UNIVERSAL™

UNIVERSAL SILENCER

A DIVISION OF NELSON INDUSTRIES, INC.

We're Leading A Quiet Revolution®

Industrial Fan Silencers

Product Catalog No. 249-A

General Information

Industrial Fan Silencers

Primary Air Fans, Forced Draft Fans and Induced Draft Fans generally require some form of acoustical treatment. Most applications require inlet and/or outlet silencers to meet OSHA and other noise requirements. For continuous exposure, a maximum of 90 dBA is generally specified to avoid hearing damage. When conversation near the fan is desired, levels of 80 dBA and less are often needed.

Universal Silencer designs and manufactures a complete line of silencers for application on all fan types. Computer enhanced technology developed for fan, turbine and other air moving equipment enables Universal to offer a cost effective solution to every fan silencing application.

Each of the four designs presented in this catalog has unique advantages over the others, depending upon the application specific requirements for octave band attenuation, pressure drop and space utilization. This catalog covers standard models and sizes and provides basic information to evaluate the merits of the individual designs for your application. Special configurations, materials, higher temperatures and sizes are available upon request.

SU5 Series - Annular Flow Silencer

The SU5 series is our highest grade standard cylindrical absorptive silencer. Its design consists of two packed concentric perforated cylinders which form an annular flow path. This design features blocked-line-of-sight from inlet to outlet, yet provides a large flow area for low flow resistance. Constructed from mild steel with a primer coated exterior. The standard SU5 silencer is suitable for temperatures up to 325°F.

Contents

AFS Series - Absorptive/Reactive Silencer

The AFS Series Fan Silencer combines a chamber reactive and absorptive design that both reflects acoustic energy and dissipates it with absorptive pack material. Constructed from plate and sheet steel in an all-welded, straight through flow path design, the AFS Series is suitable for most applications on the inlet and discharge of Centrifugal or axial blowers, especially when low pressure drop is required. The standard AFS Silencer is suitable for temperatures up to 325°F.

IFS Series - Absorptive/Parallel Baffle Silencer

The IFS Series Fan Silencer uses parallel baffles filled with absorptive pack between perforated face sheets to dissipate acoustic energy. The silencers are constructed from sheet and plate steel with rectangular flanged inlet and outlet; transitions are available for other cross sections. The silencer is painted internally and externally with our standard shop coat primer; however, high temperature paint is available upon request. Constructed from corrosion resistant materials, the baffles remain unpainted and are designed with rounded entrances in a straight through flow design for low pressure drop. The standard IFS Silencer is available in a variety of sizes up to 144" square face area and 160" in length with three grades of silencing depending upon specific acoustic requirements. The standard IFS Silencer is suitable for temperatures up to 325°F.

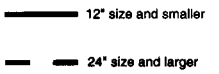
TFS - Absorptive/Tubular Flow Silencer

The TFS Series Fan Silencer uses staggered perforated flow tubes surrounded by absorptive pack material to dissipate acoustic energy. The flow tubes are constructed from corrosion resistant materials and held in place with a steel tube sheet. TFS Silencer shells are made from sheet and plate steel with rectangular flanged inlet and outlet; transitions are available for other cross sections. The silencer is painted with our standard shop coat primer; high temperature paint is available. The TFS Series has a straight through flow design and is available in standard sizes up to 96" square face area and 72" in length. The standard TFS Silencer is suitable for temperatures up to 325°F.

