



BS&B SAFETY SYSTEMS, L.L.C.  
BS&B SAFETY SYSTEMS LTD

# SK<sub>R</sub> RUPTURE DISK



## The All-Purpose Rupture Disk Introducing SAF™ Technology

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# SKR

## THE ALL PURPOSE RUPTURE DISK for controlled pressure relief

**SKR™ the first rupture disk specifically developed and performance flow tested\* for use in all service conditions**

- One disk design for gas and liquid service
- Low to high burst pressures
- Available in standard or exotic materials
- Long Service life in pressure cycling or pulsating conditions.
- Suitable for operating pressures up to 90% of the Marked Burst Pressure.
- Fail-safe design — Damage-Safety ratio 1.
- Designed for non-fragmentation.
- Standard Manufacturing Design Range, zero%, optional -5%, -10%.
- Withstands full vacuum
- Ideal for relief valve isolation.
- Info-Tag, 3-dimensional tag indicates correct orientation and ASME requirements.
- World wide patents pending.

\*ASME Code Section VIII Div.1, according to the test method of PTC-25



### SKR™ DISK SPECIFICATIONS Min/Max Pressure Rating at 72°F (22°C) PSIG (Bar)

Disk Size		Disk Material																							
		Alloy 200 (Nickel)				Hastelloy® Alloy C-276 316SS				Alloy 600 (Inconel®)				Alloy 400 (Monel®)				Tantalum				Titanium			
in	mm	Minimum		Maximum		Minimum		Maximum		Minimum		Maximum		Minimum		Maximum		Minimum		Maximum		Minimum		Maximum	
		psig	barg	psig	barg	psig	barg	psig	barg	psig	barg	psig	barg	psig	barg	psig	barg	psig	barg	psig	barg	psig	barg	psig	barg
1	25	55	3.8	500	34.5	60	4.2	500	34.5	60	4.2	500	34.5	60	4.2	500	34.5	55	3.8	500	34.5	90	6.2	500	34.5
1 1/2	40	40	2.8	500	34.5	45	3.1	500	34.5	45	3.1	500	34.5	45	3.1	500	34.5	40	2.8	500	34.5	60	4.2	500	34.5
2	50	25	1.8	500	34.5	30	2.1	500	34.5	30	2.1	500	34.5	30	2.1	500	34.5	25	1.8	500	34.5	35	2.4	500	34.5
3	80	20	1.4	500	34.5	25	1.8	500	34.5	22	1.5	500	34.5	22	1.5	500	34.5	20	1.4	500	34.5	25	1.8	500	34.5
4	100	16	1.1	500	34.5	20	1.4	500	34.5	18	1.3	500	34.5	18	1.3	500	34.5	16	1.1	500	34.5	20	1.4	500	34.5
6	150	15	1	261	18	20	1.4	261	18	15	1	261	18	15	1	261	18	15	1	261	18	20	1.4	261	18
8	200	15	1	200	13.8	20	1.4	200	13.8	15	1	200	13.8	15	1	200	13.8	15	1	200	13.8	20	1.4	200	13.8
10	250	15	1	150	10.3	20	1.4	150	10.3	15	1	150	10.3	15	1	150	10.3	15	1	150	10.3	20	1.4	150	10.3

### Design

The SKR™ reverse buckling disk is designed with a circular score line located at the edge of the domed area on the downstream side of the disk. At the marked burst pressure, the disk's dome reverses and opens by shearing around the circular score line. The SKR™ uses SAF™ technology (Structural Apex Forming) enabling very low burst pressures to be achieved with excellent opening characteristics. An integral energy-absorbing hinge located on the downstream side of the disk enables the SKR™ to perform in gas or liquid service with superior flow performance. The hinge design interacts with the Safety Head bore to retain the SKR™ disk on opening, avoiding fragmentation.

### Marked Burst Pressure

The ASME Code requires that the marked burst pressure is within the manufacturing design range and is determined such that the sample burst test pressures are within the specified tolerance ( $\pm 2$  psig at or below 40 psig or  $\pm 5\%$  above 40 psig). BS&B Safety Systems, Inc. and BS&B Safety Systems Ltd. will exceed ASME code requirements by continuing to use the average of the burst test values as the marked burst pressure (for -5% and -10% Manufacturing Design Range) and requiring this average to fall within the manufacturing design range.

This is in accordance with previous editions of the code and will maintain consistency in burst pressure marking for the user.

### Manufacturing Design Range\*\*

The standard Manufacturing Design Range for the SKR™ disk is 0%. The user's requested burst pressure will be the Marked Pressure. Optional Manufacturing Design Ranges of -5% and -10% may be selected as operating conditions permit. The Manufacturing Design Range is applied to the minus side only of the requested burst pressure.

