



BS&B SAFETY SYSTEMS, INC.  
BS&B SAFETY SYSTEMS LTD.

# ECO-SAF SYSTEM Installation Instructions

## Types ECR, ECV, V/ECR, V/ECV, ECT & V/ECT

**DANGER:** Rupture disks are intended to provide a pressure relief opening. This rupture disk is designed to burst at a specified temperature and pressure, thereby relieving excess pressure or preventing excessive vacuum in a system. A RUPTURE DISK BURST COULD CAUSE SEVERE BODILY INJURY OR DEATH, COULD RESULT IN PROPERTY DAMAGE, AND MAY RESULT IN THE RELEASE OF PRODUCT INTO THE ATMOSPHERE OR SURROUNDING AREA. IT IS IMPERATIVE THAT THIS RUPTURE DISK BE PROPERLY INSTALLED AND SAFELY VENTED IN ORDER TO AVOID BODILY INJURY, DAMAGE TO PROPERTY, POLLUTION AND LOSS OF PRODUCT. BS&B is not liable for any damage resulting from improper installation, unsafe venting, or other factors beyond BS&B's control.

### Safety Precautions

1. Do not locate the rupture disk where personnel will be exposed to released product and pressure through the disk.
2. Provide adequate support for piping and connections to absorb recoil/reaction forces when the disk ruptures. If the discharge is free vented, a baffle plate mounted on the Safety Head outlet with extra length studs will minimize recoil.
3. The rupture disk and Safety Head should not be subjected to bending stresses.

**CAUTION:** Do not locate the disk where it may be subjected to thermal shock. Moisture, rain, condensation or snow may cause a thermal shock to the disk causing the disk to burst below its rated burst pressure. A protector is recommended for temperature above 212° F (100° C), consult BS&B.

**CAUTION:** When the disk ruptures, the resulting shock wave may affect the operating performance of downstream equipment.

### Before You Install the Rupture Disk

#### Inspect Safety Head

1. Inspect Safety Head's mating surfaces for foreign material that could prevent full contact during assembly. Clean if necessary. If the metal-to-metal contact surfaces are nicked, lightly stone.

Disk Type	Safety Head Type
ECR, ECV	EC-7RS, EC-7R, EC-7I
ECT	EC-7RS
V / ECR, V / ECV	VEC-7RS, VEC-7R, VEC-7I
V / ECT	VEC-7RS

2. The Safety Head size and rating must match the companion flange size and rating.
3. The rupture disk and Safety Head must not be machined or modified in any way except by/or with the approval of BS&B.

#### Inspect The Rupture Disk

1. Handle the rupture disk carefully holding the disk by the tag and flange area. Examine seating and domed surfaces for nicks, dents, scratches, and foreign material which can damage the disk or cause leakage or affect the burst pressure. Do not install a damaged disk. Do not install a disk that has become detached from its gaskets. Installation of a damaged disk may result in a premature bursting of the disk.
2. Do not modify, add to or peel back gaskets attached to disk.
3. Do not modify, remove or substitute the vacuum/positive pressure support attached to the ECV and V/ECV type disks.

**CAUTION:** Do not reinstall a disk that had been removed from a Safety Head even if it has not ruptured. When stresses in the disk are relieved by unbolting, the impression in the seating area taken by the disk during its original installation may prevent sealing and affect disk performance if reinstalled.

Apretorqueable EC-7RS or VEC-7RS Safety Head with an installed disk may be removed from between companion flanges for inspection and/or cleaning, and reinstalled provided the capscrews are untouched and the torque is maintained.

**NOTE:** Corrosion and process conditions may affect disk life thus requiring periodic change.



## Installation of Rupture Disk in Safety Head

1. Place inlet of safety head on a work surface in position as shown in (Figure 2) with locating pins up.
2. Place NEW, UNDAMAGED rupture disk on inlet, the holes mating with the locating pins in the safety head.
3. Carefully align and place outlet flange in position as shown.
4. Assemble unit with recessed capscrews. Tighten all 12 point high strength capscrews with socket (See Table I for socket type) finger tight before torquing. DO NOT SUBSTITUTE for capscrews supplied.

5. Evenly torque the capscrews to the value shown in Torque Table I. Torque evenly in a diagonal pattern by applying 1/4 of the torque value to capscrew (1), and then applying torque to (2), (3) and (4). Repeat the torquing pattern for 3/4 of the recommended torque value. Finally using same pattern, torque to full torque value.

NOTE: Uneven or undertorquing can cause disk rupture below its rated burst pressure. Excessive torquing can cause damage to the disk and safety head.

## Installation of Safety Head EC-7RS or VEC-7RS Assembly in Pressure System

1. Insert the safety head assembly into the pressure system between companion flanges. Ensure flow arrows on the safety head point in the desired flow direction upon disk rupture. See Fig. 3 Flange Bolting Pattern.
2. Install gaskets between the safety head and the companion flanges. BS&B recommends a compressed fiber gasket no greater than 1/32 of an inch thick for this application. However, the user is cautioned to select gasket materials adequate for the service conditions and the ability of the gasket to resist "cold flow". Gaskets that "cold flow" will allow torque relaxation in non-pretorqueable safety heads which may cause low bursts. (The rupture pressure of disks installed in pretorqueable safety heads EC-7RS or VEC-7RS are unaffected.) Contact BS&B if an alternative gasket type is used.

