Catalog #77-1003

BS&B®

Rupture Disk Device Quick Reference Guide

Rupture Disk Quick

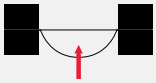
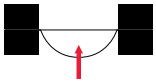
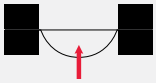
BS&B®

Sta-Saf® System

The Sta-Saf system is the combination of solid metal reverse buckling disks with pre-torqued safety heads.

Standard Features

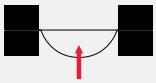
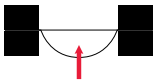
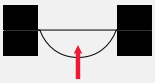
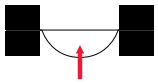
- Operating ratio up to 100% (CE) / 95% (ASME)
- Full vacuum resistant
- SRB-7RS and SRB-7FS pre-torqued safety heads
- Solid metal construction enabling optimum leak tightness
- Designed for non-fragmentation
- Recommended for isolation of pressure relief valves
- Metal tag with product identification and traceability data, as well as code symbol stamps as appropriate

	Sigma™ and Sigma EXL™ Ⓘ	SK$_R$™ Ⓘ	LPS™ Ⓘ
			
Disk Sizes	1-8 inches (25-200mm)	1-10 inches (25-250mm)	1-8 inches (25-200mm)
Burst Pressures	15-500 psig (1-34.5barg)	15-500 psig (1-34.5barg)	5-70 psig (0.3-4.8barg)
Material	*Standard, except aluminum	*Standard, except aluminum	*Standard, except aluminum
Loading (direction of flow)			
Service Phase	Gas or liquid	Gas or liquid	Gas or liquid
Manufacturing Design Range	5%, 0%	10%, 5%, 0%	10%, 5%, 0%
Cycle Life (resistance to fatigue)	Best	Best	Best
Max Operating Pressure	95% ASME (100% PED)	90% ASME (95% PED)	90% ASME (95% PED)
Vacuum Support Required	No	No	No
Designed for Non-Fragmentation	Yes	Yes	Yes
Safety Relief Valve Isolation	Yes	Yes	Yes
Safety Head	SRB-7RS, S90-7R, and SRB-7FS	SRB-7RS, S90-7R, SRB-7FS, SPR-7R, and SR-7R	SRB-7RS, S90-7R, SRB-7FS, SPR-7R, and SR-7R

* *Standard materials: aluminum, nickel alloy 200, Inconel® alloy 600, Monel® alloy 400, 316L ss, Hastelloy® alloy C-276, tantalum, titanium, Hastelloy® alloy C-22, Inconel® alloy 625, niobium.*

Ⓘ *US patents 5996605, 6178983, 6321582 and 6446653; International patents apply*

Reference Guide

S-90™	RLS™	JRS™	SRD/ SRD-L Ⓟ	
				
1-40 inches (25-1,000 mm)	1-20 inches (25-500 mm)	1-42 inches (25-1,070 mm)	1-12 inches (25-300 mm)	Disk Sizes
20-1,000 psig (1.4-69 barg)	20-2,000 psig (1.4-138 barg)	5-180 psig (0.4-12.4 barg)	12-750 psig (0.83-51.7 bar)	Burst Pressures
*Standard	*Standard, except aluminum	*Standard, except aluminum	*Standard except Aluminum	Material
				Loading (Direction of Flow)
Gas or liquid with gas pocket**	Gas or liquid	Gas or liquid with gas pocket**	Gas or Liquid	Service Phase
10%, 5%, 0%	10%, 5%, 0%	10%, 5%, 0%	10%, 5%, 0%	Manufacturing Design Range
Best	Best	Best	Best	Cycle Life (Resistance to Fatigue)
90% ASME (95% PED)	90% ASME (95% PED)	90% ASME (95% PED)	90% ASME (95% PED)	Max Operating Ratio
No	No	No	No	Vacuum Support Required
Yes	Yes	Yes	Yes	Designed for Non-Fragmentation
Yes	Yes	Yes	Yes	Safety Relief Valve Isolation
SRI-7RS, SRB-7RS, S90-7R, SRB-7FS, SPR-7R, and SR-7R	SRI-7RS, SRB-7RS, S90-7R, SRB-7FS, SPR-7R, and SR-7R	SRI-7RS, SRB-7RS and SRB-7FS	SRI-7RS, SRB-7RS, S90-7R, SRB-7FS, SPR-7R, and SR-7R	Safety Head

