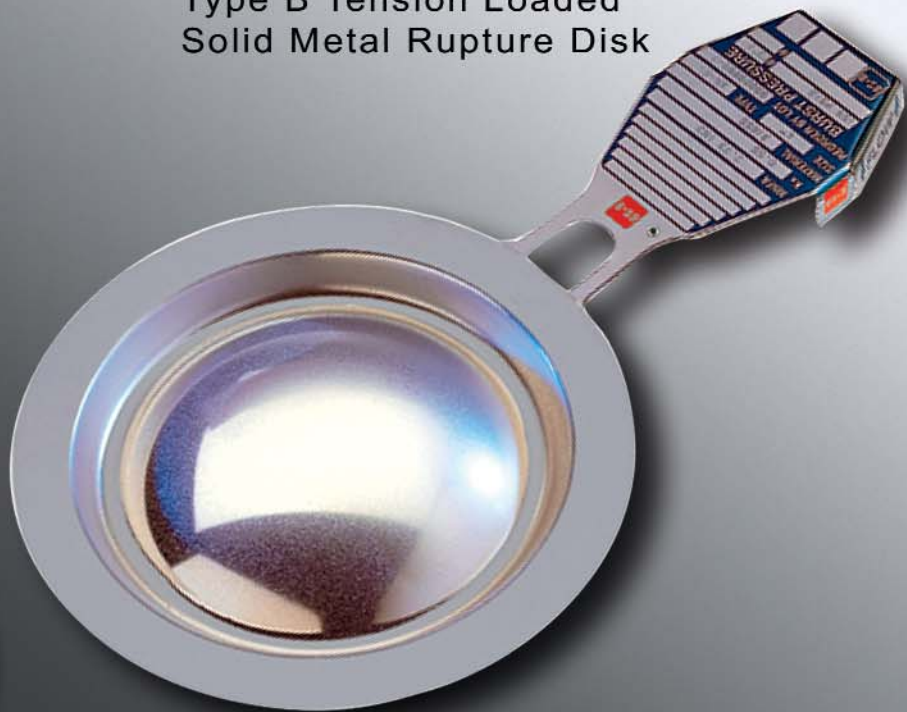




# TYPE B™ SOLID METAL RUPTURE DISKS

Type B Tension Loaded  
Solid Metal Rupture Disk



BS&B Quik-Sert  
Safety Head

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## TYPE B TENSION LOADED SOLID METAL RUPTURE DISK

The Type B Solid Metal Disk, available in many sizes and metals, withstands mild or severe corrosive conditions, elevated or cold temperatures, static or pulsing pressures – and still provides reliable overpressure protection for pressure systems within defined limits. The design utilizes a dome-shaped disk with a 30° angular seating arrangement. System pressure is applied to the dished or concave side, subjecting disk metal to tension loading.



**Type B Rupture Disk –** Prebulged solid metal disk with angular seat, before and after rupture.

## Type BV Rupture Disk for Vacuum Applications

If back pressure on convex (atmospheric) side of disk will ever exceed the pressure applied to concave (pressure) side of disk, a vacuum support may be required. Supports are not required with all disks. See table below.

### When vacuum supports are required for Type B angular seat disk

If pressure rating of disk is below these minimums, a vacuum support is required.

Where Condition is:	Full Vacuum	2/3 Vacuum	1/3 Vacuum
Absolute pressure is:	0 psia	5psia	10psia
Back pressure is:	14.7psia	9.7psia	4.7psia
Rupture Disk Material is:	and pressure rating of disk is less than		
Aluminum	450 psig	360 psig	270 psig
Silver	700 psig	560 psig	420 psig
Nickel	1200 psig	960 psig	720 psig
Monel	1200 psig	960 psig	720 psig
Inconel	1200 psig	960 psig	720 psig
316 stainless steel	1200 psig	960 psig	720 psig

For higher back pressures and other disk metals. Consult factory

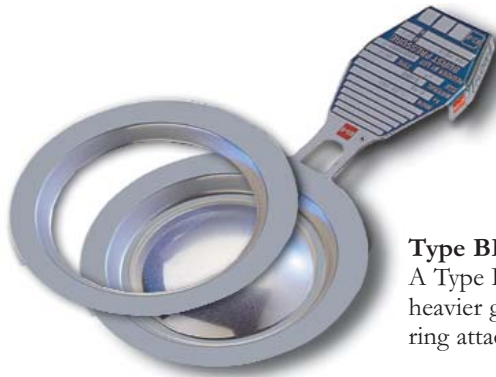
Conversion to Metric Units: Bars =PSIG ÷ 14.504

