



# SPECIAL ENGINEERING INSTRUCTIONS

DRAWN BY MAM NO. II-MR-0002  
CHK'D. BY G. Klein DATE 07/05/05 SHEET 1 OF 17  
APP. BY D. Ibbetson REVISION N RELEASE NO. 12-T-0607

REV.: S	ECN NO.: 17-T-0367	DRAWN: <i>Kumaravel</i>	CHK'D.: <i>CB</i>	DATE: 22-Sep-17
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## INSTALLATION INSTRUCTIONS FOR THE BUCKLING PIN RELIEF VALVE (BPRV)



US Patents 6,367,498; 6,488,044; 6,491,055 apply;  
International Patents Pending

**Danger:** BPRV's are intended to provide a pressure relief opening. The BPRV is designed to instantaneously open at a specified temperature and pressure, thereby relieving excess pressure or preventing excessive vacuum in a system.

**IT IS IMPERATIVE THAT THIS BPRV BE PROPERLY INSTALLED AND SAFELY VENTED IN ORDER TO AVOID BODILY INJURY, DAMAGE TO PROPERTY, POLLUTION AND LOSS OF PRODUCT.**

BS&B Pressure Safety Management, L.L.C. supply BPRV's selected by their customers, which are manufactured in reliance upon information and specifications supplied by the customer. BS&B Pressure Safety Management, L.L.C. is not liable for any damage resulting from improper installation, improper system design, unsafe venting, or other factors beyond BS&B Pressure Safety Management, L.L.C. control.



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## SAFETY PRECAUTIONS:

- Caution:** Provide adequate support for the piping and the connections to absorb recoil/reaction forces when the BPRV opens. If the discharge is free vented, a baffle plate may be mounted downstream of the outlet companion pipe flange with extra length studs to minimize recoil.
- Caution:** The BPRV valve should not be subjected to bending stresses such as those developed by misaligned piping, unsupported piping or improper torque application to companion flanges. Mating flanges faces shall be parallel to BPRV flanges.
- Caution:** Do not locate the BPRV where it may be subjected to thermal shock. Review any concerns with BS&B Safety Management, L.L.C. before installation.
- Caution:** Corrosion and process conditions may cause deterioration and necessitate periodic inspection and/or replacement of component parts.
- Caution:** When the BPRV opens, a pressure shock wave is generated. Take account of the affect this may have on the operating performance of downstream and upstream equipment.
- Caution:** When the BPRV opens, the rotating disc will extend beyond the body on both the inlet & outlet sides. Make sure that the disc cannot contact upstream or downstream components; this will affect the opening of the BPRV. Make sure that the fully opened disk does not project into an adjacent flow path that will load the disc and risk damage of the BPRV.
- Caution:** Each BPRV is designed and tested for use in a specific orientation such as vertical flow down, vertical flow up, horizontal flow with valve opening bottom up or horizontal flow with the valve opening top down. Install your BPRV in this orientation. Consult BS&B before changing orientation; retesting by BS&B is probably required. Test certificates and "Code Stamping" is void when a BPRV is applied in the wrong orientation.
- Warning:** Do not locate the BPRV where personnel will be exposed to released product and pressure through the BPRV.

## BEFORE YOU INSTALL THE BPRV VALVE

### Handling Instructions

1. Never lift or move the valve assembly using the plug, valve seat (bore), or shafts as lifting points.
2. Never lift or move the valve assembly by using the mechanism, sensor, or other attached accessories.
3. Valve should be handled gently and any rough handling of the valve should be avoided which could disturb the Mechanism settings.



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## Lifting Instructions

1. Shoulderless eye bolts should be used only where the hoist chain or sling is aligned with the axis of the bolt, so that it pulls in exactly the same direction as the shaft of the bolt. The bolt must be fully screwed into the valve body. If the chain or sling pulls at an angle to the axis of the eye bolt, the bolt may snap. It is recommended that forged steel material be used for eye bolts.
2. Shouldered eye bolts must be used whenever the chain or sling is rigged at an angle from the axis of the bolt. The eye bolt must be screwed into the valve body until the shoulder fits flat and tight against the surface of the counter bore in valve body. To make sure the eye bolt will not be bent sideways, the chain or sling must be in the plane of the eye of the eyebolt. To ensure that the shoulder is firmly seated on the surface of the load when the eye has been correctly aligned with the chain or sling, a metal washer of suitable size and shape may be used under the shoulder. The depth of thread engagement must be at least 1.5 times the diameter of the eye bolt shaft. It is recommended that forged steel material be used for eye bolts.
3. In any situation where there is doubt about the safety of using eye bolts, it is recommended that swivel hoist rings be used instead of eye bolts. Follow manufacturing recommendations in selecting and using these rings.
4. Never over-torque a lifting device. Never use a lifting device that has bad threads. Never use a lifting device that is corroded, cracked, bent, twisted, stretched, fatigued, undersized, or questionable.
5. Valves shall always be lifted vertically up using the recommended eye bolts shown in the approval drawings.
6. While lifting the valve use a single lift point with 2 straps or 2 chains that are equal in length. See Fig 1 strap A is equal in length to strap B. The length of straps need to be long enough so  $\theta$  is greater than  $50^\circ$ . COG details are given on the approval drawings.
7. Any slings, chains, lifting beams, spreaders or other necessary equipment shall be certified to lift the equipment weight plus a margin of 50%.
8. It is recommended that lifting straps be used thru the eye bolts or chains with hooks with safety latches.
9. Some of Dos and Don'ts for lifting the valve assembly are shown in figures 1 thru 4.
10. Angle of lift ( $\theta$ ) should be  $50^\circ$  or more.



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## Recommended Lifting method for smaller size valves.