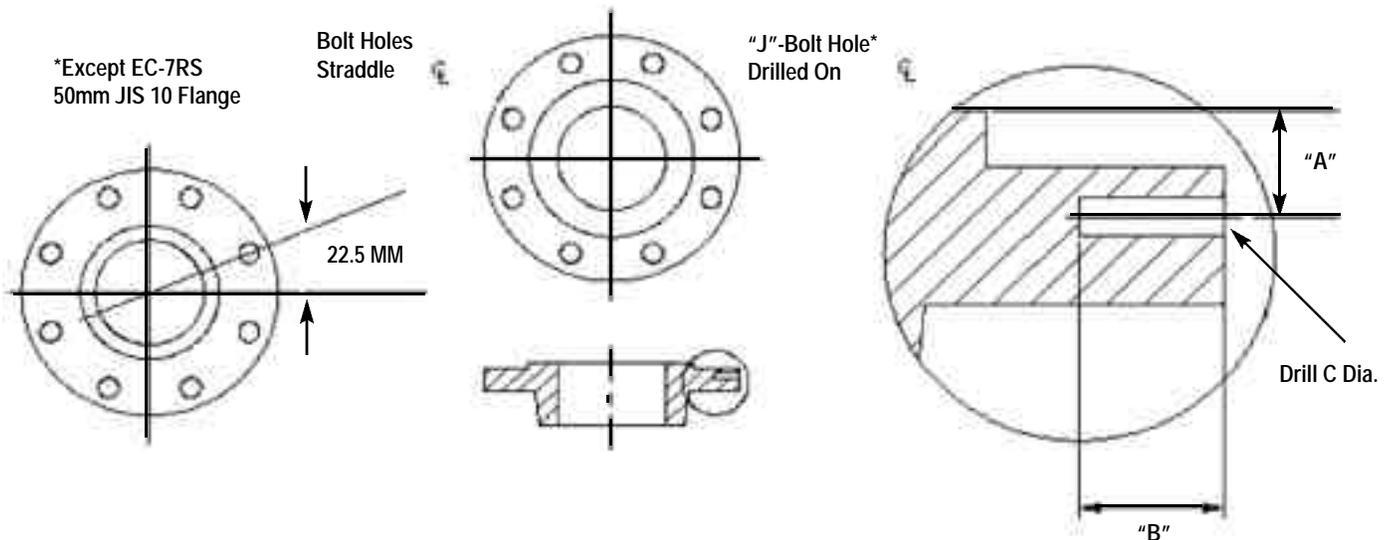
3. Install studs with nuts. Studs with nuts should be free running with lightly oiled threads. Tighten all nuts finger tight. Torque the nuts to the value shown in Table II. Torque evenly in a diagonal pattern by applying 1/4 of the recommended torque to each stud. Repeat pattern by torquing to 3/4 of the recommended torque value. Then using same pattern torque to full torque value.
4. The torque value on the companion flange nuts should be verified periodically at the system service temperature.

Torque values are for use with companion flanges with a minimum yield strength of 25,000 psi. Consult BS&B for flanges in other materials when suppliers recommend torque values lower than the BS&B recommended torque values and if gasket type differs from BS&B's recommendations.

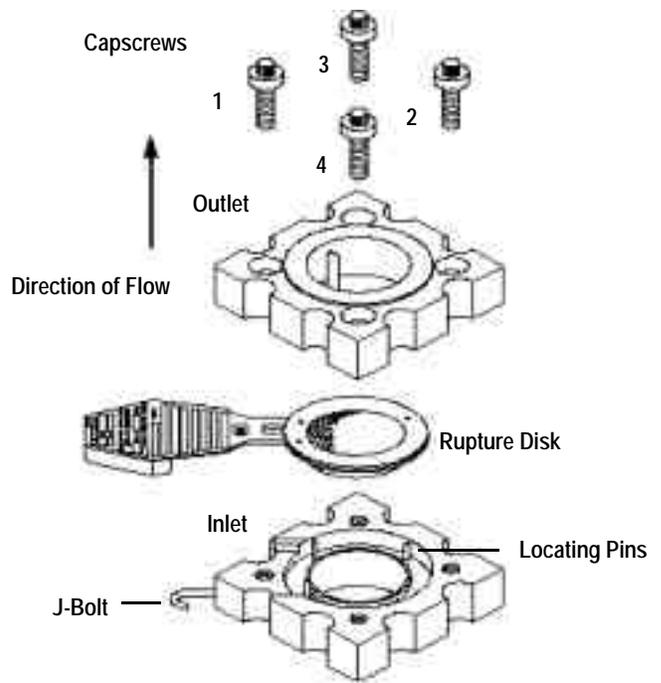
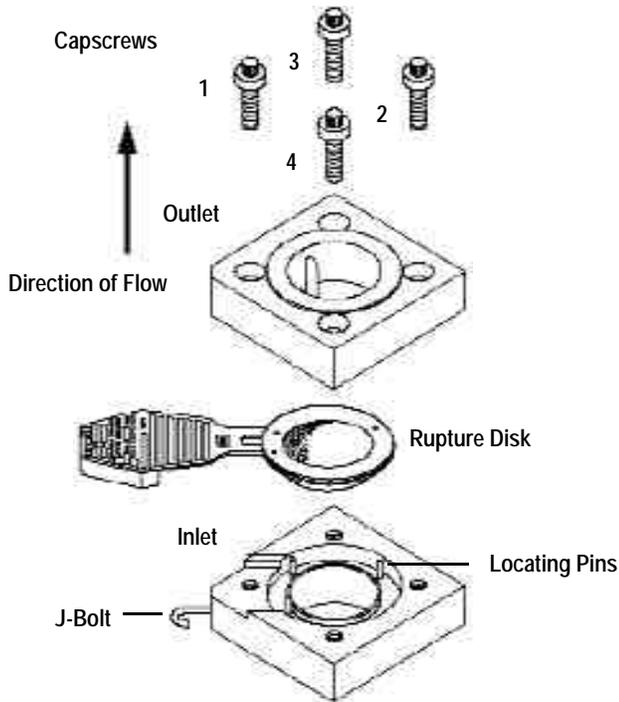
## J-Bolt Drilling

