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.

General Information

Absorptive Silencers

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

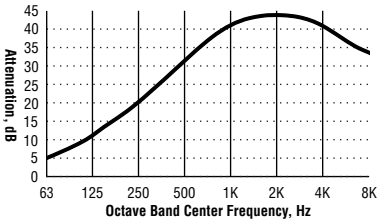
1. Since self noise and aerodynamic noise generation increase with velocity, absorptive silencers are usually sized for 4,000–8,000 ft/min. In no case should the velocity exceed 15,000 ft/min, regardless of pressure drop allowed.
2. Typical attenuation curves indicate the characteristics of the silencer 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

U5 Series

Straight-Through Absorptive Silencer

Typical Attenuation Curve

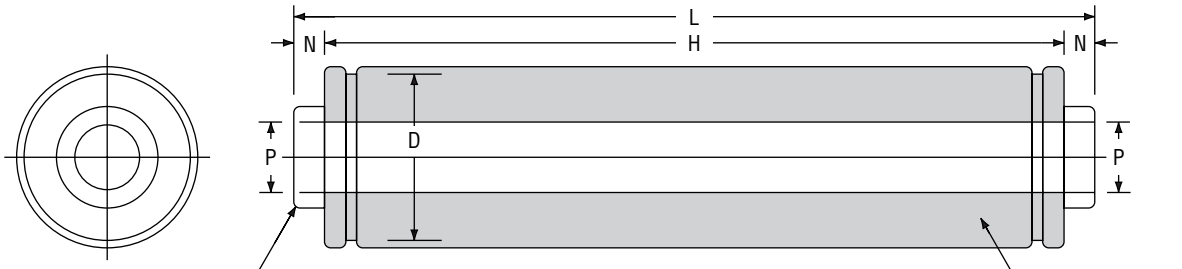


The U5 Series is a premium, straight-through, absorptive silencer. It provides excellent noise attenuation due to its very high length to diameter ratio. It is especially well suited for inlet service on small rotary positive or centrifugal blowers or the discharge of vacuum pumps. Mild steel construction 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.

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

Straight-Through Absorptive Silencer

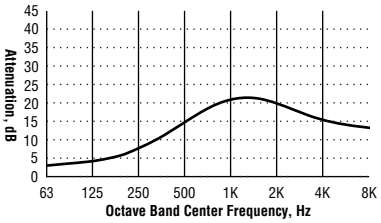
Model	Part	P	D	L	N	H	Weight
U5-½	11-150-AA	½	3¼	8	—	8	2
U5-¾	11-170-AA	¾	3¼	11	—	11	3
U5-1	11-101-AA	1	3¼	14	—	14	3
U5-1¼	11-121-AA	1¼	3¼	16	—	16	4
U5-1½	11-115-AA	1½	4¼	19¾	½	18⅞	6
U5-2	11-102-AA	2	5⅛	26	½	25	10
U5-2½	11-125-AA	2½	6⅛	33½	½	32½	15
U5-3	11-103-AA	3	6⅝	36½	½	35½	20
U5-4	11-104-AA	4	8	48⅞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

U2 Series

Straight-Through Absorptive Silencer

The U2 Series is an economical straight-though silencer for applications requiring lower-degree noise attenuation. It is fundamentally similar to the U5 Series, but has lesser attenuation due to its relatively low length to diameter ratio. Mild steel construction, primer-coated exterior.

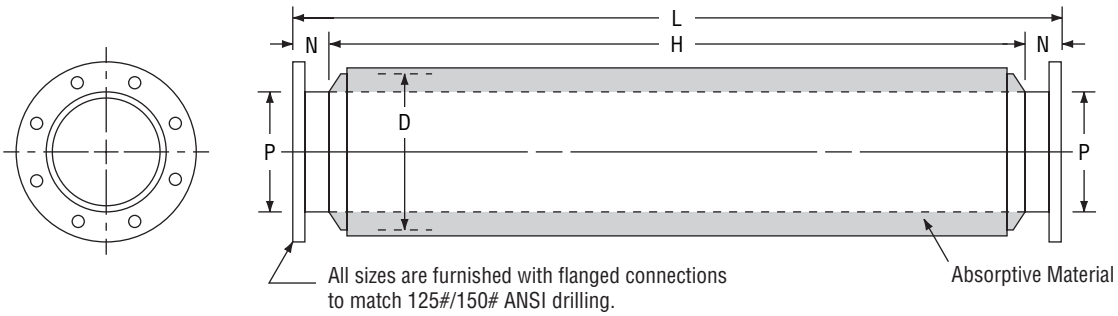
Typical Attenuation Curve



Note:
U2 series standard paint and acoustical packing are suitable for 325°F.

