

# Ultra Pals™ Packless Silencers

## Section 15000 Specifications

### 1.01 General

- A. Furnish and install "Ultra-Pals" packless 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. Unless otherwise specified, the silencers shall be constructed of Type #G-90 lock-former-quality galvanized steel. The silencer casings shall be a minimum of #22 Gauge solid galvanized. The internal partitions shall be a minimum of #26 Gauge perforated galvanized.
- B. No sound absorptive material of any kind is to be used in the silencers. The silencers shall attenuate air/gas transmitted noise solely by virtue of controlled impedance membranes and broadly tuned resonators.
- C. 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 .....	0
Smoke Development Rating.....	0

### 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. The interior partitions shall be attached to the casing 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.
- C. 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.
- D. 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. 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

### 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.

# Ultra Pals™ Packless Silencers

Type: KL

## Forward & Reverse Flow Ratings



- NO FIBERGLASS
- NO MINERAL WOOL
- NO FOAM
- NO FILL OF ANY KIND

The IAC Type KL Packless Silencers combine excellent low frequency Dynamic Insertion Loss characteristics with a lower air flow pressure drop making them suit for higher velocity HVAC applications.

The complete absence of fill, combined with ease of cleaning and draining, makes Ultra-Pals Silencers well suited for chemical plants, refineries and facilities handling gasoline, grease, solvents or other hazardous materials.

The broad band Dynamic Insertion Loss characteristics of these packless silencers makes them an excellent choice for pharmaceutical, cosmetic, food & dairy plants, hospital operating rooms, electronic manufacturing and other clean room applications where particulate matter or fiber erosion from conventional fill materials could contaminate the air/gas streams.

### Designating Silencers

**Model:** 5KL 24 x 18

**Type:** KL    **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							
3KL	-2000	7	9	16	14	11	8	7	6
	-1000	4	6	14	12	8	7	7	6
	0	5	4	11	9	7	7	7	5
	1000	4	5	13	11	7	7	6	4
	2000	5	7	15	13	10	8	7	5
6KL	-2000	9	10	22	16	11	9	8	9
	-1000	7	8	18	14	10	9	8	9
	0	6	6	16	14	9	9	9	8
	1000	6	7	18	14	10	9	8	8
	2000	8	8	21	16	12	10	8	7
9KL	-2000	13	15	28	19	15	10	10	9
	-1000	11	11	24	17	13	10	10	9
	0	9	9	20	17	12	11	10	9
	1000	10	9	24	17	13	11	10	8
	2000	11	11	28	19	15	12	10	8



(+) 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	15	15	15	15	15	15	30	30	30	30	30	30
3'	Wt/lb.	30	37	44	51	59	67	51	61	71	82	92	102
6'		60	74	88	102	118	132	101	122	142	164	184	204
9'		90	111	132	153	177	198	152	183	213	246	276	305

**Table III: Aerodynamic Performance**

IAC Model	L/Ft	Static Pressure Drop, i.w.g.															
		KL	3'	0.03	0.05	0.06	0.08	0.11	0.13	0.16	0.19	0.22	0.25	0.29	0.33	0.38	0.42
6'	0.04		0.05	0.07	0.10	0.12	0.15	0.18	0.22	0.25	0.29	0.34	0.38	0.43	0.49	0.54	0.60
9'	0.05		0.06	0.09	0.12	0.15	0.18	0.22	0.26	0.30	0.35	0.41	0.46	0.52	0.58	0.65	0.72
Silencer Face Velocity, fpm		500	600	700	800	900	1000	1100	1200	1300	1400	1500	1600	1700	1800	1900	2000

**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								
3KL	-2000	49	51	54	58	59	63	63	54
	-1000	38	38	42	47	51	48	41	35
	1000	36	36	38	43	49	46	38	35
	2000	53	49	50	51	54	62	63	54
6KL	-2000	54	55	55	57	58	62	62	54
	-1000	44	50	44	51	52	49	40	24
9KL	1000	52	43	40	44	50	50	42	25
	2000	58	58	54	54	55	64	66	59

(+) 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