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Building Sound Solutions

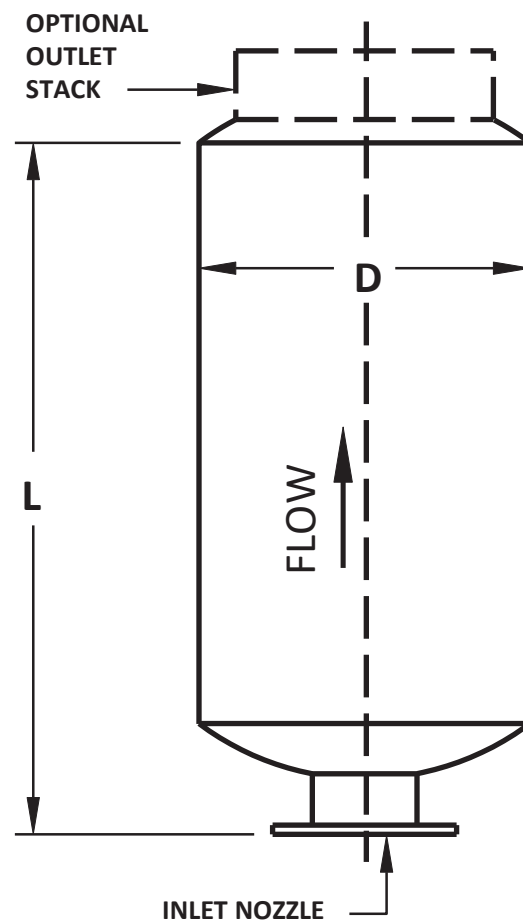
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VENT SILENCERS



INFORMATION ON VENT SILENCERS

A vent silencer or a blow off silencer is a device used to reduce unwanted noise created by gas or steam flow in a pipeline discharging directly into the atmosphere. This noise can be generated due to the high velocity flow through the valve and turbulence created around any obstacle in the line that suddenly restricts or changes the direction of flow such as valve or an orifice.

Vent silencers find wide applications in high pressure vents, steam vents, safety relief valve outlets, system blow downs and purge outlets etc.

Vent and blow down noise is a function of upstream pressure and temperature, type of gas being vented, the valve size and type, plus the effect of downstream piping.

Each vent silencer is designed to attenuate the noise level to the required sound pressure level criteria at a given distance from the silencer. This is the reason that vent and blow down silencers are seldom a catalogue selection. The details given here can be considered as a guideline. Contact our experienced engineers to recommend a silencer best suited for your application for vertical or horizontal installations.

In any steam or gas venting / blow off system, the primary release of noise energy occurs at the open stack exit. The blow off silencer is installed either within the stack or at the stack outlet to intercept this noise before it escapes into the environment.

There are two fundamental noise reduction principles used in passive silencer design. Dissipative components (using sound absorbing material) provide balanced noise reduction over a broad frequency range. Reactive components, using resonant reflections within tuned chambers and passages, provide peak noise reduction in a more concentrated frequency band. The SV series vent silencers combines both dissipative and reactive technology in a highly efficient design.

DATA REQUIRED TO SELECT VENT SILENCER

- Application (Vent, Blow down, Relief Valve etc.)
- Fluid Composition (Steam, Gas, Air)
- Molecular Weight or Specific Gravity
- Process conditions upstream of valve i.e. Flow rate (W) and units (lb/hr, SCFM, ACFM), Temperature (T1), Pressure (P1)
- Atmospheric pressure (Pa) and downstream temperature (T2) if known.
- Line size between valve and silencer and connection type.
- Line size from silencer discharge
- Unsilenced octave band noise levels, if known
- Attenuation required (silencer performance)
- Allowable pressure drop

SIZING OF A VENT SILENCER

Typical examples of sizing a SV series vent silencer are shown here. The diameter of a silencer is a function of flow rate of the gas it can safely pass without eroding the acoustical packing or regenerating noise. The silencer length is a function of the degree of noise reduction to be achieved.

A. STEAM

Example 1: Service conditions: W max. = 60000 lb / hr. superheated steam, P1 = 250 psia, T = 500 F, Pa = 14.7 psia. Require 40-45 dB attenuation minimum.

