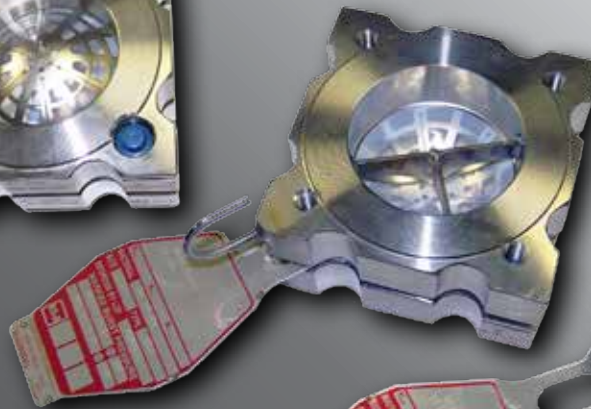
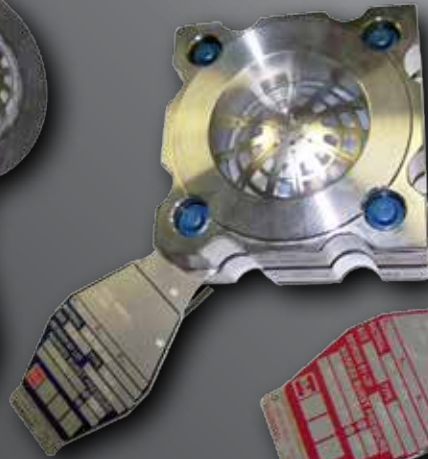


**BS&B<sup>®</sup>**

# The **Vac-Saf<sup>®</sup>** System

Two-Way Pressure Relief (Vacuum and Overpressure)

High Pressure  
Relief Direction



Low Pressure  
Relief Direction



Shown: Type **HiLo<sup>™</sup>** Two-Way Relief  
Rupture Disk and Safety Head

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# Vac-Saf™ Low Pressure Rupture Disk Devices

The Vac-Saf™ family of products satisfies requirements for low burst ratings, typically under 15 psi (1 bar) and often in the range of a few inches of water column (millibar) for the protection of vessels and silos from vacuum collapse or the effects of light overpressure. Both industrial companion flange configurations and sanitary/aseptic connection versions of the Vac-Saf product range are available to provide either one-way or two-way (pressure and vacuum) relief.

Two-way relief to provide maximum protection of gas or liquid storage vessels and plant from damage caused by excessive vacuum or overpressure. Two-way relief includes:

1. Vessels and plants are protected from an implosion occurring if excessive vacuum is created during liquid withdrawal, accidental product loss or during routine steam cleaning and sterilization.
2. Protection is provided by the same disk to relieve positive overpressure.



**Pictured:**  
Type VKB Two-Way Relief Rupture Disk With a KB-C Sanitary Outlet.

## Vac-Saf Disk Types

**Type HiLo: two-way relief:** For vacuum and over pressure relief installed in a HL-7RS, HL-7R, or HL-C (sanitary) safety head, for installation between standard pipe flanges and sanitary fittings

**Type DKB: two-way relief:** For vacuum and over pressure relief installed in a KB-7R safety head, for installation between standard pipe flanges

**Type VKB: two-way relief:** For vacuum and over pressure relief installed in a KB-C safety head with sanitary/aseptic connections

**Type P/VKB: two-way relief:** Inverted version of the type VKB disk.

**Type P/DKB: two-way relief:** For light over pressure relief installed in a PKB-7R safety head, for installation between standard pipe flanges

**Type AVB: two-way relief:** Atmospheric Vacuum Breaker Rupture Disks. Two-way relief rupture disk. Installation in the VB-7R Safety Head between standard pipe flanges

**Type AVB-ST: two-way relief:** Atmospheric Vacuum Breaker Sanitary Rupture Disks. Two-way relief rupture disk. Installation in the VB-C Safety Head

## Overpressure Direction Burst Tolerance (all Vac-Saf models and hi-side for HiLo)

Burst Pressure		Burst Tolerance
psig	bar	
>4 to 9	>0.3 to 0.6	+/- 20%
>9 to 13	>0.6 to 0.9	+/- 15%
>13 to 18	>0.9 to 1.2	+/- 10%
>18 to 25	>1.2 to 1.7	+/- 7%
>25	>1.7	+/- 5%

