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# LPS<sup>TM</sup> Rupture Disk

## Reverse Buckling Technology



U.S. Patents 5,996,605 and 6,178,983. Other patents pending

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# LPS™

## Low Pressure Reverse Buckling Disks

The LPS rupture disk was developed to provide low burst pressures from 5 psig (0.35 barg) using reverse buckling rupture disk technology. The LPS rupture disk, combined with the SRB-7RS® safety head, provides accuracy and reliability. The LPS uses SAF™ technology enabling very low burst pressures to be achieved with excellent opening characteristics.



LPS™ rupture disk

### Features

- Solid metal design
- Low burst pressure from 5 psig (0.35 barg)
- Designed for gas, liquid or two phase service
- Fail safe: damage safety ratio < 1
- Designed for non-fragmentation
- Vacuum / back pressure resistant
- High operating ratio: 90% of minimum burst pressure
- Reverse buckling disk in sizes: 1-8 inches (25-200mm)
- For installation in BS&B type SRI-7RS, SRB-7RS, and SRB-7FS pre-torqued safety heads, and type S90-7R safety head when burst rating is 15 psi (1 barg) or higher
- US patents 5996605, 6178983, 6321582, 6446653, and international patents apply

### LPS Rupture Disk Material Options

The LPS disk available in a range of corrosion resistant materials (see the table below). Standard disk materials are nickel alloy 200, stainless steel grade 316, Inconel® (nickel alloy 600), Monel® (nickel alloy 400), Hastelloy® C-276 and tantalum. The LPS disk includes an outlet side hinge to control fragmentation. Standard disk hinge material is Stainless Steel grade 316 with alternates available upon request. Fluoropolymer liners are offered with the type LPS rupture disk at burst pressures of 35 psig (2.4 barg) and higher.

### Cycle Resistance/Temperature Influence/Service Life

The cycle resistance of the LPS disk is a function of the application operating conditions. If the operating pressure is static, (without pressure cycles), then as for all types of rupture disk devices, the service life shall be maximized. If the operating pressure is mildly cyclic, such as the conditions of a sealed atmospheric tank under ambient temperature fluctuations, the LPS disk may resist in excess of 1000 cycles.

Under highly cyclic operating pressure conditions, the cycle life of the LPS disk is determined by the frequency and magnitude of pressure change from positive to negative differential. When all of the pressure cycling takes place within the operating pressure ratio of the LPS disk and at a positive differential pressure, the service life shall be maximized. Should the operating pressure cycle between full vacuum and positive pressure, the service life of the LPS disk can be anticipated at several hundred cycles.

Cycle and service life for every rupture disk depends upon its unique application operating conditions. It is particularly important to allow for the temperature's influence on burst pressure; if the rated burst temperature of the disk is selected too low, a higher actual temperature may reduce the disk burst pressure. Seek advice from BS&B Safety Systems regarding rated burst temperature. Other application factors including corrosion, erosion, abrasion, product build-up and vibration, affect the service life of a rupture disk and must be considered by the user.

### LPS™ Disk Specifications Minimum / Maximum Pressure with Rating at 72°F (22°C)

Disk Size		Nickel Alloy 200				316ss				Inconel® Alloy 600				Monel® Alloy 400				Hastelloy® Alloy C-276				Tantalum			
		psig		barg		psig		barg		psig		barg		psig		barg		psig		barg		psig		barg	
in	mm	Min	Max	Min	Max	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	20	70	1.38	4.83	15	70	1.03	4.83	20	70	1.38	4.83
1.5	40	6	55	0.41	3.79	6	55	0.41	3.79	10	55	0.69	3.79	10	55	0.69	3.79	7	55	0.48	3.79	10	55	0.69	3.79
2	50	5	40	0.34	2.76	5	40	0.34	2.76	8	40	0.55	2.76	8	40	0.55	2.76	6	40	0.41	2.76	8	40	0.55	2.76
3	80	5	35	0.34	2.41	5	35	0.34	2.41	7	35	0.48	2.41	7	35	0.48	2.41	5	35	0.34	2.41	7	35	0.48	2.41
4	100	5	30	0.34	2.06	5	30	0.34	2.06	7	30	0.48	2.06	7	30	0.48	2.06	5	30	0.34	2.06	7	30	0.48	2.06
6	150	5	25	0.34	1.72	5	25	0.34	1.72	7	25	0.48	1.72	7	25	0.48	1.72	5	25	0.34	1.72	7	25	0.48	1.72
8	200	5	25	0.34	1.72	5	25	0.34	1.72	7	25	0.48	1.72	7	25	0.48	1.72	5	25	0.34	1.72	7	25	0.48	1.72
10	250	5	25	0.34	1.72	5	25	0.34	1.72	7	25	0.48	1.72	7	25	0.48	1.72	5	25	0.34	1.72	7	25	0.48	1.72
12	300	5	25	0.34	1.72	5	25	0.34	1.72	7	25	0.48	1.72	7	25	0.48	1.72	5	25	0.34	1.72	7	25	0.48	1.72