KG/cm<sup>2</sup> =PSIG ÷ 14.22



**Type BV Rupture Disk –** A Type B disk has an attached vacuum support to assure a proper fit

## Type BR Rupture Disks for Minimum Disk Burst Pressure



**Type BR Rupture Disk:**  
A Type B thin disk with heavier gauge metal BR ring attached to top side



**Type BRR Rupture Disk:**  
A Type B thin disk with BR rings attached to both top and bottom sides



**Type BRV Rupture Disk:**  
A Type B thin disk with BR ring and vacuum support attached



**Type BSV Rupture Disk:** A Type B disk with vacuum support and soft gasket ring attached to bottom side of disk. For - disks in high vacuum service

If the pressure rating for a Type B Rupture Disk is at or near the minimum, a thin disk is dictated and a BR protective rating is required.

### When Type B disk should use BR protective ring

If burst pressure for Type B disk is lower than those shown below for standard sizes and disk metals, a BR protective ring should be considered. All ratings are psig.

Disk Size		Disk Material									
		Aluminum		Nickel Alloy 200		Monel® Alloy 400		Inconel® Alloy 600		316SS	
in.	mm.	psig	barg	psig	barg	psig	barg	psig	barg	psig	barg
1	25	260	17.92	1100	76	1450	100	1800	124	2100	144.7
1 1/2	40	173	11.42	733	50.5	967	66.7	1200	82.7	1400	96.5
2	50	104	7.17	440	30.3	580	40.7	720	49.6	840	58
3	80	73	5	309	21.3	407	28	506	35	590	40.7
4	100	57	3.9	241	16.6	318	22	395	27.2	461	31.8
6	150	43	3	181	12.5	238	16.4	296	20.4	345	23.7
8	200	33	2.3	138	9.5	181	12.4	225	15.5	263	18.13
10	250	25	1.72	107	7.4	141	9.7	175	12.06	204	14.06
12	300	22	1.5	92	6.3	121	8.3	150	10.3	175	12.06
14	350	19	1.3	79	5.4	104	7.2	129	8.9	150	10.3
16	400	17	1.2	69	4.75	91	6.2	113	7.79	131	9.03
18	450	15	1.03	61	4.2	81	5.6	100	6.9	117	8.06
20	500	13	.89	55	3.8	73	5	90	6.2	106	7.3
24	600	10	.70	46	3.2	60	4	75	5.17	88	6.07

Since seating area of disk should be free of any deformity or penetration by a foreign substance that might adhere to lip of flange holder, a heavier gauge metal BR ring should be mounted to one or both sides of the disk in the seating area to provide support and protection. When one ring is involved, the assembly is called **Type BR Rupture Disk**. When two-rings are used, the assembly is called **Type BRR Rupture Disk**. If a vacuum support is required, the BR ring is used only on atmospheric side of disk. This assembly is called **Type BRV Rupture Disk**.

A support ring may provide adequate structural strength for the rupture disk, eliminating the need for a vacuum support. See table below for when a BR can be used instead of a BRV.

Minimum burst pressure at which Types B and BR Disks with adequate support ring will withstand full vacuum

Disk Metal	PSIG	BARG
Aluminum	200	13.7
Silver	300	20.7
Nickel/Alloy 200	500	34.5
Monel/Alloy 400	500	34.5
Inconel/Alloy 600	500	34.5
316 stainless steel	500	34.5

BR Ring - Standard metal 316 stainless steel special metals include Inconel®, Monel®, Nickel, Hastelloy B and C, 276 Titanium and Tantalum. Aluminum ring is standard on Aluminum disks.

In most applications involving vacuum, the term “commercial vacuum” is used. If extremely high vacuum is involved – in the micron range—seating area of disk may require a soft gasket ring mounted to process side of support. The assembly of disk support and soft gasket ring is called **Type BSV Rupture Disk**. If a BR ring is also attached to the atmospheric side of the disk, the assembly is called **Type BRSV Rupture Disk**. Vacuum grease may also be applied to the soft ring seating surface to provide additional tightness when high vacuum is encountered. Standard materials for soft gasket ring include aluminum and teflon. Special materials include silver or nickel.

