

SECTION 13 21 48 - SOUND CONDITIONED ROOMS

PART 1 - GENERAL

1.01 SUMMARY

- A. Section Includes:
1. Furnish and install modular sound-isolating enclosures; Standard module including:
 - a. Perimeter neoprene floor seal
 - b. Door with vision light
 - c. Corner posts with integrated speakers enclosures and wiring
 - d. Wall panels with integrated wiring and mountings for microphones
 - e. Ceiling frame
 - f. Ceiling panels
 - g. Integrated ventilation, illumination, system control and power and signal distribution systems
 - h. Access raceways for signal distribution systems (i.e. smoke detectors, intercom, warning devices, etc.).
 2. Integrated components allowing for upgrade to the active electro-acoustics (VAE-Room® Practice) without disassembly.
- B. Related Sections:
1. Division 15 - Directly connected HVAC system: 105 cfm @ 55°F with a minimum of 15 cfm of outside air per occupant. Static pressure is .30" WG per room.
 2. Division 16 - Electrical: U. L. Classified to National Electrical Code (NEC) electrical connection supplied by manufacturer for installation by local electrician; 120 V, 60 Hz, 20 A dedicated circuit.

1.02 REFERENCES

- A. American Society for Testing and Materials:
1. UL Standard 723 "Test For Surface Burning Characteristics of Building Materials."
 2. ASTM C423 - Standard Test Method for Sound Absorption and Sound Absorption Coefficients by the Reverberation Room Method.
 3. ASTM E336 - Standard Test Method for Measurement of Airborne Sound Insulation in Buildings.
 4. ASTM E90 - Laboratory Measurement of Airborne Sound Transmission of Building Partitions.
 5. ASTM E413 - Classification for Determination of Sound Transmission Class.
 6. ASTM E596 - Standard Test Method for Laboratory Measurement of the Noise Reduction of Sound-Isolating Enclosures.
- B. American Concrete Institute:
1. Class C tolerance.

1.03 DEFINITIONS

- A. Noise Isolation Class (NIC): Single number rating used to describe noise reduction between two spaces through a complete structure. Because NIC is strongly affected by test environment, only NIC measured in strictly controlled independent laboratory environment may be used for comparing sound-isolating enclosures.
- B. Sound Transmission Classification (STC): A single number rating used to describe the noise reduction by a barrier. Because STC is strongly affected by the test environment, only STC measured in strictly controlled independent laboratory environment may be used for comparing sound transmission classifications.
- C. Lexicon Acoustical Reinforcement System (LARES): A patented, digital signal processing, time-variant synthetic reverberation system.

1.04 SYSTEM DESCRIPTION

- A. Design Requirements:
 - 1. Modular, sound-isolating enclosure that can simulate the acoustics of other predetermined spaces through patented, state-of-the-art digital signal processing equipment.
 - 2. Comes with nine preset acoustic simulation programs; one practice room, three recital halls, three auditoriums, one cathedral, one arena, one OFF.
 - 3. Creates a space where performers can rehearse in the acoustics of the performance areas when the actual performance area isn't available.
 - 4. A practical acoustic lab where musicians can study the relationship between their music and the spaces in which they perform.
 - 5. Highly effective as a teaching/coaching studio, "green" room or recording environment.
 - 6. Allows for 60 minutes of total digital recording time on 9 available channels.
 - 7. Provides the ability to upload music files or download practice sessions to a computer or other recording devices
 - 8. Enclosure shall be easily de-mountable and relocated without loss of effectiveness.
 - 9. Wall and ceiling panels will meet Underwriters Laboratory (UL) Class 1 classification per U.L. Standard 723 for flame spread and smoke developed.
 - 10. Modules shall seal to any floor without being physically attached, or the use of caulking.
 - 11. Interior height of standard room is 7'-5¾".
 - 12. U.L. Classified to NEC room electrical system.
- B. Performance Requirements: Current production units with 410 cubic foot interior volume, 34% perforated interior panels, 12 inch airspace between modules, concrete floor construction:
 - 1. Airborne noise reduction, laboratory installation: NIC 40 from exterior to interior of module; NIC 60 from interior of one module to interior of adjacent module.

