HOUSTON POLYTANK

INSTALLATION GUIDE

Important: If these instructions are not followed while installing tank(s) into your system, we are not responsible for damage that happens due to negligence to these instructions and your warranty will be null and void.

EXPANSION JOINTS

Plastic tanks are influenced by thermal expansion and contraction due to changes in the temperature. The coefficient of expansion in plastic is greater than metal by 19 times. One should avoid restrictions due to hard plumbing. Using expansion joints will allow the tank to expand and contract without causing abnormal forces on the plastic. Expansion joints also isolate the tank and its fittings from vibrations from pumps, valves, etc.

SPRING SUPPORTS

Heavy valves, pumps, heaters and plumbing can cause excess weight on the tanks/fittings. In general, plastic can crack when continuous extensive force is on it. The spring supports are placed under the valves, pumps, etc. to support the load to the ground to avoid continuous weight on fittings. The resistance of the springs allows vertical movement during thermal expansion and contraction. The spring supports need to be designed to carry the load of valves, pumps, etc. during expansion and contraction.

TIE DOWN ANCHORS

Plastic tanks are influenced by thermal expansion and contraction due to changes in the temperature. Because of this, the tie down anchors should only be hand tightened/snug. Tie down anchors should never be torqued.

FULL FACE GASKETS

All flanges need to have the full face of the flange gasketed (gasket no less than 3/16” thick) with 80 duro. Or less. Ensure the gasket is compatible with the contents of the tank.

HARDWARE

Fittings should not be in direct contact with our plastic flanges. Washer and lock washers are required. Ensure the hardware is compatible with the contents of the tank.

TORQUE

All bolt connections to the tank must be torqued according to the guidelines provided below.

- **All instructions in following pages apply as required action.**

TORQUE AND INSTALLATION RECORD

Project:_____Flange Set Location: _____

Connecting HDPE Flange to_____Flange.

Bolt Dia. & Grade:_____Nut Diameter & Grade: _____

Lap-Joint Flange Dia. & Pressure Rating: _____

Lubricant Used:_____Flange Temp: _____

Toque Wrench ID #:_____Calibration Date: _____

If Specified: Full-face Gasket Info: Material:_____Thickness: _____

Deep-Well Socket / Heavy-Hex Nut Wrench Size Used: _____

Axis off-set:_____Angular & Facial Gap: Top_____Bottom_____L_____R_____

"Initial" Each Step Upon Completion

1. Tank flange is being connected to a flexible connection.
2. Washers and lock washers are being used.
3. Gasket used is no less than 1/8" thick and 80 duro. Or less
4. Connections weight is supported by ground and not causing continuous weight on tank flanges.
5. Visually examine and clean both flanges, bolts, nuts and washers. Replace damaged units.
6. Liberally lubricate bolt threads, nut threads and flange surface under nut.
7. Insert full-face gasket. Do not used wrinkled or damaged gaskets.
8. Number the bolt holes in circumferential sequence starting at 12:00 position.
9. Check flange alignment, concentricity, angularity and gap for acceptability.
10. TO firm the flanges squarely together, hand tighten then pre-tighten all bolts in proper sequence to 10-20 ft pounds torque. Do not exceed 20% of the TARGET TORQUE.
11. Re-check any flange-adapter face gap and LJF gap for uniformity. ***
12. Use the appropriate crisscross pattern tightening in numerical sequence for Rounds 1, 2, 3 and 4 (tightening all bolts once in sequence constitutes for a "round").

TARGET TORQUE (and 4 to 24-HOUR RE-TORQUE):_____ foot-pounds.

***Note: Check LJF gap around the flange circumference between each of these rounds measured at every other bolt. If any gap is not reasonably uniform around the circumference, make the appropriate adjustments by selective bolt tightening before proceeding.