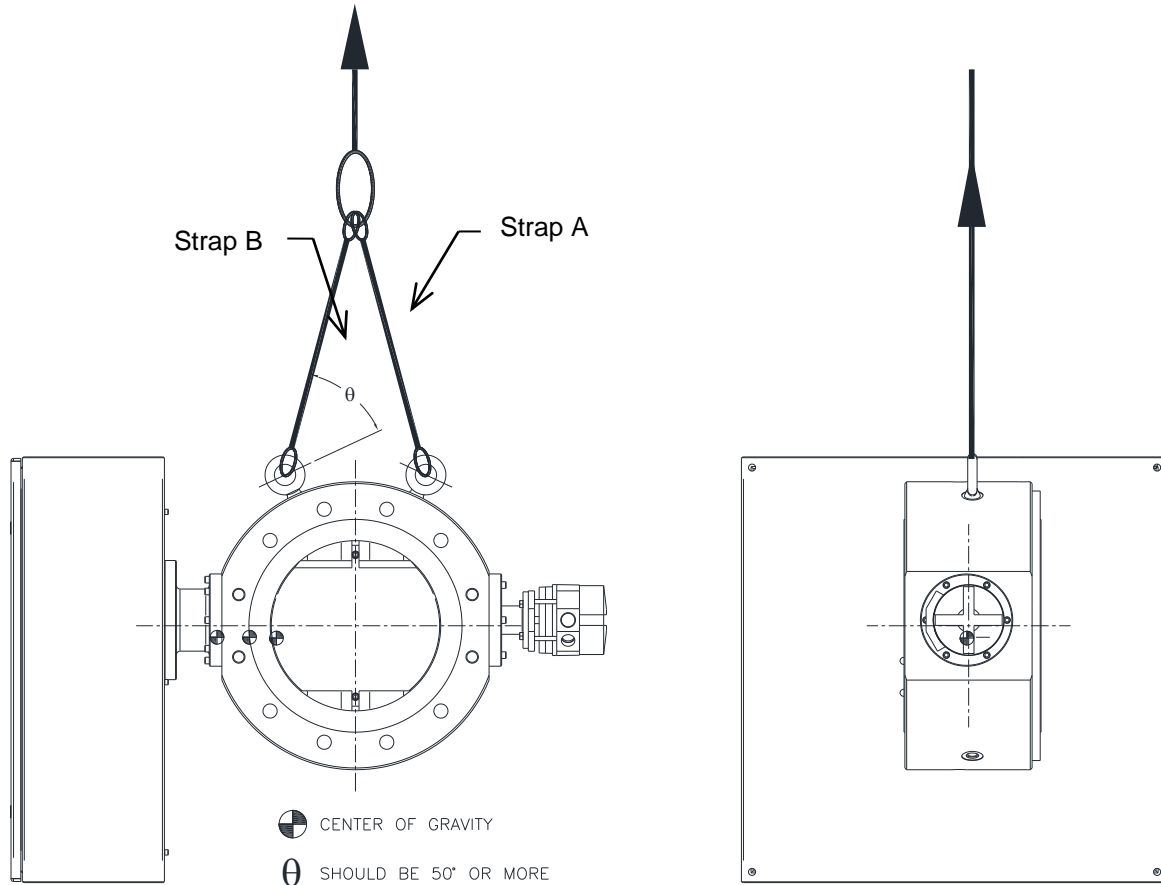


Figure 1: DO'S for BPRV (Typ)

Note: Smaller valves where Center of Gravity (COG) is considerably off center due to mechanism weight and extended spindle shafts for cryo valves.

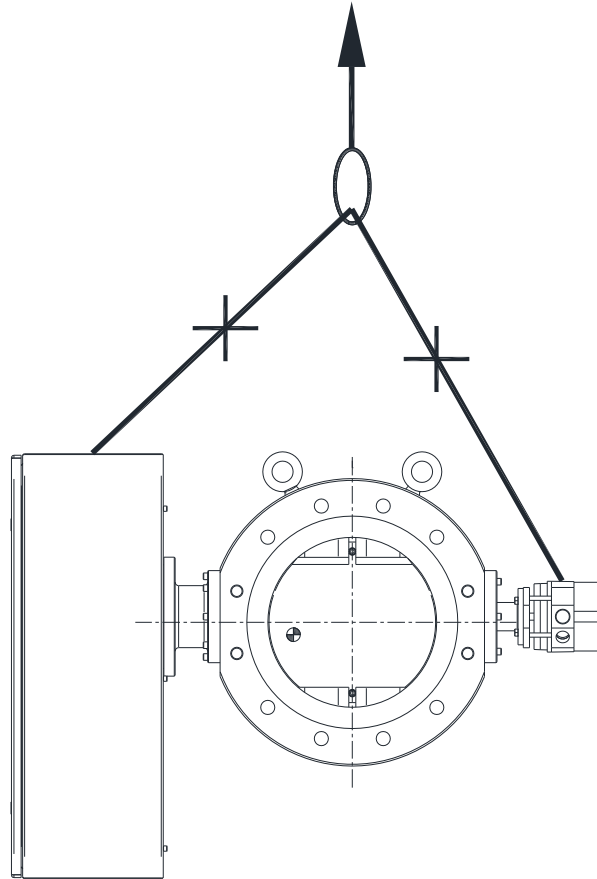


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**Figure 2:** DONT'S for BPRV (Typ)

Note: Mechanism or Sensor **MUST NOT** be strapped for lifting Valves.



