





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

# General Information

## Absorptive Silencers

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 2)

Highly efficient straight-through silencer available in pipe sizes .5”–6”. Attenuation characteristics equivalent to SU5 Series.

### U2 Series (page 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 4–5)

Highest efficiency full flow annular type silencer. Available in pipe sizes 4”–60”. Larger sizes available based on application.

### SU4 Series (page 4–5)

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 4–5)

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 for assistance.

### Data required:

- ∴ air flow rate (actual CFM)
- ∴ temperature (°F)
- ∴ pressure (psig)
- ∴ maximum pressure drop (inches of water)

### 1 Determine maximum velocity.

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

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

$\Delta P$  = 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, ft<sup>2</sup>

$Q$  = 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 (ft <sup>2</sup> )	Diameter Size (in)	Flow Area (ft <sup>2</sup> )	Diameter Size (in)
0.0014	.5	2.6	22
0.0031	.75	3.1	24
0.0055	1	3.7	26
0.012	1.5	4.3	28
0.022	2	4.9	30
0.034	2.5	5.6	32
0.049	3	6.3	34
0.067	3.5	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

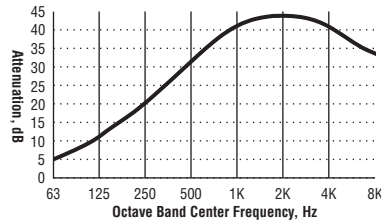
## Notes

- 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.



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.

**Typical Attenuation Curve**

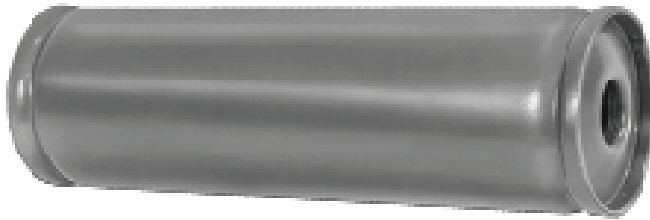


# U5 Series

## Straight-Through Absorptive Silencer

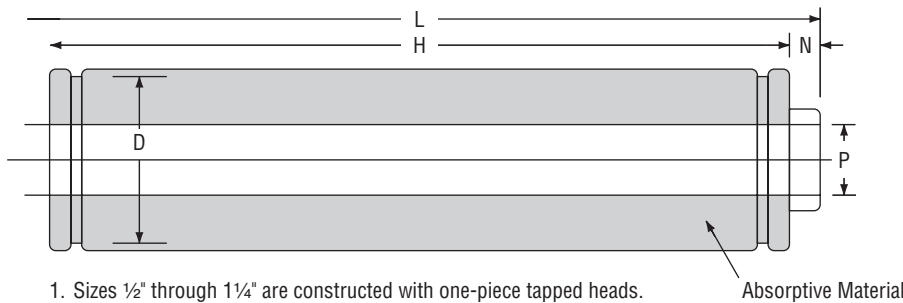
**Note**

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.

**Straight-Through Absorptive Silencer**

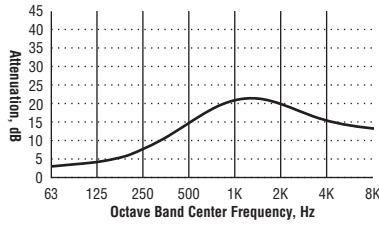
Model	Part	P	D	L	N	H	Weight
U5-.5	11-150-AA	.5	3.25	8	—	8	2
U5-.75	11-170-AA	.75	3.25	11	—	11	3
U5-1	11-101-AA	1	3.25	14	—	14	3
U5-1.25	11-121-AA	1.25	3.25	16	—	16	4
U5-1.5	11-115-AA	1.5	4.25	19.75	.5	18.875	6
U5-2	11-102-AA	2	5.125	26	.5	25	10
U5-2.5	11-125-AA	2.5	6.125	33.5	.5	32.5	15
U5-3	11-103-AA	3	6.625	36.5	.5	35.5	20
U5-4	11-104-AA	4	8	48.875	.125	48.75	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

