Quiet-Duct Ultra™ / Green Silencers
Section 15000 Specifications

1.01 General

A. Furnish and install "Quiet-Duct Ultra™/Green" (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. 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. Acoustic fill material shall be 100% environmentally friendly, and constructed of recycled natural fibers. Each fiber shall be treated with an EPA registered fungal inhibitor in order to prevent mold, mildew, fungi, and pest protection. The fill material must not contain any harmful chemicals, irritants, and/or volatile organic compounds (VOCs) in order to prevent off-gassing.

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 5
Smoke Development Rating..... 35

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
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.

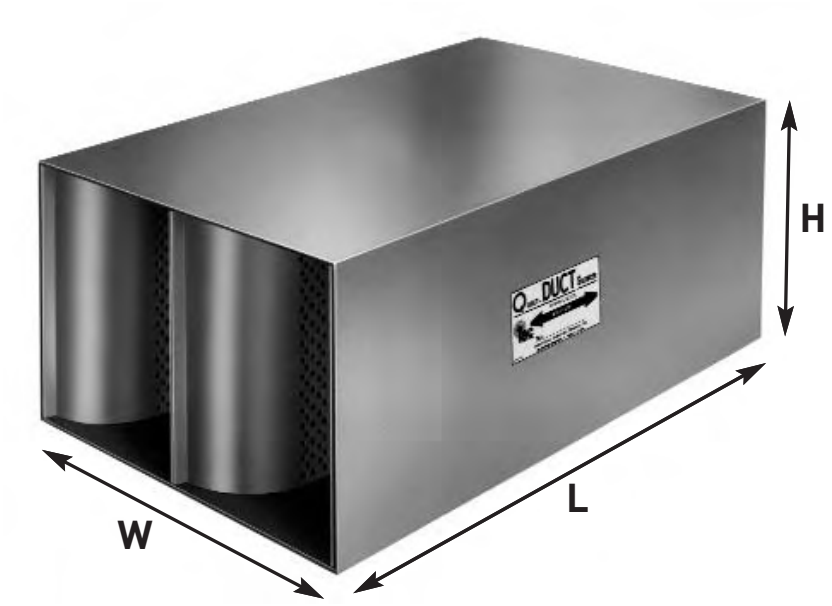
7.01 Duct Transitions

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

Quiet-Duct Ultra™/Green Silencers
Introduction

Environmentally Sound Silencers with Forward & Reverse Flow Ratings

The Ultra™/Green Quiet-Duct Series complements the traditional Commercial Series Silencers, but instead of using fiberglass or mineral wool insulation as the infill material, Ultra™/Green Quiet-Duct Series line of silencers have been designed and developed in response to the trend for environmentally friendly building projects and products. This 100% environmentally friendly attenuation solution uses recycled cotton-fiber based acoustic fill material and delivers performance that meets or exceeds that of a standard Quiet-Duct silencer. They still have the necessary flame-/smoke-spread ratings they also inhibit the growth of mold, which is a significant concern in many interior environments needing this specific type of application. All Ultra™/Green Quiet-Duct silencers have been rated with procedures certified in strict accordance with ASTM E477-99 in IAC's NVLAP Accredited Acoustical Laboratory.

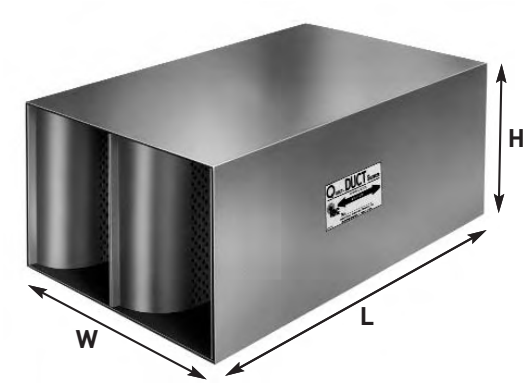


QUIET-DUCT ULTRA™/GREEN SILENCER TYPES:

- UGLFS
- UGLFM
- UGLFL
- UGS
- UGMS
- UGML
- UGL

Quiet-Duct Ultra™ / Green Silencers
Type: UGLFS

Environmentally Sound Silencers with Forward & Reverse Flow Ratings



The IAC Type UGLFS Quiet-Duct Ultra™/Green Silencers provide that same superior low frequency attenuation, now with a 100% environmentally friendly attenuation solution which uses recycled acoustic fill material, instead of fiberglass. All UGLFS Silencers have been rated and certified with procedures certified in accordance with applicable portions of ASTM E4777. All Dynamic Insertion Loss and Self-Noise Acoustic Performance data were obtained in IAC Acoustics' Aero-Acoustic Laboratory using the duct-to-room reverberant test facility with air flowing through the silencers. Like the standard LFS, the UGLFS is still advantageous where low frequency DIL requirements are high in HVAC systems. In some systems, high frequency attenuation may be provided by the system components or may not be needed.