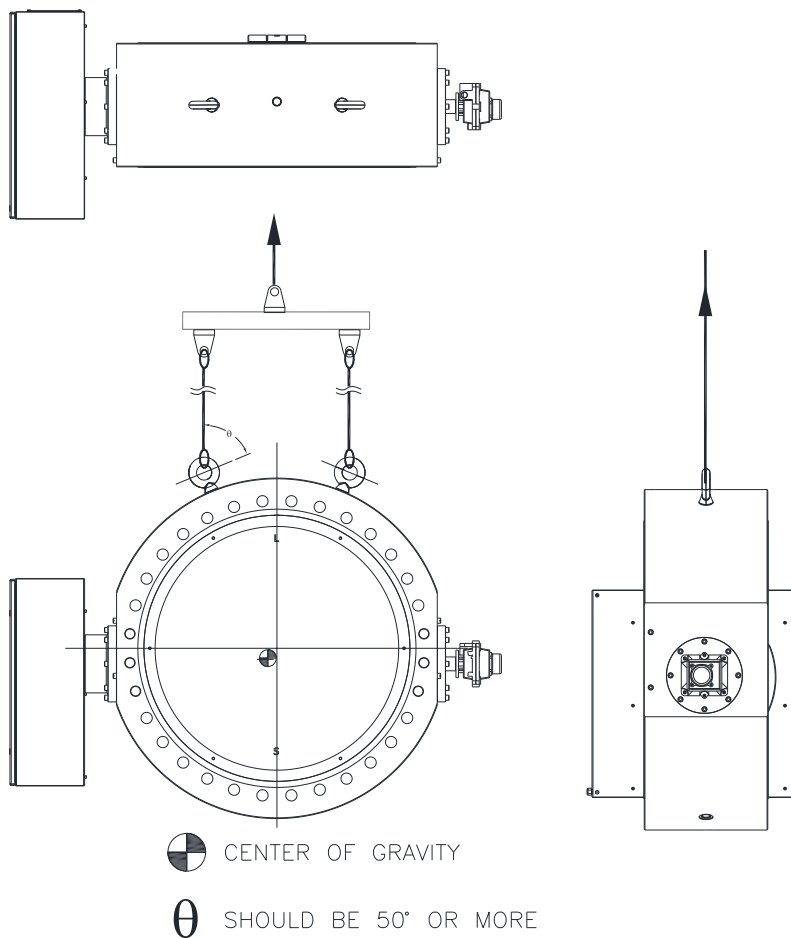
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## Recommended Lifting method for Bigger size valves



**Figure 3: DO'S for BPRV (Typ)**

Note: Larger valves where COG is closer to the center of the valve due to the heavy weight of the valve body that offsets mechanism weight.



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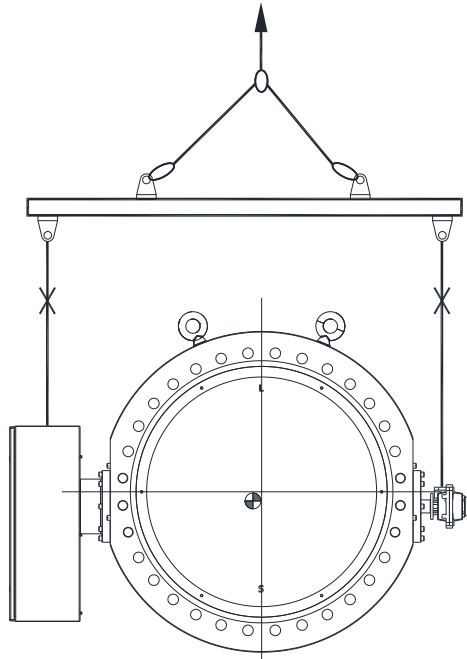


Figure 4: DONT'S for BPRV (Typ)

## Inspect the BPRV Valve

1. Inspect the BPRV valve mating surfaces for foreign materials. Dirt or grit can cause the companion flange gaskets to not seal properly and leak.
2. Inspect the mechanism for physical damage. Damage to the mechanism could cause the valve to open at a pressure other than the rated pressure.
3. The BPRV valve size and rating must match the size and rating of the companion flange.
4. If the BPRV has a rust preventative applied, clean with an appropriate solvent, such as MEK.
5. The BPRV valve must not be machined or modified in any way except with the approval of BS&B Pressure Safety Management, L.L.C. Failure to obtain such approval voids the warranty on this product.

## Check the installation conditions for the BPRV Valve

1. Ensure that the flow path orientation of the installation matches that for which the BPRV was calibrated.
2. Ensure that the BPRV rotating disc is protected within the BPRV body in the fully closed position.
3. Ensure that the BPRV rotating disk cannot contact upstream or downstream components when in the fully open position.



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## BPRV INSTALLATION IN COMPANION FLANGE