Refer to previous pages for the maximum recommended temperature and for MNFA/NRA values and SRB-7RS safety head dimensions. Consult BS&B for applications where the disk may be rated with a coincident temperature below 300°F (149°C) (176°F (80°C) for Hastelloy) but operated at a higher value. Special processing may be required.

## Operating Pressure Ratio / Maximum Operating Pressure

LPS reverse buckling disks can be operated to 90% of their minimum burst pressure. In other words, to 90% of the marked burst pressure less the burst tolerance.

## Vacuum Resistance / Back Pressure Resistance

The LPS disk will resist vacuum without the need for an additional vacuum support. Back pressure resistance is limited to 15 psig (1barg) for disks rated to burst at 15 psig (1barg) or less. For higher burst pressures, back pressure resistance is equal to the minimum burst pressure of the ordered LPS disk.

## Burst Tolerance

Specified Burst Pressure		Burst Tolerance
psig	barg	
28 and higher	1.9 and higher	±5%
20 to <28	1.4 to <1.9	±7%
10 to <20	0.7 to <1.4	±10%
<10	<0.7	±15%
Alternate: <40	<2.76	± 2psig (0.138barg)

## Manufacturing Design Range (MDR)

The standard LPS manufacturing design ranges are 0%, -5%, -10%. For Tantalum, the MDR options are -5% and -10% only.

## Sanitary / Aseptic Option

The GLP-S™ disk is available for use in the SR-C™ safety head providing low burst pressures for disks to be installed into sanitary / aseptic piping systems. The table below indicates the relationship between disk size, safety head size and the tri-clamp connection sizes at the inlet, outlet and mid-flange where the disk is installed within the safety head.

GLP-S Disk Size	SR-C Safety Head Size	SR-C Safety Head at Inlet	SR-C Clamp Size at Disk	SR-C Safety Head at Outlet
1 inch	1 inch	-	2 inch	-
-	-	2 inch	-	2 inch
2 inch	2 inch	3 inch	4 inch	3 inch
3 inch	3 inch	4 inch	4 inch	4 inch
4 inch	4 inch	4 inch	6 inch	4 inch

## Maximum Recommended Temperatures

Material	Temp °F	Temp °C
Nickel alloy 200	750°	399°
Monel® alloy 400	900°	482°
Inconel® alloy 600	1100°	593°
316 stainless steel	900°	482°
Hastelloy® alloy C-276	900°	482°
Tantalum	500°	260°

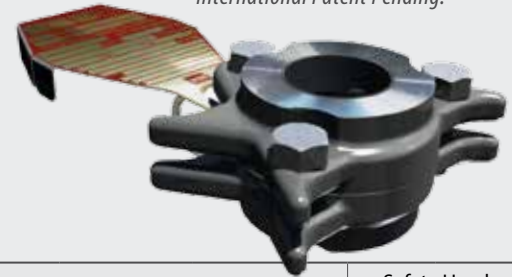
*Note: Hastelloy® is a trademark of Haynes International Inc. Monel® and Inconel® are registered trademarks of Special Metals Corporation and its subsidiaries.*

## SRI-7RS™ Safety Head

In the spirit of BS&B's core values of Innovation and Excellence, the SRI-7RS has been developed to enhance and optimize safety, reliability, convenience, and performance. The experience gained from meeting and exceeding customer expectations with the SRB-7RS safety head is built upon by the following SRI-7RS features:

- Bite seal in all sizes; proprietary feature which enhances leak tightness
- Light weight; manufactured from a casting, the SRI-7RS takes advantage of advanced metal flow modeling to achieve its light construction and rigid strength.
- Self centering; the unique perimeter shape of the SRI-7RS is self centering between ASME / ANSI B16.5, EN, and JIS specification companion flanges, optimizing flow.
- Hexagon head pretorque capscrews; supplied with the SRI-7RS safety head, high tensile stainless steel capscrews allow installation using standard workshop tools. companion flanges, the user can conveniently inspect for proper installation.
- Multiple flange rating; each nominal size SRI-7RS safety head can be installed between ASME/ANSI B16.5, EN, JIS (except 3" / 80mm and 4" / 100mm JIS10) companion flanges. A single safety head held in inventory per nominal size will support multiple applications.

