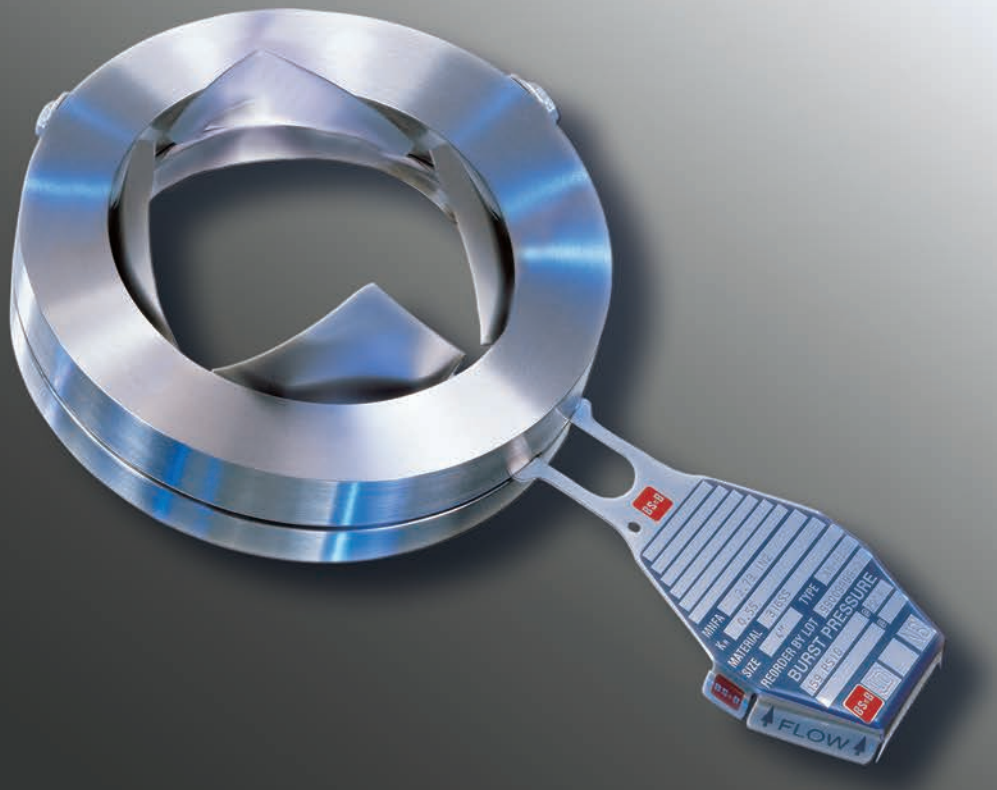
BS&B®

SAFETY SYSTEMS

NU-SAF™ Plus

Forward Acting Rupture Disks



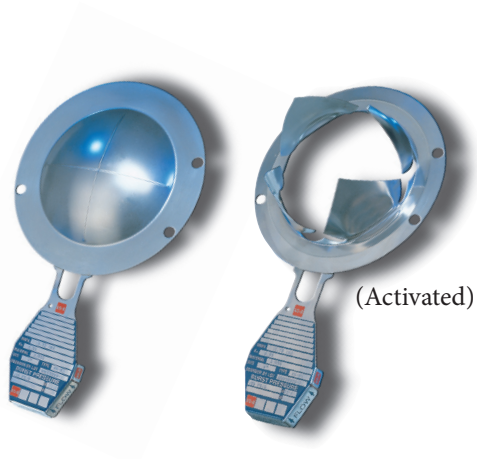
ASME UD

ISO 9001

CE

XN-85™ Precision Scored, High Performance Rupture Disk

The XN-85 is specially manufactured by forming the disk first and then scoring. This creates a minimally stressed score pattern offering optimum service life and an extended operating pressure limit of 85% of marked burst pressure or 90% of minimum burst pressure, even under cyclic conditions. Consult us with your particular operating requirements.



Features

- Solid metal
- Precision scored
- Designed for non-fragmentation
- Withstands full vacuum without support
- Operates up to 85% of the disk's marked pressure or 90% of minimum burst pressure
- Liquid and gas service (acceptable for liquid service with gas driven liquid conditions; consult factory)
- Damage safety ratio <1
- Optimum forward acting disk for pulsating or cycling conditions
- 0%, -5% and -10% manufacturing design range
- For use in pretorqued BS&B safety heads type NFI-7RS and NF-7RS or preassembled safety head types NX-7R and NF-7R.