** *Consult BS&B*

Safety Heads

SRI-7RS™

Pre-torqued Insert Design

SRB-7RS™

Pre-torqued Insert Design

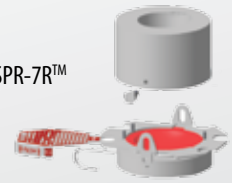
SRB-7FS™

Full Bolted Design

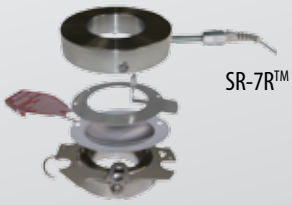
S90-7R™

Pre-assembled Insert Design

SPR-7R™



Extended Outlet / Disk Petal Containment



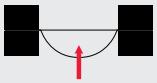
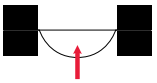
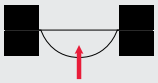
SR-7R™

Pre-assembled Insert Design for use with Burst Alert® Magnetic Sensors

Rupture Disk Quick

Alternative Reverse Buckling Disks

- **FRS™** - innovative frustum design disk providing overpressure relief at low pressure; the circular score line has an interrupted 'hinge' segment which retains the disk's central petal and prevents fragmentation
- **Eco-Saf® ECR™** - offers the lowest burst pressures available from a reverse buckling disk; The disk relieves overpressure or vacuum by reversing and opening at the perimeter of the dome
- **Sure-Saf® CSI™** - uses SAF technology (structural apex forming), which enhances accuracy of burst pressure
- **RB-90™** - provides overpressure protection by reversing and snapping against precision stainless steel knife blades
- **SVI™** - a single-use rupture disk assembly (no holder required) for isolating safety relief valves; For retrofit with fixed piping
- **SK_R-U™** - an all purpose SK_R rupture disk partnered with a threaded union-type holder

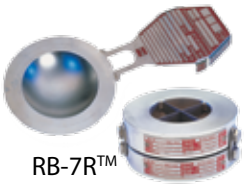
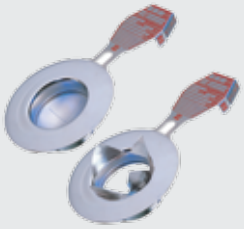
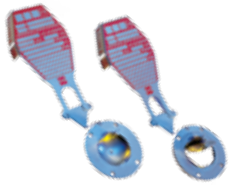
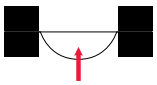
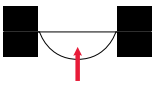
	FRS™ /FRL™	Sure-Saf® CSI™	Eco-Saf® ECR™ Ⓟ
			EC-7RS™ 
Disk Sizes	1-2 inches (25-50mm)	1-8 inches (25-200mm)	1-24 inches (25-600mm)
Burst Pressures	11.5-150 psig (0.8-10.3barg)	30-500 psig (2.1-34.5 barg)	1-180 psig (0.07-12.4 barg)
Material	*Standard, except aluminum	*Standard, except aluminum	*Standard, except aluminum with gaskets
Loading (Direction of Flow)			
Service Phase	FRS = gas FRL = liquid	Gas or liquid	Gas or liquid
Manufacturing Design Range	10%, 5%, 0%	10%, 5%, 0%	10%, 5%, 0%
Cycle Life (Resistance to Fatigue)	Best	Best	Best
Max Operating Ratio	90% ASME (95% PED)	90% ASME (95% PED)	90% ASME (95% PED)
Vacuum Support Required	No	No	***
Designed for Non-Fragmentation	Yes	Yes	Yes
Safety Relief Valve Isolation	Yes	Yes	Yes
Safety Head	SRI-7RS, SRB-7RS, S90-7R, and SRB-7FS	CSR-7RS	EC-7RS and EC-7R

