SECTION 09800

Low Frequency Sound Absorber (Modex™ Module)

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Low Frequency Sound Absorber (Modex™ Module)
B. Coordination with all trades having elements that are mounted adjacent to the devices of this section. There can be no penetrations through or other operable panels or systems concealed behind/above these devices.

1.02 PRODUCTS INSTALLED BUT NOT SUPPLIED UNDER THIS SECTION

A. Wood trim (option).

1.03 RELATED SECTIONS

A. Section 06420 – Wood Paneling
B. Section 09120 – Suspension Framing/Furring for Plaster/Gypsum Board Assemblies
C. Section 09250 – Gypsum Board
D. Division 15 Sections – Mechanical Work
E. Division 16 Sections – Electrical Work
F. Division 17 Sections – Audio, Data, Telecommunication Work

1.04 DEFINITIONS

A. Low frequency sound absorption devices are independent, stand alone units that may stack vertically in a wall-wall juncture or horizontally in a ceiling-wall juncture where the units are mounted at 90deg angle.

1.05 ALTERNATES

A. Prior Approval: Proposed substitutions for products in this section may be submitted to the architect and acoustical consultant no later than ten (10) working days prior to the bid due date. Substitutions shall only be considered if submitted with complete information including low frequency, impedance tube acoustical data. Acceptance of substituted products is contingent on the architect's and acoustical consultant's approval and the substitution's compliance with all specified criteria. The architect shall approve substitution request via addendum.
B. Unapproved Substitutions. Substitutions not approved via addendum shall not be submitted to the architect or acoustical consultant.

1.06 REFERENCES

A. Local Building Code – Current Edition
B. International Organization for Standardization
   1. ISO 354 Measurement of Sound Absorption in a Reverberation Room
   2. ISO 10534 - Determination of sound absorption coefficient and impedance in impedance tubes - Part 1: Method using standing wave ratio.
   3. ISO 17497-1 Sound-scattering properties of surfaces- Part 1: Measurement of the random-incidence scattering coefficient in a reverberation room.
C. AES-4id-2001: AES Information Document for Room Acoustics & Sound Reinforcement Systems – Characterization & Measurement of Surface Scattering Uniformity.
D. American Society for Testing & Materials (ASTM)
   1. ASTM E 1050-98 - Standard Test Method for Impedance and Absorption of Acoustical Materials Using a Tube, Two Microphones, and a Digital Frequency Analysis System
   2. ASTM C 423 - Sound Absorption & Sound Absorption Coefficients by the Reverberation Room Method
   3. ASTM E 84: Standard Test Method for Surface Burning Characteristics of Building Materials
E. Published technical papers
   1. T.J. Cox, B-I.Dalenback, P. D'Antonio, J.J. Embrechts, J.Y. Jeon, E. Mommertz and M. Vorlaender, "A tutorial on scattering and diffusion coefficients for room acoustic surfaces", Acta Acustica uW Acustica, 92, 1-15 (2006)

2. AES-4id-2001, “AES Information document for room acoustics and sound reinforcement systems- Characterization and measurement of surface scattering uniformity”, J. Audio Engineering Soc., 49(3), 149-165 (2001)
3. E. Mommertz, Appl. Acoust., 60(2), 201-204 (2000)

1.07 SYSTEM DESCRIPTION

A. Design Requirements: Low frequency absorption devices shall work on the internally damped membrane absorption principle, using an array of membrane weights and cavity depths to achieve broad bandwidth low frequency absorption by converting pressure fluctuations into air motion. The frequencies of the units shall vary based on the variables of surface impedance, mass, resistance, and cavity depth and impedance tube tested for performance verification.

B. Performance Requirements:
The Extended Low Frequency Membrane Absorbor shall provide absorption between 40 Hz and 100 Hz to extend the frequency range of porous absorbers. This shall be accomplished by a series of membrane absorbers with a bandwidth specified below at the 1/3-octave resonant frequencies of 30, 40, 50, 63, 80, and 100 Hz.

The absorption coefficients defining the bandwidth for each 1/3-octave membrane with appropriate mass and compliance shall be as listed with respect to the resonant frequency, F0. The table lists the frequencies in 5 Hz steps on either side of the resonant frequency, F0, along with the absorption coefficient as measured in a 2' x 2' impedance tube. Normal incidence sound absorption coefficients shall be measured according to the impedance tube method according to ASTM E1050-98 or ISO 10534.

