Rectangular Attenuators

- **Standard Attenuators**
- **Low Frequency Attenuators**
- **Hospital/Clean Room Attenuators**
- **Low Frequency Hospital/Clean Room Attenuators**
- **Elbow Attenuators**

Standard Attenuators

HP
MP
LP
SELF-NOISE POWER LEVELS
SOUND ATTENUATOR INSTALLATION INSTRUCTIONS

Standard Attenuators

Standard attenuators are available in three models for traditional applications requiring broad band noise reduction. Performance data is provided for four basic lengths - 36", 60", 84", and 120". Units are also offered in 48", 72", and 96" lengths.

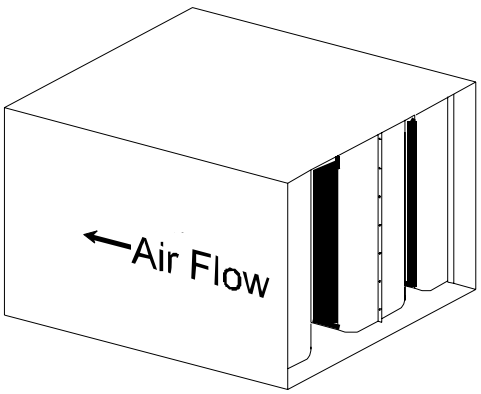
Model HP is a standard pressure drop unit ideally suited for system velocities at or near 1,000 fpm.

Model MP also provides excellent attenuation values along with a moderate pressure drop at somewhat higher air velocities.

Model LP offers the lowest pressure drop for higher velocity systems.

Special features of our Standard Attenuators are:

- **Diffusion angle to improve pressure drop**
- **Bellmouth entrance to help minimize turbulence**
- **22 gauge galvanized steel casings**
- **24 gauge perforated galvanized baffles**
- **Long strand Fiberglass acoustical fill**
- **Seams are mastic filled to insure airtight units to 8" w.g.**
- **Optional polyethylene, Mylar or fiberglass cloth liners**



ASTM E-84 ratings for the acoustical fill are:

- **Flamespread 25**
- **Smoke Developed 50**

Components are also available in stainless steel or aluminum construction.

Acoustical performance ratings are based on tests conducted by Intertek Testing Services, formerly ETL Testing Laboratories, Inc., Cortland, New York, in accordance with ASTM E477 "Standard Method of Testing Duct Liner Materials and Prefabricated Silencers for Acoustical and Airflow Performance." Copies of the test reports are available upon request.

Standard Attenuator - Model HP

Model	Flow	Velocity fpm	Press Drop	Dynamic Insertion Loss (dB) Octave Band/Center Frequency (Hz) 1 63	2 125	3 250	4 500	5 1K	6 2K	7 4K	8 8K
HP-36	Reverse Flow	-1500	0.43	6	11	17	27	38	32	20	13
		-1000	0.19	6	10	16	26	37	32	20	14
		-500	0.05	6	10	15	26	37	33	20	14
		0		5	9	15	25	37	33	22	14
	Forward Flow	500	0.05	5	8	14	24	36	33	23	15
		1000	0.19	5	8	14	24	36	33	23	15
		1500	0.43	5	8	14	24	35	34	24	15
HP-60	Reverse Flow	-1500	0.59	8	18	28	36	42	37	30	18
		-1000	0.26	8	17	26	37	45	41	31	19
		-500	0.07	8	16	24	38	47	48	32	19
		0		7	15	23	35	48	48	35	21
	Forward Flow	500	0.07	7	14	22	35	47	47	35	22
		1000	0.26	7	13	21	35	46	46	35	22
		1500	0.59	7	13	20	34	45	44	35	23
HP-84	Reverse Flow	-1500	0.77	11	24	38	45	46	42	39	23
		-1000	0.34	11	23	35	48	52	49	42	24
		-500	0.09	9	21	33	49	58	62	44	24
		0		9	20	31	48	58	62	47	27
	Forward Flow	500	0.09	9	18	30	47	59	65	47	28
		1000	0.34	9	17	28	45	57	59	47	29
		1500	0.77	8	17	26	43	54	49	47	30
HP-120	Reverse Flow	-1500	1.15	13	29	48	55	62	63	50	34
		-1000	0.51	12	29	47	54	62	63	50	34
		-500	0.13	12	28	46	52	62	64	49	32
		0		11	28	45	51	63	65	49	32
	Forward Flow	500	0.13	10	28	44	50	62	65	49	31
		1000	0.51	10	26	43	49	61	66	49	33
		1500	1.15	9	25	42	49	60	66	49	34

Forward Flow - characteristic of supply or discharge fan systems.
Reverse Flow - typical of return or intake fan systems.

Pressure Drop Calculation for Specific Velocity

Actual Velocity (fpm) = CFM x 144 ÷ [Height (in.) x Width (in.)]

$$\text{Pressure Drop} = \left(\frac{\text{Actual Velocity}}{1500}\right)^2 \times \text{Catalog Pressure Drop @ 1500 fpm}$$

Standard Construction

- 22 gauge galvanized casings
- 24 gauge perforated baffles
- Acoustic quality Fiberglass media

Optional Features

- Mylar or polyethylene liners
- Fiberglass cloth liners
- Stainless steel or aluminum construction

Computer program available which provides attenuator performance at actual job conditions.

Low Frequency Attenuators

LHP
LMP
LLP
SELF-NOISE POWER LEVELS
SOUND ATTENUATOR INSTALLATION INSTRUCTIONS

Standard Attenuator - Model MP

				Dynamic Insertion Loss (dB) Octave Band/Center Frequency (Hz)							
Model	Flow	Velocity fpm	Press Drop	1 63	2 125	3 250	4 500	5 1K	6 2K	7 4K	8 8K
MP-36	Reverse Flow	-2000	0.40	5	10	13	22	31	22	12	10
		-1500	0.23	5	9	13	21	31	22	13	10
		-1000	0.10	4	9	13	21	31	23	14	10
		0		3	8	12	21	31	24	16	11
	Forward Flow	1000	0.10	5	8	11	20	30	25	17	12
		1500	0.23	4	8	11	20	30	25	17	12
		2000	0.40	3	7	11	19	29	25	17	12
MP-60	Reverse Flow	-2000	0.52	8	15	21	31	37	31	20	13
		-1500	0.29	7	14	20	33	39	33	21	13
		-1000	0.13	6	13	20	33	41	37	22	13
		0		5	12	18	33	44	40	25	15
	Forward Flow	1000	0.13	6	11	18	30	44	42	25	17
		1500	0.29	5	11	17	29	43	40	25	17
		2000	0.52	5	10	16	29	41	37	26	18
MP-84	Reverse Flow	-2000	0.60	10	19	29	40	42	40	27	15
		-1500	0.34	9	18	27	44	47	44	28	16
		-1000	0.15	8	17	26	45	51	50	29	17
		0		7	16	24	44	56	55	33	20
	Forward Flow	1000	0.15	7	14	22	40	58	59	33	22
		1500	0.34	7	14	21	39	56	54	34	23
		2000	0.60	6	13	20	38	53	49	35	24
MP-120	Reverse Flow	-2000	0.84	11	23	38	50	61	59	36	25
		-1500	0.47	10	22	38	49	61	58	35	25
		-1000	0.21	10	22	37	48	60	58	34	24
		0		9	22	37	47	59	57	33	22
	Forward Flow	1000	0.21	9	21	37	46	58	57	34	25
		1500	0.47	9	21	37	46	58	57	34	25
		2000	0.84	8	21	36	45	58	56	35	25

Forward Flow - characteristic of supply or discharge fan systems.
Reverse Flow - typical of return or intake fan systems.

Pressure Drop Calculation for Specific Velocity

Actual Velocity (fpm) = CFM x 144 ÷ [Height (in.) x Width (in.)]

$$\text{Pressure Drop} = \left(\frac{\text{Actual Velocity}}{2000}\right)^2 \times \text{Catalog Pressure Drop @ 2000 fpm}$$

Standard Construction

22 gauge galvanized casings
24 gauge perforated baffles
Acoustic quality Fiberglass media

Optional Features

Mylar or polyethylene liners
Fiberglass cloth liners
Stainless steel or aluminum construction

Computer program available which provides attenuator performance at actual job conditions.

Standard Attenuator - Model LP

				Dynamic Insertion Loss (dB) Octave Band/Center Frequency (Hz)							
Model	**Flow**	**Velocity fpm**	**Press Drop**	**1 63**	**2 125**	**3 250**	**4 500**	**5 1K**	**6 2K**	**7 4K**	**8 8K**
		-2000	0.20	5	8	11	18	27	18	11	9
	Reverse	-1500	0.11	5	7	10	18	27	18	11	8
	Flow	-1000	0.05	5	7	10	18	27	19	11	8
LP-36		0		4	6	9	17	27	19	12	9
	Forward	1000	0.05	5	7	9	16	27	20	13	10
	Flow	1500	0.11	5	7	9	16	27	20	13	10
		2000	0.20	4	6	9	16	26	20	14	10
		-2000	0.23	6	11	16	29	36	29	16	11
	Reverse	-1500	0.13	6	10	15	29	39	29	16	10
	Flow	-1000	0.06	6	10	15	28	40	30	17	10
LP-60		0		5	9	14	27	42	31	18	12
	Forward	1000	0.06	6	9	13	25	42	32	19	13
	Flow	1500	0.13	6	9	13	25	41	32	19	13
		2000	0.23	6	8	13	24	40	32	20	13
		-2000	0.26	8	14	20	39	45	39	20	12
	Reverse	-1500	0.15	8	13	20	39	50	40	21	12
	Flow	-1000	0.07	7	13	19	38	52	41	22	12
LP-84		0		7	12	18	36	56	42	24	14
	Forward	1000	0.07	7	11	17	33	56	43	25	16
	Flow	1500	0.15	7	11	17	33	55	43	25	16
		2000	0.26	7	10	16	32	54	43	26	16
		-2000	0.30	9	18	27	48	61	49	34	17
	Reverse	-1500	0.17	9	18	26	47	60	49	33	17
	Flow	-1000	0.08	8	17	26	46	60	48	32	17
LP-120		0		7	16	26	45	58	48	31	16
	Forward	1000	0.08	7	15	26	44	56	48	30	17
	Flow	1500	0.17	7	15	26	44	56	48	30	17
		2000	0.30	7	14	26	43	56	48	31	17

Forward Flow - characteristic of supply or discharge fan systems.
Reverse Flow - typical of return or intake fan systems.

Pressure Drop Calculation for Specific Velocity

Actual Velocity (fpm) = CFM x 144 ÷ [Height (in.) x Width (in.)]

Pressure Drop = $\left(\frac{\text{Actual Velocity}}{2000}\right)^2$ x Catalog Pressure Drop @ 2000 fpm

Standard Construction

22 gauge galvanized casings
24 gauge perforated baffles
Acoustic quality Fiberglass media

Optional Features

Mylar or polyethylene liners
Fiberglass cloth liners
Stainless steel or aluminum construction

Computer program available which provides attenuator performance at actual job conditions.

Rectangular Attenuators

Self-noise Power Levels

		Self-Noise Power Levels, dB re 10^{-12} Watts Octave Band/Center Frequency (Hz)							
Model	Velocity fpm	1 63	2 125	3 250	4 500	5 1K	6 2K	7 4K	8 8K
HP	1000	53	44	38	37	41	44	38	31
	1500	58	53	47	46	47	54	53	48
	2000	71	62	55	54	52	59	63	59
MP	1000	55	48	37	35	37	35	27	27
	2000	61	57	52	49	48	55	55	50
	2500	70	63	58	55	53	59	62	58
LP	1000	53	42	37	35	35	29	22	27
	2000	60	56	52	49	48	55	51	44
	2500	67	62	57	55	52	59	59	53
LHP	1000	56	41	41	47	46	41	30	30
	1500	56	47	45	48	53	59	56	48
	2000	63	55	49	51	54	63	67	60
LMP	1000	47	39	37	37	39	39	24	22
	1500	50	43	47	48	45	46	36	30
	2000	52	49	59	55	52	54	49	40
LLP	1000	45	37	34	35	36	36	22	20
	1500	46	41	40	39	41	44	30	29
	2000	47	44	48	47	48	53	45	39
SLLP	1000	44	36	33	34	35	35	21	19
	1500	45	40	39	38	40	43	29	28
	2000	46	43	47	46	47	52	44	38

Area Correction Factors - Listed self-noise power levels are for silencers with a face area of four (4) square feet. For silencers with different face areas, the following values must be added to those in the table.

Face area (sq. ft.)	0.5	1	2	4	6	8	16	32	64	128
PWL Correction Factors, dB	-9	-6	-3	0	2	3	6	9	12	15

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Khalid Manufacturing Company

Installation and Maintenance location Guidelines

AEROSONICS

Sound Attenuator Installation Instructions

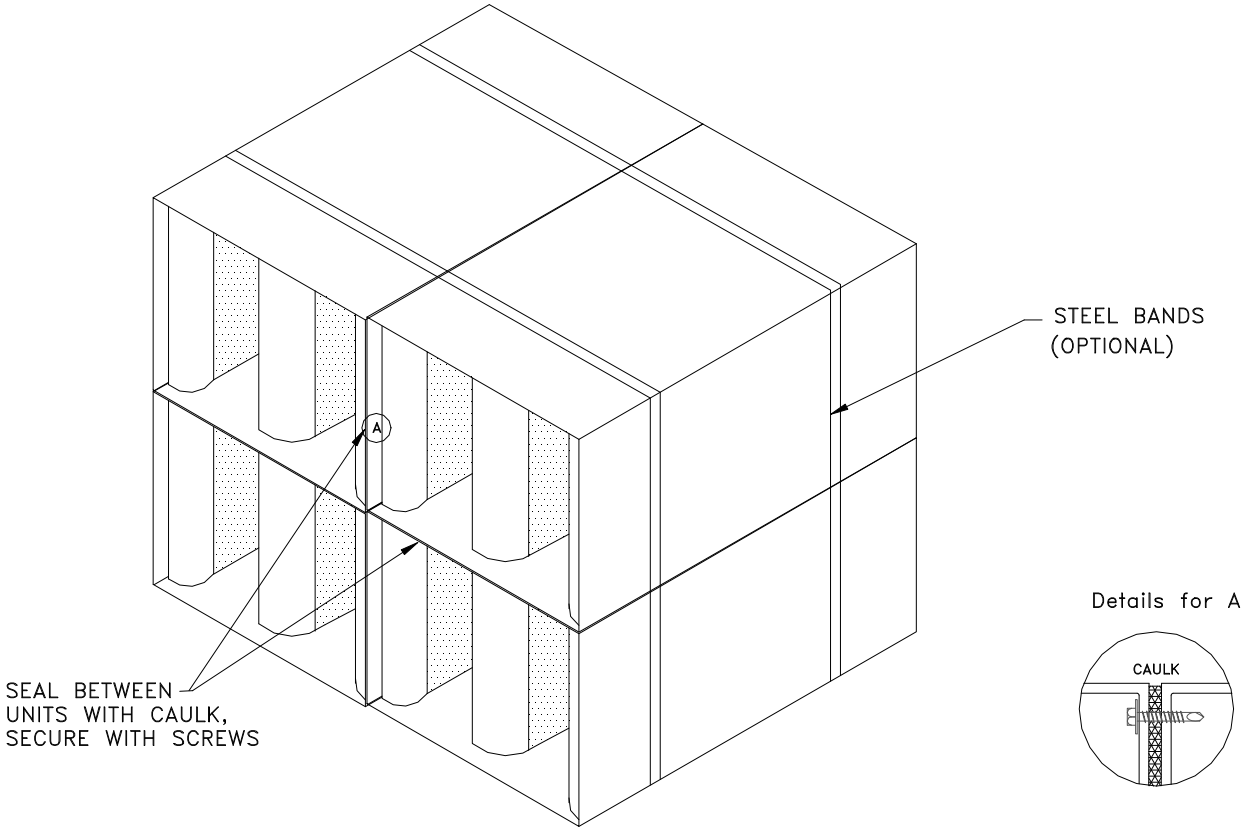
Typical connections to ducts for single units include:

Slip or lap joint using screws and sealing tape.

Flanged, gasketed, and bolted connections (gasket & bolts by others).

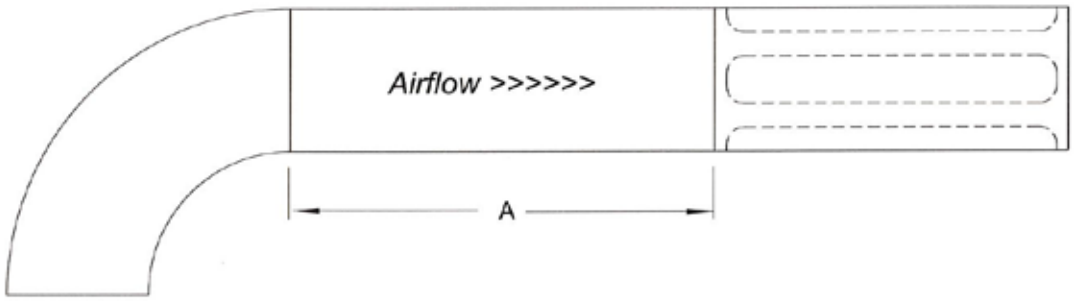
Multiple units utilize the same connection methods as used for single units. Individual units are stacked atop and beside each other to form the overall bank. To stabilize the bank, use draw bands or tack welds to hold the casings in position. Take special care to seal between the edges of each unit to prevent air from passing between the units. Nose clips or sheet metal screws with a caulk or sealant is a common solution in this area.

