

PART 1 GENERAL

1.1 SYSTEM DESCRIPTION

- .1 Telecommunications raceways system consists of outlet boxes, cover plates.

PART 2 PRODUCTS

2.1 MATERIAL

- .1 Conduits: to Section 26 05 34 - Conduits, Conduit Fastenings and Conduit Fittings.
- .2 Outlet boxes: to Section 26 05 31 - Splitters, Junction, Pull Boxes and Cabinets.
- .3 Fish wire: polypropylene type.

PART 3 EXECUTION

3.1 INSTALLATION

- .1 Install raceway system, including fish wire, outlet boxes, pull boxes, cover plates, conduit, miscellaneous and positioning material to constitute complete system and in accordance with Section 26 05 34 - Conduits, Conduit Fastenings and Conduit Fittings.
- .2 Install 27mm EMT conduit from outlet box location to the accessible ceiling space of the room it serves. Conduit in wall is to turn 90° as close as practical to the underside of structure.
- .3 Install conduit stubs through full-height partitions where cabling is to be routed.
- .4 Install nylon insulated bushings for transitions from conduit to free air system.
- .5 Where the "grouping" of various systems outlets or multiple type outlets in dry-wall type construction is specified, install "box mounting brackets" between and secure to both metal studs. To install suitably sized 100mm square and/or 119mm boxes complete with raised tile rings as may be required.
- .6 Minimum conduit size will be 27mm diameter.
- .7 All Telecommunications outlet boxes must be sized 100mm square and be complete with single gang square raised tile ring.

END OF SECTION

PART 1 - GENERAL

1.1 RELATED SECTIONS

- .1 Section 26 05 00 - Electrical General Requirements
- .2 Section 26 05 21 - Wire and Cable

1.2 REFERENCES

- .1 Canadian Standards Association (CSA International)
 - .1 ANSI/ASA 51.4-2014, Sound Level Meters.
 - .2 ANSI/ASA S1.11-2014, Octave-Band and Fractional-Octave-Band Filters.
 - .3 CSA C22.-2012, Canadian Electrical Code, Part 1, Safety Standard for Electrical Installations.
- .2 American Society for Testing and Materials (ASTM):
 - .1 ASTM E1573- 2009 Standard Test Method for Evaluating Masking Sound in Open Offices, Using A-Weighted and One-Third Octave Band Sound Pressure Levels.
- .3 International Electro-technical Vocabulary (IEC):
 - .1 IEC 651-1999, Live Working.

1.3 DIGITAL CENTRALIZED MASKING SYSTEM

- .1 Provide an electronic, frequency contoured sound masking system which includes the following:
 - .1 Strategically located speaker assemblies installed above conventional suspended acoustic tile ceiling in areas indicated.
 - .2 Speaker assemblies generating unique, diffuse and unobtrusive sound with spatial and temporal uniformity, and having a spectrum shape designed to mask speech and low level unwanted noise.
 - .3 System Components to include: Digital Sound Masking System based on a Digital Signal Processor. Self-contained single-zone digital controlled processor with Digital Class D Amplifier, Third Octave 31 Band Equalizer, Power, all onboard.
 - .4 Processor to be housed on a sound masking speaker or wall mountable chassis
 - .5 Include bracket for speaker or wall mounting.
 - .6 System to have one (1) programmable channel and serve a single zone.
 - .7 System must have one 1/3 octave band equalizer allowing the development of one (1) sound masking spectrum.

1.4 PERFORMANCE REQUIREMENTS

- .1 Provide sound masking in accordance with the system description to all areas indicated on drawings and/or schedule. Sound level performance must comply with the following one-third octave sound pressure levels and tolerances:

1/3 Octave ISO Centre (Hz)	1/3 Octave ISO Sound Pressure Levels (dB)	Tolerances (± dB)
125	44	± 3
160	43	± 3
200	42	+2-3
250	41	+1-2
315	40	± 1
400	39	± 1
500	37.5	± 1
630	36	± 1
800	34.5	± 1
1,000	33	± 1
1,250	31.5	± 1
1,600	30	± 1
2,000	28	± 1
2,500	26	± 1
3,150	24	± 1
4,000	22	± 1
5,000	20	± 1
6,300	17	+1-2
8,000	14	+1-2

- .2 Spatial Average Overall Sound Pressure Levels: Minimum 43 decibels and maximum 45 decibels, A-weighted (dBA).

1.5 SUBMITTALS

- .1 Provide requested items in accordance with Section 01 33 00 – Submittals.
- .2 Submit shop drawings indicating proposed quantity and location of all system components and related wiring and accessories
- .3 Obtain Departmental Representative approval for any changes in quantity or location of sound masking units from Departmental Representative reviewed shop drawings.
- .4 After completing installation, testing, adjusting and balancing, submit the following:
- .1 Project record drawings in the form of the above noted shop drawings, revised as necessary to accurately indicate locations of all system components, as installed.
- .2 Copy of all final sound pressure levels readings taken, including accurate description of reading locations and test methods and equipment used.

