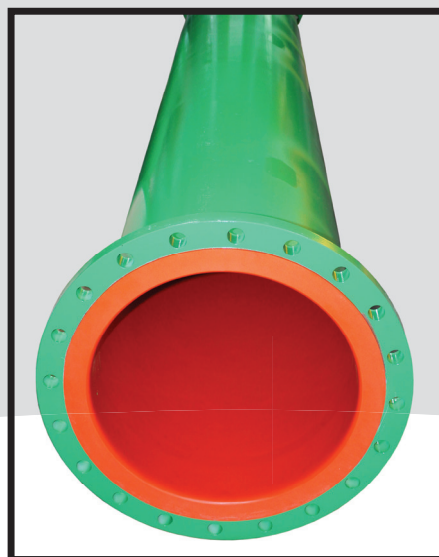


RESISTOFLEX®

brands you trust



Installation and Maintenance Instructions
For Polypropylene-Lined Piping

Flange Bolt Torquing

Torquing

When assembling flange connections, always use a full complement of clean, new high strength A193-B7 bolting. If using stainless steel bolting, the bolts should be A320/A320M Class 2 B8 (304 SS) or Class 2 B8M (316 SS) with A 94/A194M Grade 8 or 8A Nuts (for 304 SS) or Grade 8M or 8MA (for 316 SS). If other bolting materials are used, the end user must ensure that the new bolting material strength properties exceed the calculated bolt stress values to be generated in making the piping connection.

- 1) Always use flat washers on both sides of the connection.
- 2) Tighten the flange bolts with a calibrated torque wrench. The recommended bolt torque values are shown in the tables on next pages. Note: For zinc-plated bolts, or with anti-seize compounds, the torque values will be different. Please contact Resistoflex for more information
- 3) Tighten the flange bolts with a torque wrench, using a "crisscross" pattern that alternately tightens the bolts located 180 degrees apart.
- 4) Using this pattern, tighten the bolts in 20% increments of the final bolt torque until 80% of final bolt torque has been achieved.
- 5) For tightening to the final torque values, tighten bolts sequentially clockwise once around the flange. This will help ensure that the bolts are evenly stressed.
- 6) Care should be taken to avoid over-torquing, which can cause damage to the plastic sealing surfaces.

NOTES:

Gaskets: For large diameter (>12" NPS) PP, ETFE or HDPE-lined flange connections, gaskets are required for sealability and long term joint performance. These stiff plastic liners have minimal resilience and are sensitive to installer technique and support imperfections. Properly selected and installed gaskets add resilience and can help accommodate for these variables. We do not recommend the use of gaskets that contain non-resilient components such as metal inserts, as these can increase seating stress by concentrating force over a reduced area.

When bolting together dissimilar materials, always tighten to the lowest recommended torque of the components in the joint. Using higher torques may cause excessive deformation of the "softer" material in the joint.

Install a 1/2" thick spacer between Resistoflex plastic-lined pipe or fittings and other plastic-lined components, if the diameters of the raised plastic faces are different, as is often the case with plastic-lined valves. Spacers should also be used when mating plastic-lined piping to unlined pipe, fittings, valves, pumps, etc.

Retorquing

A retorque should be applied within 24 hours of the initial torque or after the first thermal cycle. This allows for seating of the plastic and for relaxation of the bolts. If the system is to perform at elevated temperatures, it is recommended that hot water be circulated at the maximum operating temperature of the process (if possible) for a minimum of 24 hours. This allows for the pipe system to experience one thermal cycle. After cool-down, retorquing of the system should be done. Torquing should only be done on the system in the ambient, cooled state, never while the process is at elevated temperature, or excessive force could be applied to the plastic faces. Never disassemble a flange joint in a hot system. Wait until the system has cooled to ambient temperature.

Hydrostatic Testing

Normally, after initial torque and retorque, a hydrostatic test should be performed following ANSI requirements. Experience has shown that if the above procedure has been followed very few, if any, of the flange joints may fail the hydrostatic test. If a flange joint does leak, first check the torque values, then tighten in 10% increments over the specified bolt torques until sealed. However, if 150% of the specified torque value is reached and the flange joint still leaks, stop and disassemble the flange joint. Something else is probably wrong such as a scratched plastic face. Only after the hydrostatic test has been successfully completed and any leaks corrected, can the pipeline be signed off and commissioned.

