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## **EXPANSION JOINTS**

### **Installation Procedures, Storage and Inspection Criteria**

BULLETIN-1003-1

### **EXPANSION JOINT INSTALLATION PROCEDURES**

1. Do not weld near any rubber expansion joint or weld the mating flanges with the expansion joint in place. There is the possibility of fire, spark or heat damage.
2. All pipe lines should be properly supported so that the expansion joints do not carry the pipe load.
3. 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 over extend and fail unless these full thrust anchors are in place.  
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 install two expansion joints rather than one. The thrust on the anchor is the pipe line area plus the arch area multiplied by the water pressure. The pipe wall thrust is only the area of the arch multiplied by the water pressure.
4. 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. The expansion joint will not act to take up axial motion. 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 very high.
5. 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 the flanges. Initial misalignment should be kept to a maximum of 1/8".
6. a. Expansion joint flanges must be in contact with a continuous surface. Depressions or protrusions typical of victaulic or similar flanges must be covered with a steel cover flange first.  
b. Rubber flanges will not retain loose elements in valve bodies that rely on contact with a steel flange. A steel cover flange must be inserted between the rubber expansion joint and the valve body.
- c. 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.
7. 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.
8. Continued support of expansion joint is required until the expansion joint is fully bolted into place.
9. 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 using over long bolts with the bolt 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.
10. Use two wrenches when tightening bolts. Unlike steel flanges where you normally tighten opposite bolts, when tightening the back up rings of rubber flanges, tighten bolts sequentially 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.  
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 and vice versa during heating and cooling cycles.
11. 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.
12. Never operate expansion joints above rated pressures or temperatures.
13. 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.

## 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. Do not store rubber

articles adjacent to electrical or other equipment that generates ozone. Whenever possible, rubber products should be stored in their original shipping containers, especially when such containers are wood crates or cardboard cartons, as this would provide protection against the deteriorating affects of oil solvents and corrosive liquids, and a container 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.

It is also very important to store expansion joints where they cannot sustain physical damage, such as being hit with a fork truck or penetrated with flying objects.

## EXPANSION JOINT INSPECTION CRITERIA

While our expansion joints are practically maintenance free, they should be inspected periodically for soundness. Early detection of leakage allows ample time for flange tightening or replacement if need be, before a problem becomes serious. If a cover is deteriorating, thorough cleaning and a coating of Hypalon paint will decrease external deterioration. While it is a good idea to check movements after installation, watch for 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.

### 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, peeling, 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 RE-INSTALLING 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 in sequence until rubber flange materials just bulge out from between mating flange and the backup ring. 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 introduce cracks.