VENT SILENCERS

- Optional Outlet Stack
- Flow
- Inlet Nozzle

Dimensions:
- L
- D
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.

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 \(T_1\), Pressure \(P_1\)
- Atmospheric pressure \(P_a\) and down stream temperature \(T_2\) 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, \(P_1 = 250\) psia, \(T = 500\) F, \(P_a = 14.7\) psia. Require 40 dB attenuation.

a. From steam tables, using \(P_1\) (250 psia) and \(T_1\) (500 F), find the upstream enthalpy, \(h_1 = 1264.7\) btu / lb.

b. Assuming constant enthalpy expansion \(h_1 = h_2\), from steam tables determine the down stream specific volume \(v_2\) using \(h_2\) (1265 btu / lb and \(P_a\) (14.7 psia), \(v_2 = 36.75\) cu. Ft. / lb.

c. Calculate actual down stream flow rate \(Q_d\) (ACFM), actual cubic feet per minute using equation

\[
Q_d = \frac{W \times V_2}{60}
\]

\[
Q_d = 60000 \times 36.75
\]

\[
= 36750\ ACFM
\]

d. Select silencer using Table 1, having capacity equal to or greater than \(Q_d\). Therefore SV-36-2 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, \(P_1 = 300\) psia, \(T_1 = 417\) F, \(P_a = 15\) psia. Require minimum of 55 dB attenuation.

Using the same procedure as example 1 above.

a. From steam tables \(h_1 = 1203.2\) btu / lb = \(h_2\)

b. For \(h_2 = 1203\) btu / lb and \(P_a = 15\) psia, \(V_2\) is determined to be 31 cu. Ft. / lb.

c. Using equation:

\[
Q_d = \frac{W \times V_2}{60}
\]

\[
Q_d = 120000 \times 31
\]

\[
= 62000\ ACFM
\]

d. From table 1, SV-48-4 is selected.

**B. GAS**

Service conditions: \(W_{max.} = 200000\  lb / hr.\) Nitrogen, (or \(Q = 45022\ SCFM\)), Specific gravity (S.G.) = 0.97, \(T_2 = 200\) F and \(P_a = 14.3\) psia. Require 40 to 50 dB attenuation.

a. If flow is given in lb / hr., calculate \(Q_d\) (ACFM) using equation:

\[
Q_d = \frac{W \times (T_2 + 460) \times 162 \times P_a \times S.G.}{35.374 \times P_a}
\]

\[
Q_d = \frac{200000 \times (200 + 460) \times 162 \times 14.3 \times 0.97}{35.374 \times 14.3}
\]

\[
= 58742\ ACFM
\]

d. Select silencer using Table 1, having capacity equal to or greater than \(Q_d\). Therefore SV-48-3 is selected.

b. If flow is given in SCFM, calculate \(Q_d\) (ACFM) using equation:

\[
Q_d = \frac{Q \times (T_2 + 460)}{35.374 \times P_a}
\]

\[
Q_d = \frac{45022 \times (200 + 460)}{35.374 \times 14.3}
\]

\[
= 58742\ ACFM
\]
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.

### TABLE 1

<table>
<thead>
<tr>
<th>INLET NOZZLE SIZE</th>
<th>MAX. SILENCER CAPACITY, ACFM</th>
<th>SHELL DIA. SV</th>
<th>OUTLET STACK</th>
<th>TYPE SV1</th>
<th>TYPE SV2</th>
<th>TYPE SV3</th>
<th>TYPE SV4</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>D MIN.</td>
<td>L</td>
<td>WEIGHT</td>
<td>WEIGHT</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>L</td>
<td>L</td>
<td>L</td>
<td>L</td>
</tr>
<tr>
<td>2</td>
<td>2940</td>
<td>10</td>
<td>6</td>
<td>45</td>
<td>90</td>
<td>60</td>
<td>110</td>
</tr>
<tr>
<td>3</td>
<td>3150</td>
<td>12</td>
<td>6</td>
<td>50</td>
<td>100</td>
<td>60</td>
<td>125</td>
</tr>
<tr>
<td>4</td>
<td>5235</td>
<td>14</td>
<td>8</td>
<td>60</td>
<td>150</td>
<td>70</td>
<td>180</td>
</tr>
<tr>
<td>4</td>
<td>7650</td>
<td>16</td>
<td>10</td>
<td>60</td>
<td>180</td>
<td>75</td>
<td>230</td>
</tr>
<tr>
<td>4</td>
<td>8800</td>
<td>18</td>
<td>10</td>
<td>66</td>
<td>230</td>
<td>80</td>
<td>285</td>
</tr>
<tr>
<td>6</td>
<td>12500</td>
<td>20</td>
<td>12</td>
<td>75</td>
<td>285</td>
<td>90</td>
<td>350</td>
</tr>
<tr>
<td>6</td>
<td>15800</td>
<td>22</td>
<td>14</td>
<td>70</td>
<td>350</td>
<td>80</td>
<td>450</td>
</tr>
<tr>
<td>6</td>
<td>18200</td>
<td>24</td>
<td>16</td>
<td>75</td>
<td>450</td>
<td>85</td>
<td>525</td>
</tr>
<tr>
<td>8</td>
<td>21500</td>
<td>26</td>
<td>16</td>
<td>75</td>
<td>500</td>
<td>92</td>
<td>625</td>
</tr>
<tr>
<td>8</td>
<td>28000</td>
<td>28</td>
<td>18</td>
<td>80</td>
<td>580</td>
<td>100</td>
<td>715</td>
</tr>
<tr>
<td>8</td>
<td>33300</td>
<td>30</td>
<td>20</td>
<td>86</td>
<td>680</td>
<td>105</td>
<td>830</td>
</tr>
<tr>
<td>10</td>
<td>36500</td>
<td>30</td>
<td>20</td>
<td>90</td>
<td>950</td>
<td>100</td>
<td>1000</td>
</tr>
<tr>
<td>10</td>
<td>41500</td>
<td>36</td>
<td>22</td>
<td>95</td>
<td>1100</td>
<td>115</td>
<td>1350</td>
</tr>
<tr>
<td>12</td>
<td>58500</td>
<td>42</td>
<td>26</td>
<td>85</td>
<td>1270</td>
<td>105</td>
<td>1600</td>
</tr>
<tr>
<td>14</td>
<td>90500</td>
<td>48</td>
<td>34</td>
<td>100</td>
<td>1750</td>
<td>115</td>
<td>2100</td>
</tr>
<tr>
<td>16</td>
<td>112500</td>
<td>54</td>
<td>36</td>
<td>105</td>
<td>2180</td>
<td>125</td>
<td>2600</td>
</tr>
<tr>
<td>18</td>
<td>142000</td>
<td>60</td>
<td>42</td>
<td>115</td>
<td>3200</td>
<td>140</td>
<td>3900</td>
</tr>
<tr>
<td>20</td>
<td>180000</td>
<td>66</td>
<td>48</td>
<td>130</td>
<td>4100</td>
<td>155</td>
<td>4900</td>
</tr>
<tr>
<td>24</td>
<td>225000</td>
<td>72</td>
<td>52</td>
<td>135</td>
<td>4800</td>
<td>165</td>
<td>5900</td>
</tr>
</tbody>
</table>

- 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.
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

• PUCK SILENCERS
  reference catalogue 9

YOUR ONE STOP CENTER FOR ALL INDUSTRIAL SILENCING NEEDS.