

Quiet-Duct Conic-Flow® Silencers

Section 15000 Specifications

1.01 General

- A. Furnish and install "Conic-Flow" (tubular) silencers of the types and sizes shown on the plans and/or listed in the schedule. Silencers shall be the product of IAC Acoustics. Any specification change must be submitted in writing and approved by the Architect/Engineer, in writing, at least 10 days prior to the bid due-date.

2.01 Materials

- A. Outer casings of tubular silencers shall be made of type #G-90 lock-former-quality galvanized steel in the following gauges:

Outside Diamer, In.	Metal Gauge	Outside Diameter, In.	Metal Gauge
12-36	22	38-60	18

- B. Interior construction of tubular silencers shall be compatible with the respective outside casing.
- C. Filler material shall be inorganic glass fiber of a proper density to obtain the specified acoustic performance and be packed under not less than 5% compression to eliminate voids due to vibration and settling. Material shall be inert, vermin- and moisture-proof.
- D. Combustion ratings for the silencer acoustic fill shall be not greater than the following when tested to ASTM E 84, NFPA Standard 255, or UL No. 723:

Flamespread Classification	20
Smoke Development Rating.....	20

3.01 Construction

- A. Units shall be constructed in accordance with the ASHRAE Guide recommendations for high pressure duct work. Seams shall be lock formed and mastic filled. Rectangular casing seams shall be in the corners of the silencer shell to provide maximum unit strength and rigidity. Interior partitions shall be fabricated from single-piece, margin-perforated sheets and shall have die-formed entrance and exit shapes so as to provide the maximum aerodynamic efficiency and minimum self-noise characteristics in the sound attenuator. Blunt noses or squared off partitions will not be accepted.
- B. Interior partitions for tubular silencers shall be secured with galvanized steel radial mounting brackets welded to the partition and the outer casing. The radial brackets shall be installed full length and at 120 degree angles to each other to assure uniform spacing for consistent aerodynamic and acoustic performance.
- C. Sound attenuating units shall not fail structurally when subjected to a differential air pressure of 8 inches water gauge from inside to outside the casing. Airtight construction shall be provided by use of a duct sealing compound on the job-site material and labor furnished by the contractor.

4.01 Acoustic Performance

- A. 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 ASTM Specification E477-99. The test facility shall be NVLAP accredited for the ASTM E477-99 test standard. Data from a non-accredited laboratory will not be acceptable. The test set-up and procedure shall be such that all effects due to end reflection, directivity, flanking transmission, standing waves and test chamber sound absorption are eliminated.

Acoustic ratings shall include Dynamic Insertion Loss (DIL) and Self-Noise (SN) Power Levels both for FORWARD FLOW (air and noise in same direction) and REVERSE FLOW (air and noise in opposite directions) with airflow of at least 2000 fpm entering face velocity. Data for rectangular and tubular type silencers shall be presented for tests conducted using silencers no smaller than the following cross-sections:

Rectangular, inch: 24 x 24, 24 x 30, or 24 x 36
 Tubular, inch: 12, 24, 36 and 48

5.01 Aerodynamic Performance

- A. Static pressure loss of silencers shall not exceed those listed in the silencer schedule as the airflow indicates. Airflow measurements shall be made in accordance with ASTM specification E477-99 and applicable portions of ASME, AMCA, and ADC airflow test codes. Tests shall be reported on the identical units for which acoustic data is presented.

6.01 Certification

- A. With submittals, the manufacturer shall supply certified test data on Dynamic Insertion Loss, Self-Noise Power Levels, and Aerodynamic Performance for Reverse and Forward Flow test conditions. Test data shall be for a standard product. All rating tests shall be conducted in the same facility, shall utilize the same silencer, and shall be open to inspection upon request from the Architect/Engineer.

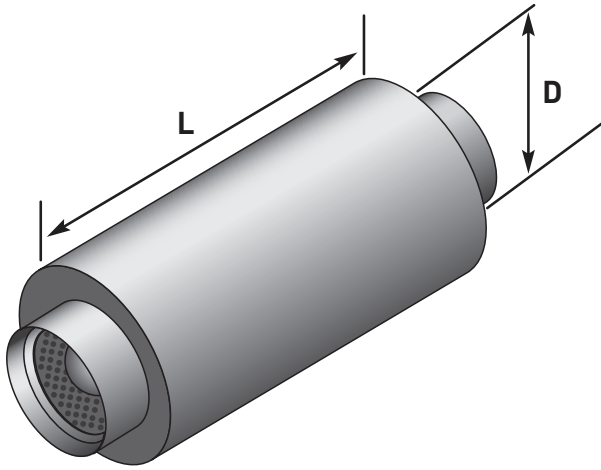
7.01 Duct Transitions

- A. When transitions are required to adapt silencer dimensions to connecting duct work they shall be furnished by the installing contractor.

