound masking systems.
  - .2 System design: to be confirmed by authorized manufacturer's representative.
  - .3 Installer qualifications: company specializing in performing Work of this Section with minimum 10 years documented experience approved by manufacturer.
- .3 System adjustment: performed by authorized manufacturer's representative or approved contractor.
- .4 Commissioning: configured and commissioned by authorized manufacturer's representative or approved contractor certified commissioning agent or qualified acoustical consultant.
- .5 Source sound masking from single supplier.

#### 1.5            CLOSEOUT SUBMITTALS

- .1 Submit in accordance with Section 01 78 00 – Closeout Submittals
- .2 Warranty:
  - .1 Provide warranty documentation covering system components for defects in parts or assembly for 5-year period from date of system start-up.
  - .2 Provide written 1-year installation warranty.
- .3 Record Documentation: provide as built schematics of system design floor plan showing:
  - .1 Quantity, type and location 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 with 01 61 00 - Common Product Requirements and manufacturer's written 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 indoor in dry location and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.
  - .2 Store and protect demountable partition and components from breakage, nicks, scratches, and blemishes.
  - .3 Replace defective or damaged materials with new.
- .4 Packaging Waste Management: remove for reuse and return by manufacturer of pallets, crates, padding, and packaging materials as specified in Construction Waste Management Plan in accordance with Section 01 74 19 –Waste Management and Disposal.

**PART 2 – PRODUCTS****2.1 MANUFACTURERS**

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

**2.2 SYSTEM COMPONENTS**

- .1 Sound masking system to be networked system with complete digital control down to individually addressable networked masking devices.
- .2 System to be comprised of 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 REQUIREMENTS:**

- .1 Provide system components conforming to and labelled for:
  - .1 Safety and Electrical: to IEC 60065.
  - .2 Electromagnetic Interference (EMI): to ICES-003.
  - .3 Plenum Rated Cabling: to CSA CMP 75C FT6, UL CL3P/CMP 75C.
  - .4 Heavy Metals: to UL 1310.

**2.4 PERFORMANCE / DESIGN CRITERIA**

- .1 System Architecture:
  - .1 Provide networked-architecture with addressable masking devices distributed throughout installation area.
  - .2 Locate speakers above finished ceiling in plenum.
- .2 System Design: in accordance with manufacturer's specification
- .3 Masking Sound Generation:
  - .1 Provide independent sound masking generator for each masking control zone.
    - .1 Each zone to be independently addressable electronic module capable of generation and control (level and spectrum) of sound masking signal and one or more loudspeakers.
    - .2 Provide random masking sound generator with no noticeable repetitive pattern.
    - .3 Pseudo-random generation with cycle to exceed 24 hours.
    - .4 Ensure one minute time-averaged sound pressure level of third-octave-band of masking sound from 160 to 5,000 Hz remains constant in space to within standard deviation of 1 Db when measured over 30-minute period.
  - .2 Masking system to include automated spectrum and level calibration process.
  - .3 System to provide function to allow gradual ramp up of masking volume each time power is applied.
    - .1 Functionality to have programmable ramp up rate, as well as enabled/disabled feature, controlled from central control device.

