



**UNIVERSAL**

---

Acoustic & Emission Technologies

# **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

<b>SU5 Series</b> .....	<b>page 3</b>
<b>AFS Series</b> .....	<b>page 4</b>
<b>IFS Series</b> .....	<b>page 5</b>
<b>TFS Series</b> .....	<b>page 6</b>
<b>Sizing Information</b> .....	<b>page 7</b>

### **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.

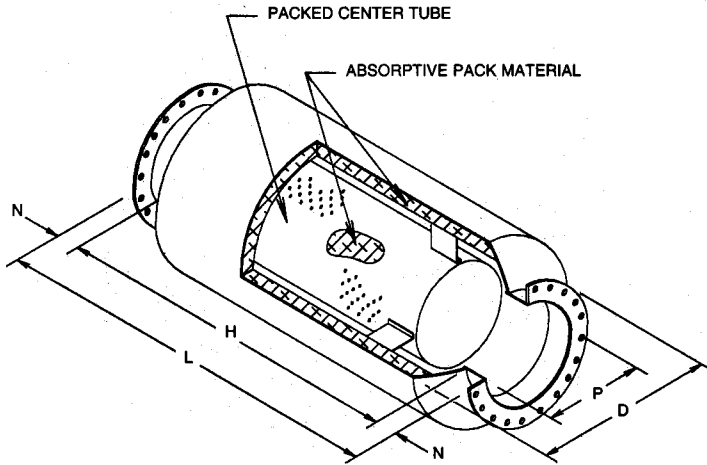
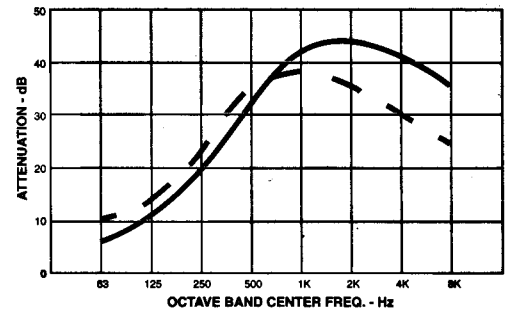
# Specifications SU5 Series

## Annular Flow Silencers

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

— 12" size and smaller  
- - - 24" size and larger

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

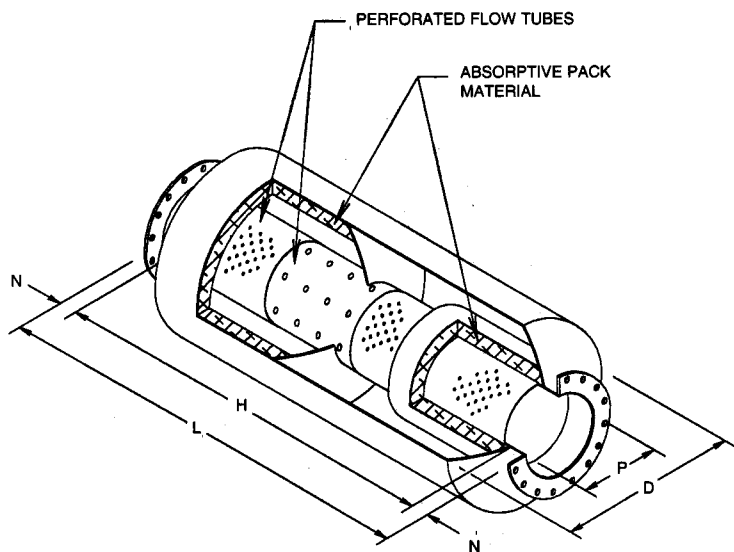
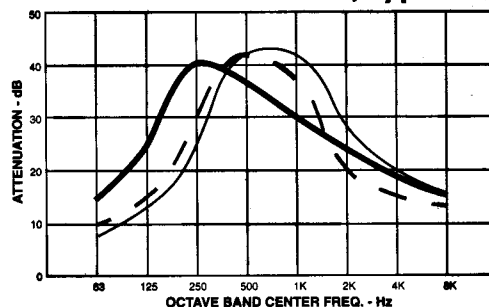
# Specifications AFS Series

## Combination Type Silencers

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

- 6" pipe size
- - - 12" pipe size
- 24" pipe size

**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

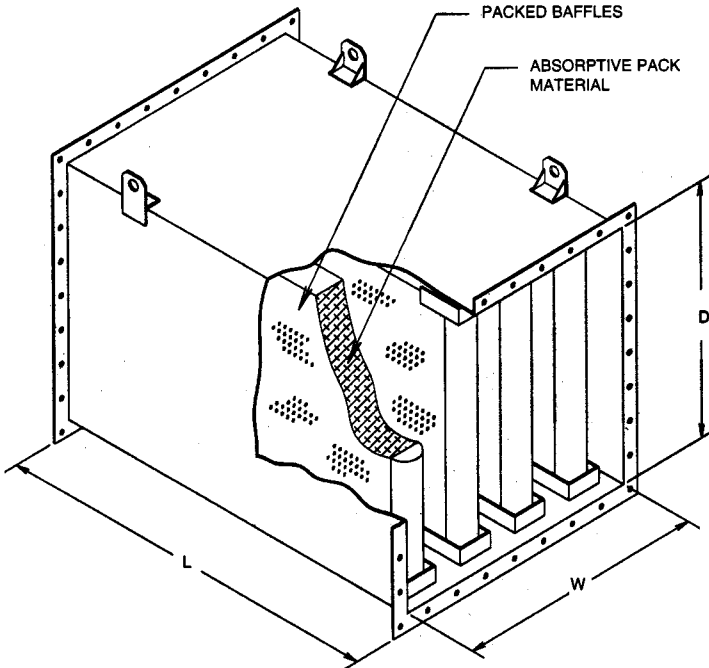
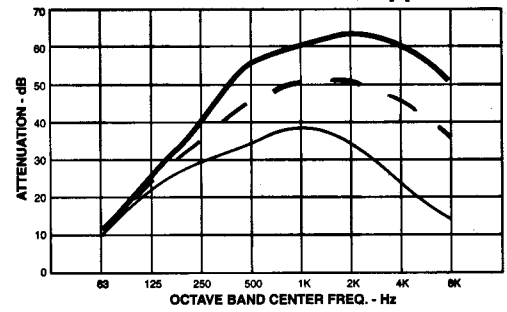
# Specifications IFS Series