Low Frequency Conic-Flow® Silencers

Type: FCS

Forward & Reverse Flow Ratings



The IAC Type FCS Conic-Flow Silencers have been rated with procedures certified in accordance with applicable portions of ASTM E477. All Dynamic Insertion Loss and Self-Noise Acoustic Performance Data were obtained in IAC's Aero-Acoustic Laboratory using the duct-to-room reverberant test facility **with air flowing through the silencers.**

Designating Silencers

Model: 12 FCS 36

Type: FCS **Diameter:** 12" **Length:** 36"

Table I: Dynamic Insertion Loss (DIL) Ratings: Forward (+) / Reverse (-) Flow

IAC Model	Octave Band	1	2	3	4	5	6	7	8
	Hz	63	125	250	500	1K	2K	4K	8K
	Face Velocity, fpm	Dynamic Insertion Loss, dB							
12FCS	-4000	10	18	29	42	40	35	31	21
	-2000	10	17	27	39	38	35	32	26
	0	10	16	26	36	36	36	33	26
	2000	9	14	24	33	34	37	34	27
	4000	8	12	22	29	33	39	35	27
24FCS	-4000	10	18	31	41	42	35	21	15
	-2000	10	16	29	38	40	35	22	17
	0	9	15	27	36	38	36	22	18
	2000	8	13	25	32	37	35	23	19
	4000	7	12	23	29	35	35	23	20
36FCS	-4000	12	21	35	41	40	27	19	14
	-2000	11	20	33	38	39	27	21	14
	0	10	18	31	37	38	27	22	15
	2000	9	16	29	35	36	28	23	16
	4000	8	14	27	33	34	28	24	17
48FCS	-4000	15	25	39	41	37	23	15	11
	-2000	13	22	37	39	36	23	17	12
	0	12	20	35	37	36	24	19	16
	2000	10	18	33	35	35	24	20	16
	4000	9	16	30	34	35	25	21	17
60FCS	-4000	18	30	43	41	35	16	12	10
	-2000	16	27	41	40	34	17	13	11
	0	14	25	39	39	33	19	15	13
	2000	12	22	37	37	33	20	16	15
	4000	10	20	34	35	33	22	18	16



(+) Forward Flow / (-) Reverse Flow. Aero-acoustic performance data based on NVLAP accredited laboratory tests conducted in strict accordance with ASTM E477-99. Contact IAC if attenuation in excess of 50 dB is required.

Table II: Weights & Measures

Model	Duct Diameter, Inches	12	14	16	18	20	22	24	26
	Silencer Length, Inches	36	36	36	36	40	44	48	52
FCS	Weight, lb.	99	111	132	149	168	188	208	234

Model	Duct Diameter, Inches	28	30	32	36	40	44	48	60
	Silencer Length, Inches	56	60	64	72	80	88	96	120
FCS	Weight, lb.	255	374	495	600	746	951	1140	1873

Table III: Aerodynamic Performance

IAC Model	L/Ft	Static Pressure Drop, i.w.g.																
		All Sizes	0.04	0.06	0.07	0.10	0.12	0.15	0.19	0.22	0.26	0.30	0.34	0.39	0.44	0.50	0.55	0.61
FCS																		
Silencer Face Velocity, fpm		1000	1200	1400	1600	1800	2000	2200	2400	2600	2800	3000	3200	3400	3600	3800	4000	

Table IV: Self-Noise Power Levels, dB re: 10-12 Watts

IAC Model	Octave Band	1	2	3	4	5	6	7	8
	Hz	63	125	250	500	1K	2K	4K	8K
	Silencer Face Velocity, fpm								
FCS (all sizes)	-3000	57	58	58	57	56	57	56	52
	-2000	50	49	51	49	46	47	45	39
	-1000	38	34	39	35	29	30	26	20
	1000	44	43	37	37	38	38	20	20
	2000	56	54	50	50	50	50	41	31
	3000	63	60	57	57	57	57	53	47

(+) Forward Flow / (-) Reverse Flow. Aero-acoustic performance data based on NVLAP accredited laboratory tests conducted in strict accordance with ASTM E477-99.

TAKE NOTE!

- Silencer Face Area is the cross-sectional area at the silencer entrance
- Face Velocity is the CFM of airflow divided by the Face Area (in sq. ft.)
- Pressure Drop for any velocity can be calculated from this equation:
 $PD = (\text{Actual FV}/\text{Catalog FV})^2 \times (\text{Catalog PD})$
- Self Noise values shown are for a four-square-foot face area silencer
- For each doubling of the face area add 3 dB to the self-noise values listed
- For each halving of the face area subtract 3 dB from the self-noise values listed
- Weights and measures are listed for limited number of available sizes