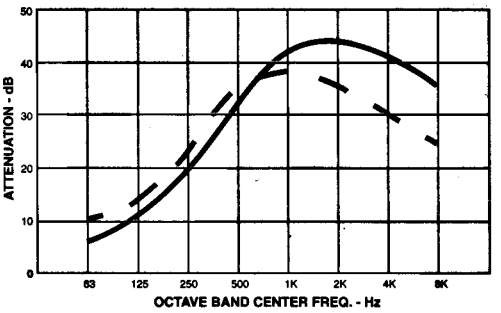
Specifications SU5 Series

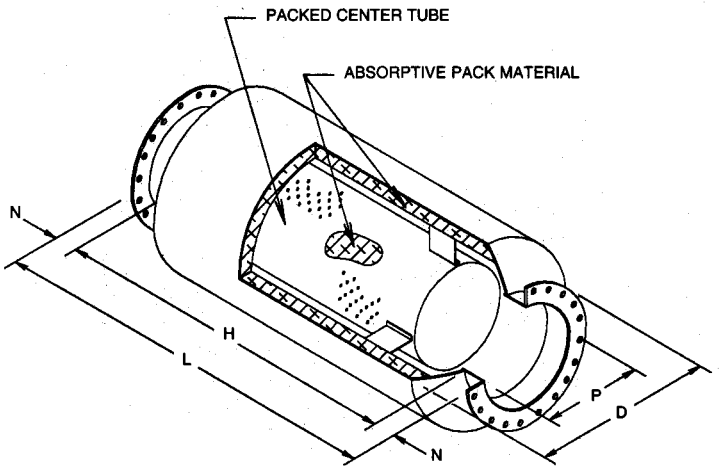
Annular Flow Silencers

NOTE: SU5 Series Standard Paint and Acoustical Packing are suitable for 325 °F.



Attenuation Curve, Typical





Features:

- All-welded mild steel construction
- Blocked-line-of-sight from inlet to outlet
- Concentric perforated internal cylinders
- Annular flow path
- Absorptive design effective for high frequencies
- Primer coated exterior
- Pressure drop coefficient, c = 0.75
- 125/150# ANSI drilled plate flanges

Common Applications:

- Inlet and discharge of high speed, low pressure Centrifugal Compressors and Blowers (discharge pressure < 15 psig)
- Inlet and discharge of Industrial Fans
- Inlet of high pressure Centrifugal Compressors
- Dry Vacuum Pump discharge
- Some low pressure vents (pressure < 15 psig)
- Any high frequency noise source

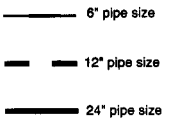
MODEL	P	D	L	N	H	WEIGHT
SU5-4	4	10	21 1/2	3	15 1/2	30
SU5-5	5	12	26	3	20	55
SU5-6	6	12	26	3	20	60
SU5-8	8	18	36	3 1/2	29	120
SU5-10	10	20	44 1/2	3 1/2	37 1/2	195
SU5-12	12	24	53	3 1/2	46	290
SU5-14	14	26	61 1/2	3 1/2	54 1/2	390
SU5-16	16	28	68	3 1/2	61	500
SU5-18	18	30	74	3 1/2	67	650
SU5-20	20	36	78	4 1/2	69	950
SU5-22	22	36	89	4 1/2	80	1,080
SU5-24	24	42	91	4 1/2	82	1,400
SU5-26	26	42	102	4 1/2	93	1,580
SU5-28	28	48	104	4 1/2	95	2,200
SU5-30	30	48	115	4 1/2	106	2,600
SU5-32	32	54	128	6	116	3,150
SU5-34	34	60	136	6	124	3,600
SU5-36	36	60	145	6	133	4,500
SU5-42	42	66	170	6	158	6,200
SU5-48	48	78	186	6	174	8,200
SU5-54	54	84	198	6	186	10,300
SU5-60	60	90	210	6	198	12,500

