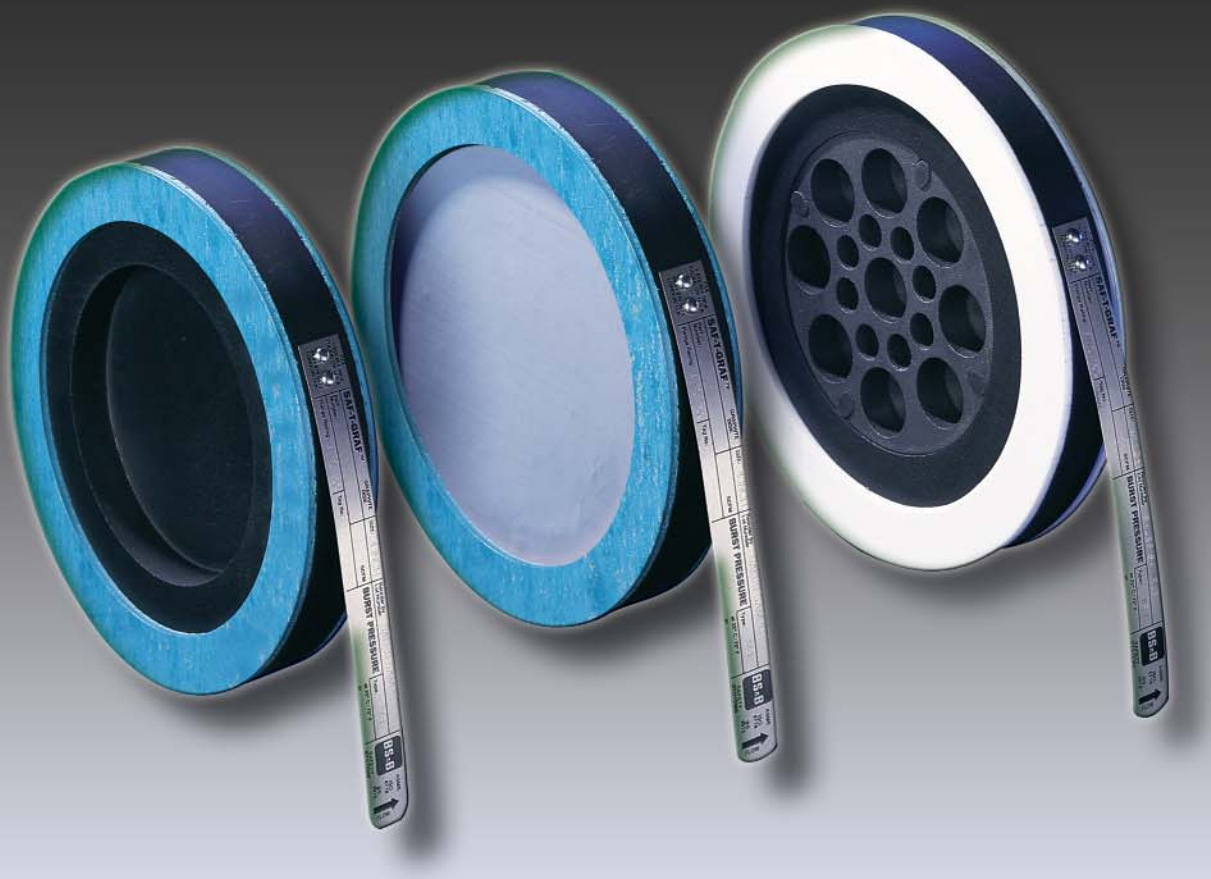
BS&B®

SAF-T-GRAF™

GRAPHITE RUPTURE DISKS



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SAF-T-GRAF® System

Introduction

Saf-T-Graf® graphite Rupture Disks are manufactured from a single piece of high quality graphite that is impregnated with an environmentally safe high temperature resin to provide excellent leak performance. All Saf-T-Graf disks may be applied in gas, liquid or two phase flow. At the heart of the Saf-T-Graf product is its Monobloc construction; the rupture disk and holder are integral, designed for simple installation between companion flanges with no potential for leakage between separate disk and holder components. Depending upon the application, different models of Saf-T-Graf Monobloc disks are available; their performance is described in the Performance Features table below:

Performance Features

	MB	IMB	FSM	AMB	AIMB	AFSM
Armored	-	-	-	Yes	Yes	Yes
Fail Safe	-	-	Yes	-	-	Yes
Vacuum Resistant	≥ 22psi ≥ 1.52bar	≥ 22psi ≥ 1.52bar	≥ 22psi ≥ 1.52bar	≥ 22psi ≥ 1.52bar	≥ 22psi ≥ 1.52bar	≥ 22psi ≥ 1.52bar
Vacuum Support Option	Type MBV Disk	-	-	Type AMBV Disk	-	-
Fitted Gaskets	Yes	Yes	Yes	Yes	Yes	Yes
Standard Temperature Range	-100°F~+400°F -73°C~+205°C	-100°F~+400°F -73°C~+205°C	-100°F~+400°F -73°C~+205°C	-100°F~+400°F -73°C~+205°C	-100°F~+400°F -73°C~+205°C	-100°F~+400°F -73°C~+205°C
High Temperature Service	-	-	-	Type AMB-HTA Disk≤800°F/ 427°C	Type AIMB-HTA Disk≤800°F 427°C	-
Tef Liner	-	Type IMBL Disk	-	-	Type AIMBL Disk	-
Sizes Available	0.5" to 24" 15~600mm	0.5" to 24" 15~600mm	0.5" to 24" 15~600mm	0.5" to 24" 15~600mm	0.5" to 24" 15~600mm	0.5" to 24" 15~600mm
ASME "UD" Stamped	Yes	Yes	No	Yes	Yes	No
"CE" Marked	Yes	Yes	No	Yes	Yes	No
ISO 4126-2 Burst Test Certificate	Yes	Yes	Yes	Yes	Yes	Yes

Armoring

Armor is recommended for all graphite disks for added safety, easier installation and elimination of breakage during installation. Armor reduces the possibility of a premature burst due to uneven or excessive torqueing 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 304/316 stainless steel as an option. BS&B recommends armor for the sizes and burst pressures in the excess of the following :

SIZE		BURST PRESSURE	
INCHES	MILLIMETERS	PSIG	BARG
0.5 - 3	15 - 80	150	10.341
4	100	100	6.894
6 - 10	150 - 250	75	5.17
12 - 24	300 - 600	50	3.447

Burst Alert Sensor

A GAS™ (Graphite Alert Sensor) is available to provide warning of a burst graphite disk

Operating Ratio

Extended service life for operating pressures up to 80% of the disk marked pressure in a static environment - Lower operating ratios can be expected in a cyclic environment.

Expedited Delivery

The following standard 150 ANSI MB sizes and burst pressures are available for quick delivery: 1", 1.5", 2", 3", 4", 6", 8" (25, 40, 50, 80, 100, 150 and 200 mm).

Stocked Burst Pressures:
10-15-20-25-30-40-50-75-100-125-150 psig

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.

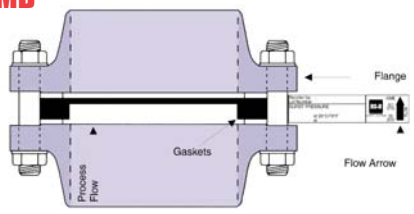
Gaskets

Standard gasket material for all Saf-T-Graf Monobloc disks is Klinger-Sil® C-4401. Optional materials include PTFE Solid, Neoprene, Garlock® 3000, Grafoil® and Gylon® 3510. Gaskets are always supplied fitted to Saf-T-Graf Monobloc disks – ready to use!

Monobloc

Model MBV (with bar) and MB.

MB



Sizes 0.5" to 24" (15mm to 600 mm)with temperature range to 400ºF (205º C).

Model MB™, MBV™, AMB™, AMBV™

Monobloc disks fit most applications where graphite disks are needed.

When using a monobloc disk in application:

- Vacuum supports are needed for disks rated below 22 psig (1.52 bar) and where a vacuum condition exists. Model MBV or AMBV Vacuum supports are not required on 0.5" and 0.75" (15mm and 20mm) monobloc disks
- Temperature ranges -100ºF to 400ºF (-73ºC to 205ºC).

