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# Vent-Saf<sup>®</sup>

Explosion Venting Protection for Equipment,  
Ducts and Buildings



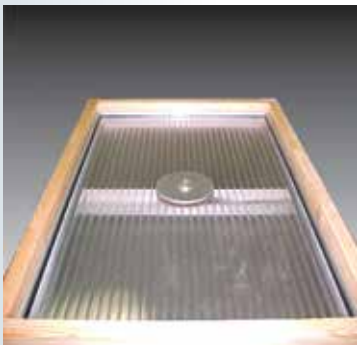
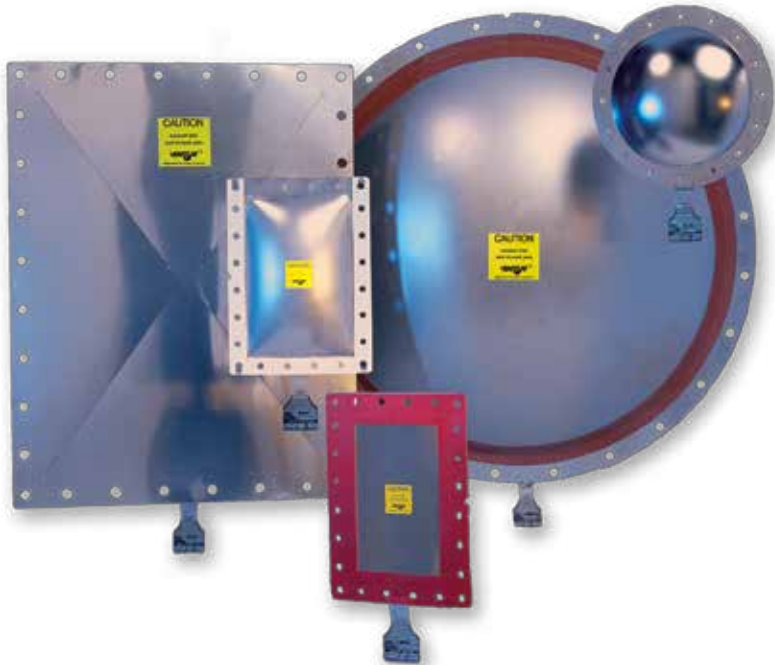
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# Vent-Saf<sup>®</sup> Explosion Vents

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.



Type VSB Building Vent



Vented Dust Explosion: 6 pounds of Corn Starch ignited in a 100 cubic foot test vessel

## Vent-Saf<sup>®</sup> 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.

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

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<sup>®</sup> 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

## Vent-Saf® Features

- 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

## Vent-Saf® Features

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.

## Vent-Saf® Explosion Vents include:

- **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)
- **Type 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.
- **Type EXP™:** A flat vent with a slotted 316ss top section and FEP/PTFE seal.
- **Type 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.