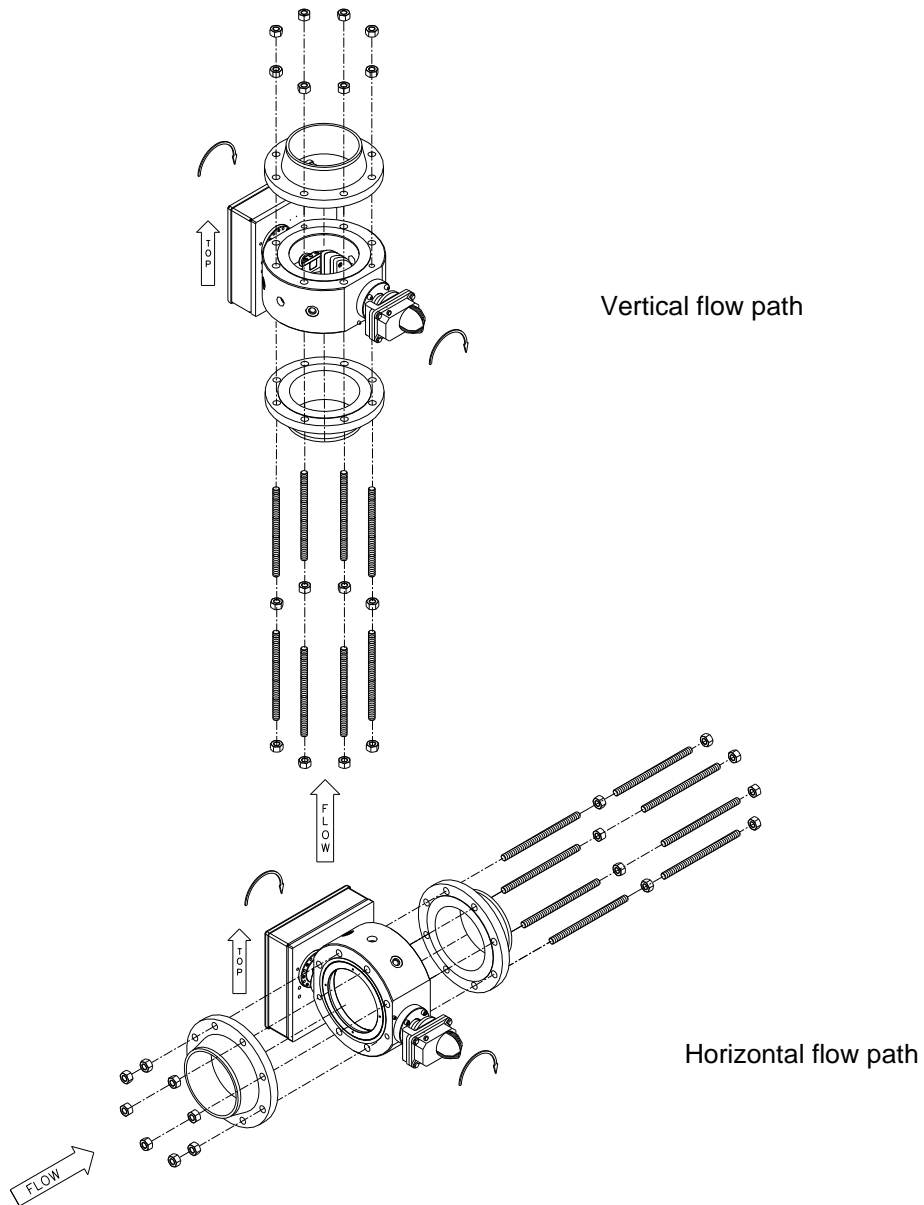


Figure 5. Typical Installation

NOTE: Figure 5 illustrates a “Vertical Flow Path” and a “Horizontal Flow Path” respectively.





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## BPRV Installation Procedure Between Companion Flanges

- Place the BPRV valve body in between companion flanges as shown in Figure 5. Make certain that the flow arrow on the body and the orientation arrow in the mechanism are correctly orientated as shown in Figure 5.
- Install the companion flange gaskets. Ensure gaskets that meet the required BS&B installation torque values shown in Table 1 for compressed fiber, for Flexitallic® "Type LS" or Flexitallic® "Type CGI", Table 2 for RTJ type gaskets are used. Other gasket types or those that require different companion flange stud torque values must be approved by BS&B before use.
- Install the studs with nuts. Tighten all nuts finger-tight before torqueing. Even torque can be achieved by applying the torque in 1/4 increments of the desired final torque. The torque shall be applied in a criss-cross pattern.
  - Compressed Fiber Gaskets** – Evenly torque the studs to the value listed in Table 1, using a calibrated torque wrench.
  - Flexitallic® Type "LS" Gasket Only** – Evenly torque the studs following the Flexitallic® installation instructions to the value listed in Table 1 using a calibrated torque wrench. Should the torque value in Table 1 differ from that recommended by Flexitallic®, consult BS&B before proceeding with installation.
  - Flexitallic® Type "CGI" Gasket Only** – Only to be used on Flanged Seal Retainer Ring applications. Evenly torque the studs following the Flexitallic® installation instructions to the value listed in Table 1 using a calibrated torque wrench. Should the torque value in Table 1 differ from that recommended by Flexitallic®, consult BS&B before proceeding with installation.
  - Klinger® Type "RTJ" Gasket Only** – Only to be used on RTJ type Flanges. Evenly torque the studs following the Klinger® installation instructions to the value listed in Table 2 using a calibrated torque wrench. Should the torque value in Table 2 differ from that recommended by Klinger®, consult BS&B before proceeding with installation.
- Remove shipping pin and install Calibrated Buckling Pin per Pin Installation Instruction received with valve.



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**TABLE 1: BPRV VALVE COMPANION FLANGE TORQUE**

Valve Size		Flange Rating		Number of Studs	Diam. Of Studs	Flexitallic® CGI Stud Torque (Flanged Seal Retainer Rings ONLY)		Flexitallic® "LS" Stud Torque		Compressed Fiber Stud Torque	
						ft-lbs	N-m	ft-lbs	N-m	ft-lbs	N-m
in	mm	ANSI	Series		in	ft-lbs	N-m	ft-lbs	N-m	ft-lbs	N-m
2	50	150	-	4	.625	90	122	50	68	51	69
		300		8	.625	90	122	50	68	52	70
		600		8	.625	90	122	50	68	76	103
		900		8	.875	240	325	133	180	248	336
3	125	150	-	4	.625	90	122	50	68	60	82
		300		8	.75	150	203	83	112	95	129
		600		8	.75	150	203	83	112	142	192
		900		8	.875	240	325	133	180	305	414
4	100	150	-	8	.625	90	122	50	68	51	70
		300		8	.75	150	203	83	112	112	152
		600		8	.875	240	325	133	180	249	338
		900		8	1.125	533	722	296	400	561	761
6	150	150	-	8	.75	150	203	83	112	85	115
		300		12	.75	150	203	83	112	120	162
		600		12	1	368	498	204	276	335	454
		900		12	1.125	533	722	296	400	589	798
8	200	150	-	8	.75	150	203	83	112	97	132
		300		12	.875	240	325	133	180	191	259
		600		12	1.125	533	722	296	400	494	670
		900		12	1.375	1,020	1,383	567	769	1,054	1,429
10	250	150	-	12	.875	240	325	133	180	127	173
		300		16	1	368	498	204	276	240	325
		600		16	1.25	750	1,017	417	565	630	854
		900		16	1.375	1,020	1,383	567	769	1,105	1,498
12	300	150	-	12	.875	240	325	133	180	145	197
		300		16	1.125	533	722	296	400	351	475
		600		20	1.25	750	1,017	417	565	623	845
		900		20	1.375	1,020	1,383	567	769	1,179	1,598
14	350	150	-	12	1	368	498	204	276	206	280
		300		20	1.125	533	722	296	400	361	490
		600		20	1.375	1,020	1,383	567	769	801	1,086
		900		20	1.5	1,200	1,627	540	732	1,550	2,102
16	400	150	-	16	1	368	498	204	276	200	272
		300		20	1.25	750	1,017	417	565	486	659
		600		20	1.5	1,200	1,627	540	732	1,095	1,484
		900		20	1.625	1,650	2,237	733	994	1,993	2,702
18	450	150	-	16	1.125	533	722	296	400	273	370
		300		24	1.25	750	1,017	417	565	481	652
		600		20	1.625	1,650	2,237	733	994	1,367	1,853
		900		20	1.875	3,000	4,067	1,333	1,807	2,813	3,814
20	500	150	-	20	1.125	533	722	296	400	268	363
		300		24	1.25	750	1,017	417	565	519	704
		600		24	1.625	1,650	2,237	733	994	1,374	1,862
		900		20	2	3,300	4,474	1,467	1,989	3,370	4,568



