Explosion Venting Protection for Equipment, Ducts and Buildings

Vent-Saf® Explosion Vents

www.bsbipd.com | www.bsbsystems.com
Explosion vents are low burst pressure membranes attached over an opening on a structure and designed to protect equipment and processes against excessive internal, explosion-incurred pressures, by means of pressure relief. An explosion vent will relieve pressure from the instant its opening (or activation) pressure $p_{stat}$ has been exceeded.

Vent-Saf® Design

In the event of a deflagration, Vent-Saf explosion vents provide a rapid and unrestricted opening at a predetermined burst pressure ($p_{stat}$) allowing combustion gases to expand and flow through the open vent. The required relief area necessary to protect plant or equipment may be determined by using the most current standards of NFPA 68 or VDI 3673. The most suitable explosion vent may be selected by matching the information in this catalog with the particular operating conditions.

BS&B explosion vents are available in both round or rectangle styles and are designed to protect industrial equipment including silos, dust collectors, cyclones, conveyers, dryers, etc.

<table>
<thead>
<tr>
<th>Design/Application</th>
<th>Gasket</th>
<th>Seal</th>
</tr>
</thead>
<tbody>
<tr>
<td>Standard designs**</td>
<td>Silicone sponge</td>
<td>Silicone sponge</td>
</tr>
<tr>
<td>Sanitary / aseptic design</td>
<td>White solid silicone (FDA)</td>
<td>RTV (FDA approved)</td>
</tr>
<tr>
<td>High temperature applications (above 300°F, 150°C)</td>
<td>Solid silicone</td>
<td>RTV (high temperature)</td>
</tr>
</tbody>
</table>

For economy half silicone sponge gaskets are provided as standard which cover half the flange to the bolt holes. Full gaskets may be supplied on request. Alternative gasket materials including Neoprene and solid Viton® are also available.

*Consult BS&B for alternative material options

**Silicone sponge component acts as a gasket / seal and is fitted to both sides of the vent
Types VSP™ and VSS™: Domed single section metal explosion vents with integral gaskets. The dome resists vacuum and vacuum cycling.

Type VSP-M™: A flat, single section explosion panel with integral frame and gaskets designed for applications in dust collectors, cyclones, conveyors.

Type VSP-L: Stainless steel vent designed for low pressures to 0.33 psig (0.022 barg)

Types VSE™: A flat, single section metal explosion vent with integral gaskets designed for near static operating pressures.

Type VSB™: Building vent for protection of building structures by very low pressure explosion vents.

Types EXP™: A flat vent with a slotted 316ss top section and FEP / PTFE seal.

Types EXP-V™ provides vacuum support.

Type EXP-DV™: A round domed explosion vent of composite construction with integral vacuum support and gaskets.

Type LCV™: A flat explosion vent of composite construction with integral gaskets.

Type HTV™: A lightly domed vent designed for high temperature service to 1,000°F (538°C) and above.

Vent-Saf® Explosion Vents include:

- Rectangular sizes from 6 x 9 inches (152 x 229mm) to 44.5 x 68 inches (1130 x 1727mm)
- Round sizes from 8 to 54 inches (203 to 1372mm)
- Material options for standard designs; sanitary aseptic designs; high temperatures above 300°F (149°C) and insulation to prevent condensation from collecting on panels
- Manufactured to meet the requirements of NFPA 654, 68, 69 and ATEX standards
- Vent sensors to provide a process shutdown signal
- Thermal insulation available to permit use in operating temperatures to 2000°F (1093°C), to reduce heat loss or prevent condensation
- Optional design for aseptic / sanitary applications
- Fail-safe design, if damaged it will provide a relief opening below its rated pressure
- Supplied with integral gaskets ready for installation
- Accurate, reliable and leak tight

Rectangular and round vent dimensions: The dimensions and relief areas of VSP and VSE vents in either rectangular or round designs are given in the following tables. Contact BS&B for non-standard sizes.

Safety frames: Rectangular vents can be mounted in lightweight angle profile safety frames. Round vents can be installed between standard weld-neck flanges in accordance with ANSI 150 or DIN PN10 or in lightweight angle profile frames. Safety frames are available in 304ss or carbon steel. The frames are designed to either bolt or weld on to the equipment to be protected. If frames are manufactured by the user, details of bolt sizes, spacing and dimensions must be given to us prior to vent manufacture to ensure correct vent performance.