Typical Attenuation Curve



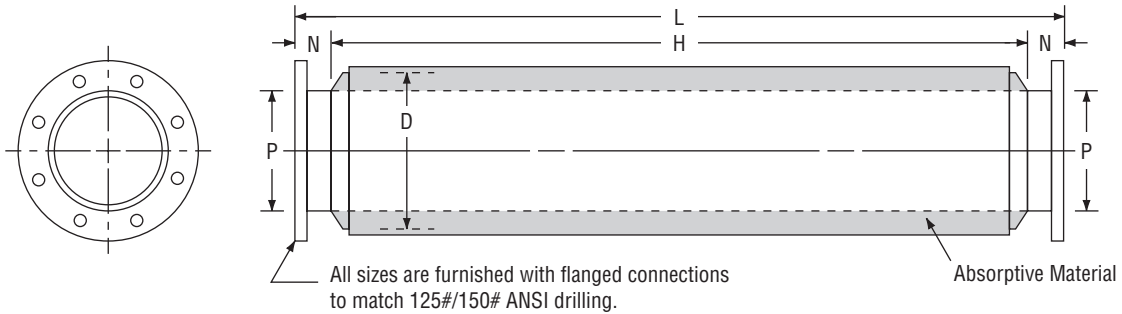
The U2 Series is an economical straight-through silencer for applications requiring lower-degree noise attenuation. It is fundamentally similar to the U5 Series, but has lesser attenuation due to its relatively low length to diameter ratio. Mild steel construction, primer-coated exterior.

### 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

**Note:**

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



### 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	3.5	46	105
U2-10	10-110-AA	10	16	65	3.5	58	160
U2-12	10-112-AA	12	18	77	3.5	70	220
U2-14	10-114-AA	14	20	89	3.5	82	340
U2-16	10-116-AA	16	22	101	3.5	94	440
U2-18	10-118-AA	18	24	113	3.5	106	530
U2-20	10-120-AA	20	26	128	4.5	119	700
U2-22	10-122-AA	22	28	140	4.5	131	820
U2-24	10-124-AA	24	30	152	4.5	143	1,070
U2-30	10-130-AA	30	36	189	4.5	180	1,940

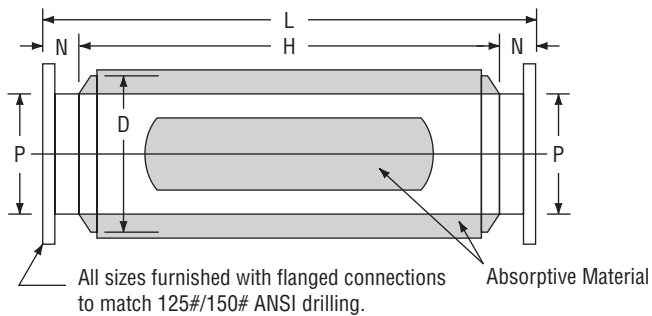
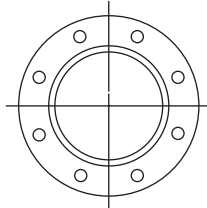


# SU Series

## 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

### 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.

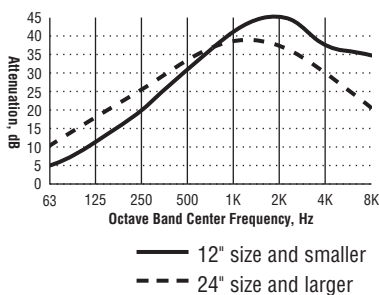
### SU4 Series

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.

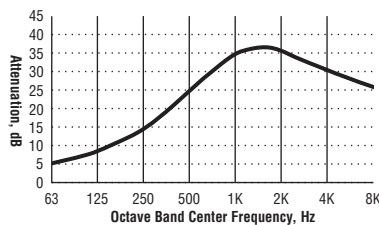
### SU3 Series

The SU3 Series is the most economical of Universal'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.

