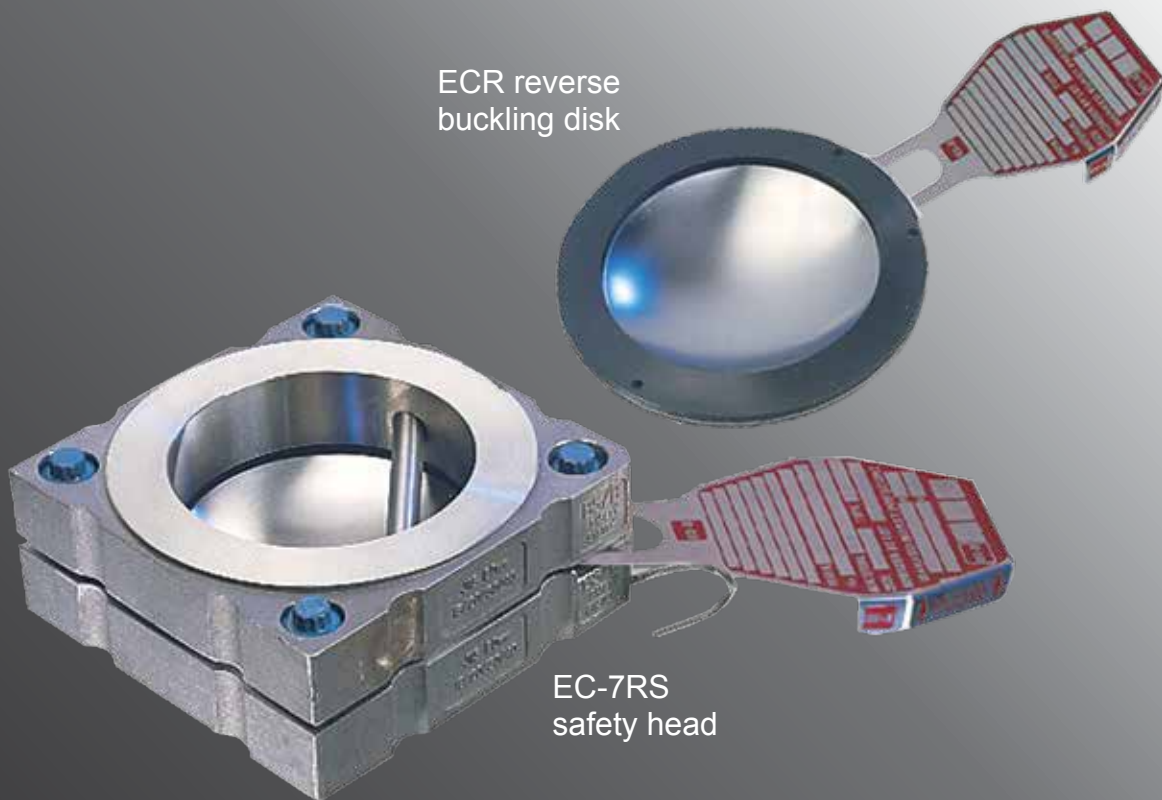


BS & B[®]

Eco-Saf™ System

Type ECR Reverse Buckling Compression Loaded Disk



ECR reverse
buckling disk

EC-7RS
safety head

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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 pulsating or cycling conditions
- If damaged, disk will burst at or below the nominal burst pressure
- Back pressure resistance from 0.5 up to 2 times the disk burst pressure (specify when ordering)
- 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



Manufacturing Design Range (MDR)

An MDR of 0%, 5% or 10% is available and is applied to the minus side of the requested burst pressure. A disk with a 0% MDR will be tagged at the requested burst pressure

Burst Tolerance

Marked burst pressure	Tolerance
5 psig (0.34barg) and above	± 10%
Less than 5 psig (0.34barg)	± 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.

There are nine Eco-Saf disk types designed for the application of conditions described in the table on the following page.

Eco-Saf Disk Types

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 (1bar), 85% flow area
ECR-S	Positive pressure relief installed in hygienic clamp safety head	< 1/2 burst pressure
V/ECR-S	Vacuum relief installed in hygienic clamp safety head	< 1/2 burst pressure
ECV-S	Positive pressure relief installed in hygienic 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 (1bar)
ECT	Two way pressure relief	Consult factory for flow area

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Monel® and Inconel® are trademarks of Inco Alloys International, Inc

Viton® is a registered trademark of DuPont Dow Elastomers L.L.C.

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.

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® (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

Rules for Selecting Gaskets (Standard Designs)

- There is a minimum of two gaskets per disk. At least one gasket must be elastomeric (Buna, Viton, silicone, EPDM). Fluoropolymer is 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 top and support - this is called a "mid-gasket"
- Fluoropolymer can be requested on the process side only to improve the disk's resistance to harsh chemicals.