Attenuators have no moving parts. Only general cleaning is required periodically, normally done when the duct itself is inspected and cleaned. Wiping the interior wall of the units with a damp cloth will generally remove any dust and dirt build-up. Minimal amounts of water can be used to remove heavy soil, but saturating the insulation is not recommended.



General Guidelines for Location of Rectangular Duct Silencers

Silencers located near elbows



A = 3 x equivalent diameter

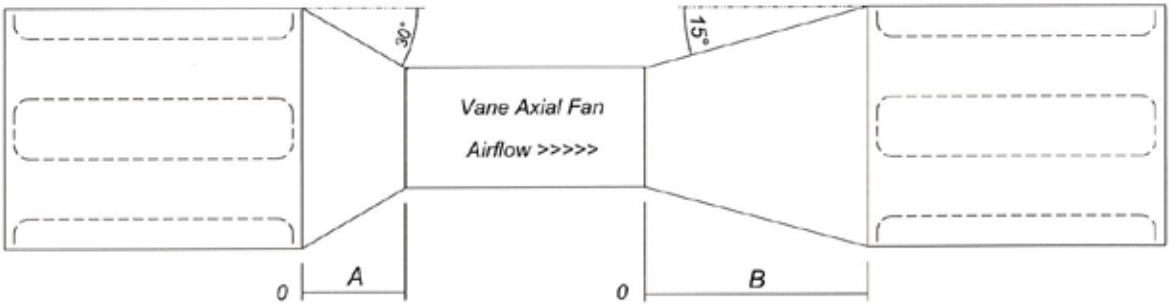
Silencers located next to Coils or Filters

Coil or Filter *Coil or Filter*

Distances should be doubled when using Low Frequency Silencers

General Guidelines for Location of Rectangular Duct Silencers

Vane Axial Fan Silencers



Rectangular Silencers

A = 0.75 x duct equivalent diameter

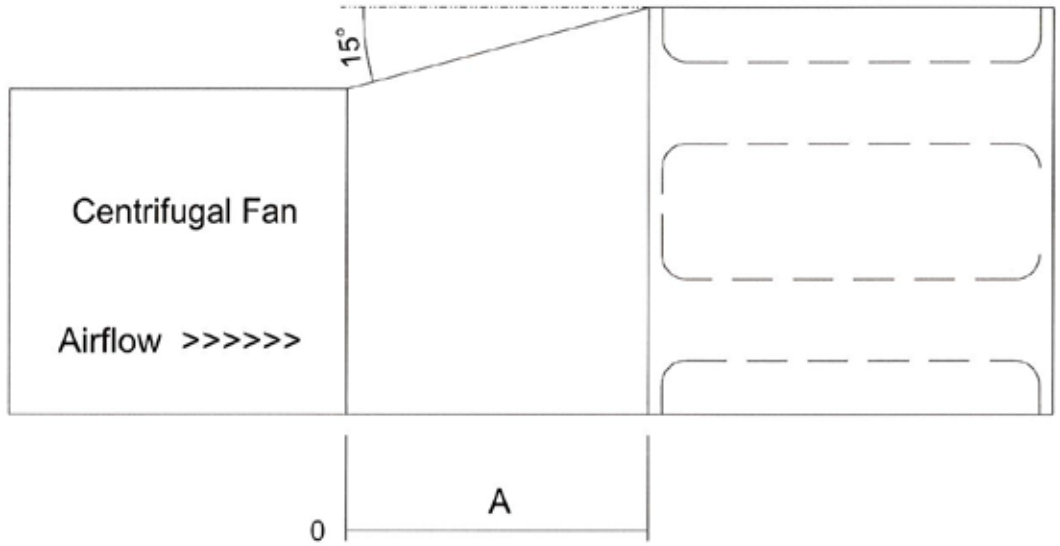
$$B = \frac{\text{Face Velocity (fpm)}}{1000} \times \text{equivalent duct diameter}$$

Tubular Silencer

A and B = 0 when silencer bullet is matched to fan hub diameter

General Guidelines for Location of Rectangular Duct Silencers

Centrifugal Fans



$$A = \frac{\text{Face Velocity (fpm)}}{1000} \times \text{equivalent duct diameter}$$

Low Frequency Attenuators

Low Frequency attenuators are available in three models for specific applications requiring increased 2 nd & 3rd octave band noise reduction. Performance data is provided for four basic lengths - 36”, 60”, 84”, and 120”. Units are also offered in 48”, 72”, and 96” lengths.

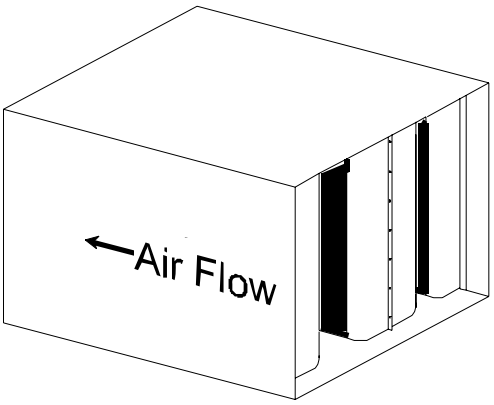
Model LHP is a standard pressure drop unit ideally suited for system velocities below 1,000 fpm.

Model LMP also provides excellent low frequency attenuation values along with a moderate pressure drop at somewhat higher air velocities.

Model LLP offers a lower pressure drop for higher velocity systems.

Special features of our Low Frequency Attenuators are:

- Diffusion angle to improve pressure drop
- Bellmouth entrance to help minimize turbulence
- 22 gauge galvanized steel casings
- 24 gauge perforated galvanized baffles
- Long strand Fiberglass acoustical fill
- Seams are mastic filled to insure airtight units to 8” w.g.
- Optional polyethylene, Mylar or fiberglass cloth liners



ASTM E-84 ratings for the acoustical fill are:

- Flamespread **25**
- Smoke Developed **50**

Components are also available in stainless steel or aluminum construction.

Acoustical performance ratings are based on tests conducted by Intertek Testing Services, formerly ETL Testing Laboratories, Inc., Cortland, New York, in accordance with ASTM E477 “Standard Method of Testing Duct Liner Materials and Prefabricated Silencers for Acoustical and Airflow Performance.” Copies of the test reports are available upon request.

Low Frequency Attenuator - Model LHP

				Dynamic Insertion Loss (dB) Octave Band/Center Frequency (Hz)							
Model	Flow	Velocity fpm	Press Drop	1 63	2 125	3 250	4 500	5 1K	6 2K	7 4K	8 8K
LHP-36	Reverse Flow	-1500	1.48	8	13	21	27	31	25	19	13
		-1000	0.66	8	12	20	27	30	25	19	13
		-500	0.17	7	12	19	26	29	26	18	12
		0		7	12	19	26	29	26	18	12
	Forward Flow	500	0.17	7	12	19	25	29	26	17	12
		1000	0.66	7	12	19	24	28	27	16	13
		1500	1.48	7	11	18	23	27	28	15	14
LHP-60	Reverse Flow	-1500	1.62	11	21	30	35	43	31	23	14
		-1000	0.72	11	21	28	35	42	32	23	14
		-500	0.18	11	20	28	33	41	32	21	13
		0		10	19	27	32	41	33	20	13
	Forward Flow	500	0.18	10	19	27	31	40	33	20	13
		1000	0.72	10	18	26	30	39	33	20	14
		1500	1.62	10	17	25	30	38	33	20	14
LHP-84	Reverse Flow	-1500	2.11	15	26	40	48	52	35	27	17
		-1000	0.94	15	26	39	47	51	35	27	16
		-500	0.24	13	25	39	47	51	35	26	16
		0		13	24	37	46	50	36	25	16
	Forward Flow	500	0.24	13	23	36	45	49	36	24	17
		1000	0.94	13	22	35	45	47	37	24	17
		1500	2.11	12	21	35	44	46	37	23	18
LHP-120	Reverse Flow	-1500	2.70	17	31	49	52	51	43	36	20
		-1000	1.20	17	31	49	52	52	43	35	19
		-500	0.30	16	30	49	51	52	44	35	19
		0		15	30	48	51	52	44	34	18
	Forward Flow	500	0.30	15	29	46	51	51	44	32	18
		1000	1.20	14	28	46	51	51	45	32	19
		1500	2.70	14	27	45	50	51	46	31	19

Forward Flow - characteristic of supply or discharge fan systems.
Reverse Flow - typical of return or intake fan systems.

Pressure Drop Calculation for Specific Velocity

Actual Velocity (fpm) = CFM x 144 ÷ [Height (in.) x Width (in.)]

$$\text{Pressure Drop} = \left(\frac{\text{Actual Velocity}}{1500}\right)^2 \times \text{Catalog Pressure Drop @ 1500 fpm}$$

Standard Construction

- 22 gauge galvanized casings
- 24 gauge perforated baffles
- Acoustic quality Fiberglass media

Optional Features

- Mylar or polyethylene liners
- Fiberglass cloth liners
- Stainless steel or aluminum construction

Computer program available which provides attenuator performance at actual job conditions.

Low Frequency Attenuator - Model LMP

				Dynamic Insertion Loss (dB) Octave Band/Center Frequency (Hz)							
Model	**Flow**	**Velocity fpm**	**Press Drop**	**1 63**	**2 125**	**3 250**	**4 500**	**5 1K**	**6 2K**	**7 4K**	**8 8K**
		-2000	0.80	7	9	18	21	18	15	11	9
	Reverse	-1500	0.45	7	9	17	20	18	14	11	9
	Flow	-1000	0.20	6	8	16	19	17	14	11	9
LMP-36		0		5	8	15	19	17	14	10	9
	Forward	1000	0.20	5	8	15	19	16	13	10	8
	Flow	1500	0.45	5	8	15	19	16	13	10	8
		2000	0.80	5	7	15	18	16	13	10	8
		-2000	0.96	10	16	27	33	30	26	15	11
	Reverse	-1500	0.54	10	16	26	32	29	25	14	11
	Flow	-1000	0.24	9	15	25	30	29	25	14	10
LMP-60		0		8	14	24	30	28	23	14	10
	Forward	1000	0.24	7	13	22	28	26	21	14	9
	Flow	1500	0.54	7	13	22	28	26	21	13	9
		2000	0.96	7	13	22	27	26	20	13	9
		-2000	1.08	12	19	33	44	41	29	18	14
	Reverse	-1500	0.61	12	19	32	43	40	29	17	13
	Flow	-1000	0.27	11	18	32	42	40	29	17	13
LMP-84		0		11	18	31	42	40	29	17	13
	Forward	1000	0.27	11	17	30	40	39	28	16	13
	Flow	1500	0.61	11	17	29	40	39	28	16	13
		2000	1.08	10	16	28	39	39	28	16	12
		-2000	1.24	15	25	43	51	48	34	22	17
	Reverse	-1500	0.70	14	24	43	50	49	34	22	17
	Flow	-1000	0.31	14	24	42	50	49	34	21	16
LMP-120		0		13	23	42	50	49	34	21	16
	Forward	1000	0.31	13	23	41	50	49	33	20	16
	Flow	1500	0.70	13	23	40	50	49	33	20	16
		2000	1.24	12	22	39	49	48	33	19	16

Forward Flow - characteristic of supply or discharge fan systems.
Reverse Flow - typical of return or intake fan systems.

Pressure Drop Calculation for Specific Velocity

Actual Velocity (fpm) = CFM x 144 ÷ [Height (in.) x Width (in.)]

$$\text{Pressure Drop} = \left(\frac{\text{Actual Velocity}}{2000}\right)^2 \times \text{Catalog Pressure Drop @ 2000 fpm}$$

Standard Construction

22 gauge galvanized casings
24 gauge perforated baffles
Acoustic quality Fiberglass media

Optional Features

Mylar or polyethylene liners
Fiberglass cloth liners
Stainless steel or aluminum construction

Computer program available which provides attenuator performance at actual job conditions.

Low Frequency Attenuator - Model LLP

				Dynamic Insertion Loss (dB) Octave Band/Center Frequency (Hz)							
Model	Flow	Velocity fpm	Press Drop	1 63	2 125	3 250	4 500	5 1K	6 2K	7 4K	8 8K
LLP-36	Reverse Flow	-2000	0.48	4	7	13	18	16	12	12	10
		-1500	0.27	4	7	12	17	15	12	12	9
		-1000	0.12	4	7	12	17	15	12	12	9
		0		3	6	12	16	15	11	11	9
	Forward Flow	1000	0.12	3	5	11	15	15	10	10	8
		1500	0.27	3	5	11	15	15	10	10	8
		2000	0.48	3	5	11	14	14	9	9	7
LLP-60	Reverse Flow	-2000	0.52	7	12	18	25	24	18	13	12
		-1500	0.29	7	12	18	25	24	18	13	12
		-1000	0.13	6	11	18	24	23	17	12	11
		0		6	10	17	23	22	17	12	10
	Forward Flow	1000	0.13	6	10	17	22	20	16	11	10
		1500	0.29	6	10	17	22	20	16	11	10
		2000	0.52	6	9	16	21	20	15	10	10
LLP-84	Reverse Flow	-2000	0.56	10	14	24	32	30	24	16	12
		-1500	0.31	10	14	24	32	30	24	16	12
		-1000	0.14	9	13	23	32	29	24	15	12
		0		9	13	22	32	29	24	15	11
	Forward Flow	1000	0.14	9	12	20	30	27	22	14	10
		1500	0.31	9	12	20	30	27	21	14	10
		2000	0.56	8	12	20	29	27	20	13	10
LLP-120	Reverse Flow	-2000	0.60	11	19	31	43	40	27	20	15
		-1500	0.34	11	19	31	43	40	27	20	15
		-1000	0.15	11	18	31	43	40	27	19	15
		0		11	17	30	42	39	26	19	15
	Forward Flow	1000	0.15	10	17	30	41	39	26	18	14
		1500	0.34	10	17	30	41	39	26	18	14
		2000	0.60	9	16	29	40	39	26	18	14

Forward Flow - characteristic of supply or discharge fan systems.
Reverse Flow - typical of return or intake fan systems.

Pressure Drop Calculation for Specific Velocity

Actual Velocity (fpm) = CFM x 144 ÷ [Height (in.) x Width (in.)]

$$\text{Pressure Drop} = \left(\frac{\text{Actual Velocity}}{2000}\right)^2 \times \text{Catalog Pressure Drop @ 2000 fpm}$$

Standard Construction

- 22 gauge galvanized casings
- 24 gauge perforated baffles
- Acoustic quality Fiberglass media

Optional Features

- Mylar or polyethylene liners
- Fiberglass cloth liners
- Stainless steel or aluminum construction

Computer program available which provides attenuator performance at actual job conditions.

Rectangular Attenuators

Self-noise Power Levels

		Self-Noise Power Levels, dB re 10^{-12} Watts Octave Band/Center Frequency (Hz)							
Model	Velocity fpm	1 63	2 125	3 250	4 500	5 1K	6 2K	7 4K	8 8K
HP	1000	53	44	38	37	41	44	38	31
	1500	58	53	47	46	47	54	53	48
	2000	71	62	55	54	52	59	63	59
MP	1000	55	48	37	35	37	35	27	27
	2000	61	57	52	49	48	55	55	50
	2500	70	63	58	55	53	59	62	58
LP	1000	53	42	37	35	35	29	22	27
	2000	60	56	52	49	48	55	51	44
	2500	67	62	57	55	52	59	59	53
LHP	1000	56	41	41	47	46	41	30	30
	1500	56	47	45	48	53	59	56	48
	2000	63	55	49	51	54	63	67	60
LMP	1000	47	39	37	37	39	39	24	22
	1500	50	43	47	48	45	46	36	30
	2000	52	49	59	55	52	54	49	40
LLP	1000	45	37	34	35	36	36	22	20
	1500	46	41	40	39	41	44	30	29
	2000	47	44	48	47	48	53	45	39
SLLP	1000	44	36	33	34	35	35	21	19
	1500	45	40	39	38	40	43	29	28
	2000	46	43	47	46	47	52	44	38

Area Correction Factors - Listed self-noise power levels are for silencers with a face area of four (4) square feet. For silencers with different face areas, the following values must be added to those in the table.

