The absorptive type silencer is the classic dissipative design, deriving its noise control properties from the basic fact that noise energy is effectively "absorbed" by various types of fibrous packing materials. More technically, as sound waves pass through the spaces between the tightly-packed small-diameter fibers of the absorptive material, the resulting viscous friction dissipates the sound energy as small amounts of heat.

Absorptive silencers are very effective on high frequency noise (500–8,000 Hz). At frequencies above and below this range, attenuation performance progressively diminishes.

Since noise is absorbed by the packing media, absorptive silencers do not rely on internal baffles, tubes or other restrictive devices to achieve noise reduction. Consequently, absorptive silencers generally employ "straight-through" or similar internal designs which impose very little air flow restriction.

U5 Series (page 3.2)
Highly efficient straight-through silencer available in pipe sizes ½"–6". Attenuation characteristics equivalent to SU5 Series.

U2 Series (page 3.3)
Moderately efficient straight-through silencer available in pipe sizes 5"–30". For better performance, use SU3, SU4, SU5, or U5 Series.

SU5 Series (page 3.4–3.5)
Highest efficiency full flow annular type silencer. Available in pipe sizes 4"–60". Larger sizes available based on application.

SU4 Series (page 3.4–3.5)
Annular type silencer with performance one grade below the SU5 Series. Available in pipe sizes 8"–60". Larger sizes available based on application.

SU3 Series (page 3.4–3.5)
Annular type silencer with performance one grade below the SU4 Series. Available in pipe sizes 8"–60" and larger.

Sizing Information, Pressure Drop Data

The flow area through the silencer must be sufficient to accommodate the maximum flow without imposing excessive pressure drop. The following instructions enable the selection of the proper silencer size and determination of actual pressure drop. These instructions assume air as the flowing gas. For other gases, density and other corrections may be necessary—contact Universal Silencer for assistance.

Data required:
air flow rate (actual CFM)
temperature (°F)
pressure (psig)
maximum pressure drop (inches of water)

1 Determine maximum velocity.

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

V = air or gas velocity, ft/min (see note 1)

ΔP = maximum pressure drop, inches of water

c = silencer pressure drop coefficient (see Table 1)

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.

$$A = \frac{Q}{V}$$

A = flow area required, ft²
Q = air flow rate (actual CFM)

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

3 From Table 2, select size with flow area equal to or greater than that calculated.

4 Determine actual gas velocity in ft/min.

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

A = flow area from Table 2

5 Determine actual pressure drop.

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

c = silencer pressure drop coefficient (see Table 1)

1 Pressure Drop Coefficients

Silencer Series	Pressure Drop Coefficient (C)
U5, U2	.25
SU5	.75
SU3, SU4	.85

2 Flow Area Size

Flow Area (ft²)	Diameter Size (in)	Flow Area (ft²)	Diameter Size (in)
0.0014	½	2.6	22
0.0031	¾	3.1	24
0.0055	1	3.7	26
0.012	1½	4.3	28
0.022	2	4.9	30
0.034	2½	5.6	32
0.049	3	6.3	34
0.067	3½	7.1	36
0.087	4	7.9	38
0.136	5	8.7	40
0.196	6	9.6	42
0.349	8	10.6	44
0.55	10	11.5	46
0.79	12	12.6	48
1.07	14	15.9	54
1.4	16	19.6	60
1.8	18	23.8	66
2.2	20	28.3	72

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 Typical attenuation curves indicate the characteristics of the silencer series and are neither a minimum nor a guarantee for an individual silencer. Individual silencer performance can be affected by sound source characteristics including pure tones, flow velocity, adjacent piping, and temperature.

