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Installation instructions for PSI and Pikotek® Gaskets

Including: VCS, LineBacker®, PGE, and GasketSeal

GPT installation instructions have been modified to fit the guidelines of ASME PCC-1-2010. It is recommended by GPT that field technicians be familiar with this standard.

1. The Insulation kit found in the package shall conform to the information listed on the package label.
2. Mating flange faces shall be examined and care should be taken to ensure that the sealing surfaces are free of scratches, pitting, rust, gouges, oil, and debris. Flange face surface finish shall be within the range of 125-250µin.
3. Use the provided isolation sleeves to check the alignment of the two flanges for concentricity and parallelism, and adjust accordingly. The isolation sleeves should freely slide all the way through the two opposing bolt holes once the flanges are properly aligned. **DO NOT FORCE THE SLEEVES THROUGH THE BOLT HOLES.**
4. Ensure that the gap between the two flange faces prior to installation is at least 1.5 times the total thickness of the gasket. Flange separating device shall be used if necessary.
5. Clean all nuts and bolts free of all rust, gouges, and debris prior to assembly.
6. Apply a **NON-METALLIC BASED BOLT LUBRICANT** liberally to the nut contact faces and to the threads on one end of the bolts 1/2" past where the nut will come to rest after tightening. (***This is not necessary if PTFE coated studs and nuts are being used.***)
7. Thread one lubricated nut onto the lubricated section of each stud.
8. Install one steel washer and one isolating washers (Install two HCS if applicable), so that the steel washer is in contact with the nut. **ISOLATION WASHER SHALL NOT BE LOCATED AGAINST THE NUT.** Slide isolating sleeve over the stud and through the two washers.
9. Insert the stud assemblies into the bolt holes around the lower half of the bolt pattern. The stud assembly should slide freely through the opposing flange bolt holes. If the assembly does not slide freely recheck flange alignment before continuing.
10. Lubricate the exposed stud threads using **A NON-METALLIC BASED LUBRICANT** and install the washers as per instructions in step 8. **ALL ISOLATION WASHERS SHALL BE AGAINST THE FLANGE.**
11. Thread the lubricated nuts onto the studs, ensuring total thread engagement between the nut and stud.

12. Inspect the condition of the sealing elements. Seals shall be fully seated to the base of its respective groove. Clean the sealing faces of the gasket, with a soft clean cloth, free from any oil and debris.
13. Insert the gasket between the flanges and check that the seals are secure in the seal grooves. Gasket shall be resting on the isolation sleeves.
14. Remove any flange spreading devices used in step 4 at this time. Install the remaining stud assemblies repeating steps 6- 11.

Bolt Torque

The following procedure shall be used for the proper bolt tightening in the flange assembly. This procedure was taken from ASME-PCC-1-2010, other alternative torque patterns and procures are given in this standard and it is recommended by GPT that field technicians become familiar with the practices outlined in this standard.

15. Bolt torque method using single tool
 - a. Number the bolts sequentially, starting with 1 and working around the flange in a clockwise manner.
 - b. Select the correct bolt torque, for the appropriate Nominal Pipe Size and Flange Pressure Class, from the Torque Tables provided.
NOTE: If the size and pressure class of the jointed flange assembly in question is not listed please contact GPT for the correct torque value.
 - c. Following the torque pattern corresponding to the number of bolts in the flange assembly, given in Table 2. Complete the following steps:
 - i. Hand tighten each stud.
 - ii. "Snug" each bolt to 10-20[ft-lb]
 - iii. Tighten to 30% of target torque value
 - iv. Tighten to 70% of target torque value
 - v. Tighten to 100% of target torque value
 - vi. Tighten in a clockwise rotation to 100% of target torque value
 - vii. Continue tightening the studs in a clockwise rotation to 100% of the target torque until no further nut rotation occurs.
 - viii. If time permits, wait a minimum of 4 hours and then repeat step v. This will restore the desired bolt preload to each of the studs that was lost due to creep relaxation of the gasket and embedment losses between the mating stud and nut threads.

16. Bolt Torque method using multiple tools

Please see ASME PCC-1-2010, Guidelines for Pressure Boundary bolted Flange Joint Assembly.

17. Using the Isolation Test Instructions test the flange assembly for electrical isolation.

18. Pressure test assembly. For safety reasons it is best to initiate your test pressures much lower than those normally encountered by your system. Work your pressure up to acceptable limits by stepping pressure 10% per pressure increments.

