

Catalog #77-7011



eMobility Battery Safety

Pressure relief **eVents** for high energy battery pack and cell protection.



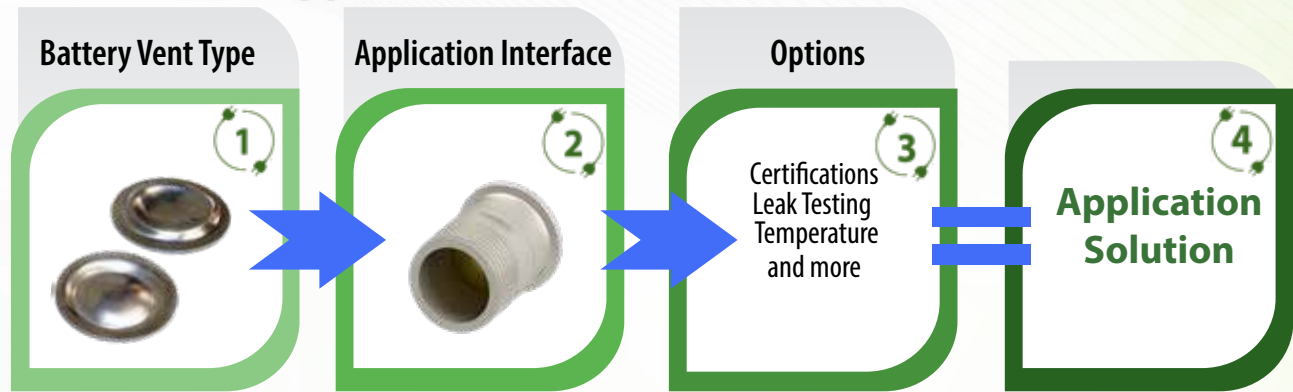
www.bsbsystems.com



BS&B manufactures battery pack and cell pressure relief eVent[®]s for the battery mobility market. With many BS&B customers requiring customized solutions, BS&B takes a personalized approach to ensure flexibility in design and burst pressures.

From prototype to serial production, BS&B's eight global manufacturing locations and team of application engineers are here to support your needs with an established array of technology platforms.

BS&B eVent Application Solutions

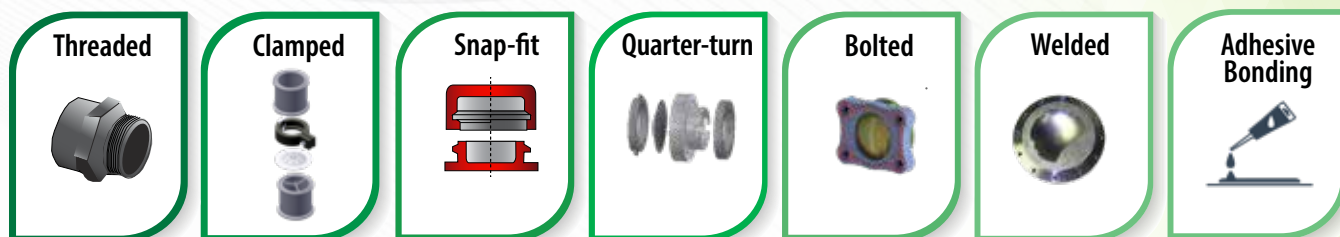


1 Battery Vent Type

Rupture Disk Type		Pressure Range	Size Range
eVent [®] Series FRB [™]		from 10 psig to 900 psig (from 0.69 barg to 62.05 barg)	from 1/8" to 1" (from 3mm to 25mm)
eVent [®] Series LPS [™]		from 3 psig to 70 psig (from 0.2 to 4.83 barg)	from 1" to 4" (from 25mm to 100mm)
eVent [®] Series HL [™]		from 0.3 psig to 4.1 psig (from 20.7 mBar to 282.8 mBar) <i>breathable and non-breathable</i>	from 7/8" to 2-1/2" (from 23mm to 64mm)
eVent [®] Series G [™]		from 0.5 psig to 11.5 psig (from 34 mBar to 793 mBar)	from 1" to 6" (from 25mm to 150mm)

Additional burst pressures and sizes upon request, including rectangular and irregular shapes to fit challenging application space requirements.