Figure 1

The EC-7RS or VEC-7RS fits inside the bolting pattern of the companion flange. See appropriate picture in figure 3 for your assembly. The J-Bolt prevents the safety head from being installed upside down. The inlet companion flange must be drilled to accept the "J" bolt. Table IV lists companion flange drilling dimensions.



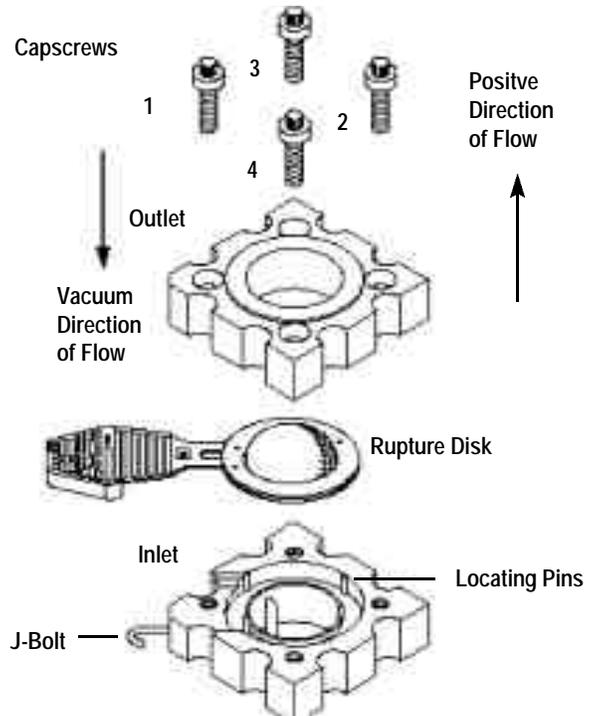
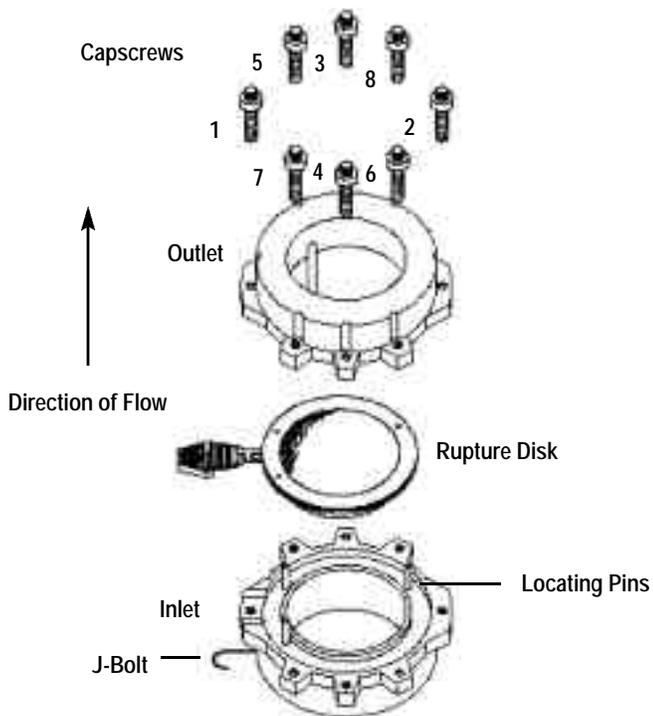
**Figure 2**  
**Safety Head Assembly Type EC-7RS**



1" (25mm)	ANSI	150/300/600
1-1/2" (40mm)	DIN	10/16/25/40
	JIS	16/20/30/40

2" (50mm)	ANSI	150/300/600
3" (80mm)	DIN	10/16/25/40
4" (100mm)	JIS	16/20/30/40

**Safety Head Assembly Type VEC-7RS**



6" (150mm) - 24" (600mm)	ANSI	150/300
	DIN	10/16/25/40
	JIS	16/20/30/40

2" (50mm)	ANSI	150/300/600
3" (80mm)	DIN	10/16/25/40
4" (100mm)	JIS	16/20/30/40

(Available in other EC-7RS designs)