* *Standard materials: aluminum, nickel alloy 200, Inconel® alloy 600, Inconel® alloy 625, Monel® alloy 400, niobium, 316L ss, Hastelloy® alloy C-276, tantalum, titanium, Hastelloy® alloy C-22*

*** *Some pressure combinations may require a vacuum support*

US patents 5996605, 6321582, 6446653

Reference Guide

RB-90™	SVI™	SK_R-U™ Ⓘ	
 RB-7R™			
1-36 inches (25-900mm)	1.5-6 inches (50-150mm)	1-2 inches (25-50mm)	Disk Sizes
10-1,800 psig (0.7-124.1barg)	3-125 psig (0.14-8.62barg)	55-500 psig (3.8-34.5barg)	Burst Pressures
*Standard	*Standard, except aluminum	*Standard, except aluminum	Material
			Loading (Direction of Flow)
Gas or liquid with gas pocket**	Gas or liquid with gas pocket**	Gas or liquid	Service Phase
10%, 5%, 0%	10%, 5%, 0%	10%, 5%, 0%	Manufacturing Design Range
Best	Best	Best	Cycle Life (Resistance to Fatigue)
90% ASME (95% PED)	90% ASME (95% PED)	90% ASME (95% PED)	Max Operating Ratio
No	No	No	Vacuum Support Required
Yes	Yes	Yes	Designed for Non-Fragmentation
	Yes	Yes	Safety Relief Valve Isolation
RB-7R		U_R-2	Safety Head

* *Standard materials: aluminum, nickel alloy 200, Inconel® alloy 600, Monel® alloy 400, 316L ss, Hastelloy® alloy C-276 Special materials: tantalum, titanium, Hastelloy® alloy C-22, Inconel® alloy 625*

** *Consult BS&B*

*** *Refer to LPS-U for lower burst pressures and RLS-U for higher burst pressures*

Ⓘ *US patents 5996605, 6178983, 6321582 and 6446653; International patents apply*

Safety Heads

EC-7RS™ and EC-7R™ safety heads

Preassembled Design

CSR-7RS™ safety head

Holder Outlet Design, Unscored Portion of Disk Prevents Fragmentation

RB-7R™ Safety Head

Insert Type

U_R-2 Safety Head

Union Holder

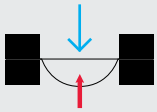
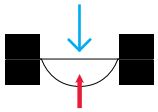
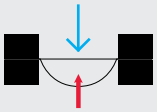
Rupture Disk Quick

Vac-Saf® Rupture Disks

The Vac-Saf system offers two-way relief to provide maximum protection of gas or liquid storage vessels and plant from damage caused by excessive vacuum or overpressure. Also available in industrial versions for installation in standard companion flange safety head models.

Sanitary Rupture Disks

- GCR-S™ - the leading sanitary / aseptic rupture disk with integral gasket, installed directly to tank fittings
- GCR-N™ - installs in a NovAseptic NA-connect® holder; The disk is flush mounted with the interior wall of the vessel for easy cleaning and sterilization
- SLP-S™ - provides the lowest burst pressure in each available size
- GLP-S™ - alternative installation design with traditional safety head

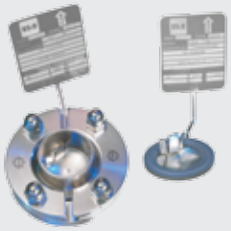
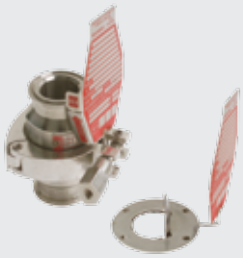
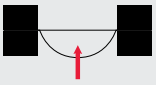
	Vac-Saf® Rupture Disks		
	HiLo™ Ⓘ	**VKB** and **P/VKB™**	**AVB-ST™** and **P/AVB-ST™**
			
