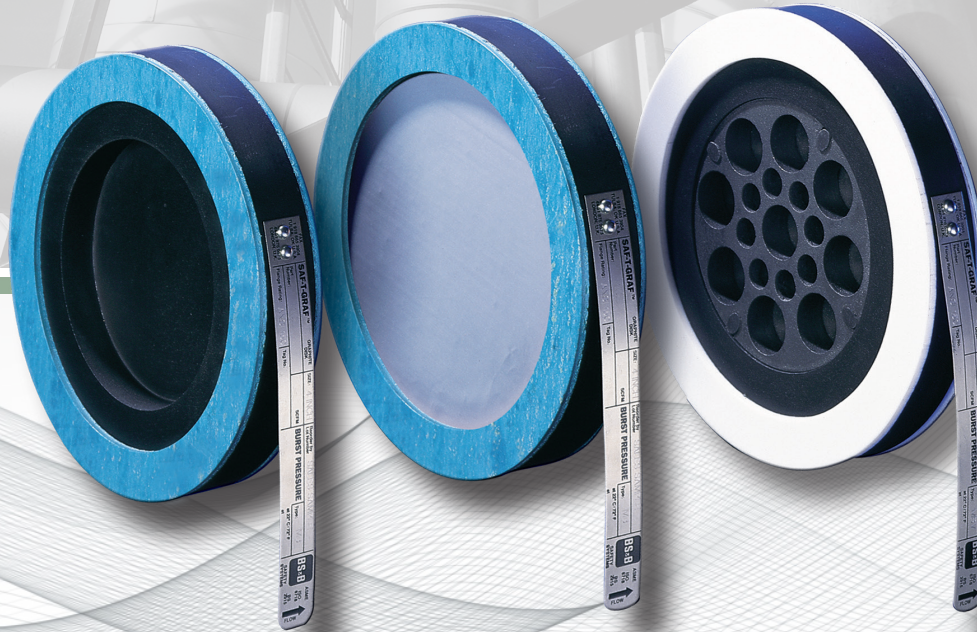


Catalog #77-8500



# Saf-T-Graf®

## Graphite Rupture Disks



# Saf-T-Graf™ Graphite Rupture Disks

## Introduction

Saf-T-Graf® graphite rupture disks are manufactured from high quality graphite impregnated with an environmentally friendly high temperature resin. Saf-T-Graf disks may be applied in gas, liquid or two phase flow applications.. At the heart of the Saf-T-Graf product is its monobloc construction. This rupture disk device is both disk

and holder in one unit, designed for simple installation between companion flanges. Depending upon the application, different models of Saf-T-Graf monobloc disks are available. Their performance is described in the table below:

## Performance Features

|                            | MB                                    | AMB                                   | IMB                                   | AIMB                                  | FSM                                   | AFSM                                  |
|----------------------------|---------------------------------------|---------------------------------------|---------------------------------------|---------------------------------------|---------------------------------------|---------------------------------------|
| Armored                    | -                                     | Yes                                   | -                                     | Yes                                   | -                                     | Yes                                   |
| Sizes available            | 0.5-24 inches<br>(15-600mm)           | 0.5-24 inches<br>(15-600mm)           | 0.5-24 inches<br>(15-600mm)           | 0.5-24 inches<br>(15-600mm)           | 0.5-24 inches<br>(15-600mm)           | 0.5-24 inches<br>(15-600mm)           |
| Vacuum resistant           | >22 psi (>1.52bar)                    | >22 psi (>1.52bar)                    | > 22 psi (>1.52bar)                   | >22 psi (>1.52bar)                    | >22 psi (>1.52bar)                    | >22 psi (>1.52bar)                    |
| Standard temperature range | -100°F to +400°F<br>(-73°C to +205°C) | -100°F to +400°F<br>(-73°C to +205°C) | -100°F to +400°F<br>(-73°C to +205°C) | -100°F to +400°F<br>(-73°C to +205°C) | -100°F to +400°F<br>(-73°C to +205°C) | -100°F to +400°F<br>(-73°C to +205°C) |
| ASME "UD" stamped          | Yes                                   | Yes                                   | Yes                                   | Yes                                   | Yes                                   | Yes                                   |
| "CE" marked                | Yes                                   | Yes                                   | Yes                                   | Yes                                   | -                                     | -                                     |
| *Vacuum support option     | Type MBV disk                         | Type AMBV disk                        | -                                     | -                                     | -                                     | -                                     |
| Fluoropolymer liner        | -                                     | -                                     | Type IMBL Disk                        | Type AIMBL Disk                       | -                                     | -                                     |
| High temperature service   | -                                     | Type AMB-HTA<br>Disk<800°F (427°C)    | -                                     | Type AIMB-HTA<br>Disk<800°F (427°C)   | -                                     | -                                     |