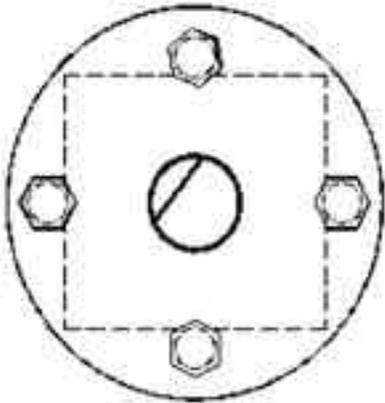
**Torque Table I**  
**Types EC-7RS, VEC-7RS**  
**Preassembly Capscrew Torque**

SIZE		SAFETY HEAD FLANGE RATING			PREASSEMBLY CAPSCREW TORQUE		12 POINT SOCKET SIZE	SOCKET DRIVE	SUGGESTED SOCKET SOURCE SNAP-ON TOOLS
					ALL TYPES				
					ALL MATERIALS				
IN	MM	ANSI	DIN	JIS	FT-LB	NT-M	IN	IN	-
1	25	150/300/600	10/16/25/40	10/16/20/30/40	4	5	1/4	3/8	SF-081
1.5	40	150/300/600	10/16/25/40	10/16/20/30/40	7	9	5/16	3/8	SF-101
2	50	150/300/600	10/16/25/40	10/16/20/30/40	13	18	5/16	3/8	SF-101
3	80	150/300/600	10/16/25/40	10/16/20/30/40	20	27	3/8	3/8	SF-121
4	100	150/300	10/16/25/40	10/16/20/30/40	25	34	7/16	3/8	SF-141
6	150	150/300	10/16/25/40	10/16/20/30/40	30	41	3/8	3/8	SF-121
8	200	150/300	10/16/25/40	10/16/20/30/40	50	67	7/16	3/8	SF-141
10	250	150/300	10/16/25/40	10/16/20/30/40	50	67	7/16	3/8	SF-141
12	300	150/300	10/16/25/40	10/16/20/30/40	40	54	3/8	3/8	SF-121
14	350	150/300	10/16/25/40	10/16/20/30/40	25	34	5/16	3/8	SF-101
16	400	150/300	10/16/25/40	10/16/20/30/40	25	34	5/16	3/8	SF-101
18	460	150/300	10/16	10/16/20	25	34	5/16	3/8	SF-101
20	500	150/300	10/16/25/40	10/16/20	40	54	3/8	3/8	SF-121
24	600	150/300	10/16/25/40	10/16/20	40	54	3/8	3/8	SF-121

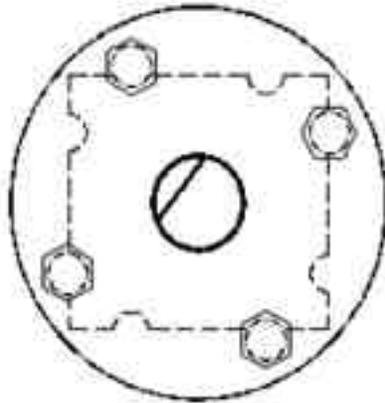
**Torque Table II**  
**Types EC-7RS, VEC-7RS, EC-7I, VEC-7I**  
**Companion Flange Torque**

SIZE		COMPANION FLANGE RATING			FLANGE STUD TORQUE	
					ALL MATERIALS	
IN	MM	ANSI	DIN	JIS	FT-LB	NT-M
1	25	150	10/16/25/40	-	10	14
1	25	300/600	-	10/16/20/30/40	12	16
1.5	40	150	-	-	23	31
1.5	40	-	10/16/25/40	10/16/20	27	37
1.5	40	300/600	-	-	30	41
1.5	40	-	-	30/40	32	44
2	50	150	10/16/25/40	10	35	47
2	50	300/600	-	16/20/30/40	18	24
3	80	150	-	-	40	54
3	80	-	10/16/25/40	10	20	27
3	80	300/600	-	16/20/30/40	23	31
4	100	150	10/16	10	40	54
4	100	300	25/40	16/20	45	61
4	100	600	-	30/40	50	68
6	150	150	-	-	35	47
6	150	300	-	-	23	31
6	150	-	-	16/20	27	37
6	150	600	-	30	30	41
6	150	-	10/16	10/40	38	52
6	150	-	25/40	-	44	60
8	200	150	10/40	-	35	48
8	200	-	16	10	25	34
8	200	300	25	16/20/30	28	38
8	200	-	-	40	40	54
10	250	150/300	10	10	50	68
10	250	-	16	16/20	54	73
10	250	-	25	-	63	86
10	250	-	40	30/40	73	99
12	300	150	-	-	60	82
12	300	-	-	10	44	60
12	300	-	-	16/20	49	67
12	300	-	10/25	-	55	75
12	300	300	16/40	30	66	90
12	300	-	-	40	79	107
14	350	150	-	-	65	88
14	350	-	10	10	40	54
14	350	-	16	-	45	61
14	350	300	-	-	50	68
14	350	-	25	16/20/30	61	83
14	350	-	40	40	69	94
16	400	150	10	10	65	88
16	400	300	16	-	71	97
16	400	-	-	16/20	82	112
16	400	-	25/40	30/40	96	131
18	460	150	-	-	100	136
18	460	-	10	10	58	79
18	460	300	16	-	70	95
18	460	-	-	16/20	79	107
20	500	150	16	16/20	94	128
20	500	-	10	10	69	94
20	500	300	-	-	86	117
20	500	-	25	-	105	143
20	500	-	40	-	117	159
24	600	150	16	-	120	163
24	600	-	10	10	92	125
24	600	300	-	16/20	110	150
24	600	-	25	-	131	178
24	600	-	40	-	143	194

