The GCR™ Series
Reverse Buckling Rupture Disk

The GCR™ Series of reverse buckling disks is designed with a circular score line located at the edge of the domed area. At the marked burst pressure, the disk's dome reverses and opens by shearing around the circular score line. The GCR series uses SAF™ (Structural Apex Forming) technology, the central "dimple," present in all GCR series rupture disks ensures a damaged disk will rupture at or below the marked burst pressure. The GCR™ series is used for hygienic/aseptic applications in the pharmaceutical, biotechnology and food industries.

Process View

Side View

US Patents 5,996,605 and 6,178,983 apply; International patents pending.

The type GR-C™ outlet that provides quick installation of the GCR-S and GCR-SS reverse buckling disk onto existing standard sanitary inlet fittings. The uniquely designed gasket helps eliminate inverted installation of the rupture disk.

Features

- One disk design for both gas and liquid service
- "Fail-safe" design damage safety ratio < 1.0
- Wide range of pressures
- Ideal for CIP / SIP service
- Integral sanitary gaskets
- 8 to 16 micro-inch typical disk surface finish
- Suitable for operating pressures up to 90% of marked burst pressure* or 95% of the specified minimum burst pressure (higher operating ratios may be available)
- Meets ASME BPE standards. CE marking also available
- Designed for non-fragmentation
- 0% standard Manufacturing Design Range - optional -5%, -10%
- Withstands full vacuum at all available burst pressures
- Available SAS™ (Sanitary Alert Sensor) for burst indication or LDS (Leak Detector Sensor) with leak sensing capability
- Integral burst disk sensor option
- Wide range of available pressures

* *At marked burst pressures of 40 psig (2.76barg) and below, the recommended maximum operating pressure is 90% of the marked burst pressure, less 2 psig (0.138barg) tolerance*

Sensors

The GCR™ Series of disks are also available with integral sensors to provide an alert of a burst rupture disk. For this added feature, specify types GCR-SS™ and GCR-SMS™.

Optional SAS™ for use between standard sanitary fittings to provide an alert of a burst rupture disk. Leaking disk detection is also available; consult BS&B for details.

Materials

The GCR series disks and GR-C outlet fitting are available in 316L stainless steel as standard. Alternative materials are available on request.

Disk Specification Min / Max Burst Pressure at 72°F (22°C)

Sanitary Fitting		Burst Pressure				Overall Height		OD	
Nominal Disk Size		Min		Max					
in	mm	psi	bar	psi	bar	in	mm	in	mm
1.5	40	10	0.69	300	20.7	1.62	41	1.98	50.3
2	50	10	0.69	300	20.7	1.62	41	2.52	64
3	80	10	0.69	175	12.1	1.81	46	3.58	90.9
4	100	10	0.69	75	5.2	1.81	46	4.68	118.9
6	150	10	0.69	75	5.2				

Other burst pressures may be available - consult BS&B

Manufacturing Design Range

0% standard MDR (Manufacturing Design Range) - The user's requested burst pressure will be the marked burst pressure. An optional MDR of -5% and -10% may be selected as operating conditions permit. The MDR is applied only to the minus side of the requested burst pressure.

MDR is a range of pressures within, which the marked burst pressure must fall to be acceptable for a particular requirement as agreed upon between the rupture disk manufacturer and the user or their agent.

Example:

- Requested burst pressure 100 psig (6.89barg)
- Agreed MDR - 10%
- Therefore the marked burst pressure shall be between 90 psig (6.21barg) and 100 psig (6.89barg)

Flow Performance

The GCR Series reverse buckling disk has been specifically developed to produce superior flow performance at all burst pressures in gas or liquid service. The circular score on the disk's dome, coupled with the nonrestrictive hinge on the outlet side of the disk, ensures an excellent pressure relief opening in all service phases.

Flow resistance factor, K_R may be used to determine the relieving capacity of a system according to the ASME and CE codes and standards. Individual K_R values have been established for both gas and liquid service for the disk. K_R values are available at www.bsbsystems.com.

Gaskets

The GCR series is supplied with gaskets which meet both FDA and USP Class VI Requirements.

Material	Service temperature	
Silicone	-67°F (-55°C)	450°F (232°C)
Viton® (white or Black)	-40°F (-40°C)	400°F (204°C)
EPDM (white or Black)	-67°F (-55°C)	300°F (149°C)
PTFE blended with stainless steel	-20°F (-29°C)	450°F (232°C)

Liners

Liners are available in all sizes as optional on the process side of the disk. FEP or PFA are generally used.

Size		Minimum burst pressure for lined disks at 72°F (22°C)	
in	mm	psig	barg
1.5	40	36	2.48
2	50	36	2.48
3	80	16	1.1
4	100	12	0.83

Burst Tolerance	
Marked burst pressure	Burst tolerance
≤40 psig (2.76bar)	±2 psig (0.14bar)
>40 psig (2.76bar)	±5%

The GCR series disks may also be marked with a minimum / maximum burst pressure or the specified burst pressure and +/- performance tolerance to meet the requirements of the CE standard.

Installation

The GR-C™ and FM-C™ ensure correct disk orientation and a leak tight rupture disk installation. BS&B recommends the assembly of GCR series rupture disks using a Tri-Clamp® 13 MHHS clamp (or equivalent) with a hexagonal nut enabling control of installation torque. The GCR series disk range exhibits minimum sensitivity to changes in clamp loading on the disk induced by service temperature variations.

GCR Disk Types

GCR-S™ and GCR-SS™ with uniquely designed FDA approved gaskets are installed between a standard inlet ferrule and the GR-C™ outlet ensuring correct orientation of disk and leak tight installation.

The GCR-SM™ and GCR-SMS™ have a symmetric gasket configuration on both sides of the disk and fit between standard Tri-Clamp® (or equivalent) fittings.

The GCR-SE™ and GCR-SES™ are installed in an FM-C™ or FT-C™ safety head. The FM-C provides for flush mounting of the disk with the interior wall of the vessel while the FT-C accomplishes the same flush mounting in an "in-line" pipe configuration, both achieving minimal dead leg between the disk and process fluid. Similar flush installation is achieved with GCR-N™ and GCR-NS™ type disks when installed in NA-Connect® holders. An integral burst alert sensor is provided on the outlet side of the disk with disk types GCR-SS, GCR-SMS and GCR-NS. The GCR-SW™ is a welded ferrule assembly with the disk is welded between standard fittings.

Gasket cross section for GCR-SM™ and GCR-SMS™

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