

Quiet-Duct Commercial Series Silencers

Section 15000 Specifications

1.01 General

- A. Furnish and install "Quiet-Duct" (rectangular) 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 rectangular silencers shall be made of 22 gauge type #G-90 lock-former-quality galvanized steel.
- B. Interior partitions for rectangular silencers shall be not less than 26 gauge type #G-90 galvanized lock-former-quality perforated steel.
- 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. Attachment of the interior partitions to the casing shall be by means of an interlocking track assembly. Tracks shall be solid galvanized steel and shall be welded to the outer casing. Attachment of the interior partitions to the tracks shall be such that a minimum of 4 thicknesses of metal exist at this location. The track assembly shall stiffen the exterior casing, provide a reinforced attachment detail for the interior partitions, and shall maintain a uniform airspace width along the length of the silencer for consistent aerodynamic and acoustic performance. Interior partitions shall be additionally secured to the outer casing with welded nose clips at both ends of the sound attenuator.

- 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.

Quiet-Duct Commercial Series Silencers

Type: ES

Forward & Reverse Flow Ratings



The IAC Type ES Quiet-Duct 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**.

For many years, the IAC Type S Quiet-Duct Silencer has been the industry standard for maximum noise reduction with minimum silencer length. The Type ES ("Energy Saver") Silencer provides the same high level of acoustic performance combined with a marked decrease in energy consumption.

Designating Silencers

Model: 5ES 24 x 18

Type: ES **Length:** 5' **Width:** 24" **Height:** 18"

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							
3ES	-2000	5	8	18	31	38	36	22	16
	-1000	3	8	17	31	38	36	22	17
	0	3	6	16	29	38	35	22	18
	1000	2	5	14	27	36	34	23	17
	2000	2	5	12	25	34	34	23	18
5ES	-2000	10	16	25	41	52	48	26	17
	-1000	10	15	24	40	50	50	31	20
	0	9	12	22	38	51	50	33	22
	1000	7	12	19	37	51	49	35	23
	2000	6	12	19	35	49	49	35	24
7ES	-2000	11	20	39	53	51	53	37	21
	-1000	11	21	36	51	53	53	43	25
	0	10	19	33	50	53	53	46	29
	1000	7	16	31	50	53	52	46	32
	2000	6	15	29	48	54	50	48	34
10ES	-2000	15	31	40	53	54	53	43	24
	-1000	13	33	44	51	51	53	48	26
	0	11	28	43	52	52	53	49	32
	1000	9	25	41	52	51	54	49	37
	2000	7	24	38	53	51	54	50	39



(+) 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

Nominal Length	W/In H/In	6	6	6	6	6	6	12	12	12	12	12	12	24	24	24
3'	Wt/lb.	25	35	42	49	60	70	43	52	62	74	83	93	71	86	102
5'		44	63	75	87	105	126	73	89	107	125	141	158	121	147	173
7'		61	88	102	122	147	176	102	125	150	176	199	226	170	207	243
10'		86	123	150	171	206	246	155	177	212	250	N/A	N/A	241	293	345

Nominal Length	W/In H/In	24	24	24	36	36	36	36	36	36	48	48	48	48	48	48
3'	Wt/lb.	117	132	147	81	102	142	162	182	204	142	172	204	234	264	294
5'		204	230	256	142	177.5	249	284	319	355	242	294	346	408	460	512
7'		288	325	362	207	244	293	330	N/A	N/A	340	414	486	576	650	724
10'		405	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	482	586	690	810	N/A	N/A

Table III: Aerodynamic Performance

IAC Model	L/Ft	Static Pressure Drop, i.w.g.															
ES	3'	0.01	0.02	0.04	0.06	0.08	0.11	0.14	0.18	0.22	0.27	0.32	0.37	0.43	0.50	0.57	0.64
	5'	0.01	0.02	0.04	0.06	0.09	0.12	0.15	0.19	0.24	0.29	0.34	0.40	0.46	0.53	0.60	0.68
	7'	0.01	0.03	0.05	0.08	0.12	0.17	0.22	0.28	0.34	0.41	0.49	0.57	0.67	0.76	0.87	0.98
	10'	0.02	0.04	0.07	0.11	0.16	0.22	0.28	0.36	0.44	0.54	0.64	0.75	0.87	1.00	1.13	1.28
Silencer Face Velocity, fpm		200	300	400	500	600	700	800	900	1000	1100	1200	1300	1400	1500	1600	1700

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								
ES (all sizes)	-2000	56	54	58	60	61	65	69	64
	-1500	47	47	52	55	57	63	64	54
	-1000	41	41	45	47	52	60	48	38
	1000	42	35	33	32	34	33	27	22
	1500	50	47	44	41	43	45	43	41
	2000	60	57	54	50	49	53	53	50

(+) 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:
 $PD = (Actual\ FV/Catalog\ FV)^2 \times (Catalog\ PD)$
- 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