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in	mm	ANSI	Series			in	ft-lbs	N-m	ft-lbs	N-m	ft-lbs
24	600	150	-	20	1.25	750	1,017	417	565	379	514
		300		24	1.5	1,200	1,627	540	732	883	1,197
		600		24	1.875	3,000	4,067	1,333	1,807	2,070	2,806
		900		20	2.5	6,600	8,948	2,933	3,977	6,080	8,244
26	650	150	A	24	1.25	750	1,017	417	565	373	506
			B	36	.75	150	203	83	112	91	123
		300	A	28	1.625	1,650	2,237	733	994	1,038	1,407
			B	32	1.25	750	1,017	417	565	495	671
		600	A	28	1.875	3,000	4,067	1,333	1,807	2,091	2,835
			B	28	1.625	1,650	2,237	733	994	1,279	1,734
		900	A	20	2.75	8,880	12,040	3,947	5,351	6,846	9,281
			B	20	2.5	6,600	8,948	2,933	3,977	5,294	7,178
28	700	150	A	28	1.25	750	1,017	417	565	369	500
			B	40	.75	150	203	83	112	91	123
		300	A	28	1.625	1,650	2,237	733	994	1,082	1,467
			B	36	1.25	750	1,017	417	565	494	669
		600	A	28	2	3,300	4,474	1,467	1,989	2,477	3,359
			B	28	1.75	2,250	3,051	1,000	1,356	1,604	2,175
		900	A	20	3	11,580	15,700	5,147	6,978	8,668	11,753
			B	20	2.75	8,880	12,040	3,947	5,351	6,837	9,270
30	750	150	A	28	1.25	750	1,017	417	565	381	517
			B	44	.75	150	203	83	112	91	124
		300	A	28	1.75	2,250	3,051	1,000	1,356	1,354	1,836
			B	36	1.375	1,020	1,383	567	769	645	875
		600	A	28	2	3,300	4,474	1,467	1,989	2,626	3,561
			B	28	1.875	3,000	4,067	1,333	1,807	1,976	2,679
		900	A	20	3	11,580	15,700	5,147	6,978	9,229	12,512
			B	20	3	11,580	15,700	5,147	6,978	8,580	11,633
32	800	150	A	28	1.5	1,200	1,627	540	732	626	849
			B	48	.75	150	203	83	112	93	125
		300	A	28	1.875	3,000	4,067	1,333	1,807	1,641	2,225
			B	32	1.5	1,200	1,627	540	732	865	1,173
		600	A	28	2.25	4,770	6,467	2,120	2,874	3,453	4,682
			B	28	2	3,300	4,474	1,467	1,989	2,374	3,219
		900	A	20	3.25	15,000	20,337	6,667	9,039	11,420	15,483
			B	20	3	11,580	15,700	5,147	6,978	9,054	12,276
34	850	150	A	32	1.5	1,200	1,627	540	732	617	837
			B	40	.875	240	325	133	180	147	199
		300	A	28	1.875	3,000	4,067	1,333	1,807	1,699	2,303
			B	36	1.5	1,200	1,627	540	732	856	1,160
		600	A	28	2.25	4,770	6,467	2,120	2,874	3,601	4,882
			B	24	2.25	4,770	6,467	2,120	2,874	3,495	4,739
		900	A	20	3.5	18,750	25,422	8,333	11,299	13,943	18,904
			B	20	3.25	15,000	20,337	6,667	9,039	11,129	15,090
36	900	150	A	32	1.5	1,200	1,627	540	732	636	862



# SPECIAL ENGINEERING INSTRUCTIONS

DRAWN BY MAM NO. II-MR-0002  
 CHK'D. BY G. Klein DATE 07/05/05 SHEET 12 OF 17  
 APP. BY D. Ibbetson REVISION N RELEASE NO. 12-T-0607