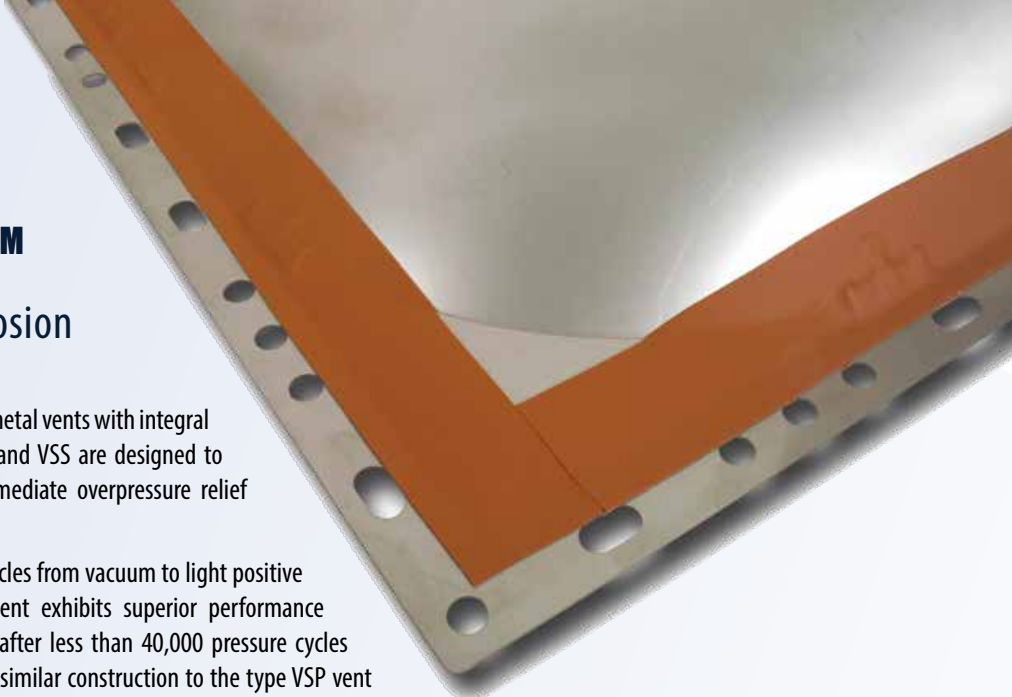
For more information about BS&B Vent-Saf explosion vents, please review our website at [www.bsbsystems.com](http://www.bsbsystems.com).



# 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.



Available in Rectangular,  
Square and Round Sizes

## 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

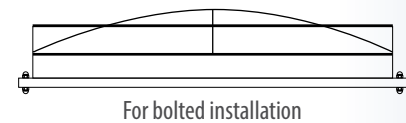
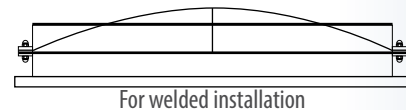
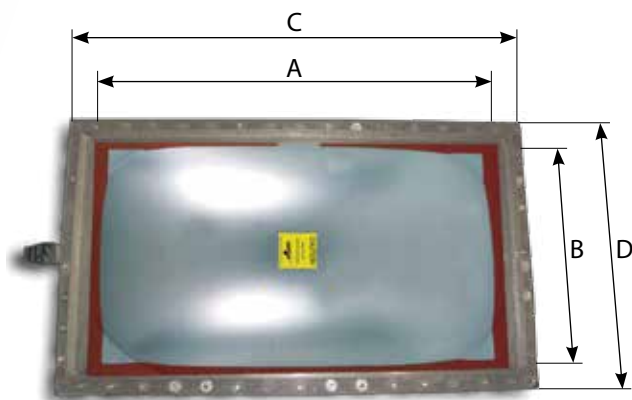
Marked Burst Pressure	Burst Tolerance
≤ 1.5 psig (0.1 barg)	± 0.25 psig (0.017 barg)
> 1.5 psig (0.1 barg)	± 5% (0.034 barg)

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)