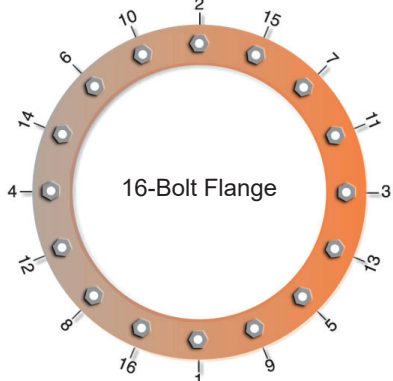
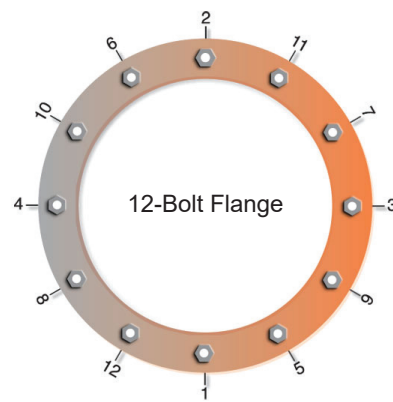
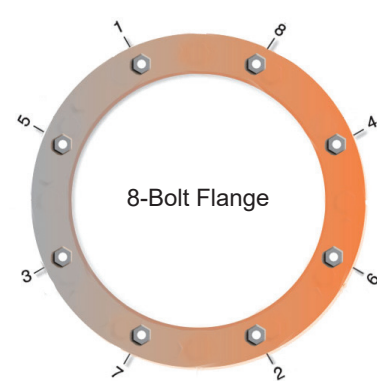
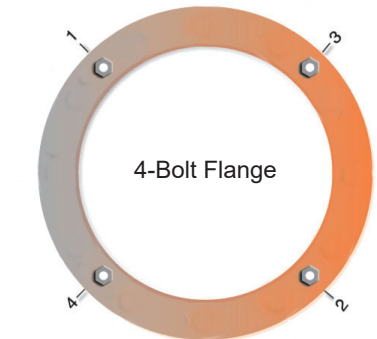
Annual retorquing

Retorquing should be considered at least annually thereafter, especially if the process line experiences elevated temperatures or extreme ambient temperature situations. Torquing should only be done on the system in the ambient, cooled state, never while the process is at elevated temperature or excessive force could be applied to the plastic faces.

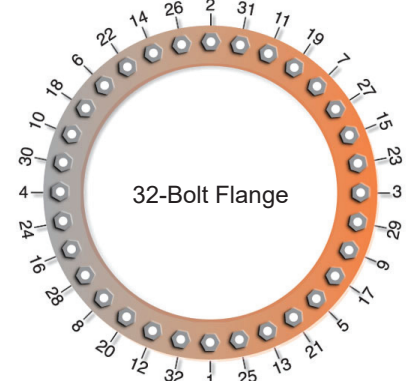
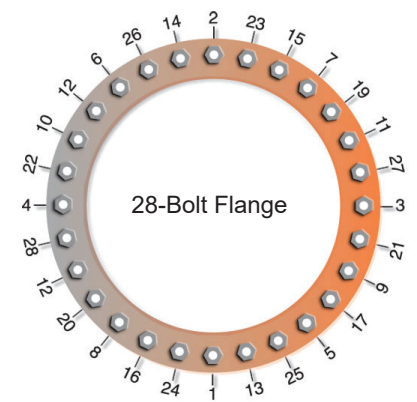
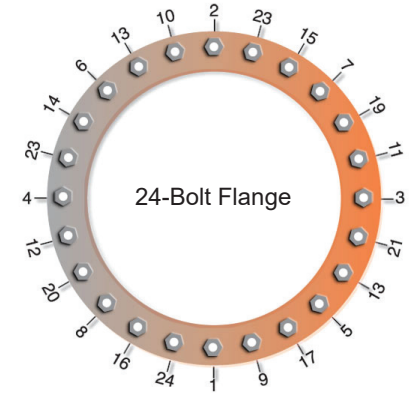
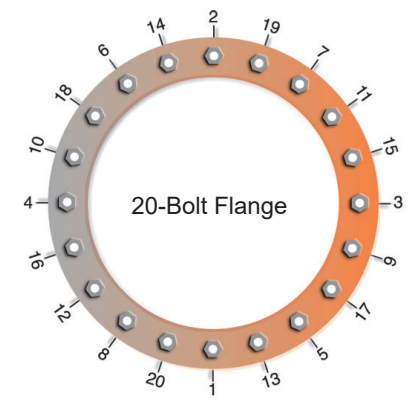
Note: Resistoflex requires the use of flat washers on both flanges.
Note: "Lightly Oiled" is considered lubrication with WD-40* or equivalent. Please contact us for guidance on torques for other bolting/lubrication systems, such as zinc-plated bolts, or bolts with anti-seize lubricants. **Note:** The maximum recommended torque values are suggested for lined systems operating at or near the maximum recommended pressures and temperatures. Systems operating under less severe conditions can, in general, experience leak-free performance using lower torque values. Additionally, when gaskets are used, we suggest comparing the torque values of the plastic-lined piping and the gasket, and using the lower torque value. For systems that will require frequent disassembly, we suggest using the minimum recommended torque value initially to avoid distortion of the plastic face.