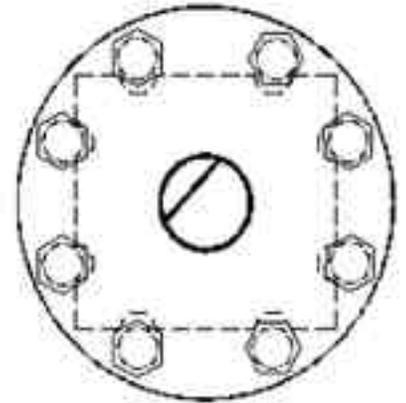
**Figure 3**  
**EC-7RS VEC-7RS Safety Heads Inside the Flange Bolting Pattern**



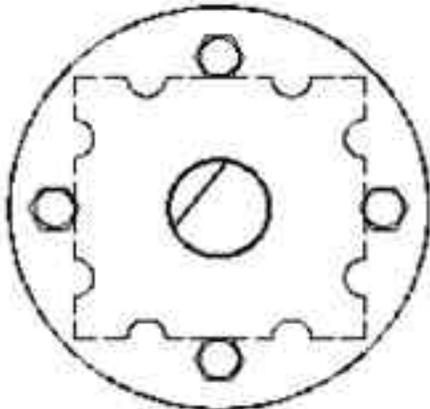
1" (25mm)      ANSI 150/300/600  
 DIN 10/16/25/40  
 JIS 16/20/30/40  
 1 1/2" (25mm)      ANSI 150/300/600  
 DIN 10/16/25/40  
 JIS 16/20/30/40



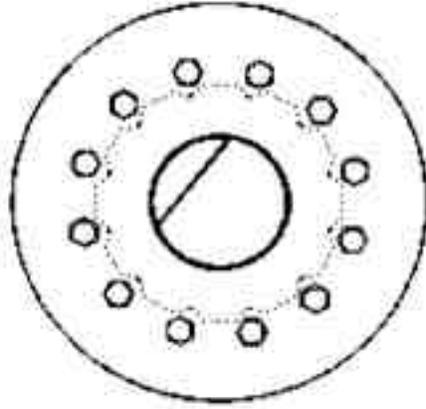
2" (50mm)      ANSI 150



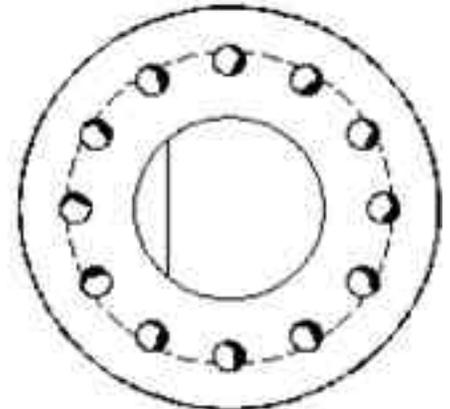
2" (50mm)      ANSI 300/600  
 JIS 16/20/30/40  
 3" (80mm)      ANSI 300/600  
 DIN 10/16/25/40  
 JIS 16/20/30/40  
 4" (100mm)      ANSI 150/300  
 DIN 10/16/25/40  
 JIS 16/20/30/40



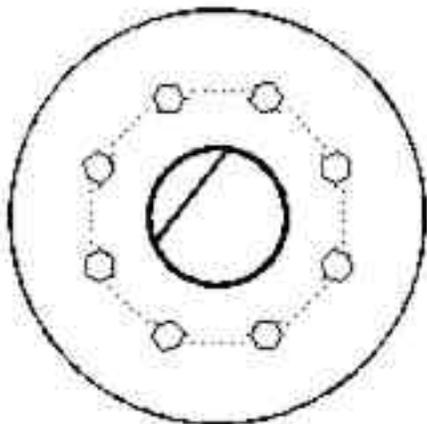
2" (50mm)      DIN 10/16/25/40  
 3" (80mm)      ANSI 150