*Example:*

*Requested Burst Pressure 100 psig (6.89 bar).*

*Agreed Manufacturing Design Range - 10%. Therefore the Marked Burst Pressure shall be between 90 psig (6.89 bar) and 100 psig (6.89 bar).*

The ASME code requires also that the Marked Burst Pressure will not exceed the Maximum Allowable Working Pressure of the vessel to be protected.

*\*\*The ASME Code defines 'the Manufacturing Design Range as a range of pressures within which the marked burst pressure must fall to be acceptable for a particular requirement as agreed upon between the Rupture Disk Manufacturer and the user or his agent.*

## Burst Tolerance

Marked Burst Pressure	Burst Tolerance
Less or equal to 40 psig (2.76 barg)	± 2 psig (0.138 barg)
above 40 psig (2.76 barg)	± 5%

Alternatively the SKR™ disk may be marked with a minimum-maximum burst pressure in which case burst test values must be within the min-max burst range.

## Flow Performance

The SKR™ Reverse Buckling Disk has been specifically developed to produce superior flow performance at all burst pressures in gas or liquid service. The circular score on the disk's dome, coupled with the non-restrictive hinge on the outlet side of the disk, ensures an excellent pressure relief opening. Flow Resistance Factor KR may be used to determine the relieving capacity of a system according to the ASME and CEN (pending) codes. Individual KR values have been established for both gas and liquid service for the SKR™ disk. Minimum Net Flow Area (MNFA) for each disk size is provided to assist with ASME sizing calculations.

## Materials

The SKR™ is available in 316SS, Nickel Alloy 200, Monel Alloy 400, Inconel Alloy 600, Hastelloy Alloy 276, Titanium and Tantalum. A competent person should select the disk material that is chemically resistant to the process media. Corrosion of the disk material will affect its performance and may result in premature bursting or leakage through the disk. For assistance in disk material selection contact BS&B Safety Systems, Inc or BS&B Safety Systems Ltd.

## Installation in SRB-7RS™ Safety Head

The SKR™ disk installed in an SRB-7RS™ Safety Head permits the correct torque to be applied in the workshop before installation into the process. The asymmetric locating pins ensure centering and orientation of the disk within the Safety Head. The performance-proven metal-to-metal 'bite type' seal in the Safety Head (2"/50mm size and above) assures a leak tight assembly. When installed properly into the SRB-7RS™ Safety Head, the assembly can be removed, inspected, cleaned carefully then reinstalled without replacing the disk as the pretorque capscrews maintain the clamp load on the disk. The SKR™ disk may also be installed into an S90-7R™ Safety Head without the benefits of a pretorque design. The SRB-7RS™ Safety Head is used with other rupture disks (Types S90™, JRS™, RLST™, FRST™) of the STA-SAF® System, Catalog 77-4001. The use of a common Safety Head facilitates upgrading from these rupture disks to the superior technology of the SKR™ Rupture Disk.



Note SKR™ hinge is retained within the SRB-7RS™ Safety Head outlet.

## Liners

Liners are available in all sizes as optional on the process side of the disk. Teflon® is generally used, other appropriate fluorocarbon film may be supplied.

Temperature Range

FEP -40°F to 400°F (-40°C to 205°C)

PTFE -40°F to 500°F (-40°C to 260°C)

## SAF™ technology: Damage-Safety Ratio <1

Structural Apex Forming, the central "dimple" present in all SKR™ Rupture Disks, combined with the unique energy absorbing hinge design ensures that a damaged SKR™ disk will rupture at or below the marked burst pressure.

## KR Values

The KR Value for the SKR™ disk for gas service is 0.37, contact BS&B Safety Systems, Inc or BS&B Safety Systems Ltd for liquid service KR values. When sizing per the ASME code use these KR values for service with schedule 40 piping, for alternate pipe schedule contact BS&B Safety Systems, Inc or BS&B Safety Systems Ltd.

### Minimum Net Flow Area (MNFA)/Net Relief Area (NRA)

unit	Disk Size															
	in	mm	in	mm	in	mm	in	mm	in	mm	in	mm	in	mm	in	mm
size	1	25	1 1/2	40	2	50	3	80	4	100	6	150	8	200	10	250
in <sup>2</sup>	0.86		1.93		3.36		7.39		12.74		28.89		50.0		78.8	
cm <sup>2</sup>	4.8		11.3		19.7		40.8		69.7		158.6		275.6		433.6	

\* Use MNFA in in<sup>2</sup> when sizing according to ASME code.

† Use Net Relief Area cm<sup>2</sup> when sizing according to European Standards.