Face area (sq. ft.)	0.5	1	2	4	6	8	16	32	64	128
PWL Correction Factors, dB	-9	-6	-3	0	2	3	6	9	12	15

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Khalid Manufacturing Company

Installation and Maintenance location Guidelines

AEROSONICS

Sound Attenuator Installation Instructions

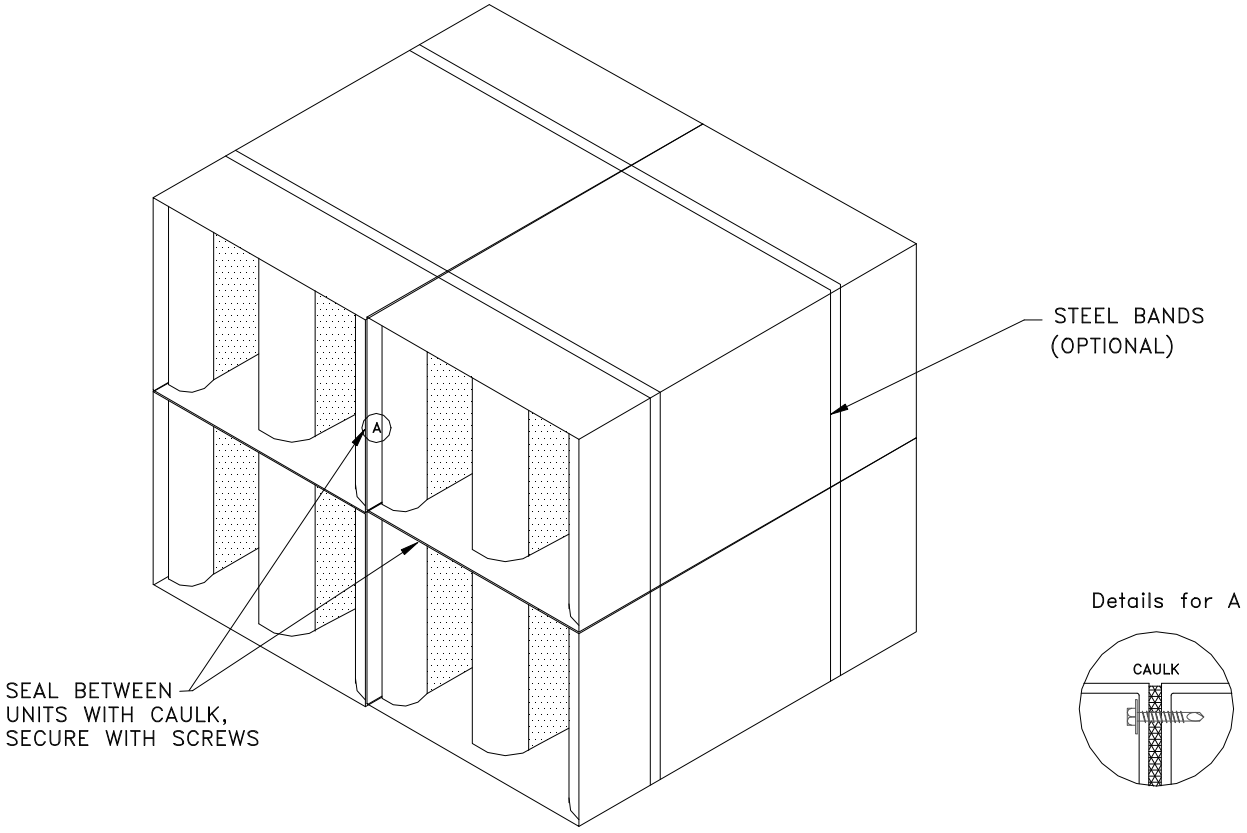
Typical connections to ducts for single units include:

Slip or lap joint using screws and sealing tape.

Flanged, gasketed, and bolted connections (gasket & bolts by others).

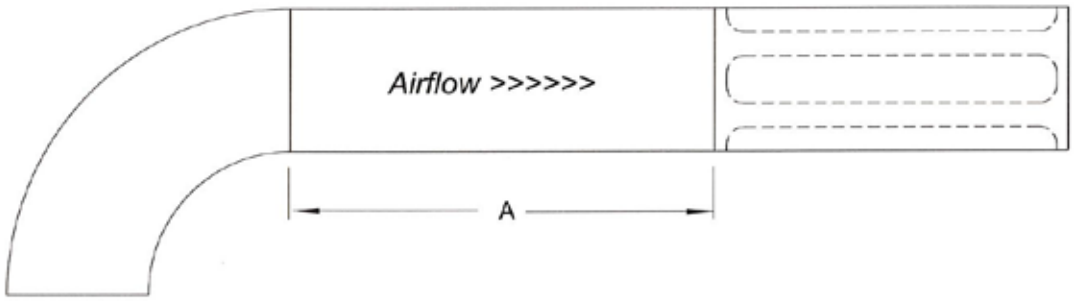
Multiple units utilize the same connection methods as used for single units. Individual units are stacked atop and beside each other to form the overall bank. To stabilize the bank, use draw bands or tack welds to hold the casings in position. Take special care to seal between the edges of each unit to prevent air from passing between the units. Nose clips or sheet metal screws with a caulk or sealant is a common solution in this area.

Attenuators have no moving parts. Only general cleaning is required periodically, normally done when the duct itself is inspected and cleaned. Wiping the interior wall of the units with a damp cloth will generally remove any dust and dirt build-up. Minimal amounts of water can be used to remove heavy soil, but saturating the insulation is not recommended.



General Guidelines for Location of Rectangular Duct Silencers

Silencers located near elbows



A = 3 x equivalent diameter

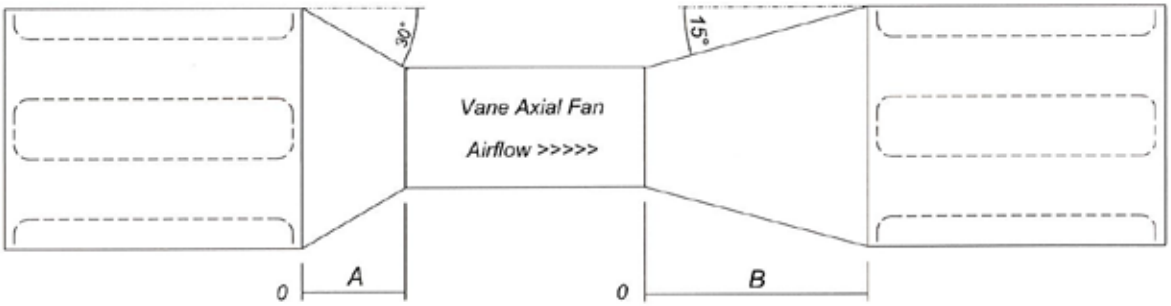
Silencers located next to Coils or Filters

Coil or Filter *Coil or Filter*

Distances should be doubled when using Low Frequency Silencers

General Guidelines for Location of Rectangular Duct Silencers

Vane Axial Fan Silencers



Rectangular Silencers

A = 0.75 x duct equivalent diameter

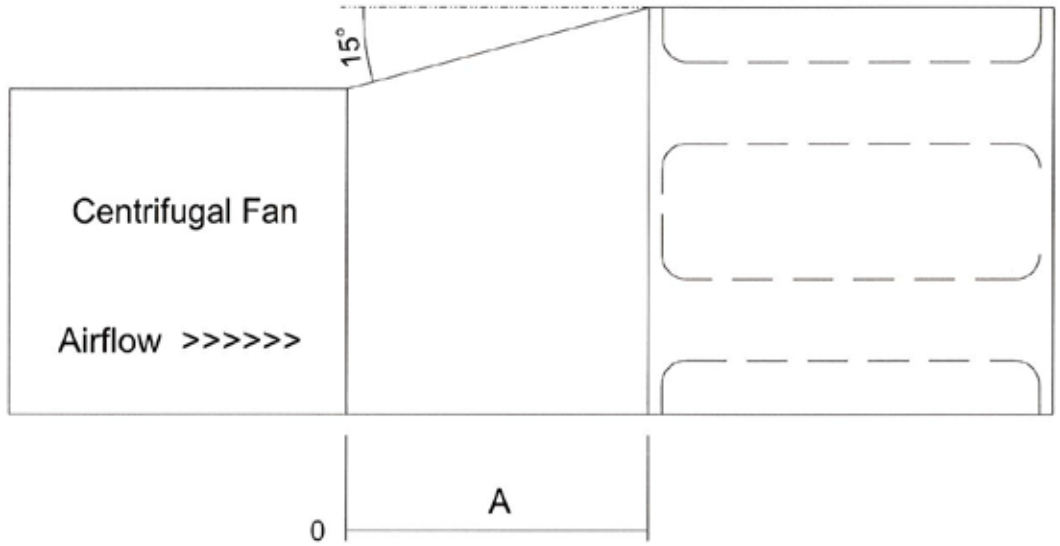
$$B = \frac{\text{Face Velocity (fpm)}}{1000} \times \text{equivalent duct diameter}$$

Tubular Silencer

A and B = 0 when silencer bullet is matched to fan hub diameter

General Guidelines for Location of Rectangular Duct Silencers

Centrifugal Fans



$$A = \frac{\text{Face Velocity (fpm)}}{1000} \times \text{equivalent duct diameter}$$

Hospital/Clean Room Attenuators

SPC
MPC
LPC
SELF-NOISE POWER LEVELS
SOUND ATTENUATOR INSTALLATION INSTRUCTIONS

Hospital/Clean Room Attenuators

Hospital/Clean Room attenuators are available in three models, specifically engineered for sensitive area applications requiring broad band noise reduction coupled with erosion proof acoustic fill. Performance data is provided for four basic lengths - 36", 60", 84", and 120". Units are also offered in 48", 72", and 96" lengths.

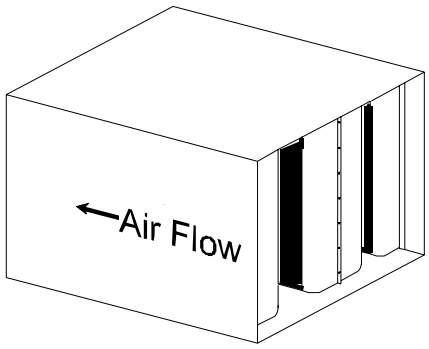
Model SPC is a standard pressure drop unit ideally suited for system velocities at or near 1,000 fpm.

Model MPC also provides excellent attenuation values along with a moderate pressure drop at somewhat higher air velocities.

Model LPC offers the lowest pressure drop for higher velocity systems.

Special features of our Hospital/Clean Room Attenuators are:

- **Diffusion angle to improve pressure drop**
- **Bellmouth entrance to help minimize turbulence**
- **22 gauge galvanized steel casings**
- **24 gauge perforated galvanized baffles**
- **Acoustic fill encapsulated in polyethylene to eliminate erosion and absorption of gases**
- **Acoustic stand-off between the perforated baffle and the acoustic fill to enhance performance**
- **Seams are mastic filled to insure airtight units to 8" w.g.**



ASTM E-84 ratings for the assembled unit:

- **Flamespread 25**
- **Smoke Developed 5**

Components are also available in stainless steel or aluminum construction.

Acoustical performance ratings are based on tests conducted by Intertek Testing Services, formerly ETL Testing Laboratories, Inc., Cortland, New York, in accordance with ASTM E477 "Standard Method of Testing Duct Liner Materials and Prefabricated Silencers for Acoustical and Airflow Performance." Copies of the test reports are available upon request.

Hospital/Clean Room Attenuator - Model SPC

				Dynamic Insertion Loss (dB) Octave Band/Center Frequency (Hz)							
Model	**Flow**	**Velocity fpm**	**Press Drop**	**1 63**	**2 125**	**3 250**	**4 500**	**5 1K**	**6 2K**	**7 4K**	**8 8K**
		-1500	0.52	8	12	17	25	34	35	31	10
	Reverse	-1000	0.23	7	10	16	24	33	34	30	10
	Flow	-500	0.06	7	10	15	24	33	34	30	10
SPC-36		0		7	9	15	23	33	34	30	10
	Forward	500	0.06	7	9	14	21	32	34	29	10
	Flow	1000	0.23	6	8	14	21	32	34	29	10
		1500	0.52	6	8	13	20	32	33	29	10
		-1500	0.74	13	14	21	33	48	54	35	12
	Reverse	-1000	0.32	11	12	21	31	47	53	35	11
	Flow	-500	0.08	10	12	20	30	47	53	35	11
SPC-60		0		10	12	20	30	46	52	34	11
	Forward	500	0.08	9	11	19	29	46	51	34	12
	Flow	1000	0.32	9	11	19	28	46	51	34	12
		1500	0.74	8	10	17	28	46	50	34	13
		-1500	0.95	14	16	25	42	52	58	46	14
	Reverse	-1000	0.42	14	15	24	40	51	56	46	14
	Flow	-500	0.11	13	14	23	40	50	56	45	14
SPC-84		0		12	14	22	39	50	55	44	15
	Forward	500	0.11	12	13	22	38	50	55	44	16
	Flow	1000	0.42	12	13	22	38	49	54	43	17
		1500	0.95	11	12	20	36	49	52	41	17
		-1500	1.33	17	18	32	47	61	64	48	16
	Reverse	-1000	0.59	17	18	30	46	59	62	47	16
	Flow	-500	0.15	16	18	29	46	57	60	45	17
SPC-120		0		15	17	28	46	55	58	45	17
	Forward	500	0.15	14	16	27	45	54	57	44	17
	Flow	1000	0.59	14	16	27	44	53	56	43	18
		1500	1.33	13	16	26	42	53	55	43	18

Forward Flow - characteristic of supply or discharge fan systems.
Reverse Flow - typical of return or intake fan systems.

Pressure Drop Calculation for Specific Velocity

Actual Velocity (fpm) = CFM x 144 ÷ [Height (in.) x Width (in.)]

$$\text{Pressure Drop} = \left(\frac{\text{Actual Velocity}}{1500}\right)^2 \times \text{Catalog Pressure Drop @ 1500 fpm}$$

Standard Construction

22 gauge galvanized casings
24 gauge perforated baffles
Acoustic Fill encapsulated in polyethylene to eliminate erosion and absorption of gases

Optional Features

Stainless steel or aluminum construction

Computer program available which provides attenuator performance at actual job conditions.

Hospital/Clean Room Attenuator - Model MPC

				Dynamic Insertion Loss (dB) Octave Band/Center Frequency (Hz)							
Model	Flow	Velocity fpm	Press Drop	1 63	2 125	3 250	4 500	5 1K	6 2K	7 4K	8 8K
MPC-36	Reverse Flow	-2000	0.40	8	10	14	20	27	29	22	8
		-1500	0.23	7	9	12	18	26	27	21	8
		-1000	0.10	6	8	11	17	25	26	21	8
		0		6	7	10	16	25	26	20	8
	Forward Flow	1000	0.10	6	7	10	15	24	26	19	9
		1500	0.23	5	7	10	15	24	25	19	9
		2000	0.40	5	6	9	14	22	25	19	9
MPC-60	Reverse Flow	-2000	0.52	10	13	17	28	39	42	26	11
		-1500	0.29	10	12	16	26	39	42	26	10
		-1000	0.13	9	11	16	24	38	42	25	10
		0		8	10	15	23	38	41	25	10
	Forward Flow	1000	0.13	8	9	14	21	38	41	25	11
		1500	0.29	7	8	12	21	37	40	25	11
		2000	0.52	7	8	12	20	36	39	24	12
MPC-84	Reverse Flow	-2000	0.60	12	14	22	34	43	49	33	14
		-1500	0.34	11	13	20	32	42	49	33	12
		-1000	0.15	11	13	19	31	41	48	32	12
		0		10	12	18	29	40	48	31	12
	Forward Flow	1000	0.15	10	11	18	28	39	47	30	14
		1500	0.34	10	11	17	28	39	45	28	15
		2000	0.60	9	10	17	27	37	45	28	16
MPC-120	Reverse Flow	-2000	0.84	14	16	25	39	51	59	42	15
		-1500	0.47	13	16	24	37	50	58	41	14
		-1000	0.21	13	16	22	36	48	56	40	14
		0		12	15	21	36	45	53	38	15
	Forward Flow	1000	0.21	12	14	20	34	44	51	37	16
		1500	0.47	11	14	20	32	43	50	37	17
		2000	0.84	11	13	20	32	43	50	35	17

Forward Flow - characteristic of supply or discharge fan systems.
Reverse Flow - typical of return or intake fan systems.

Pressure Drop Calculation for Specific Velocity

Actual Velocity (fpm) = CFM x 144 ÷ [Height (in.) x Width (in.)]

$$\text{Pressure Drop} = \left(\frac{\text{Actual Velocity}}{2000}\right)^2 \times \text{Catalog Pressure Drop @ 2000 fpm}$$

Standard Construction

22 gauge galvanized casings
24 gauge perforated baffles
Acoustic Fill encapsulated in polyethylene to eliminate erosion and absorption of gases

Optional Features

Stainless steel or aluminum construction

Computer program available which provides attenuator performance at actual job conditions.