Designating Silencers

Model: 5UGLFS-24-18
Type: UGLFS **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							
3UGLFS	-2000	6	13	25	32	28	20	17	14
	-1000	6	12	24	32	27	20	19	14
	0	5	12	24	32	28	21	19	14
	1000	6	11	22	30	27	21	18	14
	2000	5	9	20	29	26	20	18	14
5UGLFS	-2000	11	23	39	46	44	27	24	19
	-1000	11	22	36	45	44	29	25	18
	0	10	20	35	43	43	29	24	17
	1000	10	17	31	40	41	28	22	14
	2000	9	14	29	38	39	29	20	14
7UGLFS	-2000	12	27	43	50	49	33	21	18
	-1000	12	23	43	48	49	36	25	17
	0	10	24	40	45	46	32	23	16
	1000	10	22	35	42	43	29	20	17
	2000	10	23	37	45	44	28	19	16
10UGLFS	-2000	16	32	48	52	52	43	24	18
	-1000	15	31	52	51	54	45	30	19
	0	16	30	51	52	54	47	32	20
	1000	14	26	48	54	53	49	33	24
	2000	13	24	47	56	55	49	36	26

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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	6	6	6	6	6	6	12	12	12	12	12	12	24	24	24
	H/In	18	24	30	36	42	48	18	24	30	36	42	48	18	24	30
3'	Wt/lb.	18	21	25	29	31	35	35	42	50	57	61	70	54	64	74
5'		29	35	42	47	52	59	58	70	83	94	104	117	89	104	121
7'		41	49	59	67	75	83	82	98	118	134	150	166	125	146	175
10'		59	70	84	95	N/A	N/A	117	140	167	190	N/A	N/A	178	209	250

Nominal Length	W/In	24	24	24	36	36	36	36	36	36	48	48	48	48	48	48
	H/In	36	42	48	18	24	30	36	42	48	18	24	30	36	42	48
3'	Wt/lb.	82	92	102	89	106	124	139	153	172	108	128	148	164	184	204
5'		136	152	157	147	174	204	230	256	274	178	208	242	272	304	314
7'		196	218	240	207	244	293	330	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
10'		280	N/A	N/A	295	349	417	470	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

Table III: Aerodynamic Performance

IAC Model	L/Ft	Static Pressure Drop, i.w.g.															
UGLFS	3'	0.04	0.05	0.07	0.09	0.11	0.14	0.17	0.20	0.24	0.28	0.32	0.36	0.41	0.46	0.51	0.57
	5'	0.04	0.06	0.08	0.10	0.13	0.16	0.19	0.22	0.26	0.31	0.35	0.40	0.45	0.51	0.56	0.62
	7'	0.04	0.06	0.08	0.10	0.13	0.16	0.20	0.23	0.28	0.32	0.37	0.42	0.47	0.53	0.59	0.65
	10'	0.04	0.06	0.09	0.11	0.14	0.18	0.21	0.26	0.30	0.35	0.40	0.45	0.51	0.57	0.64	0.71
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								
UGLFS (all sizes)	-2000	58	54	58	61	62	62	65	63
	-1500	51	49	53	56	56	59	60	53
	-1000	45	42	45	43	45	49	44	37
	1000	46	42	45	43	45	49	44	37
	1500	56	54	57	56	52	56	57	51
	2000	68	64	65	66	61	61	64	61

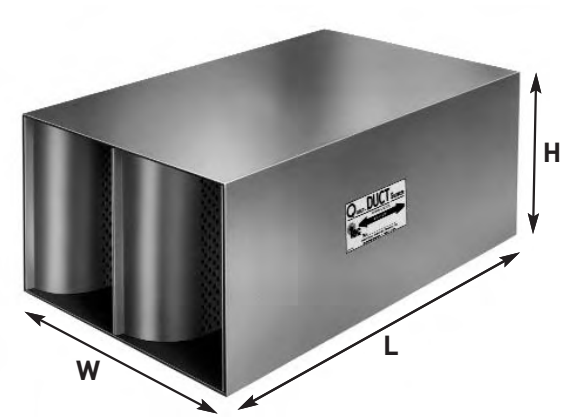
(+) Forward Flow / (-) Reverse Flow. Aero-acoustic performance data based on NVLAP accredited laboratory tests conducted in strict accordance with ASTM E477-99.

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 x (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

Quiet-Duct Ultra™ / Green Silencers
Type: UGLFM

Environmentally Sound Silencers with Forward & Reverse Flow Ratings



The IAC Type UGLFM Quiet-Duct Ultra™ / Green Silencers come with a 100% environmentally friendly attenuation solution which uses recycled acoustic fill material, instead of fiberglass. The UGLFM also provides the same improved low frequency attenuation particularly in the third octave band. When the third band performance is critical, a Type UGLFM Quiet Duct Ultra-Green selection often results in a shorter silencer length than other equivalent silencer models. Type UGLFM Quiet-Duct Ultra™ / Green 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. Type UGLFM Silencers are advantageous where low frequency, particularly in the third octave band, DIL requirements are high in HVAC systems.