- From steam tables, using P1 (250 psia) and T1 (500 F), find the upstream enthalpy, h1 = 1264.7 btu / lb.
- Assuming constant enthalpy expansion h1 = h2, from steam tables determine the downstream specific volume v2 using h2 (1265 btu / lb and Pa (14.7 psia), V2 = 36.75 cu. Ft. / lb.
- Calculate actual down stream flow rate Q d (ACFM), actual cubic feet per minute using equation

$$Q d = \frac{W \times V_2}{60}$$

$$Q d = \frac{60000 \times 36.75}{60} \\ = 36750 \text{ ACFM}$$

- Select attenuation & silencer using Tables 1 & 2, having capacity equal to or greater than Q d. Therefore SV2-10-36-115 is selected. Table 1 can be used to select SV type for desired attenuation or contact our engineers for selection.

Example 2: Service Conditions : W max. = 120000 lb / hr. of saturated steam, P1 = 300 psia. T1 = 417 F, Pa = 15 psia. Require minimum of 55 dB attenuation.

Using the same procedure as example 1 above. a. From steam tables h1 = 1203.2 btu / lb = h2

- For h2 = 1203 btu / lb and Pa = 15 psia , V2 is determined to be 31 cu. Ft. / lb.

- Using equation:

$$Q d = \frac{W \times V_2}{60}$$

$$Q d = \frac{120000 \times 31}{60} \\ = 62000 \text{ ACFM}$$

- From the tables, SV3-14-48-150 is selected.

B. GAS

Service conditions: W max. = 200000 lb / hr. Nitrogen, (or Q = 45022 SCFM), Specific gravity (S.G.) = 0.97, T2 = 200 F and Pa = 14.3 psia. Require 60-65 dB attenuation.

- If flow is given in lb / hr., calculate Q d (ACFM) using equation:

$$Q d = \frac{W \times (T_2 + 460)}{162 \times P_a \times S.G.}$$

$$Q d = \frac{200000 \times (200 + 460)}{162 \times 14.3 \times 0.97} \\ = 58742 \text{ ACFM}$$

- If flow is given in SCFM, calculate Q d (ACFM) using equation :

$$Q d = \frac{Q \times (T_2 + 460)}{35.374 \times P_a}$$

$$Q d = \frac{45022 \times (200 + 460)}{35.374 \times 14.3} \\ = 58742 \text{ ACFM}$$

- From the tables, SV4-14-48-175 is selected.

SPECIFICATIONS

SV SERIES VENT SILENCERS

TABLE 1
TYPICAL PERFORMANCE
 (Dynamic Insertion Loss) dBA

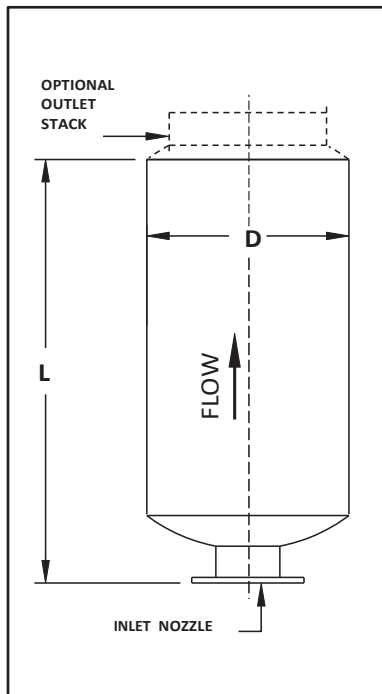
VENT SIZE & TYPE	Attenuation (dBA)	Octave Band Center Frequency, Hz							
		63	125	250	500	1000	2000	4000	8000
SV1	35-40	10	18	27	33	39	40	35	30
SV2	45-50	12	23	34	42	49	50	43	37
SV3	55-60	14	29	42	53	60	60	51	44
SV4	65-70	16	34	49	63	70	69	60	50

The **SV series vent silencers** are recommended for reducing excessive noise caused by the discharge of high pressure gas, steam or air into the atmosphere.