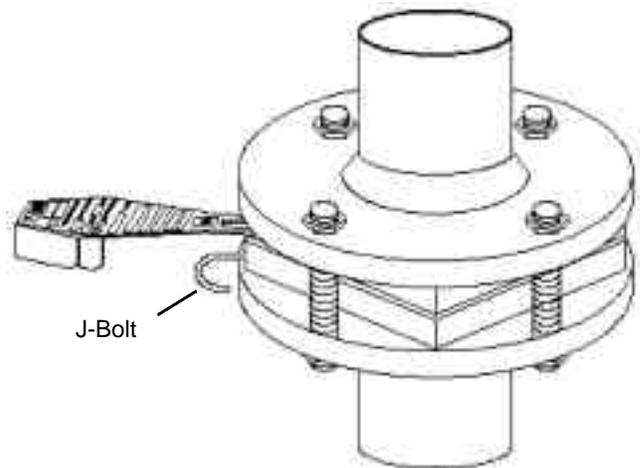
6" (150mm)      ANSI 300  
 JIS 30/40



6" (150mm)      JIS 16/20



6" (150mm)      ANSI 150  
 DIN 10/16/25/40



**Safety Head Installed Between Companion Flanges**

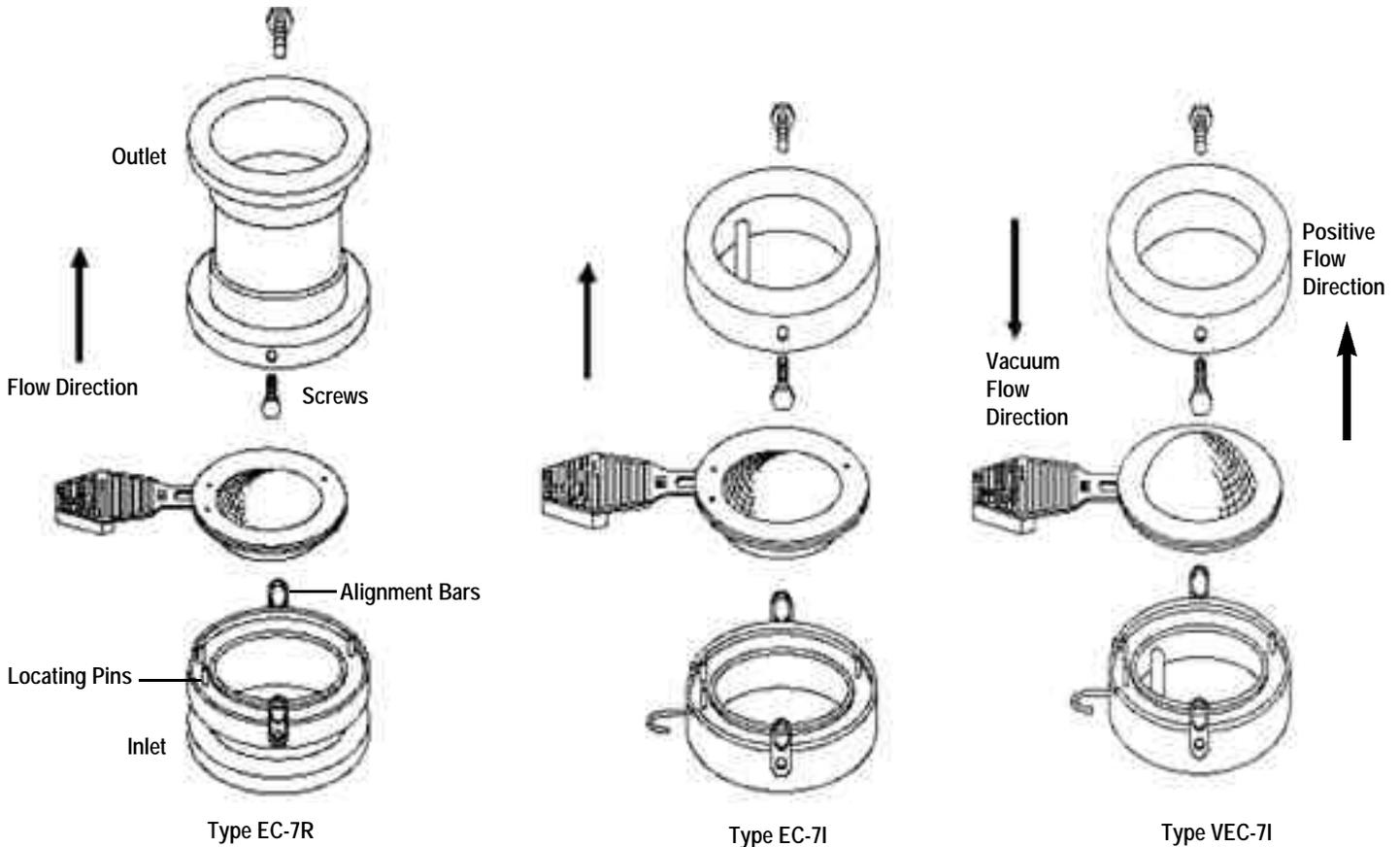
**Table III**  
**EC-7RS, VEC-7RS**  
**Companion Flange Studs**

