



BS&B SAFETY SYSTEMS, L.L.C.
BS&B SAFETY SYSTEMS, LTD.



**type ECR reverse
buckling
compression
loaded style disk**

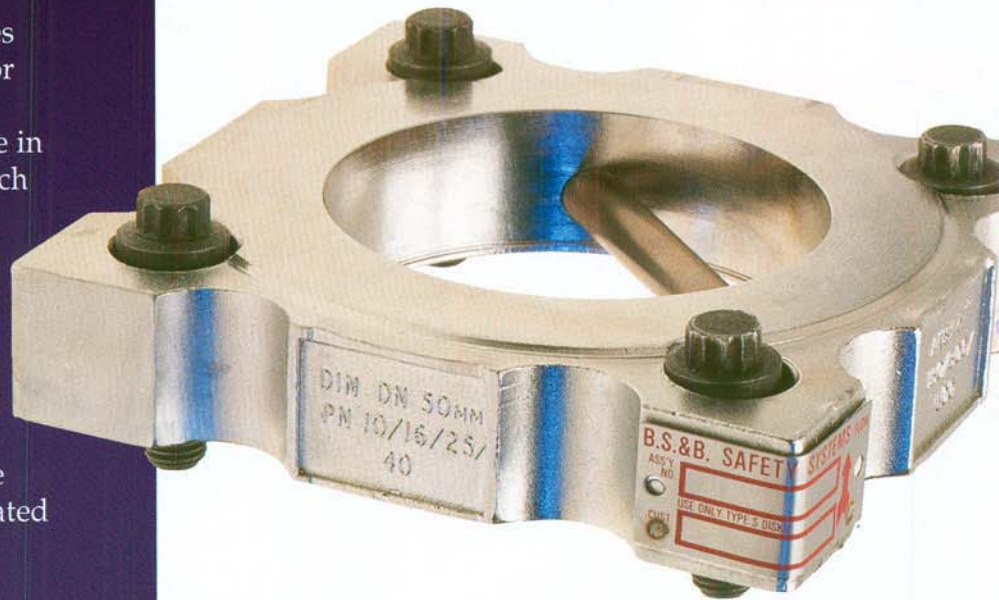
THE ECO-SAF SYSTEM

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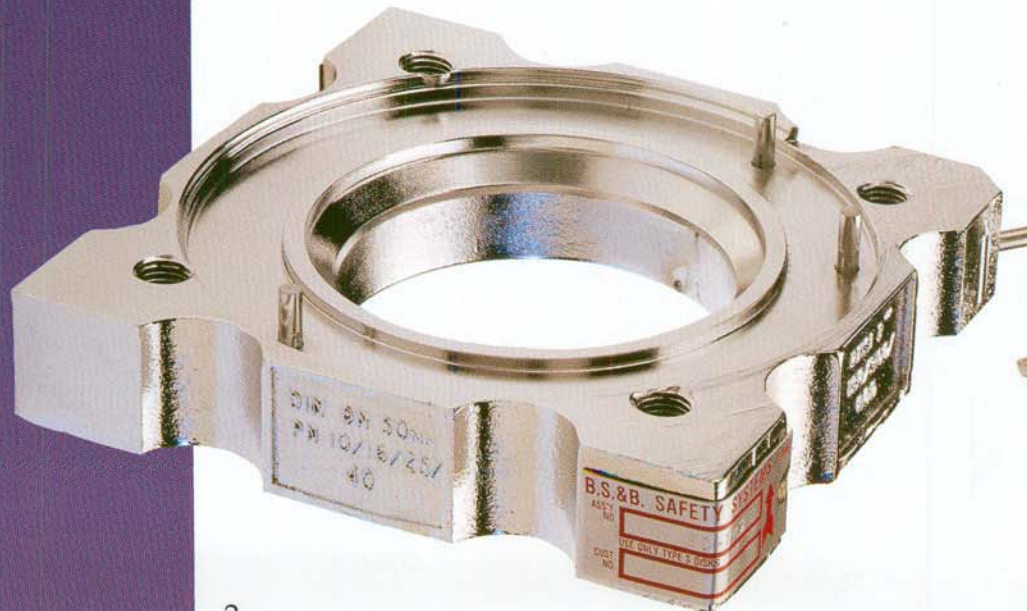
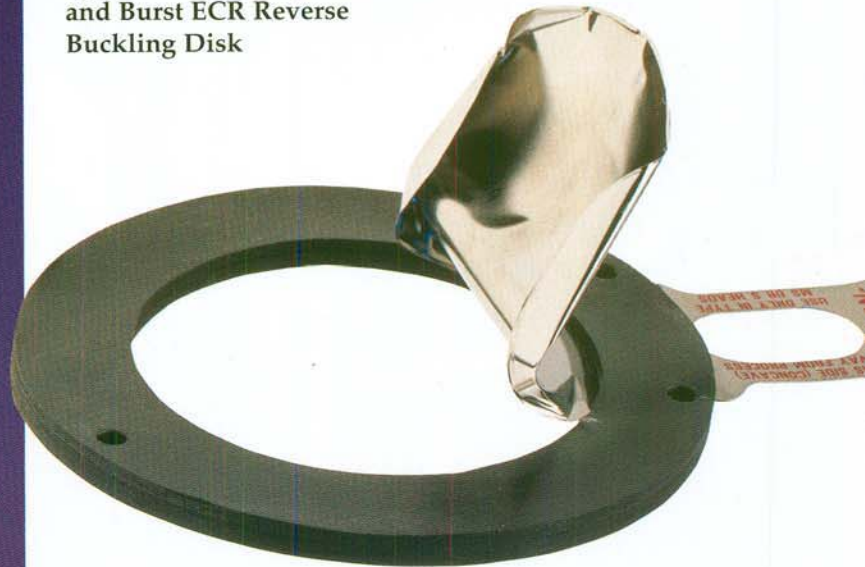
The type ECR Reverse Buckling Compression Loaded Style Disk provides overpressure relief in either gas/vapor or liquid applications. The ECR disk is designed with a perforated circular score in the perimeter of the dome. Gaskets which are activated by assembly of the safety head, cover the perforated score line to achieve a sealed construction. The snap action of reverse buckling disk technology enables very low burst pressures to be achieved avoiding the use of weaker slotted composite disk designs. At the disk's burst pressure the disk reverses, opening along this perforated score line, relieving the overpressure.