Designating Silencers

Model: 5UGLFM-24-18
Type: UGLFM **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							
3UGLFM	-2000	5	9	17	24	20	13	14	12
	-1000	4	8	17	25	20	14	15	11
	0	3	8	16	24	20	14	14	10
	1000	2	6	14	22	18	13	12	10
	2000	2	6	14	22	18	12	12	10
5UGLFM	-2000	6	17	28	37	31	16	18	16
	-1000	6	15	27	37	31	18	21	15
	0	6	14	27	36	31	18	19	14
	1000	6	12	24	34	30	18	15	10
	2000	5	10	23	32	30	18	15	9
7UGLFM	-2000	10	21	35	44	38	20	16	16
	-1000	9	19	33	42	40	22	20	15
	0	9	19	32	42	40	22	19	14
	1000	9	15	29	43	39	23	18	16
	2000	8	14	28	42	40	23	18	16
10UGLFM	-2000	13	26	43	51	49	25	19	17
	-1000	12	23	42	50	50	28	24	17
	0	13	23	41	51	51	28	23	16
	1000	12	20	39	52	51	29	22	17
	2000	11	19	37	52	52	29	22	19

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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	6	6	6	6	6	6	12	12	12	12	12	12	24	24	24
	H/In	18	24	30	36	42	48	18	24	30	36	42	48	18	24	30
3'	Wt/lb.	18	21	25	29	31	35	35	42	50	57	61	70	54	64	74
5'		29	35	42	47	52	59	58	70	83	94	104	117	89	104	121
7'		41	49	59	67	75	83	82	98	118	134	150	166	125	146	175
10'		59	70	84	95	N/A	N/A	117	140	167	190	N/A	N/A	178	209	250

Nominal Length	W/In	24	24	24	36	36	36	36	36	36	48	48	48	48	48	48
	H/In	36	42	48	18	24	30	36	42	48	18	24	30	36	42	48
3'	Wt/lb.	82	92	102	89	106	124	139	153	172	108	128	148	164	184	204
5'		136	152	157	147	174	204	230	256	274	178	208	242	272	304	314
7'		196	218	240	207	244	293	330	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
10'		280	N/A	N/A	295	349	417	470	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

Table III: Aerodynamic Performance

IAC Model	L/Ft	Static Pressure Drop, i.w.g.															
UGLFM	3'	0.05	0.07	0.09	0.12	0.15	0.19	0.23	0.27	0.32	0.37	0.42	0.48	0.55	0.61	0.68	0.76
	5'	0.05	0.07	0.10	0.13	0.16	0.20	0.24	0.29	0.34	0.39	0.45	0.51	0.57	0.64	0.72	0.79
	7'	0.05	0.07	0.10	0.13	0.17	0.21	0.25	0.30	0.35	0.41	0.47	0.53	0.60	0.67	0.75	0.83
	10'	0.06	0.08	0.12	0.15	0.19	0.24	0.29	0.34	0.40	0.46	0.53	0.60	0.68	0.76	0.85	0.94
Silencer Face Velocity, fpm		500	600	700	800	100	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								
UGLFM (all sizes)	-3000	64	62	64	66	65	64	66	62
	-2000	53	50	54	56	56	59	58	51
	-1000	42	40	43	45	47	46	37	27
	1000	47	34	36	35	40	37	27	20
	2000	54	52	58	56	51	56	55	50
	3000	68	64	64	63	61	63	66	63

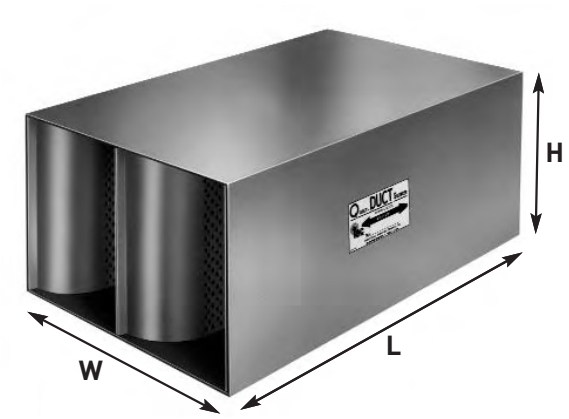
(+) Forward Flow / (-) Reverse Flow. Aero-acoustic performance data based on NVLAP accredited laboratory tests conducted in strict accordance with ASTM E477-99.

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 x (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

Quiet-Duct Ultra™ / Green Silencers
Type: UGLFL

Environmentally Sound Silencers with Forward & Reverse Flow Ratings



The IAC Type UGLFL Quiet-Duct Ultra™ / Green Silencers, along with the 100% environmentally friendly attenuation solution which uses recycled acoustic fill material, instead of fiberglass, still provides that same improved low frequency attenuation as well as low pressure drop aerodynamic performance. When third and fourth band performance is critical at the lowest available pressure drop, a Type UGLFL Quiet-Duct Ultra-Green selection often results in a shorter silencer length than other equivalent silencer models. Type UGLFL Quiet-Duct Ultra™ / Green 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. Type UGLFL Silencers are advantageous where low frequency acoustic performance and low pressure drop aerodynamic performance are both essential to the HVAC system.