## Type B Solid Metal Rupture Disks for Elevated or Cold Temperature Service

Minimum/maximum burst pressure ratings for standard Type B Rupture Disks at 72°F are included on pages 6 and 7. To determine burst pressure rating at elevated or cold temperatures, a temperature correction factor must be applied to ratings at 72°F.

The temperature conversion table on page 5 applies only to BS&B Type B series solid metal disks and cannot be used for Type D Composite Disks or reverse buckling disks. Data used to develop the table has been obtained from reliable sources; however, BS&B does not warrant the figures nor will they be held liable for any use to which the figures may be put.

Temperature correction factors are shown in percent from rupture pressure at 72°F. Values are approximate and based on disk metal at temperatures listed.

When selecting Type B Disks for elevated or cold temperature service, check installed conditions whenever possible to determine actual temperatures. You will be able to specify disks with greater burst accuracy.

## How to Use the Temperature Conversion Table

To determine the estimated rupture pressure of a disk at temperatures other than 72°F, multiply the rated pressure at 72°F by the temperature correction factor shown for the disk metal.

### Example

What is the rupture pressure at 500°F of a nickel disk rated at 300psi at 72°F.

1. Consult temperature conversion table. Correction factor for nickel disk at 500°F is 86%.
2. Multiply disk rating at 72°F by correction factor:  $300 \times 0.86 = 258$ .

Rupture pressure of a nickel disk rated 300 psi at 72°F is therefore 258 psi at 500°F

If you require a disk for a specific pressure at elevated or cold temperature and want to determine if it is a standard disk, convert the required pressure at elevated or cold temperature to pressure at 72°F.

### Recommended maximum temperatures for metals used in standard Type B Disks:

Aluminum	250°F	121°C	Monel/Alloy 400	900°F	482°C
Silver	250°F	121°C	Inconel/Alloy 600	1100°F	593°C
Nickel/Alloy 200	750°F	399°C	316ss	900°F	482°C
			Hastelloy C-276/ Alloy C-276	900°F	482°C

### NOTE:

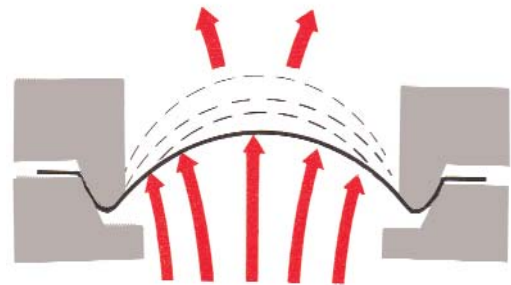
#### Tension Loaded

Conventional rupture disk with angular seating, pressure loading is on concave side of disk. This puts the disk metal under tension.

As pressure increases on a conventional disk in tension, the seating design allows the dome to thin out to a point where it can no longer withstand the pressure. The disk ruptures and metal segments fold back against the walls of the fitting in an irregular pattern to provide a full opening. The ultimate tensile strength of the metal determines its failure point when loaded in tension.

#### Fail Safe

Damaged disks rupture at rated pressure or lower, not higher than rated.



#### Warranty

The Type B Rupture Disk must be used in BS&B rupture disk holder types FA, SA, SF, or UA or other types recommended by and manufactured by BS&B. Substitution of either rupture disk or rupture disk holder not manufactured by BS&B not only may affect the burst pressure or opening characteristics of the disk, it also voids BS&B warranty.



## Specifications for Type B Disks Min/Max Pressure Rating at 72°F (22°C)

The following BS&B rupture disks are standard. Those in the most popular materials and bursting pressures are available for quick delivery. Disks with

higher or lower bursting pressures than those listed and in other materials are available on special order. Special metals: Platinum, Titanium, Hastelloy C-276.