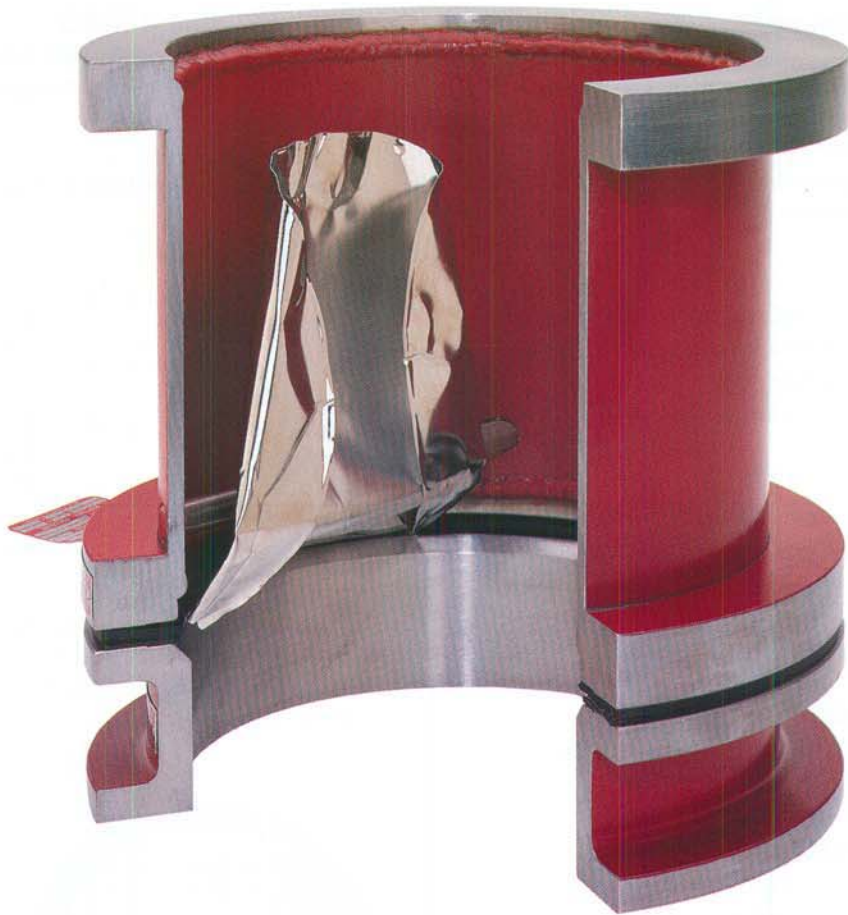
APPLICATIONS

- Overpressure protection at the lowest available reverse buckling burst pressures.
- Prevents fugitive emissions from API storage vessels. The ECR disk may be installed below the emergency fire vent, isolating the vent and eliminating leakage of the stored fluid. The vessel's normal breathing vent will continue to operate.
- Relief valve isolation, an ECR disk may be installed at the inlet of a safety relief valve offering the following benefits:
 - Reduces fugitive emissions.
 - Less expensive valve trim may be used in corrosive applications.
 - Valve life is extended by isolating valve parts from corrosive fluid.



Type EC-7RS Safety Head and Burst ECR Reverse Buckling Disk





Type EC-7R "Spool Design" Safety Head

FEATURES AND BENEFITS

- Sizes from 1" (25mm) to 24" (600mm).
- Lowest burst pressure in a reverse buckling style disk.
- Designed to be non-fragmenting.
- Overpressure relief for either gas/vapor or liquid applications.
- Suitable for operating pressures up to 90% of the minimum burst pressure.
- High performance in pressure cycling or pulsating conditions.
- If installed damaged, disk will burst \leq the nominal burst pressure.
- Back pressure resistance from 0.5 and up to 2 times tagged burst pressure subject to process conditions.
- Vacuum resistant. (May require addition of vacuum support.)
- Low torque sensitivity.
- Disk acts as a positive seal to prevent fugitive emissions.
- Smooth convex disk surface suitable for hygienic or polymerisation applications.
- Ideal for relief valve isolation.
- Standard materials, Nickel Alloy 200, Monel Alloy 400, Inconel Alloy 600, 316SS, Hastelloy C-276 and Tantalum.
- Patent No: 5,368,180, 5,413,237, 4,751,938.

The ECR disk is a low pressure reverse buckling disk designed with a perforated circular score in the perimeter of the dome. When overpressure occurs, the disk reverses opening along the perforated score line and folds around the pivot in the outlet of the Safety Head. The pivot ensures that the disk's petal is retained after rupture.

OPERATING RATIO*