SIZE		COMPANION FLANGE RATING			NUMBER OF STUDS	DIAMETER OF STUD		MINIMUM LENGTH OF STUD	
IN	MM	ANSI	DIN	JIS		IN	MM	IN	MM
1	25	150	-	-	4	1/2	-	4-3/4	-
1	25	300	-	-	4	5/8	-	5-1/4	-
1	25	600	-	-	4	5/8	-	5-3/4	-
1	25	-	10/16/25/40	-	4	-	12	-	125
1	25	-	-	10/16/20	4	-	16	-	135
1	25	-	-	30/40	4	-	16	-	135
1.5	40	150	-	-	4	1/2	-	5	-
1.5	40	300/600	-	-	4	3/4	-	5-3/4	-
1.5	40	-	10/16/25/40	10/16/20	4	-	16	-	135
1.5	40	-	-	30/40	4	-	20	-	155
2	50	150	-	-	4	5/8	-	5-1/2	-
2	50	300	-	-	8	5/8	-	5-3/4	-
2	50	600	-	-	8	5/8	-	6-1/2	-
2	50	-	10/16/25/40	-	4	-	16	-	145
2	50	-	-	10	4	-	16	-	135
2	50	-	-	16/20	8	-	16	-	140
2	50	-	-	30/40	8	-	16	-	155
3	80	150	-	-	4	5/8	-	6-1/4	-
3	80	300	-	-	8	3/4	-	7-1/4	-
3	80	600	-	-	8	3/4	-	7-3/4	-
3	80	-	10	-	8	-	16	-	155
3	80	-	16/25/40	-	8	-	16	-	160
3	80	-	-	10	8	-	16	-	150
3	80	-	-	16/20	8	-	20	-	165
3	80	-	-	30/40	8	-	20	-	185
4	100	150	-	-	8	5/8	-	7	-
4	100	300	-	-	8	3/4	-	7-3/4	-
4	100	600	-	-	8	7/8	-	9	-
4	100	-	10/16	10	8	-	16	-	165
4	100	-	25/40	-	8	-	21	-	185
4	100	-	-	16/20	8	-	20	-	185
4	100	-	-	30/40	8	-	22	-	210
6	150	150	-	-	8	3/4	-	8-1/4	-
6	150	300	-	-	12	3/4	-	9-1/4	-
6	150	600	-	-	12	1	-	10-1/2	-
6	150	-	10/16	-	8	-	21	-	205
6	150	-	25/40	-	8	-	25	-	225
6	150	-	-	10	8	-	20	-	200
6	150	-	-	16/20	12	-	22	-	235
6	150	-	-	30	12	-	24	-	245
6	150	-	-	40	12	-	30	-	270
8	200	150	-	-	8	3/4	-	8-3/4	-
8	200	300	-	-	12	7/8	-	10	-
10	250	150	-	-	12	7/8	-	9-3/4	-
10	250	300	-	-	16	1	-	11-1/2	-
12	300	150	-	-	12	7/8	-	10-1/4	-
12	300	300	-	-	16	1 - 1/8	-	13	-
16	400	150	-	-	16	1	-	12-1/2	-
16	400	300	-	-	20	1 - 1/4	-	15-1/2	-
18	450	150	-	-	16	1 - 1/8	-	14	-
18	450	300	-	-	24	1 - 1/4	-	16-1/2	-
20	500	150	-	-	20	1 - 1/8	-	15-1/2	-
20	500	300	-	-	24	1 - 1/4	-	17-1/2	-
24	600	150	-	-	20	1 - 1/4	-	18	-
24	600	300	-	-	24	1 - 1/2	-	20-1/2	-