2 Application Interface



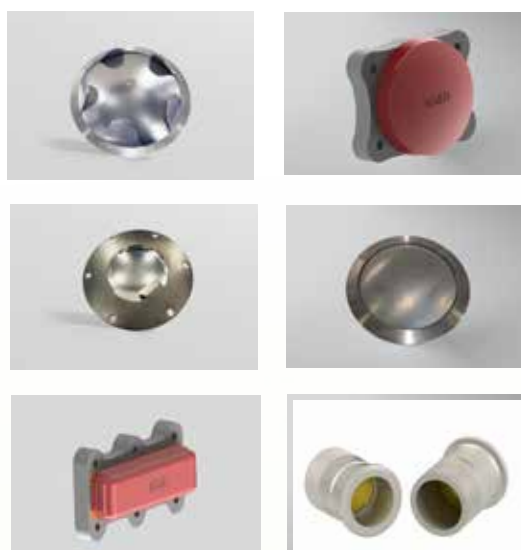
3 Options

PACKAGING	BREATHABLE	MARKING	ON DEMAND ACTIVATION
CLEANING	LEAK TESTING	FAST PROTOTYPING	FLAME ARRESTERS
CERTIFICATIONS	VALIDATION TESTING	TEMPERATURE TESTING	BURST ALERT SENSORS

4 Application Solutions

With hundreds of millions of rupture disk applications deployed by its OEM customers, BS&B is uniquely prepared to support your pressure relief requirements. Many eVent application solutions are delivered as a ready to use assembly with the rupture disk integrated into a holder device for the best performance and reliability.

As the eMobility market and related infrastructure evolves, BS&B pressure relief application solutions are protecting cells, battery packs, fuel cells, hydrogen infrastructure, and BESS systems.





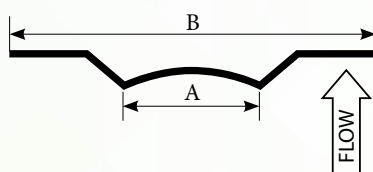
eVent™ Series FRB™

Cell & battery pack manufacturers rely on the eVent FRB™ for overpressure protection due to its small size, low-pressure capabilities, and fast response time (milliseconds). From 1/8" (3mm) to 1" (25mm) Nominal flow diameters, and 10 psig (0.7 barg) to 900 psig (62 barg) activation pressures, the FRB is the perfect solution for your design requirements.

BS&B also offers the added advantage of integrating the FRB disk with welding expertise, and with the Prototype Introduction Track "PIT" program, BS&B supports your cell and pack development program with fast completion of your initial welded cell prototypes.

Features

- Gas or liquid service. Order as FRB for gas or vapor service or FRB-L for full liquid service
- Standard sizes: 1/8, 1/4, 3/8, 1/2, 3/4 and 1 inch (3, 6, 9, 12, 19 and 25 mm)
- Pressure ratings from 10 to 900 psig (0.7 to 62 barg)
- Full opening along circular score
- Solid metal, reverse buckling technology
- Standard materials: stainless steel, nickel 200, Inconel® 600, and aluminum
- Standard and custom holder designs are available
- Low volume, starting at one unit
- High volume, automated manufacturing



Nominal Size		A		B	
		Flow Diameter		Outside Diameter Options	
in	mm	in	mm	in	mm
1/8	3	0.125	3.175	0.312	7.925
1/4	6	0.215	5.461	0.500, 0.550	12.700, 13.970
3/8	9	0.350	8.890	0.670, 0.750, 0.935, 1.000	17.018, 19.05, 23.749, 25.400
1/2	12	0.525	13.335	0.935, 1.000	23.749, 25.400
3/4	19	0.787	19.990	1.181	29.997
1	25	0.95	24.130	1.425, 1.500	36.195

These dimensions are for information only, exact FRB disk installation design shall be advised by BS&B for each application.