A 90% operating ratio allows the process to operate up to 90% of the minimum burst pressure without affecting the disk's service life.

*Ratio of operating pressure to burst pressure.

MATERIALS

The ECR disks are available in 316SS, Nickel Alloy 200, Monel Alloy 400 and Inconel Alloy 600, Hastelloy C-276 or Tantalum. The standard gasket materials are Buna N, Viton and FEP/PTFE. (Consult BS&B for alternatives.)

PRESSURE CYCLING AND PULSATING SERVICE

The ECR disk will have a superior life in pressure cycling or pulsating conditions.

VACUUM OR BACK PRESSURE RATING

The vacuum or back pressure resistance capability is from 0.5 and up to 2 times the disk's tagged burst pressure subject to process conditions. The disk's vacuum or back pressure resistance rating should be specified when ordering. If required, an integral vacuum support for vacuum may be supplied-disk type ECV. The resultant flow capacity will be reduced by up to 16%. (Consult BS&B.)

NON - FRAGMENTING

The type ECR disk is designed to be non-fragmenting on rupture.

OPERATING TEMPERATURES

The operating temperature range is dependent on the choice of the integrated gasket seal materials.

GASKETS

The disks are supplied with gaskets attached to both sides of the disk.

Gasket Seal Material	Temperature Range
Buna N	-60°F to 230°F -51°C to 110°C
Viton	-50°F to 400°F -46°C to 204°C
FEP/PTFE*	-50°F to 400°F -46°C to 204°C

*Process Side of Disk

Alternate materials upon request.

LOW DAMAGE RATIO

If a disk is accidentally damaged before or during installation, the disk will burst at a pressure not exceeding its tagged burst pressure in the reverse buckling direction.



TYPE ECR DISK MIN/MAX BURST PRESSURES

Burst Pressures at 22°C (72°F) in Disk Materials

Alloy 200, Alloy 600, Alloy 400, and 316SS, Hastelloy C-276 and Tantalum

Disk Size		Minimum		Maximum	
Inches	mm	Psig	Barg	Psig	Barg
1	25	2	0.138	180	12.41
1.5	40	2	0.138	80	5.52
2	50	2	0.138	80	5.52
3	80	1	0.069	50	3.45
4	100	1	0.069	50	3.45
6	150	1	0.069	50	3.45
8-24	200/600	1	0.069	15	1.03

Lower burst pressures may be available upon request, particularly in larger sizes.