**Table IV**  
**EC-7RS, VEC-7RS, EC-7I, VEC-7I**  
**Companion Flange "J" Bolt Drilling Dimensions**

SIZE		COMPANION FLANGE RATING			DIMENSIONS					
					A		B		C	
IN	MM	ANSI	DIN	JIS	IN ± 1/32	MM ± .8	IN + 1/16 - 0	MM + 1.6 - 0	IN	MM
1	25	150	-	-	5/16	8	7/16	11	7/16	11
1	25	-	10/16	-	13/32	10	5/16	8	7/16	11
1	25	-	-	10/16	9/32	7	35/64	14	7/16	11
1	25	300	-	-	7/16	11	1/2	13	7/16	11
1	25	-	25	-	13/32	10	5/16	8	7/16	11
1	25	-	-	20	9/32	7	5/8	16	7/16	11
1	25	600	-	-	9/16	14.5	5/8	16	7/16	11
1	25	-	40	-	13/32	10	35/64	14	7/16	11
1	25	-	-	30/40	13/32	10	6/8	16	7/16	11
1.5	40	150	-	-	3/8	9.5	7/16	11	7/16	11
1.5	40	-	10/16	-	13/32	10	13/32	10	7/16	11
1.5	40	-	-	10/16/20	11/32	9	5/8	16	7/16	11
1.5	40	300	-	-	1/2	13	1/2	13	7/16	11
1.5	40	-	25/40	-	13/32	10	13/32	10	7/16	11
1.5	40	-	-	30/40	7/16	11	19/32	15	7/16	11
1.5	40	600	-	-	9/16	14.5	1/2	13	7/16	11
2	50	150	-	-	1/2	13	7/16	11	7/16	11
2	50	-	-	10/16/20	13/32	10	7/16	11	7/16	11
2	50	-	10/16/25/40	-	15/32	12	19/32	15	7/16	11
2	50	-	-	30/40	15/32	12	5/8	16	7/16	11
2	50	300/600	-	-	9/16	14.5	11/16	17.5	7/16	11
3	80	150	-	-	11/16	17.5	7/16	11	7/16	11
3	80	-	-	10	13/32	10	13/32	10	7/16	11
3	80	-	10/16/25/40	-	15/32	12	13/32	10	1/2	13
3	80	-	-	16/20	1/2	13	11/32	9	7/16	11
3	80	300/600	-	-	3/4	19	13/16	20.5	7/16	11
3	80	-	-	30/40	1/2	13	19/32	15	7/16	11
4	100	150	-	-	11/16	17.5	9/16	14.5	7/16	11
4	100	-	10/16	-	15/32	12	13/32	10	19/32	15
4	100	-	-	10	13/32	10	13/32	10	7/16	11
4	100	300	-	-	3/4	19	1-1/6	27	7/16	11
4	100	-	25/40	-	15/32	12	23/32	18	19/32	15
4	100	-	-	16/20	19/32	15	1/2	13	7/16	11
4	100	600	-	-	3/4	19	9/16	14.5	7/16	11
4	100	-	-	30	19/32	15	25/32	20	7/16	11
4	100	-	-	40	19/32	15	1-1/32	26	7/16	11
6	150	150/600	-	-	3/4	19	9/16	14.5	7/16	11
6	150	-	10/16	-	15/32	12	7/16	11	5/8	16
6	150	-	-	10	35/64	14	5/16	8	7/16	11
6	150	-	-	16/20	13/32	10	15/32	12	7/16	11
6	150	300	-	-	3/4	19	1-5/16	33.5	7/16	11
6	150	-	25/40	-	15/32	12	3/4	19	5/8	16
6	150	-	-	30	43/64	17	1-3/16	30	7/16	11
6	150	-	-	40	43/64	17	1-49/64	45	7/16	11
8	200	150	-	-	5/8	16	1/2	13	5/8	16
8	200	300	-	-	5/8	16	1-1/4	32	5/8	16
10	250	150	-	-	5/8	16	1/2	13	5/8	16
10	250	300	-	-	5/8	16	1-1/4	32	5/8	16
12	300	150/300	-	-	5/8	16	5/8	16	5/8	16
16	400	150	-	-	5/8	16	3/8	9.5	11/16	17.5
16	400	300	-	-	5/8	16	1/2	13	11/16	17.5
18	460	150	-	-	5/8	16	1/2	13	11/16	17.5
18	460	300	-	-	5/8	16	9/16	14.5	11/16	17.5
20	500	150	-	-	5/8	16	5/8	16	11/16	17.5
20	500	300	-	-	5/8	16	5/8	16	11/16	17.5
24	600	150	-	-	5/8	16	11/16	17.5	11/16	17.5
24	600	300	-	-	5/8	16	1	25.5	11/16	17.5

Figure 4  
EC-7R, EC-7I and VEC-7I



**Type EC-7R, EC-7I and VEC-7I Non-pretorqueable Safety Head**

**Installation of Rupture Disk in Safety Head**

1. Place inlet of Safety Head on a work surface in position as shown with locating pins up. (Fig. 4)
2. Place NEW, UNDAMAGED rupture disk on inlet, the holes in the disk mating with the locating pins. The disk's details on the tag should show in the direction of flow.
3. Carefully align and place outlet flange in position as shown.
4. Assemble unit with alignment bars and screws. Tighten screws sufficiently to hold disk snugly in place between Safety Head inlet and outlet.

**Installation of the EC-7R or EC-7I or VEC-7I Assembly in Pressure System**

1. Insert the Safety Head assembly in the pressure system between companion flanges. Ensure flow arrows on the Safety Head point in the desired flow direction upon disk rupture.
2. Install gaskets between the Safety Head and the companion flanges. BS&B recommends a compressed fiber gasket no greater than 1/32\* of an inch thick for this application. However, the user is cautioned to select gasket materials adequate for the service conditions and the ability of the gasket to resist "cold flow". Gaskets that "cold flow" will allow torque relaxation, which will cause low bursts. Contact BS&B if an alternative gasket type will be used.
3. Install studs with nuts. Studs with nuts should be free running with lightly oiled threads. Tighten all nuts finger tight. Torque the nuts to the value shown in Table II. Consult BS&B for companion flange torque values for Safety Head type EC-7R, VEC-7R. Torque evenly in a diagonal pattern by applying 1/4 of the recommended torque to each stud. Repeat pattern by torquing to 3/4 of the recommended torque value. Then using same pattern torque to full torque value.
4. The Safety Head size and rating must match the companion flange size and rating.
5. The torque value on the companion flange nuts should be verified periodically at the system service temperature.

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## ISO 9001 Quality System Certification



Patent Numbers 5,368,180; 5,413,237; 4,751,938 and other international patents.