Dimensions in Inches - Weight in Pounds

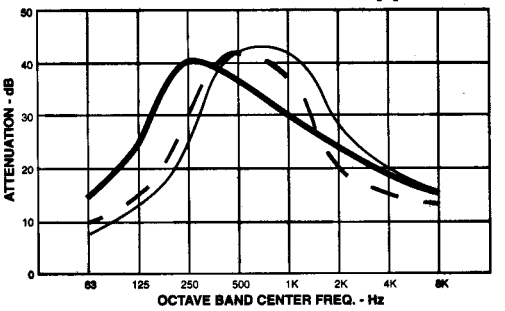
Specifications AFS Series

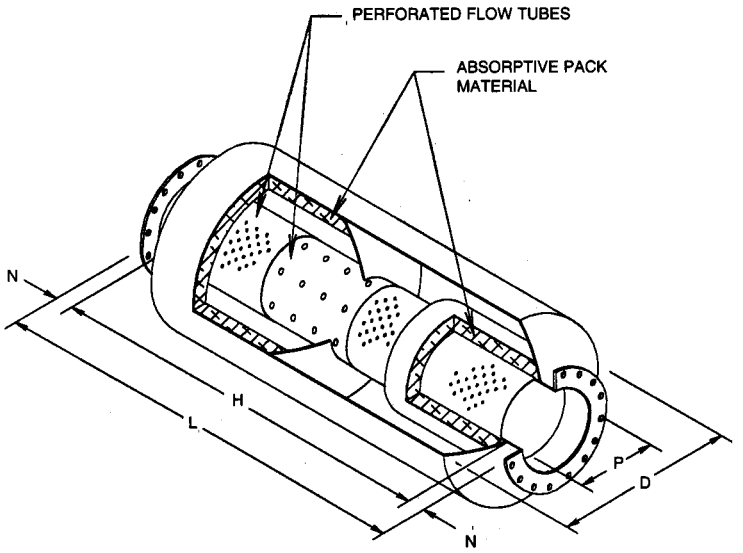
Combination Type Silencers

NOTE: AFS Series Standard Paint and Acoustical Packing are suitable for 325 °F.



Attenuation Curve, Typical





Features:

- All-welded mild steel construction
- Straight through flow path
- Combination reactive and absorptive design for good mid-frequency attenuation
- Low pressure drop
- Primer coated exterior
- Pressure drop coefficient, c=0.6 for pipe sizes < 24" and c=1.0 for 24" and larger
- 125/150# ANSI drilled plate flanges

Common Applications:

- Inlet and discharge of Centrifugal Blowers
- Inlet and discharge of Axial Blowers
- Inlet and discharge of Industrial Fans
- Inlet of Centrifugal Compressors
- Small Reciprocating Compressors

MODEL	P	D	L	N	H	WEIGHT
AFS-4	4	12	34	3	28	60
AFS-5	5	14	40 1/2	3	34 1/2	80
AFS-6	6	16	47	3	41	135
AFS-8	8	20	60 1/2	3 1/2	53 1/2	220
AFS-10	10	24	67 1/2	3 1/2	60 1/2	380
AFS-12	12	28	74 1/2	3 1/2	67 1/2	500
AFS-14	14	36	89	3 1/2	82	980
AFS-16	16	36	100 1/2	3 1/2	93 1/2	1,150
AFS-18	18	42	108	3 1/2	101	1,400
AFS-20	20	48	124	4 1/2	115	1,800
AFS-22	22	48	129	4 1/2	120	1,950
AFS-24	24	54	143	4 1/2	134	2,450
AFS-26	26	60	157	4 1/2	148	3,670
AFS-28	28	60	168 1/2	4 1/2	159 1/2	4,100
AFS-30	30	66	182	4 1/2	173	4,825
AFS-32	32	66	187 1 /2	4 1/2	178 1/2	5,100
AFS-34	34	66	193	4 1/2	184	5,400
AFS-36	36	72	207	4 1/2	198	6,400
AFS-42	42	84	220	6	208	9,500
AFS-48	48	96	272	6	260	15,000

Dimensions in Inches - Weight in Pounds

Specifications
IFS Series

Absorptive
Parallel Baffle Type
Rectangular Silencers

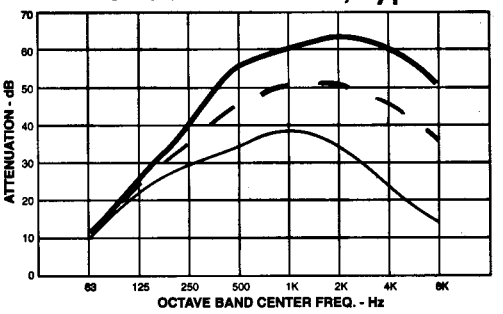
NOTE: IFS Series Standard Paint and Acoustical Packing are suitable for 325 °F.