Disk Material - Unlined Disks																									
Disk Size		Aluminum				Nickel Alloy 200				Monel® Alloy 400				Inconel® Alloy 600				316ss				Hastelloy C-276/ Alloy C-276			
in	mm	Min.		Max.		Min.		Max.		Min.		Max.		Min.		Max.		Min.		Max.		Min.		Max.	
		psig	barg	psig	barg	psig	barg	psig	barg	psig	barg	psig	barg	psig	barg	psig	barg	psig	barg	psig	barg	psig	barg	psig	barg
1/2	13	80	5.5	1500	103	280	19.3	20000	1379	340	23.5	25000	1724	440	30.3	30000	2068	625	43	30000	2068	-	-	-	-
1	25	40	2.76	1000	69	145	10	8000	552	175	12	10000	689	225	16	12000	827	320	22	12000	827	400	27.6	12000	827
1.5	40	26	1.8	750	52	95	6.5	6000	414	115	8	6000	414	150	10.3	6000	414	210	14	6000	414	263	18	6000	414
2	50	16	1.1	570	39	55	3.8	4000	276	67	4.6	4500	310	87	6	6000	414	120	8.3	6000	414	150	10	6000	414
3	80	12	0.8	460	32	41	2.8	2500	172	49	3.4	3200	220	63	4.4	4000	276	90	6.2	6000	414	113	8	6000	414
4	100	9	0.6	360	25	31	2.10	1900	131	37	2.5	2400	165	48	3.3	3000	207	68	4.7	6000	414	85	6	6000	414
6	150	7	0.48	275	19	23	1.6	1400	97	28	2	1800	124	36	2.5	2200	152	51	3.5	3600	248	64	4	3600	248
8	200	5	0.35	205	14	18	1.3	1100	76	22	1.5	1450	100	28	2	1700	117	40	2.76	2100	145	50	3.4	3600	248
10	250	4	0.275	165	11	14	0.97	800	55	17	1.2	1150	79	22	1.5	1400	97	30	2	1400	97	-	-	-	-
12	300	4	0.275	140	9.7	12	0.8	670	46	15	1	960	66	19	1.3	1000	69	27	1.87	1000	69	-	-	-	-
14	350	3	0.21	125	8.6	11	0.76	570	39	13	0.9	750	52	17	1.2	750	52	23	1.6	750	52	-	-	-	-
16	400	3	0.21	105	7.2	9	0.60	410	28	11	0.76	475	33	15	1	500	35	20	1.4	500	34	-	-	-	-
18	450	3	0.21	95	6.5	8	0.5	445	30	10	0.7	450	31	13	0.9	475	33	18	1.25	475	33	-	-	-	-
20	508	2	0.14	85	5.8	8	0.5	400	27.5	9	0.62	450	31	12	0.8	450	31	16	1.1	450	31	-	-	-	-
24	610	2	0.14	71	4.9	37	2.5	145	10	-	-	-	-	-	-	-	-	60	4.1	230	16	-	-	-	-

For 30" (762mm) - 44"(1117.6mm) Size, consult BS&B for ratings and availability

### FEP Lined Disks

Disk Size		Aluminum								Nickel Alloy 200								Monel® Alloy 400							
in	mm	Minimum Pressure 1-side		Minimum Pressure 2-side		Maximum Pressure 1 & 2 sides		Maximum Temperature FEP	Minimum Pressure 1-side		Minimum Pressure 2-side		Maximum Pressure 1 & 2 sides		Maximum Temperature FEP	Minimum Pressure 1-side		Minimum Pressure 2-side		Maximum Pressure 1 & 2 sides		Maximum Temperature FEP			
		psig	barg	psig	barg	psig	barg	°F	°C	psig	barg	psig	barg	psig	barg	°F	°C	psig	barg	psig	barg	psig	barg	°F	°C
1/2	13	235	16.2	380	26	1500	103	250	121	500	34	600	41.3	6000	414	400	204	500	34	600	41.3	6000	414	400	204
1	25	90	6.2	140	9.65	1000	69	250	121	195	13.4	245	138	3000	207	400	204	225	15.5	275	18.9	3000	207	400	204
1.5	40	60	4.1	95	6.55	700	48	250	121	130	8.9	165	11.3	2000	138	400	204	150	10.3	185	12.7	2000	138	400	204
2	50	40	2.75	64	4.4	500	34	250	121	79	5.4	105	7.2	1300	90	400	204	91	6.2	115	7.9	1300	90	400	204
3	80	26	1.8	40	2.75	400	27	250	121	55	3.8	69	4.75	900	62	400	204	63	4.34	77	5.3	900	62	400	204
4	100	20	1.40	31	2.1	325	22	250	121	42	2.90	53	3.6	650	49	400	204	48	3.30	59	4.06	650	49	400	204
6	150	15	1	23	1.58	240	16.5	250	121	31	2.1	39	2.7	500	34	400	204	36	2.5	44	3.03	500	34	400	204
8	200	11	0.76	17	1.17	180	12.4	250	121	24	1.6	30	2	375	26	400	204	28	1.9	34	2.34	375	26	400	204
10	250	9	0.62	14	0.96	135	9.3	250	121	19	1.3	24	1.65	300	21	400	204	22	1.5	27	1.86	300	21	400	204
12	300	8	0.56	12	0.82	110	7.6	250	121	16	1.1	20	1.4	250	17	400	204	19	1.3	23	1.58	250	17	400	204