\*Note: Required for disks rated below 22 psig (1.5 barg) where the disk may be exposed to a vacuum.

## Armoring

Armor is recommended for all graphite disks for added safety, easier installation and elimination of breakage during installation. Armor consists of a steel ring encircling the outside diameter of the graphite rupture disk. This design reduces the possibility of a premature burst due to uneven or excessive torquing of the flange studs.

Armor is standard on disks with burst pressures in excess of 150 psig or to fit ANSI Class 300 / 600 flanges. Carbon steel armor is standard with 300 series stainless steel as an option. BS&B strongly recommends armor for applications where lateral blow out / loss of containment represents a safety concern (for example at higher burst pressures and whenever personnel may be present).

BS&B strongly recommends armor for disks sizes shown when rated pressures equal to or exceed values in chart.

| Size  |       | Burst pressure |      |
|-------|-------|----------------|------|
| in    | mm    | psig           | barg |
| 0.5-3 | 15-80 | 150            | 10.3 |
| 4     | 100   | 100            | 6.9  |
| 6-10  | 75    | 75             | 5.2  |
| 12-24 | 50    | 50             | 3.5  |



## Saf-T-Graf Model Description

- MB - Monobloc
- AMB - Armored monobloc
- IMB - Inverted monobloc
- AIMB - Armored inverted monobloc
- IMBL - Inverted monobloc with liner
- AIMBL - Armored inverted monobloc with liner
- FSM - Fail-Saf monobloc
- AFSM - Armored Fail-Saf monobloc

# Saf-T-Graf™ Graphite Rupture Disks

## Operating Ratio

Extended service life for operating pressures up to 80% of the disk minimum burst pressure in a static environment. Operating ratio can vary depending upon operating conditions. A cyclic duty from vacuum to positive differential pressure with a low burst pressure graphite rupture disk may be limited to a 60% operating ratio. As burst pressure increases and range of pressure cycling decreases, the limit of 80% is achieved. Consult factory for more details.

## Expedited Delivery

The following standard type MB sizes and burst pressures are available for quick delivery: 1, 1.5, 2, 3, 4, 6 and 8 inches (25, 40, 50, 80, 100, 150 and 200mm); 10, 15, 20, 25, 30, 40, 50, 75, 100, 125, 150 psig (0.7, 1, 1.4, 1.7, 2, 2.8, 3.4, 5.2, 6.9, 8.6, and 10.3bar).

## Burst Alert Sensor

A GAS™ (graphite alert sensor) is available to provide warning of a burst graphite disk when connected to an appropriate monitoring circuit.

## Gaskets

Standard gasket material for all Saf-T-Graf disks is Klinger-Sil® C-4401. Optional materials include PTFE Solid, Neoprene, Garlock® 3000, Grafoil® and Gylon® 3510. Gaskets are always attached for models MB, AMB, MBV and AMBV. For all other models, gaskets are supplied attached unless specially ordered without gaskets.

Note: The gasket contributes to burst pressure control for models MB, AMB, MBV and AMBV.

## Companion Flange Rating

Saf-T-Graf monobloc rupture disks are supplied for installation between companion flanges of all international standards including ANSI / ASME, EU / DIN / AFNOR and JIS. The flange standard and its pressure rating must be identified at the time of order.

## Temperature

Saf-T-Graf graphite disks are available with coincident temperatures from -290° to 800°F (-179° to 427°C). Above 400°F (205°C) a high temperature assembly (HTA) is required and may be used with disk types AMB, AIMB, or AFSM. The HTA acts as a thermal barrier, reducing the temperature at the AMB, AIMB, or AFSM disk by up to 200°F (93°C). HTA's are armored. Up to two HTA's may be deployed in series, upstream of an AMB, AIMB, or AFSM rupture disk device.