*Note: The SRI-7RS safety head is US & International Patent Pending.*



Size		Safety Head Flange Rating			Safety Head Flange Thickness	
in	mm	ASME / ANSI	EN	JIS	in	mm
1	25	150/300/600	10/16/25/40	10/16/20/30/40	1.5	38
1.5	40	150/300/600	10/16/25/40	10/16/20/30/40	1.7	43
2	50	150/300/600	10/16/25/40	10/16/20/30/40	1.9	48
3	80	150/300/600	10/16/25/40	16/20/30/40	2.2	55
4	100	150/300*	10/16/25/40	16/20/30/40	2.9	73
6	150	150/300*	10/16/25/40	10/16/20/30	3.6	92
8	200	150/300*	10/16/25/40	16/20/30	3.8	95

*\* Available for ANSI 600# with adapter ring. Consult BS&B or your local representative.*

## SRB-7RS™ Safety Head

Size		Safety Head Flange Rating			Face-to-Face Dimensions	
in	mm	ASME / ANSI	EN/DIN	JIS	in	mm
1	25	150	10/16	10/16	1.50	38
1	25	300/600	25/40	20/30/40	1.50	38
1	25	900/1500	-	-	3.00	76
1.5	40	150	10/16	10/16	1.63	43
1.5	40	300/600	25/40	20/30/40	1.63	43
1.5	40	900/1500	-	-	2.60	66
2	50	150	10/16	10/16	1.88	48
2	50	300/600	25/40	20/30/40	1.88	48
2	50	900/1500	-	-	3.37	85
3	80	150	10/16	10/16	2.19	55
3	80	300/600	25/40	20/30/40	2.19	55
3	80	900	-	-	3.50	89
4	100	150	10/16	10/16	2.88	73
4	100	300	25/40	20/30/40	2.88	73
4	100	600	-	-	2.56	67
6	150	150	10/16	10/16	3.63	94
6	150	300	25/40	20/30/40	3.63	107
6	150	600	-	-	3.06	79
8	200	150	-	-	3.75	95
8	200	300	-	-	3.75	95
10	250	150	-	-	4.31	109
10	250	300	-	-	4.31	109
12	300	150	-	-	4.62	117
12	300	300	-	-	5.25	133



SRB-7RS™  
Safety Head

The SRB-7RS is the industry standard pre-torqued holder which ensures proper clamping of a rupture disk before installation between companion flanges.

The SRB-7RS locates inside the studs between two companion flanges, typically referred to as 'insert type' installation. A J-bolt ensures the safety head is fitted in the required direction between companion flanges by engaging a blind hole drilled on the inlet companion flange perimeter. The J-bolt provides a constant visible signal of correct installation.

Fluoropolymer coated high tensile carbon steel pre-torque cap screws (blue color) are provided as standard. Alternative pre-torque cap screw materials are available upon request. The SRB-7RS is designed for well centered installation inside the companion flange bolt circle of a wide range of flange types and ratings including ASME/ANSI, EN, and JIS. The SRB pre-torqued holder is also available in the full-bolted SRB-7FS configuration.

*Note: Optional tell tale connection in safety head outlet will be required to meet ASME and PED code requirements when downstream devices are present.*



SRB-7FS™  
Safety Head

## TR™ Series Torque Resistant Safety Head Option

The Type TR™ Series torque resistant safety head option offers the identical performance and flow characteristics valued from standard BS&B safety heads. The only difference – the TR Series Safety Heads are designed with a wider seating surface to be used with metal spiral wound gaskets at the flange.

Order as: SRB-7RS-TR or S90-7R-TR

*Products, specifications and all data in this literature are subject to change without notice. Questions regarding product selection and specifications for specific applications should be directed to BS&B Safety Systems, L.L.C. or BS&B Safety Systems Ltd. All sales are subject to BS&B Safety Systems, L.L.C. or BS&B Safety Systems Ltd. standard terms and conditions of sale. Nothing herein should be construed as a warranty of merchantability or fitness for a particular purpose.*



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