Hospital/Clean Room Attenuator - Model LPC

				Dynamic Insertion Loss (dB) Octave Band/Center Frequency (Hz)							
Model	**Flow**	**Velocity fpm**	**Press Drop**	**1 63**	**2 125**	**3 250**	**4 500**	**5 1K**	**6 2K**	**7 4K**	**8 8K**
		-2000	0.20	5	6	8	10	17	18	11	7
	Reverse	-1500	0.11	5	6	7	10	17	18	11	6
	Flow	-1000	0.05	5	6	7	10	17	19	11	6
LPC-36		0		4	5	6	9	17	19	12	7
	Forward	1000	0.05	5	6	6	8	17	20	13	8
	Flow	1500	0.11	4	5	6	8	16	20	14	8
		2000	0.20	4	5	6	7	15	20	14	8
		-2000	0.23	7	9	13	19	28	28	16	8
	Reverse	-1500	0.13	6	8	13	19	29	29	16	7
	Flow	-1000	0.06	6	8	13	18	30	30	17	7
LPC-60		0		5	7	11	17	32	31	18	9
	Forward	1000	0.06	6	7	10	15	32	32	19	10
	Flow	1500	0.13	6	6	10	14	31	32	20	10
		2000	0.23	5	6	9	13	29	32	20	10
		-2000	0.26	8	11	15	24	30	39	20	10
	Reverse	-1500	0.15	8	10	15	24	32	40	21	10
	Flow	-1000	0.07	7	10	14	23	34	41	22	10
LPC-84		0		7	9	13	21	38	42	24	12
	Forward	1000	0.07	7	8	12	18	38	43	25	14
	Flow	1500	0.15	7	7	11	17	36	43	26	14
		2000	0.26	6	7	10	16	34	43	26	15
		-2000	0.30	9	14	17	28	43	49	34	13
	Reverse	-1500	0.17	9	14	16	27	42	49	33	13
	Flow	-1000	0.08	8	13	16	26	42	48	32	13
LPC-120		0		7	12	16	25	40	48	31	14
	Forward	1000	0.08	7	11	16	24	39	48	30	15
	Flow	1500	0.17	7	10	16	23	38	48	30	15
		2000	0.30	7	9	15	22	38	48	31	15

Forward Flow - characteristic of supply or discharge fan systems.
Reverse Flow - typical of return or intake fan systems.

Pressure Drop Calculation for Specific Velocity

Actual Velocity (fpm) = CFM x 144 ÷ [Height (in.) x Width (in.)]

$$\text{Pressure Drop} = \left(\frac{\text{Actual Velocity}}{2000}\right)^2 \times \text{Catalog Pressure Drop @ 2000 fpm}$$

Standard Construction

22 gauge galvanized casings
24 gauge perforated baffles
Acoustic Fill encapsulated in polyethylene to eliminate erosion and absorption of gases

Optional Features

Stainless steel or aluminum construction

Computer program available which provides attenuator performance at actual job conditions.

Rectangular Attenuators

Self-noise Power Levels

		Self-Noise Power Levels, dB re 10^{-12} Watts Octave Band/Center Frequency (Hz)							
Model	Velocity fpm	1 63	2 125	3 250	4 500	5 1K	6 2K	7 4K	8 8K
SPC	1000	63	50	42	41	44	44	38	34
	1500	69	58	50	49	50	55	55	52
	2000	83	75	60	59	57	61	66	65
MPC	1000	55	48	37	35	37	35	27	27
	1500	61	57	52	49	48	55	55	50
	2000	70	63	58	55	53	59	62	58
LPC	1000	53	42	36	33	35	29	22	27
	1500	60	56	51	47	46	53	51	44
	2000	67	62	56	55	52	59	59	53
LSPC	1000	56	41	41	47	46	41	30	30
	1500	56	47	45	48	53	59	56	48
	2000	63	55	49	51	54	63	67	60
LMPC	1000	47	39	37	37	39	39	24	22
	1500	50	43	47	48	45	46	36	30
	2000	52	49	59	55	52	54	49	40
LLPC	1000	45	37	34	35	36	36	22	20
	1500	46	41	40	39	41	44	30	29
	2000	47	44	48	47	48	53	45	39

Area Correction Factors - Listed self-noise power levels are for silencers with a face area of four (4) square feet. For silencers with different face areas, the following values must be added to those in the table.

Face area (sq. ft.)	0.5	1	2	4	6	8	16	32	64	128
PWL Correction Factors, dB	-9	-6	-3	0	2	3	6	9	12	15

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Khalid Manufacturing Company

Installation and Maintenance location Guidelines

AEROSONICS

Sound Attenuator Installation Instructions

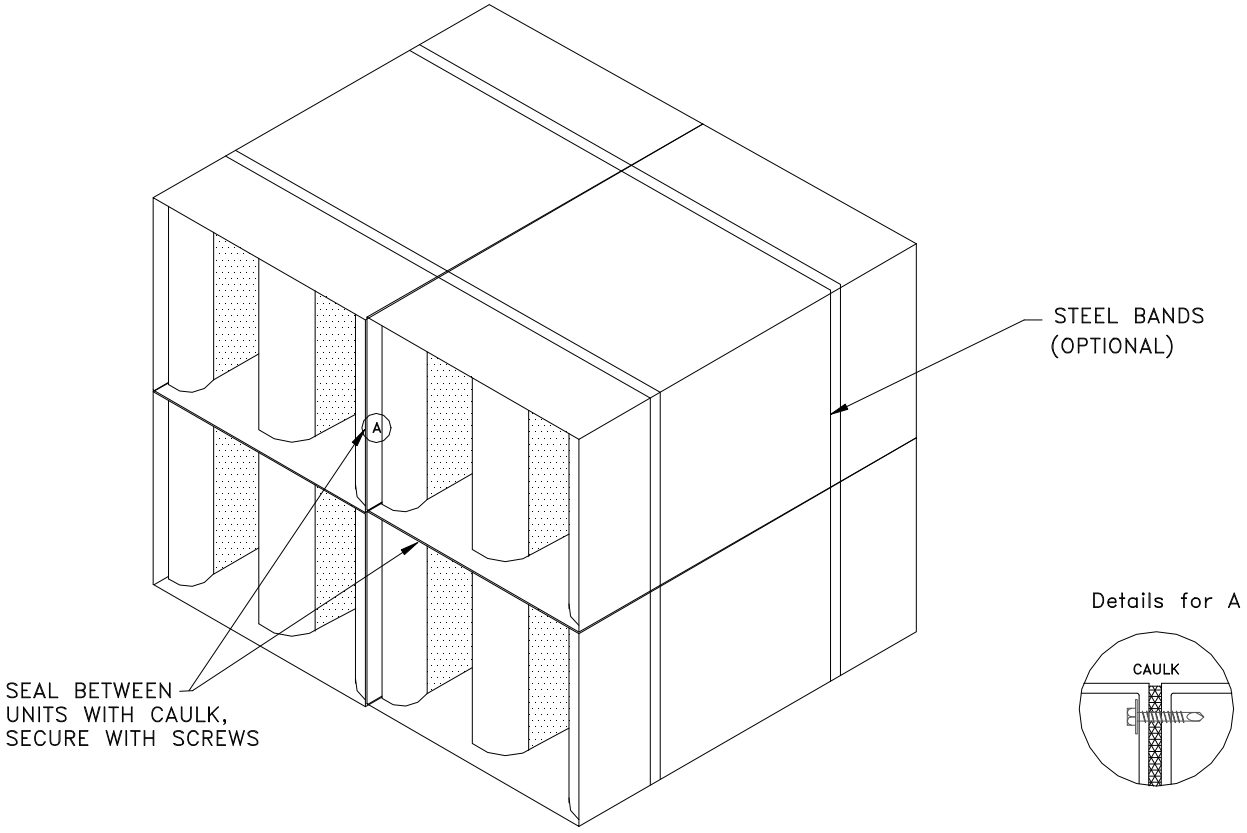
Typical connections to ducts for single units include:

Slip or lap joint using screws and sealing tape.

Flanged, gasketed, and bolted connections (gasket & bolts by others).

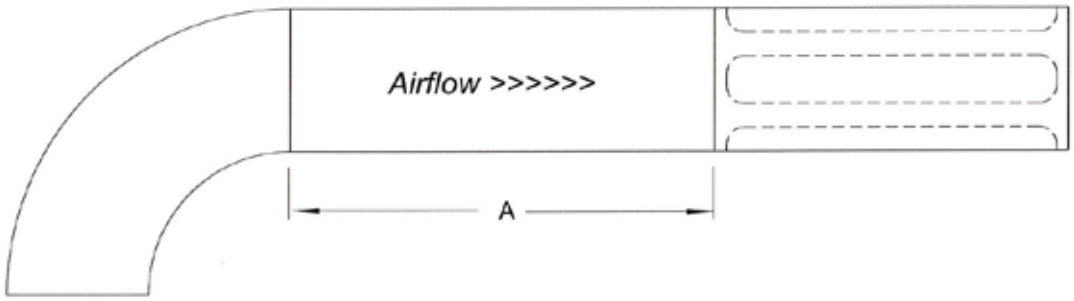
Multiple units utilize the same connection methods as used for single units. Individual units are stacked atop and beside each other to form the overall bank. To stabilize the bank, use draw bands or tack welds to hold the casings in position. Take special care to seal between the edges of each unit to prevent air from passing between the units. Nose clips or sheet metal screws with a caulk or sealant is a common solution in this area.

Attenuators have no moving parts. Only general cleaning is required periodically, normally done when the duct itself is inspected and cleaned. Wiping the interior wall of the units with a damp cloth will generally remove any dust and dirt build-up. Minimal amounts of water can be used to remove heavy soil, but saturating the insulation is not recommended.



General Guidelines for Location of Rectangular Duct Silencers

Silencers located near elbows



A = 3 x equivalent diameter

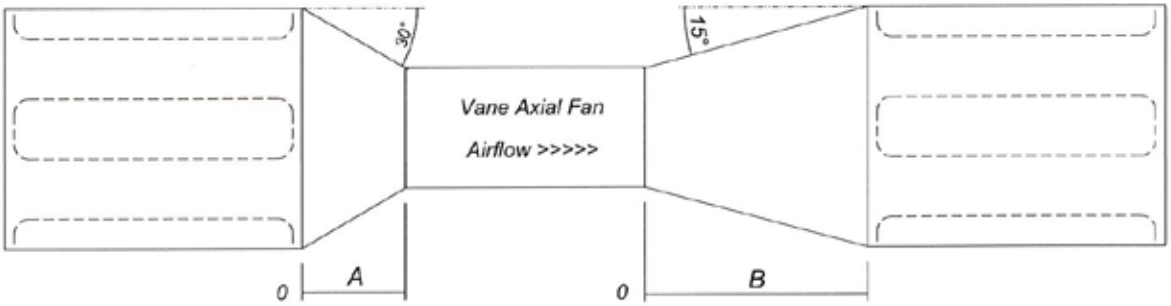
Silencers located next to Coils or Filters

Coil or Filter *Coil or Filter*

Distances should be doubled when using Low Frequency Silencers

General Guidelines for Location of Rectangular Duct Silencers

Vane Axial Fan Silencers



Rectangular Silencers

A = 0.75 x duct equivalent diameter

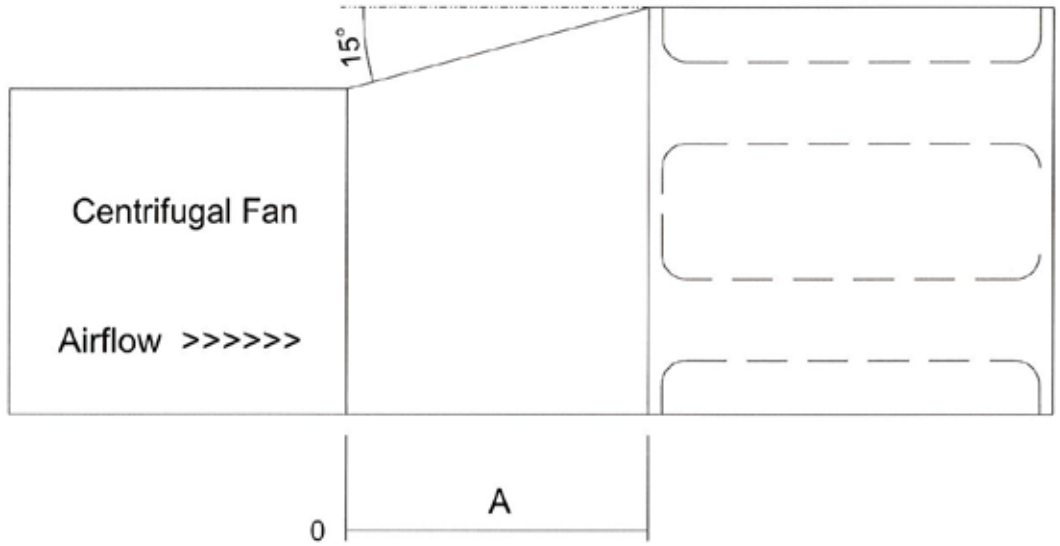
$$B = \frac{\text{Face Velocity (fpm)}}{1000} \times \text{equivalent duct diameter}$$

Tubular Silencer

A and B = 0 when silencer bullet is matched to fan hub diameter

General Guidelines for Location of Rectangular Duct Silencers

Centrifugal Fans



$$A = \frac{\text{Face Velocity (fpm)}}{1000} \times \text{equivalent duct diameter}$$

Low Frequency Hospital/Clean Room Attenuators

LSPC
LMPC
LLPC
SELF-NOISE POWER LEVELS
SOUND ATTENUATOR INSTALLATION INSTRUCTIONS

Low Frequency Hospital/Clean Room Attenuators

Low Frequency Hospital/Clean Room attenuators are available in three models, specifically engineered for sensitive area applications requiring increased 2nd and 3rd octave band noise reduction coupled with erosion proof acoustic fill. Performance data is provided for four basic lengths - 36", 60", 84", and 120". Units are also offered in 48", 72", and 96" lengths.

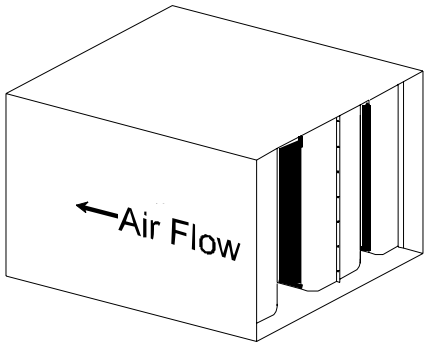
Model LSPC is a standard pressure drop unit ideally suited for system velocities at or near 1,000 fpm.

Model LMPC also provides excellent attenuation values along with a moderate pressure drop at somewhat higher air velocities.

Model LLPC offers the lowest pressure drop for higher velocity systems.

Special features of our Low Frequency Hospital/Clean Room Attenuators are:

- **Diffusion angle to improve pressure drop**
- **Bellmouth entrance to help minimize turbulence**
- **22 gauge galvanized steel casings**
- **24 gauge perforated galvanized baffles**
- **Acoustic fill encapsulated in acoustic property cloth to eliminate erosion and absorption of gases**
- **Acoustic stand-off between the perforated baffle and the acoustic fill to enhance performance**
- **Seams are mastic filled to insure airtight units to 8" w.g.**



ASTM E-84 ratings for the assembled unit:

- **Flamespread 25**
- **Smoke Developed 50**

Components are also available in stainless steel or aluminum construction.

Acoustical performance ratings are based on tests conducted by Intertek Testing Services, formerly ETL Testing Laboratories, Inc., Cortland, New York, in accordance with ASTM E477 "Standard Method of Testing Duct Liner Materials and Prefabricated Silencers for Acoustical and Airflow Performance." Copies of the test reports are available upon request.

Low Frequency
Hospital/Clean Room Attenuator - Model LSPC

				Dynamic Insertion Loss (dB) Octave Band/Center Frequency (Hz)							
Model	**Flow**	**Velocity fpm**	**Press Drop**	**1 63**	**2 125**	**3 250**	**4 500**	**5 1K**	**6 2K**	**7 4K**	**8 8K**
		-1500	1.48	9	12	17	21	27	22	18	8
	Reverse	-1000	0.66	9	12	17	21	27	22	18	8
	Flow	-500	0.17	9	12	17	21	26	22	17	7
LSPC-36		0		8	12	16	20	25	23	17	7
	Forward	500	0.17	8	12	16	19	25	24	17	8
	Flow	1000	0.66	8	12	16	19	24	24	16	8
		1500	1.48	8	12	16	19	24	24	16	8
		-1500	1.62	12	21	24	27	38	28	22	9
	Reverse	-1000	0.72	12	21	24	27	38	28	22	9
	Flow	-500	0.18	12	19	23	26	38	29	21	9
LSPC-60		0		11	18	23	25	37	30	19	8
	Forward	500	0.18	11	17	23	24	36	30	19	9
	Flow	1000	0.72	11	17	22	23	35	30	19	9
		1500	1.62	11	17	22	23	35	30	19	9
		-1500	2.11	16	25	33	37	45	32	26	13
	Reverse	-1000	0.94	16	25	33	37	45	32	26	13
	Flow	-500	0.24	15	24	32	36	45	32	25	12
LSPC-84		0		14	23	31	35	45	33	24	11
	Forward	500	0.24	14	22	31	35	43	33	23	12
	Flow	1000	0.94	14	21	30	35	42	34	23	12
		1500	2.11	14	21	30	35	42	34	23	12
		-1500	2.70	18	30	42	44	47	39	34	16
	Reverse	-1000	1.20	18	30	42	44	47	39	34	16
	Flow	-500	0.30	17	29	41	43	47	40	33	15
LSPC-120		0		16	29	41	43	47	40	33	15
	Forward	500	0.30	16	28	40	43	46	40	32	15
	Flow	1000	1.20	15	27	39	43	46	41	31	16
		1500	2.70	15	27	39	43	46	41	31	16

Forward Flow - characteristic of supply or discharge fan systems.
Reverse Flow - typical of return or intake fan systems.