FRB Battery eVent Burst Pressure Capabilities

Pressure ratings at 72°F (22°C) for gas or vapor service. (Order as FRB)

Disk Size		Disk Material															
		Nickel 200				Inconel® 600				316ss				Aluminum			
		min		max		min		max		min		max		min		max	
in	mm	psig	barg	psig	barg	psig	barg	psig	barg	psig	barg	psig	barg	psig	barg	psig	barg
1/8	3	200	13.79	500	34.47	250	17.24	850	58.61	300	20.68	900	62.05	125	8.62	400	27.58
1/4	6	100	6.89	450	31.03	150	10.34	800	55.16	150	10.34	850	58.61	60	4.14	300	20.68
3/8	9	50	3.45	400	27.58	60	4.14	750	51.71	60	4.14	800	55.16	35	2.41	250	17.24
1/2	13	35	2.41	200	13.79	45	3.10	650	44.82	45	3.10	675	46.54	25	1.72	200	13.79
3/4	19	20	1.39	100	6.89	25	1.72	325	22.40	25	1.72	360	24.82	15	1.03	100	6.89
1	25	10	0.69	65	4.48	15	1.03	160	11.03	15	1.03	190	13.10	10	0.69	50	3.45

Pressure ratings at 72°F (22°C) for liquid service. (Order as FRB-L)

Disk Size		Disk material															
		Nickel 200				Inconel® 600				316ss				Aluminum			
		min		max		min		max		min		max		min		max	
in	mm	psig	barg	psig	barg	psig	barg	psig	barg	psig	barg	psig	barg	psig	barg	psig	barg
1/8	3	Consult factory															
1/4	6	250	17.24	450	31.03	250	17.24	800	55.16	250	17.24	850	58.61	60	4.14	300	20.68
3/8	9	150	10.34	400	27.58	150	10.34	750	51.71	150	10.34	800	55.16	35	2.41	250	17.24
1/2	13	80	5.52	200	13.79	80	5.52	650	44.82	80	5.52	675	46.54	25	1.72	200	13.79
3/4	19	Consult factory															
1	25	Consult factory															

eVent™ Series LPS™



The eVent LPS™ provides low burst pressures starting at 3 psig (0.2 barg). The LPS is a reverse buckling metal rupture disk using SAF™ technology, which enables low burst pressures to be achieved while maintaining excellent opening characteristics.

BS&B offers a variety of choices for application interface designs using LPS rupture disk technology including: plastic body; metal body; cassette; aluminum and stainless steel welded assemblies; snap fit; quarter-turn; and adhesive bonding.

BS&B partners with you to solve overpressure requirements for pressurized systems. Solutions may include off-the-shelf assemblies or customized designs requiring unique sealing and interface options to meet the constraints placed by the assembly and production of your products. You can count on BS&B as your team member to help guide you through the pressure relief selection process. It's what we do.

LPS technology is validated for many conditions including:

- Burst Pressure Performance
- Effective Sealing
- Advanced Life Pressure Cycle Testing
- Mechanical Shock Drop Testing
- Random Vibration Endurance Test
- Salt Spray with Humidity Functional Endurance Test
- Fluid Corrosion
- Tested for many types of automotive related fluid
- Climatic Sequence Testing
- Thermal Life Test



Features

- Solid metal design provides leak tight performance
- Low burst pressure capability from 3 psig (0.2 barg)
- Fail safe: Damage Safety Ratio ≤ 1
- Designed for non-fragmentation
- High operating ratio: 90% of minimum burst pressure
- High backpressure resistance
- Defined vent area
- Custom designs available (examples below)
- Stainless steel and aluminum construction



LPS Battery eVent Burst Pressure Capabilities Rated at 72°F (22°C)