Common Applications

- intermediate size rotary positive blower inlet
- centrifugal blower inlet or discharge
- intermediate size dry vacuum pump discharge
- gas turbine inlet
- high-speed centrifugal compressor inlet
- high frequency noise sources



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Straight-Through Absorptive Silencer

Model	Part	P	D	L	N	H	Weight
U2-5	10-105-AA	5	10	36	3	30	45
U2-6	10-106-AA	6	12	40	3	34	70
U2-8	10-108-AA	8	14	53	3½	46	105
U2-10	10-110-AA	10	16	65	3½	58	160
U2-12	10-112-AA	12	18	77	3½	70	220
U2-14	10-114-AA	14	20	89	3½	82	340
U2-16	10-116-AA	16	22	101	3½	94	440
U2-18	10-118-AA	18	24	113	3½	106	530
U2-20	10-120-AA	20	26	128	4½	119	700
U2-22	10-122-AA	22	28	140	4½	131	820
U2-24	10-124-AA	24	30	152	4½	143	1,070
U2-30	10-126-AA	30	36	189	4½	180	1,940

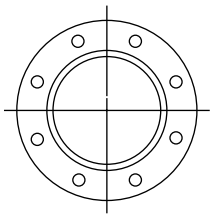
SU Series

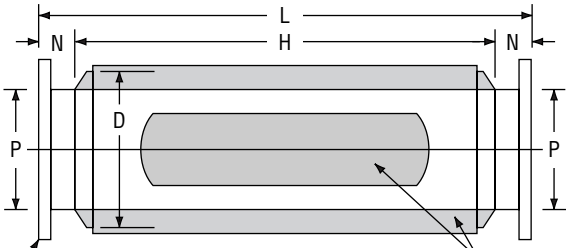
Annular Flow Absorptive Silencer

Note:
SU Series standard paint and acoustical packing are suitable for 325°F.

Common Applications

- inlet and discharge of high-speed, low-pressure centrifugal compressors and blowers (discharge P < 15 psig)
- industrial fan inlet and discharge
- high-pressure centrifugal compressors inlet
- gas turbine inlet
- dry vacuum pump discharge
- some low-pressure vents (< 15 psig)
- high-frequency noise sources
- inlet of turbocharged reciprocating engines





All sizes furnished with flanged connections to match 125#/150# ANSI drilling.

Absorptive Material

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

SU5 Series

The SU5 Series is our highest grade standard absorptive silencer. Its design consists of two concentric perforated cylinders lined with acoustical pack, forming an annular flow path. This design features full blocked-line-of-sight, while providing full flow area for low resistance. Mild steel construction, primer-coated exterior.

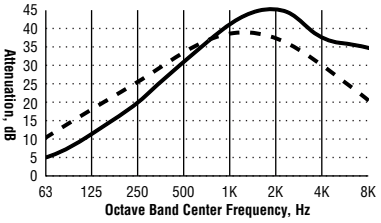
SU4 Series

The SU4 Series provides lower attenuation, ranking just below the SU5 Series. The design of this unit features a bullet centered in the flow tube to provide annular flow path and partial blocked-line-of-sight. Pressure drop is only slightly greater than the SU5. Mild steel construction, primer-coated exterior.

SU3 Series

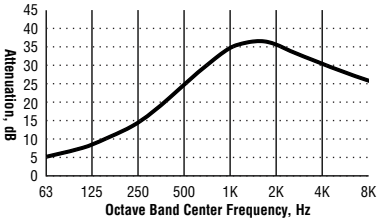
The SU3 Series is the most economical of Universal Silencer's three grades of annular design silencers. Its design is nearly identical to the SU4, including annular flow path and partial blocked-line-of-sight. Pressure drop coefficient is the same as for the SU4 Series. Mild steel construction, primer-coated exterior.