Pressure Drop Calculation for Specific Velocity

Actual Velocity (fpm) = CFM x 144 ÷ [Height (in.) x Width (in.)]

$$\text{Pressure Drop} = \left(\frac{\text{Actual Velocity}}{1500}\right)^2 \times \text{Catalog Pressure Drop @ 1500 fpm}$$

Standard Construction

22 gauge galvanized casings
24 gauge perforated baffles
Acoustic Fill encapsulated in polyethylene to eliminate erosion and absorption of gases

Optional Features

Stainless steel or aluminum construction

Computer program available, which provides attenuator performance at actual job conditions.

Low Frequency
Hospital/Clean Room Attenuator - Model LMPC

				Dynamic Insertion Loss (dB) Octave Band/Center Frequency (Hz)							
Model	Flow	Velocity fpm	Press Drop	1 63	2 125	3 250	4 500	5 1K	6 2K	7 4K	8 8K
LMPC-36	Reverse Flow	-2000	0.80	8	9	14	16	16	13	10	6
		-1500	0.45	7	8	14	15	15	12	10	6
		-1000	0.20	7	8	14	15	15	12	10	6
		0		6	8	13	15	14	12	9	6
	Forward Flow	1000	0.20	6	8	13	15	14	12	9	6
		1500	0.45	6	8	13	15	15	11	9	5
		2000	0.80	6	7	13	14	15	11	9	5
LMPC-60	Reverse Flow	-2000	0.96	10	15	23	26	27	23	14	9
		-1500	0.54	10	14	21	24	26	22	13	8
		-1000	0.24	10	14	21	24	26	22	13	8
		0		9	13	20	23	25	21	16	8
	Forward Flow	1000	0.24	9	13	20	23	25	21	16	8
		1500	0.54	9	12	19	22	24	20	12	7
		2000	0.96	9	12	19	21	23	18	12	7
LMPC-84	Reverse Flow	-2000	1.08	13	19	28	36	30	26	147	12
		-1500	0.61	12	18	27	35	30	26	17	11
		-1000	0.27	12	18	27	35	30	26	17	11
		0		12	17	26	33	30	25	16	11
	Forward Flow	1000	0.27	12	17	26	33	30	25	16	11
		1500	0.61	12	17	25	32	29	25	16	11
		2000	1.08	11	16	24	32	29	24	15	10
LMPC-120	Reverse Flow	-2000	1.24	16	25	35	39	37	31	21	15
		-1500	0.70	15	23	33	38	37	31	20	14
		-1000	0.31	15	23	33	38	37	31	20	14
		0		14	22	33	38	36	31	20	14
	Forward Flow	1000	0.31	14	22	33	38	36	31	20	14
		1500	0.70	14	22	32	38	35	30	20	14
		2000	1.24	13	21	32	37	35	30	20	14

Forward Flow - characteristic of supply or discharge fan systems.
Reverse Flow - typical of return or intake fan systems.

Pressure Drop Calculation for Specific Velocity

Actual Velocity (fpm) = CFM x 144 ÷ [Height (in.) x Width (in.)]

$$\text{Pressure Drop} = \left(\frac{\text{Actual Velocity}}{1500}\right)^2 \times \text{Catalog Pressure Drop @ 1500 fpm}$$

Standard Construction

22 gauge galvanized casings
24 gauge perforated baffles
Acoustic Fill encapsulated in polyethylene to eliminate erosion and absorption of gases

Optional Features

Stainless steel or aluminum construction

Computer program available, which provides attenuator performance at actual job conditions.

Low Frequency
Hospital/Clean Room Attenuator - Model LLPC

				Dynamic Insertion Loss (dB) Octave Band/Center Frequency (Hz)							
Model	**Flow**	**Velocity fpm**	**Press Drop**	**1 63**	**2 125**	**3 250**	**4 500**	**5 1K**	**6 2K**	**7 4K**	**8 8K**
		-2000	0.48	5	7	11	14	14	11	9	6
	Reverse	-1500	0.27	5	7	10	13	14	11	9	6
	Flow	-1000	0.12	5	7	10	13	13	11	8	6
LLPC-36		0		4	6	10	13	13	11	8	6
	Forward	1000	0.12	4	5	9	12	13	10	7	5
	Flow	1500	0.27	4	5	9	12	13	10	7	5
		2000	0.48	4	5	9	11	12	10	6	5
		-2000	0.52	8	12	15	20	22	16	11	8
	Reverse	-1500	0.29	8	12	15	20	22	16	11	8
	Flow	-1000	0.13	8	12	15	19	21	15	10	7
LLPC-60		0		7	11	15	18	20	15	10	6
	Forward	1000	0.13	7	10	14	18	19	15	10	6
	Flow	1500	0.29	7	10	14	18	19	15	10	6
		2000	0.52	7	9	13	17	19	14	9	6
		-2000	0.56	11	14	21	25	27	22	13	9
	Reverse	-1500	0.31	11	14	21	25	27	22	13	9
	Flow	-1000	0.14	10	13	20	25	28	22	13	8
LLPC-84		0		10	13	19	25	28	22	13	8
	Forward	1000	0.14	10	12	18	24	26	20	12	8
	Flow	1500	0.31	10	12	18	24	26	20	12	8
		2000	0.56	10	12	17	23	26	20	11	7
		-2000	0.60	12	19	26	33	36	24	16	11
	Reverse	-1500	0.34	12	19	26	33	36	24	16	11
	Flow	-1000	0.15	12	18	26	33	36	24	15	11
LLPC-120		0		11	17	25	32	35	23	15	11
	Forward	1000	0.15	11	16	25	30	35	23	14	10
	Flow	1500	0.34	11	16	25	30	35	23	14	10
		2000	0.60	11	16	24	29	35	23	14	10

Forward Flow - characteristic of supply or discharge fan systems.
Reverse Flow - typical of return or intake fan systems.

Pressure Drop Calculation for Specific Velocity

Actual Velocity (fpm) = CFM x 144 ÷ [Height (in.) x Width (in.)]

$$\text{Pressure Drop} = \left(\frac{\text{Actual Velocity}}{1500}\right)^2 \times \text{Catalog Pressure Drop @ 1500 fpm}$$

Standard Construction

22 gauge galvanized casings
24 gauge perforated baffles
Acoustic Fill encapsulated in polyethylene to eliminate erosion and absorption of gases

Optional Features

Stainless steel or aluminum construction

Computer program available, which provides attenuator performance at actual job conditions.

Rectangular Attenuators

Self-noise Power Levels

		Self-Noise Power Levels, dB re 10^{-12} Watts Octave Band/Center Frequency (Hz)							
Model	Velocity fpm	1 63	2 125	3 250	4 500	5 1K	6 2K	7 4K	8 8K
SPC	1000	63	50	42	41	44	44	38	34
	1500	69	58	50	49	50	55	55	52
	2000	83	75	60	59	57	61	66	65
MPC	1000	55	48	37	35	37	35	27	27
	1500	61	57	52	49	48	55	55	50
	2000	70	63	58	55	53	59	62	58
LPC	1000	53	42	36	33	35	29	22	27
	1500	60	56	51	47	46	53	51	44
	2000	67	62	56	55	52	59	59	53
LSPC	1000	56	41	41	47	46	41	30	30
	1500	56	47	45	48	53	59	56	48
	2000	63	55	49	51	54	63	67	60
LMPC	1000	47	39	37	37	39	39	24	22
	1500	50	43	47	48	45	46	36	30
	2000	52	49	59	55	52	54	49	40
LLPC	1000	45	37	34	35	36	36	22	20
	1500	46	41	40	39	41	44	30	29
	2000	47	44	48	47	48	53	45	39

Area Correction Factors - Listed self-noise power levels are for silencers with a face area of four (4) square feet. For silencers with different face areas, the following values must be added to those in the table.

Face area (sq. ft.)	0.5	1	2	4	6	8	16	32	64	128
PWL Correction Factors, dB	-9	-6	-3	0	2	3	6	9	12	15

شركة خالد لصناعة
Khalid Manufacturing Company

Installation and Maintenance location Guidelines

AEROSONICS

Sound Attenuator Installation Instructions

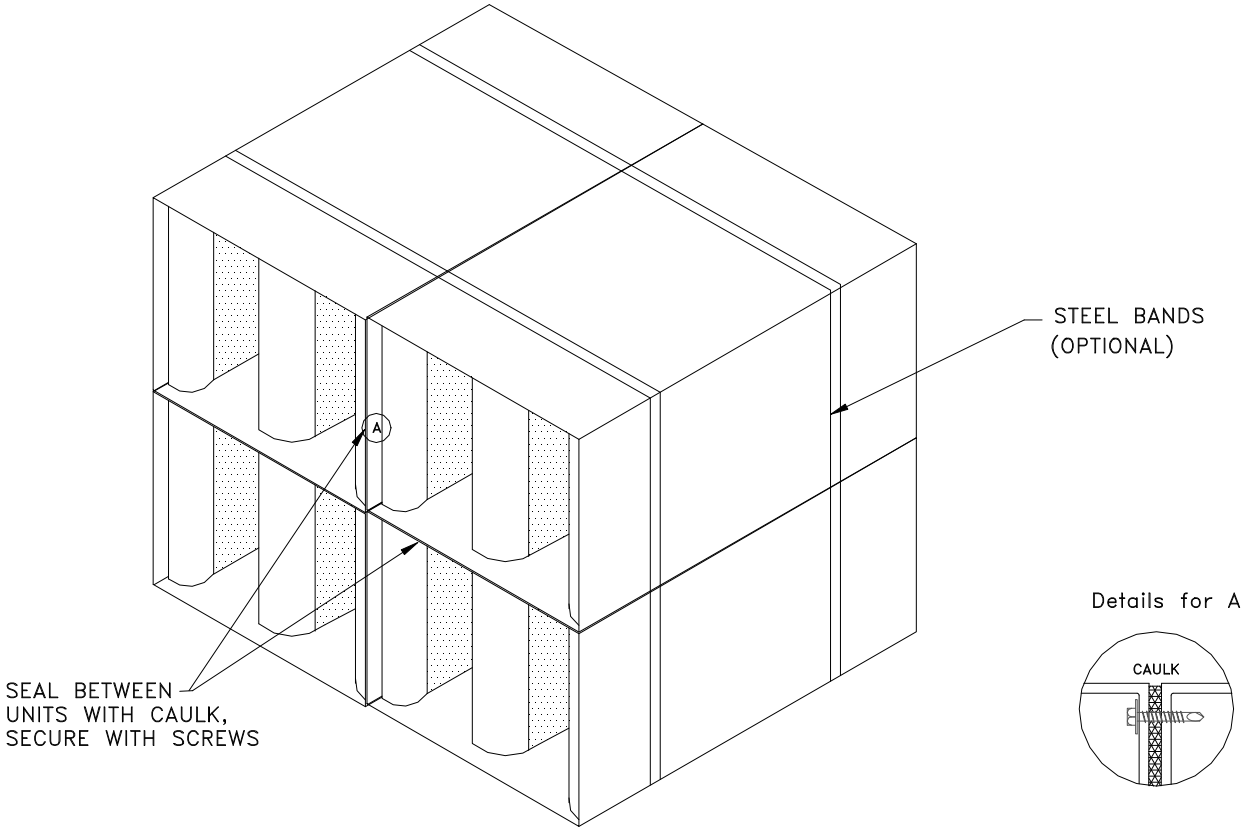
Typical connections to ducts for single units include:

Slip or lap joint using screws and sealing tape.

Flanged, gasketed, and bolted connections (gasket & bolts by others).

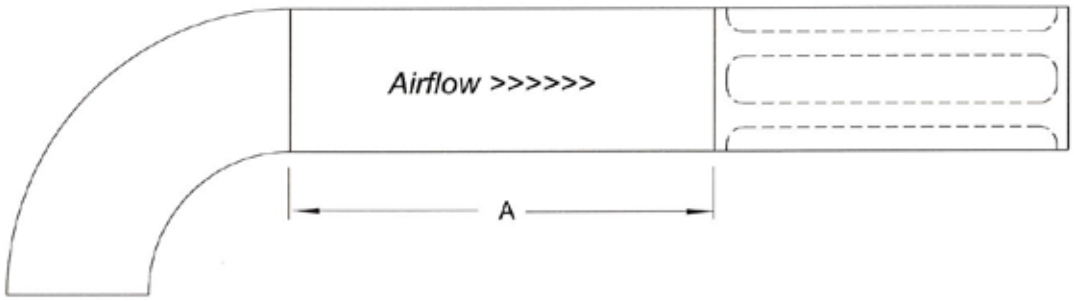
Multiple units utilize the same connection methods as used for single units. Individual units are stacked atop and beside each other to form the overall bank. To stabilize the bank, use draw bands or tack welds to hold the casings in position. Take special care to seal between the edges of each unit to prevent air from passing between the units. Nose clips or sheet metal screws with a caulk or sealant is a common solution in this area.

Attenuators have no moving parts. Only general cleaning is required periodically, normally done when the duct itself is inspected and cleaned. Wiping the interior wall of the units with a damp cloth will generally remove any dust and dirt build-up. Minimal amounts of water can be used to remove heavy soil, but saturating the insulation is not recommended.



General Guidelines for Location of Rectangular Duct Silencers

Silencers located near elbows



A = 3 x equivalent diameter

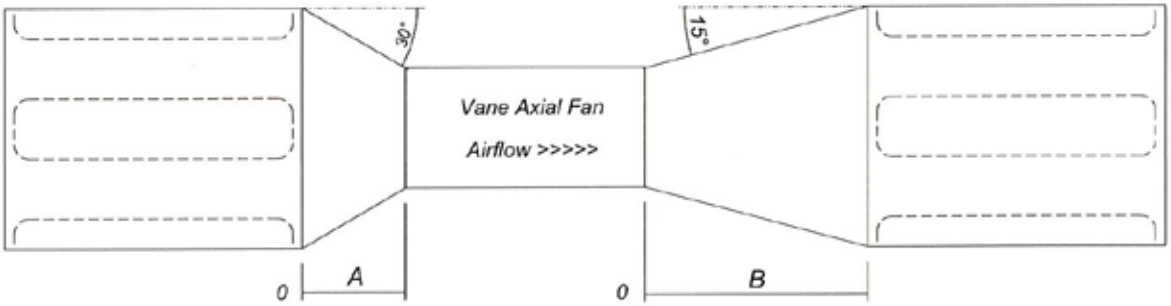
Silencers located next to Coils or Filters

Coil or Filter *Coil or Filter*

Distances should be doubled when using Low Frequency Silencers

General Guidelines for Location of Rectangular Duct Silencers

Vane Axial Fan Silencers



Rectangular Silencers

A = 0.75 x duct equivalent diameter

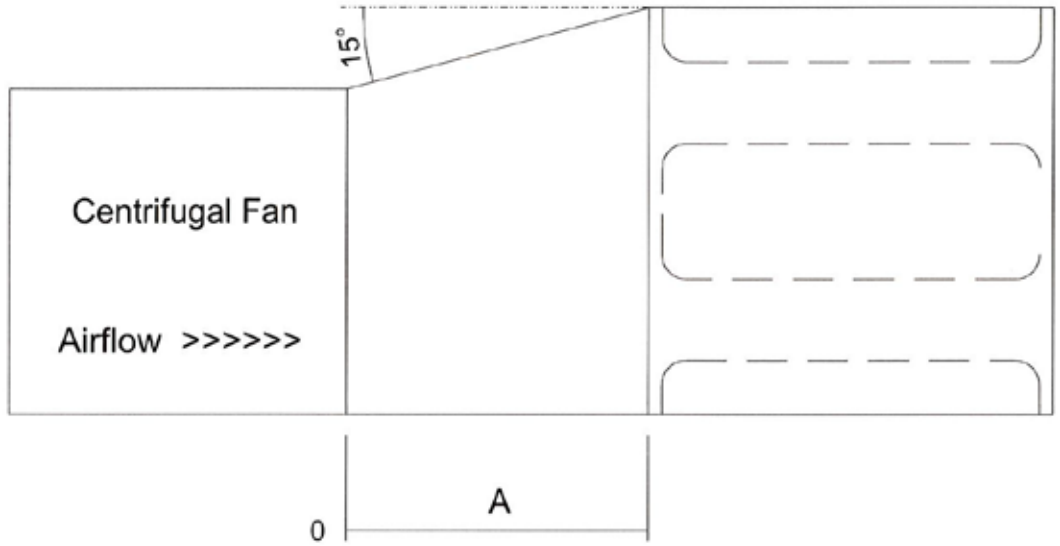
$$B = \frac{\text{Face Velocity (fpm)}}{1000} \times \text{equivalent duct diameter}$$

Tubular Silencer

A and B = 0 when silencer bullet is matched to fan hub diameter

General Guidelines for Location of Rectangular Duct Silencers

Centrifugal Fans



$$A = \frac{\text{Face Velocity (fpm)}}{1000} \times \text{equivalent duct diameter}$$

Elbow Attenuators

EHP
EMP
ELP
SELF-NOISE POWER LEVELS
SOUND ATTENUATOR INSTALLATION INSTRUCTIONS

Elbow Attenuators

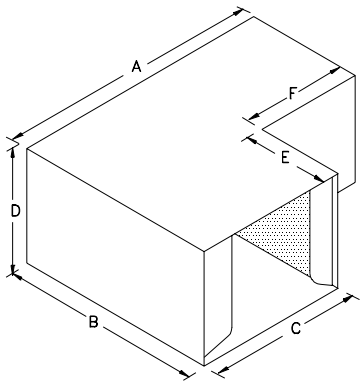
Elbow attenuators are available in three models for horizontal or vertical applications requiring broad band noise reduction when space for straight attenuators is not available. Performance data is provided for eight centerline lengths - 36", 48", 60", 72", 84", 96", 108", and 120". Special centerline lengths are available, upon request.