LOW REVERSAL RATIO

If a type ECR or V/ECR disk and holder is accidentally installed in the wrong direction, the disk will burst at a pressure between 0.5 and 2.0 times its burst pressure. The maximum reversal pressure may be specified when ordering.

MANUFACTURING RANGE

A manufacturing range of 0%, 5% or 10% is available and is applied to the minus side of the requested burst pressure. A disk with a requested burst pressure of 3 psig (0.21 barg) and a 10% manufacturing range will be tagged at a burst pressure between 2.7 psig (0.19 barg) and 3 psig (0.21 barg). A disk with a 0% manufacturing range will be tagged at the requested burst pressure.

TOLERANCE

The burst tolerance is the maximum variation from the tagged burst pressure. Each disk will be additionally tagged with both minimum and maximum burst pressure.

Tagged Burst Pressure	Tolerance
5 psig (0.34 barg) and above	+/- 10%
Less than 5 psig (0.34 barg)	+/- 15%

Consult BS&B for +/- 5% Tolerance

OTHER DISK TYPES

The V/ECR and V/ECV are inverted styles of the types ECR and ECV rupture disks for very low burst pressure in the case of vacuum relief.

■ Type V/ECR provides vacuum relief with full opening, and positive pressure resistance from 0.5 and up to 2 times the tagged burst pressure subject to process conditions.

■ Type V/ECV provides vacuum relief and is supplied with a positive pressure support on the vent side. This support offers positive pressure resistance, and up to 16% reduction in flow capacity.

Type ECT* is a two-way disk providing both overpressure and vacuum relief. The disk is suitable for operating pressures up to 90% of the minimum burst pressure in the overpressure direction, and up to 70% of the vacuum rating. Full opening in vacuum relief, and up to 16% reduction in flow capacity in overpressure relief. Sizes 2" to 6".

Type V/ECT* is an inverted two-way disk providing both vacuum and overpressure relief. The disk is suitable for operating pressures up to 90% of the minimum vacuum burst pressure, and up to 70% of the burst pressure in the overpressure direction. Full opening in overpressure relief, and up to 16% reduction of flow capacity in vacuum relief. Sizes 2" to 6".

SANITARY/ASEPTIC APPLICATIONS

Eco-Saf rupture disks in non-contaminating materials presenting a smooth disk surface towards the process are ideal for sanitary/aseptic applications. The disk's sanitary gasket provides a leak tight seal when installed in its holder Type ER-C and secured by standard sanitary clamps.

Type ECR-S provides overpressure relief with full opening and vacuum/back pressure resistance from 0.5 and up to 2 times the tagged burst pressure subject to process conditions.

Type V/ECR-S provides vacuum relief with full opening and positive pressure resistance from 0.5 and up to 2 times the tagged burst pressure subject to process conditions.

Type V/ECT-S* is an inverted two-way disk providing both vacuum and overpressure relief. The disk is suitable for operating pressures up to 90% of the minimum vacuum burst pressure, and up to 70% of the burst pressure in the overpressure direction. Full opening in overpressure relief, and up to 16% reduction of flow capacity in vacuum relief.

*For overpressure/vacuum relief pressures and burst tolerances, contact BS&B.

RUPTURE DISK SENSOR

An EC-Alert sensor provides immediate warning of a ruptured disk when used with a BS&B Burst Disk Monitor or other suitable electrical monitoring equipment. The EC-Alert sensor is available for all disk types including the two-way ECT type.

SAFETY HEADS

Disk Type	Safety Head Type
ECR, ECV	EC-7RS, EC-7R
ECT	EC-7RS ⁽¹⁾
V/ECR, V/ECV	VEC-7RS, VEC-7R ⁽²⁾
V/ECT	VEC-7RS ⁽¹⁾
ECR-S	ER-C ⁽³⁾
V/ECR-S	VER-C ⁽²⁾⁽³⁾
V/ECT-S	VER-C ⁽¹⁾⁽³⁾

(1) Safety Head tags indicate overpressure and vacuum flow directions.