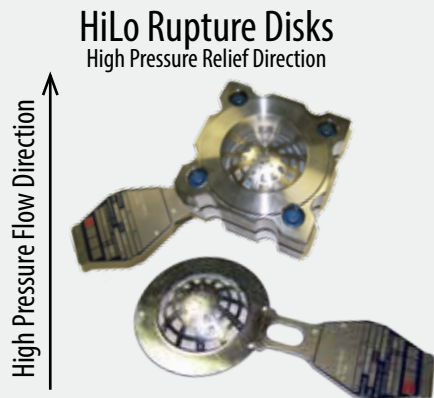
## Vacuum Direction Burst Tolerance (all Vac-Saf models and Lo-Side for HiLo)

Burst Pressure		Burst Tolerance
inch WC	mbar	
<8	<2.76	+/- 1.5 in W (3.8mbar)
>8	>2.76	+/- 20%

## Manufacturing Design Range (all Vac-Saf models Hi-Side for HiLo)

Burst Pressure		Manufacturing Design Range
psig	bar	
≤40	≤2.76	+/- 2 psig (0.138bar)
>40	>2.76	- 10%

## Type HiLo™ Two-Way Relief Rupture Disks



# Type HiLo™ Two-Way Relief Rupture Disks

## Features

- Unique, two-way acting HiLo disk prevents vessel damage from overpressure or implosion under vacuum
- Vacuum pressure relief through reverse buckling of the disk (lo-side)
- Positive pressure relief through forward acting burst of the disk (hi-side)
- Available in sizes 2 to 12 inches (50 to 300 mm)
- Temperature capability up to 400°F (200°C)
- Set pressures starting at 5 inch water column and up (12.5 mBar)
- Gas service (acceptable for liquid service with a compressible gas / vapor pocket between the liquid and disk. Minimum 20 pipe diameter gas volume on process and vent side of disk)
- Available type RLB one-way acting disk for pressure relief ranging from 5 to 300 inch water column (12.5 to 747 mbar)
- Available pretorqued safety head, type HL-7RS

## Burst Pressure Capability

### Fluoropolymer Seal Burst Pressure Range from 50°F to 150°F (10°C to 65°C)

Size		Low Pressure Direction Burst Pressure				High Pressure Direction Burst Pressure			
		WC inches		mbar		psi		bar	
		Min	Max	Min	Max	Min	Max	Min	Max
2	50	10	51	25	127	11	28	0.8	1.9
3	80	6	36	15	90	8	28	0.6	1.9
4	100	5	28	12.5	70	7	28	0.5	1.9
6	150	6	19	15	47	4	22	0.3	1.5
8	200	5	15	12.5	37	3	22	0.2	1.5

Available with other pressure/temperature combinations. Contact BS&B.

### Chemfilm® DF2919 Seal Burst Pressure Range from 50°F to 400°F (10°C to 204°C)

Size		Low Pressure Direction Burst Pressure				High Pressure Direction Burst Pressure			
		WC inches		mbar		psi		bar	
		Min	Max	Min	Max	Min	Max	Min	Max
2	50	18	300	45	747	39	75	2.7	5.2
3	80	7	300	17.5	747	28	75	1.9	5.2
4	100	5	300	12.5	747	22	75	1.5	5.2
6	150	6	300	15	747	15	75	1.0	5.2
8	200	5	300	12.5	747	12	75	0.08	5.2

For some combinations of size, temperature and burst pressures: Temperature range is -100°F to 350°F (-73°C to 176°C). Chemfilm is a registered trademark of Saint-Gobain Performance Plastics Corporation.

## The HiLo Composite Reverse Buckling Disk Components

**1. Top section** - controls Hi pressure burst rating

**2. Seal** - provides leak tightness

**3. Support Arch** - controls Lo pressure burst rating



Stainless steel is standard material for top section and support arch. Seal material is either fluoropolymer or Chemfilm®. Alternative materials are available upon request.

When activated in the “Lo” pressure direction, the arch collapses without being released which allows the seal to be opened on the knife arrangement located in the safety head. The flow area is controlled by both the relief holes in the top section (which does not open) and the knife arrangement, which punctures the seal.

When activated in the “Hi” pressure direction, the top section tears at the apex of the dome and opens in a flower petal arrangement, allowing the seal to open. (The arch remains in position.)

**Burst pressure capability:** The available burst pressure is determined by the material used for the HiLo seal.



# Vac-Saf™ Low Pressure Rupture Disk Devices

## Type **HiLO™** Safety Head Options

HL-7RS Pretorqued Safety Head allows the HiLo or RLB rupture disk to be rigidly clamped before installation between companion flanges. The disk can be inspected and leak tested before mounting between companion flanges, or at some intermediate inspection interval. The HL-7RS shares the overall dimensions of the type SRB-7RS safety head. Please review Catalog #77-4001 Sta Saf.