Disk Sizes	2-12 inches (50-300mm)	2-12 inches (50-300mm)	2-8 inches (50-200mm)
Burst Pressures	5-300 inches WC (low) / 3-125 psi (high) (9-560mm Hg / 0.2-8.6bar)	5.5-52 inches WC (low)/ 6-170psi (high) (10-97mm Hg / 0.2-8.6bar)	3-40 psig (0.2-2.8barg)
Material	*Standard (not aluminum) and special	*Standard (not aluminum) and special	*Standard (not aluminum) and special
Loading (Direction of Flow)			
Service Phase	Gas or liquid with gas pocket**	Gas or liquid with gas pocket**	Gas or liquid
Manufacturing Design Range	10%, 5%, 0%	10%, 5%, 0%	10%, 5%, 0%
Cycle Life (Resistance to Fatigue)	Better	Better	Better
Max Operating Ratio	80% ASME (90% for some designs) (85% PED)	80% ASME (90% for some designs) (85% PED)	80% ASME (85% PED)
Vacuum Support Required	No	No	No
Designed for Non-Fragmen-tation	Yes	Yes	Yes
Safety Relief Valve Isolation	No	No	No
Safety Head	HL-7RS, HL-7R, HL-C	Quik-Sert	VB-C, P/VB-C

* *Standard materials: aluminum, nickel (alloy 200), Inconel® (alloy 600), Monel® (alloy 400), 316L ss, Hastelloy® (alloy C-276) Special materials: tantalum, titanium, Hastelloy® (alloy C-22), Inconel® (alloy 625)*

** *Consult BS&B*

US patents 7011104 and 7308903 apply

Reference Guide

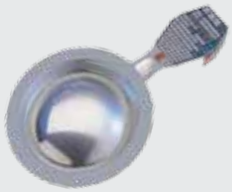
GCR-S™	GCR-N™	SLP-S™	GLP-S™	
				
1.5-4 inches (40-100mm)	1.5-2 inches (40-50mm)	1.5-4 inches (40-100mm)	1-4 inches (25-100mm)	Disk Sizes
10-300 psig (0.7-20.7barg)	10-101 psig (0.7-7barg)	5-70 psig (0.3-4.8barg)	5-70 psig (0.3-4.8barg)	Burst Pressures
*Standard (not aluminum) and special	*Standard (not aluminum) and special	*Standard (not aluminum) and special	*Standard (not aluminum) and special	Material
				Loading (Direction of Flow)
Gas or liquid	Gas or liquid	Gas or liquid	Gas or liquid	Service Phase
10%, 5%, 0%	10%, 5%, 0%	10%, 5%, 0%	10%, 5%, 0%	Manufacturing Design Range
Best	Best	Best	Best	Cycle Life (Resistance to Fatigue)
90% ASME (95% PED)	90% ASME (95% PED)	90% ASME (95% PED)	90% ASME (95% PED)	Max Operating Ratio
No	No	No	No	Vacuum Support Required
Yes	Yes	Yes	Yes	Designed for Non-Fragmentation
Yes	Yes	Yes	Yes	Safety Relief Valve Isolation
GR-C™	NA-Connect®	GR-C	SR-C™	Safety Head

* *Standard materials: aluminum, nickel (alloy 200), Inconel® (alloy 600), Monel® (alloy 400), 316L ss, Hastelloy® (alloy C-276) Special materials: tantalum, titanium, Hastelloy® (alloy C-22), Inconel® (alloy 625)*
Gasket material options for the GCR and SLP series includes silicone, Viton®, EPDM and Polysteel