Designating Silencers

Model: 5UGLFL-24-18
Type: UGLFL **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							
3UGLFL	-2000	3	7	15	20	19	11	14	12
	-1000	3	8	14	20	18	12	15	11
	0	3	9	16	23	23	16	14	10
	1000	3	9	16	25	26	20	13	10
	2000	3	8	15	25	25	13	13	10
5UGLFL	-2000	5	12	22	31	31	14	20	16
	-1000	5	12	20	31	30	17	21	15
	0	5	11	20	30	29	16	18	13
	1000	4	8	17	27	26	15	13	9
	2000	4	7	16	27	25	14	13	8
7UGLFL	-2000	8	18	28	38	31	16	16	15
	-1000	7	15	25	37	32	18	18	14
	0	6	15	25	38	32	18	17	13
	1000	6	12	23	39	31	19	16	15
	2000	5	10	20	38	32	18	16	15
10UGLFL	-2000	10	23	34	42	41	18	19	17
	-1000	9	20	33	41	43	21	21	16
	0	9	19	31	43	43	21	20	15
	1000	9	15	28	46	42	22	19	16
	2000	7	13	26	47	43	21	18	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	6	6	6	6	6	6	12	12	12	12	12	12	24	24	24
	H/In	18	24	30	36	42	48	18	24	30	36	42	48	18	24	30
3'	Wt/lb.	18	21	25	29	31	35	35	42	50	57	61	70	54	64	74
5'		29	35	42	47	52	59	58	70	83	94	104	117	89	104	121
7'		41	49	59	67	75	83	82	98	118	134	150	166	125	146	175
10'		59	70	84	95	N/A	N/A	117	140	167	190	N/A	N/A	178	209	250

Nominal Length	W/In	24	24	24	36	36	36	36	36	36	48	48	48	48	48	48
	H/In	36	42	48	18	24	30	36	42	48	18	24	30	36	42	48
3'	Wt/lb.	82	92	102	89	106	124	139	153	172	108	128	148	164	184	204
5'		136	152	157	147	174	204	230	256	274	178	208	242	272	304	314
7'		196	218	240	207	244	293	330	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
10'		280	N/A	N/A	295	349	417	470	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

Table III: Aerodynamic Performance

IAC Model	L/Ft	Static Pressure Drop, i.w.g.															
UGLFL	3'	0.01	0.05	0.08	0.11	0.15	0.19	0.24	0.30	0.36	0.43	0.51	0.59	0.68	0.77	0.87	0.97
	5'	0.01	0.05	0.08	0.12	0.16	0.20	0.26	0.32	0.39	0.46	0.54	0.63	0.72	0.82	0.92	1.04
	7'	0.01	0.05	0.09	0.12	0.17	0.22	0.28	0.34	0.41	0.49	0.57	0.67	0.77	0.87	0.98	1.10
	10'	0.02	0.06	0.10	0.14	0.19	0.24	0.31	0.38	0.46	0.55	0.64	0.74	0.86	0.97	1.10	1.23
Silencer Face Velocity, fpm		400	800	1000	1200	1400	1600	1800	2000	2200	2400	2600	2800	3000	3200	3400	3600

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								
UGLFL (all sizes)	-3000	55	54	56	57	56	59	61	56
	-2000	46	45	48	49	50	54	49	42
	-1000	31	30	34	35	40	45	28	20
	1000	32	24	32	25	34	39	24	20
	2000	47	42	46	44	46	51	46	38
	3000	56	53	54	55	53	58	59	53

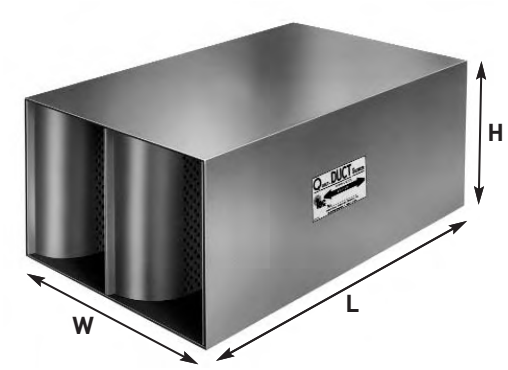
(+) Forward Flow / (-) Reverse Flow. Aero-acoustic performance data based on NVLAP accredited laboratory tests conducted in strict accordance with ASTM E477-99.

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 x (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

Quiet-Duct Ultra™ / Green Silencers
Type: UGS

Environmentally Sound Silencers with Forward & Reverse Flow Ratings



The IAC Type UGS Quiet-Duct Ultra™ / Green Silencer for many years has been the industry standard for maximum noise reduction with minimum silencer length. In response to the current trend for environmentally friendly building products, the UGS Quiet-Duct Ultra™ / Green Silencers also come with a 100% environmentally friendly attenuation solution which uses recycled acoustic fill material, instead of fiberglass. The IAC Type UGS Quiet-Duct Ultra™ / Green 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: 5UGS-24-18
Type: UGS **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							
3UGS	-1500	4	9	18	35	41	36	22	14
	-1000	3	9	17	35	40	36	23	15
	-750	3	8	16	34	41	36	24	16
	750	3	6	14	31	39	35	25	16
	1000	3	6	14	31	39	35	25	16
	1500	3	6	13	29	38	35	25	16
5UGS	-1500	8	15	28	46	47	42	35	21
	-1000	8	14	26	45	46	45	37	22
	-750	8	13	26	45	46	45	37	22
	750	6	10	23	44	46	45	38	23
	1000	6	10	22	43	46	45	38	24
	1500	5	9	21	42	46	45	39	24
7UGS	-1500	12	22	35	48	46	44	39	24
	-1000	11	20	33	47	47	46	44	25
	-750	10	19	33	47	47	46	44	26
	750	7	15	28	48	47	46	44	32
	1000	7	15	27	48	47	46	44	33
	1500	6	14	27	48	48	46	45	34
10UGS	-1500	14	27	43	45	47	46	41	31
	-1000	14	30	42	45	47	46	46	32
	-750	13	27	41	45	47	46	46	33
	750	10	21	40	47	48	46	47	42
	1000	10	21	39	46	48	46	47	43
	1500	9	19	39	47	48	47	46	44

