

## SECTION 23 05 44

### SOUND ATTENUATION FOR HVAC PIPING AND EQUIPMENT

#### PART 1 - GENERAL

##### 1.01 SECTION INCLUDES

- A. Sound attenuator.
- B. Fill material.

##### 1.02 RELATED SECTIONS

- A. Section 01 33 00 - Submittal Procedures
- B. Section 01 33 23 - Shop Drawings, Product Data, and Samples
- C. Section 01 78 23 – Operation and Maintenance Data
- D. Section 09 91 00 – Painting
- E. Section 23 31 00 - HVAC Ducts and Casings

##### 1.03 MEASUREMENT AND PAYMENT

- A. General: Separate measurement or payment will not be made for the work required under this Section. All costs in connection with the Work specified herein will be considered to be included or incidental to the Work of this Contract.

##### 1.04 REFERENCES

- A. American Society for Testing and Materials (ASTM):
  - 1. ASTM E84 Test Method for Surface Burning Characteristics of Building Materials
  - 2. ASTM E90 Test Method for Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions
  - 3. ASTM E477 Test Method for Measuring Acoustical and Airflow Performance of Duct Liner Materials and Prefabricated Silencers
- B. National Fire Protection Association (NFPA):
  - 1. NFPA 90A Standard for the Installation of Air Conditioning and Ventilating Systems
- C. Sheet Metal and Air Conditioning Contractors National Association Inc. (SMACNA):
  - 2. SMACNA HVAC Duct Construction Standards - Metal and Flexible

**1.04 SUBMITTALS**

- A. General: Refer to Section 01 33 00 - Submittal Procedures, and Section 01 33 23 - Shop Drawings, Product Data, and Samples, for submittal requirements and procedures.
- B. Shop Drawings: Submit manufacturer's assembly-type Shop Drawings, indicating dimensions, weight loadings, required clearances, and methods of assembly of component parts.
- C. Product Data: Submit manufacturer's product data, including construction sizes, pressure drop and acoustical performance data, for specified sound attenuators. Submit certificates of compliance for products proposed for use.
- D. Maintenance Data: Submit maintenance data and parts list for each type of sound attenuator, including "trouble-shooting" maintenance guide. Include this data, product data, and Shop Drawings in maintenance manual in accordance with requirements of Section 01 78 23 - Operations and Maintenance Data.

**1.05 DELIVERY, STORAGE, AND HANDLING**

- A. Deliver sound attenuators with identification on outside of casings indicating type of sound attenuator and location to be installed. Avoid crushing or bending, and prevent dirt and debris from entering and settling in sound attenuators.
- B. Store sound attenuators so as to protect them from weather and construction work traffic. Where possible, store indoors; when necessary to store outdoors, store above grade and enclose with waterproof wrapping.

**PART 2 - PRODUCTS**

**2.01 SOUND ATTENUATOR**

- A. Sound attenuators shall be of the factory-fabricated type for low velocity service.
- B. Sound attenuators shall be constructed of galvanized steel sheets. Outer casing gage and seam construction shall be equal to or greater than required by SMACNA HVAC Duct Construction Standards - Metal and Flexible for ductwork of the same size and pressure class, but not less than 22 gage. Inner casing shall be perforated plate, 26 gage minimum. Seams shall be lock-formed and mastic-filled.
- C. Sound attenuators shall not fail structurally when subjected to an air pressure differential of 10 inches water gage from inside to outside of casing. For attenuators with multiple modules, airtight construction shall be provided by use of duct sealing compound between modules.
- D. For a sound attenuator unit rated at 2000 fpm face velocity, the self-noise power levels shall not exceed, and the dynamic insertion loss (DIL) ratings shall not be less than, the values shown in Table 1, as follows:

**Table 1 - Sound Attenuator Rating**

	(dB re 10 <sup>12</sup> W)							
<b>Octave Band</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>	<b>6</b>	<b>7</b>	<b>8</b>
Mid-Frequency (cycles per second)	63	125	250	500	1000	2000	4000	8000
Self-Noise Power Level	58	52	46	43	42	45	45	39
DIL - 5 feet length	3	8	15	28	30	21	14	10
DIL - 7 feet length	4	12	20	36	38	28	18	12

Values shall be obtained on a test unit not less than 24 inches by 24 inches in size made by a nationally recognized independent certified acoustical laboratory.

- E. Airflow capacities shall be as indicated or required. Air pressure drop through the attenuator shall not exceed the value indicated, or shall not be in excess of 15 percent of the total external static pressure of the air handling system, whichever is less.
- F. Sound attenuators shall be acoustically rated with metal duct inlet and outlet sections while under the rated airflow conditions measured by independent laboratory in accordance with requirements of ASTM E90 and ASTM E477. Noise reduction data shall include the effects of flanking paths and vibration transmission.
- G. Certified test ratings for attenuation, regeneration, and pressure drop shall be furnished. Provide manufacturer's certification that insertion loss ratings, regenerated noise ratings, and pressure drop tests were all made on same identical equipment by an independent acoustical laboratory.

**2.02 FILL MATERIAL**

- A. Provide inorganic, mineral, or glass fiber fill material, of sufficient density to obtain the specified acoustical performance, pre-packed under not less than five percent compression, to eliminate voids due to vibration and pressure variables.
- B. Fill material shall be inert, vermin- and moisture-proof, and shall comply with applicable requirements of NFPA 90A.
- C. Provide fill material with flame spread index of 25 or less, and smoke developed index of 50 or less, when tested in accordance with ASTM E84 test method.

**PART 3 - EXECUTION**

**3.01 INSTALLATION**

- A. Install sound-attenuation devices and appurtenances as indicated. Conform to SMACNA HVAC Duct Construction Standards - Metal and Flexible and the manufacturer's installation instructions, as applicable.

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- B. Provide sealed joints to prevent air leakage through cell joints. Streamline leading edges of adjacent cells with continuous nonferrous metal nosing.
- C. Provide bracing of internal components of casing to prevent distortion or flutter.
- D. Reduction of noise shall be not less than the indicated values.
- E. Hangers and devices in exterior locations exposed to the weather shall be painted with corrosion-resistant paint as specified in Section 09 91 00 - Painting.
- F. Connect ductwork to sound attenuators in accordance with applicable requirements of Section 23 31 00 - HVAC Ducts and Casings.

**END OF SECTION 23 05 44**