

Sigma EXL™ and **Sigma™**

Rupture Disks for the Highest Operating Pressure in Gas or Liquid Service

Safety Heads



SRB-7RS™
Pretorqued Safety Head

Sigma EXL and Sigma rupture disks, combined with the SRI-7RS™ or SRB-7RS™ pretorqued safety heads, provides accuracy and reliability.



SRI-7RS™
Pretorqued Safety Head



SRB-7FS™
Pretorqued Full-Bolted Safety Head



S90-7R™
Pre-Assembled Safety Head

For detailed information about Safety heads available for the Sigma EXL and Sigma, including safety head specifications, please consult catalog 77-4001, Sta-Saf Rupture Disks, available online at www.bsbsystems.com

Sigma EXL™ and Sigma™

Rupture Disks for the Highest Operating Pressure in Gas or Liquid Service

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 and its safety head 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 and service durability. 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 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). Prior to delivery, 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.

FEATURES

- Sizes 1-12 inches (25-300 mm)
- High operating ratio: 95% of marked burst pressure
- High operating ratio: 100% of minimum burst pressure (CEN ISO4126-2)
- Standard 0% MDR, optional -5%. (Sigma EXL standard is 0% MDR. For Sigma, 5% is standard)
- Designed for non-fragmentation
- Designed for gas, liquid and multi-phase flow conditions
- Fail safe: damage safety ratio <1
- SAF™ technology
- Vacuum resistant
- Smooth process side of disk resists product accumulation
- Long service life in pressure cycling or pulsating conditions
- For installation in Types SRI-7RS, SRB-7RS, S90-7R, SRB-7FS and TR-Series pretorqued safety heads
- US patents 6178983, 6321582, 6446653, 6494074 and international patents apply
- AQA Quality Assurance

BURST TOLERANCE

Marked Burst Pressure	Burst Tolerance
≤ 40 psig (2.76 barg)	± 2 psig (0.138 barg)
> 40 psig (2.76 barg)	± 5%

MANUFACTURING DESIGN RANGE (MDR)

The Sigma EXL rupture disk has a standard "0%" MDR. The Sigma rupture disk has less than a "-5%" range.



SIGMA™ and Sigma EXL™ Disk Specifications Minimum / Maximum Pressure Rating at 72°F (22°C) PSIG (Barg)

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	2.41	34.47	35	500	2.41	34.47	50	500	3.45	34.47	58	500	4.00	34.47	55	500	3.79	34.47
1.5	40	30	400	2.06	27.58	30	400	2.07	27.58	45	400	3.10	27.58	45	400	3.10	27.58	45	400	3.10	27.58
2	50	25	400	1.72	27.58	25	400	1.72	27.58	30	400	2.07	27.58	30	400	2.07	27.58	30	400	2.07	27.58
3	80	20	400	1.38	27.58	20	400	1.38	27.58	22	400	1.52	27.58	22	400	1.52	27.58	25	400	1.72	27.58
4	100	16	400	1.10	27.58	16	400	1.10	27.58	18	400	1.24	27.58	18	400	1.24	27.58	20	400	1.38	27.58
6	150	15	225	1.03	15.51	15	225	1.03	15.51	15	225	1.03	15.51	15	225	1.03	15.51	20	225	1.38	15.51
8	200	15	125	1.03	8.62	15	125	1.03	8.62	15	125	1.03	8.62	15	125	1.03	8.62	20	125	1.38	8.62
10	250	15	100	1.03	6.89	10	100	0.69	6.89	15	100	1.03	6.89	15	100	1.03	6.89	20	100	1.38	6.89
12	300	15	75	1.03	5.17	10	75	0.69	5.17	15	75	1.03	5.17	15	75	1.03	5.17	20	75	1.38	5.17

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

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 ISO4126-2 ‘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.

Damage Safety Ratio < 1

If a Sigma EXL series rupture disk is accidentally damaged, it will relieve pressure by bursting at or below its marked burst pressure. This fail safe design feature is called the damage safety ratio, and with a value of 1 or less, will ensure that a damaged Sigma EXL or Sigma disk will not exceed the marked burst pressure, typically reversing and opening at a reduced pressure.

Maximum Recommended Temperature


Material	Max. Temperature
Nickel (alloy 200)	750°F (399°C)
Monel® (alloy 400)	900°F (482°C)
Inconel® (alloy 600)	1100°F (593°C)
316 stainless steel	900°F (482°C)
Hastelloy® C-276 (alloy C-276)	900°F (482°C)
Titanium	572°F (300°C)
Tantalum	500°F (260°C)
Fluoropolymer liner (PTFE)	500°F (260°C)
Fluoropolymer liner (FEP, PFA)	400°F (204°C)

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 is 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 Sigma EXL and Sigma rupture disks enables their application to the highest operating pressures available from the rupture disk industry.



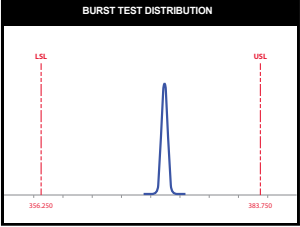
BURST TEST CERTIFICATE

SUPPLIED TO		DATE	08-Dec-17	PO No.	17102215
BS&B LOT No. 17096050-1					
SIZE 3" DN 80					
TYPE SIGMA-EXL					
MATERIAL 316, TI			HEAT No. N-22352		
QUANTITY SUPPLIED 3				TAG No(s) 607-456-1237	

We certify that the Rupture Disks covered by this data have been manufactured, inspected and tested in accordance with the parameters below:

BURST PRESSURE				
MARKED	UNITS	TOLERANCE	TEMP	
375	psi(G)	+/- 5%	400 Deg F	

BURST TEST RESULTS				
MARKED	UNITS	TOLERANCE	TEMP	
1	490.00	psi(G)	72 Deg F	
2	490.00	psi(G)	72 Deg F	
3	377.00	psi(G)	400 Deg F	
4	377.00	psi(G)	400 Deg F	



PERFORMANCE TESTING		RESULTS
Burst Pressure Tests		PASS
Proof Pressure Test	100% MIN	PASS
Liquid Opening Test		PASS

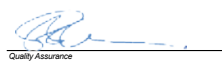
Note: Burst test distribution curve generated using test data normalised to rated burst temperature.

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Manufactured & tested according to:
EN ISO 4126-2

MARKED ASME Section VIII UD (stamp).


 Quality Assurance

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