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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 H/In	6 12	6 24	6 36	12 12	12 18	12 24	12 30	12 36	12 42	12 48
3'	Wt/lb.	22	35	49	33	43	52	62	74	83	93
5'		40	63	87	56	73	89	107	125	141	158
7'		55	88	122	78	102	125	150	176	199	226
10'		77	123	171	111	155	177	212	250	N/A	N/A

Nominal Length	W/In H/In	24 18	24 24	24 30	24 36	24 42	24 48	36 30	36 36	36 42	36 48
3'	Wt/lb.	71	86	102	117	132	147	142	162	182	204
5'		121	147	173	204	230	256	249	284	319	355
7'		170	207	243	288	325	362	N/A	N/A	N/A	N/A
10'		241	293	345	405	N/A	N/A	N/A	N/A	N/A	N/A

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)

IAC Model	Static Pressure Drop, i.w.g.						
UGS	3'	0.88	0.40	0.22	0.25	0.43	0.93
	5'	1.10	0.49	0.25	0.25	0.47	1.08
	7'	1.40	0.61	0.31	0.29	0.54	1.30
	10'	1.98	0.80	0.42	0.40	0.71	1.65
Silencer Face Velocity, fpm		-1500	-1000	-750	750	1000	1500

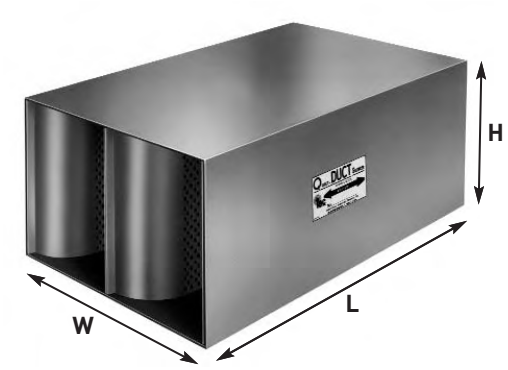
Table IV: Self-Noise Power Levels, dB re: 10-12 Watts

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								
3UGS	-1500	42	49	53	56	57	66	65	46
	-1000	33	41	45	47	51	54	43	32
	-750	34	35	38	41	44	42	29	26
	750	36	36	37	40	45	42	31	25
	1000	38	42	43	45	48	50	42	31
	1500	47	53	52	54	55	57	55	46
5UGS	-1500	41	48	53	56	57	66	65	47
	-1000	35	42	45	47	49	54	41	31
	-750	35	36	38	40	43	39	28	26
	750	31	33	37	38	42	37	26	25
	1000	34	42	44	45	47	48	40	31
	1500	47	54	53	54	53	56	54	46
7UGS	-1500	43	49	54	56	57	63	62	49
	-1000	34	43	46	48	50	54	43	33
	-750	32	37	39	39	44	41	28	26
	750	37	38	38	37	42	39	28	25
	1000	38	45	46	45	46	48	40	30
	1500	50	56	56	57	54	56	56	48
10UGS	-1500	40	46	51	56	57	61	62	49
	-1000	35	40	45	48	49	54	43	34
	-750	35	36	39	41	43	42	30	26
	750	35	39	40	41	44	42	30	25
	1000	38	46	47	47	48	50	43	33
	1500	53	58	58	58	55	58	57	49

Self-Noise values shown are for a four-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 IV.

Quiet-Duct Ultra™ / Green Silencers
Type: UGMS

Environmentally Sound Silencers with Forward & Reverse Flow Ratings



The IAC Type UGMS Quiet-Duct Ultra-Green Silencer provides that same 100% environmentally friendly attenuation solution which uses recycled acoustic fill material, instead of fiberglass, and still provides that same excellent attenuation in the medium velocity range. Type UGMS Quiet-Duct Ultra-Green 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. The UGMS Quiet-Duct Ultra-Green Silencer is very advantages in that it provides an awesome design flexibility suitable for many different types of applications based on its baffle geometry.

