EXPANSION JOINTS
INSTALLATION PROCEDURES, STORAGE & INSPECTION CRITERIA

EXPANSION JOINT INSTALLATION PROCEDURES

1. Confirm system operating temperature and pressure do not exceed maximum allowable ratings of flexible connector as noted on submittal.
2. Confirm chemical compatibility of fluid media with flex connector elastomer.
3. Do not weld near any rubber expansion joint or weld the steel flanges to the piping with the expansion joint installed. There is the possibility of fire, spark or heat damage.
4. All pipe lines should be properly supported so the expansion joints do not carry the pipe load.
5. a. Anchors are to be provided upstream and downstream of the expansion joints at both ends of the thermally expanding or contracting pipe length. Expansion joints will not function and may very well overextend and fail unless these full thrust anchors are in place. In the absence of anchors, control rods as described in Instruction 6 below are required.

   b. Where a shut-off valve, reducing valve, check valve or any mechanical pipe fitting is installed in the expansion joint line, check with the manufacturer to be certain the pipe fitting can take the expansion joint thrust. If not, the pipe must be anchored on either side of the fitting and two expansion joints installed rather than one. The thrust on the anchor is the pipe line area plus the arch area multiplied by the water pressure.
6. If it is not possible to anchor the pipe line in the above manner, control units must be used. Once a control unit is installed, if there is no anchor on one or both sides of the expansion joint, the expansion joint will open up to the control rod lock out position and remain in that position. When control rods are locked, the expansion joint will not accept axial extension. It will make up for misalignment, transverse and possibly angular motion.

   Where transverse forces are to be kept to a minimum, chain or cable assemblies should be substituted for the rigid control rods. While spherical seats on the control rods are of some value, the force required to move piping laterally when control rods are used, remains high.
7. All pipes are to be lined up accurately before installing expansion joints. Although rubber units will adjust themselves to misaligned flanges within the specified limits, it is difficult to force expansion joints into position before they are rigidly bolted to theflanges. Initial misalignment should be kept to a maximum of 1/8".
8. a. Expansion joint rubber flanges must be in contact with a flat surface. Normal 1/16" raised face is OK. Unacceptable depressions or protrusions are typical of victaulic or similar flanges.

   b. Rubber flanges will not retain loose elements in valve bodies that rely on contact with a steel flange. For example, some check valves are manufactured with brass inserts positioned by screws. When mating steel flanges with these valves, there is no problem. However, with a rubber connector, it cuts the rubber face and can cause failure, leakage or brass insert escape.
9. Any of the above conditions must be corrected by installing a full diameter steel flange drilled to standard dimensions so the flange bolts pass through it. The I.D. matches the I.D. of the piping. Minimum Plate Thickness is as follows: 1/2" thick for 1-1/2" to 8" pipe, 3/4" thick for 10" to 18" pipe, and 1" thick for 20" to 24" pipe. Gasket between this filler flange and the mating steel flange. Please contact factory for recommendations for larger diameters.
10. Apply a thin film of graphite dispersed in glycerin or water to the face of the rubber flanges before installing. No other type of lubricant or seal should be used on the flange face. The graphite prevents the rubber from adhering to the metal flange so that the rubber pipe or joint can be removed without damage, should it ever be necessary.
11. While it is occasionally cost effective to install expansion joints in pre-compressed or elongated positions to increase travel in the opposite direction, it is best to install them in normal lengths, avoiding compression or elongation.
12. Do not lift the expansion joints by the bolt holes. They may be lifted by a padded sling or the two ends of a piece of pipe passing through the joint. Another convenient method is to cut the lifting pipe longer than the joint, and lift it by means of a chain or cable running through the pipe. It is preferable not to roll joints on their flanges. Transport them to the position of installation and install them without contact with the floor wherever possible.
13. Continued support of expansion joint is required until the expansion joint is fully bolted into place.
14. It is preferable to install bolts with SAE washers. While it is not always possible because of arch interference, it is also preferable to install the bolts with the head next to the rubber arch. This eliminates the possibility of bolts protruding past the nuts and cutting into the rubber arch. When bolts must be installed from the pipe line side, limit bolt length to 1/8" of thread protruding from the nut.

    When control units are required, install gusset plates on outboard side of mating flange. Insert control rods through outside hole of gusset plate. See detail on page 3.
15. Use two wrenches when tightening bolts. When tightening the back up rings of rubber flanges, tighten bolts in cross pattern sequence until the rubber flange bulges uniformly between the back up ring and the adjoining pipe flange. This tightening process continues until bolts are fully torqued. See page 2 for detail.