Burst Tolerance

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

Material	Maximum Recommended Temperature	
Aluminum	250°F	121°C
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

Manufacturing Design Range (MDR)

The choice of a 0%, -5% or -10% MDR is available. The total range is placed on the minus side of requested burst pressure.

Disk size		Aluminum				Nickel alloy 200				Inconel® alloy 600				Monel® alloy 400				316ss			
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	113	188	8	13	188	1500	13	103	225	1800	16	124	225	1500	16	103	335	1800	23	124
1.5	40	81	135	6	9	135	1500	9	103	165	1800	11	124	165	1500	11	103	250	1800	17	124
2	50	68	113	5	8	113	1350	8	93	135	1800	9	124	135	1350	9	93	200	1800	14	124
3	80	54	90	4	6	90	1250	6	86	108	1600	8	110	108	1250	8	86	160	1600	11	110
4	100	45	75	3	5	75	1200	5	82	90	1400	6	97	90	1200	6	83	135	1400	9	97
6	150	36	60	3	4	60	1100	4	76	72	1150	5	79	72	1100	5	76	125	1200	9	83
8	200	-	-	-	-	53	1000	4	69	63	1050	4	72	63	1000	4	69	120	1100	8	76
10	250	-	-	-	-	45	900	3	62	54	950	4	66	54	900	4	62	115	1000	8	69
12	300	-	-	-	-	41	750	13	52	50	850	4	59	50	750	4	52	110	900	8	62
14	350	-	-	-	-	35	500	2	34	42	700	3	48	42	500	3	34	100	800	7	55
16	400	-	-	-	-	33	270	2	19	39	350	3	24	39	270	3	19	90	400	6	28
18	450	-	-	-	-	33	200	2	14	38	260	3	18	38	200	3	14	85	300	6	21
20	500	-	-	-	-	32	170	2	12	36	220	3	15	36	170	3	12	80	250	6	17
24	600	-	-	-	-	30	140	2	9	33	180	2	12	33	140	2	9	70	200	5	14

Optional liner; liners are available in all sizes on the process or downstream side (or for both; consult factory). Tef fluorocarbon film application range -40°F (-40°C) to 500°F (260°C)

Type XT™ Advanced Rupture Disk Performance from a Forward Acting, Tension Loaded Design

Features

- Sizes 1-10 inches (25-250mm)
- Seven standard materials; wide range of corrosion resistance - Refer to the material temperature table
- 'X' shaped score pattern; designed for non-fragmentation; excellent for relief valve isolation.
- Smooth surface on process side; resistant to product accumulation
- Operates up to 80% of marked burst pressure or 85% of minimum burst pressure
- Designed for gas service or liquid service
- High flow capacity / low flow resistance: certified for gas and liquid service
- Fail safe: design safety ratio < 1
- 1 piece solid metal construction; excellent leak tightness
- Withstands full vacuum without support
- Available "CE" marked or ASME stamped (UD)
- For use in pretorqued BS&B safety heads type NFI-7RS and NF-7RS or preassembled safety head types NX-7R and NF-7R

A 90% operating pressure ratio may apply under static operationg conditions; consult factory

Material	Maximum recommended temperature	
Nickel alloy 200	750ºF	399ºC
Monel® alloy 400	900ºF	482ºC
Inconel® alloy 600	1100ºF	593ºC
Stainless steel 316	900ºF	482ºC
Hastelloy® (alloy C-276 or C-22)	900ºF	482ºC
Aluminum	250ºF	121ºC
Tantalum	500ºF	260ºC

Burst Tolerance

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

Burst Pressure Capabilities at 72°F (22°C)

Nominal size		Aluminum				Nickel alloy 200 & tantalum				Inconel® alloy 600 & Monel® alloy 400				316ss				Hastelloy® alloy C-276, C-22			
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	80	1450	6	100	165	1450	11	100	165	1450	11	100	175	1450	12	100	240	1450	17	100
1.5	40	55	1450	4	100	115	1450	8	100	115	1450	8	100	125	1450	9	100	176	1450	12	100
2	50	45	1450	3	100	105	1450	7	100	105	1450	7	100	115	1450	8	100	160	1450	11	100
3	80	45	1300	3	100	90	1300	6	90	90	1300	6	90	100	1300	7	90	140	1300	10	90
4	100	40	1150	3	79	90	1150	6	79	90	1150	6	79	95	1150	7	79	140	1150	10	79
6	150	40	1040	3	72	90	1040	6	71	90	1040	6	71	90	1040	6	72	130	1040	9	72
8	200	40	960	3	66	85	960	6	66	85	960	6	66	90	960	6	66	130	960	9	66
10	250	-	-	-	-	85	840	6	58	85	840	6	58	90	840	6	58	125	840	9	58