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

### IFSS

### IFSH

W	D	Open Area (sq ft)	WEIGHT			
			L = 60 c = 0.5	L = 110 c = 0.6	L = 160 c = 0.6	
24	24	2.0	405	715	1,035	
	36	3.0	545	985	1,430	
	48	4.0	735	1,330	1,940	
	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	36	4.5	820	1,490	2,175	
	48	6.0	980	1,790	2,620	
	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	48	8.0	1,245	2,265	3,315	
	60	10.0	1,495	2,745	4,015	
	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	60	12.5	2,025	3,715	5,435
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		72	18.0	2,635	4,865	7,125
		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

W	D	Open Area (sq ft)	WEIGHT			
			L = 60 c = 0.6	L = 110 c = 0.7	L = 160 c = 0.8	
27	24	1.5	525	930	1,360	
	36	2.3	710	1,290	1,890	
	48	3.0	935	1,710	2,500	
	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	36	3.0	975	1,775	2,600	
	48	4.0	1,175	2,140	3,140	
	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	
45	48	5.0	1,415	2,590	3,790	
	60	6.3	1,710	3,155	4,630	
	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	
	63	60	8.8	2,515	4,635	6,800
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		72	12.0	3,170	5,875	8,630
		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

W	D	Open Area (sq ft)	WEIGHT			
			L = 60 c = 0.8	L = 110 c = 0.9	L = 160 c = 1.0	
24	24	1.0	510	910	1,325	
	36	1.5	700	1,270	1,855	
	48	2.0	920	1,680	2,460	
	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		
32	36	2.0	955	1,740	2,545	
	48	2.7	1,150	2,105	3,085	
	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	48	4.0	1,620	2,970	4,350	
	60	5.0	1,960	3,625	5,325	
	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	
	64	60	6.7	2,755	5,090	7,420
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		72	9.0	3,435	6,380	9,380
		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

Dimensions in Inches - Weight in Pounds

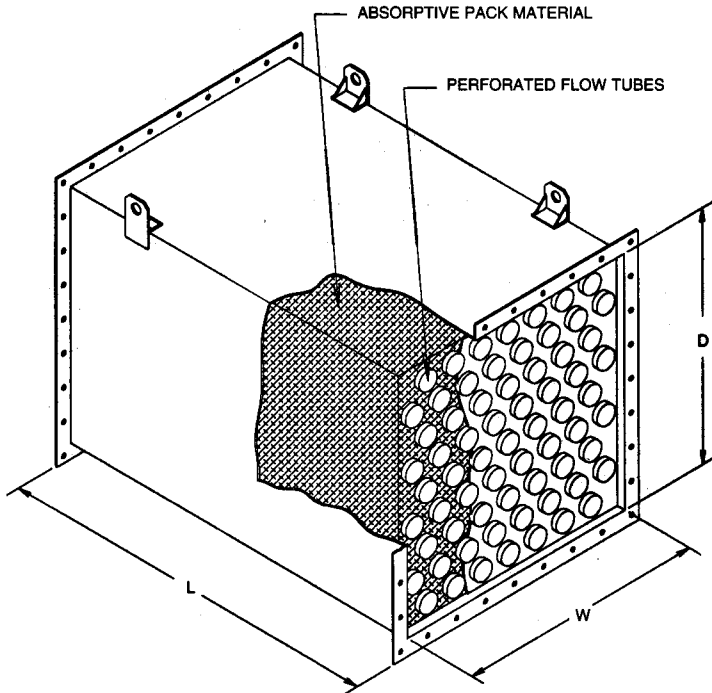
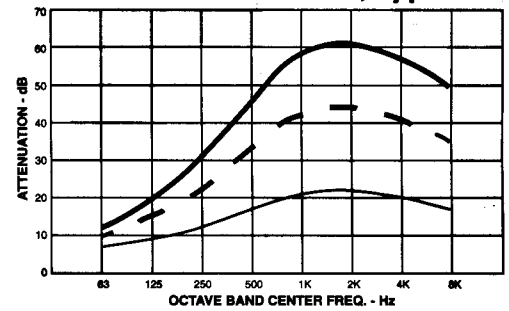
# Specifications TFS Series

Absorptive  
Tubular Flow Type  
Rectangular Silencers

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

- TFS - 24" long
- - - TFS - 48" long
- TFS - 72" long

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 = 72 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:

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

- V = Air or gas velocity, ft/min (see Note 1)
- ΔP = 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:

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

$A_{\text{required}}$  = Flow area required, ft<sup>2</sup>

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.

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

A = Flow area of size of silencer chosen, ft<sup>2</sup>.

5. Determine actual pressure drop in inches of water:

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

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 at [www.universalAET.com](http://www.universalAET.com) or e-mail at [info@universalAET.com](mailto:info@universalAET.com)

---

Represented By:



**UNIVERSAL**

**Acoustic & Emission Technologies**

P.O. Box 411, Stoughton, Wisconsin 53589  
(608) 873-4272 Fax (608) 873-4298

[info@universalAET.com](mailto:info@universalAET.com)  
[www.universalAET.com](http://www.universalAET.com)