REV.: S	ECN NO.: 17-T-0367	DRAWN: <i>Kumaravel</i>	CHK'D.: <i>CB</i>	DATE: 22-Sep-17
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Valve Size		Flange Rating		Number of Studs	Diam. Of Studs	Flexitallic® CGI Stud Torque (Flanged Seal Retainer Rings ONLY)		Flexitallic® "LS" Stud Torque		Compressed Fiber Stud Torque	
in	mm	ANSI	Series			in	ft-lbs	N-m	ft-lbs	N-m	ft-lbs
		300	B	44	.875	240	325	133	180	147	199
			A	32	2	3,300	4,474	1,467	1,989	1,930	2,616
		600	B	32	1.625	1,650	2,237	733	994	1,104	1,497
			A	28	2.5	6,600	8,948	2,933	3,977	4,660	6,318
		900	B	28	2.25	4,770	6,467	2,120	2,874	3,364	4,561
			A	20	3.5	18,750	25,422	8,333	11,299	14,697	19,926
38	950	150	B	44	3	11,580	15,700	5,147	6,978	8,971	12,164
			A	32	1.5	1,200	1,627	540	732	659	894
		300	B	40	1	368	498	204	276	213	289
			A	32	1.5	1,200	1,627	540	732	921	1,249
		600	B	36	1.625	1,650	2,237	733	994	1,103	1,495
			A	28	2.25	4,770	6,467	2,120	2,874	3,538	4,797
		900	A	20	3.5	18,750	25,422	8,333	11,299	14,363	19,474
40	1000	150	B	44	1	368	498	204	276	212	287
			A	36	1.5	1,200	1,627	540	732	614	833
		300	B	40	1.625	1,650	2,237	733	994	1,152	1,562
			A	32	1.625	1,650	2,237	733	994	1,085	1,471
		600	B	40	1.625	1,650	2,237	733	994	1,085	1,471
			A	32	2.25	4,770	6,467	2,120	2,874	3,426	4,644
		900	A	24	3.5	18,750	25,422	8,333	11,299	13,487	18,287
42	1050	150	B	48	1	368	498	204	276	211	286
			A	36	1.5	1,200	1,627	540	732	633	858
		300	B	36	1.625	1,650	2,237	733	994	1,196	1,621
			A	36	1.75	2,250	3,051	1,000	1,356	1,385	1,878
		600	B	36	1.75	2,250	3,051	1,000	1,356	1,385	1,878
			A	28	2.5	6,600	8,948	2,933	3,977	4,796	6,502
		900	A	24	3.5	18,750	25,422	8,333	11,299	13,956	18,922
44	1100	150	B	52	1	368	498	204	276	210	285
			A	40	1.5	1,200	1,627	540	732	628	851
		300	B	40	1.75	2,250	3,051	1,000	1,356	1,454	1,971
			A	40	1.75	2,250	3,051	1,000	1,356	1,361	1,846
		600	B	40	1.75	2,250	3,051	1,000	1,356	1,361	1,846
			A	32	2.5	6,600	8,948	2,933	3,977	4,632	6,280
		900	A	24	3.75	23,100	31,319	10,267	13,920	16,801	22,779
46	1150	150	B	40	1.125	533	722	296	400	323	438
			A	40	1.5	1,200	1,627	540	732	643	872
		300	B	36	1.875	3,000	4,067	1,333	1,807	1,870	2,535
			A	36	1.875	3,000	4,067	1,333	1,807	1,747	2,369
		600	B	36	1.875	3,000	4,067	1,333	1,807	1,747	2,369
			A	32	2.5	6,600	8,948	2,933	3,977	4,832	6,552
		900	A	24	4	28,136	38,148	12,505	16,955	20,024	27,148
48	1200	150	B	44	1.125	533	722	296	400	319	433
			A	44	1.5	1,200	1,627	540	732	638	865
		300	B	40	1.875	3,000	4,067	1,333	1,807	1,807	2,450
			A	40	1.875	3,000	4,067	1,333	1,807	1,711	2,319
		600	B	40	1.875	3,000	4,067	1,333	1,807	1,711	2,319
			A	32	2.75	8,880	12,040	3,947	5,351	6,143	8,329
		900	A	24	4	28,136	38,148	12,505	16,955	20,625	27,964
50	1250	150	B	44	1.75	2,250	3,051	1,000	1,356	1,012	1,373
			A	48	1.125	533	722	296	400	316	428



# SPECIAL ENGINEERING INSTRUCTIONS

DRAWN BY MAM NO. II-MR-0002  
 CHK'D. BY G. Klein DATE 07/05/05 SHEET 13 OF 17  
 APP. BY D. Ibbetson REVISION N RELEASE NO. 12-T-0607

REV.: S	ECN NO.: 17-T-0367	DRAWN: <i>Kumaravel</i>	CHK'D.: <i>CB</i>	DATE: 22-Sep-17
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Valve Size		Flange Rating		Number of Studs	Diam. Of Studs	Flexitallic® CGI Stud Torque (Flanged Seal Retainer Rings ONLY)		Flexitallic® "LS" Stud Torque		Compressed Fiber Stud Torque	
in	mm	ANSI	Series			in	ft-lbs	N-m	ft-lbs	N-m	ft-lbs
		300	A	32	2	3,300	4,474	1,467	1,989	2,145	2,908
			B	44	1.875	3,000	4,067	1,333	1,807	1,683	2,282
		600	A	28	3	11,580	15,700	5,147	6,978	8,149	11,048
			B	44	1.75	2,250	3,051	1,000	1,356	1,034	1,402
52	1300	150	A	44	1.75	2,250	3,051	1,000	1,356	1,056	1,431
			B	52	1.125	533	722	296	400	313	425
		300	A	32	2	3,300	4,474	1,467	1,989	2,211	2,998
			B	48	1.875	3,000	4,067	1,333	1,807	1,662	2,253
600	A	32	3	11,580	15,700	5,147	6,978	7,842	10,632		
	B	44	1.75	2,250	3,051	1,000	1,356	1,056	1,431		
54	1350	150	A	44	1.75	2,250	3,051	1,000	1,356	1,056	1,431
			B	56	1.125	533	722	296	400	313	425
		300	A	28	2.25	4,770	6,467	2,120	2,874	3,159	4,283
			B	48	1.875	3,000	4,067	1,333	1,807	1,767	2,396
600	A	32	3	11,580	15,700	5,147	6,978	8,114	11,002		
	B	44	1.75	2,250	3,051	1,000	1,356	1,050	1,423		
56	1400	150	A	48	1.75	2,250	3,051	1,000	1,356	1,071	1,452
			B	60	1.125	533	722	296	400	312	423
		300	A	28	2.25	4,770	6,467	2,120	2,874	3,253	4,411
			B	36	2.25	4,770	6,467	2,120	2,874	3,034	4,113
600	A	32	3.25	15,000	20,337	6,667	9,039	9,887	13,406		
	B	48	1.75	2,250	3,051	1,000	1,356	1,071	1,452		
58	1450	150	A	48	1.75	2,250	3,051	1,000	1,356	1,071	1,452
			B	48	1.25	750	1,017	417	565	452	612
		300	A	32	2.25	4,770	6,467	2,120	2,874	3,130	4,244
			B	40	2.25	4,770	6,467	2,120	2,874	3,034	4,113
600	A	32	3.25	15,000	20,337	6,667	9,039	10,146	13,756		
	B	52	1.75	2,250	3,051	1,000	1,356	1,061	1,439		
60	1500	150	A	52	1.75	2,250	3,051	1,000	1,356	1,061	1,439
			B	52	1.25	750	1,017	417	565	446	605
		300	A	32	2.25	4,770	6,467	2,120	2,874	3,215	4,359
			B	40	2.25	4,770	6,467	2,120	2,874	3,057	4,145
600	A	28	3.5	18,750	25,422	8,333	11,299	13,024	17,658		
	B	48	1.75	2,250	3,051	1,000	1,356	1,071	1,452		
64	1600	-	-	64	1.25	750	1,017	417	565	-	-
74	1850	-	-	64	1.25	750	1,017	417	565	-	-