Operating Temperatures

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

Sensors

Three types of sensors can be used with the ECO disk (EC-BAS, EC-SAS or EC-MBS).

Leak Tightness

Disk type	Inlet gasket	Burst pressure	Leak rate
All	fluoropolymer	Any	0.5 to 10 ⁻⁴ cc/sec
ECV, ECT	Any	Any	10 ⁻¹ to 10 ⁻⁵ cc/sec
ECR, VECR, VECV, VECT	Elastomeric	1 to 4 psi	10 ⁻² to 10 ⁻⁴ cc/sec
		4 to 8 psi	10 ⁻³ to 10 ⁻⁸ cc/sec
		Above 8 psi	10 ⁻⁴ to 10 ⁻¹⁰ cc/sec

Gasket Material (determined by disk type and gasket material)

Minimum Burst Pressures

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	Min								Min			
		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	-	-

Maximum Burst Pressures

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	Max								Max							
		psig	barg	psig	barg	psig	barg	psig	barg	psig	barg	psig	barg	psig	barg	psig	barg
1	25	180	12	180	12	180	12	180	12	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	-	-

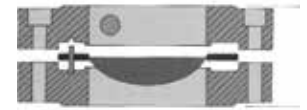
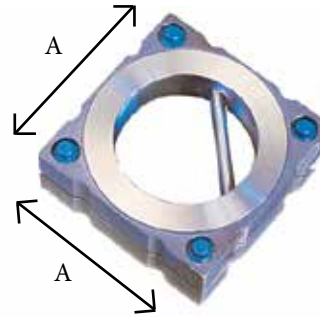
Burst pressures at 72°F (22°C) in disk materials. Disk materials nickel alloy 200; 316 stainless steel; Hastelloy® alloy C-276; Inconel® alloy 600; Monel® alloy 400; and tantalum

Safety Heads

EC-7RS Safety Head

The ECR disk is 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 proper disk orientation. Application of the correct integral cap screw torque activates the disk integral gasket to achieve bubble tight construction. The EC-7RS is designed with a unique metal-to-metal stop, preventing overtorquing and damage to the disk. Flow arrows



EC-7RS pre-torqued design

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.

Size		Safety head flange rating			Safety head thickness	Dimensions A	
in	mm	ANSI	DIN	JIS	in	in	mm
1	25	150	-	-	1.3	2.6	67
1	25	300/600	10/16/25/40	10/16/20/25/40	1.3	2.9	73
1.5	40	150	-	10/16/20	1.5	3.4	86
1.5	40	300/600	10/16/25/40	30/40	1.5	3.7	95
2	50	150/300/600	10/16/25/40	10/16/20/25/40	1.7	4.1	105
3	80	150/300/600	10/16/25/40	16/20/30/40	2.0	5.2	133
3	80	-	-	10	2.0	5.2	121
4	100	150/300	10/16/25/40	10/16/30/40	2.7	6.2	159
6	150	150/300	10/16/25/40	10/30/40	3.4	9.8 in OD (248mm OD)	
8	200	150/300	-	-	3.7	Flower petal	
10	250	150/300	-	-	5.8	Flower petal	
12	300	150	-	-	4.7	16 in OD (406mm OD)	
14	350	150	-	-	6.2	17.6 in OD (448mm OD)	
16	400	150	-	-	7.4	20.1 in OD (511mm OD)	
18	450	150	-	-	8.1	21.5 in OD (546mm OD)	
20	500	150	-	-	8.9	24.9 in OD (632mm OD)	
24	600	150	-	-	10.3	28.1 in OD (714mm OD)	

EC-7R 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.

Size		Safety head flange rating				Safety head height	
in	mm	ANSI 150		DIN 16		in	mm
		in	mm	in	mm		
24	600	28.1	714	28.9	734	32	813



Spool design



EC-7R insert type safety head

Sanitary EC Series Models

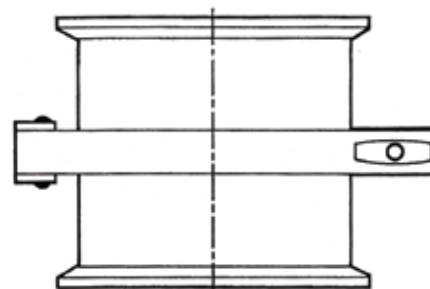
Any type of EC series disk can be made in a hygienic clamp holder configuration, although several types are not truly sanitary. Sanitary disks will be built with FDA approved gaskets.

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	3.25	83
		1	2.5	1	3	76
1.5	40	2	4	2	3	76
		1.5	4	1.5	3	76
2	50	2	4	2	4.19	106
		3	4	3	3.69	94
		3	4	3	4	102
3	80	3	6	3	4	102
		4	6	4	4	102
4	100	4	8	4	5.5	140
		6	10	6	5.5	140

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 design
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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