

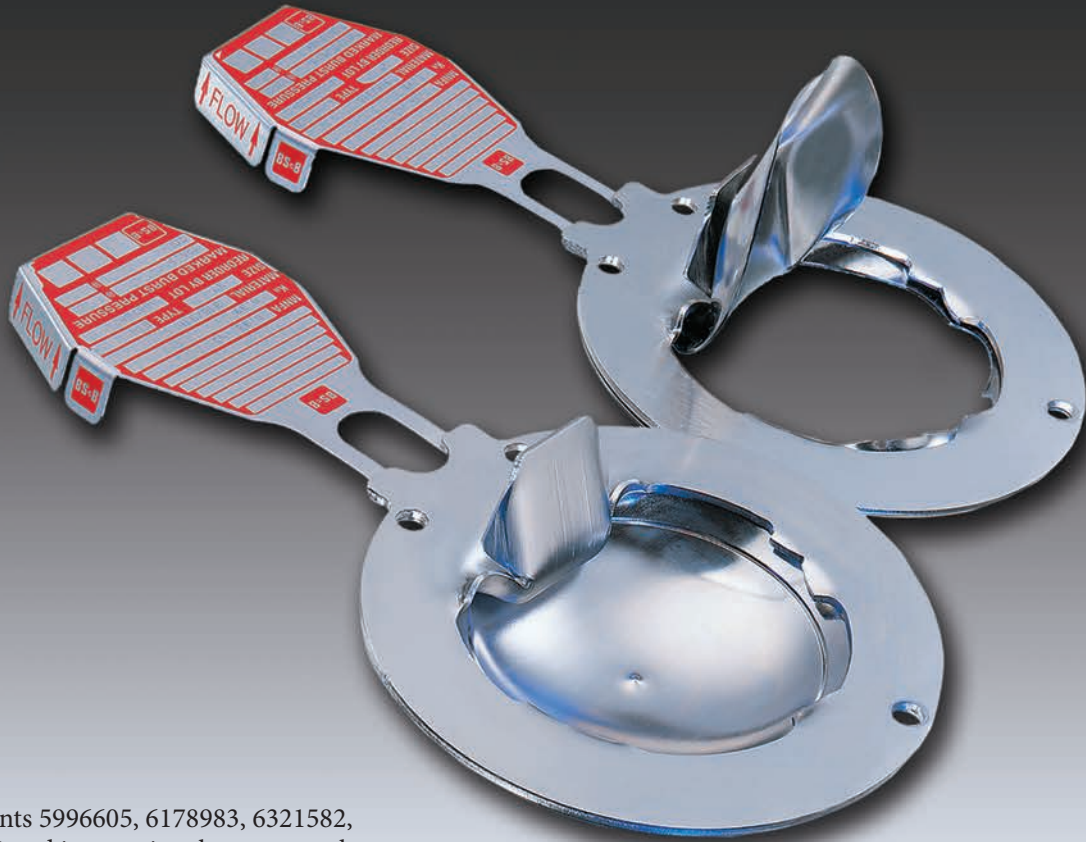


SAFETY SYSTEMS

# SIGMA EXL™

## Reverse Buckling Rupture Disk

Designed for the Highest Operating Pressure in Gas or Liquid Service



US patents 5996605, 6178983, 6321582, 6446653 and international patents apply



# Sigma™, Sigma EXL™ Rupture Disks for the Highest Operating Pressure in Gas or Liquid Service



## Features

- Reverse buckling disk in sizes 1-8 inches (25-200mm)
- High operating ratio: 95% of marked burst pressure
- High operating ratio: 100% of minimum burst pressure (CEN ISO4126-2)
- Standard 0% MDR, optional -5%
- Designed for non-fragmentation
- Designed for gas, liquid or two-phase flow conditions
- Fail safe: damage safety ratio <1
- Sta-Saf™ technology
- Vacuum resistant
- Smooth process side of disk resists product accumulation
- Long service life in pressure cycling or pulsating conditions
- For installation in BS&B type SRI-7RS, SRB-7RS and SRB-7FS pretorqued safety heads
- US patents 5996605, 6178983, 6321582, 6446653 and international patents apply

For users who wish to obtain the enhanced quality assurance testing of this disk design, and can accept more traditional reverse buckling disk accuracy, the Sigma™ rupture disk is offered with a -5% MDR.

### MDR

The Sigma EXL rupture disk has a standard “0%” MDR, and the Sigma rupture disk less a “-5%” range.