- .4 System Control & Grouping:
  - .1 Include software control interface capable of making and displaying sound masking and sound masking timer settings.
  - .2 Ensure settings are digital and adjustable by software control interface and control panel.
  - .3 Software control interface to be capable of monitoring and reporting on system settings affecting masking performance.
    - .1 Limit masking level controls to software control interface and/or control panel(s) located in locked mechanical room, electrical room or IT room local to area being controlled, accessible only by authorized personnel.
    - .2 When control panel supplied have client confirm location.
  - .4 Ensure digital signal processing (DSP) technology is used for masking sound generation and adjustment of masking signals.
  - .5 Arrange sound masking system into groups of zones and individual zones of loudspeakers based on common installation conditions and each zone not exceed two (2) loudspeakers.
    - .1 Divide each group into zones of one or two loudspeakers.
    - .2 Ensure each zone is individually addressable and controllable for both volume and spectrum in third- octave-bands for fine tuning of system.
    - .3 Ensure each group of zones is individually addressable and controllable for volume for fine tuning of system.
  - .6 Ensure each zone is independently controllable through network device with capabilities as follows:
    - .1 Third-octave-band equalizer with adjustment capabilities for minimum of 16 third-octave-bands for masking signal, capable of equalizing masking signal output to loudspeakers within corresponding zone within plus or minus 1 dB in each third-octave band.
    - .2 Equalizers to provide minimum adjustment range of 160 to 5,000 Hz.
    - .3 Masking volume to be adjustable within each zone in 0.5 dBA increments over range of 35 dBA to 85 dBA at distance of 1m.
    - .4 Output adjustments to be implemented via control panel or software control interface.
  - .7 Consider each closed office, boardroom or meeting room as separate zones.
  - .8 Open office, close to glazed areas: align zones comprised of two speakers such that both speakers are closest speakers to glazing.
  - .9 Acoustic privacy: locate individual zones in front of doors in corridor/open areas for closed offices and meeting rooms.
  - .10 Locate speakers within 500 mm of location in design drawing to insure optimum masking and speech privacy control.
- .5 Acoustical Performance Requirements: in accordance with ASTM E1573.
  - .1 Areas to conform to masking sound levels as defined in sound spectrum in Table D.9 below.
  - .2 Speakers should still be installed in these areas.
  - .3 Sound quality: no audible hum or noise, other than masking noise, from this system in masked spaces should be detected
  - .4 Uniformity in third-octave-band to vary no more than +/- 2 dB from National Research Council Canada (NRC) Canada optimum spectrum in Table D.9 when adjusted by vendor
    - .1 Variations of more than +/- 2 dB in third-octave band of measurements provided by vendor to be corrected by vendor at 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,
      - .2 43 dBA in private offices and closed rooms,
      - .3 47 dBA for acoustic privacy beside doors) and,
      - .4 47 dBA in open plan areas verified and adjusted accordingly every zone.
    - .3 Target spectrum of 45 dBA in Table D.9 to be maintained for each defined volume by subtracting 3dB in each third-octave band for meeting rooms, 2 dB for private offices and by adding 2dB for each third-octave beside doors for acoustic privacy and in open office areas to obtain specified dBA levels.

- .5 Acoustic privacy group: tune loudspeakers in those groups before turning on other loudspeakers to ensure that level and spectrum in areas requiring acoustic privacy is determined from loudspeakers from that group rather than from other group.
  - .1 Once acoustic privacy group tuning is complete proceed to tuning for other groups.
- .6 After adjustment, system to provide spatial uniformity of  $\pm 1$  dBA for combined mechanical and sound masking sound level within each zone.
- .7 Ensure system provides third-octave-band equalizer for smooth and seamless adjustability of sound spectrum within preferred spectral curve, as shown below and in accordance with NRC's publication *The Acoustical design of conventional open plan offices*, for each zone.

Table D.9 – NRC Canada Optimum Sound Masking Spectrum

Third-octave Frequency	NRC Canada Optimum Spectrum
Nominal dBA	45
160	41.5
200	41.5
250	41
315	40.5
400	39.5
500	38.5
630	37.5
800	37
1,000	35.5
1,250	33.5
1,600	31
2,000	28.5
2,500	26.5
3,150	23.5
4,000	21.5
5,000	19.5

- .1 Measured spectrum: verify and adjust to match spectrum in Table D.9 for every zone.
  - .2 Closed rooms: optional spectrum may be provided with lower mid-range third-octave band levels for more neutral sounding spectrum closer to level decreasing by 5 dB per octave. Specific spectrum to be determined on test.
- .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 Ensure system is equipped with timer function allowing masking volume levels to be automatically adjusted according to programmed schedule.
    - .2 Ensure system is equipped with calendar-based programmable timer function.
      - .1 Ensure timer schedules are assigned to individual or group of primary network devices.
    - .3 Ensure system provides automatic daylight saving time adjustments.
    - .4 Ensure system provides acclimatization (level ramp-up) process that automatically increases masking volume over period of time according to programmed schedule.
      - .1 Ensure system allows for independent acclimatization schedules for each timer zone.
    - .5 Ensure system allows for up to eight independent timer zones.
    - .6 Ensure system allows independent timer schedules for each day of week.
    - .7 Ensure system allows variable rates of volume adjustment.

- .8 In-Room Occupant Control:
  - .1 Ensure system allows for option to include specified number of wall-mounted, in-room controls giving facility occupants manual control over loudspeaker volume in designated rooms.
    - .1 Controls in accordance with system drawings.
  - .2 Ensure installation of in-room controls are coordinated with client.
    - .1 When electrical boxes and conduit required, client will provide and install.
- .9 Diagnostic Performance: ensure system is capable of identifying electronic components that are not functioning via diagnostics function and reporting result of diagnostics.
- .10 Reporting Performance:
  - .1 Ensure software control interface is capable of reading and displaying current settings for masking and timer zones.
  - .2 Ensure system is capable of generating detailed reports of system settings down to level of each masking and timer zone.
- .11 Security Performance:
  - .1 Ensure below-ceiling electronic components are contained in locked metal enclosure or cabinet.
  - .2 Ensure access to control functions are password protected.
  - .3 Ensure system allows for settings to be backed up on electronic storage medium.