For 30" (762mm) - 44"(1117.6mm) Size, consult BS&B for ratings and availability

## FEP Lined Disks

Disk Size		Inconel® Alloy 600								316ss								Hastelloy C-276/Alloy C-276							
in	mm	Minimum Pressure 1-side		Minimum Pressure 2-side		Maximum Pressure 1 & 2 sides		Maximum Temperature FEP		Minimum Pressure 1-side		Minimum Pressure 2-side		Maximum Pressure 1 & 2 sides		Maximum Temperature FEP		Minimum Pressure 1-side		Minimum Pressure 2-side		Maximum Pressure 1 & 2 sides		Maximum Temperature FEP	
		psig	barg	psig	barg	psig	barg	°F	°C	psig	barg	psig	barg	psig	barg	°F	°C	psig	barg	psig	barg	psig	barg	°F	°C
1/2	13	790	54	790	54	10000	689	400	204	820	56.5	910	62.7	10000	689	400	204	-	-	-	-	-	-	400	204
1	25	275	18.9	325	22.4	5000	344	400	204	370	25.5	420	28.9	5000	344	400	204	450	31	500	34.4	5000	344	400	204
1.5	40	185	12.7	220	15.1	3400	234	400	204	245	16.9	280	19.3	3400	234	400	204	298	20.5	333	22.9	3400	234	400	204
2	50	110	7.6	135	9.3	1800	124	400	204	145	10	170	11.7	1800	124	400	204	175	12	200	13.7	1800	124	400	204
3	80	77	5.3	91	6.2	1500	103	400	204	105	7.2	120	8.3	1500	103	400	204	128	8.8	143	9.8	1500	103	400	204
4	100	59	4.06	70	4.8	1100	75.8	400	204	79	5.40	90	6.2	1100	75.8	400	204	96	6.60	107	7.3	1100	75.8	400	204
6	150	44	3.03	52	3.5	800	55.1	400	204	59	4.06	67	4.6	800	55.1	400	204	72	4.9	80	5.5	800	55.1	400	204
8	200	34	2.3	40	2.75	600	41.4	400	204	46	3.17	52	3.5	600	41.4	400	204	56	3.8	60	4.1	600	41.4	400	204
10	250	27	1.86	32	2.2	500	34.4	400	204	27	1.86	32	2.2	500	34.4	400	204	-	-	-	-	-	-	400	204
12	300	23	1.6	27	1.86	400	27.5	400	204	23	1.58	27	1.86	400	27.5	400	204	-	-	-	-	-	-	400	204

For 30" (762mm) - 44" (1117.6mm) Size, consult BS&B for ratings and availability

### Type B Solid Metal Rupture Disks for Bolted, Flange, and Union Type Safety Heads

Linings - Standard materials: FEP Plastic (Teflon®)  
 Maximum temp. 400°F  
 Special materials: TFE plastic (Teflon®)  
 Maximum Temp. 500°F

Coatings - Vinylite, a mild corrosion retardant for disk metal can be applied to one or both sides of disk. Maximum temperature: 150°F

1. All liners have passed a spark test to assure pin hole-free condition.
2. Protective ring is required for solid metal disks with FEP/TFE lining on both sides in all disk materials except aluminum. Specify Type BR, BRV, BV, BRV, BRR, BSV (Angular Seat Only)

Burst tolerances are the maximum expected variation from the disk stamped burst pressure.

#### Normal Rupture Tolerances for Type B Series Solid Metal Disks

Marked Burst Pressure (psig)	Expected Rupture Tolerance
Greater than 2 to less than 15.....	± 1.5psig
15 to less than 40.....	± 2.0psig
40 and above.....	± 5%