Optional liner: A flurocarbon film liner is available as an option on the process side of the XT disk.
TEF fluoropolymer film application range -40°F to 500°F (-40°C to 260°C)

Type XB™ Rupture Disks

The XB rupture disk (also referred to as "Scored B" or "SCD B") is a non-fragmenting, high pressure rupture disk that opens along pre-weakened score lines. The XB offers a broader range of burst pressures than the XT.

Burst Tolerance

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

MDR

The XB is available with either -5% or -10% MDR. Consult BS&B for manufacturing design ranges less than -5%.

Material	Maximum recommended temperature	
Nickel alloy 200	750ºF	399ºC
Monel® alloy 400	900ºF	482ºC
Inconel® alloy 600	1100ºF	593ºC
Stainless steel 316	900ºF	482ºC
Hastelloy® (alloy C-276 or C-22)	900ºF	482ºC
Aluminum	250ºF	121ºC
Tantalum	500ºF	260ºC

Features

- Sizes 1 through 24 inches (25 through 600mm)
- Six standard materials; wide range of corrosion resistance
- 'X' shaped score pattern; designed for non-fragmentation, excellent for relief valve isolation
- Smooth surface on inlet side; resistant to product accumulation
- Designed for gas or liquid service
- High flow capacity / low flow resistance: certified Krgl of 0.4 and high flow area in all sizes
- Fail safe: design safety ratio < 1 means a damaged XB disk will burst at or below its rated burst pressure
- 1 piece solid metal construction; excellent leak tightness
- Vacuum resistant; no additional support required
- 3-D tag; always visible with standard pipe flanges to verify disk description and confirm correct installation direction
- Available "CE" marked or "UD" stamped
- For use in pretorqued BS&B safety heads type NFI-7RS and NF-7RS or preassembled safety head types NX-7R and NF-7R

XB Disk Specifications Minimum / Maximum Pressure Ratings at 72°F (22°C)

Disk size		Aluminum				Nickel alloy 200				Inconel® alloy 600				Monel® alloy 400				Hastelloy® alloy C 276 and 316ss			
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	125	1000	9	69	250	4000	17	276	250	6000	17	414	250	4000	17	276	300	6000	21	414
1.5	40	100	750	7	52	200	2600	14	179	200	4000	14	276	200	2600	14	179	250	4000	17	276
2	50	85	500	6	35	175	2300	12	159	175	3500	12	241	175	2300	12	159	225	3500	16	241
3	80	75	300	5	21	150	2000	10	138	150	3000	10	207	150	2000	10	138	175	3000	12	207
4	100	70	250	5	17	135	1750	9	121	135	2500	9	172	135	1750	9	121	150	2500	10	172
6	150	60	200	4	14	125	1250	9	86	125	2000	9	138	125	1250	9	86	-	-	-	-
8	200	-	-	-	-	110	1100	8	76	110	1750	8	121	110	1100	8	76	-	-	-	-
10	250	-	-	-	-	100	1000	7	69	100	1500	7	103	100	1000	7	69	-	-	-	-
12	300	-	-	-	-	90	850	6	59	90	1250	6	86	90	850	6	59	-	-	-	-
14	350	-	-	-	-	80	650	6	45	80	1000	6	69	-	-	-	-	-	-	-	-
16	400	-	-	-	-	75	525	5	36	75	800	5	55	-	-	-	-	-	-	-	-
18	450	-	-	-	-	70	400	5	28	70	600	5	41	-	-	-	-	-	-	-	-
20	500	-	-	-	-	65	350	5	24	65	500	5	35	-	-	-	-	-	-	-	-
24	600	-	-	-	-	60	175	4	12	60	250	4	17	-	-	-	-	-	-	-	-