Typical Attenuation Curve

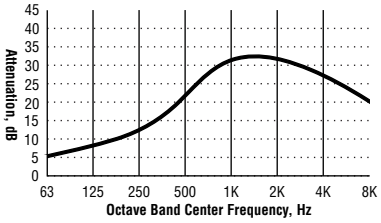


12" size and smaller
24" size and larger

Typical Attenuation Curve



Typical Attenuation Curve



SU Series

Annular Flow Absorptive Silencer

	Model	Part	P	D	L	N	H	Weight
SU5	SU5-4	14-104-AA	4	10	21½	3	15½	30
SU5	SU5-5	14-105-AA	5	12	26	3	20	55
SU5	SU5-6	14-106-AA	6	12	26	3	20	60
SU5	SU5-8	14-108-AA	8	18	36	3½	29	120
SU5	SU5-10	14-110-AA	10	20	44½	3½	37½	195
SU5	SU5-12	14-112-AA	12	24	53	3½	46	290
SU5	SU5-14	14-114-AA	14	26	61½	3½	54½	390
SU5	SU5-16	14-116-AA	16	28	68	3½	61	500
SU5	SU5-18	14-118-AA	18	30	74	3½	67	650
SU5	SU5-20	14-120-AA	20	36	78	4½	69	950
SU5	SU5-22	14-122-AA	22	36	89	4½	80	1,080
SU5	SU5-24	14-124-AA	24	42	91	4½	82	1,400
SU5	SU5-26	14-126-AA	26	42	102	4½	93	1,580
SU5	SU5-28	14-128-AA	28	48	104	4½	95	2,200
SU5	SU5-30	14-130-AA	30	48	115	4½	106	2,600
SU5	SU5-32	14-132-AA	32	54	128	6	116	3,150
SU5	SU5-34	14-134-AA	34	60	136	6	124	3,600
SU5	SU5-36	14-136-AA	36	60	145	6	133	4,500
SU5	SU5-42	14-142-AA	42	66	170	6	158	6,200
SU5	SU5-48	14-148-AA	48	78	186	6	175	8,200
SU5	SU5-54	14-154-AA	54	84	198	6	186	10,300
SU5	SU5-60	14-160-AA	60	90	210	6	198	12,500
SU4	SU4-8	13-108-AA	8	14	33	3½	26	90
SU4	SU4-10	13-110-AA	10	16	35	3½	28	120
SU4	SU4-12	13-112-AA	12	18	47	3½	40	180
SU4	SU4-14	13-114-AA	14	20	51	3½	44	240
SU4	SU4-16	13-116-AA	16	22	59	3½	52	320
SU4	SU4-18	13-118-AA	18	24	63	3½	56	370
SU4	SU4-20	13-120-AA	20	26	73½	4½	64½	490
SU4	SU4-22	13-122-AA	22	28	73½	4½	64½	530
SU4	SU4-24	13-124-AA	24	30	85½	4½	76½	720
SU4	SU4-30	13-130-AA	30	36	108	4½	99	1,340
SU4	SU4-36	13-136-AA	36	42	122	4½	113	2,020
SU4	SU4-42	13-142-AA	42	48	137	6	125	3,200
SU4	SU4-48	13-148-AA	48	54	161½	6	149½	4,100
SU4	SU4-54	13-154-AA	54	60	178	6	166	5,400
SU4	SU4-60	13-160-AA	60	66	192½	6	180½	7,300
SU3	SU3-8	12-108-AA	8	14	31	3½	24	85
SU3	SU3-10	12-110-AA	10	16	35	3½	28	120
SU3	SU3-12	12-112-AA	12	18	39	3½	32	155
SU3	SU3-14	12-114-AA	14	20	39	3½	32	200
SU3	SU3-16	12-116-AA	16	22	47	3½	40	270
SU3	SU3-18	12-118-AA	18	24	47	3½	40	290
SU3	SU3-20	12-120-AA	20	26	49½	4½	40½	350
SU3	SU3-22	12-122-AA	22	28	55½	4½	46½	420
SU3	SU3-24	12-124-AA	24	30	55½	4½	46½	500
SU3	SU3-26	12-126-AA	26	30	61	4½	52	680
SU3	SU3-28	12-128-AA	28	36	63½	4½	54½	830
SU3	SU3-30	12-130-AA	30	36	62	4½	53	890
SU3	SU3-32	12-132-AA	32	36	68	4½	59	1,120
SU3	SU3-34	12-134-AA	34	42	75	4½	66	1,360
SU3	SU3-36	12-136-AA	36	42	80	4½	71	1,490
SU3	SU3-42	12-142-AA	42	48	83	6	71	1,920
SU3	SU3-48	12-148-AA	48	54	89½	6	77½	2,600
SU3	SU3-54	12-154-AA	54	60	96	6	84	3,300
SU3	SU3-60	12-160-AA	60	66	108½	6	96½	4,430

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