2. Airborne noise reduction, typical field installation: NIC 41 from interior to exterior of module and NIC 65 from interior of one module to interior of adjacent module.
3. Ambient noise at center of module, lighting and ventilating systems operating: Not exceeding NC 25.
4. Reverberation time in contiguous octave bands, center frequencies from 125 to 4000 Hz: 0.45 plus or minus 0.1 second (based on a 640 cu. ft. interior volume).
5. Sound absorption coefficients of perforated wall and ceiling panels:

One-third Octave Band Center Frequency (Hz)	Absorption Coefficient (Sabins/sq. ft.)
125	0.57
250	0.98
500	1.13
1000	1.06
2000	1.06
4000	1.03
6. Lighting level: 80 foot-candles at 36 inches above floor at module center.
7. Sound-isolating door; STC = 43 with a full window.
8. Sound-isolating ventilation: acoustically isolated HVAC connection with a rating of STC = 45 (for directly connect HVAC).
9. Control Panel: Twelve push buttons for program, level controls of acoustic environment selections, record and playback selections.

C. Limitations:

1. Upgrades to VAE-Room® Practice are limited to rooms that are 125 square feet or less.
2. Upgrades to VAE-Room□ Practice are not available for rooms that have ceiling extensions.

1.05 SUBMITTALS (REFER TO SECTION 01300)

- A. Product Data: Submit applicable reference standards, current performance data, **U.L. Listing Card**, and application recommendations and product limitations.
- B. Shop Drawings: Submit assembly and installation drawings showing product components in assembly with adjacent materials and products.
- C. Contract Closeout Submittals (refer also to Section 01700):
 1. Operation and Maintenance Data.
 2. Warranty.

1.06 QUALITY ASSURANCE

- A. Installer's Qualifications: Installation, disassembly and reassembly shall be by the manufacturer or shall be under the direct supervision of the manufacturer.

1.07 DELIVERY, STORAGE AND HANDLING

- A. Pack and ship to avoid damage according to manufacturer's recommendations:
 1. Finish and assemble all components in the factory before shipment.

2. Ship components in individual, sealed, labeled cartons.
 3. Deliver components to room designated for installation.
- B. Do not accept damaged products at the site. Do not install damaged products.
- C. Store products in heated indoor storage near point of installation. Retain protective packaging until installing.

1.08 PROJECT CONDITIONS

- A. Environmental Requirements: Do not install modules until all mortar, wet and dust producing trades have completed their work and finish floor is in place.
- B. Field Measurements: Obtain required field measurements from Contractor and indicate on shop drawings.

1.09 WARRANTY

- A. Provide manufacturer's written warranty that products found to be not in accordance with the requirements of the Contract Documents within a period of three years after date of commencement of warranties shall be corrected promptly after receipt of written notice from Owner.

PART 2 - PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

- A. WENGER CORPORATION, 555 Park Drive, Owatonna, MN 55060, Contact: Don Carr, 800/326-8373 ext 620.

2.02 STANDARD MANUFACTURED COMPONENTS

- A. Control panel: 12-button control panel; nine acoustic environments, volume up and down and system mute (OFF). Lighting, room ventilation fans and master power for active acoustic system each individually controlled by an on/off toggle switch. UL listed, CSA approved transformer.
- B. Microphone: Transducer type; self-polarized condenser microphone; frequency response: 60 to 20,000 Hz; signal to noise ratio re 1 Pa (A-weighted): 67dB; maximum sound pressure level for 1.0% THD: 115dB SPL. UL listed, CSA approved.
- C. Preamplifier: Input Impedance: greater than 3k ohms; frequency response - 20 to 20kHz, +0, -1dB; THD: 0.01% (1kHz, +24dBm, 600 ohm, balanced out); maximum gain: 66dB; Minimum Gain: 26dB; maximum output: +24dBm, balanced output, 600 ohms; UL listed power supply.
- D. Equalization: 2/3 Octave ISO spacing, 25 to 16kHz, constant-Q, THD <0.01% @ 0dBu input, IMD <0.05% SMPTE; frequency response 20Hz to 20kHz (+/- 0.25 dB); equivalent input noise -100dBu (A-weighted); dynamic range 124 dB. UL listed, CSA approved.