Note: HTA's shall not be used with graphite disks having a vacuum support. The vacuum support will block the release of the HTA insulation material, restricting flow.

## Burst Tolerance

| Marked burst pressure       | Burst tolerance                |
|-----------------------------|--------------------------------|
| < 1 psig<br>(0.07bar)       | -0/+0.75 psig<br>(-0/+0.05bar) |
| 1-15 psig<br>(0.07-1.03bar) | +/-0.75 psig<br>(+/-0.05bar)   |
| > 15 psig<br>(1.03bar)      | +/-5%                          |

For sizing, see the BS&B website or contact BS&B for appropriate  $K_R$  values

Example: If a Saf-T-Graf MB type disk is ordered with a 29 psig (2bar) burst pressure, it will burst between 27.5 psig (1.9bar) and 30.5 psig (2.1bar).

For reduced tolerances contact BS&B



# Saf-T-Graf™ Graphite Rupture Disks

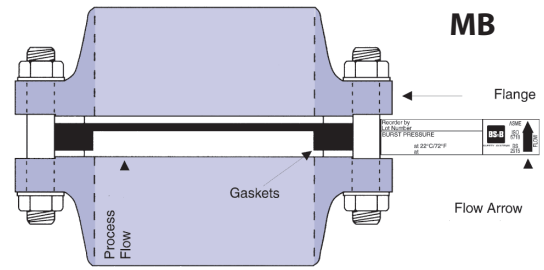
## Type MB™ Series

Model MB™, MBV™, AMB™, AMBV™

The type MB monobloc satisfies most applications requiring the capabilities of a low burst pressure, full opening, broadly corrosion resistant rupture disk where the application can accept the fragmentation of a graphite disk activation. The armored version is called the AMB.



Model MBV (dial)



Sizes 0.5 to 24 inches (15 to 600mm) with temperature range to 400°F (205° C)

Monobloc graphite disks require vacuum supports under the following application conditions:

- Burst pressure is below 22 psig (1.52bar) and full vacuum may be present (-14.5 psi / -1bar)
- Vacuum exceeds 30% of burst pressure. For example, a 10 psig (0.7bar) burst pressure disk will experience a -3 psig (-0.2bar) vacuum
- Cycling between vacuum conditions and positive pressure may occur and burst pressure is below 22 psig (1.52bar)
- Vacuum supports are needed for disks rated below 22 psig (1.52bar) and where a vacuum condition exists. Model MBV or AMBV vacuum supports are not required on 0.5 and 0.75 inch (15 and 20mm) monobloc disks
- Temperature ranges -100° to 400°F (-73° to 205°C). For further clarification on when to use a vacuum support, consult factory

The monobloc type MBV may include either a 'bar' or 'dial' type vacuum support. Both types are non opening when the MBV rupture disk activates. The 'bar' type support is supplied for MBV disks having burst pressure between 10 and 22 psi (0.69 and 1.52bar). The 'dial' type support is supplied for MBV disks having burst pressures below 10 psi (0.69bar). The adjustment in free flow area varies by support type and MBV disk nominal size; see table. When armored the disk type becomes AMBV.