Rupture Disk Quick

Forward Acting Tension Loaded Disks

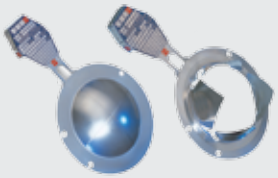
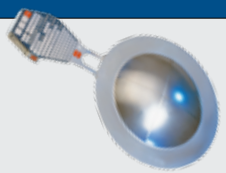
- D™ - composite disk consisting of a slotted metal top section and a metal or fluoropolymer seal for low burst pressure
- B™ - prebulged, solid metal rupture disk; system pressure is applied to the dished or concave side, subjecting disk metal to tension loading
- AV™ - flat rupture disk for atmospheric vessels and isolating outlet port of relief valves; ready gasketted with fiber gaskets; direct installation between companion flanges
- XN-85™ - precision scored, high performance specially manufactured by forming the disk first and then scoring
- XT™ - advanced rupture disk performance with an 'X' shaped score pattern; Designed for non-fragmentation; Excellent for relief valve isolation
- XB™ - non-fragmenting rupture disk opens along pre-weakened score lines offers a broader range of burst pressures than the XN
- LCN™ - low pressure rupture disk with flat composite metal design that withstands full vacuum

	D™	B™	AV™
			
Disk Sizes	2-30 inches (25-750mm)	1/8-24 inches (3-600mm)	2-36 inches (50-900mm)
Burst Pressures	20-1,000 psig (1.4-69barg)	2-100,000 psig (0.1-6,900barg)	1-25 psig (0.69-2barg)
Material	*Standard	*Standard	*Standard, except aluminum
Loading (Direction of Flow)			
Service Phase	Gas or liquid	Gas or liquid	Gas or liquid
Manufacturing Design Range	Full, 1/2, 1/4, 0%	Full, 1/2, 1/4, 0%	10%, 5%, 0%
Cycle Life (Resistance to Fatigue)	Good	Good	Good
Max Operating Ratio	80% ASME (85% PED)	70% ASME (75% PED)	60% ASME (65% PED)
Vacuum Support Required	Yes	Yes	Yes
Designed for Non-Fragmentation	Yes Minimally fragmenting with metal seal	No	Yes Minimally fragmenting with metal seal
Safety Relief Valve Isolation	Not recommended	Not recommended	Yes (@ outlet)
Safety Head	FA-7R™ Quick-Sert	FA-7R Quick-Sert	-

* *Standard materials: aluminum, nickel (alloy 200), Inconel® (alloy 600), Monel® (alloy 400), 316L ss, Hastelloy® (alloy C-276) Special materials: tantalum, titanium, Hastelloy® (alloy C-22), Inconel® (alloy 625)*

** *Some seal material may be released. Fiber gaskets attach on both sides of the AV disk; Standard gaskets are Klingersil®. As an option fluoropolymer gaskets may be supplied, preferably glass-filled.*

Reference Guide

XN85™	XT™	XB™ (Scored B or SCD B)	LCN™	
				
1-24 inches (25-600mm)	1-10 inches (25-225mm)	1-24 inches (25-600mm)	1-24 inches (25-600mm)	Disk Sizes
30-1,800 psig (2.1-124.1barg)	40-1,450 psig (5.5-100barg)	60-6,000 psig (4.1-414barg)	3-188 psig (0.2-13barg)	Burst Pressures
*Standard and special	*Standard and special	*Standard and special	*Standard (not aluminum) and special	Material
				Loading (Direction of Flow)
Gas or liquid with gas pocket**	Gas or liquid	Gas or liquid	Gas or liquid	Service Phase
10%, 5%, 0%	10%, 5%, 0%	10%, 5%, 0%	10%, 5%, 0%	Manufacturing Design Range
Better	Better	Better	Better	Cycle Life (Resistance to Fatigue)
85% ASME (90% PED)	85% ASME (90% PED)	85% ASME (90% PED)	80% ASME (85% PED)	Max Operating Ratio
No	No	No	No	Vacuum Support Required
Yes	Yes	Yes	**Yes	Designed for Non-Fragmentation
Yes	Yes	Yes	Not recommended	Safety Relief Valve Isolation
NF-7RS™, NX-7R™, NXV-7R™ and NF-7R™	NF-7RS, NX-7R, NXV-7R, NF-7R and TL-7R™	NF-7RS and NX-7R	NF-7RS, NX-7R, NXV-7R and NF-7R	Safety Head