Operating temperature: The standard explosion vent may be used in temperatures -40°F to 300°F (-40°C to 150°C), the sanitary / aseptic design, -80°F to 450°F (-62°C to 232°C), and with solid silicone gaskets and RTV (high temperature) seal -80°F to 500°F (-62°C to 260°C). Thermal insulation permits higher temperatures.

Thermal insulation: Thermally insulated vents, using either urethane or ceramic material may be offered to prevent heat loss or condensation on the vent. Insulation will also permit their use in high temperature service up to 2,000°F (1,093°C). The insulation is integral to panel construction, requiring no additional field installation. The type and thickness of the insulation material will be selected to suit the operating temperature requirements. The additional insulation is taken into consideration when the burst pressure is determined. An optional stainless steel weather cover is available to provide added protection of the insulation against rain, ice or debris.

Sanitary / aseptic applications: These explosion vents of single section stainless steel construction with smooth internal surface finish are free of cavities. Solid white silicone gaskets are supplied fitted to the vent flange area and FDA approved RTV sealing material applied to the vent perimeter to achieve a sanitary / aseptic construction.

For more information about BS&B Vent-Saf explosion vents, please review our website at www.bsbsystems.com.
Type **VSP™** and **VSS™**

**Domed Single Section Metal Explosion Vents with Integral Gaskets**

VSP™ and VSS™ explosion vents are domed single section metal vents with integral gaskets. The dome is formed to resist vacuum. The VSP and VSS are designed to protect processes from internal explosive pressures. Immediate overpressure relief occurs when the vents are activated.

The VSP vent has been tested to over 1 million pressure cycles from vacuum to light positive pressure while retaining its burst accuracy. The VSP vent exhibits superior performance compared to conventional composite vents that fatigue after less than 40,000 pressure cycles under equivalent test conditions. The type VSS vent is of similar construction to the type VSP vent and is suitable for static or cyclic vacuum service conditions only. The VSS is designed to meet the USDA 3-A standards.

### Features
- Unique, economic patented design
- Accurate, reliable and leak tight
- Enhanced abrasion resistance
- One piece metal construction without slits on the process side avoiding product accumulation
- Optional design for sanitary / aseptic applications
- No fragile PTFE seal which may puncture and admit moisture
- Superior dynamic performance due to low mass compared with composite designs
- Operating pressures up to 60% of the minimum tagged burst pressure rating (80% under certain conditions)
- Thermal insulation available to permit use in operating temperatures to 2000°F (1093°C) to reduce heat loss or prevent condensation
- Fail safe design
- Supplied with integral gaskets ready for installation
- Standard materials are 316ss with a variety of gasket and seal materials depending upon application.

### Installation

Rectangular vents can be mounted in lightweight angle profile safety frames. Round vents can be installed between standard weld-neck flanges in accordance with ANSI 150 or DIN PN10 or in lightweight angle profile frames. Safety frames are available in 304ss or carbon steel. The frames are bolted or welded to the equipment. If frames are manufactured by the user, details of bolt sizes, spacing and dimensions must be given to BS&B prior to vent manufacture to ensure correct vent performance.

### Vacuum Service

The VSP and VSS vents with their domed construction are designed to resist high vacuum under cycling conditions without the need for vacuum support bars attached to the inlet safety frame.

### Burst Tolerance

<table>
<thead>
<tr>
<th>Marked Burst Pressure</th>
<th>Burst Tolerance</th>
</tr>
</thead>
<tbody>
<tr>
<td>≤ 1.5 psig (0.1 barg)</td>
<td>± 0.25 psig (0.017 barg)</td>
</tr>
<tr>
<td>&gt; 1.5 psig (0.1 barg)</td>
<td>± 5% (0.034 barg)</td>
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</tbody>
</table>

An alternative tolerance of +25% may be offered if required by the customer; contact BS&B. The tag affixed to the discharge side of the vent will be marked with a minimum-maximum burst range.
### Rectangular Dimensions (Round dimensions located on page 6)