Frequency Hz	Absorption Coefficient
-20	0.20
-15	0.45
-10	0.60
-5	0.75
F0	0.90
5	0.75
10	0.60
15	0.45
20	0.20

1.08 SUBMITTALS

A. Product Data: Submit manufacturers’ technical data including basic system description, options and component sizes. Identify all applicable features and options. Cross out any inapplicable features or options.

B. Shop Drawings: The contractor shall produce and submit shop drawings of products and suspension or mounting systems overlaid on base drawings (interior elevations or reflected ceiling plans) supplied electronically by the architect. Show overall layout with dimensions and references to details as necessary for penetrations, joints, ends and intersections with other materials or building components. Submit schedule of all quantities. Field-verify site conditions with dimensions shown on shop drawings.

C. Samples: Minimum 22.9 cm (9”) x 22.9 cm (9”) sample of fabric.

D. Certifications: Manufacturers’ certifications that products comply with specified requirements, including laboratory reports showing compliance with specified tests and standards.

1.09 QUALITY ASSURANCE

A. Qualifications: Manufacturer and installation contractor shall have a minimum of three years experience with similar systems.

B. Single Source: All products under this section shall be supplied by a single manufacturer to ensure consistency in product size and finish.

C. Flame Spread / Smoke Developed Characteristics: Product components tested individually by independent, accredited NVLAP facility according to ASTM E 84 and NFPA 255.
   1. Composite Flame Spread Rating: 25 (maximum)
   2. Smoke Developed: 450 (maximum)

D. Pre-Installation Meeting: Installing contractor shall organize and conduct pre-installation meetings with all other trades to coordinate substrate conditions, conditioning of the space (temperature & humidity), and elements attaching to, penetrating through or concealed above/behind work in this section.

1.10 DELIVERY STORAGE AND HANDLING

A. Shipping, Handling and Unloading: Deliver wood panels to the project site in the manufacturer's original, unopened packaging. Do not unpack or handle finished products until the project environmental requirements have been met and the products are ready to be installed.
B. Storage and Protection: Store all wood panels and associated wood trim pieces in a clean, dry, fully-enclosed storage facility. Protect products from damage that may be caused by exposure to water, chemicals, direct sunlight or infestation.
C. Acceptance at Site: Ensure that all project environmental requirements have been met prior to unpacking or installing wood panels and all associated wood trim products. Full or partial installation constitutes complete product acceptance.
D. Waste Management and Disposal: Dispose of all packaging materials and debris in a safe and environmentally responsible manner according to the instructions set forth by the General Contractor, local ordinances or codes and the Environmental Protection Agency.

1.11 PROJECT CONDITIONS

A. Project Environmental Requirements: Prior to unpacking or installing wood products, ensure that the installation area is fully enclosed and protected from moisture and direct sunlight. Ensure that the building's mechanical systems are fully operational and will not be turned off again even for testing and balancing of the mechanical systems. Coordinate with other trades to ensure that all work above or behind wood surfaces is complete and that all wet and dusty trades have completed work.
B. Product Acclamation: For a minimum period of seventy-two (72) hours and prior to unpacking or installing any wood products, allow both the installation area and the wood products to stabilize in temperature and humidity levels that are representative of the final temperature and humidity levels expected after building completion and occupation. Do not install products if the humidity exceeds 65%.
C. Product Handling: Handle wood panels carefully so as to avoid chipping, scratching, scuffing or denting the wood finish or edges.

1.12 WARRANTY

A. Submit to Owner or Owner's Representative a written and dated warranty issued by the manufacturer warranting units against defects in materials or manufacturing for a period of one (1) year from the date of delivery.
B. Components used in the system but not provided by the manufacturer are excluded from the manufacturer's warranty. Damage caused by exposure to moisture or rapid or extreme changes to temperature or humidity are excluded from the manufacturer's warranty. Damage caused by improper storage, handling, acclimatization, or installation is excluded from the warranty.

1.13 OWNER'S INSTRUCTIONS

A. Installing contractor shall provide to the building owner or to the owner's representative a copy of the manufacturer's maintenance manual supplied with the panels.