Do not use Elbow Attenuators when space permits the use of straight rectangular units. Follow the same location guidelines as rectangular attenuators.

Model EHP is a standard pressure drop unit ideally suited for system velocities at 500 to 1,000 fpm.

Model EMP also provides excellent attenuation values along with a moderate pressure drop at velocities from 1,000 to 1,500 fpm.

Model ELP offers the lowest pressure drop for velocities above 1,500 fpm.

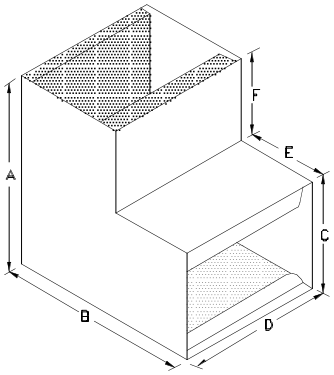


Special features of our Elbow Attenuators are:

- **Bellmouth entrance to help minimize turbulence**
- **22 gauge galvanized steel casings**
- **24 gauge perforated galvanized baffles**
- **Long strand Fiberglass acoustical fill**
- **Seams are mastic filled to insure airtight units to 8" w.g.**
- **Optional polyethylene, Mylar or fiberglass cloth liners.**

ASTM E-84 ratings for the acoustical fill are:

- **Flamespread 25**
- **Smoke Developed 50**



Components are also available in stainless steel or aluminum construction.

Acoustical performance ratings are based on independent tests of a 24" x 24" attenuator conducted by Intertek Testing Services, following general guidelines prescribed by ASTM E477-96 and pending guidelines being developed specifically for Elbow Attenuators. Copies of the test reports are available upon request.

Elbow Attenuator - Model EHP

				Dynamic Insertion Loss (dB) Octave Band/Center Frequency (Hz)							
Model	**Flow**	**Velocity fpm**	**Press Drop**	**1 63**	**2 125**	**3 250**	**4 500**	**5 1K**	**6 2K**	**7 4K**	**8 8K**
	Reverse	-1000	0.55	12	16	20	23	26	22	21	20
	Flow	-500	0.13	11	15	18	22	35	22	21	20
EHP-36		0	0	10	14	17	22	24	23	21	20
	Forward	500	0.13	9	14	16	21	24	23	22	20
	Flow	1000	0.55	8	13	16	21	23	24	23	21
	Reverse	-1000	0.56	14	18	23	29	32	28	25	22
	Flow	-500	0.14	12	17	22	29	31	29	26	23
EHP-48		0	0	11	16	21	29	31	29	27	24
	Forward	500	0.14	10	16	21	28	32	30	28	24
	Flow	1000	0.56	8	15	21	27	33	32	30	24
	Reverse	-1000	0.57	15	19	26	35	38	34	27	21
	Flow	-500	0.14	14	18	26	36	37	35	29	24
EHP-60		0	0	12	18	26	36	37	35	29	24
	Forward	500	0.14	11	17	25	35	37	36	30	25
	Flow	1000	0.57	10	17	25	34	38	37	32	26
	Reverse	-1000	0.58	17	20	29	42	44	39	29	21
	Flow	-500	0.14	15	20	30	42	44	40	30	23
EHP-72		0	0	13	21	31	43	44	41	32	25
	Forward	500	0.14	13	20	29	42	45	41	33	26
	Flow	1000	0.58	12	20	28	41	45	42	34	27
	Reverse	-1000	0.59	17	25	33	46	47	42	31	24
	Flow	-500	0.14	15	25	33	46	47	43	32	25
EHP-84		0	0	13	26	34	47	47	44	34	26
	Forward	500	0.14	13	25	33	46	47	44	35	27
	Flow	1000	0.59	12	25	32	45	48	45	36	28

Model number indicates centerline length of unit in inches.

Forward Flow - characteristic of supply or discharge fan systems.
Reverse Flow - typical of return or intake fan systems.

Pressure Drop Calculation for Specific Velocity

Actual Velocity (fpm) = CFM x 144 ÷ [Height (in.) x Width (in.)]

$$\text{Pressure Drop} = \left(\frac{\text{Actual Velocity}}{1000}\right)^2 \times \text{Catalog Pressure Drop @ 1000 fpm}$$

Standard Construction

22 gauge galvanized casings
24 gauge perforated baffles
Acoustic quality Fiberglass media

Optional Features

Mylar or polyethylene liners
Fiberglass cloth liners
Stainless steel or aluminum construction

Computer program available which provides attenuator performance at actual job conditions.

Elbow Attenuator - Model EMP

				Dynamic Insertion Loss (dB) Octave Band/Center Frequency (Hz)							
Model	Flow	Velocity fpm	Press Drop	1 63	2 125	3 250	4 500	5 1K	6 2K	7 4K	8 8K
EMP-36	Reverse Flow	-1500	0.42	8	15	19	21	22	18	17	14
		-1000	0.19	9	14	18	21	22	19	18	14
		0	0	8	14	17	20	22	19	18	14
	Forward Flow	1000	0.19	8	13	17	20	23	21	17	15
		1500	0.42	7	13	17	19	23	21	17	15
EMP-48	Reverse Flow	-1500	0.45	8	16	21	27	28	25	23	16
		-1000	0.20	9	15	20	26	27	24	22	16
		0	0	8	15	19	25	27	24	23	16
	Forward Flow	1000	0.20	8	12	19	25	28	26	23	17
		1500	0.45	7	13	19	26	28	26	24	18
EMP-60	Reverse Flow	-1500	0.49	11	15	23	30	32	28	25	18
		-1000	0.22	11	16	22	31	32	29	25	18
		0	0	9	16	21	30	32	29	26	18
	Forward Flow	1000	0.22	9	14	21	30	33	30	27	18
		1500	0.49	8	14	20	29	32	29	28	19
EMP-72	Reverse Flow	-1500	0.51	13	16	26	35	36	33	28	23
		-1000	0.23	13	17	25	36	37	34	28	23
		0	0	10	18	24	35	36	34	28	22
	Forward Flow	1000	0.23	10	17	24	35	36	34	28	24
		1500	0.51	10	17	23	34	35	33	30	25
EMP-84	Reverse Flow	-1500	0.54	13	19	32	39	38	35	28	23
		-1000	0.24	14	20	32	40	40	37	29	24
		0	0	11	21	31	39	39	37	29	23
	Forward Flow	1000	0.24	11	20	31	39	39	38	30	24
		1500	0.54	10	20	30	38	38	36	30	25

Model number indicates centerline length of unit in inches.

Forward Flow - characteristic of supply or discharge fan systems.
Reverse Flow - typical of return or intake fan systems.

Pressure Drop Calculation for Specific Velocity

Actual Velocity (fpm) = CFM x 144 [Height (in.) x Width (in.)]

$$\text{Pressure Drop} = \left(\frac{\text{Actual Velocity}}{1500}\right)^2 \times \text{Catalog Pressure Drop @ 1500 fpm}$$

Standard Construction

- 22 gauge galvanized casings
- 24 gauge perforated baffles
- Acoustic quality Fiberglass media

Optional Features

- Mylar or polyethylene liners
- Fiberglass cloth liners
- Stainless steel or aluminum construction

Computer program available which provides attenuator performance at actual job conditions.

Elbow Attenuator - Model ELP

Model	Flow	Velocity fpm	Press Drop	Dynamic Insertion Loss (dB) Octave Band/Center Frequency (Hz) 1 63	2 125	3 250	4 500	5 1K	6 2K	7 4K	8 8K
	Reverse	-2000	0.24	9	10	13	16	18	20	18	12
	Flow	-1500	0.13	9	10	12	15	18	19	18	12
ELP-36		0	0	7	9	12	15	18	18	17	12
	Forward	1500	0.13	6	9	13	14	19	19	19	11
	Flow	2000	0.24	6	8	12	14	18	19	19	11
	Reverse	-2000	0.28	9	11	14	19	21	22	19	12
	Flow	-1500	0.15	9	11	15	20	21	22	19	13
ELP-48		0	0	8	10	14	20	21	22	20	13
	Forward	1500	0.15	8	10	15	19	23	23	21	15
	Flow	2000	0.28	7	9	14	19	23	23	21	15
	Reverse	-2000	0.32	10	11	16	22	22	23	19	14
	Flow	-1500	0.18	9	10	16	23	23	23	19	14
ELP-60		0	0	9	10	15	23	23	24	21	15
	Forward	1500	0.18	8	9	15	21	24	25	21	16
	Flow	2000	0.32	8	9	15	21	24	25	21	16
	Reverse	-2000	0.36	11	12	17	22	24	24	20	15
	Flow	-1500	0.20	10	11	16	23	24	25	20	15
ELP-72		0	0	9	10	15	24	24	25	22	16
	Forward	1500	0.20	9	10	15	23	26	26	23	18
	Flow	2000	0.36	8	11	16	23	26	26	23	19
	Reverse	-2000	0.40	12	14	18	24	28	27	23	17
	Flow	-1500	0.22	11	14	18	26	27	28	23	17
ELP-84		0	0	10	13	17	26	27	28	25	18
	Forward	1500	0.22	10	12	16	26	29	29	27	20
	Flow	2000	0.40	9	12	16	25	29	30	27	21

Model number indicates centerline length of unit in inches.

Forward Flow - characteristic of supply or discharge fan systems.
Reverse Flow - typical of return or intake fan systems.

Pressure Drop Calculation for Specific Velocity

Actual Velocity (fpm) = CFM x 144 ÷ [Height (in.) x Width (in.)]

$$\text{Pressure Drop} = \left(\frac{\text{Actual Velocity}}{2000}\right)^2 \times \text{Catalog Pressure Drop @ 2000 fpm}$$

Standard Construction

- 22 gauge galvanized casings
- 24 gauge perforated baffles
- Acoustic quality Fiberglass media

Optional Features

- Mylar or polyethylene liners
- Fiberglass cloth liners
- Stainless steel or aluminum construction

Computer program available which provides attenuator performance at actual job conditions.

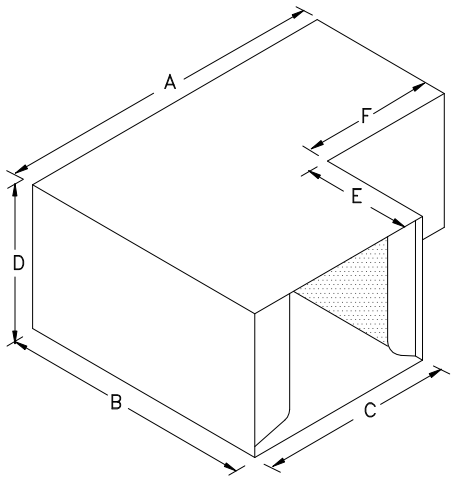
Rectangular Elbow Attenuators

Self-noise Power Levels

Model	Velocity fpm	Self-Noise Power Levels, dB re 10^{-12} Watts Octave Band/Center Frequency (Hz) 1 63	2 125	3 250	4 500	5 1K	6 2K	7 4K	8 8K
EHP	750	55	41	37	36	43	45	39	33
	1000	60	50	42	38	45	53	50	44
	1500	71	62	55	50	50	59	63	59
EMP	750	54	40	35	36	42	39	32	29
	1500	60	58	55	50	50	57	56	50
	2000	72	62	57	56	58	62	64	59
ELP	1000	59	40	33	35	42	41	32	27
	2000	68	57	52	49	51	58	59	53
	2500	75	64	59	55	55	62	65	61

Area Correction Factors - Listed self-noise power levels are for silencers with a face area of four (4) square feet. For silencers with different face areas, the following values must be added to those in the table.

Face area (sq. ft.)	0.5	1	2	4	6	8	16	32	64	128
PWL Correction Factors, dB	-9	-6	-3	0	2	3	6	9	12	15



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Installation and Maintenance location Guidelines

AEROSONICS

Sound Attenuator Installation Instructions

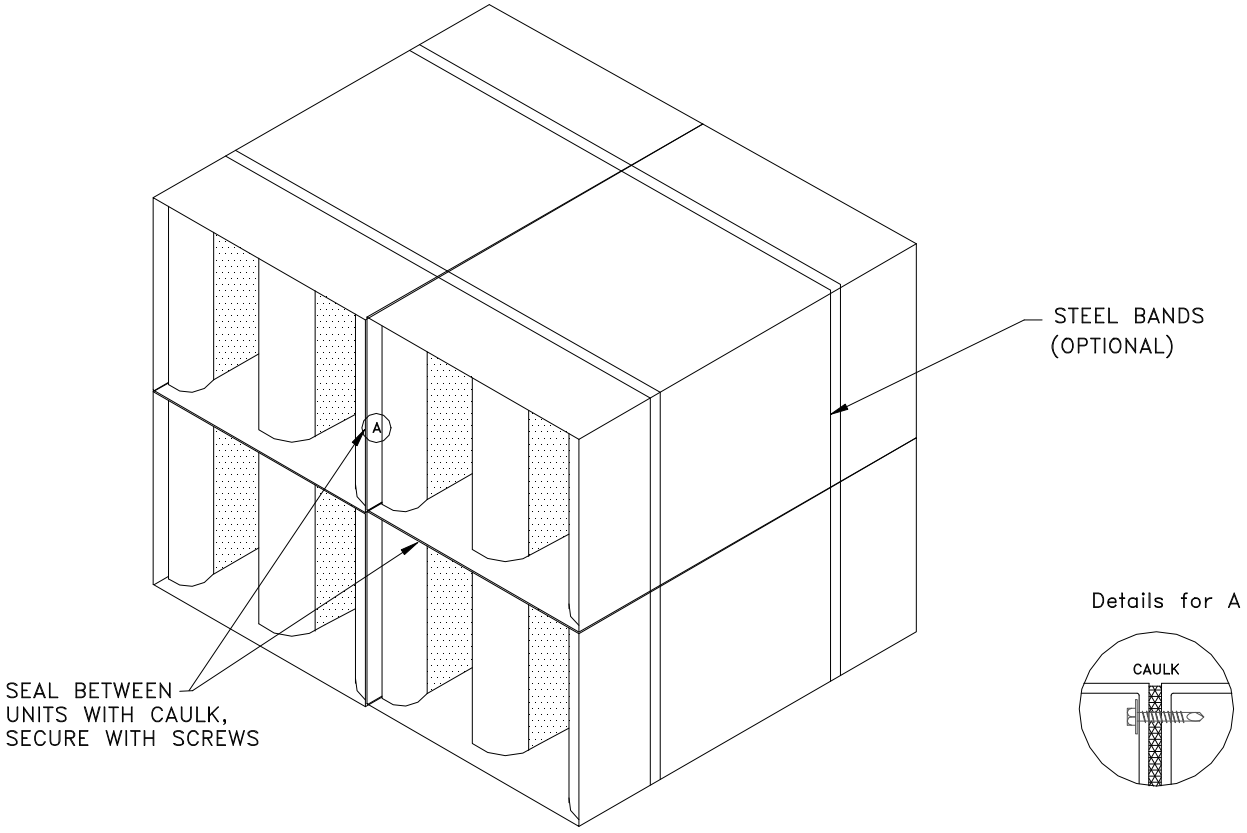
Typical connections to ducts for single units include:

Slip or lap joint using screws and sealing tape.

Flanged, gasketed, and bolted connections (gasket & bolts by others).