<table>
<thead>
<tr>
<th>Nominal size</th>
<th>Frame inside dimension</th>
<th>Frame outside dimension</th>
<th>Net relief area</th>
</tr>
</thead>
<tbody>
<tr>
<td>9 x 12</td>
<td>230 x 305</td>
<td>305</td>
<td>98</td>
</tr>
<tr>
<td>12 x 18</td>
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<td>516</td>
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<tr>
<td>18 x 36</td>
<td>457 x 915</td>
<td>915 18</td>
<td>621</td>
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<td>457 x 1181</td>
<td>1181 18</td>
<td>789</td>
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<td>1499 19</td>
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<tr>
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<td>610 x 610</td>
<td>610 24</td>
<td>552</td>
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<td>24 x 30</td>
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<td>693</td>
</tr>
<tr>
<td>24 x 36</td>
<td>610 x 915</td>
<td>915 24</td>
<td>834</td>
</tr>
<tr>
<td>24 x 44</td>
<td>610 x 1118</td>
<td>1118 24</td>
<td>1022</td>
</tr>
<tr>
<td>24 x 48</td>
<td>610 x 1220</td>
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<td>1116</td>
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<td>1220 30</td>
<td>1401</td>
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<td>826 x 1651</td>
<td>1651 32.5</td>
<td>2064</td>
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<tr>
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<td>1118 44</td>
<td>1892</td>
</tr>
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<td>1130 44.5</td>
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</tr>
<tr>
<td>44.5 x 68</td>
<td>1130 x 1727</td>
<td>1727 44.5</td>
<td>2970</td>
</tr>
</tbody>
</table>

The outlet frame for the type VSS vent is 0.5 inches wider and 0.5 inches longer than the standard outlet frame.

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**Operating Temperature**

The standard explosion vent may be used in temperatures -40°F to 300°F (-40°C to 150°C), the sanitary / aseptic design -80°F to 450°F (-62°C to 232°C), and with solid silicone gaskets and RTV (high temperature) seal -80°F to 50°F (-62°C to 260°C). Thermal insulation permits higher temperatures.

**Vent Construction**

The perimeter of the rectangular vents are laser cut on three sides in a stitch pattern. The fourth side acts as a hinge, and retains the central section, controlling fragmentation upon opening.

**Gasket Seal**

Standard designs silicone sponge sanitary / hygienic design white solid silicone RTV (FDA approved). High temperature applications above 300°F (150°C) red solid silicone RTV (high temperature). Alternative gasket materials including neoprene and solid Viton® are also available.
### Round VSP and VSE Vent Dimensions

<table>
<thead>
<tr>
<th>Nominal size</th>
<th>Frame dimensions</th>
<th>Frame angle</th>
<th>Net relief area</th>
</tr>
</thead>
<tbody>
<tr>
<td>in/mm</td>
<td>Outside dimensions A</td>
<td>in/mm</td>
<td>in²/mm²</td>
</tr>
<tr>
<td>16</td>
<td>406/19.8 mm</td>
<td>502/16.3</td>
<td>413/1.8</td>
</tr>
<tr>
<td>18</td>
<td>457/21.8 mm</td>
<td>553/18.3</td>
<td>464/1.8</td>
</tr>
<tr>
<td>20</td>
<td>508/23.8 mm</td>
<td>603/20.3</td>
<td>514/1.8</td>
</tr>
<tr>
<td>24</td>
<td>610/27.8 mm</td>
<td>705/24.3</td>
<td>616/1.8</td>
</tr>
<tr>
<td>30</td>
<td>762/34.3 mm</td>
<td>870/30.3</td>
<td>768/2</td>
</tr>
<tr>
<td>32</td>
<td>813/36.3 mm</td>
<td>921/32.3</td>
<td>819/2</td>
</tr>
<tr>
<td>36</td>
<td>915/40.3 mm</td>
<td>1,022/36.3</td>
<td>921/2</td>
</tr>
<tr>
<td>40</td>
<td>1,016/44.3 mm</td>
<td>1,124/40.3</td>
<td>1,022/2</td>
</tr>
<tr>
<td>44</td>
<td>1,118/48.3 mm</td>
<td>1,226/44.3</td>
<td>1,124/2</td>
</tr>
</tbody>
</table>

- VSP standard panels are available in sizes 16 to 44 inches only
- VSE vents are available in all sizes
- Standard VSE Vents 8 to 14 inches fit ANSI 150 bolting
**Type VSE™**

Flat, Single Section Metal Explosion Vents with Integral Gaskets

VSE™ explosion vents are flat single section metal vents with integral gaskets. The VSE offers a low burst pressure membrane of calculated area fixed over an opening on the structure to be protected. In the event of a deflagration the vents provide a rapid and unrestricted opening at a predetermined burst pressure (Pstat) allowing combustion gases to expand and flow through the open vent. The required relief area necessary to protect plant or equipment may be determined by using the most current standards of NFPA 68 or VDI 3673.