    Rubber flanges relax. Bolt tightness should be checked several days after initial operation, and periodically thereafter to prevent leakage. This is particularly important in pipe lines where the service changes from hot to cold during heating and cooling cycles.
16. Any gouges or cracks in the cover that develop after installation, should be sealed, even though they do not appear to be serious. This can be done by coating with rubber cement, thus preventing oil or water from penetrating the fabric carcass. The Mercer Rubber Company sells special cements for this purpose. Should you wish to order, please specify the material that the joint cover is made of, such as Natural Rubber, Neoprene, Hypalon, etc.
17. In order to prevent heat buildup, expansion joints in hot water or air systems should not be insulated.
18. Insulation on cold lines should be installed for easy removal to facilitate retightening.

BOLT TIGHTENING PROCEDURE FOR RUBBER EXPANSION JOINTS

1. Visually examine and clean flanges, bolts, nuts and washers. Replace components if necessary.

2. Number bolts in cross-pattern sequence according to the appropriate sketch to the right. Diameters up to 32" are shown. Please contact factory for assistance with larger diameters.

3. Insert bolts into flanges with bolt head next to rubber arch and hand tighten bolts. When bolts must be installed from pipeline side, limit bolt extension beyond nut to 1/8".

4. Check gap around the circumference between rubber flange and mating flange for uniformity.

5. Tighten bolts following the appropriate torque pattern shown to the right to percent of final torque noted. Approximate final torque values are listed on page 3.

   For 4-Bolt and 8-Bolt Flanges

   Round 1 - Tighten to 30% of final torque value
   Round 2 - Tighten to 60% of final torque value
   Round 3 - Tighten to 100% of final torque value

