

Eco-Saf[™] Reverse Buckling
Compression Loaded Style Rupture Disk

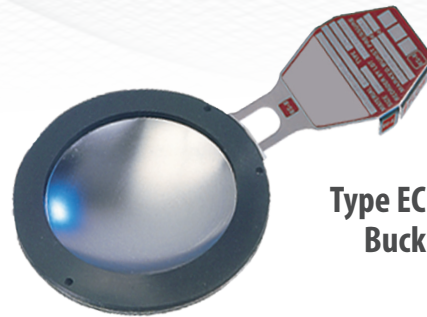
Eco-Saf™ System

Eco-Saf™ (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 circular cut in the perimeter of the dome. Gaskets, which are activated by assembly of the safety head, cover the disk's circular cut to achieve a sealed construction. The snap action of reverse buckling disk technology enables very low burst pressures to be achieved. At the disk's rated pressure, the disk reverses, opening along the disk's circular cut, relieving overpressure.

Features

- Sizes from 1 to 24 inches (25 to 600mm)
- Lowest burst pressure in a reverse buckling style disk
- Designed for non-fragmentation
- Gas and full liquid service
- Suitable for operating pressures up to 90% of the minimum burst pressure
- Optimum fatigue resistance in pressure pulsating or cycling conditions
- If installed damaged, disk will burst < the nominal burst pressure
- The ECR and V/ECR disks will burst at a pressure between 0.5 and 2.0 time its burst pressure even if the disk and holder are accidentally installed in the wrong direction*

* The backpressure resistance of a lot is generally within the range of 0.25 to 1.5 times the rate burst pressure. If a backpressure resistance greater than 0.25 times burst pressure is required, it must be quoted. Special backpressure lot testing may be required.



Type ECR™ Reverse Buckling Disk



ECR Rupture Disk (Activated)

- Vacuum resistant up to 50% of marked burst pressure (consult factory for higher vacuum resistance)
- Low torque sensitivity
- Ideal for relief valve or tank vent isolation
- Standard 0% MDR; optional -5% and -10% MDR
- For use with BS&B type EC-7RS pretorqued safety head and EC-7R pre-assembled safety head

Eco-Saf Disk Types, Refined by Service

Type	Service	Vacuum or Back Pressure Resistance
ECR	Positive pressure relief	< 1/2 burst pressure
V/ECR	Vacuum relief	< 1/2 burst pressure
ECV	Positive pressure relief with integral vacuum support	Full vacuum, 85% flow area
V/ECV	Vacuum relief back pressure with integral support	15 psi back pressure (1 bar), 85% flow area
ECR-S	Positive pressure relief installed in sanitary / aseptic clamp safety head	< 1/2 burst pressure
V/ECR-S	Vacuum relief installed in sanitary / aseptic clamp safety head	< 1/2 burst pressure
ECV-S	Positive pressure relief installed in sanitary / aseptic clamp safety head; disk has integral vacuum support	Full vacuum, 85% flow area
V/ECV-S	Vacuum relief installed in sanitary / aseptic clamp safety head; disk has integral back pressure support	15 psi back pressure (1 bar)
ECT	Two way pressure relief	Consult factory for flow area

Burst Tolerance

Marked Burst Pressure	Burst Tolerance
5 psig (0.34 barg) and above	±10%
Less than 5 psig (0.34 barg)	±15%

Note: 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, FEP/PTFE and EPDM silicone. Consult BS&B for alternatives. **Note:** Hastelloy® is a trademark of Haynes International Inc. Monel® and Inconel® are registered trademarks of Special Metals Corporation and its subsidiaries.

Rules for Selecting Gaskets

(Standard Designs)

- There is a minimum of two gaskets per disk. At least one gasket shall be elastomeric (Buna, Viton, silicone, EPDM). Fluoropolymers gaskets are not elastomeric. It is highly preferable to have two elastomeric gaskets
- A disk with a vacuum support or pressure support will have a fluoropolymer or silicone gasket between the disk and support - this is called a "mid-gasket".
- A fluoropolymer gasket may be requested on one-side only. This is not a liner; therefore, both rupture disk and safety head materials shall be compatible with process conditions.

