SECTION 23 33 01

DUCT SILENCERS

PART 1 - PART 1 GENERAL

1.1 SECTION INCLUDES

A. Straight rectangular duct silencers.

1.2 REFERENCES

A. AABC National Standards for Total System Balance, 7th Edition

B. ANSI S1.13-2005 American National Standard Measurement of Sound Pressure Levels in Air

C. ANSI/SMACNA HVAC Duct Construction Standards Metal and Flexible, 4th Edition

D. ASTM E477-20 Standard Test Method for Laboratory Measurements of Acoustical and Airflow Performance of Duct Liner Materials and Prefabricated Silencers

E. NEBB Procedural Standard for Measurement of Sound and Vibration, 3rd Edition

1.3 SUBMITTALS

A. Performance Data

1. The silencer manufacturer shall provide a submittal detailing all duct silencer data specified in the mechanical drawing schedule.

2. Submit laboratory acoustic and aerodynamic performance obtained according to ASTM E477-20. The laboratory must be NVLAP accredited to perform testing according to the ASTM E477-20 standard.

a. The submitted silencer pressure drops shall not exceed those listed in the silencer schedule. Pressure drops shall be reported using the same units as in the silencer schedule.

b. The submitted silencer dynamic insertion loss shall not be less than that listed in the silencer schedule. The dynamic insertion loss shall be at the scheduled air flow rate and air floe direction.

c. The submitted silencer airflow generated noise shall not be greater than that listed in the silencer schedule. The airflow generated noise shall be at the scheduled air flow rate and air flow direction.

B. Source Quality-Control

1. The silencer manufacturer shall provide a copy of the laboratory NVLAP accreditation certificate for ASTM E477-20 testing.

1.4 DELIVERY, STORAGE, AND HANDLING

A. Delivery: Deliver materials to the site in the manufacturer’s original, unopened containers and packaging.

B. Storage: Store materials in a dry indoor area, protected from damage and in accordance with manufacturer’s instructions.

C. Handling: Handle and lift silencers in accordance with manufacturer’s instructions. Protect materials and finishes during handling and installation to prevent damage.

PART 2 - PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

A. Dynamic Sound Control

1. Or equal with prior written approval by the project engineer.

2. As a condition of pre-approval, alternate manufacturers must submit duct silencer test reports for their silencers to the project engineer. The testing shall be performed in accordance with ASTM E477-20 by a laboratory that is NVLAP accredited for ASTM E477-20.

2.2 GENERAL REQUIREMENTS

A. Silencers shall be of the size, configuration, acoustic performance, and aerodynamic performance as scheduled on the drawings. All silencers shall be factory fabricated and supplied by the same manufacturer.

B. Silencer inlet and outlet connection dimensions must be equal to the duct sizes shown on the drawings. Duct transitions at silencers are not permitted unless shown on the contract drawings.

C. Silencers shall be constructed in accordance with ASHRAE and SMACNA standards for the specified pressure and velocity classification. Material gauges noted in other sections are minimums. Material gauges shall be increased as required for the system pressure and velocity classification.

D. All casing seams and joints shall be lock-formed and sealed, or stitch welded and sealed as noted on schedule.

E. All perforated steel shall be adequately stiffened to insure flatness and form.

F. All spot welds shall be factory protected with a corrosion resistant (zinc rich) coating.

G. Silencer assemblies, including acoustic media fill, film liner, sealants, and acoustical spacer, shall have flame-spread index not exceeding 25 and smoke-developed index not exceeding 50 when tested according to ASTM E 84, NFPA 255 or UL 723.

H. Airstream Surfaces: Surfaces in contact with the airstream shall comply with requirements in ASHRAE 62.1-2007.

2.3 CONSTRUCTION

A. Outer Casing: 22 gauge G60 galvanized

B. Internal Liner: perforated 22 gauge G60 galvanized

C. Baffle Fill: inorganic glass fiber material or recycled cotton material

D. Assembly: Factory shall assemble silencer and accessories and furnish as a single unit.

2.4 ALTERNATE CONSTRUCTION

A. Mylar Lining: Acoustic fill shall be lined with Mylar film to prevent erosion of acoustic fill and/or absorption of moisture by insulation. Bacterial or microbial growth within silencer is also reduced. The film shall be separated from the perforated metal by a factory-installed acoustically transparent spacer. The spacer shall be flame retardant and erosion resistant.

B. Fiberglass Cloth Lining: Acoustic fill shall be lined with acoustically transparent fiberglass cloth to prevent erosion of acoustic fill into airstream.

C. High Transmission Loss (HTL) Casing: The silencer outer casing shall be a heavier gauge to prevent breakout sound transmission.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Inspect areas to receive sound attenuators. Notify the Engineer of conditions that would adversely affect the installation or subsequent utilization of the silencers. Do not proceed with installation until unsatisfactory conditions are corrected.

3.2 INSTALLATION

A. Install silencer according to manufacturer's written installation instructions.

B. Install sound attenuators at locations indicated on the drawings and in accordance with manufacturer's installation instructions.

C. If duct transitions are required to adapt silencer dimensions to installed ductwork dimensions, the contractor shall provide the required hardware and labor.

D. Ensure that silencers are installed with airflow directional arrows in the direction of airflow.

E. Support each silencer independent of connecting ductwork.

F. Layout ductwork for silencer locations to provide a minimum of five diameters of straight duct upstream of the silencer and ten diameters of straight duct downstream of the silencer.

3.3 FIELD QUALITY CONTROL

A. Provide services of an independent testing agency to take noise measurements in accordance with provisions of NEBB Procedural Standard for Measurement of Sound and Vibration, 3rd Edition. Use meters meeting requirements of ANSI/ASA S1.4 PART 3.

B. After start-up and balancing of HVAC systems, take octave band sound pressure level measurements from 16 Hz to 8,000 Hz in spaces determined to be critical by the Architect.

C. Submit complete report of test results including sound curves and NC values.

END OF SECTION