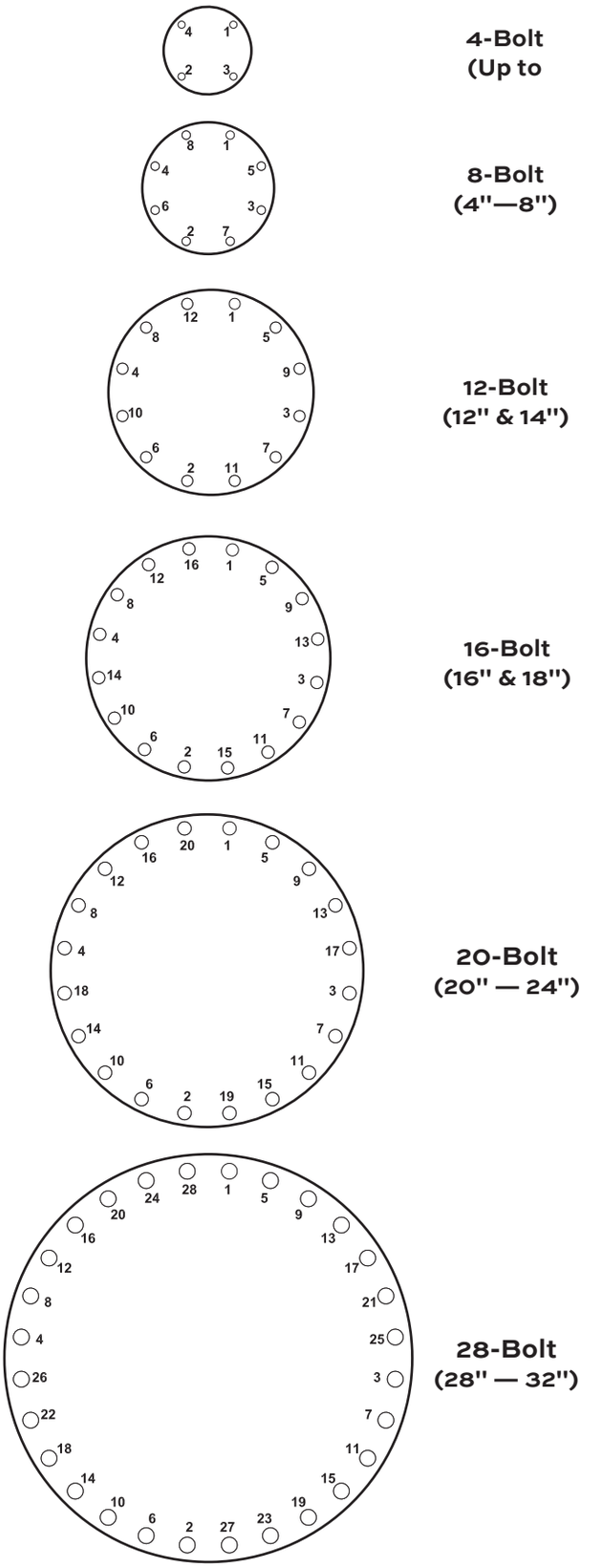
   For 12-Bolt Flanges and Above

   Round 1 - Tighten to 20% of final torque value
   Round 2 - Tighten to 40% of final torque value
   Round 3 - Tighten to 80% of final torque value
   Round 4 - Tighten to 100% of final torque value

   Check gap of rubber flange and mating flange between each of these rounds, measured at every other bolt. If the gap is not reasonably uniform around the circumference, make the appropriate adjustments by selective bolt tightening before proceeding.

6. Round 4 (4 and 8 Bolt), Round 5 (12 Bolt and above) – Use rotational, clockwise tightening sequence, starting with bolt no. 1, for one complete round and continue until no further nut rotation occurs at 100% of the final torque value for any nut.

7. Re-torque after 24 hours, repeating last Round of Step 5, followed by Step 6. A large percentage of the short-term bolt preload loss occurs within 24 hours after initial tightening. This final tightening recovers that loss.



SAMPLE TORQUE PATTERNS

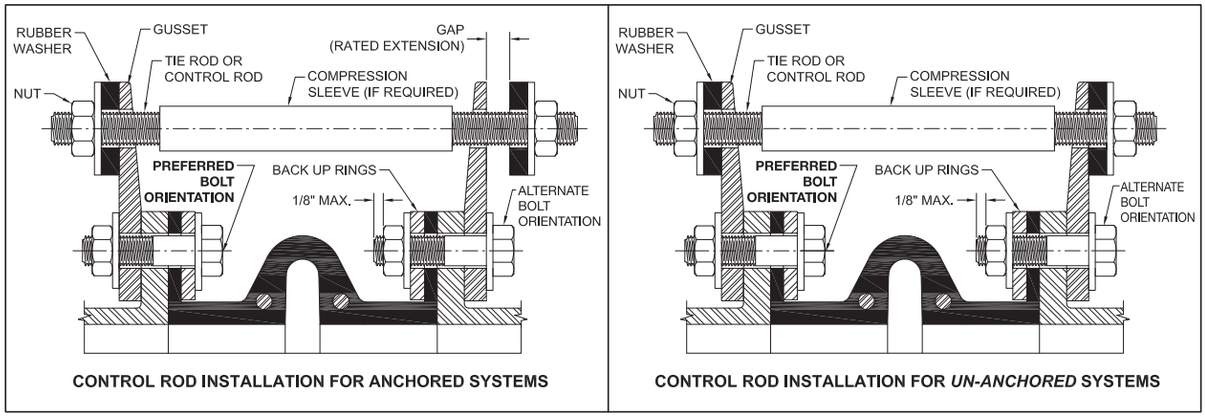
INSTALLATION BOLT TORQUE (A307 UNLUBRICATED) FOR MERCER EXPANSION JOINTS MODELS 150, 450/WA450, 500 & 900 WITH 150# DRILLING

Expansion Joint Diameter (in)	Rated Pressure (psi)	Bolt Diameter (in)	Torque Value (ft-lb)
1	250	1/2	18
1 1/4	250	1/2	21
1 1/2	250	5/8	25
2	250	5/8	43
2 1/2	250	5/8	59
3	250	5/8	66
4	250	5/8	44
5	250	3/4	60
6	250	3/4	69
8	250	3/4	98
10	250	7/8	98
12	250	7/8	139
14	250	1	179
16	250	1	161
18	250	1 1/8	181
20	250	1 1/8	171
22	250	1 1/4	203
24	250	1 1/4	239
26	250	1 1/4	219
28	250	1 1/4	206
30	250	1 1/4	228
32	250	1 1/2	322
34	250	1 1/2	294
36	250	1 1/2	322
38	250	1 1/2	371
40	175	1 1/2	297
42	175	1 1/2	321
44	175	1 1/2	307
46	175	1 1/2	321
48	175	1 1/2	309

