
PART 1 GENERAL**1.1 RELATED DOCUMENTS**

- A. The requirements of the General Conditions, Supplementary Conditions and the following Specification sections apply to all Work herein:
1. Section 23 00 10 - General Requirements
 2. Section 23 00 20 - HVAC Scope of Work
 3. Section 23 05 07 - Design Conditions
 4. Section 23 05 93 - Testing, Balancing, and Adjusting
 5. Section 23 31 00 - Ductwork and Sheet Metal
 6. Section 23 34 00 - Exhaust and Ventilating Fans
 7. Section 23 73 23 - Custom Factory-Built Air Handling Units
 8. Section 23 73 63 - Custom Factory-Built Tri-Path Multi-Zone Air Handling Units
 9. Section 23 81 25 - Computer Room Chilled Water Air Handling Units

1.2 SUMMARY

- A. Furnish and install sound absorbing sections herein specified and as indicated on the Drawings.

1.3 REFERENCE STANDARDS

- A. All sound absorbing sections shall be designed, manufactured and tested in accordance with the latest applicable industry standards including the following:
1. ASTM E84 and C24
 2. NFPA Standard 90A
 3. UL Standard 723
 4. ASTM E477-99

1.4 SUBMITTALS

- A. The following submittal data shall be furnished according to the General Conditions and Section 23 00 10 and shall include, but not be limited to:
1. Sound Absorbing Sections*, including tests, etc. The sound absorbing section manufacturer shall submit certified test data on dynamic insertion loss, self-noise power levels and air flow static pressure loss. All test data shall be provided by the manufacturer which has been performed in an acoustical testing laboratory certified under the National Voluntary Laboratory Accreditation Program (NVLAP) by the National Institute of Standards and Technology.
 2. Certificate of Accreditation under NVLAP of the testing laboratory shall be provided. The submittal shall include complete description, drawings, etc., of test facilities.
 3. Prior to execution of factory testing and lab testing, submit test procedures, recording forms, and test equipment cut sheets to Engineer for review. Refer to Section 23 00 20 titled "Scope of Work" for "Scheduling Procedures".
 4. Factory Test Schedule.
 5. Factory Test Reports.
 6. Lab Test Schedule.
 7. Lab Test Reports.
- B. All items or equipment listed above with asterisks (*) shall be certified by the manufacturer using Manufacturer Certification "MCA" as set forth in Section 23 00 10. See Section 23 00 10 for certification requirements.

1.5 WARRANTY

- A. Comply with the requirements of the General Conditions and Section 23 00 10.

PART 2 PRODUCTS**2.1 ACCEPTABLE MANUFACTURERS**

- A. If it complies with these Specifications, sound absorbing sections manufactured by one of the following manufacturers will be acceptable:
1. AeroSonics Inc.
 2. Dynasonics (PCI Industries)
 3. Industrial Acoustics Company, Inc. (IAC)
 4. Rink Sound Control
 5. Semco
 6. Vibro-Acoustics.

2.2 SOUND ABSORBING SECTIONS

- A. It shall be carefully noted that the choice of dissipative type sound attenuating devices must include the static attenuation characteristics of the device in addition to the self-regenerating noise characteristics, which greatly affect the performance. The outer casing shall be constructed of a minimum 22 gauge lock forming galvanized steel with seams mastic filled to withstand 8" water gauge pressure differential. The interior partitions shall be made of minimum 26 gauge perforated galvanized steel. Filler material shall be of inorganic mineral or glass fiber and density to obtain the specified acoustic performance. The filler material shall be packed under not less than five (5%) percent compression to eliminate voids due to vibration. The casings of the absorbing device shall be double walled or treated as required to limit the radiated noise to the levels specified hereinafter. The sizes indicated on the Drawings are the minimum that will be acceptable.
- B. Combustion rating for the silencer acoustic fill shall be not more than the following when tested in accordance with ASTM E84 and C24, NFPA Standard 90A or UL No. 723:
- | | |
|----------------------|----|
| 1. Flame Spread | 25 |
| 2. Smoke Development | 50 |
| 3. Fuel Contribution | 20 |
- C. It shall be the responsibility of the HVAC Subcontractor to satisfy the Engineer prior to the installation of all air conditioning equipment with regard to the ability of the sound absorbing device to perform in accordance with the manufacturer's ratings. Rating shall be based on the attenuation of the sound absorber itself. Submittal data shall include certified copies of acoustical tests for each type of sound attenuator on this project. All sound absorbing sections shall be tested in a NVLAP acoustical laboratory which is currently accredited by the United States Department of Commerce National Institute of Standards and Technology. All acoustical test data shall be dated with the actual test date. Submittal and test data generated prior to the acoustical testing laboratory receiving NVLAP accreditation will not be accepted. Submittal data shall include a copy of the laboratory Certificate of Accreditation. Acoustical test reports and data based on utilizing an earlier version of the ASTM E477 standard other than the 1999 revision will not be acceptable. Any sound absorbing section installed on the project which does not perform as claimed by the Manufacturer or does not meet the requirements for which it was intended shall be removed and shall be replaced with a new unit which meets the specified performance, at no additional cost to the Owner.
- D. Sound absorbing sections' acoustic ratings shall be determined in a NVLAP accredited acoustical laboratory test facility, which provides for air flow through the sound absorbing section during test. The test setup and procedure shall be in accordance with ASTM E477-99 testing procedures such that all effects due to reflection, directivity, flanking transmission, standing waves and test chamber sound absorption are eliminated. The conversion from sound pressure level to sound power level shall utilize the calibrated reference sound, i.e. the sound ratings shall be listed in mid frequency octave bands as set forth in ANSI Standard S1.6-S1.11. The acoustic ratings shall include "dynamic insertion loss" and "airflow generated noise levels" at velocities defined in the "self generated noise table" tested according to ASTM E477-99 and shall provide the minimum sound ratings as follows:

1. Minimum Sound Trap Dynamic Insertion Loss (Forward Flow):

SPECIFICATION TYPES

OCTAVE BAND	A	B	C	D	E	F	G	H	I	J	K	L	M	N
	DYNASONICS TYPE - AS STANDARD													
	36-SF35	60-SF35	84-SF35	36-SF55	60-SF55	84-SF55	36-SF75	60-SF75	84-SF75	36-LF75	60-LF75	84-LF75	36-LF55	120-SF95
1	4	6	11	3	5	11	3	7	10	4	6	10	3	17
2	2	3	5	2	4	7	5	7	9	7	12	19	5	22
3	5	7	12	6	8	15	11	14	19	12	19	23	10	40
4	14	20	32	16	23	35	20	31	41	16	26	32	14	54
5	21	36	47	23	38	50	27	43	47	19	30	40	16	54
6	18	25	39	19	25	40	26	36	49	16	21	28	13	52
7	14	17	24	15	17	25	19	23	31	14	16	19	11	54
8	12	15	18	13	15	19	16	18	23	11	14	15	10	37

2. Sound Trap Self-Generated Noise:

PWL (dB re: 10-12 Watt)

OCTAVE BAND	A, B, C	D, E, F	G, H, I	J, K, L	M	N
	TYPE SF35 @ 2,000 FPM	TYPE SF55 @ 1,500 FPM	TYPE SF75 @ 1,000 FPM	TYPE LF75 @ 1,000 FPM	TYPE LF55 @ 1,000 FPM	TYPE 120-SF95 @ 750 FPM
2	62	55	52	50	48	55
3	52	45	41	43	41	42
4	47	43	41	39	38	42
5	49	44	44	44	37	45
6	52	42	40	42	33	42

- E. The static pressure loss of the sound absorbing section shall not exceed those specified in the "Schedule of Capacities" in the Contract Documents when the specified air volume is flowing through the sound absorbing section. Air flow measurements shall be made in accordance with ASTM E477-99.

2.3 CONE/DIFFUSER AND SILENCER

- A. Duct diffusers and silencers on axial flow fans shall be sized and designed for the axial fans installed and shall be tailored for each fan size requirement. Acoustical Diffuser Cones shall be Dynasonics Model ADC or one of the manufacturer's listed herein and comply with the following minimum requirements:
 1. Factory prefabricated with flanged inlet and outlet collars.
 2. Shell:
 - a. Interior: Minimum 26 gauge galvanized steel, perforated twenty-three (23%) percent open.
 - b. Exterior: Minimum 22 gauge galvanized steel.
 - c. Center Cone: Minimum 26 gauge galvanized steel, perforated minimum twenty-three (23%) percent open.
 3. Filler:
 - a. Flame Spread: maximum 25.

- b. Fuel Contributed and Smoke Development: maximum 50.
- c. Inert, mildew and vermin proof.
- d. No voids or settling.
- 4. Interior center cone shall be same diameter as fan hub.
- 5. Acoustical Performance: "Minimum Dynamic Net Insertion Loss" tested according to ASTM E477-99 shall be as follows:

VANE AXIAL FAN CONE/DIFFUSER SILENCER						
DYNAMIC INSERTION LOSS						
Octave Band Center Frequency (Hz)	125	250	500	1000	2000	4000
Dynamic Insertion Loss	6	6	10	11	8	9

2.4 SOUND ABSORBING SECTION TESTS

- A. All tests to determine compliance with the Specifications will be made by the manufacturer prior to the preparation of Shop Drawings. All sound absorbing sections shall be provided with the necessary structural support, subject to the approval of the Engineer.

PART 3 EXECUTION

3.1 INSTALLATION

- A. All sound absorbing sections shall be installed in accordance with the latest industry standards, per the manufacturer's recommendations and as indicated on the Drawings.

3.2 FACTORY TESTING

- A. All sound absorbing sections shall be tested in accordance Standard ASTM 477-99 in accordance with the latest applicable industry standards and as specified herein.

3.3 FIELD TESTING

- A. Prior to execution of field testing, submit test procedures, recording forms, and test equipment cut sheets to Engineer for review. Refer to Section 23 00 20 titled "Scope of Work" for "Scheduling Procedures".
- B. Refer to Section 23 05 93 for additional testing requirements for sound absorbing sections.

END OF SECTION