**Features**
- Unique, economic patented design
- Accurate, reliable and leak tight
- Enhanced abrasion resistance
- One piece metal construction without slits on the process side avoiding product accumulation
- Optional design for sanitary / aseptic applications
- No fragile PTFE seal which may puncture and admit moisture
- Superior dynamic performance due to low mass compared with composite designs
- Operating pressures up to 60% of the minimum tagged burst pressure rating (80% under certain conditions)
- Thermal insulation available to permit use in operating temperatures to 2000°F (1093°C) to reduce heat loss or prevent condensation
- Fail safe design
- Supplied with integral gaskets ready for installation
- Standard materials are 316ss with a variety of gasket and seal materials depending upon application.

**Burst Tolerance**

<table>
<thead>
<tr>
<th>Marked Burst Pressure</th>
<th>Burst Tolerance</th>
</tr>
</thead>
<tbody>
<tr>
<td>≤ 1.0 psig (0.069 barg)</td>
<td>± 0.25 psig (0.017 barg)</td>
</tr>
<tr>
<td>&gt; 1.0 psig (0.069 barg)</td>
<td>± 5% (0.034 barg)</td>
</tr>
</tbody>
</table>

An alternative tolerance of +25% may be offered if required by the customer; contact BS&B. The tag affixed to the discharge side of the vent will be marked with a minimum-maximum burst range.

**Vent Construction**

The perimeter of the rectangular vents are laser cut on three sides in a stitch pattern. The fourth side acts as a hinge, and retains the central section, controlling fragmentation upon opening.

**Gasket Seal**

Standard designs silicone sponge sanitary / hygienic design white solid silicone RTV (FDA approved). High temperature applications above 300°F (150°C) red solid silicone RTV (high temperature). Alternative gasket materials including neoprene and solid Viton™ are also available.

**Vacuum Service**

The VSE is installed in a safety frame with support bars in order to withstand light vacuum or back-pressure including:
- Vent construction and materials - types VSP and VSS
- Installed in safety frames or between weld-neck flanges
- A round domed composite vent laser cut across the dome
- Burst pressure (pstat) from 1 psig (0.1barg) and above depending on size
- Size range: round: nominal sizes 6 to 48 inches (150 to 1,200mm)
Type **VSB™** Building Vent

Low Pressure Explosion Vent Designed to Protect Buildings and Structures

**Applications**

The VSB™ explosion relief vent is designed for architects, engineers, and end users seeking to protect low strength structures from overpressure, such as storage buildings designed for processing, handling, or storing combustible dusts or flammable materials.

The vent panels are housed in extruded aluminum housings which are custom sized to accommodate planned or existing openings in a building structure. For example, they can be sized to replace existing windows. The panels conform to the requirements of NFPA 68 for non-fragmenting devices that do not pose projectile hazards.

The pressure relief panel mounted within the aluminum frame is made from translucent polycarbonate (clear or bronze). Opaque white is also available as an option. The panel is provided with a set point specified at time of ordering. The pressure set point mechanism in the VSB vent panel is designed such that it does not ever require testing or calibration once installed.

**Features**

- Lowest available vent set pressure
- Zero maintenance of functional parts
- Low mass, simple installation
- Designed for non-fragmentation
- Available translucent construction
- Excellent insulating properties
- Simple replacement

**VSB Vent Construction**

- Translucent polycarbonate or metal sheet
- Aluminum perimeter frame
- Dual seal from frame to vent
- Centrally mounted ‘burst tab’ to control set pressure
- Dynamic release cord that retains vent after activation

Polycarbonate vent construction permits transmission of daylight while maintaining insulation properties similar to double panel glass (typical R value of 2.7) and an impact strength rating of over 200 times that of single panel glass.
**Type VSP-M™**

Flat, Single Section Explosion Panel with Integrated Frame and Gasket

Built with cross-rib folded edges and designed for applications in dust collectors, cyclones, and conveyors.

**Features**
- Available burst pressure from 0.218 – 5 psig (0.015 - 0.345bar)
- Magnetic burst sensor designed to provide immediate indication of an activation
- Ground wire
- Thermal insulation
- Fragment free
- Material stainless steel
- Operating ration: 80%

**Options**
- Bolts and earth lead
- Sanitary: white FDA approved silicone gasket /temperature -40° to +356°F (-40° to +180°C)
- Material stainless steel AISIL
- Other gasket materials available
- Different burst pressure available

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**Type EXP/DV™**

Composite Contraction Laser Cut Explosion Vents with Stitch Patterns Controlling Burst Pressures

The type EXP/DV vent exhibits good performance under pressure cycling conditions from vacuum to light positive pressure and is suitable for positive pressures up to 80% of the minimum burst pressure. A fluoropolymer liner covers the slits, which provides a seal. The vent burst pressure is controlled by the arrangement of the stitch pattern.