Designating Silencers

Model: 5UGMS-24-18
Type: UGMS **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							
3UGMS	-3000	4	6	13	25	27	19	12	9
	-2000	4	6	13	25	26	17	11	8
	-1000	5	5	12	24	25	18	11	9
	1000	4	5	11	23	24	19	14	10
	2000	4	4	11	21	24	20	15	11
	3000	3	4	10	20	23	21	15	11
5UGMS	-3000	4	11	21	41	42	30	16	11
	-2000	3	10	20	40	45	29	16	11
	-1000	2	9	19	39	43	28	16	9
	1000	2	7	16	37	42	31	20	13
	2000	2	7	15	35	42	31	20	14
	3000	2	7	15	34	42	33	20	14
7UGMS	-3000	4	18	28	43	41	41	21	13
	-2000	4	14	26	47	48	40	21	12
	-1000	3	13	24	47	51	40	20	11
	1000	2	11	21	45	50	43	25	16
	2000	3	10	20	44	50	42	26	16
	3000	2	9	20	44	50	45	28	18
10UGMS	-3000	6	18	33	42	41	44	28	16
	-2000	6	19	35	47	49	47	28	15
	-1000	5	16	32	47	51	50	28	14
	1000	4	14	29	47	51	51	32	19
	2000	4	12	26	47	51	50	34	21
	3000	4	12	25	46	46	46	37	23

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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	7.5	7.5	7.5	7.5	7.5	7.5	15	15	15	15	15	15	30	30	30
	H/In	18	24	30	36	42	48	18	24	30	36	42	48	18	24	30
3'	Wt/lb.	26	40	45	51	66	80	47	57	67	80	89	100	80	95	110
5'		46	67	80	91	112	134	80	96	114	134	150	167	135	161	187
7'		65	95	100	129	158	190	112	135	159	193	216	240	188	224	261
10'		90	135	157	180	223	270	159	192	226	273	N/A	N/A	220	319	371

Nominal Length	W/In	30	30	30	45	45	45	45	45	45	60	60	60	60	60	60
	H/In	36	42	48	18	24	30	36	42	48	18	24	30	36	42	48
3'	Wt/lb.	130	145	160	127	152	156	177	197	218	160	190	220	260	290	320
5'		22	248	274	215	257	275	310	345	381	270	322	374	44	496	548
7'		310	347	384	300	359	N/A	N/A	N/A	N/A	376	448	522	620	694	768
10'		440	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	440	638	742	880	N/A	N/A

Table III: Aerodynamic Performance

IAC Model	L/Ft	Static Pressure Drop, i.w.g.															
UGMS	3'	0.06	0.08	0.10	0.12	0.14	0.17	0.20	0.23	0.26	0.29	0.33	0.36	0.40	0.44	0.49	0.53
	5'	0.08	0.10	0.12	0.15	0.17	0.20	0.24	0.27	0.31	0.35	0.39	0.44	0.48	0.53	0.58	0.64
	7'	0.10	0.12	0.15	0.18	0.22	0.26	0.30	0.34	0.39	0.44	0.49	0.54	0.60	0.67	0.73	0.80
	10'	0.12	0.15	0.19	0.23	0.27	0.31	0.36	0.42	0.48	0.54	0.60	0.67	0.74	0.82	0.90	0.98
Silencer Face Velocity, fpm		800	900	1000	1100	1200	1300	1400	1500	1600	1700	1800	1900	2000	2100	2200	2300

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:

$PD = (\text{Actual FV}/\text{Catalog FV})^2(\text{Catalog PD})$

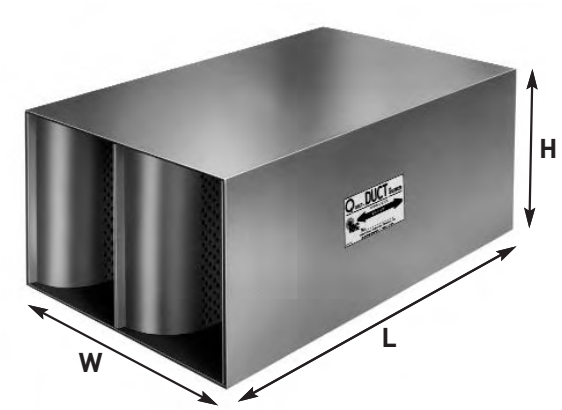
Table IV: Self-Noise Power Levels, dB re: 10-12 Watts

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								
3UGMS	-3000	46	58	60	64	63	63	65	57
	-2000	35	50	53	56	58	61	56	43
	-1000	36	38	39	44	43	37	25	26
	1000	40	33	30	34	35	32	22	25
	2000	40	45	45	47	48	52	59	40
	3000	49	58	56	57	57	59	60	54
5UGMS	-3000	45	56	59	63	63	64	66	58
	-2000	37	48	53	56	57	61	57	43
	-1000	33	37	40	42	43	39	26	26
	1000	34	32	30	32	35	29	22	25
	2000	36	44	46	46	47	52	48	38
	3000	50	57	56	57	55	59	61	54
7UGMS	-3000	45	60	63	67	66	65	68	60
	-2000	37	53	56	59	58	62	59	46
	-1000	34	39	41	42	43	39	27	26
	1000	36	32	30	32	36	32	23	26
	2000	39	47	47	47	47	53	49	40
	3000	52	59	57	58	56	58	61	54
10UGMS	-3000	46	59	64	66	65	63	67	58
	-2000	38	53	56	58	56	60	57	43
	-1000	35	42	43	43	43	39	27	26
	1000	34	33	36	37	37	31	23	26
	2000	38	49	51	53	52	54	50	41
	3000	53	61	61	62	61	61	62	55

Self-Noise values shown are for a four-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 IV.