∴ See pages 1.1–1.3 for ordering information | www.universalsilencer.com

Typical Attenuation Curve

U5 Series

**Straight-Through
Absorptive Silencer**
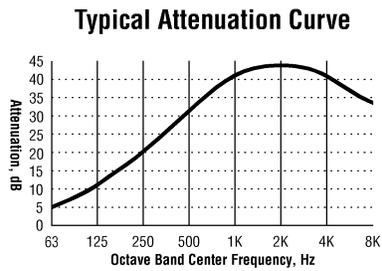
The U5 Series is a premium, straight-through, absorptive silencer. It provides excellent noise attenuation due to its very high length to diameter ratio. It is especially well suited for inlet service on small rotary positive or centrifugal blowers or the discharge of vacuum pumps. Mild steel construction with enamel paint.
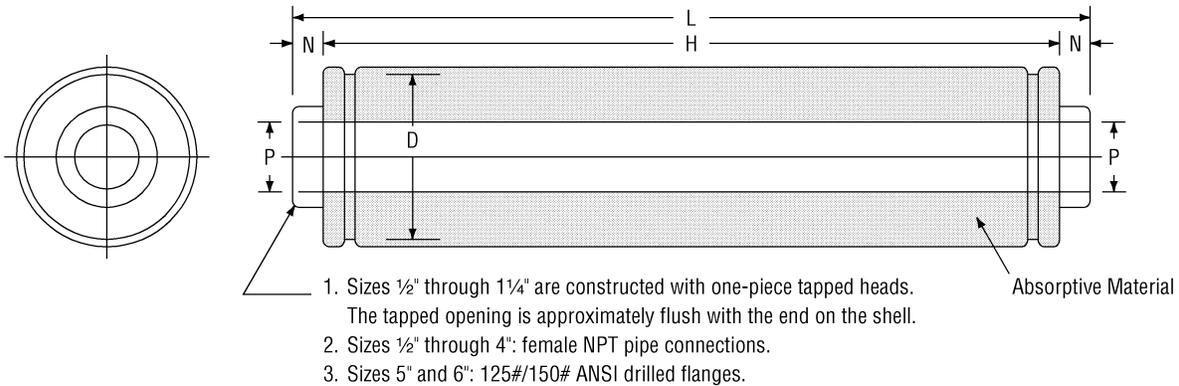
Note
U5 series standard paint and acoustical packing are suitable for 325°F.
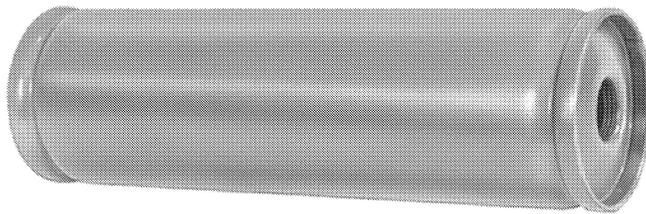
Common Applications
∴ rotary positive/centrifugal blowers
∴ vacuum pump discharge
∴ air valves and cylinders
∴ small low-pressure vents
∴ high frequency noise sources

1. Sizes ½" through 1¼" are constructed with one-piece tapped heads. The tapped opening is approximately flush with the end on the shell.
2. Sizes ½" through 4": female NPT pipe connections.
3. Sizes 5" and 6": 125#/150# ANSI drilled flanges.

Absorptive Material

Straight-Through Absorptive Silencer

Model	Part	P	D	L	N	H	Weight
U5-½	11-150-AA	½	3¼	8	—	8	2
U5-¾	11-170-AA	¾	3¼	11	—	11	3
U5-1	11-101-AA	1	3¼	14	—	14	3
U5-1¼	11-121-AA	1¼	3¼	16	—	16	4
U5-1½	11-115-AA	1½	4¼	19¾	½	18⅞	6
U5-2	11-102-AA	2	5⅛	26	½	25	10
U5-2½	11-125-AA	2½	6⅛	33½	½	32½	15
U5-3	11-103-AA	3	6⅝	36½	½	35½	20
U5-4	11-104-AA	4	8	48⅞	⅛	48¾	40
U5-5	11-105-AA	5	10	57	3	51	60
U5-6	11-106-AA	6	12	63	3	57	100