* *Standard materials: aluminum, nickel alloy 200, Inconel® alloy 600, Monel® alloy 400, 316L ss, Hastelloy® alloy C-276, tantalum, titanium, Hastelloy® alloy C-22, Inconel® alloy 625*

** *Consult BS&B*

Other Pressure

Saf-T-Graf® Monobloc and replaceable element Graphite Disks

77-8550

Convenient, Economic, Corrosion Resistant Graphite disks are made from impregnated graphite offering low burst pressure and excellent corrosion resistance. BS&B graphite disks are supplied with integral gaskets for direct installation between international pipe flanges. The replaceable element range is installed in graphite or stainless steel safety heads before installation between pipe flanges.

- 0.5-24 inches (15-600mm)
- Burst pressures 0.25-1,000 psig (0.02-69barg)
- Temperatures to 400°F (205°C) - higher operating temperatures to 800°F (427°C) are achieved using a 'high temperature assembly'

A steel Amoring ring around the disk for added safety and easier installation is recommended.

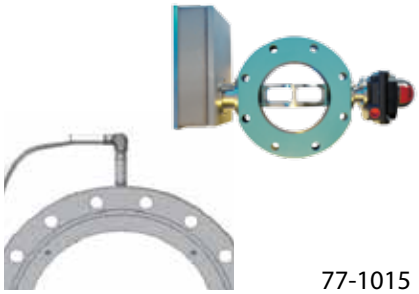
Custom Engineered Products

77-7005

Combining Custom with Economy

- A wide range of standard and custom-designed rupture disk assemblies are available for your specific application
- Assemblies are designed to be discarded after disk rupture; other designs permit the replacement of the ruptured disk
- Customized designs are available for customer applications which cannot be met using standard assembly designs
- 1/8-6 inches (3-150mm)
- Burst pressures from 1-100,000 psig (0.07-6,900barg)
- Disk assemblies include soldered, welded, crimped and threaded designs

Specialty Valves



77-1015

Buckling Pin Pressure Relief Technology

- Fast acting, quick opening buckling pin activation pressure relief devices designed to protect personnel, equipment and the environment from danger of overpressure
- Ability to 'field-reset' while remaining installed after an over pressure event

BPRV™ - offers the highest flow capacity and convenient inline installation

- 2-60 inches (50-1,500mm)
- ASME "UD" stamped
- European Pressure Equipment Directive "CE" marked

BPAV™ - controlled by a precision buckling pin that is calibrated to respond to the forces generated by inlet pressure acting on the valve plug

US patents 5984269, 6098495, 6367498, 6488044, 6491055 and patent pending

Standard material for graphite disk gaskets is Klinger-Sil® C-4401; other material options include PTFE solid, neoprene, Garlock® 3000, Grafoil® and Gylon® 3510
Klinger-Sil® is a registered trademark of Thermoseal Inc.
Garlock® 3000 and Gylon® 3510 are trademarks of Garlock Inc.
Grafoil® is a trademark of GrafTech International Holdings Inc.

Relief Solutions

Industrial Explosion Protection

77-8024

Type IPD system - explosion suppression and isolation systems detect the earliest stage of a deflagration by sensing the pressure wave that comes ahead of the flameball and uses the signal to activate delivery of an extinguishing agent

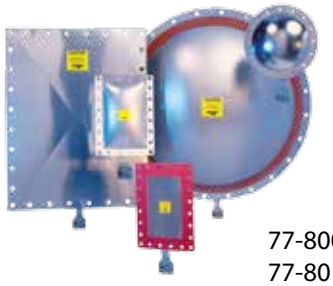
A typical system consists of the following:

- Sensor
- Power supply module
- System monitor
- Several explosion suppression 'cannons'

BS&B is the fastest growing manufacturer of industrial explosion protection technology with products designed to meet the requirements of the United States OSHA Combustible Dust National Emphasis program, NFPA standards and European ATEX Directive.