**TABLE 2: BPRV VALVE COMPANION FLANGE TORQUE**  
**Bolt Materials: ASTM A193 B7, B16 & ASTM A320 L7**

Valve Size		Flange Rating		Number of Studs	Diam. Of Studs	Klinger® Type "RTJ" Gasket stud Torque	
in	mm	ANSI	Series			ft-lbs	N-m
2	50	150	-	4	.625	85	116
		300		8	.625	85	116
		600		8	.625	95	130
		900		8	.875	239	325



# SPECIAL ENGINEERING INSTRUCTIONS

DRAWN BY     MAM     NO.     II-MR-0002      
 CHK'D. BY     G. Klein     DATE     07/05/05     SHEET     14     OF     17      
 APP. BY     D. Ibbetson     REVISION     N     RELEASE NO.     12-T-0607    

REV.: <b>S</b>	ECN NO.: <b>17-T-0367</b>	DRAWN: <i>Kumaravel</i>	CHK'D.: <i>CB</i>	DATE: <b>22-Sep-17</b>
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Valve Size		Flange Rating		Number of Studs	Diam. Of Studs	Klinger® Type "RTJ" Gasket stud Torque	
in	mm	ANSI	Series		in	ft-lbs	N-m
3	125	150	-	4	.625	85	116
		300		8	.75	149	203
		600		8	.75	168	229
		900		8	.875	269	366
4	100	150	-	8	.625	85	116
		300		8	.75	149	203
		600		8	.875	269	366
		900		8	1.125	587	797
6	150	150	-	8	.75	149	203
		300		12	.75	168	229
		600		12	1	401	545
		900		12	1.125	587	797
8	200	150	-	8	.75	149	203
		300		12	.875	269	366
		600		12	1.125	587	797
		900		12	1.375	1114	1511
10	250	150	-	12	.875	239	325
		300		16	1	357	485
		600		16	1.25	823	1116
		900		16	1.375	1114	1511
12	300	150	-	12	.875	239	325
		300		16	1.125	522	708
		600		20	1.25	823	1116
		900		20	1.375	1114	1511
14	350	150	-	12	1	357	485
		300		20	1.125	522	708
		600		20	1.375	1114	1511
		900		20	1.5	1629	2209
16	400	150	-	16	1	357	485
		300		20	1.25	731	992
		600		20	1.5	1466	1988
		900		20	1.625	2093	2839
18	450	150	-	16	1.125	522	708
		300		24	1.25	731	992
		600		20	1.625	1884	2555
		900		20	1.875	3277	4444
20	500	150	-	20	1.125	522	708
		300		24	1.25	823	1116
		600		24	1.625	1884	2555
		900		20	2	4004	5430
24	600	150	-	20	1.25	731	992
		300		24	1.5	1466	1988
		600		24	1.875	2950	4000
		900		20	2.5	7175	9728

NOTES:



# SPECIAL ENGINEERING INSTRUCTIONS

DRAWN BY MAM NO. II-MR-0002  
CHK'D. BY G. Klein DATE 07/05/05 SHEET 15 OF 17  
APP. BY D. Ibbetson REVISION N RELEASE NO. 12-T-0607

REV.: S	ECN NO.: 17-T-0367	DRAWN: <i>Kumaravel</i>	CHK'D.: <i>CB</i>	DATE: 22-Sep-17
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Torque values are based on the use of gaskets shown. Consult BS&B Pressure Safety Management, L.L.C. for flanges in other materials when suppliers recommend torque values higher than the BS&B Pressure Safety Management, L.L.C. recommended torque values and if gasket type differs from BS&B Pressure Safety Management, L.L.C. recommendation.

2" to 24" valve sizes are derived from ASME B16.5. Sizes 26" and above are derived from ASME B16.47.

Recommended CGI stud torques are based on a design stress of 45,000 psi. These torque values to be used with the flanged retainer ring design only. If the applied torques are to exceed 50,000 psi stud stress, contact BS&B Pressure Safety Management, L.L.C. for engineering verification.

Recommended LS stud torques are based on a design stress of 20,000 psi to 25,000 psi.