MB™, MBV™, AMB™, 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	1.73	10.3	0.625	16	150	10/16
0.75	20	25	150	1.73	10.3	0.625	16	150	10/16
1	25	10	150	0.69	10.3	0.875	22	150	10/16
1.5	40	7	150	0.49	10.3	0.875	22	150	10/16
2	50	2	150	0.14	10.3	0.875	22	150	10/16
3	80	1	150	0.069	10.3	0.875	22	150	10/16
4	100	1	150	0.069	10.3	0.875	22	150	10/16
6	150	1	150	0.069	10.3	0.875	22	150	10/16
8	200	0.5	150	0.035	10.3	1.125	29	150	10/16
10	250	0.25	125	0.0173	8.6	1.50	38	150	10/16
12	300	0.25	125	0.0173	8.6	2.00	51	150	10/16
14	350	0.25	100	0.0173	6.89	2.25	57	150	10/16
16	400	0.25	100	0.0173	6.89	2.50	64	150	10/16
18	450	0.25	100	0.0173	6.89	2.75	70	150	10/16
20	500	0.25	50	0.0173	3.4	3.00	76	150	10/16
24	600	0.25	50	0.0173	3.4	3.00	76	150	10/16

Contact BS&B for special disk thickness.

Fail-Saf Monobloc - *FSM™*
Inverted Monobloc - *IMB™*
Inverted Monobloc with Liner - *IMBL™*

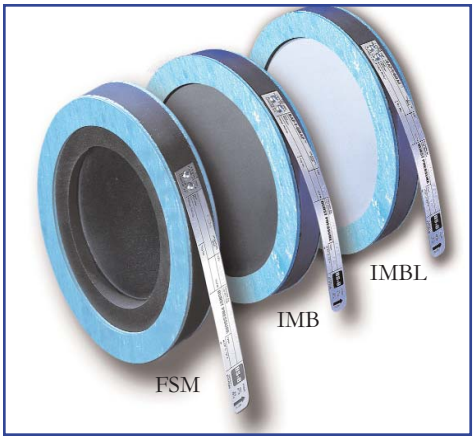
Fail-Saf Monobloc - FSM

The most impressive feature of the FSM is its "fail-safe" design, which allows the disk to burst at the precise marked burst pressure from either side. It cannot be installed upside down between pipe flanges, which greatly reduces installation errors.

Inverted Monobloc-IMB Inverted Monobloc with Liner - IMBL

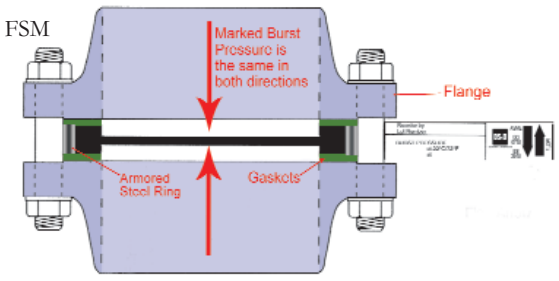
IMB and IMBL disks are available to fit ANSI Class 150, Class 300 and Class 600 flanges. The IMBL extends corrosion resistance and resists product build-up with the use of a Fluoropolymer liner. Liner temperature, 500ºF (260ºC)

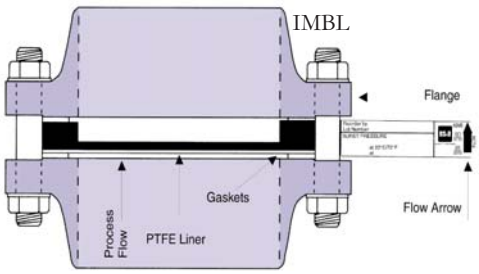
- If a vacuum support is required, Model MBV™ or AMBV™ disks must be specified; with Fluoropolymer coating if required.
- Temperature ranges -100ºF to 400ºF (-73ºC to 205ºC).