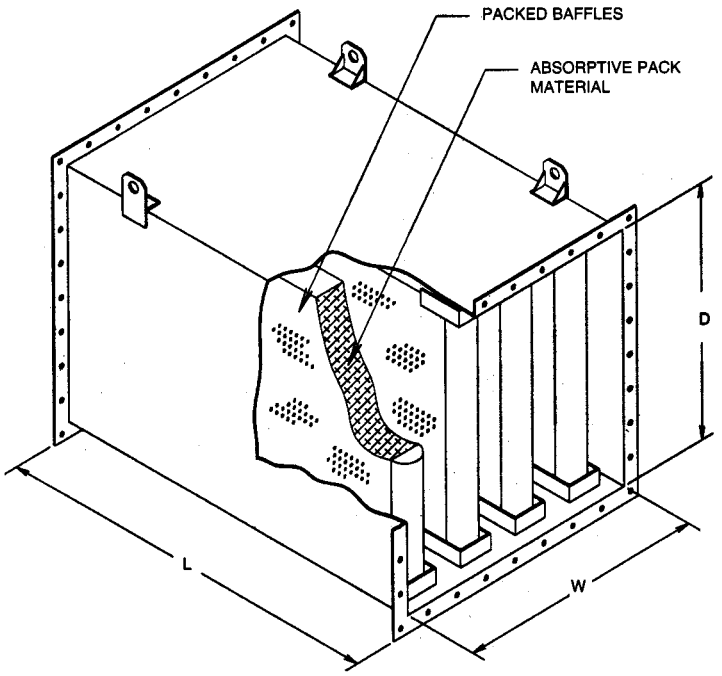
IFSL - 110" long

IFSS - 110" long

IFSH - 110" long

Attenuation Curve, Typical





Features:

- All-welded mild steel construction
- Straight through flow design
- Three standard grades and lengths
- Acoustically packed parallel baffles arranged for good middle to high frequency absorption
- Lift lugs for easy handling
- Primer coated shell inside and out
- Rectangular flanged inlet and outlet
- Adapters or flow transitions available for other configurations
- Low pressure drop

Common Applications:

- Inlet and discharge of Industrial Fans
- Building or Enclosure Ventilation/Intakes
- Low pressure vents (pressure < 15 psig)
- Any high frequency noise source

IFSL

W	D	Open Area (sq ft)	WEIGHT L = 60 c = 0.5	WEIGHT L = 110 c = 0.6	WEIGHT L =160 c = 0.6
	24	2.0	405	715	1,035
	36	3.0	545	985	1,430
	48	4.0	735	1,330	1,940
24	60	5.0	900	1,635	2,380
	72	6.0	1,030	1,880	2,740
	84	7.0	1,395	2,545	3,710
	96	8.0	1,550	2,830	4,125
	36	4.5	820	1,490	2,175
	48	6.0	980	1,790	2,620
36	60	7.5	1,195	2,190	3,200
	72	9.0	1,570	2,870	4,190
	84	10.5	1,795	3,300	4,820
	96	12.0	1,985	3,650	5,330
	48	8.0	1,245	2,265	3,315
	60	10.0	1,495	2,745	4,015
48	72	12.0	1,925	3,535	5,170
	84	14.0	2,200	4,055	5,935
	96	16.0	2,420	4,470	6,540
	60	12.5	2,025	3,715	5,435
60	72	15.0	2,280	4,200	6,145
	84	17.5	2,600	4,810	7,050
	96	20.0	2,855	5,285	7,745
	72	18.0	2,635	4,865	7,125
72	84	21.0	3,005	5,565	8,160
	96	24.0	3,860	6,805	9,960
84	84	24.5	3,405	6,320	9,275
	96	28.0	4,145	7,675	11,245
96	96	32.0	4,160	8,545	12,525