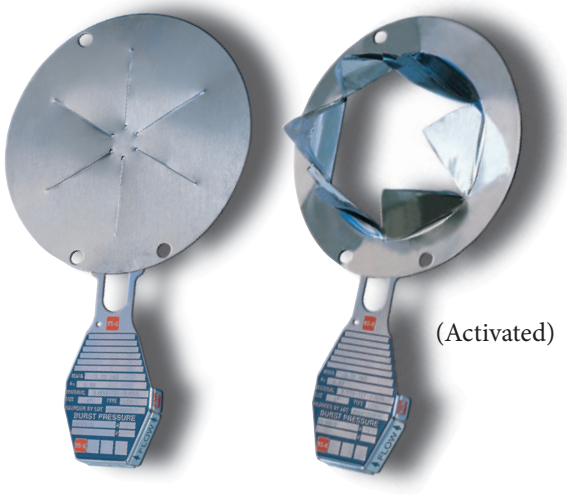
Optional liner: A flurocarbon film liner is available as an option on the process side of the XT disk.
TEF fluoropolymer film application range -40°F to 500°F (-40°C to 260°C)

Forward Acting Composite Tension Loaded Disks

LCN™

Low Pressure Rupture Disk

The type LCN flat rupture disk uses composite technology to achieve low burst ratings from resistant materials that shall be selected to suit application service conditions.



(Activated)

Features

- Flat composite metal construction
- Fluorocarbon film seal
- Can withstand full vacuum
- Operates up to 80% of the minimum burst pressure
- Suitable for gas and liquid applications
- Damage safety ratio <1
- Standard materials of construction 316ss / fluorocarbon film / 316ss - Consult BS&B for other materials
- For use in pretorqued BS&B safety heads type NFI-7RS and NF-7RS or preassembled safety head types NX-7R and NF-7R

Marked burst pressure	Burst tolerance
< 7 psig (0.48barg)	± 1 psig (0.069barg)
< 15 psig (1.03barg)	± 1.5 psig (0.1barg)
15< 40 psig (2.76barg) > 40 psig (2.76barg)	± 2 psig (0.138barg) ± 5%

Manufacturing Design Range (MDR)

Marked burst pressure	MDR
≥ 40 psig (2.76barg)	-5% or -10%
> 15 psig (1.03barg) and 140 psig (2.76barg)	-10%
≤ 15 psig (2.03barg)	0%**

Recommended temperature limits		
Minimum	-40°F	-40°C
Maximum	400°F	204°C

LCN Specifications: Minimum / Maximum Disk Burst Pressures at 72°F (22°C)

Disk size		316ss / fluorcarbon film / 316ss			
in	mm	psig		barg	
		Min	Max	Min	Max
1	25	14	188	1	13
1.5	40	12	135	0.8	9
2	50	7	113	0.5	8
3	80	5	90	0.4	6
4	100	5	75	0.4	5
6	150	3	60	0.2	4
8	200	3	53	0.2	4
10	250	3	45	0.2	3
12	300	3	41	0.2	3
14	350	3	35	0.2	2
16	400	3	33	0.2	2
18	450	3	33	0.2	2
20	500	3	32	0.2	2
24	600	3	30	0.2	2

The requested burst pressure is the marked burst pressure

Vacuum and Back Pressure Resistance

All burst pressures at or above 45 psig (3.1barg) allow the LCN disk to resist full vacuum. At lower burst pressures the LCN disk will resist partial vacuum up to the equivalent of 35% of the marked burst pressure. Greater vacuum resistance can be provided by the NXV-7R™ safety head which has an integral vacuum support.

For back pressure resistance exceeding 15 psi (1.03bar) the NXV-7R safety head shall be used. Consult BS&B for maximum back pressure resistance. The NXV-7R safety head with integral vacuum support will reduce the free flow area by up to 40%.