Rectangular VSP, VSS and VSE vent dimensions											
Nominal size		Frame inside dimension				Frame outside dimension				Net relief area	
		A		B		C		D			
in	mm	in	mm	in	mm	in	mm	in	mm	in <sup>2</sup>	cm <sup>2</sup>
9 x 12	230 x 305	12	305	9	230	16	406	13	330	98	630
12 x 18	305 x 457	18	457	12	305	22	559	16	406	201	1298
18 x 18	457 x 457	18	457	18	457	22	559	22	559	306	1976
18 x 24	457 x 610	24	610	18	457	28	711	22	559	411	2653
18 x 30	457 x 762	30	762	18	457	34	864	22	559	516	3330
18 x 36	457 x 915	36	915	18	457	40	1016	22	559	621	4008
18 x 46.5	457 x 1181	46.5	1181	18	457	50.5	1283	22	559	789	5091
19 x 59	483 x 1499	59	1499	19	483	63	1600	23	584	1082	6982
24 x 24	610 x 610	24	610	24	610	28	711	28	711	552	3562
24 x 30	610 x 762	30	762	24	610	34	864	28	711	693	4473
24 x 36	610 x 915	36	915	24	610	40	1016	28	711	834	5382
24 x 44	610 x 1118	44	1118	24	610	48	1220	28	711	1022	6595
24 x 48	610 x 1220	48	1220	24	610	52	1321	28	711	116	7202
29 x 59	735 x 1499	59	1499	29	737	63	1600	33	838	1667	10756
30 x 36	762 x 915	36	915	30	762	40	1016	34	864	1047	6756
30 x 40	762 x 1016	40	1016	30	762	44	1118	34	864	1165	7518
30 x 48	762 x 1220	48	1220	30	762	52	1321	34	864	1401	9040
32.5 x 65	826 x 1651	65	1651	32.5	826	69	1752	36.5	927	2064	13316
36 x 36	915 x 915	36	915	36	915	40	1016	40	1016	1260	8131
44 x 44	1118 x 1118	44	1118	44	1118	48	1220	48	1220	1892	12208
44.5 x 44.5	1130 x 1130	44.5	1130	44.5	1130	48.5	1231	48.5	1232	1936	12490
44.5 x 68	1130 x 1727	68	1727	44.5	1130	72	1829	48.5	1232	2970	19161

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



### 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.

### 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.

### 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 Viton® are also available.



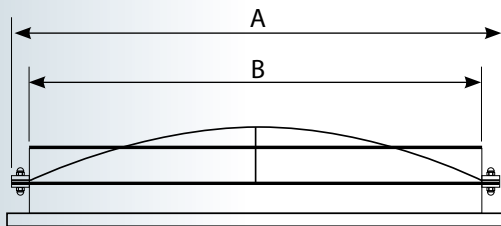
## Round Dimensions (Rectangular dimensions located on page 5)

Round VSP and VSE Vent Dimensions									
Nominal size		Frame dimensions				Frame angle		Net relief area	
		Outside dimensions A		Inside dimensions B					
in	mm	in	mm	in	mm	in	mm	in <sup>2</sup>	cm <sup>2</sup>
16	406	19.8	502	16.3	413	1.8	45	192	1,236
18	457	21.8	553	18.3	464	1.8	45	243	1,568
20	508	23.8	603	20.3	514	1.8	45	301	1,939
24	610	27.8	705	24.3	616	1.8	45	434	2,799
30	762	34.3	870	30.3	768	2	51	680	4,385
32	813	36.3	921	32.3	819	2	51	774	4,992
36	915	40.3	1,022	36.3	921	2	51	980	6,325
40	1,016	44.3	1,124	40.3	1,022	2	51	1211	7,815
44	1,118	48.3	1,226	44.3	1,124	2	51	1467	9,462

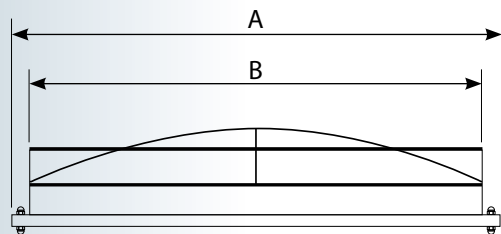
VSP standard panels are available in sizes 16 to 44 inches only

VSE vents are available in all sizes

Standard VSE Vents 8 to 14 inches fit ANSI 150 bolting



For welded installation



For bolted installation



Available in Rectangular, Square and Round Sizes

# 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

Marked Burst Pressure	Burst Tolerance
≤ 1.0 psig (0.069 barg)	± 0.25 psig (0.017 barg)
> 1.0 psig (0.069 barg)	± 5% (0.034 barg)

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.