(2) Safety Head tag indicates vacuum flow direction. Types EC-7RS, VEC-7RS are pre-torqueable Safety Heads. Types EC-7R and VEC-7R are "spool" design Safety Heads, and are installed in the process by clamping between standards pipe flanges (ANSI, DIN, JIS and API).

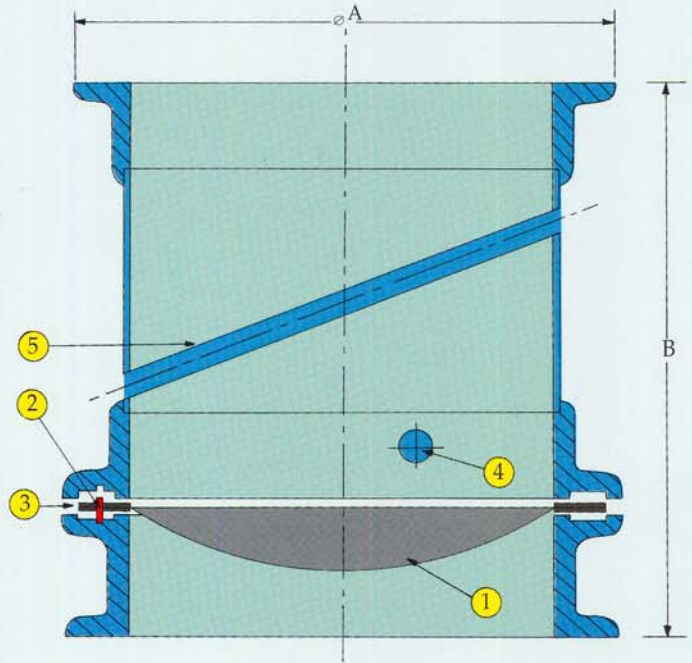
(3) For holder dimensions refer to Catalog 77-4015, Page 7, and holder type SR-C.

TYPE EC-7R SAFETY HEAD (SIZES 1-24 Inch)

This is a spool design to fit regular light duty ANSI, DIN, JIS and API flange systems for low pressure service. Asymmetric locating pins center the disk in the Safety Head, and ensure correct direction of disk installation. The EC-7R Safety Head has three flange connections, one at the center where the ECR disk is installed, one at the inlet and one at the outlet flange. On installation of the Safety Head and disk assembly between pipe flanges, application of the correct torque to the flange bolts activates the disk's gasket to achieve a seal. The Safety Head is designed with a metal-to-metal stop preventing over torquing and consequential damage to the disk. Flow arrows indicate the direction of flow during process venting.

When the disk ruptures, the petal is fully contained within the EC-7R Safety Head outlet. This eliminates interference with downstream vents or instrumentation. Eye bolts are available for ease of manipulation of the Safety Head, especially useful for larger sizes.

The EC-7R Safety Head is available in 316SS, Carbon steel, Aluminium, or composite low mass material. Alternate materials may be requested.



- ① Disk
- ② Locating pin
- ③ Disk gasket
- ④ Primary pivot
- ⑤ Secondary pivot

EC-7R SAFETY HEAD SPECIFICATIONS

Nominal Size		Outside Diameter A				Safety Head Height B	
		ANSI 150		DIN 16			
Inches	mm	Inches	mm	Inches	mm	Inches	mm
1	25	2.5	64	2.8	71	2.38	60
1.5	40	3.25	83	3.62	92	3.00	76
2	50	4.0	102	4.21	107	4.00	102
3	80	5.25	133	5.59	142	5.13	130
4	100	6.75	172	6.38	162	6.25	159
6	150	8.63	219	8.54	218	8.68	220
8	200	10.88	276	10.71	273	11.30	287
10	250	13.25	337	12.91	327	14.00	355
12	300	16.00	406	15.08	383	16.75	425
14	350	17.63	448	17.44	443	18.62	473
16	400	20.13	511	19.49	495	21.35	542
18	450	21.50	546	21.85	555	24.00	610
20	500	23.75	604	24.29	617	26.75	679
24	600	28.13	714	28.9	734	32.00	813

Note: Same dimensions apply to type VEC-7R.



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REGISTERED FIRM



I.S./ISO 9001/EN 29001
QUALITY SYSTEM
Cert. Reg. No. M262

USA



Cert. Reg. No. QA-346

ISO 9001 Quality System Certification

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Note: Products, specifications and all the data in the literature are subject to change without notice.