**Burst Tolerance**
+ 0.5 psig (0.03barg) of the nominal burst pressure; A tag is fixed to the discharge side of the vent and marked with the burst range.
Example: A vent with a nominal burst pressure of 3 psig (0.2barg) will be tagged minimum 2.5 psig (0.17barg) - maximum 3.5 psig (0.24barg)

**Operating Temperature**
-40°F (-40°C) to 500°F (260°C); Thermally insulated vents may be offered to prevent heat loss or condensation on the vent or to permit their use in high temperature service up to 2000°F (1,093°C).

**Installation**
The EXP/DV vent, supplied with gaskets, can be installed between standard weldneck flanges in accordance with DIN PN10, ANSI 150 or directly on to the structure to be protected. The vent is installed with a hold-down ring on the outlet side to insure proper performance. A rectangular flat composite vent laser cut around it's perimeter with integral gaskets.
**Type LCV™ Flat Explosion Vent**

Composite Construction with Integral Gaskets

The LCV™ is designed for static or light pressure cycling duty and is suitable for operating pressure up to 60% of the minimum burst pressure.

**Burst Pressure (pstat)**

The LCV is available from 0.5 psig (0.04 barg) to 5 psig (0.3 barg), depending on the size.

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**Type EXP™ and EXP/V™**

Rectangular or Round Explosion Vents with Vacuum Support Safety Frame

This vent is designed for static or light pressure cycling duty and is suitable for operating pressure up to 60% of the minimum burst pressure.

**Burst Pressure (pstat)**

From 0.75 psig (0.05 barg) to 5 psig (0.3 barg), depending on size.

**Sizes**

- Rectangular — nominal sizes 6 x 9 inches (152 x 229 mm) to 77 x 77 inches (1,960 x 1,960 mm)
- Round — nominal sizes 6 to 48 inches (150 to 1,220 mm)

**Burst Tolerance**

+0.25 psig (+0.02 barg) for rectangular EXP and EXP/V
+0.5 psig (+0.03 barg) for round EXP and EXP/V

**Operating Temperature**

-40°F (-40°C) to 500°F (260°C); Thermally insulated vents may be offered to prevent heat loss or condensation on the vent or to permit their use in high temperature service up to 2000°F (1093°C).

Vacuum service: must be installed in a safety frame with support bars in order to withstand vacuum or back pressure.

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**Burst Tolerance**

+0.25 psig (0.02 barg) of the nominal burst pressure; Tags are marked with a minimum / maximum burst range

Vacuum service: The LCV is fitted with a support to resist vacuum.

**Operating Temperature**

-40°F (-40°C) to 500°F (260°C); Thermally insulated vents using ceramic fiber material may be offered to prevent heat loss or condensation on the vent or to permit their use in high temperature service up to 2000°F (1093°C).

**Vent Construction and Material**

The LCV vent is a rectangular flat composite vent of 316ss and FEP / PTFE construction laser cut in a stitch pattern around the vent’s perimeter.

**Installation**

The type LCV vent is supplied with gaskets ready for installation in safety frames. A type LC vent is available without a support.

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**Vent Construction and Materials**

Type EXP - a flat vent with a slotted 316ss* top section and FEP / PTFE seal

Type EXP/V - a flat vent with a slotted 316ss top section, FEP / PTFE seal and a slotted support to resist light vacuum

*Vents are available in other materials

**Safety Frames**

Safety frames for type EXP and type EXP/V feature both round and rectangular vents designed to be held in place. Safety frames are available in two designs. The first bolts directly onto the structure. The second is designed to be welded onto the structure. Safety frame materials are 304ss, 316ss, or carbon steel.
### Rectangular EXP and EXP/V Explosion Vent

<table>
<thead>
<tr>
<th>Nominal size</th>
<th>A (in)</th>
<th>A (cm)</th>
<th>B (in)</th>
<th>B (cm)</th>
<th>J (in)</th>
<th>J (cm)</th>
<th>K (in)</th>
<th>K (cm)</th>
<th>Net relief area</th>
</tr>
</thead>
<tbody>
<tr>
<td>12x18</td>
<td>30</td>
<td>12</td>
<td>46</td>
<td>18</td>
<td>45.7</td>
<td>16</td>
<td>40.6</td>
<td>22</td>
<td>55.9</td>
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<tr>
<td>18x24</td>
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### Round EXP and EXP/V Explosion Vent

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