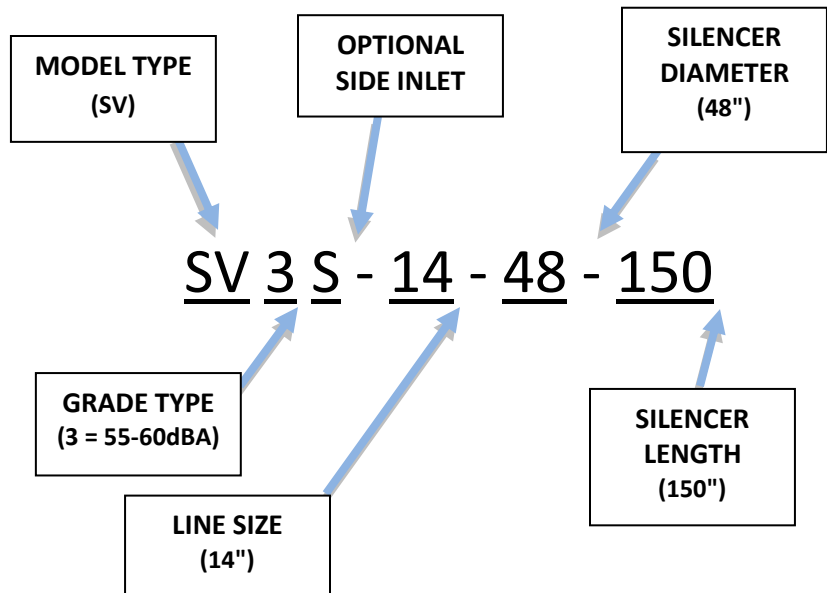
The silencers are of reactive / absorptive type design. The gas and noise enters the silencer through the single stage or multi stage diffuser where it is permitted to expand through many small holes into the expansion chamber. The design of diffuser and size of the expansion chamber provides a tuned reactive section. The diffuser also provides a frequency shift to higher frequencies which are best attenuated by the absorptive section. The gas then passes through the absorptive section which consists of multiple perforated flow tubes surrounded by dense acoustical packing providing a broad range of attenuation in the mid to high frequency ranges.

The standard construction is a rigid all welded carbon steel shell assembly, flow tube bundle and inlet / diffuser with acoustical packing of dense long strand fiberglass suitable for service temperatures indicated. Length of flow tubes and number of tube bundles is dependent on degree of silencing required. The silencer thickness includes 1/16" corrosion allowance and finished with rust inhibitive primer. The optional features include multiple inlets, special materials or finishes, mounting brackets and code requirements.

FIGURE 1



VENT SILENCER NOMENCLATURE



- Intermediate and larger sizes available on request, consult factory.
- Dimensions and weights are approximate and may change slightly with production models.
- Dimension in inches.
- Weight in lbs.

We specialize in custom designs and also provide various nozzle orientations to suit your specific requirements.

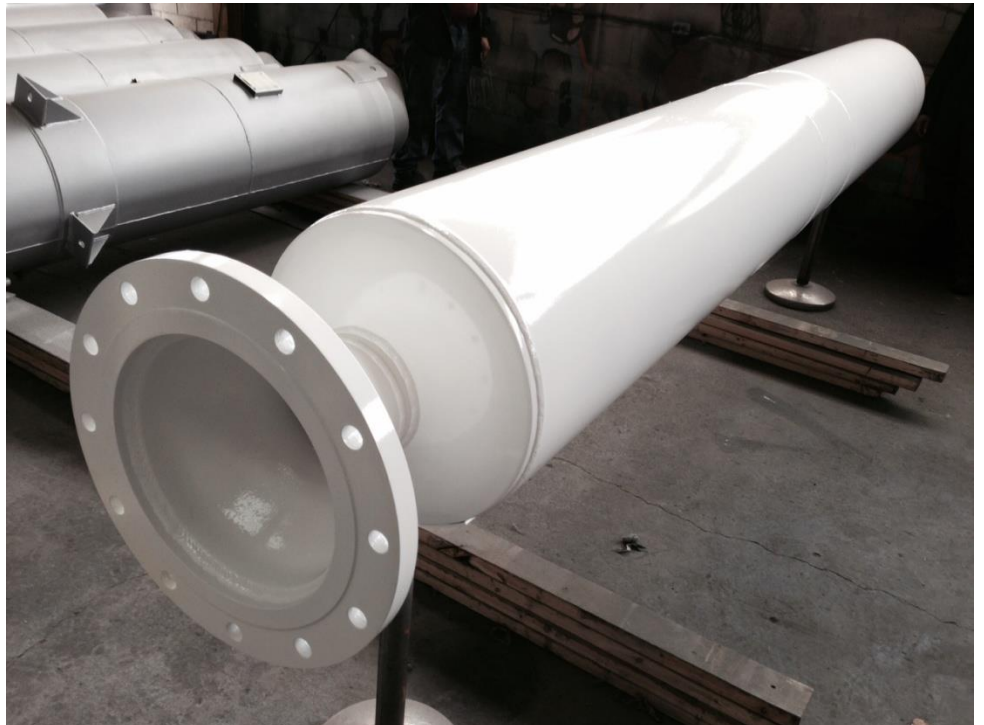
TABLE 2 (Dimensions are in inches, Weights are in pounds)