Quiet-Duct Ultra™ / Green Silencers
Type: UGML

Environmentally Sound Silencers with Forward & Reverse Flow Ratings



The IAC Type UGML Quiet-Duct Ultra-Green Silencer provides that same 100% environmentally friendly attenuation solution which uses recycled acoustic fill material, instead of fiberglass, and still provides that same excellent attenuation in the medium-to-low velocity ranges. Type UGML Quiet-Duct Ultra-Green 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: 5UGML-24-18
Type: UGML **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							
3UGML	-3000	3	4	11	21	17	10	7	5
	-2000	2	4	10	21	17	11	7	5
	-1000	4	3	10	21	17	11	8	6
	1000	4	3	8	19	16	11	8	6
	2000	3	3	8	18	16	11	8	7
	3000	2	3	7	17	16	12	9	8
5UGML	-3000	6	8	17	35	30	16	7	4
	-2000	6	7	16	34	29	16	8	4
	-1000	5	7	16	34	29	17	9	5
	1000	4	6	14	32	28	18	10	9
	2000	4	6	13	31	29	18	11	9
	3000	4	5	13	29	29	19	12	10
7UGML	-3000	6	10	21	44	41	24	14	10
	-2000	6	9	20	43	40	23	14	10
	-1000	6	9	20	42	40	23	13	10
	1000	5	7	18	40	39	24	13	10
	2000	5	7	17	38	39	24	13	11
	3000	5	7	16	37	39	24	14	12
10UGML	-3000	7	14	28	44	44	33	17	11
	-2000	7	14	27	48	50	30	17	12
	-1000	7	12	25	47	51	30	14	11
	1000	6	10	23	48	51	30	15	11
	2000	6	10	22	48	51	31	16	12
	3000	6	9	22	48	53	32	17	14

NVLAP®

(+) 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	9	9	9	9	9	9	18	18	18	18	18	18	36	36	36
	H/In	18	24	30	36	42	48	18	24	30	36	42	48	18	24	30
3'	Wt/lb.	35	41	52	57	65	73	52	61	71	84	94	104	69	103	120
5'		60	71	82	95	107	119	87	103	121	142	158	175	120	175	201
7'		84	100	116	133	150	167	122	144	168	200	223	247	169	246	283
10'		118	141	167	190	240	215	174	203	239	284	N/A	N/A	238	349	403

Nominal Length	W/In	36	36	36	54	54	54	54	54	54	72	72	72	72	72	72
	H/In	36	42	48	18	24	30	36	42	48	18	24	30	36	42	48
3'	Wt/lb.	138	153	168	121	164	191	222	247	272	138	206	240	276	306	336
5'		239	265	291	207	278	322	381	423	466	239	350	402	478	530	582
7'		337	374	411	291	390	451	537	597	658	337	492	566	674	748	822
10'		475	N/A	N/A	412	554	642	759	N/A	N/A	475	698	806	950	N/A	N/A

Table III: Aerodynamic Performance

IAC Model	L/Ft	Static Pressure Drop, i.w.g.															
UGML	3'	0.05	0.07	0.10	0.13	0.16	0.20	0.24	0.28	0.33	0.38	0.44	0.50	0.57	0.64	0.71	0.78
	5'	0.06	0.08	0.12	0.15	0.19	0.24	0.28	0.34	0.40	0.46	0.53	0.60	0.68	0.76	0.85	0.94
	7'	0.07	0.11	0.14	0.19	0.24	0.29	0.36	0.42	0.50	0.58	0.66	0.75	0.85	0.95	1.06	1.18
	10'	0.09	0.13	0.18	0.23	0.29	0.36	0.44	0.52	0.61	0.71	0.82	0.93	1.05	1.18	1.31	1.45
Silencer Face Velocity, fpm		1000	1200	1400	1600	1800	2000	2200	2400	2600	2800	3000	3200	3400	3600	3800	4000

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:

$PD = (\text{Actual FV}/\text{Catalog FV})^2(\text{Catalog PD})$

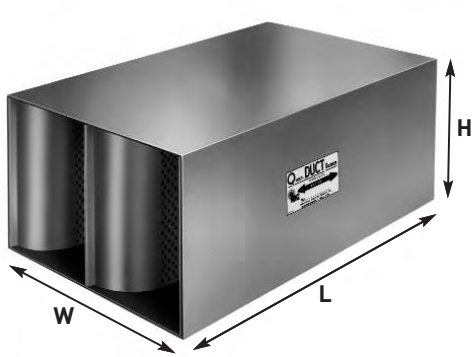
Table IV: Self-Noise Power Levels, dB re: 10-12 Watts

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								
3UGML	-3000	42	53	56	60	61	62	61	51
	-2000	33	47	51	55	56	57	50	36
	-1000	31	35	38	43	40	31	22	24
	1000	35	30	30	33	33	26	21	25
	2000	36	41	43	45	48	50	45	35
	3000	44	52	51	53	53	58	58	51
5UGML	-3000	41	59	62	66	61	62	64	51
	-2000	37	50	53	55	55	58	48	36
	-1000	34	37	37	40	39	30	22	25
	1000	33	32	32	35	35	26	22	24
	2000	34	44	46	48	49	51	45	36
	3000	44	53	55	57	56	60	59	52
7UGML	-3000	42	54	58	62	61	62	62	52
	-2000	38	48	52	55	55	57	50	38
	-1000	35	36	40	43	41	33	22	25
	1000	34	28	27	28	31	23	24	27
	2000	35	41	41	42	45	49	43	32
	3000	45	52	51	52	51	57	57	49
10UGML	-3000	42	57	61	65	63	62	64	54
	-2000	36	50	53	56	55	58	50	39
	-1000	35	38	38	40	39	30	22	24
	1000	33	30	27	28	30	21	21	24
	2000	35	40	40	42	45	50	43	33
	3000	47	53	51	52	51	57	58	51

Self-Noise values shown are for a four-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 IV.