US patents 5934381, 6269746 and patent pending

Vent-Saf® and Vent-Saf® Plus



77-8003
77-8015

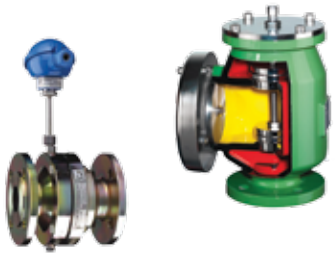
Explosion Panels

- Designed to protect equipment against damage in the event of deflagration of combustible materials
- Explosion panels are low burst pressure membranes which are designed to be fastened over an opening of calculated size to provide rapid pressure relief
- BS&B utilizes NFPA 68, EN 14491, and VDI-3673 venting guidelines, which are recognized worldwide

BS&B offers a complete line of explosion vents including types VSP™, VSS™, VSE™, VSB™, EXP™, EXP-DV™, LCV™ and HTV™. Most applications are served by the type VSP domed vent.

US patent 6792964

BS&B FlameSaf™



BS&B FlameSaf Products

- In-line flame arresters
- End-of-line flame arresters
- End-of-line breather vents
- In-line breather vents
- Arrester certified to EN / ISO 16852:2010

Flame arresters are used as secondary protection against explosions by preventing the transmission of flame and explosion transfer in machines, equipment and plant, containing inflammable gas or steam-air mixtures of inflammable liquids. These autonomous safety systems limit the effects of the explosions, rendering them harmless, they are intended to allow flow but prevent flame transmission.

The BS&B FlameSaf product line includes arrester technology suited to safe management of deflagration and detonation risks in piping systems and equipment. End-of-line and in-line devices are available along with P/V vents that offer integral arresters.

Hastelloy® is a trademark of Haynes International Inc.
Monel® and Inconel® are trademarks of Inco Alloys International, Inc
Viton® is a registered trademark of DuPont Dow Elastomers L.L.C.

Edmonton, AB Canada
T: +1 780 955 2888
F: +1 780 955 3975
E: contacts@bsbprocess.com

Tulsa, OK USA
T: +1 918 622 5950
F: +1 918 665 3904
E: sales@bsbsystems.com

Minneapolis, MN USA
T: +1 952 941 0146
F: +1 952 941 0646
E: sales@bsbipd.com

Houston, TX USA
T: +1 713 682 4515
F: +1 713 682 5992
E: sales@bsbsystems.com

Monterrey, Mexico
T: +011 52 81 1958 0560
F: +011 52 81 1958 0560 138
E: sales@bsbsystems.com

Sao Paulo, Brasil
T: +55 11 2084 4800
F: +55 11 2021 3801
E: sales@bsbbrasil.com

BS&B®

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CE

BSBSystems.com

Visit our website for the most complete, up-to-date information

Manchester, UK
T: +44 0 161 955 4202
F: +44 0 161 870 1086
E: sales@bsb-systems.co.uk

Limerick, Ireland
T: +353 61 517000
F: +353 61 309689
E: info@bsbflamearrester.ie

Moscow, Russia
T: +7 495 747 5916
F: +7 499 133 4394
E: sales@bsbsystems.ru

Shanghai, China
T: +86 21 6391 2299
F: +86 21 6391 2117
E: sales@bsbsystems.com

Frankfurt, Germany
T: +49 6022 26 2310
F: +49 6022 26 2311
E: info@bsbsystems.de

Yokohama, Japan
T: +81 45 450 1271
F: +81 45 451 3061
E: information@bsb-systems.co.jp

The Netherlands
T: +31 70 362 2136
F: +31 70 360 4724
E: info@bsbsystems.de

United Arab Emirates
T: +971 2406 9603
F: +971 2406 9810
E: sales@bsbsystems.ae

Singapore
T: +65 6513 9780
F: +65 6484 3711
E: sales@bsb.com.sg

Chennai, India
T: +91 44 2450 4200
F: +91 44 2450 1056
E: sales@bsbsystems.com

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