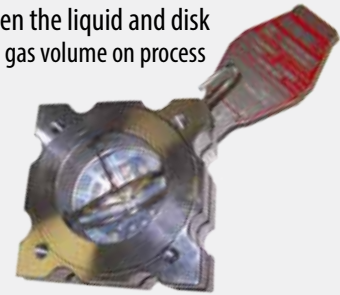
HL-7R Pre-Assembled Safety Head locates are inside the bolt circle of a pair of companion flanges. The companion flange bolt loading energizes the seal between the HiLo and the HL-7R safety head. Care is required in following the BS&B recommended companion flange torque load to achieve optimum disk performance.

*HL-7RS and HL-7R safety heads are available in 316 stainless steel and carbon steel as standard. Alternative materials are available upon request.*

## Type **RLB™** Rupture Disks: One-Way Pressure or Vacuum Relief

### Features

- Prevents vessel damage from light overpressure
- Available in sizes 2-12 inches (50-200 mm)
- Designed for low pressure applications (5" WC to 300" WC)
- Available in temperatures from -40°F to 400°F (-40°C to 204°C)
- Gas service (acceptable for liquid service with a compressible gas / vapor pocket between the liquid and disk Minimum 20 pipe diameter gas volume on process and vent side of disk)
- Withstands full vacuum
- Non-fragmenting design



## Type **HiLO™** Sanitary / Hygienic Rupture Disks for pharmaceutical, biotechnical and food industries

The HiLo-S rupture disk and HL-C safety head, with quick release hygienic fittings, provide easy installation and replacement. The hygienic seal provides a leak-tight connection (a thin gasket is required). The clamp is supplied with an extended hexagonal nut for accurate torquing. The HiLo-S sanitary rupture disk and HL-C safety head are manufactured with a uniformly smooth internal finish and supplied cleaned and packaged ready for use.



HL-C safety head

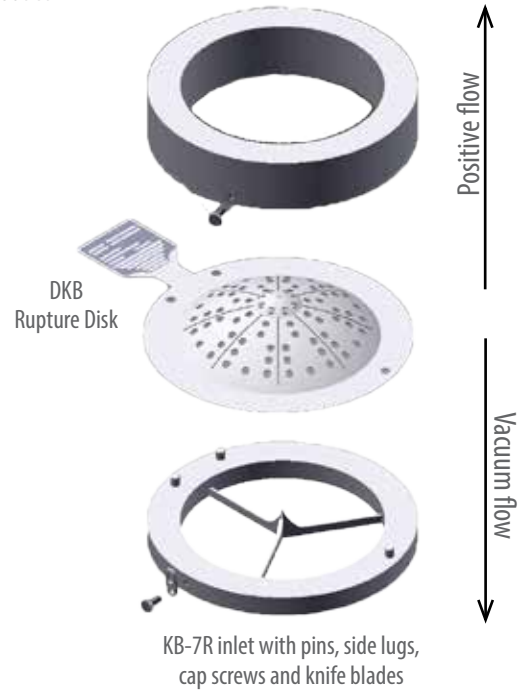
### Sanitary VB-C and HL-C Holder Dimensions

Disk/Holder Size		Clamp Connection Size/ Tube O.D.				Face-to-Face Dimensions			
in	mm	Mid-Clamp		End Connections		VB-C		HL-C	
		in	mm	in	mm	in	mm	in	mm
2	50	3	80	2	50	3	80	5	80
		3	80	3	80	3	90	3	80
3	80	4	100	3	80	4	130	5	130
		4	100	4	100	4	130	3	80
4	100	6	150	4	100	5.5	100	6.5	140
		6	150	6	150	5.5	100	4	100
6	150	8	200	6	150	5.5	140	4	100
		8	200	8	200				
8	200	10	250	8	200	Contact BS&B		5	130
		10	250	10	250				
10	250	Contact BS&B for dimensions							
12	300								



## Industrial Flanged Installation Using DKB Disk

KB-7R Outlet



## Types **DKB™** and **VKB™** Rupture Disks **Features**

- Unique two-way acting disks provide vacuum or overpressure
- Available in sizes 2-8 inches (50-200 mm)
- Vacuum relief pressures available from 44 inch WC (110 mbar) down to 5.5 inches WC (14 mbar)
- Gas service (acceptable for liquid service with a compressible gas / vapor pocket between the liquid and disk)
- Disk offers smooth surface towards the process which prevents product accumulation and facilitates cleaning of the disk
- The standard material of the disk's metal section is 316ss. Consult BS&B regarding other materials, e.g. Inconel® alloy 600, nickel 200, Monel® alloy 400 and Hastelloy® alloy C-276. The disk's seal material is fluoropolymer.