Disk Size		Nickel Alloy 200				316ss				Monel® Alloy 400, Inconel® Alloy 600 and Tantalum				Hastelloy® Alloy C-276				Aluminum			
in	mm	psig		barg		psig		barg		psig		barg		psig		barg		psig		barg	
		Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max
1	25	15	70	1.03	4.83	15	70	1.03	4.83	20	70	1.38	4.83	15	70	1.03	4.83	-	-	-	-
1.5	40	6	55	0.41	3.79	6	55	0.41	3.79	10	55	0.69	3.79	7	55	0.48	3.79	-	-	-	-
2	50	5	40	0.34	2.76	5	40	0.34	2.76	8	40	0.55	2.76	6	40	0.41	2.76	3	0.20	0.55	2.76
3	80	5	35	0.34	2.41	5	35	0.34	2.41	7	35	0.48	2.41	5	35	0.34	2.41	2.5	35	0.17	2.41
4	100	5	30	0.34	2.06	5	30	0.34	2.06	7	30	0.48	2.06	5	30	0.34	2.06	2.5	30	0.17	2.06

Sizes up to 16" (400mm). Consult BS&B for details.



Metal housing option.

Features

- Reverse buckling plastic rupture disk with metal arch provides accurate pressure relief
- Instant flow area that provides fast pressure relief
- Low burst pressure from 0.3 psig (20 mBar)
- Temperature stability between -40°C to +85°C
- Breathable and non-breathable PTFE options
- Sizes 23mm through 64mm
- Withstands up to 1m water backpressure
- Defined vent area
- Metal housing
- Custom designs available
- Environmental performance compliance:
 - IP6KX, avoid dust ingress
 - IPX6K, avoids pressure wash water ingress
 - IPX69K, immersion



With optional metal housing. Contact BS&B

US and International Patent Pending.

eVent™ Series HL™

The eVent HL, reverse buckling plastic rupture disk, offers air breathing capability (optional) with accurate pressure relief. Burst pressures are controlled by a calibrated metal support arch, which retains the plastic domed rupture disk under normal operating conditions.

The eVent HL breathable vent is intended for battery packs with weak flexible containers that must be stabilized close to atmospheric pressure (e.g. +/- 20 mbar) while also performing as an emergency venting device in case of fire or other overpressure generating event. A sintered PTFE seal provides a water tight barrier while allowing air to pass through the rupture disk dome. The eVent HL non-breathable vent can be used alone or in combination with independent breather vents.

The assembly is available as an injection moulded engineered plastic or metal housing. By choosing the metal housing option, the eVent can be certified IP69K, the highest rating on the Ingress Protection (IP) scale. This certification is rated for dust, water immersion, and strong water jet spray, confirming that neither dust or water penetrates the device under standardized test conditions.

Burst Pressure Capability

Size	Min		Max	
	psig	mBar	psig	mBar
23	3.2	220.6	4.1	282.8
35	1.4	96.5	3.5	241.4
47	0.8	55.2	3.1	213.8
64	0.3	20.7	2.5	172.5



*Plastic housing option.
Exploded view.*



eVent™ Series G™ graphite rupture disks

US and International Patent Pending.

The eVent G is manufactured from high quality graphite blended with an environmentally friendly resin to achieve a leak tight material structure. The eVent G achieves low burst pressures with low tensile strength. It's customizable and available in a variety of designs to meet different nominal sizes and overpressure relief requirements.

The eVent G assembly can be produced with either metal or plastic housing components, or even a combination of both metal and plastic. The leak tightness of the rupture disk and control of its burst pressure are achieved through proper engagement with its housing.

By choosing the metal housing option, the eVent can be certified IP69K, the highest rating on the Ingress Protection (IP) scale. This certification is rated for dust, water immersion, and strong water jet spray, confirming that neither dust or water penetrates the device under standardized test conditions.

