Quiet-Duct Ultra™ / Low Silencers
Section 15000 Specifications

1.01 General

A. Furnish and install "Quiet-Duct Ultra™/Low" (rectangular) silencers of the types and sizes shown on the plans and/or listed in the schedule. Silencers shall be the product of Industrial Acoustics Company. 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. 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 jobsite 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

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.

6.01 Certification

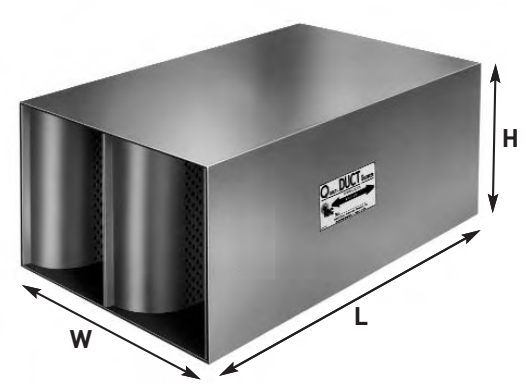
A. With submittals, the manufacturer shall supply certified test data on Dynamic Insertion Loss, Self-Noise Power Levels, and Aerodynamic Performance for Reverse and Forward Flow test conditions. Test data shall be for a standard product. All rating tests shall be conducted in the same facility, shall 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 Ultra™ / Low Silencers
Type: ULS3

Low Frequency Silencers with Forward & Reverse Flow Ratings



First introduced back in 2005, these have been designed to optimize Dynamic Insertion Loss performance for frequencies between 25 Hz and 80 Hz. The Quiet-Duct Ultra™ / Low silencers offers to the industry, first to be published by IAC, a guaranteed performance data in the 31.5 Hz full octave–band center frequencies.

ULS3 is designed to provide optimization for applications where the Dynamic Insertion Loss performance in more discrete frequencies is required to effectively control narrow-band noise sources, using a finer resolution of the 1/3 Octave Band DIL Data with Static Pressure Drop ratings +/- from 250 – 750 fpm. All Quiet-Duct Ultra/Low silencers have been rated with procedures certified in strict accordance with ASTM E477-99 in IAC's NVLAP Accredited Acoustical Laboratory.

Designating Silencers

Model: 5ULS3-24-18
Type: ULS3 **Length:** 5' **Width:** 24" **Height:** 18"

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

IAC Model	Octave Band	0	1	2	3	4	5	6	7	8
	Hz	31.5	63	125	250	500	1K	2K	4K	8K
	Face Velocity, fpm		Dynamic Insertion Loss, dB							
3ULS3	-750	4	10	15	17	16	14	12	11	9
	-500	4	10	15	17	16	14	12	11	9
	-250	4	10	15	17	16	14	12	11	9
	250	3	9	14	17	16	15	12	11	9
	500	3	9	14	16	16	15	12	11	9
	750	3	9	14	16	16	15	12	11	9
5ULS3	-750	6	14	22	25	23	18	15	13	11
	-500	6	14	22	25	23	18	15	13	11
	-250	5	13	21	25	23	19	15	13	11
	250	5	13	21	24	23	19	15	13	11
	500	5	13	20	24	23	19	15	13	11
	750	5	12	20	24	23	19	15	13	11
7ULS3	-750	8	17	29	33	30	23	17	15	13
	-500	7	17	28	32	30	23	17	15	13
	-250	7	17	28	32	30	23	17	15	13
	250	7	16	27	31	30	23	17	15	13
	500	7	16	27	31	30	23	17	15	14
	750	6	15	26	31	30	23	17	15	14
10ULS3	-750	10	23	38	44	40	29	20	18	15
	-500	10	22	37	43	40	30	20	18	15
	-250	10	22	37	43	40	30	20	18	15
	250	9	21	36	42	40	30	21	19	15
	500	9	20	35	41	40	30	21	19	15
	750	8	20	35	41	40	30	21	19	16

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(+) 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	27	27	27	27	27	27	27	54	54	54	54	54	54	54
	H/In	12	18	24	30	36	42	48	12	18	24	30	36	42	48
3'	Wt/lb.	48	58	67	76	86	95	104	83	98	112	126	141	155	169
5'		79	93	107	121	136	150	164	136	157	178	199	221	242	263
7'		109	128	147	167	186	205	224	178	216	244	272	301	N/A	N/A
10'		154	181	208	236	261	288	315	N/A	N/A	N/A	N/A	N/A	N/A	N/A

*Note: Widths are available from 24" to 30" and from 48" to 54"

Table III: Aerodynamic Performance

Silencer Face Area is the cross-sectional area at the air entering face of the module or bank of modules. The Face Velocity is the CFM of airflow divided by the Face Area (in square feet). Pressure Drop for any face velocity can be calculated from the equation:

PD = (Actual FV/Catalog FV)^2(Catalog PD).

PD values are per ASTM E477 test standard. For the smaller widths available add 15% and subtract 5% for the larger widths available. If silencers are near elbows, transitions or other non-ideal conditions sufficient allowances must be made to account for system effects when calculating the overall silencer pressure loss.

IAC Model	Static Pressure Drop, i.w.g.						
ULS2	3'	0.06	0.25	0.57	N/A	N/A	N/A
	5'	0.07	0.28	0.63	N/A	N/A	N/A
	7'	0.08	0.30	0.68	N/A	N/A	N/A
	10'	0.09	0.34	0.77	N/A	N/A	N/A
Silencer Face Velocity, fpm		250	500	750	1000	1250	1500

Table IV: 1/3 Octave Band DIL Data

IAC Model	Octave Band	31.5 Hz			63 Hz		
	Hz	25	31.5	40	50	63	80
	Silencer Face Velocity, fpm						
3ULS3	-750	3	4	5	8	11	13
	-500	3	4	5	8	10	12
	-250	3	3	5	8	10	12
	250	2	3	5	7	10	12
	500	2	3	5	7	10	12
	750	2	3	4	7	9	11
5ULS3	-750	4	6	8	11	15	18
	-500	4	6	8	11	14	18
	-250	4	5	7	11	14	17
	250	4	5	7	10	14	17
	500	4	5	7	10	13	16
	750	3	5	7	10	13	16
7ULS3	-750	6	8	11	15	19	23
	-500	6	8	10	14	18	23
	-250	5	7	10	14	18	22
	250	5	7	10	13	17	21
	500	5	7	9	13	17	21
	750	5	6	9	13	16	21
10ULS3	-750	8	11	15	19	24	30
	-500	8	11	14	19	24	30
	-250	7	10	14	19	23	29
	250	7	10	13	18	22	28
	500	7	9	13	17	22	28
	750	6	9	12	17	22	27

One-Third (1/3) Octave Band data for IAC Quiet-Duct Ultra™/Low silencers is provided for those applications where Dynamic Insertion Loss performance in more discrete frequencies is required to effectively control narrow-band noise sources. Table IV presents the 1/3 Octave Band DIL components that combine to comprise the Full Octave Band DIL values.

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

IAC Model	Octave Band	0	1	2	3	4	5	6	7	8
	Hz	31.5*	63	125	250	500	1K	2K	4K	8K
	Silencer Face Velocity, fpm									
ULS2	-750	56	53	53	50	51	54	56	50	43
	-250	37	34	26	27	27	34	37	20	<20
	+250	33	30	23	23	23	31	33	<20	<20
	+750	53	50	49	47	47	50	53	46	39

Self-Noise values are shown for a five-square-foot area silencer. For each doubling of the face area add three dB; for each halving of the face area, subtract three dB from the values in Table V.

* Estimated