IFSS

W	D	Open Area (sq ft)	WEIGHT L = 60 c = 0.6	WEIGHT L = 110 c = 0.7	WEIGHT L =160 c = 0.8
	24	1.5	525	930	1,360
	36	2.3	710	1,290	1,890
	48	3.0	935	1,710	2,500
27	60	3.8	1,150	2,105	3,075
	72	4.5	1,310	2,415	3,530
	84	5.3	1,730	3,185	4,655
	96	6.0	1,920	3,530	5,165
	36	3.0	975	1,775	2,600
	48	4.0	1,175	2,140	3,140
36	60	5.0	1,430	2,630	3,850
	72	6.0	1,835	3,380	4,945
	84	7.0	2,110	3,900	5,710
	96	8.0	2,330	4,310	6,315
	48	5.0	1,415	2,590	3,790
	60	6.3	1,710	3,155	4,630
45	72	7.5	2,170	4,005	5,865
	84	8.8	2,490	4,615	6,765
	96	10.0	2,745	5,090	7,465
	60	8.8	2,515	4,635	6,800
63	72	10.5	2,835	5,250	7,705
	84	12.3	3,250	6,045	8,875
	96	14.0	3,570	6,645	9,765
	72	12.0	3,170	5,875	8,630
72	84	14.0	3,630	6,760	9,935
	96	16.0	4,375	8,125	11,925
90	84	17.5	4,390	8,190	12,045
	96	20.0	5,245	9,760	14,340

IFSH

W	D	Open Area (sq ft)	WEIGHT L = 60 c = 0.8	WEIGHT L = 110 c = 0.9	WEIGHT L =160 c = 1.0
	24	1.0	510	910	1,325
	36	1.5	700	1,270	1,855
	48	2.0	920	1,680	2,460
24	60	2.5	1,135	2,075	3,035
	72	3.0	1,295	2,385	3,490
	84	3.5	1,710	3,145	4,595
	96	4.0	1,895	3,495	5,105
	36	2.0	955	1,740	2,545
	48	2.7	1,150	2,105	3,085
32	60	3.3	1,410	2,590	3,800
	72	4.0	1,805	3,325	4,870
	84	4.7	2,080	3,845	5,635
	96	5.3	2,300	4,260	6,240
	48	4.0	1,620	2,970	4,350
	60	5.0	1,960	3,625	5,325
48	72	6.0	2,460	4,550	6,670
	84	7.0	2,825	5,250	7,710
	96	8.0	3,115	5,790	8,500
	60	6.7	2,755	5,090	7,420
64	72	8.0	3,110	5,770	8,420
	84	9.3	3,570	6,655	9,720
	96	10.7	3,925	7,320	10,695
	72	9.0	3,435	6,380	9,380
72	84	10.5	3,945	7,355	10,820
	96	12.0	4,720	8,785	12,905
88	84	12.8	4,685	8,760	12,895
	96	14.7	5,570	10,390	15,270
96	96	16.0	5,995	11,190	16,450