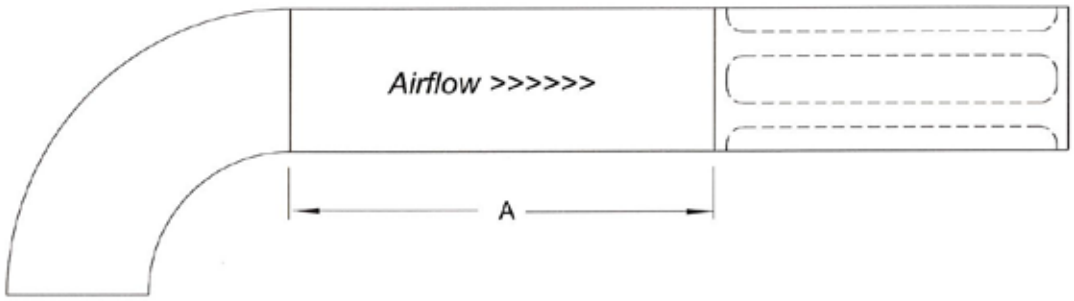
Multiple units utilize the same connection methods as used for single units. Individual units are stacked atop and beside each other to form the overall bank. To stabilize the bank, use draw bands or tack welds to hold the casings in position. Take special care to seal between the edges of each unit to prevent air from passing between the units. Nose clips or sheet metal screws with a caulk or sealant is a common solution in this area.

Attenuators have no moving parts. Only general cleaning is required periodically, normally done when the duct itself is inspected and cleaned. Wiping the interior wall of the units with a damp cloth will generally remove any dust and dirt build-up. Minimal amounts of water can be used to remove heavy soil, but saturating the insulation is not recommended.



General Guidelines for Location of Rectangular Duct Silencers

Silencers located near elbows



A = 3 x equivalent diameter

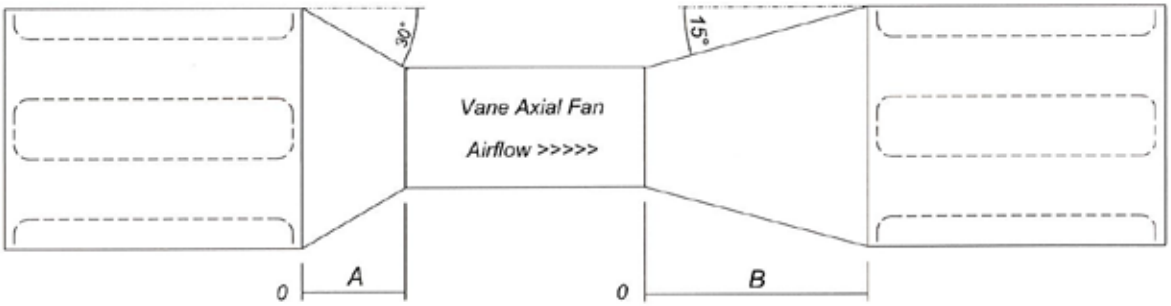
Silencers located next to Coils or Filters

Coil or Filter *Coil or Filter*

Distances should be doubled when using Low Frequency Silencers

General Guidelines for Location of Rectangular Duct Silencers

Vane Axial Fan Silencers



Rectangular Silencers

A = 0.75 x duct equivalent diameter

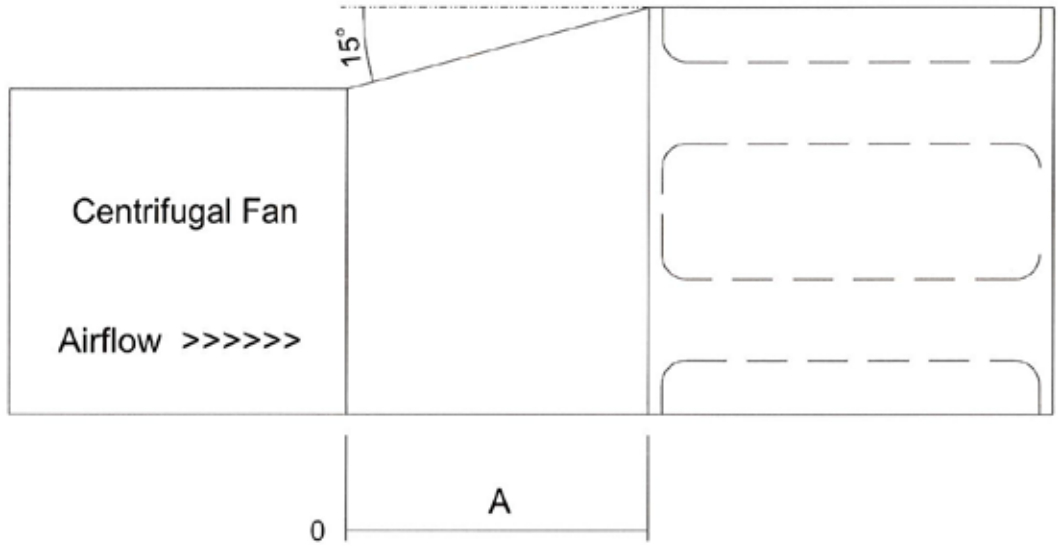
$$B = \frac{\text{Face Velocity (fpm)}}{1000} \times \text{equivalent duct diameter}$$

Tubular Silencer

A and B = 0 when silencer bullet is matched to fan hub diameter

General Guidelines for Location of Rectangular Duct Silencers

Centrifugal Fans



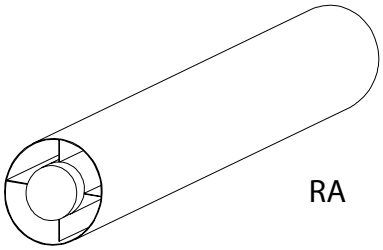
$$A = \frac{\text{Face Velocity (fpm)}}{1000} \times \text{equivalent duct diameter}$$

Tubular Silencers

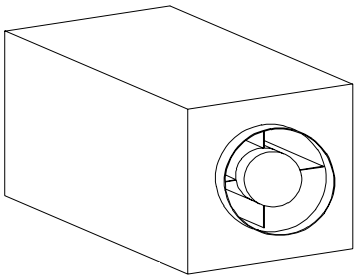
- **Single Wall Attenuators**
- **Double Wall Attenuators**
- **Low Frequency Attenuators**
- **Packless for Round Ductwork**
- **Packless Silencers for Control Valves**

Standard Tubular Attenuators

Models RA and RB are single wall units that provide an economical solution to less severe noise problems. Standard unit length is three times the diameter, minimum 48."



RA



DR

Models DRA, DRB, and DRC provide improved performance by adding a double wall casing. Unit width is diameter plus 6". Standard unit length is two times the diameter, minimum 36," plus 2" long collar on each end.

Special features of standard tubular attenuators include:

- Radius spun inlet nose on center absorber to provide minimum pressure drop
- Available in one inch diameter increments from 10" - 22" and 2" diameter increments from 24" - 60".
- SMACNA galvanized steel gauges for RA and RB casings
- DR model casings:
  - 12" - 24" diameter - 22 ga. galvanized steel
  - 26" - 60" diameter - 18 ga. galvanized steel
- 24 gauge perforated galvanized baffles
- Long strand Fiberglass acoustical fill
- Seams are roll formed and mastic filled to insure airtight units to 8" w.g.
- Optional polyethylene, Mylar or fiberglass cloth liners

ASTM E-84 ratings for the acoustical fill are:

- Flamespread **25**
- Smoke Developed **5**

Components are also available in stainless steel or aluminum construction.

Acoustical performance ratings are based on tests conducted by Intertek Testing Services, formerly ETL Testing Laboratories, Inc., Cortland, New York, in accordance with ASTM E477 "Standard Method of Testing Duct Liner Materials and Prefabricated Silencers for Acoustical and Airflow Performance." Copies of the test reports are available upon request.

Single Wall Attenuators

RA
RB
SELF-NOISE POWER LEVELS

Single Wall Tubular Attenuator - Models RA RB

				Dynamic Insertion Loss (dB) Octave Band/Center Frequency (Hz)							
Model	Flow	Velocity fpm	Press Drop	1 63	2 125	3 250	4 500	5 1K	6 2K	7 4K	8 8K
RA	Reverse Flow	-4000	0.73	8	12	18	22	20	14	11	10
		-2000	0.19	8	11	17	21	18	14	11	11
		0		7	10	16	21	18	15	12	12
	Forward Flow	+2000	0.19	5	10	14	22	19	17	12	12
		+4000	0.73	4	8	13	21	19	17	12	13
RB	Reverse Flow	-4000	0.45	2	6	9	14	16	8	5	5
		-2000	0.12	2	5	9	13	14	8	6	5
		0		1	4	8	12	12	9	6	7
	Forward Flow	+2000	0.12	1	3	8	12	11	9	6	6
		+4000	0.45	0	3	8	12	10	9	6	6

Forward Flow - characteristic of supply or discharge fan systems.
Reverse Flow - typical of return or intake fan systems.

Pressure Drop Calculation for Specific Velocity

Actual Velocity (fpm) = CFM x 144 ÷ [3.14 x r² (in.)] r = radius

$$\text{Pressure Drop} = \left(\frac{\text{Actual Velocity}}{4000}\right)^2 \times \text{Catalog Pressure Drop @ 4000 fpm}$$

Standard Construction

SMACNA galvanized steel
gauges for casings
24 gauge perforated baffles
Acoustic quality Fiberglass media

Optional Features

Mylar or polyethylene liners
Fiberglass cloth liners
Stainless steel or aluminum construction

Computer program available which provides attenuator performance at actual job conditions.

Tubular Attenuators

Self-noise Power Levels

		Self-Noise Power Levels, dB re 10^{-12} Watts Octave Band/Center Frequency (Hz)							
Model	Velocity fpm	1 63	2 125	3 250	4 500	5 1K	6 2K	7 4K	8 8K
RA	2000	59	57	51	47	47	45	42	33
	4000	69	68	70	71	64	66	61	57
RB	2000	62	59	51	47	47	44	39	36
	4000	68	67	59	55	57	55	49	52
DRA	2000	57	55	49	44	42	41	39	34
	4000	72	69	67	69	57	61	64	60
DRB	2000	55	53	46	43	41	40	37	32
	4000	69	65	64	65	52	57	59	56
DRC	2000	52	49	44	41	40	38	35	30
	4000	65	62	62	63	49	51	53	51
LRA	2000	57	55	49	44	42	41	39	34
	4000	72	69	67	69	57	61	64	60
LRB	2000	55	53	46	43	41	40	37	32
	4000	69	65	64	65	52	57	59	56
LRC	2000	52	49	44	41	40	38	35	30
	4000	65	62	62	63	49	51	53	51
RPS	2000	56	52	51	52	55	60	59	49
	4000	59	61	60	58	60	64	68	66
RPL	2000	45	44	40	39	41	36	26	20
	4000	57	57	55	54	55	58	57	48
REPL	2000	56	52	49	43	50	52	49	35
	4000	68	67	63	60	62	65	68	64

Area Correction Factors - Listed self-noise power levels are for silencers with a face area of 3.1 square feet. For silencers with different face areas, the following values must be added to those in the table. Area correction values do not apply to models RPS, RPL, or REPL.

Face area (sq. ft.)	0.75	1.5	2.5	3.1	4	6	8	15
PWL Correction Factors, dB	-6	-3	-1	0	1	3	4	7

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Double Wall Attenuators

DRA
DRB
DRC
SELF-NOISE POWER LEVELS

AEROSONICS

Double Wall Tubular Attenuator

Models DRA DRB DRC

				Dynamic Insertion Loss (dB) Octave Band/Center Frequency (Hz)							
Model	Flow	Velocity fpm	Press Drop	1 63	2 125	3 250	4 500	5 1K	6 2K	7 4K	8 8K
DRA	Reverse Flow	-4000	0.90	11	16	24	35	43	34	25	17
		-2000	0.22	11	15	23	34	42	37	27	19
		0		10	14	22	34	40	40	29	20
	Forward Flow	+2000	0.22	9	14	21	32	38	36	27	20
		+4000	0.90	6	13	21	30	33	32	25	20
DRB	Reverse Flow	-4000	0.36	9	11	20	30	29	23	18	16
		-2000	0.10	9	10	19	28	28	23	18	16
		0		8	8	18	26	28	23	19	17
	Forward Flow	+2000	0.10	7	8	17	26	26	21	19	16
		+4000	0.36	7	8	15	24	25	19	18	15
DRC	Reverse Flow	-4000	0.32	5	9	14	28	27	23	17	14
		-2000	0.08	4	8	13	26	26	23	18	15
		0		4	8	12	25	26	23	19	16
	Forward Flow	+2000	0.08	4	7	12	23	25	21	18	16
		+4000	0.32	3	7	11	22	24	21	17	16

Forward Flow - characteristic of supply or discharge fan systems.
Reverse Flow - typical of return or intake fan systems.

Pressure Drop Calculation for Specific Velocity

Actual Velocity (fpm) = CFM x 144 ÷ [3.14 x r² (in.)] r = radius

$$\text{Pressure Drop} = \left(\frac{\text{Actual Velocity}}{4000}\right)^2 \times \text{Catalog Pressure Drop @ 4000 fpm}$$

Standard Construction

10” - 24” diameter - 22 ga. galv.
26” - 60” diameter - 18 ga. galv.
24 gauge perforated baffles
Acoustic quality Fiberglass media

Optional Features

Mylar or polyethylene liners
Fiberglass cloth liners
Stainless steel or aluminum construction

Computer program available which provides attenuator performance at actual job conditions.

Tubular Attenuators

Self-noise Power Levels

		Self-Noise Power Levels, dB re 10^{-12} Watts Octave Band/Center Frequency (Hz)							
Model	**Velocity fpm**	**1 63**	**2 125**	**3 250**	**4 500**	**5 1K**	**6 2K**	**7 4K**	**8 8K**
RA	**2000**	59	57	51	47	47	45	42	33
	4000	69	68	70	71	64	66	61	57
RB	**2000**	62	59	51	47	47	44	39	36
	4000	68	67	59	55	57	55	49	52
DRA	**2000**	57	55	49	44	42	41	39	34
	4000	72	69	67	69	57	61	64	60
DRB	**2000**	55	53	46	43	41	40	37	32
	4000	69	65	64	65	52	57	59	56
DRC	**2000**	52	49	44	41	40	38	35	30
	4000	65	62	62	63	49	51	53	51
LRA	**2000**	57	55	49	44	42	41	39	34
	4000	72	69	67	69	57	61	64	60
LRB	**2000**	55	53	46	43	41	40	37	32
	4000	69	65	64	65	52	57	59	56
LRC	**2000**	52	49	44	41	40	38	35	30
	4000	65	62	62	63	49	51	53	51
RPS	**2000**	56	52	51	52	55	60	59	49
	4000	59	61	60	58	60	64	68	66
RPL	**2000**	45	44	40	39	41	36	26	20
	4000	57	57	55	54	55	58	57	48
REPL	**2000**	56	52	49	43	50	52	49	35
	4000	68	67	63	60	62	65	68	64

Area Correction Factors - Listed self-noise power levels are for silencers with a face area of 3.1 square feet. For silencers with different face areas, the following values must be added to those in the table. Area correction values do not apply to models RPS, RPL, or REPL.

Face area (sq. ft.)	0.75	1.5	2.5	3.1	4	6	8	15
PWL Correction Factors, dB	-6	-3	-1	0	1	3	4	7

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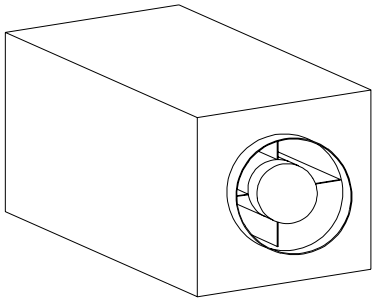
Low Frequency Attenuators

LRA
LRB
LRC
SELF-NOISE POWER LEVELS

AEROSONICS

Low Frequency Tubular Attenuators

Models LRA, LRB, and LRC provide improved LOW FREQUENCY performance to solve the toughest noise problems. Unit width is diameter plus 16". Standard unit length is two times the diameter, minimum 36," plus 2" long collars on each end.



Special features of the LOW FREQUENCY tubular attenuators include:

- **Radius spun inlet note on center absorber to provide minimum pressure drop**
- **Available in one inch diameter increments from 10" - 22" and 2" diameter increments from 24" - 60".**
- **LR model casings:**
  - **12" - 24" diameter - 22 ga. galvanized steel**
  - **26" - 60" diameter - 18 ga. galvanized steel**
- **24 gauge perforated galvanized baffles**
- **Long strand Fiberglass acoustical fill**
- **Seams are roll formed and mastic filled to insure airtight units to 8" w.g.**
- **Optional polyethylene, Mylar or fiberglass cloth liners**

ASTM E-84 ratings for the acoustical fill are:

- **Flamespread 25**
- **Smoke Developed 50**

Components also available in stainless steel or aluminum construction.

Acoustical performance ratings are based on tests conducted by Intertek Testing Services, formerly ETL Testing Laboratories, Inc., Cortland, New York, in accordance with ASTM E477 "Standard Method of Testing Duct Liner Materials and Prefabricated Silencers for Acoustical and Airflow Performance." Copies of the test reports are available upon request.