## Specifications

| Nominal size |     | Burst ratings |     |      |      | Disk thickness |    | ANSI flange rating | DIN   |
|--------------|-----|---------------|-----|------|------|----------------|----|--------------------|-------|
|              |     | psig          |     | barg |      |                |    |                    |       |
| in           | mm  | Min           | Max | Min  | Max  | in             | mm |                    |       |
| 0.5          | 15  | 25            | 150 | 1.7  | 10.3 | 0.6            | 16 | 150                | 10/16 |
| 0.8          | 20  | 25            | 150 | 1.7  | 10.3 | 0.6            | 16 | 150                | 10/16 |
| 1            | 25  | 10            | 150 | 0.7  | 10.3 | 0.9            | 22 | 150                | 10/16 |
| 1.5          | 40  | 7             | 150 | 0.5  | 10.3 | 0.9            | 22 | 150                | 10/16 |
| 2            | 50  | 2             | 150 | 0.1  | 10.3 | 0.9            | 22 | 150                | 10/16 |
| 3            | 80  | 1             | 150 | 0.1  | 10.3 | 0.9            | 22 | 150                | 10/16 |
| 4            | 100 | 1             | 150 | 0.1  | 10.3 | 0.9            | 22 | 150                | 10/16 |
| 6            | 150 | 1             | 150 | 0.1  | 10.3 | 0.9            | 22 | 150                | 10/16 |
| 8            | 200 | 0.5           | 150 | 0.04 | 10.3 | 1.1            | 29 | 150                | 10/16 |
| 10           | 250 | 0.25          | 125 | 0.02 | 8.6  | 1.5            | 38 | 150                | 10/16 |
| 12           | 300 | 0.25          | 125 | 0.02 | 8.6  | 2.0            | 51 | 150                | 10/16 |
| 14           | 350 | 0.25          | 100 | 0.02 | 6.9  | 2.3            | 57 | 150                | 10/16 |
| 16           | 400 | 0.25          | 100 | 0.02 | 6.9  | 2.5            | 64 | 150                | 10/16 |
| 18           | 450 | 0.25          | 100 | 0.02 | 6.9  | 2.8            | 70 | 150                | 10/16 |
| 20           | 500 | 0.25          | 50  | 0.02 | 3.4  | 3.0            | 76 | 150                | 10/16 |
| 24           | 600 | 0.25          | 50  | 0.02 | 3.4  | 3.0            | 76 | 150                | 10/16 |

## Vacuum Support Factors

| Size      | 1/2 | 3/4 | 1   | 1 1/2 | 2   | 3   | 4   | 6   | 8   | 10  | 12  | 14  | 16  | 18  | 20  | 24  |
|-----------|-----|-----|-----|-------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| Dial type | -   | -   | -   | .56   | .57 | .60 | .62 | .58 | .60 | .60 | .60 | .60 | .60 | .60 | .60 | .60 |
| Bar type  | -   | -   | .70 | .80   | .80 | .80 | .80 | .80 | .80 | .80 | .80 | .80 | .80 | .80 | .80 | .80 |

Dial type 1/4-9 psig (0.02-0.6bar); Bar type: 10-22 psig (0.7-1.5bar)

Note: See photograph above to view difference between "dial" and "bar" type vacuum supports.

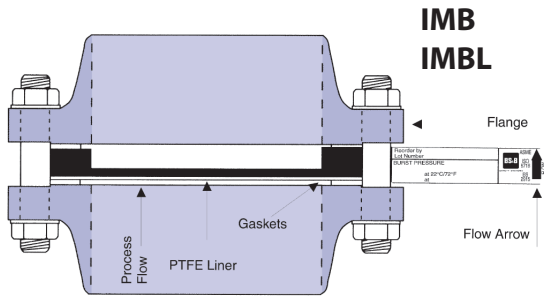
# Saf-T-Graf™ Graphite Rupture Disks

## IMB™ Inverted Monobloc

The type IMB satisfies higher burst pressure requirements than the type MB disk. Inverting the recess location from upstream to downstream, the graphite structure withstands the higher stresses associated with higher burst pressure. At the higher burst pressure of the type IMB disk, a vacuum support is not required. Armored inverted monobloc disks are type AIMB.

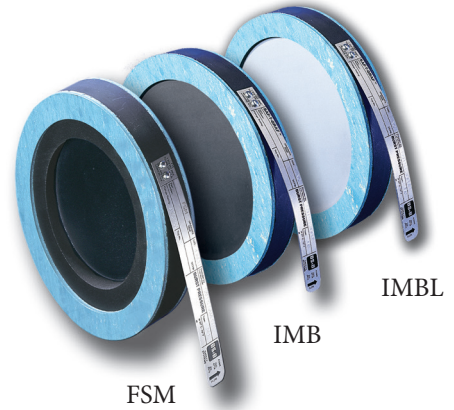
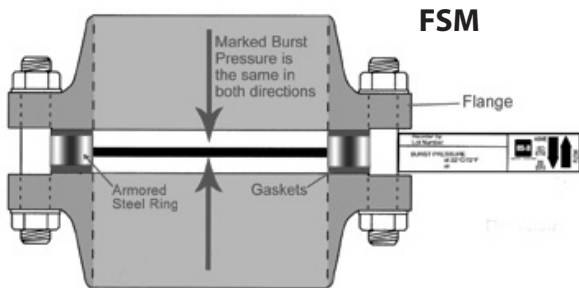
## IMBL™ Inverted Monobloc

An optional fluoropolymer liner can be provided on the inlet side of the inverted monobloc graphite disk to enhance corrosion resistance and non-stick properties. The lined type is designated IMBL or when armored, AIMBL.