### Pressure Range for Vacuum and Overpressure Positive Relief for Disk Types DKB and VKB at 72°F (22°C)

Disk Size		Vacuum Relief				Vacuum Relief Area		Overpressure Relief			
		Min		Max				Min		Max	
in	mm	in WC	mbar	in WC	mbar	sq in	sq cm	psig	barg	psig	barg
2	50	7.5	19	44	110	1.5	9.7	18	1.2	170	12
3	80	6.5	16	30	75	3.6	23.0	16	1.1	170	12
4	100	5.5	14	30	75	5.9	38.3	13	0.9	119	8.2
6	150	5.5	14	30	75	12.3	79.4	13	0.9	90	6.2
8	200	5.5	14	20	50	18.5	119.4	7	0.5	55	3.8

### Sanitary KB-C and P/KB-C Holder Dimensions

Disk/Holder Size		Clamp Connection Size/ Tube O.D.				Face-to-Face Dimensions			
		Mid-Clamp		End Connections		KB-C		P/ KB-C	
in	mm	in	mm	in	mm	in	mm	in	mm
2	50	3	80	2	50	3	80	3	80
		3	80	3	80	3.5	90	3	80
3	80	4	100	3	80	5	130	5	130
		4	100	4	100	3	80	3	80
4	100	6	150	4	100	4	100	5.5	140
		6	150	6	150	4	100	4	100
6	150	8	200	6	150	5.5	140	4	100
		8	200	8	200	4	100		
8	200	10	250	8	200	7	180	Contact BS&B	
		10	250	10	250	4.5	115		
10	250	Contact BS&B for dimensions							
12	300								

## Sanitary/Aseptic Installation Using VKB Disk





# Vac-Saf™ Low Pressure Rupture Disk Devices

## Types **P/DKB™ P/VKB™** Rupture Disks

Types P/DKB and P/VKB rupture disk are one-way acting disk designed to relieve light overpressure. The disks may be used in either gas or liquid service with gas pocket. The type P/VKB is the inverted style of the type VKB disk.

### Vacuum Relief or Light Overpressure Relief

At the rated relief pressure, the disk seal separates from the perforated metal section to snap against a set of knife blades located in the disk holder inlet. The perforated metal section remains intact, and flow through the holes in the metal section relieves the pressure.

Note: the P/DKB and P/VKB are used for light overpressure. For vacuum, a DKB or VKB is used.

#### Pressure Range for Light Overpressure Relief for Disk Types P/DKB and P/VKB at 72°F (22°C)

Disk Size		Positive Relief				Positive Relief Area	
		Min		Max			
in	mm	in WC	mbar	in WC	mbar	sq in	sq cm
2	50	7.5	19	44	110	1.5	9.7
3	80	6.5	16	30	75	3.6	23.0
4	100	5.5	14	30	75	5.9	38.3
6	150	5.5	14	30	75	12.3	79.4
8	200	5.5	14	20	50	18.5	119.4

### P/DKB™ and P/VKB™ Features

- Unique one-way acting disks prevent vessel damage from light overpressure
- Available in sizes 2-8 inch (50-200mm)
- Pressures available from 44 inch WC (110 mbar) down to 5.5 inch WC (14 mbar)
- Gas service (acceptable for liquid service with a compressible gas / vapor pocket between the liquid and disk)
- Asymmetric alignment pins in the safety head mate with locating holes in the rupture disk ensures centering and orientation of the disk in the safety head
- The standard material of the disk's metal section is 316ss. Consult BS&B regarding other materials.

### Operating Pressure

The system may operate up to 80% of the minimum of the burst range without affecting the service life of the disk.

### Operating Temperature Range

Minimum -40°F (-40°C) to maximum 175°F (79.44°C) risks may be steam cleaned at 260°F (126°C) but low pressures must be maintained.

## Type **AVB-ST™** for Sanitary Service

The Type AVB-ST rupture disk is a two-way acting flat disk for positive pressure and light vacuum relief. The type P/AVB-ST rupture disk is a one-way acting flat disk designed for light positive pressure relief for applications where sanitary/aseptics ferrule type fittings are used.