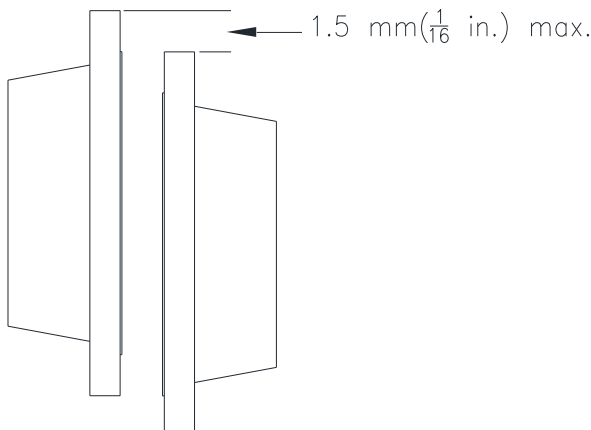
Recommended compressed fiber stud torques are derived from Klingersil® recommended gasket values for the ASME Section VIII Div 1, Mandatory Appendix 2 calculation.

Recommended RTJ stud torques are derived from Klingersil® recommended gasket values.

## Guidelines for Flange Alignment for Valve Installation

Proper alignment of flange joint assembly is required for maximum seating surface contact, maximum opportunity for uniform gasket loading, and improves the effectiveness of all bolt tightening methods.

1. Out-of-tolerance conditions should be corrected before the Valve and the Gasket is installed to avoid damaging the gasket.
2. Proper alignment will result in the bolts passing through the flanges at right angles and the nuts resting against the flanges for proper tightening.
3. The following are the tolerance guidelines for flange joint assembling per Standards ASME B31.3(335.2.5 for Flanged Joint Assembly) and ASME PCC-1(E-2.4).
4. Assuming no external alignment devices are used to achieve proper flange alignment, the flanges alignments must meet **a.** thru **d.** as specified in ASME PCC-1(E.2.4).
  - a. **Centerline high/low** (Reference: ASME PCC-1 (E-2.4) – The alignment of the flanges shall be that the OD of the flanges are not misaligned more than 1/16" (.063") at any point. This shall be measured at four (4) locations around the flange OD. (see below figure).





# SPECIAL ENGINEERING INSTRUCTIONS

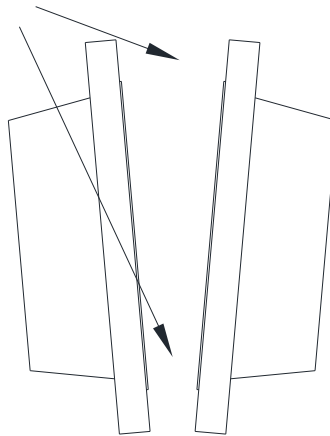
DRAWN BY MAM NO. II-MR-0002  
CHK'D. BY G. Klein DATE 07/05/05 SHEET 16 OF 17  
APP. BY D. Ibbetson REVISION N RELEASE NO. 12-T-0607

REV.: S	ECN NO.: 17-T-0367	DRAWN: <i>Kumaravel</i>	CHK'D.: <i>CB</i>	DATE: 22-Sep-17
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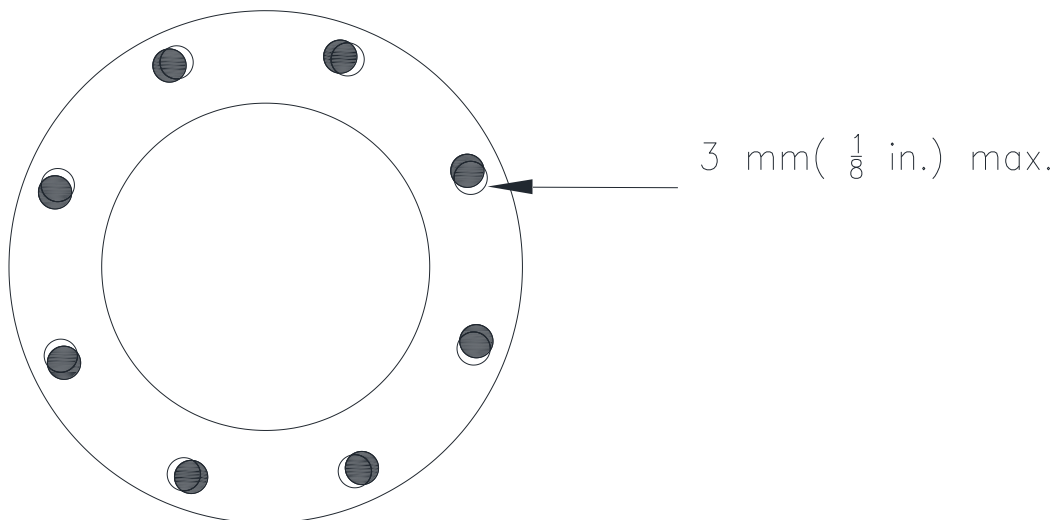
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- b. Parallelism** (Reference: ASME PCC-1 (E-2.4) – The alignment of the flanges shall be as shown in figure below to meet the requirements of PCC-1 (E-2.4). This maximum difference shall be achieved when applying a force, no greater than 10% of the maximum torque or bolt load for any bolt.

Maximum 0.8 mm ( $\frac{1}{32}$  in.)  
difference between the  
widest and narrowest



- c. Rotational two hole** (Reference: ASME PCC-1 (E-2.4) – The alignment of the flanges is such that the bolt holes align have a maximum misalignment with each other as shown in figure below.







# SPECIAL ENGINEERING INSTRUCTIONS

DRAWN BY MAM NO. II-MR-0002  
CHK'D. BY G. Klein DATE 07/05/05 SHEET 17 OF 17  
APP. BY D. Ibbetson REVISION N RELEASE NO. 12-T-0607

REV.: S	ECN NO.: 17-T-0367	DRAWN: <i>Kumaravel</i>	CHK'D.: <i>CB</i>	DATE: 22-Sep-17
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- d. **Excessive Spacing or Gap** (Reference: ASME PCC-1 (E-2.4) – A condition where two flanges are separated by a distance greater than the two gasket thicknesses and will not come together when using less than 10% of the total target bolt torque or 20% of any single "target" bolt torque.