Pretorqued Safety Heads for Tension Loaded Rupture Disks

NF-7RS™

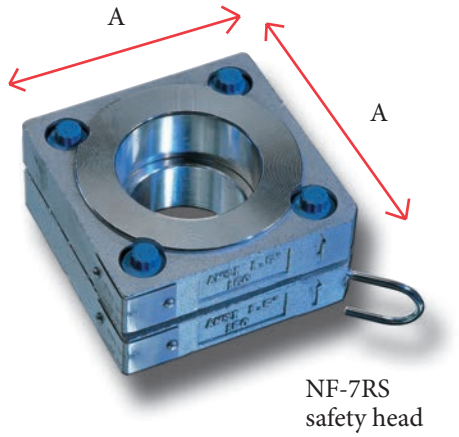
Features

- Insert type safety heads that fit inside the bolt circle of companion flanges
- Pretorqued design, cap screws energize the seal between the rupture disk and safety head, independent of companion flange bolt arrangement
- Positive locating pins center the disk correctly in the safety heads, thus eliminating disk slippage and possible incorrect installation
- Bite seal sizes 2" (50mm) and larger
- For extra protection, a J-bolt is standard on the safety head inlets. The safety heads can only fit between the companion flanges in the one direction that allows the J-bolt to mate with the drilled hole in the companion flange inlet. Correct flow direction is thus assured
- Disk dome protected by safety head outlet
- Available in sizes 1-40 inches (25-1000mm) (NF-7RS)

Materials Available

- Aluminum
- Carbon steel
- 316ss
- Inconel®
- Monel®
- Hastelloy C®

Consult factory for availability of other materials



NF-7RS safety head

NF-7RS Dimensions

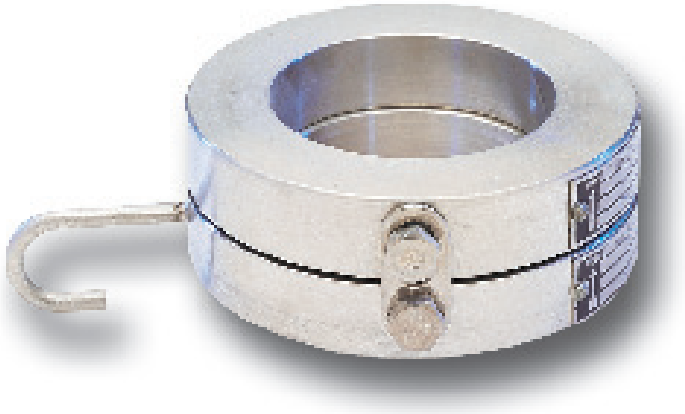
Nominal size		Safety head flange rating			Overall height		Outside dimensions	Shape
in	mm	ANSI	DIN	JIS	in	mm	A	
1	25	150	-	-	1.5	38	OD 2.6 in (67mm)	square
		300/600	10/16/25/40	10/16/20/30/40	1.5	38	OD 2.9 in (73mm)	square
1.5	40	150	-	10/16/20	1.7	43	OD 3.4 in (86mm)	square
		300/600	10/16/25/40	30/40	1.7	43	OD 3.7 in (95mm)	square
2	50	150/300/600	10/16/25/40	10/16/20/30/40	1.9	48	OD 4.1 in (104mm)	square
3	80	150/300/600	10/16/25/40	10/16/20/40	2.2	55	OD 5.2 in (133mm)	square
		-	-	10	2.2	55	OD 5.2 in (132mm)	square
4	100	150/300	10/16/25/40	16/20/30/40	2.9	73	OD 6.2 in (158mm)	square
		-	-	10	2.9	73	OD 6.2 in (158mm)	square
		600	-	-	2.6	65	OD 7.6 in (192mm)	round
6	150	150/300	10/16/25/40	10/30/40	3.6	92	OD 9.8 in (248mm)	round
		600	-	-	4.5	114	OD 10.4 in (264mm)	round
8	200	150/300	-	-	3.8	97	OD 12.0 in (305mm)	round
10	250	150/300	-	-	4.3	110	OD 14.1 in (359mm)	round
12	300	150	-	-	4.8	121	OD 16.0 in (406mm)	round
		300	-	-	5.3	133	OD 16.5 in (419mm)	round
14	350	150	-	-	5.3	133	OD 17.8 in (451mm)	round
		300	-	-	5.9	149	OD 19.6 in (483mm)	round
16	400	150	-	-	6.4	162	OD 20.1 in (511mm)	round
		300	-	-	7.1	181	OD 21.1 in (536mm)	round
18	450	150	-	-	7.4	187	OD 22.8 in (578mm)	round
		300	-	-	7.9	200	OD 23.4 in (594mm)	round
20	500	150	-	-	8.4	241	OD 24.8 in (629mm)	round
		300	-	-	8.6	219	OD 25.6 in (651mm)	round
24	600	150	-	-	10.3	260	OD 29.5 in (749mm)	round
		300	-	-	10.8	273	OD 30.4 in (772mm)	round