FSM™, IMB™, AIMB™, IMBL™, AIMBL™ 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	250	1.73	17.2	0.625	16	150	10/16
0.75	20	25	250	1.73	17.2	0.625	16	150	10/16
1	25	10	250	0.69	17.2	0.875	22	150	10/16
1.5	40	7	250	0.49	17.2	0.875	22	150	10/16
2	50	3	250	0.21	17.2	0.875	22	150	10/16
3	80	2	250	0.14	17.2	0.875	22	150	10/16
4	100	1.5	250	0.104	17.2	0.875	22	150	10/16
6	150	1	170	0.069	11.7	0.875	22	150	10/16
8	200	0.5	170	0.035	11.7	1.125	29	150	10/16
10	250	0.25	150	0.0173	10.3	1.50	38	150	10/16
12	300	0.25	150	0.0173	10.3	2.00	51	150	10/16
14	350	0.25	150	0.0173	10.3	2.25	57	150	10/16
16	400	0.25	150	0.0173	10.3	2.50	64	150	10/16
18	450	0.25	150	0.0173	10.3	2.75	70	150	10/16
20	500	0.25	150	0.0173	10.3	3.00	76	150	10/16
24	600	0.25	150	0.0173	10.3	3.00	76	150	10/16
0.5	15	25	1000	1.73	68.9	0.625	16	300/600	25/40
0.75	20	25	1000	1.73	68.9	0.625	16	300/600	25/40
1	25	10	1000	0.69	68.9	1.00	25	300/600	25/40
1.5	40	7	1000	0.49	68.9	1.00	25	300/600	25/40
2	50	3	500	0.21	34.4	1.00	25	300/600	25/40
3	80	2	500	0.14	34.4	1.25	32	300	25/40
4	100	1.5	500	0.10	34.4	1.25	32	300	25/40
6	150	1	450	0.069	31	1.75	44	300	25/40
8	200	0.5	450	0.035	31	2.25	57	300	25/40





Venting Capacities

Venting capacities are expressed below in standard cubic feet per minute of air x 1000 at standard conditions. Adjustments must be made when utilizing vacuum supports.

Vacuum Example: An 8" Monobloc disk @ 10 psig utilizing a bar type of vacuum support, reduces the original capacity by a factor of .80 . Example: 19.5 x .80 = 15.6 x 1000 SCFM air

Venting capacities are based upon ASME VIII UG 131, using a 0.62 coefficient of discharge*, ratio of specific heats of 1.4 and a "Z" (compressibility) of 1.0 which simulates an entry into a vent system from a process vessel. Below 15 psig the flow becomes subcritical and appropriate corrections have been made to the venting capacities (calculated according to API guidelines).

Alternately, the low K_R values for graphite disks can be used for the determination of vent system capacity. This may permit the use of a smaller size of graphite disk.

Disk Diameter (in/mm)