## FSM™ Fail-Saf Monobloc

Having the same burst pressure capability as the IMB disk, the type FSM has a recess on both sides resulting in the same burst rating when actuated from either direction, hence 'fail-saf' monobloc. When armored, the disk type is AFSM.



**FSM, IMB, AIMB, IMBL and AIMBL Specifications**

| Nominal size | Burst ratings |     |      |      |    | Disk thickness |    | ANSI flange rating | DIN   |
|--------------|---------------|-----|------|------|----|----------------|----|--------------------|-------|
|              | psig          |     | barg |      | in | mm             |    |                    |       |
| 0.5          | 15            | 25  | 250  | 1.72 | 17 | 0.6            | 16 | 150                | 10/16 |
| 0.5          | 15            | 25  | 1000 | 1.72 | 69 | 0.6            | 16 | 300/600            | 25/40 |
| 0.8          | 20            | 25  | 250  | 1.72 | 17 | 0.6            | 16 | 150                | 10/16 |
| 0.8          | 20            | 25  | 1000 | 1.72 | 69 | 0.6            | 16 | 300/600            | 25/40 |
| 1            | 25            | 10  | 250  | 0.   | 17 | 0.9            | 22 | 150                | 10/16 |
| 1            | 25            | 10  | 1000 | 0.7  | 69 | 1.0            | 25 | 300/600            | 25/40 |
| 1.5          | 40            | 7   | 250  | 0.5  | 17 | 0.9            | 22 | 150                | 10/16 |
| 1.5          | 40            | 7   | 1000 | 0.5  | 69 | 1.0            | 25 | 300/600            | 25/40 |
| 2            | 50            | 3   | 250  | 0.21 | 17 | 0.9            | 22 | 150                | 10/16 |
| 2            | 50            | 3   | 500  | 0.21 | 34 | 1.0            | 25 | 300/600            | 25/40 |
| 3            | 80            | 2   | 250  | 0.14 | 17 | 0.9            | 22 | 150                | 10/16 |
| 3            | 80            | 2   | 500  | 0.14 | 34 | 1.2            | 32 | 300                | 25/40 |
| 4            | 100           | 1.5 | 250  | 0.10 | 17 | 0.9            | 22 | 150                | 10/16 |
| 4            | 100           | 1.5 | 500  | 0.10 | 34 | 1.3            | 32 | 300                | 25/40 |
| 6            | 150           | 1   | 170  | 0.07 | 12 | 0.9            | 22 | 150                | 10/16 |
| 6            | 150           | 1   | 450  | 0.07 | 31 | 1.8            | 44 | 300                | 25/40 |
| 8            | 200           | 0.5 | 170  | 0.04 | 12 | 1.1            | 29 | 150                | 10/16 |
| 8            | 200           | 0.5 | 450  | 0.04 | 31 | 2.3            | 57 | 300                | 25/40 |
| 10           | 250           | 0.3 | 150  | 0.02 | 10 | 1.5            | 38 | 150                | 10/16 |
| 12           | 300           | 0.3 | 150  | 0.02 | 10 | 2.0            | 51 | 150                | 10/16 |
| 14           | 350           | 0.3 | 150  | 0.02 | 10 | 2.3            | 57 | 150                | 10/16 |
| 16           | 400           | 0.3 | 150  | 0.02 | 10 | 2.5            | 64 | 150                | 10/16 |
| 18           | 450           | 0.3 | 150  | 0.02 | 10 | 2.8            | 70 | 150                | 10/16 |
| 20           | 500           | 0.3 | 150  | 0.02 | 10 | 3.0            | 76 | 150                | 10/16 |
| 24           | 600           | 0.3 | 150  | 0.02 | 10 | 3.0            | 76 | 150                | 10/16 |

# Saf-T-Graf™ Replaceable Element, Graphite Rupture Disks

Replaceable element graphite disks combine the low burst pressure, full opening, broad corrosion resistance of the monobloc Saf-T-Graf technology with a metal safety head. The replaceable element rupture disk and the metal safety head combined comprise the rupture disk device. For those wishing to avoid risk of lateral blowout, the BS&B replaceable element graphite disks are all armored.