Safety Heads for Tension Loaded Rupture Disks

NF-7R™ Safety Head

Features

- Insert type safety head that fits inside the bolt circle of companion flanges
- Locating pins ensure centering and orientation of disk within the safety head
- Metal-to-metal "bite-type" seal (sizes 2"/50mm and larger)
- Standard materials 316ss and carbon steel -consult BS&B for other materials
- Disk dome protected by safety head outlet
- For extra protection, a J-bolt is standard providing physical and visual confirmation and correct installation direction



NF-7R™ Safety Head Dimensions

Nominal size		Safety head flange rating			Overall height		Outside dimensions		Shape
in	mm	ANSI	DIN	JIS	in	mm	in	mm	
1	25	150	6	-	1.5	38	2.5	64	round
		300/600	10/16/25/40	10/16/20	1.5	38	2.8	70	round
1.5	40	150	-	-	1.5	38	3.3	83	round
		300/600	10/16/25/40	-	1.5	38	3.6	92	round
2	50	150	-	-	1.5	38	4.0	102	round
		300/600	-	30/40	1.5	38	4.3	108	round
3	80	150	-	-	1.8	44	5.3	133	round
		300/600	63	30/40	1.6	40	5.8	146	round
4	100	150	63	-	2.3	57	6.8	171	round
		300	-	40	2.3	57	7.0	178	round
		600	-	63	2.9	73	7.5	191	round
		-	63	30	2.9	73	6.7	170	round
6	150	150	-	-	2.8	71	8.6	219	round
		300	-	-	2.8	71	9.8	248	round
		600	-	-	3.1	78	10.4	264	round
8	200	150	-	-	3.2	81	10.9	276	round
		300	-	-	3.2	81	12.0	305	round
10	250	150	-	-	4.3	110	13.2	337	round
		300	-	-	4.3	110	14.1	359	round
12	300	150	-	-	4.5	114	16.0	406	round
		300	-	-	4.5	114	16.5	419	round
14	350	300	-	63	5.6	146	19.0	483	round
16	400	-	25	30	5.6	142	20.1	511	round
18	450	150	-	16/20	7.5	191	21.5	546	round
		300	-	-	7.5	191	23.4	594	round
20	500	150	-	-	6.3	159	23.8	603	round
24	600	150	-	-	7.0	178	28.1	714	round
		300	-	-	7.0	197	30.4	772	round

Features

- Insert type safety head that fits inside the bolt circle of companion flanges.
- Positive locating pins ensure centering and orientation of disk in the safety head
- Metal-to-metal "bite-type" size 2" (50mm) and larger
- The inlet and outlet of the NX-7R safety head and rupture disk are held together by side lugs
- Standard material 316ss
- Consult BS&B for other materials
- Optional dial type vacuum support for full vacuum resistance for LCN disks with burst pressure below 45 psig (3.1barg) - type NXV-7R. Free flow area will be reduced by 40%. Consult BS&B for specific value
- Disk dome protection sizes 1" to 3" (25mm to 80mm) only

NX-7R™, NXV-7R™ Dimensions

Nominal size		Safety head flange rating				Overall height	
in	mm	ANSI / BS 1560	BS 4504 / DIN	JIS	BS 10	in	mm
1	25	150				1.38	35
		300/600	10/16/25/40	10/16/20/30	F	1.38	35
1.5	40	150				1.38	35
		300/600	10/16/25/40			1.38	35
2	50	150				1.38	35
		300/600	10/16/25/40			1.38	35
3	80	150		10		1.38	35
		300	10/16/25/40		F	1.38	35
					D-E	1.38	35
4	100	150				1.38	35
			25/40	30	F	1.38	35
		300				1.38	35
				10		1.38	35
				40		1.38	35
			10/16	16/20	D-E	1.38	35
6	150	150				1.38	35
		300	63	30		1.38	35
			25/40			1.38	35
8	200	150	10/16		D-E	1.62	41
		300				1.62	41
			25			1.62	41
			40			1.62	41
					F	1.62	41
10	250	150			D-E	2.4	60
		300		30		1.81	46
			10/16	10		1.81	46
			25			2.2	55
			40	16/20	F	2.4	60
				40		1.81	46

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. All sales are subject to the BS&B companies' 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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