*WD-40 is a trademark of WD-40 Company, San Diego, CA USA

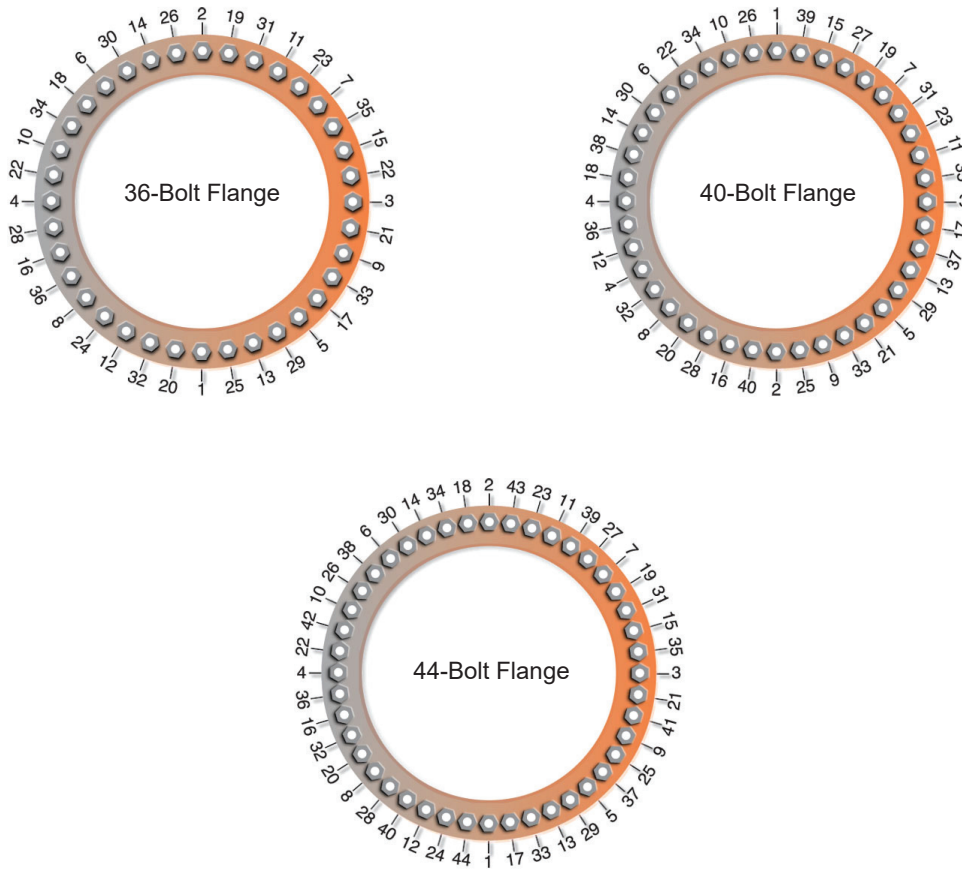
Torque Values and Bolting Sequence



PP-Lined Piping With Class 150 Flanges		
Bolts "Lightly Oiled" (nut factor = 0.20)		
Size	Torque Values (ft-lbs per bolt)	
	Min	Max
1	14	18
1.5	32	41
2	66	85
3	103	134
4	68	88
6	125	162
8	167	217
10	158	205
12	193	251
14	198	257
16	184	239
18	268	349
20	243	316
24	320	416
26	370	481
28	339	441
30	376	489
32	497	647
34	460	598
36	502	653
38	528	686
40	492	640
42	566	735
44	531	691
46	553	719
48	553	719



Bolting Sequence and Storage / Maintenance



Handling and Storing Plastic-Lined Pipe

To obtain maximum performance from Plastic-Lined Piping Products, it is important that the flared or molded end faces of the plastic are protected from damage during storage, handling and installation. The following should be considered when handling Plastic-Lined Piping Products:

- Store indoors or under cover.
- Never put the lifts of a forklift inside of the pipe to transport. This can damage the plastic liner.
- Never weld on plastic-lined pipe or fittings.
- Protective end caps are not designed for prolonged outdoor exposure.
- Protective end caps on all pipe and fittings should be left in place until the pipe is ready to be installed.
- Do not damage the plastic sealing faces when removing the end caps.
- If end caps are removed for inspection, they must be re-installed with bolting as soon as possible.
- Avoid rough handling of plastic-lined pipe in temperatures below 40°F. Plastic becomes brittle in low temperatures, and is more susceptible to cracking during rough handling.
- Avoid mechanical or thermal shock to piping that is stored in cold temperatures.
- All paint systems have a poor resistance to handling and transit damage. This fact should be considered when evaluating pre-erection shop painting versus in-place painting. If shop painting is selected, touch-up will be required after job-site receipt. Touch-up costs are for Buyer's account.