Nominal Pipe Size	Bolt Torque Values [ft-lb] Per Flange Pressure Class						
	150	300	400	600	900	1500	2500
1/2	21	21	21	21	64	65	69
3/4	23	41	41	41	68	68	71
1	25	44	44	44	108	108	114
1 1/4	29	49	49	49	115	115	177
1 1/2	34	84	84	84	174	174	254
2	63	48	48	48	115	112	175
2 1/2	68	79	79	79	168	172	263
3	79	86	86	86	126	255	379
3 1/2	59	89	129	129	N/A	N/A	N/A
4	62	93	134	134	259	386	706
5	104	104	147	200	366	667	1128
6	111	94	135	187	277	533	1709
8	128	147	201	284	532	937	1777
10	157	194	267	389	557	1529	3500
12	173	266	382	401	575	1811	4896
14	219	273	388	553	779	2633	N/A
16	215	383	529	739	1026	3669	N/A
18	307	409	538	971	1568	4990	N/A
20	297	410	706	972	1949	6528	N/A
22	437	708	935	1262	N/A	N/A	N/A
24	457	777	1230	1640	3716	10539	N/A
26	654	550	799	2399	4867	N/A	N/A
28	647	542	816	2395	6249	N/A	N/A
30	661	584	1010	3368	6558	N/A	N/A
32	659	913	1242	3363	8272	N/A	N/A
34	667	906	1254	3470	10256	N/A	N/A
36	666	952	1488	4541	10635	N/A	N/A
38	1016	1001	652	6022	11036	N/A	N/A
40	1026	992	825	5968	10717	N/A	N/A
42	1053	1040	842	6126	11086	N/A	N/A
44	1043	1033	1046	7665	13431	N/A	N/A
46	1052	1080	1317	7853	16090	N/A	N/A
48	1054	1073	1303	10034	16570	N/A	N/A

Table 1: Torque values for each Nominal Pipe Size and Flange Pressure Class. Torque values are for standard weld neck raised face and RTJ flanges, per flange specifications ANSI B16.5 and B16.47 Series A flanges.

Notes:

1. Recommended bolt torques are derived using ASME Section VIII-Division 1-Mandatory Appendix 2.
2. Bolt torque values listed assume a lubricated stud bolt resulting in 0.16 friction factor.
3. Recommended torque values are based on using weld-neck (integral) flanges and ring type gaskets. Contact GPT for torque values for all other flange types.

No. of Bolts	Sequential Torque Pattern
4	1-3-2-4
8	1-5-3-7-2-6-4-8
12	1-7-4-10-2-8-5-11-3-9-6-12
16	1-9-5-13-3-11-7-15-2-10-6-14-4-12-8-16
20	1-11-6-16-3-13-8-18-5-15-10-20-2-12-7-17-4-14-9-19
24	1-13-7-19-4-16-10-22-2-14-8-20-5-17-11-23-3-15-9-21-6-18-12-24
28	1-15-8-22-4-18-11-25-6-20-13-27-2-16-9-23-5-19-12-26-7-21-14-28-3-17-10-24
32	1-17-9-25-5-21-13-29-3-19-11-27-7-23-15-31-2-18-15-21-2-18-10-26-6-22-14-30-4-20-12-28-8-24-16-32
36	1-2-3-19-20-21-10-11-12-28-29-30-4-5-6-22-23-24-13-14-15-31-32-33-7-8-9-25-26-27-16-17-18-34-35-36
40	1-2-3-4-21-22-23-24-13-14-15-16-33-34-35-36-5-6-7-8-25-26-27-28-17-18-19-20-37-38-39-40-9-10-11-12-29-30-31-32
44	1-2-3-4-25-26-27-28-13-14-15-16-37-38-39-40-5-6-7-8-29-30-31-32-17-18-19-20-41-42-43-44-9-10-11-12-33-34-35-36-21-22-23-24

Table 2: Sequential torque pattern to follow based on the number of bolt holes.

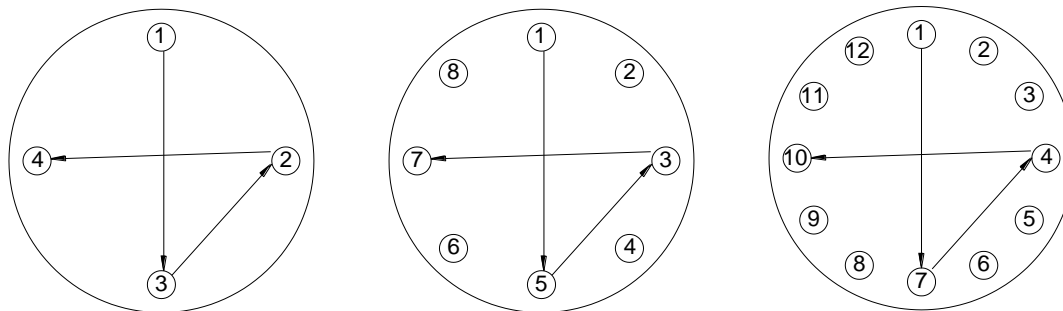


Figure 1: Typical numbering sequences for flanges with 4, 8, and 12 bolt holes, showing tightening sequence taken from Table 2.