Low Frequency
Double Wall Tubular Attenuator
Models LRA LRB LRC

				Dynamic Insertion Loss (Db) Octave Band/Center Frequency (Hz)							
Model	**Flow**	**Velocity fpm**	**Press Drop**	**1 63**	**2 125**	**3 250**	**4 500**	**5 1K**	**6 2K**	**7 4K**	**8 8K**
	Reverse	-3000	0.45	14	18	28	36	41	32	22	20
	Flow	-1500	0.11	13	18	27	35	42	35	23	21
LRA		0		11	16	26	34	41	35	23	21
	Forward	+1500	0.11	10	15	25	32	40	35	24	21
	Flow	+3000	0.45	9	14	23	30	38	36	24	20
	Reverse	-3000	0.19	12	14	25	30	36	26	19	16
	Flow	-1500	0.05	11	14	24	30	37	28	20	16
LRB		0		10	12	23	29	37	29	20	17
	Forward	+1500	0.05	9	12	22	28	36	29	21	16
	Flow	+3000	0.19	8	11	20	26	34	30	21	15
	Reverse	-3000	0.17	9	12	22	27	32	21	17	14
	Flow	-1500	0.04	9	11	21	27	32	22	18	15
LRC		0		8	11	21	26	34	24	20	16
	Forward	+1500	0.04	7	11	20	25	32	24	20	16
	Flow	+3000	0.17	7	10	19	24	30	22	20	14

Forward Flow - characteristic of supply or discharge fan systems.
Reverse Flow - typical of return or intake fan systems.

Pressure Drop Calculation for Specific Velocity

Actual Velocity (fpm) = CFM x 144 ÷ [3.14 x r² (in.)] r = radius

$$\text{Pressure Drop} = \left(\frac{\text{Actual Velocity}}{3000}\right)^2 \times \text{Catalog Pressure Drop @ 3000 fpm}$$

Standard Construction
- 10” - 24” diameter - 22 ga. galv.
- 26” - 60” diameter - 18 ga. galv.
- 24 gauge perforated baffles
- Acoustic quality Fiberglass media

Optional Features
- Mylar or polyethylene liners
- Fiberglass cloth liners
- Stainless steel or aluminum construction

Computer program available which provides attenuator performance at actual job conditions.

Tubular Attenuators

Self-noise Power Levels

		Self-Noise Power Levels, dB re 10^{-12} Watts Octave Band/Center Frequency (Hz)							
Model	Velocity fpm	1 63	2 125	3 250	4 500	5 1K	6 2K	7 4K	8 8K
RA	2000	59	57	51	47	47	45	42	33
	4000	69	68	70	71	64	66	61	57
RB	2000	62	59	51	47	47	44	39	36
	4000	68	67	59	55	57	55	49	52
DRA	2000	57	55	49	44	42	41	39	34
	4000	72	69	67	69	57	61	64	60
DRB	2000	55	53	46	43	41	40	37	32
	4000	69	65	64	65	52	57	59	56
DRC	2000	52	49	44	41	40	38	35	30
	4000	65	62	62	63	49	51	53	51
LRA	2000	57	55	49	44	42	41	39	34
	4000	72	69	67	69	57	61	64	60
LRB	2000	55	53	46	43	41	40	37	32
	4000	69	65	64	65	52	57	59	56
LRC	2000	52	49	44	41	40	38	35	30
	4000	65	62	62	63	49	51	53	51
RPS	2000	56	52	51	52	55	60	59	49
	4000	59	61	60	58	60	64	68	66
RPL	2000	45	44	40	39	41	36	26	20
	4000	57	57	55	54	55	58	57	48
REPL	2000	56	52	49	43	50	52	49	35
	4000	68	67	63	60	62	65	68	64

Area Correction Factors - Listed self-noise power levels are for silencers with a face area of 3.1 square feet. For silencers with different face areas, the following values must be added to those in the table. Area correction values do not apply to models RPS, RPL, or REPL.

Face area (sq. ft.)	0.75	1.5	2.5	3.1	4	6	8	15
PWL Correction Factors, dB	-6	-3	-1	0	1	3	4	7

Acoustical Diffuser Cones for Vane Axial Fans

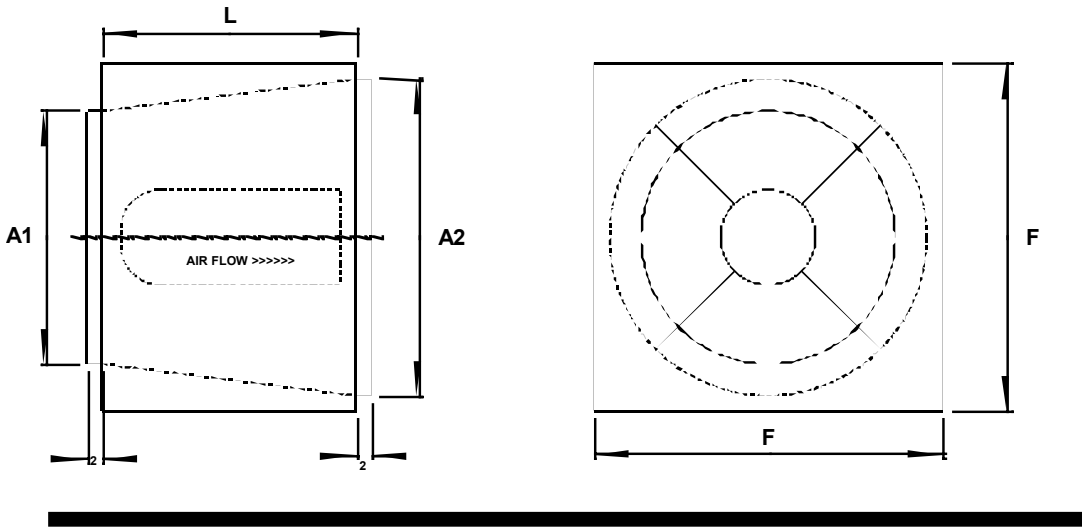
- **Cone Diffusers**

Cone Diffusers

CD

Cone Diffusers for Vane Axial Fans

The AeroSonics Cone Diffuser is specifically engineered for silencing vane axial fans. The diameter of each Cone Diffuser is precisely matched to the manufacturer's fan size.



Special features of the Cone Diffuser include:

- **Reduced turbulence with center pod sized to match axial fan hub**
- **Inlet diameter specifically dimensioned to fan manufacturer's size**
- **18 gauge galvanized casings - 22 gauge perforated cone and center pod**
- **Long strand Fiberglass acoustic fill**
- **Seams are mastic filled to insure airtight units to 8" w.g.**
- **Optional polyethylene, Mylar or fiberglass cloth liner**

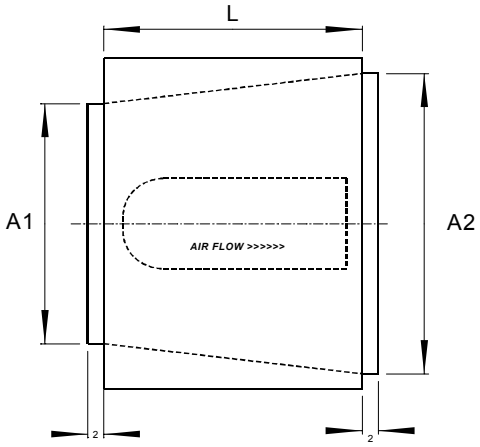
ASTM E-84 ratings for the acoustical fill are:

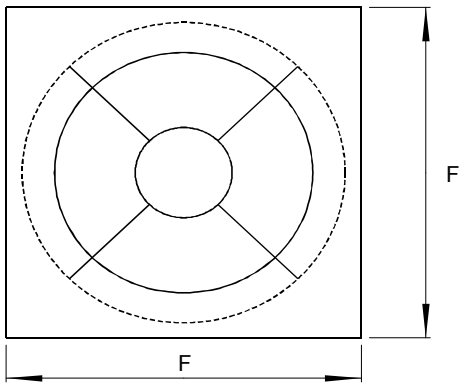
- **Flamespread 25**
- **Smoke Developed 50**

Acoustical performance ratings are based on tests conducted by Intertek Testing Services, formerly ETL Testing Laboratories, Inc., Cortland, New York, in accordance with ASTM E477 "Standard Method of Testing Duct Liner Materials and Prefabricated Silencers for Acoustical and Airflow Performance." Copies of the test reports are available upon request.

Cone Diffuser for Vane Axial Fans - Model CD

	Diameter		*Casing*			Dynamic Insertion Loss (dB) Octave Band/Center Frequency (Hz)							
Model	**A1 (in.)**	**A2 (in.)**	**F (in.)**	**L (in.)**	**Lbs.**	**1 63**	**2 125**	**3 250**	**4 500**	**5 1K**	**6 2K**	**7 4K**	**8 8K**
CD 23 ¼	**23 ¼**	**30**	**34**	**28**	**148**	**3**	**5**	**12**	**19**	**23**	**19**	**16**	**14**
CD 25 ¼	**25 ¼**	**32**	**36**	**28**	**155**	**3**	**5**	**12**	**19**	**23**	**19**	**15**	**13**
CD 27 ¼	**27 ¼**	**34**	**38**	**28**	**165**	**3**	**6**	**12**	**18**	**22**	**18**	**15**	**13**
CD 29 ¼	**29 ¼**	**36**	**40**	**28**	**175**	**3**	**6**	**13**	**18**	**21**	**17**	**14**	**13**
CD 32	**32**	**40**	**44**	**32**	**218**	**4**	**7**	**13**	**18**	**21**	**16**	**14**	**12**
CD 34	**34**	**42**	**46**	**32**	**236**	**4**	**7**	**14**	**18**	**20**	**16**	**12**	**12**
CD 36	**36**	**46**	**50**	**40**	**277**	**4**	**8**	**14**	**18**	**18**	**15**	**12**	**11**
CD 38	**38**	**48**	**52**	**40**	**328**	**4**	**10**	**15**	**17**	**16**	**14**	**11**	**11**
CD 42 ½	**42 ½**	**52**	**56**	**40**	**374**	**4**	**11**	**16**	**17**	**15**	**12**	**10**	**10**
CD 45	**45**	**56**	**60**	**44**	**480**	**5**	**11**	**16**	**17**	**14**	**12**	**10**	**10**
CD 48	**48**	**60**	**64**	**46**	**540**	**5**	**12**	**16**	**17**	**14**	**12**	**10**	**10**
CD 54	**54**	**68**	**72**	**54**	**621**	**5**	**12**	**16**	**17**	**14**	**11**	**10**	**10**
CD 60	**60**	**74**	**78**	**54**	**702**	**5**	**12**	**17**	**17**	**13**	**11**	**10**	**10**
CD 66	**66**	**82**	**86**	**60**	**1150**	**5**	**13**	**17**	**17**	**13**	**10**	**10**	**10**
CD 72	**72**	**90**	**94**	**72**	**1400**	**5**	**13**	**17**	**17**	**13**	**10**	**10**	**10**





Standard Construction

18 gauge galvanized casings
22 gauge perforated baffles
Long strand Fiberglass acoustic fill

Optional Features

Stainless steel or aluminum construction
Polyethylene or Mylar Liner
Fiberglass cloth liner

Cross Talk Silencers - Grille Silencers

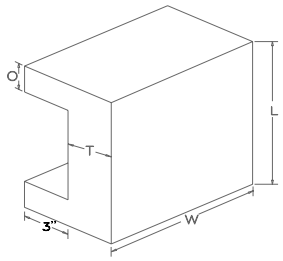
- **Transfer**
- **Grille**

Transfer

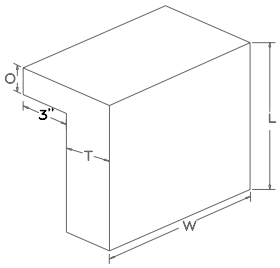
L
Z
TC
S

Transfer Silencers

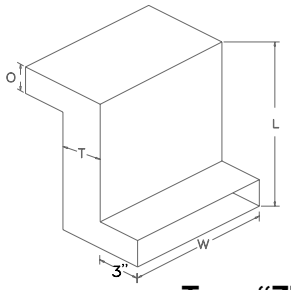
The Transfer Silencer is designed to allow air to circulate freely while blocking speech and disturbing noises. Typical installations are in ceiling spaces over partitions separating occupied areas.



Type "U"

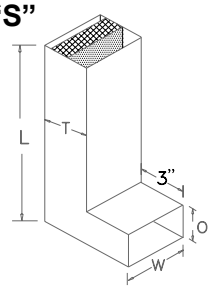


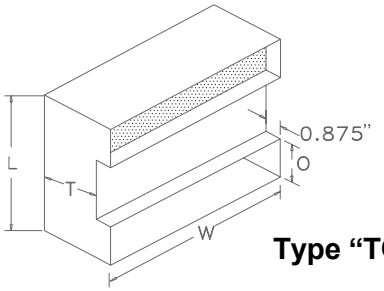
Type "L"



Type "Z"

Type "S"





Type "TC"

Special features of the Transfer Silencer include:

- **22 gauge galvanized casings**
- **24 gauge perforated baffle**
- **Long strand Fiberglass acoustic fill**
- **Seams are mastic filled to insure airtight units to 8" w.g.**
- **Optional polyethylene, Mylar or fiberglass cloth liner**

ASTM E-84 ratings for the acoustical fill are:

- **Flamespread 25**
- **Smoke Developed 50**

Components also available in stainless steel

or aluminum construction.

Transfer Silencers

ACOUSTICAL PERFORMANCE								
OCTAVE BAND	1	2	3	4	5	6	7	8
FREQUENCY (Hz)	63	125	250	500	1000	2000	4000	8000
NOISE REDUCTION (dB) - Models U, L, Z	22	30	33	37	47	49	49	43
NOISE REDUCTION (dB) - Model TC	16	21	25	32	40	44	42	40

STATIC PRESSURE DROP (PD)						
		.05	.10	.15	.20	.25
Model	Type	Air Flow (CFM)				
114	U, L, Z	125	190	240	250	280
130	"	260	400	490	560	590
142	"	320	510	650	750	780
214	"	180	260	320	370	400
230	"	380	560	680	780	810
242	"	530	760	950	1100	1140
314	"	250	370	450	520	550
342	"	740	1050	1400	1600	1680
TC22	TC	380	500	640	740	780
TC12	TC	190	260	330	360	390

Transfer Silencers - Dimensional Characteristics

Model	W	T	O	Length (inches)				Weight
				TC	L	U & Z	S	
114	14	3 ½	6		42	48		30
130	30	3 ½	6		42	48		63
142	42	3 ½	6		42	48		85
214	14	5	8		40	48		32
230	30	5	8		40	48		68
242	42	5	8		40	48		93
314	14	7	10		38	48		38
330	30	7	10		38	48		80
342	42	7	10		38	48		105
S6	6	7	6				13	13
S8	8	7	6				19	15
TC-12	10 ½	7	8	22 ½				29
TC-22	22 ½	7	8	22 ½				33

Acoustical Louvers

- **Acoustical Louvers**

Acoustical Louvers

AL-12
AL-8

Acoustical Louvers

12" or 8" deep Acoustical Louvers provide exceptional sound control at outside air intake or exhaust openings. Fan and equipment noise remains in the mechanical space.

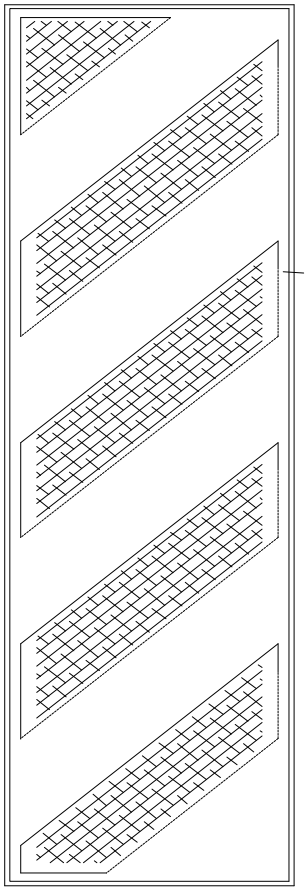
Special features of the Acoustical Louver include:

- **18 gauge galvanized casings**
- **22 gauge perforated baffle**
- **Long strand Fiberglass acoustic fill**
- **Optional flange and birdscreen available**
- **Painted exterior available**

ASTM E-84 ratings for the acoustical fill are:

- **Flamespread 25**
- **Smoke Developed 50**

Components also available in stainless steel or aluminum construction.



Acoustical Performance								
Octave Band	1	2	3	4	5	6	7	8
Center Frequency, Hz	63	125	250	500	1K	2K	4K	8K
12" Deep - Noise Reduction, dB	10	12	15	17	19	18	18	14
8" Deep - Noise Reduction, dB	9	11	12	15	17	16	16	11
12" Deep - Transmission Loss, dB	4	6	9	11	13	12	12	8
8" Deep - Transmission Loss, dB	4	5	6	9	11	10	10	7

Static Pressure Loss						
Face Velocity, fpm	250	350	500	750	1000	1100
12" Deep Pressure Drop	0.04	0.06	0.15	0.35	0.60	0.75
8" Deep Pressure Drop	0.04	0.06	0.15	0.35	0.60	0.75