## Burst Tolerance

Marked burst pressure	Burst tolerance
≤ 40 psig (2.76barg)	± 2 psig (0.138barg)
> 40 psig (2.76 barg)	± 5%

### Introduction

The Sigma EXL reverse buckling rupture disk has been developed to provide the highest operating pressure capability available from a rupture disk pressure relief device. Sigma EXL technology coupled with either the SRI-7RS, SRB-7RS or SRB-7FS safety heads combine the accuracy and reliability of reverse buckling disk technology with unique disk and safety head design features that enable the Sigma EXL disk to operate to 95% of the marked burst pressure (100% of minimum burst pressure according to CEN ISO 4126-2 standards). The Sigma EXL rupture disk embraces Saf™ technology (structural apex forming), the central feature on the disk dome enhancing burst pressure accuracy.

At its burst pressure, the Sigma EXL rupture disk dome reverses and opens by shearing around a circular score line located near the perimeter of the dome. The score line engages with one or more points on the integral hinge down stream of the disk. The disk opens around its circular score line with the central petal supported by the hinge, avoiding fragmentation. The Sigma EXL is offered with a simple burst pressure tolerance.

No MDR needs to be considered for this high operating ratio disk (effectively a ‘zero’ range disk). The performance of every Sigma EXL disk is assured by proof pressure testing each disk to its maximum recommended operating pressure. The Sigma EXL provides the user with the highest operating ratio of any rupture disk pressure relief device.

## Certification

The certification procedure for Sigma EXL™ and Sigma™ rupture disks exceeds those required by standard industry codes and standards that require limited destructive testing to validate burst pressure and permit acceptance of the lot with any burst test distribution and uncentered test data. The Sigma EXL and Sigma disks' test data is graphically presented on their burst test certificate (see example). The curve includes 'in process' and final certification burst test data to build a clear picture of the burst pressure distribution. Only when the data is appropriately centered and distributed is the lot accepted for shipment. The certificate indicates also the burst test results of rupture disks tested from the 'lot' for the Quality Department final acceptance – the quantity of test results will typically be determined by the certification code or standard chosen by the user.

Sigma EXL and Sigma rupture disks are also validated for liquid service for each lot using a fully hydraulic burst test system and the burst test certificate endorsed accordingly.

The combination of statistical control techniques for burst pressure, and proof pressure testing of all ordered Sigma EXL and Sigma rupture disks enables their application to the highest operating pressures available from the rupture disk industry.

### Sigma EXL™ and Sigma™ Disk Specification Min / Max Pressure Rating at 72°F (22°C) PSIG (Bar)

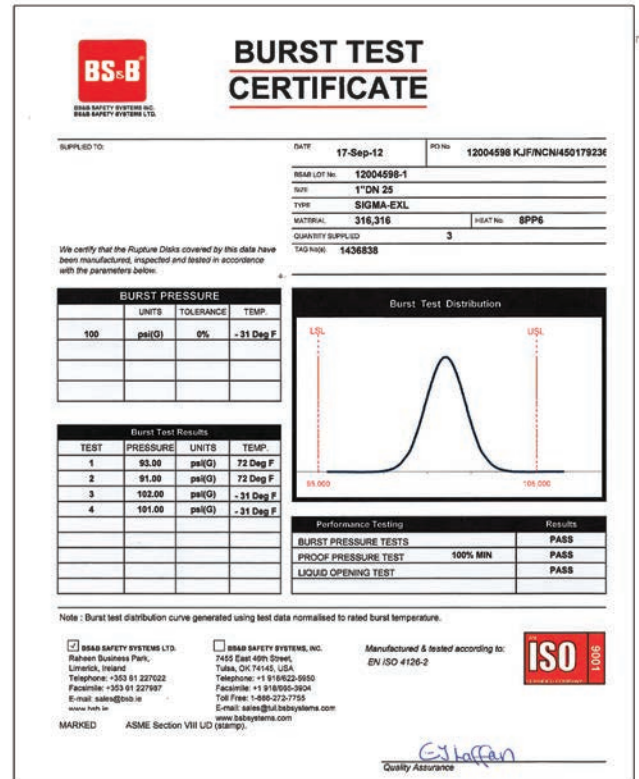
Disk size		Nickel alloy 200				316ss				Inconel® alloy 600				Monel® alloy 400				Hastelloy® alloy C-276			
in	mm	psig		barg		psig		barg		psig		barg		psig		barg		psig		barg	
		Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max
1	25	35	500	2.4	34.5	35	500	2.4	34.5	50	500	3.5	34.5	58	500	3.5	34.5	34.5	500	3.8	34.5
1.5	40	30	400	2.1	27.5	30	400	2.1	27.5	45	400	3.1	27.5	45	400	3.1	27.5	27.5	400	3.1	27.5
2	50	25	400	1.8	27.5	25	400	1.8	27.5	30	400	2.1	27.5	30	400	2.1	27.5	27.5	400	2.1	27.5
3	80	20	400	1.4	27.5	20	400	1.4	27.5	22	400	1.5	27.5	22	400	1.5	27.5	27.5	400	1.5	27.5
4	100	16	400	1.1	27.5	16	400	1.1	27.5	18	400	1.3	27.5	18	400	1.3	27.5	27.5	400	1.3	27.5
6	150	15	225	1	15.5	15	225	1	15.5	15	225	1	15.5	15	225	1	15.5	15.5	225	1	15.5
8	200	15	125	1	8.6	15	125	1	8.6	15	125	1	8.6	15	125	1	8.6	8.6	125	1	8.6