### **PART 3 - EXECUTION**

#### **3.1 EXAMINATION**

- .1 Verification of Conditions: ensure Work area is in readiness for installation of sound masking system in accordance with manufacturer's instructions.
  - .1 Visually inspect Work area 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 from Departmental Representative.

#### **3.2 PREPARATION:**

- .1 Ensure facility is constructed according to plans including wall and door locations, ceiling types and plenum barriers.
- .2 Ensure plenum height is appropriate in accordance with manufacturer's instructions and installation drawings.
- .3 Ensure power requirements have been provided.
- .4 Ensure planned space is available for centrally located components and wiring.
- .5 Ensure third-party components interfacing with system have been provided.

#### **3.3 INSTALLATION**

- .1 Install sound masking system in accordance with manufacturer's instructions and installation drawings.
- .2 Support cabling and masking system components on their own dedicated suspension and mounting systems independent of ceiling grid, and ensure support system meets seismic requirements for

building in accordance with Section 26 05 29 – Hangers and Supports for Electrical Systems and Seismic Restraint Systems (SRS).

- .3 Follow system design for location of loudspeakers, wiring and control panels.
- .4 Record necessary changes to system design on plan.
- .5 Ensure supplementary materials used meet applicable safety standards.

### 3.4      SYSTEM START-UP AND COMMISSIONING

- .1 Perform system start-up in accordance with manufacturer's instructions.
- .2 Commissioning Agency to be certified or qualified Acoustical Consultant.
- .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 third-octave sound measurement samples from 160 Hz to 5,000 Hz throughout facility in each 100 m<sup>2</sup>.
  - .1 Special attention to identify and measure building noises which exceeds preferred optimum sound masking spectrum.
  - .2 Provide report of these measurements to Departmental Representative in advance of system verification.
  - .3 Provide separate readings for every zone at 1.2 m from floor using moving microphone technique with minimum 15 second equivalent average level (Leq), keeping at least 1m away from reflecting surface.
    - .1 When not possible to be at least 1 m from reflecting surface, measure as far away as possible from sound reflecting surface.
  - .4 Sound level meter: to ASA S1.13.
    - .1 Use ANSI calibrated Type 1 with microphone frequency response uniformity of plus or minus 1 dB from 160 to 5000 Hz.
    - .2 Mounted or held such that there are no sound reflections from operator or part of measuring instrument affecting its response
    - .3 Hold sound level meter away from body of operator and vertical and horizontal surfaces.
    - .4 Mount microphone on tripod or stand and connected via extension cable to sound level meter.
  - .5 Calibrate sound level meter every two hours using 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 Conduct third-octave sound level measurement with sound masking deactivated and mechanical system on, to document existing conditions at each commissioning location.
  - .1 Identify third-octave sound-band in existing conditions that exceed target volume and spectrum levels.
  - .2 Note excessive mechanical noise, which exceeds target limits and inform findings to Departmental Representative before proceeding.

- .7 Verify specified sound volume and spectrum with mechanical system on to conform to sound masking curve
  - .1 If sound masking curve and overall volume requirements are not met at commissioning location, modify system design, installation or commissioning, at vendor's expense until conformance is achieved.
- .8 Provide calibration reports of vendor's measuring equipment when requested.
- .9 Provide report to Departmental Representative identifying system settings, measurement results and commissioning date, including:
  - .1 Floor plan showing schematic of system, final loudspeaker and equipment locations, identifying groups and zones after commissioning.
  - .2 Spreadsheet format file with measured results with zone ID, the dBA and 1/3 octave band measured levels for each zone, target dBA level for zone, and individual and maximum deviations from target dBA and spectrum levels for each 1/3 octave band.
    - .1 Deviations must be clearly identified for both dBA and individual 1/3 octave bands.

### 3.5            ADJUSTING

- .1 Adjust sound masking system settings in accordance with manufacturer's written recommendations.

### 3.6            CLEANING

- .1 In accordance with Section 01 00 10 – General Instructions, 1.15 Cleaning.
  - .1 Progress cleaning: leave work area clean at end of each day.
  - .2 Final cleaning: upon completion remove surplus materials, rubbish, tools and equipment.

### 3.7            DEMONSTRATION AND TRAINING

- .1 In accordance with Section 01 79 00 – Demonstration and Training
- .2 Arrange for manufacturer to train Departmental Representative's personnel in operation and maintenance of sound masking equipment.

### 3.8            PROTECTION

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

END OF SECTION