

## SECTION 15830 SOUND ATTENUATORS

### PART 1 - GENERAL

#### 1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 1 Specification Sections, apply to this Section.

#### 1.2 WORK INCLUDED

- A. Duct Sound attenuators.
- B. Unit Sound attenuators.
- C. Space Sound attenuators.

#### 1.3 RELATED SECTIONS

- A. Examine all drawings and criteria sheets and all other Sections of the Specifications for requirements which affect work under this Section whether or not such work is specifically mentioned in this Section.

#### 1.4 REFERENCES

- A. NFPA 90A - Installation of Air Conditioning and Ventilation Systems.
- B. UL 181 - Factory-Made Air Ducts and Connectors.
- C. NFPA 70 - Electric Duct Heaters.
- D. ASTM A 653/A653M Steel Sheet, Zinc Coated Galvanized.
- E. ASTM C 553 Mineral fiber Blanket and felt.
- F. ASTM C 612 Mineral fiber Block and Board Thermal insulation.
- G. ASTM E 84 Surface Burning Characteristics of Building materials.
- H. NFPA 255 Surface Burning Characteristics of Building materials.
- I. UL 723 Surface Burning Characteristics of Building materials.

- J. ASTM E-477-99

## 1.5 SUBMITTALS

- A. See Section 15050 and General Conditions for additional requirements.
- B. Submit shop drawings and product data sheets indicating configuration, general assembly, and materials used in fabrication.
- C. Submit product performance data indicating design air flow, minimum static pressure drop at operating condition.
- D. Submit sound power and noise criteria (NC) values for radiated and discharge paths.
- E. Submit installation, operation and maintenance documentation.
- F. The manufacturer shall supply certified test data for each scheduled silencer. The data shall include dynamic insertion loss, generated noise and pressure drop for forward or reverse flow, matching the project's air distribution system requirement. All ratings shall be conducted in the same facility and shall utilize the same silencer.
- G. Test facilities and test reports shall be open to inspection upon request from the Engineer. Silencer performance must have been substantiated by laboratory testing according to ASTM E-477-99 and so certified when submitted for approval.
- H. Acoustic laboratory must be NVLAP accredited for the ASTM E-477-99 test standard. A copy of the accreditation certificate shall be included with the submittals. **Data from non-NVLAP accredited test facilities will not be accepted.**

## 1.6 QUALIFICATIONS

- A. Manufacturer: The company manufacturing the products specified in this section shall have a minimum of ten years experience producing products of this type.

## 1.7 WARRANTY

- A. Provide manufacturer's parts warranty for one year from unit start-up.

PART 2 - PRODUCTS

2.1 GENERAL

- A. Acceptable manufacturers contingent on compliance with the specifications:
  - 1. Vibro Acoustics
  - 2. VAW Systems
  - 3. Dynasonics
  - 4. United McGill
  - 5. Kinetics Noise Control
  - 6. Commercial Acoustics
  - 7. SEMCO
- B. Silencers in aluminum systems shall be aluminum with all casing gauges adjusted accordingly.
- C. Silencers in stainless steel systems shall be stainless steel.
- D. Silencer in galvanized systems shall be galvanized steel.
- E. Silencer in welded systems shall be continuously welded. See sheet metal section.
- F. All gauges are based on steel. If aluminum is required equivalent strength aluminum gauges shall be used.

2.2 CIRCULAR SILENCERS

- A. All circular silencers shall be constructed with a casing of a minimum gauge noted below and minimum 22 gauge galvanized perforated internal liner. All casing seams and joints shall be lockformed and sealed or stitch welded and sealed except welded system shall be continuously welded.

	<u>Casing Diameter</u>	<u>Casing Gauge</u>
1.	Less than 30"	20
2.	30" to 54"	18
3.	Over 54"	16

- B. All packless circular silencers shall be constructed with a casing of a minimum gauge noted below and minimum 26 gauge perforated internal liner. All casing seams and joints shall be lockformed and sealed except welded systems shall be continuously welded.

	<u>Connection Diameter</u>	<u>Casing Gauge</u>
1.	Less than 18"	22

2.	18" to 30"	20
3.	30" to 54"	18
4.	Over 54"	16

C. All welded silencers shall be a minimum of 16 gauge.

### 2.3 RECTANGULAR SILENCERS

A. All rectangular silencers shall be constructed with a casing of a minimum gauge noted below and minimum 22 gauge perforated internal liner. All casing seams and joints shall be lockformed and sealed except welded systems shall be continuously welded.

	<u>Connection Dimension</u>	<u>Casing Gauge</u>
1.	Less than 48"	22
2.	Over 54"	Provide Calculations

B. All welded silencers shall be a minimum of 16 gauge.

### 2.4 ELBOW SILENCERS

A. All elbow silencers shall be constructed with a minimum 18 gauge outer casing and minimum 22 gauge perforated internal liner. All acoustical splitters shall be internally radiused and aerodynamically designed for efficient turning of the air. Half and full splitters are required as necessary to achieve the scheduled insertion loss. All elbow silencers with a turning cross-section dimension greater than 48" shall have at least two half splitters and one full splitter.