VSE (back) with RTV sealant

### 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

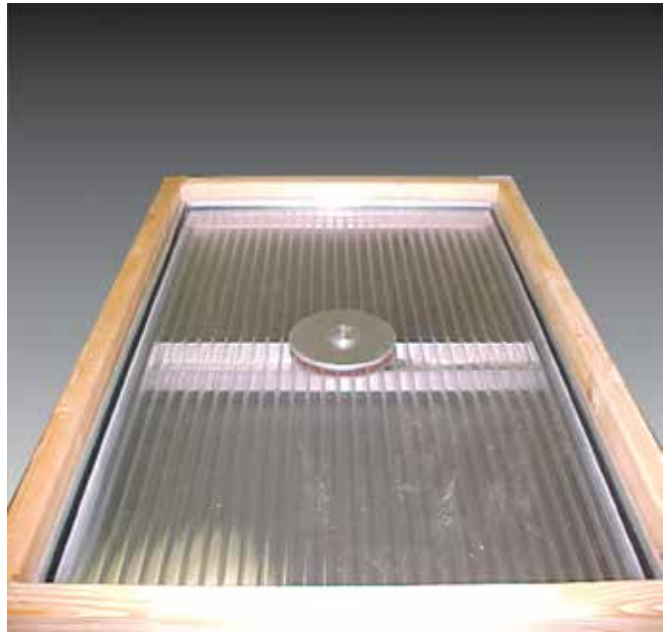
The VSB™ explosion relief vent is designed for architects, engineers, and end users seeking to protect low strength structures from overpressure, such as storage buildings designed for processing, handling, or storing combustible dusts or flammable materials.

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.



Dynamic testing of a VSB building vent



#### 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

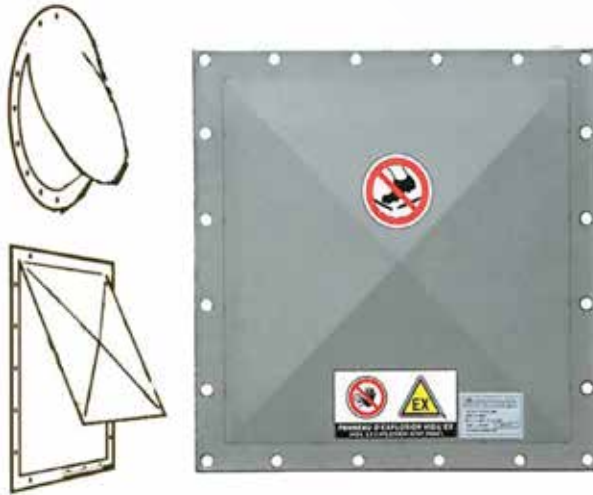
Polycarbonate vent construction permits transmission of daylight while maintaining insulation properties similar to double panel glass (typical R value of 2.7) and an impact strength rating of over 200 times that of single panel glass.



## 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

## Type EXP/DV™

### Composite Contruaction 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 stich 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).



Vacuum service: fitted with a vacuum support to resist high vacuum

#### 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 (0.04barg) to 5 psig (0.3barg), depending on the size.



#### Burst Tolerance

+0.25 psig (0.02barg) 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.

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

#### Sizes

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

#### 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).

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



#### Burst Tolerance

+0.25 psig (+0.02barg)