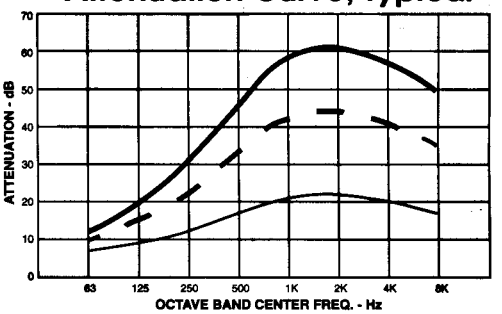
Dimensions in Inches - Weight in Pounds

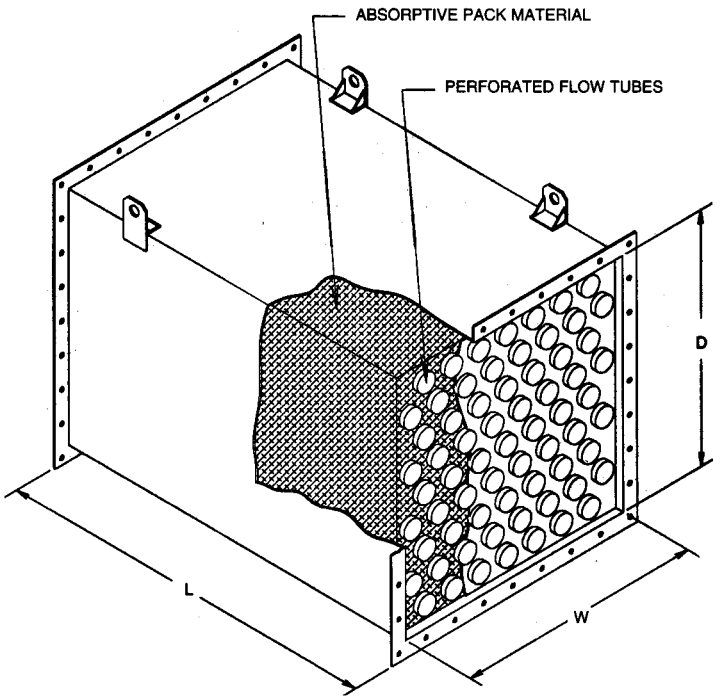
Specifications
TFS Series

Absorptive
Tubular Flow Type
Rectangular Silencers

NOTE: TFS Series Standard Paint and Acoustical Packing are suitable for 325 °F.

Attenuation Curve, Typical





Features:

- All-welded mild steel construction
- Straight through flow design
- Staggered perforated flow tubes surrounded by acoustical pack material
- High attenuation in short length
- Lift lugs for easy handling
- Primer coated shell inside and out
- Rectangular flanged inlet and outlet
- Adapters or flow transitions available for other configurations

Common Applications:

- Inlet and discharge of Industrial Fans
- Building or Enclosure Ventilation/Intakes
- Low pressure vents (pressure < 15 psig)
- Any high frequency noise source

W	D	Open Area (sq ft)	WEIGHT		
			L = 24 c = 0.8	L = 48 c = 0.9	L = 7 2 c = 1.0
24	24	1.2	165	275	385
	36	1.8	215	370	525
	48	2.8	325	565	805
	60	3.4	400	685	975
	72	4.0	460	800	1,130
	84	4.9	655	1,125	1,590
	96	5.5	735	1,260	1,785
36	36	2.9	335	575	820
	48	4.4	430	760	1,090
	60	5.3	525	915	1,310
	72	6.3	735	1,265	1,790
	84	7.7	850	1,465	2,085
	96	8.6	945	1,635	2,325
48	48	5.9	555	970	1,390
	60	7.2	655	1,150	1,645
	72	8.6	900	1,555	2,210
	84	10.5	1,040	1,805	2,575
	96	11.8	1,155	2,010	2,865
60	60	9.2	930	1,610	2,290
	72	10.8	1,065	1,850	2,635
	84	13.3	1,230	2,150	3,065
	96	14.9	1,370	2,390	3,410
72	72	13.1	1,235	2,145	3,055
	84	16.1	1,420	2,490	3,560
	96	18.1	1,835	3,155	4,475
84	84	18.8	1,615	2,830	4,050
	96	21.2	2,070	3,565	5,065
96	96	24.3	2,305	3,980	5,650

Dimensions in Inches - Weight in Pounds

Sizing Information

In order to properly size a silencer the flow area through it must be sufficient to accommodate the maximum flow without imposing excessive pressure drop. The following instructions enable the user to 1) select proper silencer size, and 2) determine actual pressure drop. These instructions assume flowing gas is air. For other gases, density and other corrections, contact Universal Silencer for assistance.