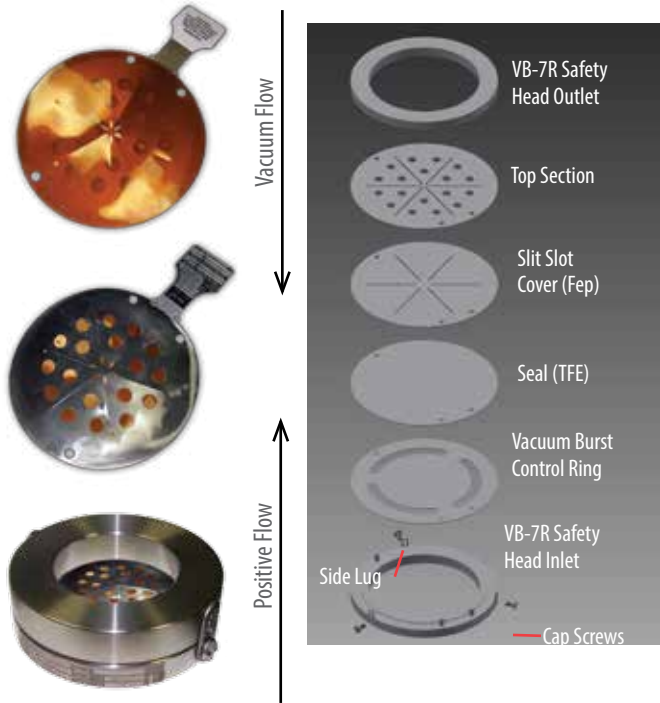
The P/AVB-ST disk is an inverted form of the type AVB-ST disk and satisfies the medium range of overpressure and vacuum relief requirements that cannot be met by the P/VKB disk. Temperature range minimum -40°F (-40°C), maximum 400°F (204°C). Other sizes and material available on request. The construction of the disk may not be suitable for all sanitary applications; consult BS&B



Sanitary VB-C Holder

# AVB™ Atmospheric Vacuum Breaker Rupture Disks

A two-way relief rupture disk designed to protect vessels and silos from both positive overpressure and implosions under vacuum conditions.



## Positive Pressure Relief. Min / Max Burst Pressures at 72°F (22°C)

Disk Size		psig		barg		Relief Area
in	mm	Min	Max	Min	Max	
3	80	5	100	0.35	6.89	Full
4	100	5	100	0.35	6.89	Full
6	150	3	85	0.21	5.86	Full
8	200	3	85	0.21	4.48	Full

## VB-7R Safety Head Dimensions

Normal Size		Flange Bolting		Outside Diameter		Overall Height	
in	mm	ANSI	DIN	ANSI (in)	DIN (mm)	in	mm
3	80	150	10/16	5.3	142	1.3	32
4	100	150	10/16	6.8	162	1.3	32
6	150	150	10/16	8.6	217	1.3	32
8	200	150	10	10.9	272	1.3	32

## Temperature Limits

	°F	°C
Min	-40	-40
Max	400	204

## Features

- A two-way acting, flat rupture disk which bursts in one direction to relieve positive overpressure and vacuum relief in the other direction
- Available in sizes 2-12 inches (150-200mm)
- Operating pressures rated up to 70% of the tagged burst pressure in the positive direction and 60% in the vacuum direction
- The AVB disk is installed in a VB-7R Quicksert safety head which fits inside the bolt circle of companion flanges
- Asymmetric alignment pins in the safety head mate with locator holes in the rupture disk for proper alignment and installation

## Manufacturing Design Ranges (MDR)

- Available with 0%, 5% and 10% MDR
- Disks with 0% MDR will be tagged at requested rating
- On disks with 5% or 10% MDR, the total range is placed on the minus side of the requested burst pressure
- Applicable only in the positive relief direction

**Example:** If a 50 psig (3.4barg) disk is requested with a 10% manufacturing range, it may be tagged at any pressure between 45 (3.1barg) and 50 psig (3.4barg)

Tagged Burst Pressure Rating		Burst Tolerance %
psig	barg	
3-5	0.2-0.4	± 25
6-8	0.4-0.6	± 20
9-12	0.6-0.8	± 15
13-17	0.9-1.2	± 10
18-25	1.2-1.7	± 7
26 +	1.8 +	± 5

## Vacuum Relief Min/Max Burst Pressures at 72°F (22°C)

Disk Size		psig		barg		Burst Range		Relief Area	
in	mm	Min	Max	Min	Max	psig	barg	in <sup>2</sup>	cm <sup>2</sup>
3	80	3	10	0.206	0.689	± 0.5	± 0.0345	2.0	13.1
4	100	2	10	0.138	0.689	± 0.5	± 0.0345	3.6	23.1
6	150	1.5	6	0.103	0.413	± 0.3	± 0.0172	5.9	38.3
8	200	1	6	0.069	0.413	± 0.3	± 0.02	9.3	59.7

**Note:** Burst range includes all tolerances. No additional manufacturing design range.

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