1.14 MAINTENANCE

A. Extra Materials: If provided per the project requirements, extra materials shall remain in the manufacturer's original, unopened packaging and shall be given to the building owner or owner's representative upon substantial completion of work.

PART 2 PRODUCTS

2.01 MANUFACTURER

A. RPG Acoustical Systems, LLC, 99 South St, Passaic, NJ 07055 (telephone) 973-916-1166, http://www.rpgacoustic.com.

2.02 MATERIALS

A. Core (standard): Medium density fiberboard (MDF) with internal, low frequency components and fabric facing.

2.03 MANUFACTURED UNITS

A. Unit Dimensions

1. Standard 2 x 2 Units: Height 23-5/8", Width 23-5/8", Depth 7"

B. Weight
1. Standard 2 x 2 Units: 20 pounds (maximum)

C. Frequency selection: Choose 30, 40, 50, 63, 80, or 100 Hz center tuning (resonant) frequency.

2.04 ACCESSORIES

A. There are no accessories.

2.05 FINISHES

A. Shop Finishing: Units shall be face finished with fabric per architect selection. Casework shall be left unfinished or painted black as specified.

PART 3 EXECUTION

3.01 INSTALLERS

A. Installing contractor shall have a minimum of five (3) years successful experience installing wood ceiling and wall systems in similar applications using similar mounting techniques.

3.02 EXAMINATION

A. Site Verification of Conditions: Examine installation area for compliance with all manufacturers' project environmental requirements and ensure uninstalled products have been stored, handled and acclimatized properly prior to commencing installation. Inspect all substrates for completion and quality of work to ensure that surfaces are level, plumb, clean, dry and completely cured from water or solvent evaporation. Do not commence installation if the structural capacity of the substrate is questionable or inadequate.
B. Coordination with Other Trades: Coordinate with all other trades to ensure that wet work including concrete, terrazzo, plastering, painting, etc. in the installation area is complete, cured and dry prior to installation. Coordinate with all other trades to verify that components associated with mechanical, electrical, lighting, data, telecommunication, audio, video, fire suppression and other building systems are installed behind or above designated installation areas prior to commencing installation. Coordinate the exact size, location and sequencing of building system components to avoid penetration of the wood ceiling/wall panels.

3.03 PREPARATION

A. Protection: Protect all floor, wall and ceiling finishes against possible damage prior to commencing installation and during installation.
B. Surface Preparation: When necessary, field measure substrates to acquire accurate dimensions of units and submit final dimensions to manufacturer.
C. Prior to commencing installation, unpack all parts and set on clean, dry surface. Ensure that all pieces are present.
D. Field Measure: Prior to commencing installation, measure units and ensure that dimensions correspond to field measured dimensions of installation area.

3.04 INSTALLATION

A. Install units as shown and detailed in the architectural drawings and according to manufacture's guidelines and industry standards.
B. Attach units to wall or ceiling through side flanges so that finished fabric side faces into occupied space.

3.05 CONSTRUCTION

A. Interface with Other Work: Support all light fixtures, HVAC air inlet/outlet devices, speakers, signage, sprinkler heads/piping, etc. independently from wood panels. Contractor shall not use wood panels to support the weight of any other building element or component.

3.06 ADJUSTING

A. Following initial installation, adjust mounting hardware or suspension system so that removable panels can be removed easily, yet stay safely secured upon replacement. Adjust panels so that

surfaces are aligned, flush and level or plumb and gaps in between units are of a consistent width and straight.

B. Check that manufacturer's joining requirements were maintained during installation.

C. Remove and replace at no extra charge any damaged panels that cannot be repaired to the Owner's and Architect's satisfaction.

3.07 CLEANING

A. Remove dust from surfaces and penetrations by vacuuming using only a soft brush. Do not scratch or tear fabric surfaces with sharp metal or plastic vacuum cleaner extensions. Remove pencil marks with soft erasure

B. Remove and replace at no additional charge any materials that cannot be cleaned to the Owner's satisfaction.

3.08 DEMONSTRATION

A. Demonstrate to the building owner or to the owner's representative the safe and proper method for removing and replacing all types of accessible panels.

3.09 PROTECTION

A. Upon completion of work, protect installed wood surfaces from damage or soiling until project substantial completion and owner occupancy.

END OF SECTION