Quiet-Duct Ultra™ / Green Silencers
Type: UGL

Environmentally Sound Silencers with Forward & Reverse Flow Ratings



Designating Silencers

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

The IAC Type UGL Quiet-Duct Ultra™/Green Silencers, has the 100% environmentally friendly attenuation solution which uses recycled acoustic fill material, instead of fiberglass and still provides that same improved lower frequency attenuation and aerodynamic performance as well. Type UGL Quiet-Duct Ultra™/Green 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. Type UGL Silencers are advantageous where low frequency acoustic performance is essential to the HVAC system.

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							
3UGL	-3000	1	5	9	16	21	18	10	7
	-2000	1	5	9	15	20	18	10	7
	-1000	1	4	8	15	19	18	10	7
	1000	1	4	7	14	18	19	11	8
	2000	1	4	7	13	18	19	11	8
	3000	1	4	7	13	17	19	12	8
5UGL	-3000	3	9	15	26	35	31	14	8
	-2000	4	8	14	25	33	31	14	9
	-1000	3	7	13	24	33	31	14	9
	1000	3	6	12	23	30	31	15	12
	2000	2	6	11	22	29	31	16	11
	3000	3	5	11	21	28	31	17	11
7UGL	-3000	3	13	19	35	40	38	17	10
	-2000	4	10	18	34	41	39	16	10
	-1000	4	9	17	32	40	38	16	10
	1000	3	8	14	30	38	39	18	12
	2000	3	8	14	29	37	39	19	12
	3000	2	7	14	28	35	39	20	12
10UGL	-3000	5	18	28	47	44	42	21	11
	-2000	7	14	25	45	47	46	21	11
	-1000	7	12	23	43	47	46	21	12
	1000	7	10	21	41	48	47	23	16
	2000	6	10	20	40	47	47	25	17
	3000	5	10	19	39	47	47	27	18

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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 H/In	6 12	12 12	12 18	12 24	12 30	12 36	12 42	12 48
3'	Wt/lb.	24	33	43	52	62	74	83	93
5'		41	56	73	89	107	125	141	158
7'		59	78	102	125	150	176	199	266
10'		81	111	155	177	212	250	N/A	N/A

Nominal Length	W/In H/In	24 18	24 24	24 30	24 36	24 42	24 48	36 24	36 30	36 36	36 42	36 48	48 30	48 36	48 42	48 48
3'	Wt/lb.	71	86	102	117	132	147	121	143	163	184	205	182	209	235	261
5'		121	147	173	204	230	256	211	245	279	312	346	312	353	395	438
7'		170	207	243	288	325	362	286	351	398	445	492	N/A	N/A	N/A	N/A
10'		241	293	345	405	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

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:

$PD = (Actual\ FV/Catalog\ FV)^2(Catalog\ PD)$

IAC Model	Static Pressure Drop, i.w.g.						
UGL	3'	0.48	0.21	0.05	0.06	0.25	0.61
	5'	0.60	0.26	0.06	0.07	0.27	0.64
	7'	0.75	0.30	0.07	0.08	0.30	0.72
	10'	0.99	0.41	0.10	0.09	0.35	0.83
Silencer Face Velocity, fpm		-3000	-2000	-1000	1000	2000	3000

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								
3UGL	-3000	50	55	58	61	64	69	66	52
	-2000	37	49	53	56	61	61	48	34
	-1000	38	34	38	41	41	31	23	26
	1000	33	30	33	36	36	28	23	26
	2000	41	45	47	49	52	52	45	32
	3000	62	64	58	59	60	61	59	50
5UGL	-3000	48	53	55	58	62	65	64	52
	-2000	36	46	51	53	59	60	50	35
	-1000	34	35	37	40	42	31	23	26
	1000	34	30	29	32	33	24	24	25
	2000	35	43	43	43	49	50	42	30
	3000	48	54	54	54	56	59	57	49
7UGL	-3000	48	54	56	59	63	69	66	52
	-2000	42	46	52	53	60	60	48	35
	-1000	33	31	34	38	41	30	23	26
	1000	32	31	30	33	34	23	22	26
	2000	36	45	45	45	50	52	43	31
	3000	54	56	56	56	57	61	59	50
10UGL	-3000	51	54	55	57	61	66	64	52
	-2000	37	47	51	52	58	59	48	37
	-1000	34	32	35	39	40	29	23	26
	1000	32	28	26	31	32	22	23	26
	2000	35	44	44	43	49	50	41	30
	3000	52	56	56	55	55	60	57	49

Self-Noise values shown are for a four-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 IV.