**Note:** Safety heads are available in graphite upon request

## Model RE

The unique fail safe design of the RE type disk assures the disk cannot be installed incorrectly in the safety head as the disk will burst at its rated burst pressure in either direction. A disk with a burst pressure of 22 psig (1.52bar) or above will withstand full vacuum.



## Model REL

An REL type disk with a fluoropolymer liner permanently attached to the process side of the disk can be supplied for extra protection against corrosive fluids or to prevent product build-up.

## Model REV

The REV type disk is suitable for applications where vacuum conditions exist and when the burst pressure is less than 22

### Performance Features - Replaceable Element

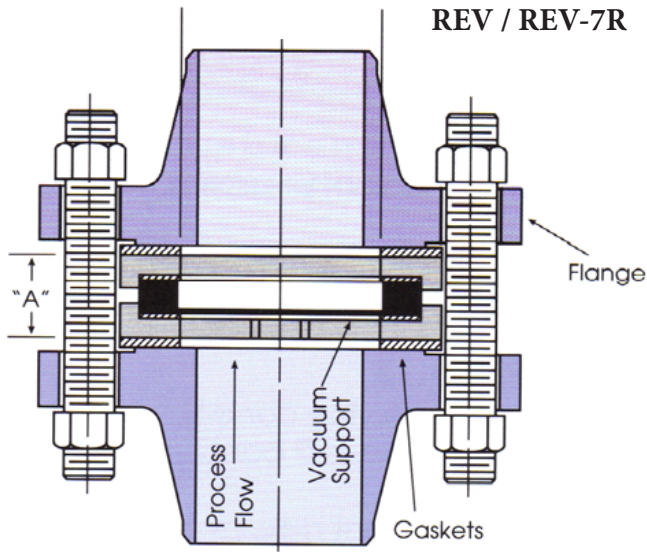
|                            | RE                                   |
|----------------------------|--------------------------------------|
| Armored                    | Yes                                  |
| Fail safe                  | -                                    |
| Vacuum resistant           | > 22psi<br>(> 1.52bar)               |
| Vacuum support option      | Type REV disk                        |
| Standard temperature range | -100° to 400°F<br>(-73° to 205°C)    |
| High temperature service   | Type AIMB-HTA Disk<br><800°F (427°C) |
| fluoropolymer liner        | Type REL disk                        |
| Sizes available            | 1 to 24 inches<br>(25 to 600mm)      |
| ASME "UD" stamped          | Yes                                  |
| "CE" marked                | Yes                                  |