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

#### 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

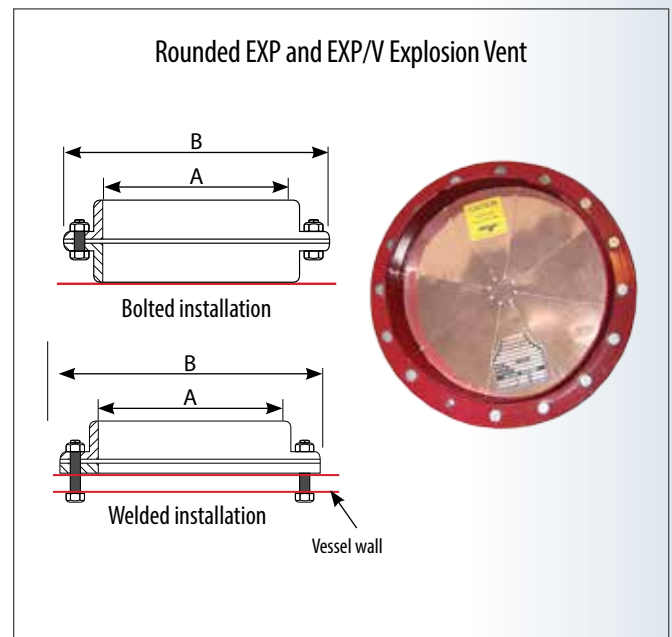
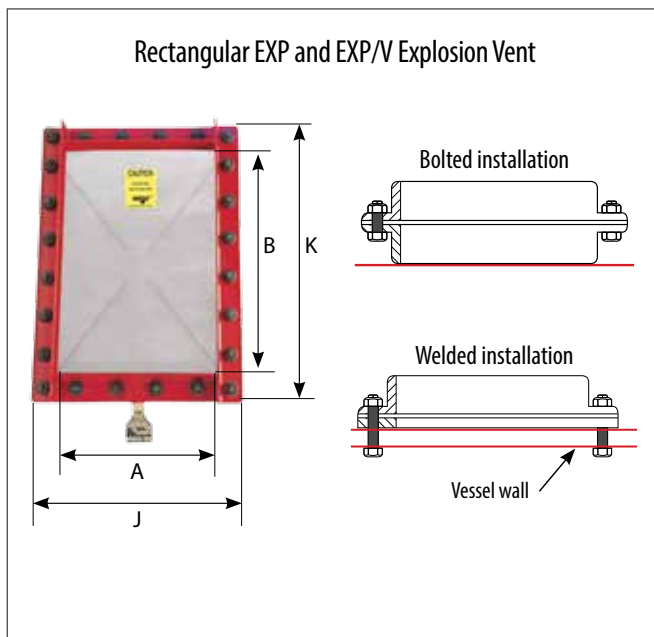
Safety frames for type EXP and type EXP/V feature both round and rectangular vents designed to be held in place. Safety frames are available in two designs. The first bolts directly onto the structure. The second is designed to be welded onto the structure. Safety frame materials are 304ss, 316ss, or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

## Rectangular EXP and EXP/V Explosion Vent

Dimensions											
Nominal size		A		B		J		K		Net relief area	
in	cm	in	cm	in	cm	in	cm	in	cm	in <sup>2</sup>	cm <sup>2</sup>
12x18	30x46	12	30.5	18	45.7	16	40.6	22	55.9	210	1355
18x24	46x61	18	45.7	24	61.0	22	55.9	28	71.1	423	2729
18x36	46x91	18	45.7	36	91.4	22	55.9	40	101.6	639	4123
24x30	61x76	24	70.0	30	76.2	28	71.1	34	86.4	708	4568
24x36	61x91	24	61.0	36	91.4	28	71.1	40	101.6	852	5497
24x48	61x122	24	61.0	48	121.9	28	71.1	52	132.1	1140	7355
30x36	76x91	30	76.2	36	91.4	34	86.4	40	101.6	1065	6871
30x48	76x122	30	76.2	48	121.9	34	86.4	52	132.1	1425	9194
32.5x65	83x165	32.5	82.6	65	165.1	36.5	92.7	69	175.3	2096	13523
44.5x68	113x173	44.5	113.0	68	172.7	48.5	123.2	72	182.9	3004	19381

## Round EXP and EXP/V Explosion Vent

Dimensions							
Nominal size		A		B*		Net relief area	
in	cm	in	cm	in	cm	in <sup>2</sup>	cm <sup>2</sup>
16	41	16.25	16.25	19.75	50.17	179	1115
18	46	18.25	18.25	21.75	55.25	227	1465
20	51	20.25	20.25	23.75	60.33	281	1813
24	61	24.25	24.25	27.75	70.49	405	2613
30	76	30.25	30.25	34.25	87	633	4084
32	81	32.25	32.25	36.25	92.08	720	4645
36	92	36.25	36.25	38.25	97.16	912	5884
40	102	40.25	40.25	44.25	112.4	1127	7271
44	112	44.25	44.25	48.25	122.56	1364	8800
60	152	60	60	64	162.56	2518	16245





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