Expansion Joint Diameter (in)	Rated Pressure (psi)	Bolt Diameter (in)	Torque Value (ft-lb)
50	100	1 3/4	317
52	100	1 3/4	338
54	100	1 3/4	360
58	100	1 3/4	356
60	100	1 7/8	377
62	100	1 7/8	399
64	100	1 7/8	441
66	100	1 7/8	455
68	100	1 7/8	441
70	100	1 7/8	464
72	100	1 7/8	442
74	100	1 7/8	454
76	100	1 7/8	447
78	100	2	526
80	100	2	550
82	100	2	575
84	100	2	549
86	75	2	549
88	75	2	535
90	75	2 1/8	585
92	75	2 1/8	610
94	75	2 1/8	634
96	75	2 1/4	681
98	50	2 1/4	663
100	35	2 1/2	661
102	35	2 1/2	644
108	35	2 1/2	717
120	25	2 1/2	801
132	25	2 1/2	907
144	25	2 1/2	1015

For torque values for other styles, drilling patterns and higher pressure, contact Mercer Rubber Co.

DETAIL OF CONTROL ROD AND COMPRESSION SLEEVE FOR ANCHORED AND UNANCHORED SYSTEMS



CONTROL ROD INSTALLATION FOR ANCHORED SYSTEMS

CONTROL ROD INSTALLATION FOR *UN-ANCHORED* SYSTEMS

STORAGE OF EXPANSION JOINTS

Rubber products in storage can be adversely affected by the following:

1. Temperature
2. Humidity
3. Ozone
4. Sunlight
5. Oils
6. Solvents
7. Corrosive liquids and fumes
8. Insects and rodents.

The ideal storage temperature is 50°F to 80°F. Continued exposure to temperatures below 32°F and above 90°F should be avoided. It is also recommended that relative humidity is maintained at 20% to 70%. Rubber products should not be stored where they come in contact with ozone, direct or reflected sunlight. Whenever possible, expansion joints should be stored in their original shipping containers, especially when such containers are wood crates or cardboard cartons, as this provides protection against the deteriorating affects of oil solvents and corrosive liquids and also affords some protection against ozone and sunlight. Since rodents and insects will attack and eat rubber, the area should be clear of these nuisances.

Expansion joints should not be piled one upon another. Over a period of time, the weight will reduce the face to face lengths. It is best to stack them on shelves to prevent this from happening.

Store expansion joints where they cannot sustain physical damage, such as being hit with a fork truck.

EXPANSION JOINT INSPECTION CRITERIA

While our expansion joints are practically maintenance free, they should be inspected periodically. Early leak detection allows ample time for flange tightening or replacement, before a problem becomes serious. If a cover is deteriorating, thorough cleaning and a coating of Hypalon paint will limit further deterioration. Check joints that appear to be overly compressed, elongated or distorted, and then measure actual elongation, compression, lateral deflection and angular movements. Compare them with the original rated movement capability from your certified drawings or Mason/Mercer literature. Joints operating outside of their rated movements are candidates for premature failure.

Check to see temperature and pressure conditions have not exceeded those for which the expansion joint was designed.

Examine the outer cover of the joint for signs of deterioration. Surface cracks in the rubber cover are not cause for alarm, provided that the underlying fabric is not cut or broken. Many unnecessary replacements are made for superficial surface cracking or checking.

While expansion joints are guaranteed for a period of one year and designed for many years of service, it is suggested that they be replaced every 7 years.

DURING MAINTENANCE SHUTDOWN

Remove joint for complete examination or if there is access, crawl up to large diameter joints. The tube should not show signs of excess wear (fabric plies exposed) or deterioration (swelling, pealing, flaking). Tubes should be free of cracks or gouges in excess of 1/16" in depth. Flanges should be sound, showing no cutting or gouging by mating flange surfaces.

All rubber surfaces should be resilient and the flanges and body flexible. Brittleness and/or excessive stiffness, especially in higher temperature applications, indicate heat aging and deterioration.

WHEN REINSTALLING OR REPLACING EXPANSION JOINTS

Be sure that mating flange surfaces are smooth, and that misalignment is minimal. If piping is badly out of alignment, Mason or Mercer can furnish replacement expansion joints with this initial offset built in. Tighten bolts as outlined in our installation instructions. Re-install control units, if they were used before. It is important to install control units no longer than their original length. Allowing an older joint to travel past the point at which it has been used for years may result in damage.