### Standard Manufacturing Ranges for Solid Metal Disks Before the Disk is Stamped

Desired Pressure Rating		Test specimens must rupture within limits below of the pressure you specify			
		Plus		Minus	
psig	barg	psig	barg	psig	barg
2.5 - 3.5	0.17 - 0.24	1	0.07	1	0.07
4 - 6	0.3 - 0.4	2	0.13	1	0.07
7 - 10	0.48 - 0.03	2.5	0.17	1.5	0.1
11 - 16	0.75 - 0.05	3	0.2	2	0.13
17 - 25	1.17 - 1.72	4	0.27	2	0.13
26 - 40	1.8 - 2.76	5	0.34	3	0.2
41 - 65	2.8 - 4.5	6	0.4	4	0.27
66 - 100	4.6 - 6.9	9	0.62	5	0.34
101 - 150	6.9 - 10.3	12	0.8	6	0.4
151 - 200	10.5 - 13.7	16	1.1	9	0.62
201 - 350	13.8 - 24.1	23	1.6	12	0.8
351 - 500	24.2 - 34.4	30	2	15	1.03
501 & up	34.5 & up	6	0.4	3	0.2

#### Why A Manufacturing Range?

When ordering a rupture disk, a manufacturing range will automatically be assigned to the specified burst pressure per the table above. This eliminates the necessity for the manufacturer to stock all possible thicknesses of all materials (near 100,000 thicknesses required) to make all burst pressures. As an example, if you order a B Disk to burst at 80psig, BS&B will enter the order to the shop with the standard manufacturing range shown on the above table (+9, -5) or 75 - 89 psig. We will try for your requested pressure of 80psig but can ship the lot of disks if the tag pressure falls between 75-89psig. Once the disk is rated and stamped, 78psig for example, the burst tolerance of ± 5% now applies to this stamped pressure.

**Optional:** The standard manufacturing ranges shown above can be reduced by 1/2 or 1/4 at additional costs. Hastelloy C-276/Alloy C-276 standard manufacturing range and 1/2 range only

## Safety Heads for Type B Rupture Disks

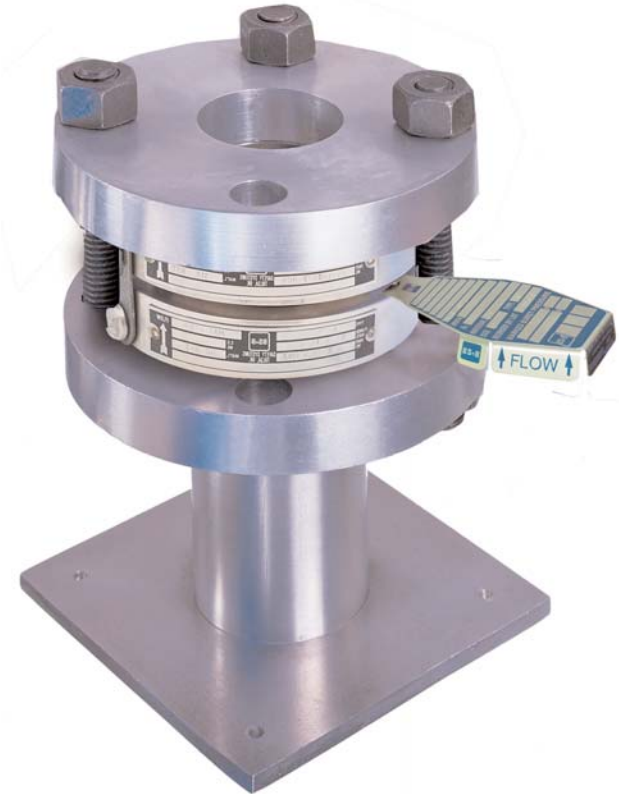
BS&B Bolted Type Safety Heads are normally compatible with ANSI (ASA) pipe flanges and the flanged connections used on most pressure vessels. Safety Head flanges feature angular seating design to accommodate Type B Solid Metal Disks.

The BS&B Quik-Sert is a reduced outside diameter flat-faced flange assembly (FA-7R) that nests between the studs of two ANSI (ASA) flanges. Flanges and rupture disk are preassembled to assure proper installation of disk (not at factory). The complete safety head can be removed without removing discharge piping.

## Union Type Safety Heads

BS&B Union Type Safety Heads are used in applications where space is limited and where quick or frequent changeout of rupture disk may be necessary. Standard sizes are 1/2", 1", 1 1/2" and 2" I.D. BS&B Union Type Safety Head design features angular seating of rupture disk and will accept Type B Solid Metal Disks.

BS&B Quik-Sert installed between two ANSI (ASA) pipe flanges.



### BS&B Quik-Sert Safety Head –

Flanges are assembled with bolted side bars or with recessed cap screws depending on the size and ANSI rating.

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