

# Quiet-Elbow™ Silencers

## Section 15000 Specifications

### 1.01 General

- A. Furnish and install "Quiet-Duct Elbow" style 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 casing of the silencer shall be made of minimum 18 gauge type #G-90 lock-former-quality galvanized steel. Interior partitions for the silencer shall be not less than 22 gauge type #G-90 galvanized perforated steel.
- B. Filler material shall be of 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.
- C. Combustion ratings for the silencer acoustic fill shall be not greater than the following when tested per 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. Casing seams shall be formed, welded, and mastic sealed. Interior acoustic baffles shall be perforated sheets with solid evase design entrance/exit shapes to provide maximum aerodynamic efficiency and minimum self-noise. Blunt shapes will not be accepted.
- B. Interior partitions shall be welded to the casing and shall be of radius design so as to provide a uniform elbow airway in the silencer.
- 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.

### 4.01 Acoustic Performance

- A. Silencer ratings shall have been determined from data taken in a duct-to-reverberant room test facility which provides for airflow 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.
- B. 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 radius elbow silencers shall be presented for tests conducted using silencers no smaller than the following sizes:  
Rectangular, inches: 24 x 24, 24 x 30, or 24 x 36

### 5.01 Aerodynamic Performance

- A. Static pressure loss of the silencer shall not exceed that listed in the schedule at the airflow indicated. Airflow measurements shall be made in accordance with ASTM specification E477-99 and applicable portions of ASME, AMCA, and ADC airflow test codes.

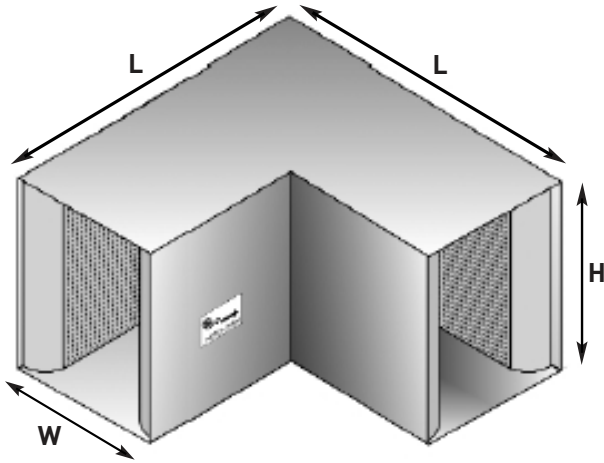
### 6.01 Certification

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

# Quiet-Elbow™ Silencers

## Type: ELBM-ES

### Forward & Reverse Flow Ratings



IAC Type ELBM Modular Elbows are designed to fit where shorter type of duct runs do not allow for standard type rectangular silencers. ELBM elbows also add the benefit of improved mid-range frequency performance while keeping the pressure drop minimal. ELBM's can come as standard with fiberglass infill with the same characteristics of our Quiet-Duct Commercial Series; they can also come as 100% Environmental friendly having the same characteristics of our Quiet-Duct Ultra/Green Series and they can also come with our "Hospital Grade" type characteristics, as with our Quiet-Duct Clean-Flow Series.

### Designating Silencers

**Model:** 5ELBM 24 x 18

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

**Pressure Loss for ELBM silencers is 0.2" at 1000 fpm**

**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							
3ELBM-ES	-2000	4	8	16	31	39	39	29	22
	-1000	4	8	16	31	39	39	29	22
	0	4	8	16	31	39	39	29	22
	1000	4	8	16	31	39	39	29	22
	2000	4	8	16	31	39	39	29	22
5ELBM-ES	-2000	8	13	21	41	55	54	41	29
	-1000	8	13	21	41	55	54	41	29
	0	8	13	21	41	55	54	41	29
	1000	8	13	21	41	55	54	41	29
	2000	8	13	21	41	55	54	41	29
7ELBM-ES	-2000	8	18	36	54	59	58	51	37
	-1000	8	18	36	54	59	58	51	37
	0	8	18	36	54	59	58	51	37
	1000	8	18	36	54	59	58	51	37
	2000	8	18	36	54	59	58	51	37
10ELBM-ES	-2000	10	26	43	61	59	62	56	43
	-1000	10	26	43	61	59	62	56	43
	0	10	26	43	61	59	62	56	43
	1000	10	26	43	61	59	62	56	43
	2000	10	26	43	61	59	62	56	43



(+) 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**

IAC Model	W/In H/In	12	12	12	12	12	12	12	24	24	24	24	24	24	24
3ELBM-ES	Wt/lb.	94	109	129	149	169	194	224	129	144	164	184	204	234	264
5ELBM-ES		129	149	184	209	244	281	319	184	204	234	264	294	339	384
7ELBM-ES		171	199	248	283	332	383.8	437	248	276	318	360	402	465	528
10ELBM-ES		234	274	344	394	464	538	614	344	384	444	504	564	654	744

IAC Model	W/In H/In	36	36	36	36	36	36	36	48	48	48	48	48	48	48
3ELBM-ES	Wt/lb.	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
5ELBM-ES		179	249	289	324	364	439	489	230	264	344	424	504	584	664
7ELBM-ES		241	339	395	444	500	605	675	312.4	360	472	584	696	808	920
10ELBM-ES		334	474	554	624	704	854	954	436	504	664	824	984	1144	1304

**Table III: Aerodynamic Performance**

IAC Model	L/Ft	Static Pressure Drop, i.w.g.															
		ELBM-ES	3'	0.01	0.02	0.03	0.04	0.04	0.06	0.07	0.08	0.09	0.11	0.12	0.14	0.16	0.18
5'	0.01		0.02	0.03	0.04	0.04	0.06	0.07	0.08	0.09	0.11	0.12	0.14	0.16	0.18	0.20	0.22
7'	0.01		0.02	0.03	0.04	0.04	0.06	0.07	0.08	0.09	0.11	0.12	0.14	0.16	0.18	0.20	0.22
10'	0.01		0.02	0.03	0.04	0.04	0.06	0.07	0.08	0.09	0.11	0.12	0.14	0.16	0.18	0.20	0.22
Silencer Face Velocity, fpm		250	300	350	400	450	500	550	600	650	700	750	800	850	900	950	1000

**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								
ELBM-ES	-2000	62	67	68	70	68	71	72	67
	-1000	54	60	60	66	60	68	59	60
	0	55	61	56	59	59	62	54	51
	1000	55	62	51	52	57	56	48	41
	2000	61	69	63	61	64	67	63	54

(+) 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