USE TABLES 1 & 2, FIGURE 1 TO MAKE FINAL SILENCER SELECTION

INLET NOZZLE SIZE	MAX NOZZLE SIZE	INTERMITTENT CAPACITY, ACFM	MAX. CONTINUOUS CAPACITY, ACFM	SHELL DIA	TYPE SV1		TYPE SV2		TYPE SV3		TYPE SV4	
					LENGTH L	WEIGHT	LENGTH L	WEIGHT	LENGTH L	WEIGHT	LENGTH L	WEIGHT
				D								
2	2	2258	1620	10	45	90	60	110	70	150	80	210
3	3	4014	2880	12	50	100	60	125	85	170	95	230
4	4	6272	4500	14	60	150	70	180	95	225	105	260
4	4	7589	5445	16	60	180	75	230	100	300	115	330
4	6	9032	6480	18	66	230	80	285	110	375	125	420
6	6	10600	7604	20	70	285	85	350	112	500	130	580
6	6	12294	8819	22	75	350	90	450	118	595	135	700
6	8	16057	11519	24	80	450	95	525	122	695	140	825
8	8	20322	14579	26	85	525	100	625	126	815	145	1000
8	10	25089	17999	28	90	590	105	715	130	930	150	1175
8	14	30358	21778	30	95	700	110	840	135	1050	155	1450
10	18	49175	35277	36	100	820	115	900	140	1360	160	1600
10	18	64228	46077	40	105	950	120	1000	145	1450	165	1900
12	20	72508	52016	42	110	1270	125	1600	150	2000	175	2300
14	22	100356	71995	48	115	1750	130	2100	150	2700	175	3200
16	24	132721	95213	54	120	2180	135	2600	165	3450	190	4200
18	30	169602	121671	60	125	3200	140	3900	180	5100	205	5800
20	36	210999	151369	66	130	4100	155	4900	200	6350	235	7350
24	40	256912	184307	72	135	4800	165	5900	220	7700	245	8600

OPTIONS INCLUDE:

- Special Line Size
- Special Overall Length
- Special Diameter
- Saddle Mounts
- Horizontal Mounting Bands
- Vertical Mounting Brackets
- Rain Cap
- Bird Screen
- Flange Type and Class



OTHER PRODUCTS AVAILABLE:

- **ROTARY POSITIVE BLOWER INTAKE AND DISCHARGE SILENCERS**
reference catalogue 1
- **BASE SILENCERS FOR ROTARY POSITIVE BLOWERS**
reference catalogue 2
- **COMBINATION SILENCERS FOR ROTARY POSITIVE BLOWERS**
reference catalogue 3
- **FAN SILENCERS**
reference catalogue 4
- **CENTRIFUGAL COMPRESSOR SILENCERS**
reference catalogue 5
- **VENT SILENCERS**
reference catalogue 6
- **ENGINE SILENCERS**
reference catalogue 7
- **NOISE ENCLOSURES**
reference catalogue 8
- **LOW PROFILE DISK ENGINE SILENCERS**
reference catalogue 9

**YOUR ONE STOP CENTER FOR ALL
INDUSTRIAL SILENCING NEEDS**



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