NOTE: A fluoropolymer spacer may be installed on the vent side of an Eco-Saf disk by BS&B. This material when present must be acceptable to the operating conditions.

Low Damage Ratio

If a type ECR disk is accidentally damaged before or during installation, the disk will burst providing full relief opening at a pressure not exceeding its tagged burst pressure.

Sensors

Burst Alert® Sensors shall be selected according to the burst rating, flange configuration (industrial or sanitary), disk type and duty (one-way or two-way burst directions). Consult BS&B.

Operating Temperatures

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

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
Viton® (black)	-50°F to 400°F	-46°C to 204°C
PEF / PTFE	-50°F to 400°F	-46°C to 204°C
Silicone	-60°F to 400°F	-51°C to 204°C
EPDM (black)	-60°F to 300°F	-51°C to 149°C

Eco-Saf Minimum Burst Pressures (determined by disk type and gasket material)

Disk Size		Buna N, Viton, silicone and EPDM gaskets								Fluoropolymer gaskets (process side for ECR only)			
		ECR and V/ECR		ECV and V/ECV		ECR-S and V-ECR-S		ECV-S and V/ECV-S		ECR and V/ECR		ECV and V/ECV	
in	mm	psig	barg	psig	barg	psig	barg	psig	barg	psig	barg	psig	barg
1	25	2	0.1	8	0.6	6.5	0.5	8	0.6	6.5	0.5	12	0.8
1.5	40	2	0.1	5	0.3	4.5	0.3	5	0.3	4.5	0.3	7	0.5
2	50	2	0.1	3	0.2	3	0.2	3	0.2	3	0.2	5	0.4
3	80	1	0.1	2	0.1	2	0.1	2	0.1	2	0.1	5	0.4
4	100	1	0.1	2	0.1	2	0.1	2	0.1	2	0.1	4	0.2
6	150	1	0.1	2	0.1	2	0.1	2	0.1	2	0.1	4	0.2
8-10	200-250	1	0.1	1.5	0.1	1.5	0.1	1.5	0.1	1.5	0.1	2	0.1
12-24	300-600	1	0.1	-	-	1	0.1	-	-	1	0.1	-	-

Eco-Saf Maximum Burst Pressures (determined by disk type and gasket material)

Disk Size		Buna N gaskets								Viton®, silicone and EPDM gaskets							
		ECR and V/ECR		ECV and V/ECV		ECR-S and V-ECR-S		ECV-S and V/ECV-S		ECR and V/ECR		ECV and V/ECV		ECR-S and V-ECR-S		ECV-S and V/ECV-S	
in	mm	psig	barg	psig	barg	psig	barg	psig	barg	psig	barg	psig	barg	psig	barg	psig	barg
1	25	100	6.9	100	6.9	100	6.9	100	6.9	25	2	25	2	25	2	25	2
1.5	40	80	5.5	80	6	80	5.5	80	6	25	2	25	2	25	2	25	2
2	50	80	5.5	80	6	80	5.5	80	6	25	2	25	2	25	2	25	2
3	80	50	3.5	50	3.5	50	3.5	50	3.5	25	2	25	2	25	2	25	2
4	100	50	3.5	50	3.5	50	3.5	50	3.5	25	2	25	2	25	2	25	2
6	150	50	3.5	50	3.5	50	3.5	50	3.5	25	2	25	2	25	2	25	2
8-10	200-250	15	1	15	1	15	1	15	1	15	1	15	1	15	1	15	1
12-24	300-600	15	1	-	-	15	1	-	-	15	1	-	-	15	1		

Burst pressures at 72°F (22°C). Disk materials nickel (alloy 200); 316L stainless steel; Hastelloy® (alloy C-276); Inconel® (alloy 600); Monel® (alloy 400); and tantalum are available with the same min/max burst pressures. Consult BS&B for applications where the disk may be rated with a coincident specified temperature below the maximum process temperature to which the disk may be exposed.