1.6 QUALITY ASSURANCE

- .1 Quality Assurance: in accordance with Section 04 45 00 – Quality Control.
- .2 Qualifications: electrical Work to be carried out by qualified, licensed electricians.

1.7 DELIVERY, STORAGE AND HANDLING

- .1 Construction/Demolition Waste Management and Disposal: separate waste materials for reuse and recycling in accordance with Section 01 74 21 – Construction/Demolition Waste Management and Disposal.

1.8 SYSTEM STARTUP

- .1 Take measurements to verify that the installed sound masking system meets specified acoustical performance requirements in accordance with ASTM E1573.
- .2 Performance verification will be performed after Substantial Performance of the Work.
- .3 Make measurements to verify that the installed sound masking system meets specified acoustical performance requirements with Departmental Representative.
- .4 Verification Departmental Representative will be performed with mechanical systems shut down in area being tested.
- .5 Verification will also be performed with mechanical systems in full operation in area being tested.

1.9 OPERATING INSTRUCTIONS

- .1 Testing, tuning, and balancing will be performed after normal working hours of facility users, or as otherwise required by Departmental Representative.
- .2 Schedule testing, adjusting, and balancing will be performed after above-ceiling mechanical and electrical work, suspended acoustic tile ceiling, and sound masking system installation are complete.

PART 2 – PRODUCTS

2.1 SPEAKER

- .1 Cone: 100-200mm (3.9" – 7.9"), single, Low Q" type.
- .2 Frequency Response: 125-8000 Hz +/- 4dB on axis.
- .3 Sensitivity: 94 dB EIA minimum.
- .4 Power Handling: 5 watts EIA minimum.
- .5 Resonant Frequency: 99 Hz maximum.
- .6 Mounting: four (4) screws (studs) to grill cover.

2.2 TRANSFORMERS:

- .1 Type: 70.7volt.
- .2 Minimum Primary Power Taps: COM, 0.25, 0.5, 1, 2, 4 watts set with exterior switch.
- .3 Mounting: directly to speaker frame.

2.3 SPEAKER ENCLOSURES:

- .1 Size: 300mm (11.8") square (round) 100mm (3.9") deep.
- .2 Construction: 0.6mm (1/42") minimum thickness sheet steel.
- .3 Undercoating: factory applied to eliminate resonance.
- .4 Mounting: Bracket.

2.4 GRILLE COVERS:

- .1 Construction: one (1) piece, 0.6mm (1/42") minimum thickness sheet steel.
- .2 Perforated speaker opening to suit speaker size.
- .3 Four screw clip opening to enclosure.

2.5 MICRO PROCESSOR CONTROL

- .1 The digital processor/amp shall be capable of producing pink noise and 15 watts of amplification.
- .2 The DSP is integrated in the self-contained unit.
- .3 The system shall be monitored and adjusted with a computer connected to the controller.
- .4 Processing capacity: 264 MIPS, 528 MFLOPS sustained operation
- .5 Memory storage is non-volatile RAM (Random Access Memory) for all programs and set up parameters which are stored and recoverable during power outages for up to ten (10) years.
- .6 DSP must be capable of control of volume and equalization for one zone.

2.6 POWER SUPPLY

- .1 Input voltage: 85 to 264VAC.
- .2 Output current: 0 to 1.56A continuous.
- .3 Power factor: >.90 at full load.
- .4 Overload protection: Shall incorporate current limit to protect from damage.
- .5 Power mains: Power mains: I.T.E Power Supply 24V~0.0-.5A UL Listed.

2.7 NOISE GENERATION

- .1 One (1) channel independent, uncorrelated full random non - repeating noise generation with constant energy per octave bandwidth.
- .2 Minimum spectrum accuracy: 1 dB from 40-10,000 Hz.
- .3 Repetition Rate: repeats every 271 hours.
- .4 Mounting: Integrated within Digital Signal Processing.

2.8 EQUALIZER FILTERS

- .1 Requirement on each output channel with control over 31 - 1/3 octave bands on each channel.
- .2 Integrated within Digital Signal Processing unit.
- .3 Equalization: 1/3 octave using ISO standard frequencies from 63-12,500 Hz minimum.
- .4 Output: 600 ohms balanced and adjustable.
- .5 Filters: adjustable minimum 20 dB adjustment per band.
- .6 Level Tolerance: +/- 1 dB from 200-4000 Hz.
- .7 Total Harmonic Distortion: less than 0.5% at full rated output.
- .8 Equivalent Input Noise: less than -85 dBA from 20-20,000 Hz unweighted.