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.

## Damage Safety Ratio <1

If a Sigma EXL or Sigma rupture disk is accidentally damaged, it will relieve pressure by bursting at or typically below its marked burst pressure. This failsafe design feature is called the damage safety ratio, and with a value of 1 or less, will ensure that the Sigma EXL or Sigma disk will, if damaged, relieve pressure at a reduced burst pressure. A damaged Sigma EXL or Sigma rupture disk will typically reverse and then open at a reduced pressure.

Refer to the maximum recommended temperature chart found in the glossary



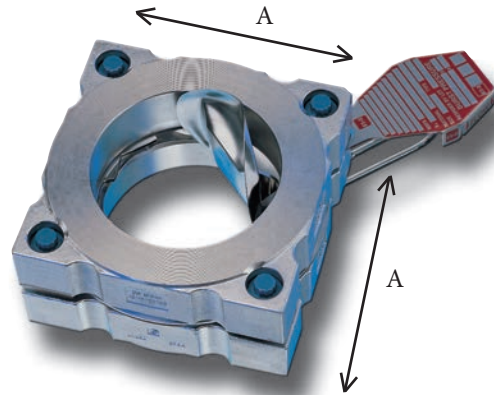
## Operating Ratio

Sigma EXL reverse buckling disks can sustain operating pressures to 95% of their marked burst pressure, or to 100% of their minimum burst pressure. (For disks certified under CEN ISO 4126-2 'performance tolerance', the Sigma EXL disk can sustain operating pressures to 100% of the burst pressure less the negative performance tolerance.)

Sigma reverse buckling disks having a -5% MDR may also sustain operating pressures to 95% of their marked burst pressure, or to 100% of their minimum burst pressure. However, this operating pressure may be lower than for a Sigma EXL disk by as much as the -5% MDR.

## SRB-7RS Safety Head Specifications

Size		Safety head flange rating			Safety head flange thickness		Dimensions A	
in	mm	ASME / ANSI	EN	JIS	in	mm	in	mm
1	25	150	10/16	10/16	1.5	38	2.6	67
1	25	300/600	25/40	20/30/40	1.5	38	2.9	73
1	25	900/1500	-	-	-	-	-	-
1.5	40	150	10/16	10/16	1.6	43	3.4	86
1.5	40	300/600	25/40	20/30/40	1.6	43	3.75	95
1.5	40	900/1500	-	-	-	-	-	-
2	50	150	10/16	10/16	1.75	48	4.1	105
2	50	300/600	25/40	20/30/40	-	-	-	-
2	50	900/1500	-	-	-	-	-	-
3	80	150	10/16	10/16	2.1	55	5.25	133
3	80	300/600	25/40	20/30/40	2.6	67	4.75	121
3	80	900	-	-	-	-	-	-
4	100	150	10/16	10/16	2.9	73	6.25	159
4	100	300	25/40	20/30/40	2.8	70	Flower petal	
4	100	600	-	-	2.6	67	7 5/8 inches OD (194mm OD)	
6	150	150	10/16	10/16	3.7	94	Flower petal	
6	150	300	25/40	20/30/40	4.2	107	Flower petal	
6	150	600	-	-	3.1	79	10 3/8 inches OD (264mm OD)	
8	200	150	-	-	3.8	97	Flower petal	
8	200	300	-	-	-	-	-	



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

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

Limerick, Ireland  
T: +353 61 484700  
F: +353 61 227987  
E: sales@bsb.ie

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

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

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

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

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

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

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

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

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

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

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

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

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

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