Burst Rating psig	1/2	15	3/4	20	1	25	1.5	40	2	50	3	80	4	100	6	150	8	200	10	250	12	300	14	350	16	400	18	450	20	500	24	600
1/4	-		-		-		-		-		-		-		-		-		3.71		5.34		7.26		9.49		12.0		14.8		21.3	
1/2	-		-		-		-		-		-		-		-		3.35		5.24		7.54		10.3		13.4		16.9		20.9		30.2	
1	-		-		-		-		-		0.666		1.18		2.66		4.73		7.40		10.7		14.5		18.9		24.0		29.6		42.6	
1 1/2	-		-		-		-		-		0.814		1.45		3.26		5.79		9.05		13.0		17.7		23.2		29.3		36.2		52.1	
2	-		-		-		-		0.417		0.939		1.67		3.76		6.68		10.4		15.0		20.4		26.7		33.8		41.7		60.1	
3	-		-		-		-		0.510		1.15		2.04		4.59		8.15		12.7		18.3		24.9		32.6		41.3		50.9		73.4	
4	-		-		-		-		0.587		1.32		2.35		5.28		9.39		14.7		21.1		28.8		37.6		47.5		58.7		84.5	
5	-		-		-		-		0.655		1.47		2.62		5.89		10.5		16.4		23.6		32.0		41.9		53.0		65.5		94.3	
6	-		-		-		-		0.715		1.61		2.86		6.44		11.4		17.9		25.7		35.0		45.8		57.9		71.5		103	
7	-		-		-		0.433		0.771		1.73		3.08		6.93		12.3		19.3		27.7		37.8		49.3		62.4		77.0		111	
8	-		-		-		0.462		0.822		1.85		3.29		7.39		13.1		20.5		29.6		40.3		52.6		66.6		82.2		118	
9	-		-		-		0.489		0.869		1.96		3.48		7.82		13.9		21.7		31.3		42.6		55.6		70.4		86.9		125	
10	-		-		0.229		0.514		0.914		2.06		3.66		8.23		14.6		22.9		32.9		44.8		58.5		74.0		91.4		132	
15	-		-		0.279		0.627		1.11		2.51		4.46		10.0		17.8		27.8		40.1		54.6		71.3		90.2		111		160	
20	-		-		0.328		0.737		1.31		2.95		5.24		11.8		21.0		32.8		47.2		64.2		83.9		106		131		189	
25	0.0942		0.212		0.377		0.848		1.51		3.39		6.03		13.6		24.1		37.7		54.2		73.8		96.4		122		151		217	
30	0.106		0.240		0.426		0.958		1.70		3.83		6.81		15.3		27.2		42.6		61.3		83.5		109		138		170		245	
40	0.131		0.295		0.524		1.18		2.40		4.72		8.38		18.9		33.5		52.4		75.4		103		134		170		210		302	
50	0.156		0.350		0.622		1.40		2.49		5.60		9.95		22.4		39.8		62.2		89.6		122		159		202		249		358	
75	0.217		0.488		0.868		1.95		3.47		7.81		13.9		31.2		55.5		86.8		125		170		222		281		347		500	
100	0.278		0.626		1.11		2.50		4.45		10.0		17.8		40.1		71.2		111		160		218		285		361		445		641	
125	0.340		0.764		1.36		3.06		5.43		12.2		21.7		48.9		86.9		136		196		266		348		440		543		783	
150	0.410		0.902		1.60		3.61		6.42		14.4		25.7		57.7		103		160		231		314		411		520		642		924	
175	0.462		1.04		1.85		4.16		7.40		16.6		29.6		66.6		118		-		-		-		-		-		-		-	
200	0.524		1.18		2.09		4.71		8.38		18.9		33.5		75.4		134		-		-		-		-		-		-		-	
225	0.585		1.32		2.34		5.27		9.36		21.1		37.4		84.3		150		-		-		-		-		-		-		-	
250	0.647		1.45		2.59		5.82		10.3		23.3		41.4		93.1		165		-		-		-		-		-		-		-	
275	0.708		1.59		2.83		6.37		11.3		25.5		45.3		102		181		-		-		-		-		-		-		-	
300	0.769		1.73		3.08		6.92		12.3		27.7		49.2		111		197		-		-		-		-		-		-		-	
350	0.892		2.01		3.57		8.03		14.3		32.1		57.1		128		228		-		-		-		-		-		-		-	
400	1.01		2.28		4.06		9.13		16.2		36.5		64.9		146		260		-		-		-		-		-		-		-	
450	1.14		2.56		4.55		10.2		18.2		40.9		72.8		164		291		-		-		-		-		-		-		-	
500	1.26		2.84		5.04		11.3		20.2		45.4		80.6		-		-		-		-		-		-		-		-		-	
1000	2.49		5.60		9.95		22.4		-		-		-		-		-		-		-		-		-		-		-		-	

** To be used for direct discharge to the atmosphere, disk installation ≤ eight diameters from vessel nozzle entry, length of discharge pipe ≤ 5 pipe diameters, nominal diameter of inlet and discharge piping ≥ the NPS designation of the device.*

Vacuum Support Factors: Dial Type: 0.25 to 9 psig (0.02 to 0.62 bar) Bar Type: 10psig (0.69 bar) - 22 psig (1.52 bar)

SIZE	1/2	3/4	1	1.5	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

Temperature

-100°F (-73°C) to 400°F (205°C).Higher temperatures to 800°F(427°C) are accommodated using High Temperature Assemblies(HTA) used with armored disks (HTA models are not to be used with models MBV and AMBV disk (disks with vacuum support). The maximum number of High Temperature Assemblies are two per disk. Each HTA will reduce temperatures 200°F (93.3°C). All high temperature assemblies require armoring

- If a disk is ordered with a burst temperature within 40°F (4.5°C) to 100°F (38°C), it will be burst tested and rated at 72° F (22°C).
- If the requested burst temperature is outside of 40°F (4.5°C) to 100°F (38°C) burst tests will be carried out at the actual burst temperature (at no additional charge) and not estimated using a correction coefficient.

(ASME or other international standards certification at additional cost).

Burst Tolerance

The burst tolerance is the maximum variation from the marked burst pressure.

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

For reduced tolerances contact BS&B Safety Systems, L.L.C. or BS&B Safety Systems LTD.

Marked Burst Pressure	Tolerance
Less than 1psig (0.07bar)	0.75psig (-0/+0.052bar)
1psig (0.07 bar) - 15 psig	0.75 psig (+/-0.052 bar)
Above 15 psig (1.03bar)	+/-5%

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