Features

- High quality graphite design
- Low burst pressure capability from 0.5 psig (34 mBar)
- Thermally stable burst pressure
- Nominal sizes from 1" to 6" (25mm to 150mm);
Larger sizes available. Contact BS&B.
- Full Opening upon activation
- Compact assembly design suitable for low profile installations
- Round, rectangle, and customized configurations available
- Environmental performance compliance:
 - IP6KX, avoid dust ingress
 - IPX6K, avoids pressure wash water ingress
 - IPX69K, immersion

Vacuum support is available for eVents 1" (25mm) and larger. Vacuum support is only needed under the following application conditions:

- Burst pressure is below 22 psig (1.52barg) and full vacuum may be present (-14.5 psi / -1barg)
- Vacuum exceeds 30% of burst pressure. For example, a 10 psig (0.7barg) burst pressure disk will experience a -3 psig (-0.2barg) vacuum
- Cycling between vacuum conditions and positive pressure



Metal housing option.



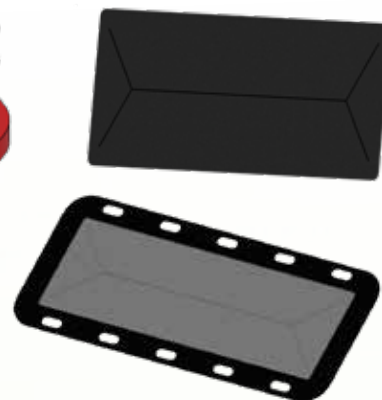
Burst Pressure Capability

Size		Min		Max	
in	mm	psig	mbar	psig	mbar
1	25	4	276	11.5	793
1.5	40	2	138	6.2	428
2	50	1.2	83	4.8	331
3	80	1	69	3.2	221
4	100	0.7	48	1.6	110
6	150	0.5	34	1.5	103

*Rectangular and irregular shape
eVent G available upon request.*



*Plastic housing option.
Exploded view.*



Rectangular eVent G shown.



PIT™ PROGRAM

(Prototype Introduction Track)



Similar to a Race Car Pit Team, the BS&B Prototype Introduction Track combines special skill sets to work in unison with the common goal of giving the customer an excellent prototype order experience.

- Rapid response Prototype Introduction Track
- Schedule management to assure on time performance
- Focus on your needs, not a 'cookie cutter' approach
- Engineering engagement throughout
- Plan For Success™ approach
- Access to Engineering and Quality from design to delivery



AMERICAS

Tulsa, OK USA

T: +1 918 622 5950

E: sales@bsbsystems.com

Houston, TX USA

T: +1 713 682 4515

E: sales@bsbsystems.com

Minneapolis, MN USA

T: +1 952 941 0146

E: sales@bsbipd.com

Edmonton, AB Canada

T: +1 780 955 2888

E: contacts@bsbprocess.com

Monterrey, Mexico

T: +52 81 8299 5861

E: sales@bsbsystems.com

Sao Paulo, Brasil

T: +55 11 2084 4800

E: sales@bsbbrasil.com

EUROPE, MIDDLE EAST & AFRICA

Limerick, Ireland

T: +353 61 484700

E: sales@bsb.ie

Düsseldorf, Germany

T: +49 211 930550

E: info@bormann-neupertbsb.de

Manchester, UK

T: +44 161 955 4202

E: sales@bsb-systems.co.uk

The Hague, The Netherlands

T: +31 20 399 9965

E: info@bsbsystems.nl

Copenhagen, Denmark

T: +45 3318 9000

E: info@bsbsystems.dk

United Arab Emirates

T: +971 55 518 0314

E: sales@bsbsystems.ae

ASIA PACIFIC

Singapore

T: +65 6513 9780

E: sales@bsb.com.sg

Yokohama, Japan

T: +81 45 450 1271

E: information@bsb-systems.co.jp

Seoul, South Korea

T: +82 2 2636 9110

E: sales@bsbsystems.kr

Shanghai, China

T: +86 21 6391 2299

E: sales@bsbsystems.com

Chennai, India

T: +91 44 2450 4200

E: sales@bsbsystems.com

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