_____Lubricate, Hand tighten, Pre-tighten

_____Round 1 – Tighten to_____ft.lbs. (30%)

_____Round 2 – Tighten to_____ft.lbs. (60%)

_____Round 3 – Tighten to_____ft.lbs. (100%)

_____Rotational (clockwise) Round

_____For Large Flanges ≥ 16 + Bolts

_____Lubricate, Hand tighten, Pre-tighten

_____Round 1 – Tighten to_____ft.lbs. (25%)

_____Round 2 – Tighten to_____ft.lbs. (50%)

_____Round 3 – Tighten to_____ft.lbs. (75%)

_____Round 4 – Tighten to_____ft.lbs. (100%)

_____Rotational (clockwise) Round

_____Rotational (clockwise) Round: 100% of Target Torque. Use rotational clockwise tightening sequence, starting with bolt #1, for one complete round and continue until no further bolt or nut rotation occurs at 100% of the target torque value for each nut.

_____4 – 24 Hour Re-Torque & Inspection:

Re-torque to target torque value using one or two sequence-rounds, followed by one Rotational round at the target Torque value

Must be properly initialed, signed, and dated for warranty to be valid on flange repairs.

Documentation Recorded By:_____Date: _____

Joint Technical/Mechanic:_____Date: _____

TIGHTENING SEQUENCE:

Number the bolts in rotation around the Lap-Joint Flange circumference in a clockwise order, beginning with the first bolt at the top in the nominal 12:00 position, the second being the next bolt to the right, the third being the next bolt to the right, etc until all bolts are numbered sequentially.

Following the table below, tighten the given bolt number to the desired torque value for the given round of tightening as specified on the Torque Record Checklist.

TABLE 1 [refer to ASME Document PCC-1 for Bolt Sequences]

NUMBER OF BOLTS	CRISS-CROSS PATTEREN TIGHTENING SEQUENCE
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 >> 5-10-15-20 >> 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 >> 2-18-10-26 >> 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
48	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 >> 45-46-47-48
52	1-2-3-4 >> 29-30-31-32 >> 13-14-15-16 >> 41-42-43-44 >> 5-6-7-8 >> 33-34-35-36 >> 17-18-19-20 >> 45-46-47-48 >> 21-22-23-24 >> 49-50-51-52 >> 25-26-27-28 >> 9-10-11-12 >> 37-38-39-40

The crisscross bolt tightening sequence and multi-round tightening are necessary to counteract the flange / bolt elastic interaction.

TABLE 2

EXAMPLES OF ESTIMATED BOLT TORQUE TO SEAL HDPE FLANGE FACES:

The **engineer of record** is usually responsible for establishing each flange joint criteria, and performing the required calculations to determine the initial and residual torque values.

These estimated values are based on non-plated bolts and studs, using a nut factor of K **=0.16** for lightly greased bolts and nuts. The calculations uses a HDPE flange face seating stress of **1200-psi** as a minimum and **1800-psi** as a maximum, and assumes the flanged joint is between two HDPE flange adapters (in which the contact area is largest), without a rubber gasket.

IPS Nominal Pipe Size	Number of bolts	Initial	Minimum Lubed Torque (Ft-Lbs)	Initial	Maximum Lubed Torque (Ft-Lbs)
2”	4		20		30
3”	4		20		30
4”	8		20		30
6”	8		30		40
8”	8		30		40
10”	12		50		60
12”	12		50		60
Side Manway 24”	24		75		75
Top Manway 24”	8-10		20		30

NOTE: Uniform bolt pre-load (torque), without large “scatter”, is as useful as the target pre-load. Within the limits of the HDPE flange adapter, gasket, or metal LJF, higher pre-load is desirable. The higher the pre-load is safely achievable, the more closely the assembly will behave like the theoretical model and seal well. Higher pre-load means that a given internal pressure will result in the least possible change in contact sealing pressure. Be consistent (avoid changes) with materials and tools when following written assembly procedures.

Train and supervise the bolting personnel. Tell the crew what is to be accomplished, why, and explain that good results are not automatically achieved. Skill and care are essential. Bolted Joint assembly is a technical skill that is not common in the construction and maintenance profession, being considered more like a specialty. There is no universally accepted testing, nor certification, of bolted-joint assembly mechanics. With no common training, certification, nor standards, it is no surprise there is +/- 25% variability in assembly torque. Specifications and instructions by the engineer, followed by trained mechanics, help to solve the dilemma.

(NOTE: Consult ASME Document PCC-1, Appendix A for training and certification of bolted joint assemblers)