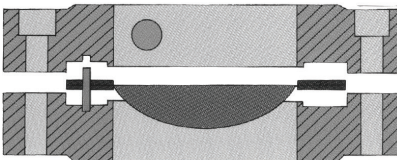
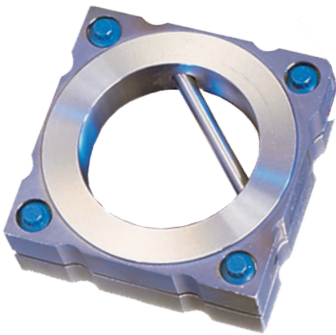
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EC-7RS™

Pre-torqued Safety Head

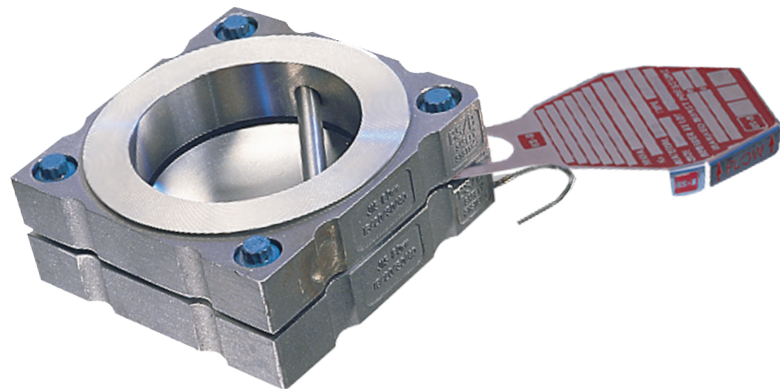
The Eco-Saf family of rupture disks are installed in the EC-7RS safety head and the capscrews torqued to provide the correct load on the disk in the workshop before installation into the process. The pretorqueable feature minimizes the possibility of process leakage or premature disk failure due to incorrect torque.

Asymmetric locating pins centers the disk in the safety head ensuring direction of disk installation. Application of the correct integral cap screw torque activates the disk integral gasket to achieve a bubble tight construction. The EC-7RS is designed with a unique metal-to-metal stop, preventing overtightening and damage to the disk. Flow arrows indicate the direction of process flow during venting. The safety head fits ANSI, DIN and JIS pipe flange bolting patterns in 316ss, carbon steel, aluminum, alloy 400, alloy 600, Hastelloy® C-276.



EC-7RS Pre-Torqued Design

Size		Safety Head Flange Rating			Face-to-Face Dimensions	
in	mm	ANSI	DIN	JIS	in	mm
1	25	150	6	-	1.34	34
1	25	300/600	10/16/25/40	10/16/20/30/40	1.34	34
1.5	40	150	-	10/16/20	1.52	39
1.5	40	300/600	10/16/25/40	30/40	1.52	39
2	50	150/300/600	10/16/25/40	10/16/20/30/40	1.70	43
3	80	150/300/600	10/16/25/40	16/20/30/40	2.08	53
3	80	-	-	10	2.08	53
4	100	150/300	10/16/25/40	16/20/30/40	2.70	69
4	100	-	-	10	2.70	69
4	100	600	-	-	2.70	69
6	150	150/300	10/16/25/40	10/30/40	3.44	87
6	150	-	-	16/20	3.44	87
6	150	600	-	-	3.44	87
8	200	150/300	10	-	3.71	94
10	250	150/300	-	-	5.80	147
12	300	150	-	-	4.68	119
12	300	300	-	-	5.80	147
14	350	150	-	-	6.15	156
14	350	300	-	-	6.15	156
16	400	150	-	-	7.40	188
16	400	300	-	-	7.40	188
18	450	150	-	-	8.10	206
18	450	300	-	-	8.10	206
20	500	150	-	-	8.84	225
20	500	300	-	-	8.84	225
24	600	150	-	-	10.28	261
24	600	300	-	-	10.28	261