### RE, REL and REV Burst Pressure Capability

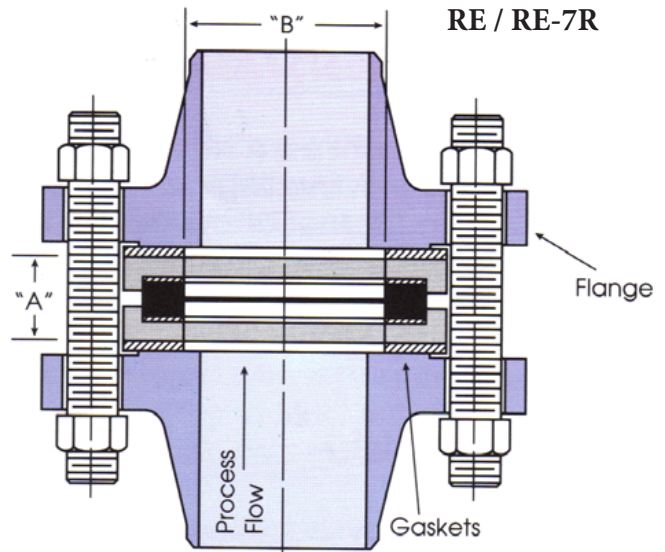
| Nominal size |     | Burst ratings @ 72°F (22°C) |     |      |     | Total assembly thickness 'A' |    |          |     |
|--------------|-----|-----------------------------|-----|------|-----|------------------------------|----|----------|-----|
| in           | mm  | psig                        |     | barg |     | 316ss                        |    | Graphite |     |
|              |     | Min                         | Max | Min  | Max | in                           | mm | in       | mm  |
| 1            | 25  | 10.0                        | 435 | 0.7  | 30  | 1.1                          | 28 | 1.1      | 28  |
| 1.5          | 40  | 7.0                         | 290 | 0.5  | 20  | 1.1                          | 28 | 1.2      | 31  |
| 2            | 50  | 3.0                         | 217 | 0.2  | 15  | 1.1                          | 28 | 1.3      | 32  |
| 2.5          | 65  | 3.0                         | 174 | 0.2  | 12  | 1.2                          | 30 | 1.5      | 37  |
| 3            | 80  | 2.2                         | 145 | 0.2  | 10  | 1.4                          | 35 | 1.7      | 42  |
| 4            | 100 | 2.2                         | 116 | 0.2  | 8   | 1.5                          | 37 | 1.9      | 47  |
| 5            | 125 | 1.5                         | 87  | 0.1  | 6   | 1.6                          | 40 | 1.9      | 47  |
| 6            | 150 | 1.0                         | 72  | 0.1  | 5   | 1.7                          | 44 | 1.9      | 47  |
| 8            | 200 | 1.0                         | 58  | 0.1  | 4   | 2.0                          | 50 | 2.4      | 61  |
| 10           | 250 | 1.0                         | 43  | 0.1  | 3   | 2.0                          | 53 | 2.7      | 68  |
| 12           | 300 | 1.0                         | 36  | 0.1  | 3   | 2.4                          | 61 | 3.0      | 76  |
| 14           | 350 | 1.0                         | 29  | 0.1  | 2   | 2.5                          | 63 | 3.2      | 80  |
| 16           | 400 | 1.0                         | 21  | 0.1  | 2   | 2.8                          | 70 | 3.3      | 83  |
| 18           | 450 | 1.0                         | 21  | 0.1  | 2   | 3.0                          | 77 | 3.6      | 92  |
| 20           | 500 | 1.0                         | 17  | 0.1  | 1   | 3.5                          | 88 | 4.1      | 105 |
| 24           | 600 | 1.0                         | 17  | 0.1  | 1   | 3.7                          | 93 | 4.4      | 111 |

For proper sizing, see the BS&B website or contact BS&B for appropriate  $K_R$  values.

# Saf-T-Graf™ Replaceable Element, Graphite Rupture Disks



Type REV graphite rupture disk in REV-7R safety head (type REL / REL-7R excluding vacuum support)



Type RE graphite rupture disk in RE-7R safety head

## RE-7R Safety Head

The insert type RE-7R safety head installs inside the companion flange bolt circle and is designed to accept either type RE or type REL rupture disks.

## Flange Ratings

The safety heads are designed to fit between companion flanges of all international standards. (Refer to glossary)

## Material



Safety heads are available in carbon steel, 316ss or impregnated graphite as standard.

## REV-7R Safety Head

The REV-7R safety head is provided with an integral non-opening vacuum support on the process side and is designed to accommodate the REV disk only. The REV-7R vacuum support reduces the free flow area according to the table.

Vacuum supports are designed utilizing the latest computer software to maximize venting capacities while maintaining structural strength. Flow arrows on the side of the safety head facilitate correct installation between pipe flanges. Safety heads are machined to meet ANSI B16.5 standards.

## Vacuum Support Factors

| Size  | 1/2 | 3/4 | 1   | 1 <sup>1/2</sup> | 2   | 3   | 4   | 6   | 8   | 10  | 12  | 14  | 16  | 18  | 20  | 24  |
|---|-----|-----|-----|------------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| Dial type  | -   | -   | -   | .56              | .57 | .60 | .62 | .58 | .60 | .60 | .60 | .60 | .60 | .60 | .60 | .60 |
| Bar type   | -   | -   | .70 | .80              | .80 | .80 | .80 | .80 | .80 | .80 | .80 | .80 | .80 | .80 | .80 | .80 |

Dial type 1/4-9 psig (0.02-0.6bar)

Bar type: 10-22 psig (0.7-1.5bar)



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