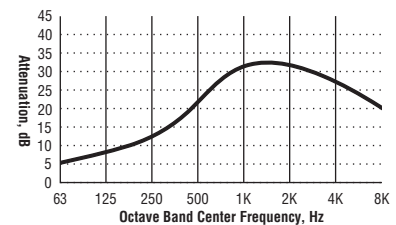
Typical Attenuation Curve



Typical Attenuation Curve



Typical Attenuation Curve



# SU Series

## Annular Flow Absorptive Silencer

Model	Part	P	D	L	N	H	Weight
SU5-4	14-104-AA	4	10	21.5	3	15.5	30
SU5-5	14-105-AA	5	12	26	3	20	50
SU5-6	14-106-AA	6	12	26	3	20	60
SU5-8	14-108-AA	8	18	36	3.5	29	120
SU5-10	14-110-AA	10	20	44.5	3.5	37.5	200
SU5-12	14-112-AA	12	24	53	3.5	46	295
SU5-14	14-114-AA	14	26	61.5	3.5	54.5	390
SU5-16	14-116-AA	16	28	68	3.5	61	510
SU5-18	14-118-AA	18	30	74	3.5	67	655
SU5-20	14-120-AA	20	36	78	4.5	69	850
SU5-22	14-122-AA	22	36	89	4.5	80	1,040
SU5-24	14-124-AA	24	42	91	4.5	82	1,285
SU5-26	14-126-AA	26	42	102	4.5	93	1,535
SU5-28	14-128-AA	28	48	104	4.5	95	1,985
SU5-30	14-130-AA	30	48	115	4.5	106	2,190
SU5-32	14-132-AA	32	54	128	6	116	2,855
SU5-34	14-134-AA	34	60	136	6	124	3,670
SU5-36	14-136-AA	36	60	145	6	133	4,095
SU5-42	14-142-AA	42	66	170	6	158	5,985
SU5-48	14-148-AA	48	78	186	6	174	8,040
SU5-54	14-154-AA	54	84	198	6	186	9,420
SU5-60	14-160-AA	60	90	210	6	198	11,175
SU4-8	13-108-AA	8	14	33	3.5	26	90
SU4-10	13-110-AA	10	16	35	3.5	28	130
SU4-12	13-112-AA	12	18	47	3.5	40	175
SU4-14	13-114-AA	14	20	51	3.5	44	240
SU4-16	13-116-AA	16	22	59	3.5	52	315
SU4-18	13-118-AA	18	24	63	3.5	56	365
SU4-20	13-120-AA	20	26	73.5	4.5	64.5	485
SU4-22	13-122-AA	22	28	73.5	4.5	64.5	520
SU4-24	13-124-AA	24	30	85.5	4.5	76.5	720
SU4-26	13-126-AA	26	36	96	4.5	87	1,170
SU4-28	13-128-AA	28	36	96	4.5	87	1,205
SU4-30	13-130-AA	30	36	108	4.5	99	1,345
SU4-36	13-136-AA	36	42	122	4.5	113	1,995
SU4-42	13-142-AA	42	48	137	6	125	2,820
SU4-48	13-148-AA	48	54	161.5	6	149.5	4,100
SU4-54	13-154-AA	54	60	178	6	166	5,400
SU4-60	13-160-AA	60	66	192.5	6	180.5	7,300
SU3-8	12-108-AA	8	14	31	3.5	24	85
SU3-10	12-110-AA	10	16	35	3.5	28	120
SU3-12	12-112-AA	12	18	39	3.5	32	155
SU3-14	12-114-AA	14	20	39	3.5	32	195
SU3-16	12-116-AA	16	22	47	3.5	40	270
SU3-18	12-118-AA	18	24	47	3.5	40	290
SU3-20	12-120-AA	20	26	49.5	4.5	40.5	350
SU3-22	12-122-AA	22	28	55.5	4.5	46.5	415
SU3-24	12-124-AA	24	30	55.5	4.5	46.5	500
SU3-26	12-126-AA	26	30	61	4.5	52	680
SU3-28	12-128-AA	28	36	63.5	4.5	54.5	830
SU3-30	12-130-AA	30	36	62	4.5	53	885
SU3-32	12-132-AA	32	36	68	4.5	59	1,120
SU3-34	12-134-AA	34	42	75	4.5	66	1,330
SU3-36	12-136-AA	36	42	80	4.5	71	1,485
SU3-42	12-142-AA	42	48	83	6	71	1,915
SU3-48	12-148-AA	48	54	89.5	6	77.5	2,595
SU3-54	12-154-AA	54	60	96	6	84	3,300
SU3-60	12-160-AA	60	66	108.5	6	96.5	4,430

SU5

SU4

SU3

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