- E. LARES Processor: frequency response; unprocessed channels 10Hz - 100kHz, +1dB, -3dB, Ref. 1kHz; processed channels 10 - 18kHz, +1dB, -3dB, Ref. 1kHz; THD + Noise: <0.25% @ 1kHz maximum level; signal to noise ratio: 90dB min., A-weighted, Ref. 1kHz level; includes LARES patented software including time variant gain before feedback software. UL listed, CSA approved.
- F. Amplification: Output power: 45 watt @ 4 ohms, 20 - 20kHz, 0.1% THD; frequency response: +/- 0.1dB from 20Hz to 20kHz at 1 watt; signal to noise ratio: 106dB (20Hz to 20kHz) at full output; Total Harmonic Distortion (THD): < 0.001% @ 45 watts from 20Hz to 400Hz and increasing linearly to 0.05% at 20kHz; Inter Modulation Distortion (IMD): < 0.05% from 10mW to 0.25W and <0.01% from 0.25W to 45W; Slew Rate: 6V per micro second; damping factor: > 400 from DC (0Hz) to 400Hz. UL listed.
- G. Speakers: frequency response; On axis (0°) +/- 2dB from 70 - 20kHz; Off Axis (30°) +/- 2dB from 70 - 15kHz; sensitivity-room/anechoic: 89dB/86dB; maximum input power: 80 watts; low frequency extension: 48Hz (DIN).
- H. Voltage Protection: rated input voltage: 105 to 135 VAC 50/60 Hz; 120 VAC nominal; rated current and load handling: 12A maximum; circuit breaker - 12A, re-settable; high voltage spike protection: up to 13,000A spikes; suppressing spikes at 140 volts AC RMS, 330V let through; high voltage suppression between hot to neutral, hot to ground, neutral to ground; AC energy absorption - 490 Joules; high frequency noise suppression - greater than 80dB @ 1Mhz; UL listed and CSA approved.
- I. Wall Frame: 16 gauge steel channel with 1-1/4 inch thick neoprene pad adjustable plus or minus 3/8 inch to provide seal at floor and to compensate for 3/4 inch maximum variation in floor surface. Frame shall not lag, bolt or screw into building floor surface.
- J. Wall Panels: 15" x 30" wide and 4" thick; exterior face 16 gauge steel; interior face 22 gauge perforated or solid steel; filled with sound absorbing material; acoustical seal by two continuous Isoloss™ gaskets at perimeter of each panel; alignment and compression seal between panels by mechanical locks. Integrated microphone mounts and wiring located behind perforated wall panels (2 per room). Forced fit, "H" member or friction fit panels not allowed.
- K. Door Panel: Righthand or lefthand, out-swinging or in-swinging prehung 36" door in frame; two inches thick; exterior face - 16 gauge steel; interior face - 14 gauge steel; filled with sound-absorbing material; 24 by 76 inches vision light glazed with 1/4" and 3/16" panes of laminated safety glass, 2 inch air space; Frame - 16 gauge tubular steel filled with sound-absorbing material; 16 gauge door insert panels; double acoustical seal - magnetic and compression seal at head and jambs, adjustable sweep seal at bottom; hardware - ramped metal threshold (1/2"), continuous hinge, handicapped approved handle, bumper, schoolhouse function lock. (Door is STC 43)
- L. Corner Assembly: Same construction as wall panels. 11-1/2" wide on each outside face. Exterior face 16 gauge steel; interior face 22 gauge perforated

steel. Filled with sound absorbing material; acoustical seal by two continuous Isoloss™ gaskets at perimeter of each panel; alignment and compression seal between panels by mechanical locks. Integrated speaker enclosures and wiring in each corner assembly.