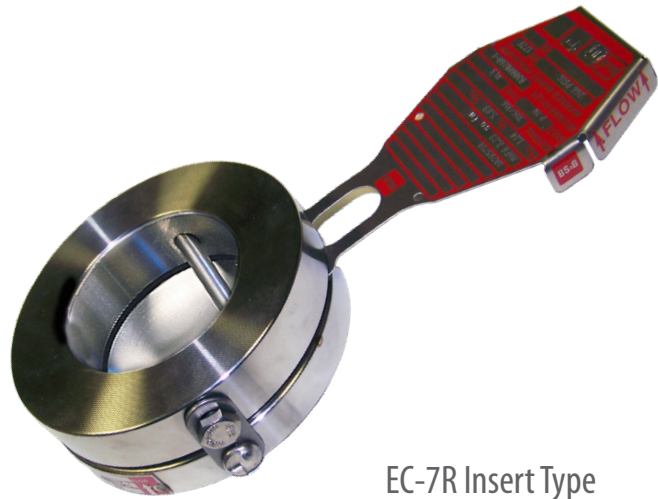
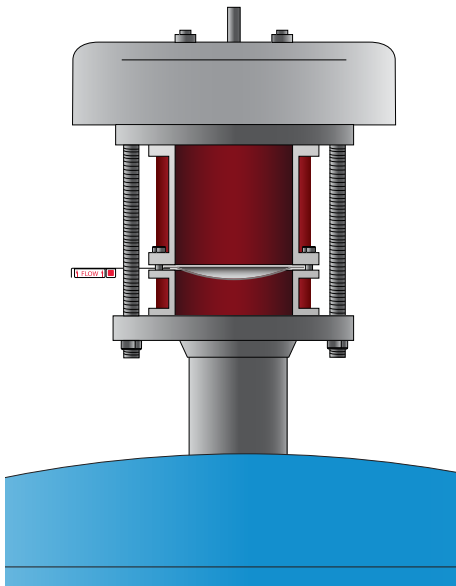
EC-7R™

Pre-assembled Safety Head

Asymmetric locating pins center the disk in the safety head, and ensure correct direction of disk installation. 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 EC-7R is designed with a metal-to-metal stop preventing overtorquing 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 outlet of the spool design EC-7R. 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 insert design of the EC-7R does not contain the disk petal after rupture.

Tank Vent used with Eco-Saf Rupture Disk and Spool Design Safety Head



EC-7R Insert Type Safety Head

Sanitary EC Series Models

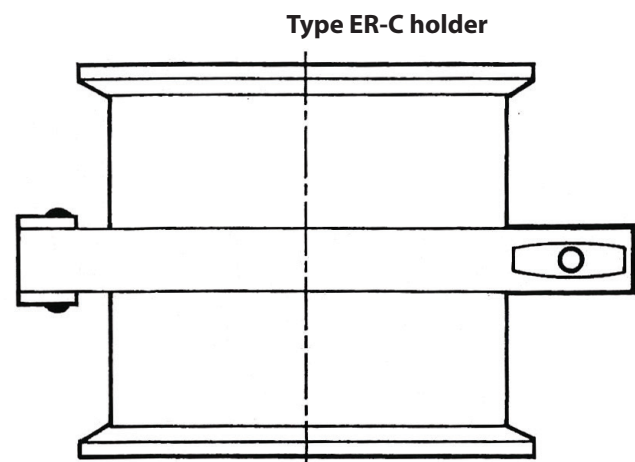
Any type of EC series disk can be made in a sanitary clamp holder configuration, although several types are not truly sanitary. Sanitary disks will be built with FDA approved gaskets.

ER-C holder dimensions						
Disk holder size		Clamp connection size / tube OD (inch)			Height	
in	mm	@ inlet	@ disk	@ outlet	in	mm
1	25	1.5	2.5	1.5	5.00	127
		1	2.5	1	5.00	127
1.5	40	2	4	2	6.00	152.40
		1.5	4	1.5	6.00	152.40
2	50	2	4	2	5.00	127
		3	4	3	5.00	127
		3	4	3	5.00	127
3	80	3	6	3	6.75	171.45
		4	6	4	5.50	139.70
4	100	4	8	4	6.0	152.40
		6	10	6	6.0	152.40
6	150	6	10	6	9.00	228.60

Safety Heads

Disk type	Safety head type
ECR, ECV, ECT	EC-7RS, EC-7R, EC-7R spool design
V/ECR, V/ECV, V/ECT	VEC-7RS, VEC-7R, EC-7R spool desing
ECR-S	ER-C
V/ECR-S, V/ECT-S	VER-C

- Safety head tags indicate overpressure and vacuum flow directions
- 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)





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