- .9 Output: transformer isolated.
- .10 Front panel security cover.
- .11 Mounting: Integrated in self-contained unit

2.10 AMPLIFIERS

- .1 One (1) Channel, CLASS D solid state, EIA rated.
- .2 Audio power handling: continuous for speaker load plus minimum 3 dB margin (single or multi-channel).
- .3 Frequency response +/- 0.3 dB 20Hz – 20kHz at 100 ohms.
- .4 Total Harmonic Distortion: less than 1% at 1kHz at rated output.
- .5 Transformer Output: 25 volts
- .6 Manual gain control adjustable to 34 dB.
- .7 Output Regulation within 2dB, from no load to full load.
- .8 Power Supply: self-contained and CSA approved.
- .9 Mounting: Integrated in self-contained unit to be mounted on a speaker or wall.
- .10 Input impedance: 50Kohms.
- .11 Output impedance: 0.08ohms.
- .12 Carrier Frequency: 400kHz.
- .13 Constant voltage at 50W.
- .14 +/- 15VDC and 100kHz square sine wave.
- .15 Peak current: 1.2 Amps.

2.11 MATERIALS

- .1 All plastics shall meet UL94VO flammability rating
- .2 Cold roll steel -18 AWG -.047" nominal
- .3 Black powder coat paint
- .4 Corrosion resistant
- .5 White silk screen on rear
- .6 Front LCD Lights
- .7 Wireless Antennae

2.12 STANDARD OF ACCEPTANCE

- .1 NanoMaskIt Digital Centralized remote, Single Zone Sound Masking Systems by Vibra-Sonic Controls and Materials Handling Inc.

PART 3 – EXECUTION

3.1 INSTALLATION

- .1 Install system components above suspended ceiling in accordance with manufacturer's instructions and in a manner that will permit specified acoustical performance requirements will be met.
- .2 Suspend sound masking units with mounting brackets/chain securely anchored to underside of structure. Confirm there is no strain on any electrical wiring. Avoid mounting that could result in generation of vibration noise or distortion.
- .3 Mount closed enclosure to radiate sound upward (unless otherwise specified).
- .4 Install centralized Digital Signal Processor to speaker in ceiling plenum
- .5 Ground audio system to building power supply ground.

3.2 NAMEPLATES AND LABELS

- .1 Confirm manufacturer's nameplates, CSA labels and identifications nameplates are visible and legible after equipment is installed

3.3 INSTALLATION, CABLE

- .1 Avoid damage to cables. Provide adequate cable strain relief.
- .2 Run cables parallel and perpendicular to building lines. Attach wiring to top of structural elements in a non-obstructive fashion. Secure every 2 meters and at changes in direction.
- .3 Connect each speaker wire pair to one terminal pair on screw terminal blocks at centralized cabinet equipment.

3.4 LOCATION OF OUTLETS

- .1 Indicated within Installation Information.

3.5 MOUNTING HEIGHTS

- .1 Indicated within Installation Information.

3.6 TESTING, ADJUSTING, AND BALANCING

- .1 Calibrate the microphone and related test equipment prior to testing.
- .2 Test, adjust, and balance system with mechanical system and other noise generating equipment shut down in areas receiving sound masking.
- .3 Test, adjust, and balance system until sound spectrum and levels meet specified performance requirements. Adjust settings of installed units, relocate installed units, or add additional units, if and as required.
- .4 Upon completion of tests, perform walk-through verification of areas that will be covered by sound masking. Adjust and re-test areas having abnormal characteristics or levels.

3.7 TESTS AND TEST METHODS:

- .1 Test to determine each zone's octave band sound pressure levels. Take a series of readings for unit coverage area.

- .2 Test to determine spatial average overall sound pressure levels. Take minimum of one reading for each enclosed room covered by sound masking and minimum of one reading per 20 m² of floor area in all open spaces covered by sound masking.
- .3 Position of Measuring Microphone: 1220 mm above floor and minimum 1000 mm away from any sound reflecting surface, in locations representative of each area that are sound masked.

3.8 MEASURE SOUND PRESSURE LEVELS USING ONE OF FOLLOWING METHODS:

- .1 An Equivalent Continuous Sound Level (LEQ) mode for minimum interval of 15 seconds.
- .2 IEC 651 'slow' time constant, average reading of the highest and lowest level during 15 second intervals.

3.9 TEST EQUIPMENT:

- .1 Sound Level Meter: to ANSI S1.4-1983, Type 1 or better.
- .2 Octave Band Filter: to ANSI S1.11, Class II or better.
- .3 Accuracy of Acoustic Calibrator: within ± 0.3 dB at 25°C.

END OF SECTION