- M. Ceiling Panels: 15" wide and 4" thick same construction as wall panels. Ceiling spans greater than 105 inches require center support beam.
- N. Sprinkler Ceiling Panels: 15" wide and 4 " thick ceiling panels using typical ceiling panel construction with predrilled holes for fire sprinkler system installation.. Holes are factory-sealed (top and bottom) for optional sprinkler system installed by others.
- O. Light Panels: U.L. classified to NEC with U. L. label on each light panel; same construction as ceiling panels; provide fluorescent luminaires with sound level "A" rated, electronic ballasts; all parts UL/CSA listed; provide thermal overload protection; 8 foot power cable.
- P. Ceiling Frame: 16 gauge steel channel to align ceiling and wall panels with clamping mechanism to compress ceiling panel acoustical gaskets.
- Q. Ceiling Vent Panel: 15" wide by 6" thick for intake air through acoustical plenum with 1-1/2 inch sound-absorbing duct liner and four 90 degree bends; 8" round duct connection; use only flex duct for connection (to maintain sound isolation) Maximum of 120 cfm per vent panel.
- R. Power Panel: U.L. classified to NEC with U. L. label on each power panel; same construction as wall panels; junction & electrical boxes with airtight cover plates.

Interior – one 4 x 4 box centered 46 inches above floor with cover plates (thermostat, data lines, etc) ; one four x four junction box with three toggle switches (one labeled "LIGHT" for light control, one labeled "AIR" to control fans were applicable and one labeled "SYSTEM" to control the optional virtual acoustics package); one box with cover plate or control panel for optional virtual acoustics.

One 4 x 4 and one 2 x 4 boxes 80 inches above floor with cover plates for connections for alarms, warning devices, smoke detectors, etc.; one four-plex receptacle located 15" above the floor. Exterior – Three UL classified electrical connectors for fans, luminaire and virtual electronics; three empty raceways interconnecting interior with exterior using duplex and 4-plex junction boxes and ½" EMT metal conduit for customer-installed circuitry; 20 foot power cable.

- T. Finishes:
 - 1. Hardware and Electrical Cover Plates: Satin chrome. All Other Components: Iron phosphate precoat and epoxy powder thermoset (baked) finish; colors: oyster wall and ceiling panels with charcoal trim; door insert panels with choice pebble, wedgewood, black and raspberry. Air dry finish not allowed.

2.04 OPTIONS REQUIRED

- A. Vertical Closure Panel: Provide visual closure between modules without transmitting sound from one module to another and module to building structure; 1/2 inch thick thermoset composite wood with flexible gasketing. Color is oyster.
- B. Horizontal Closure Panel: Provide visual closure between module and bulk head above; Constructed of 1/2 inch thick thermoset composite wood with flexible gasketing. Color is oyster. Maximum height of closure will be 24".

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Verification of Conditions: Confirm that substrate floor is flat within 1/4 inch measured from a 10 foot straight-edge (American Concrete Institute Class C tolerance).
- B. Ceiling Clearance:
 - 1. Modules with direct connect HVAC:
 - a. Standard Height Module - minimum clearance 10'7".

3.02 INSTALLATION

- A. Manufacturer shall install modules or directly supervise installation.
- B. Assemble and install modules without the use of caulking or other wet sealants, fillers, insulation, rivets, or sheet metal screws.
- C. All components are manufactured units, prewired where appropriate. Field modification, cutting, fitting and wiring are prohibited.

3.03 ADJUSTING

- A. Adjust all gaskets, seals and hardware for maximum performance.

3.04 CLEANING

- A. Clean all surfaces according to manufacturer's recommendations.
- B. Remove all packaging and construction rubbish and debris.

3.05 SCHEDULES

- A. Pre-engineered VAE Music Practice Rooms as shown in drawings:

END