Data Require:

Air flow rate (Actual CFM)
Temperature (°F)
Pressure (psig)
Maximum allowable pressure drop (inches of water)

1. Determine the maximum allowable velocity to achieve the required pressure drop:

$$V = 4005\sqrt{\left(\frac{\triangle P}{C}\right)\left(\frac{14.7}{P+14.7}\right)\left(\frac{T+460}{530}\right)}$$

V = Air or gas velocity, ft/min (see Note 1)
△P = Maximum pressure drop (inches of water)
C = Silencer pressure drop coefficient (see pages 3-6)
T = Air temperature °F (See Note 2)
P = Operating pressure, psig (If at atmospheric pressure, pressure ratio is unity and may be omitted from equation. If P exceeds 15 psig, contact Universal Silencer for recommendations.)

2. Determine flow area required:

$$A_{required} = \frac{Q}{V}$$

$A_{required}$ = Flow area required, ft^2

Q = Air flow rate (Actual CFM)

For reference, if SCFM is given rather than ACFM, then convert using the following equation.

$$\text{Actual CFM} = (\text{Standard CFM})\left(\frac{.14.7}{P+14.7}\right)\left(\frac{T+460}{530}\right)$$

3. From Table 1 or the tables on pages 3-6, select a size with a flow area equal to or greater than that calculated in step 2.

4. Determine the actual gas velocity in feet per minute.

$$V_{actual} = \frac{Q}{A}$$

A = Flow area of size of silencer chosen, ft^2.

5. Determine actual pressure drop in inches of water:

$$\triangle P_{actual} = C\left(\frac{V_{actual}}{4005}\right)^2\left(\frac{530}{T+460}\right)\left(\frac{P+14.7}{14.7}\right)$$

Table 1
Conversion - Pipe Diameter from Flow Area

Flow Area (sq ft.)	Diameter (inches)	Flow area (sq ft.)	Diameter (inches)
0.087	4	4.3	28
0.136	5	4.9	30
0.196	6	5.6	32
0.349	8	6.3	34
0.55	10	7.1	36
0.79	12	7.9	38
1.07	14	8.7	40
1.4	16	9.6	42
1.8	18	10.6	44
2.2	20	11.5	46
2.6	22	12.6	48
3.1	24	15.9	54
3.7	**26**	**19.6**	**60**

NOTES:
1. Since self noise and aerodynamic noise generation increase with velocity, absorptive silencers are usually sized for 4,000-8,000 ft/min. In no case should the velocity exceed 15,000 ft/min, regardless of pressure drop allowed.

2. Attenuation curves are typical of the characteristics of the silencer series and, as such, are not a guarantee for an individual silencer. Individual silencer performance can be affected by many environmental and operational factors, such as the sound source characteristics including pure tones, flow velocity, adjacent piping and temperature.

Industrial Fan Silencers

CONTACT UNIVERSAL SILENCER FOR ALL YOUR INDUSTRIAL SILENCING AND AIR FILTRATION REQUIREMENTS.

Complete lines of Silencers and Air Filters/Filter-Silencers for:

- Rotary Positive Blowers and Vacuum Pumps
- Reciprocating Engines
- Industrial Fans
- Gas Turbine Engines
- High Pressure Vents & Blowdowns
- Centrifugal Compressors
- Specialty Applications (Such as Pressure Reduction Valves, Rotary Screw Compressors, etc.)

Representatives in Major Industrial Areas of U.S. and Canada

Write, Call or Fax for Literature at the address below or contact us on our Web Page at *http://www.universal-silencer.com* or email to *universal@universal-silencer.com*

Represented By:

UNIVERSAL™

UNIVERSAL SILENCER

A DIVISION OF NELSON INDUSTRIES, INC.
P.O. Box 411, Stoughton, Wisconsin 53589
608-873-4272 Fax 608-873-4298

USD-249A-7/96