### Recommended Max Temperatures (may be lower for CE marked disks)

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°
Titanium	572°	300°
Tantalum	500°	260°

### SRB-7RS™ Safety Head Specifications

Nominal Size	Safety Head Flange Rating				Safety Head Flange Thickness		Dimensions				
	in	mm	ANSI	DIN	JIS	in	mm	X		Y	
1	25	150	-	-	-	1 1/2	38.0	2 5/8	66.7	2 5/8	66.7
1	25	300/600	10/16/25/40	10/16/20/30/40	10/16/20/30/40	1 1/2	38.0	2 7/8	73.0	2 7/8	73.0
1 1/2	40	150	-	-	10/16/20	1 5/8	43.0	3 3/8	85.7	3 3/8	85.7
1 1/2	40	300/600	10/16/25/40	10/16/20/30/40	30/40	1 5/8	43.0	3 3/4	95.2	3 3/4	95.2
2	50	150/300/600	10/16/25/40	10/16/20/30/40	10/16/20/30/40	1 3/4	47.5	4 1/8	104.8	4 1/8	104.8
3	80	150/300/600	10/16/25/40	10/16/20/30/40	16/20/30/40	2 1/8	55.0	5 1/4	133.3	5 1/4	133.3
3	80	-	-	-	10	2 5/8	66.7	4 3/4	120.6	4 3/4	120.6
4	100	150/300	10/16/25/40	16/20/30/40	16/20/30/40	2 7/8	73.0	6 1/4	158.7	6 1/4	158.7
4	100	-	-	-	10	2 3/4	69.9	Flower Petal			
4	100	600	-	-	-	2 5/8	66.7	7 5/8" OD/193.7 mm OD			
6	150	150/300	10/16/25/40	10/30/40	10/30/40	3 11/16	93.7	Flower Petal			
6	150	-	-	-	16/20	4 1/5	106.7	Flower Petal			
6	150	600	-	-	-	3 1/8	79.4	10 3/8" OD/263.5 mm			
8	200	150/300	-	-	-	3 13/16	96.8	Flower Petal			
10	250	150/300	-	-	-	4 3/8	111.1	Flower Petal			

US patent No 4,751,938 and other international patents.

Teflon® is a registered trademark of DuPont.

Inconel® and Monel® are registered trademarks of Inco Alloys International.

Hastelloy® is a registered trademark of Haynes International, Inc.

## S90-7R Dimensions

Nominal Size		Safety Head Flange Rating	Outside Diameter		Overall Height	
in	mm		in	mm	in	mm
1	25	150	2.50	63.5	1.69	43.0
		300/600	2.75	69.9	1.25	32.0
		DIN PN 10/16/25/40	2.80	71.0	1.77	45.0
1 1/2	40	150	3.25	82.8	1.25	32.0
		300/600	3.62	91.9	1.25	32.0
		DIN PN 10/16/25/40	3.62	91.9	1.50	38.0
2	50	150	4.00	101.6	1.25	32.0
		300/600	4.25	108.0	1.25	32.0
		DIN PN 10/16/25/40	4.21	107.0	1.50	38.0
3	80	150	5.25	133.4	1.50	38.0
		300/600	5.75	146.0	1.50	38.0
		DIN PN 10/16/25/40	5.59	142.0	1.73	44.0
4	100	150	6.75	171.5	1.72	43.6
		300	7.00	177.8	1.72	43.6
		600	7.50	190.5	1.72	43.6
		DIN PN 10/16	6.38	162.0	1.77	45.0
		DIN PN 25/40	6.58	167.0	1.88	48.0
6	150	150	8.62	218.9	2.50	64.0
		300	9.75	248.0	2.50	64.0
		600	10.38	263.6	2.62	66.5
		DIN PN 10/16	8.54	217.0	2.50	64.0
		DIN PN 25/40	8.78	223.0	2.50	64.0
8	200	150	10.88	276.1	3.38	86.0
		300	12.00	304.8	3.38	86.0
		600	12.50	317.5	3.75	95.3
		DIN PN 10/16	10.71	272.0	3.46	88.0
		DIN PN 25	11.14	283.0	3.38	86.0
10	250	150	13.25	336.6	6.02	153.0
		300	14.13	358.9	6.02	153.0
		600	15.62	396.7	-	-
		DIN PN 10/16	12.91	328.0	6.02	153.0
		DIN PN 25	13.39	340.0	-	-
		DIN PN 40	13.86	352.0	-	-

# SK<sub>R</sub><sup>™</sup>

## THE ALL SERVICE RUPTURE DISK

Manufactured in conformance with the requirements of the following international codes and standards

ASME (UD stamped)

CEN EN ISO 4126-2 (pending)

BS 2915

ISO 6718

TUV AD Merkblatt A1

SVTI

Stoomwezen

ISO 9001 Quality System Certification



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