B. All welded silencers shall be a minimum of 16 gauge.

### 2.5 TRANSITIONAL SILENCERS

A. All transitional rectangular silencers shall be constructed with a minimum of 22 gauge outer casing and minimum 22 gauge perforated internal liner. Transitioning shall occur internal to the silencer such that the height of the gap or air passage is uniformly changing with the length of the splitters.

B. All welded silencers shall be a minimum of 16 gauge.

2.6 ACOUSTIC MEDIA:

A. Dissipative and Film Lined silencers:

1. Media shall be of acoustic quality, shot-free glass fiber insulation with long, resilient fibers bonded with a thermosetting resin. Glass fiber density and compression shall be as required to insure conformance with laboratory test data. Glass fiber shall be packed with a minimum of 15% compression during silencer assembly. Media shall be bacteria and fungus resistant, resilient such that it will not crumble or break, and conforming to irregular surfaces. Media shall not cause or accelerate corrosion of aluminum or steel. Mineral wool will not be permitted as a substitute for glass fiber.

B. Packless (No-Media silencers):

1. All No-Media silencers shall not contain absorptive media of any kind. Attenuation shall be achieved with controlled impedance membranes and broadly tuned resonators.

2.7 MEDIA PROTECTION

A. Dissipative silencers:

1. Where indicated on the silencer schedule, media shall be encapsulated in glass fiber cloth to help prevent shedding, erosion and impregnation of the glass fiber. Axial Cone silencers shall have a glass fiber cloth liner.

B. Film Lined silencers:

1. The acoustic media shall be completely wrapped with Tedlar film to help prevent shedding, erosion and impregnation of the glass fiber.
2. The wrapped acoustic media shall be separated from the perforated metal by a factory installed 1/2" thick acoustically transparent spacer.
  - a. The spacer shall be flame retardant and erosion resistant.
  - b. A mesh, screen or corrugated perforated liner will not be acceptable as a substitute for the specified spacer.

2.8 COMBUSTION RATINGS

A. Dissipative silencers:

1. Silencer materials, including glass fiber shall have maximum combustion ratings as noted below when tested in accordance with ASTM E84, NFPA 255 or UL 723.
  - a. Flamespread Classification: 15
  - b. Smoke Development Rating: 5

2.9 FILM LINED SILENCERS

- A. Silencer materials, including glass fiber, Tedlar film and acoustical spacer shall have maximum combustion ratings as noted below when tested in accordance with ASTM E84, NFPA 255 or UL 723.
  - 1. Flamespread Classification: 20
  - 2. Smoke Development Rating: 45

2.10 HTL CASINGS(HIGH TRANSMISSION LOSS)

- A. Where indicated on the silencer schedule, silencers shall have high transmission loss (HTL) walls externally applied and completely sealed to the silencer casing by the silencer manufacturer to assure quality controlled transmission loss. The HTL walls shall consist of media, airspace, mass and outer protective metal skin, as required, to obtain the specified room noise criteria. Standard acoustical panels will not be accepted as HTL walls. If requested by the Engineer, breakout noise calculations for each air handling and fan system shall be provided with the silencer submittal to insure compliance with the room noise criteria. Breakout noise calculations shall be based on the sound power levels of the specified equipment.

PART 3 - EXECUTION

3.1 CONSTRUCTION

- A. Silencers shall be constructed in accordance with ASHRAE and SMACNA standards for the pressure and velocity classification specified for the air distribution system in which it is installed. Material gauges noted in “Part 2 - Products”, are minimums.
  - 1. Material gauges shall be increased as required for the system pressure and velocity classification.
  - 2. The silencers shall not fail structurally when subjected to a differential air pressure of 12 inches water gauge.
- B. Casings shall be lockformed and sealed, except as noted in Section B Materials, to provide leakage-resistant construction. Airtight construction shall be achieved by use of a duct-sealing compound supplied and installed by the contractor at the jobsite.
- C. All perforated metal shall be adequately stiffened to insure flatness and form. All spot welds shall be painted.

## PART 4 - SCHEDULES

4.1 SEE DRAWINGS FOR SCHEDULES.

### 4.2 ACOUSTIC PERFORMANCE

- A. Silencer dynamic insertion loss shall not be less than that listed in the silencer schedule.
- B. Silencer generated noise shall not be greater than that listed in the silencer schedule.
- C. Acoustic performance shall include dynamic insertion loss and generated noise for forward flow (air and noise in same direction) or reverse flow (air and noise in opposite direction) in accordance with the project's air distribution system requirements.
- D. All silencer ratings shall be determined in a duct-to-reverberant room test facility which provides for airflow in both directions through the test silencer in accordance with the ASTM E-477-99 test standard. The test set-up, procedure and facility shall eliminate all effects due to flanking, directivity, end reflection, standing waves and reverberation room absorption.

### 4.3 AERODYNAMIC PERFORMANCE

- A. Silencer pressure drops shall not exceed those listed in the silencer schedule. Silencer pressure drop measurements shall be made in accordance with the ASTM E-477-99 test standard. Tests shall be conducted and reported on the identical units for which acoustical data is presented.

END OF SECTION