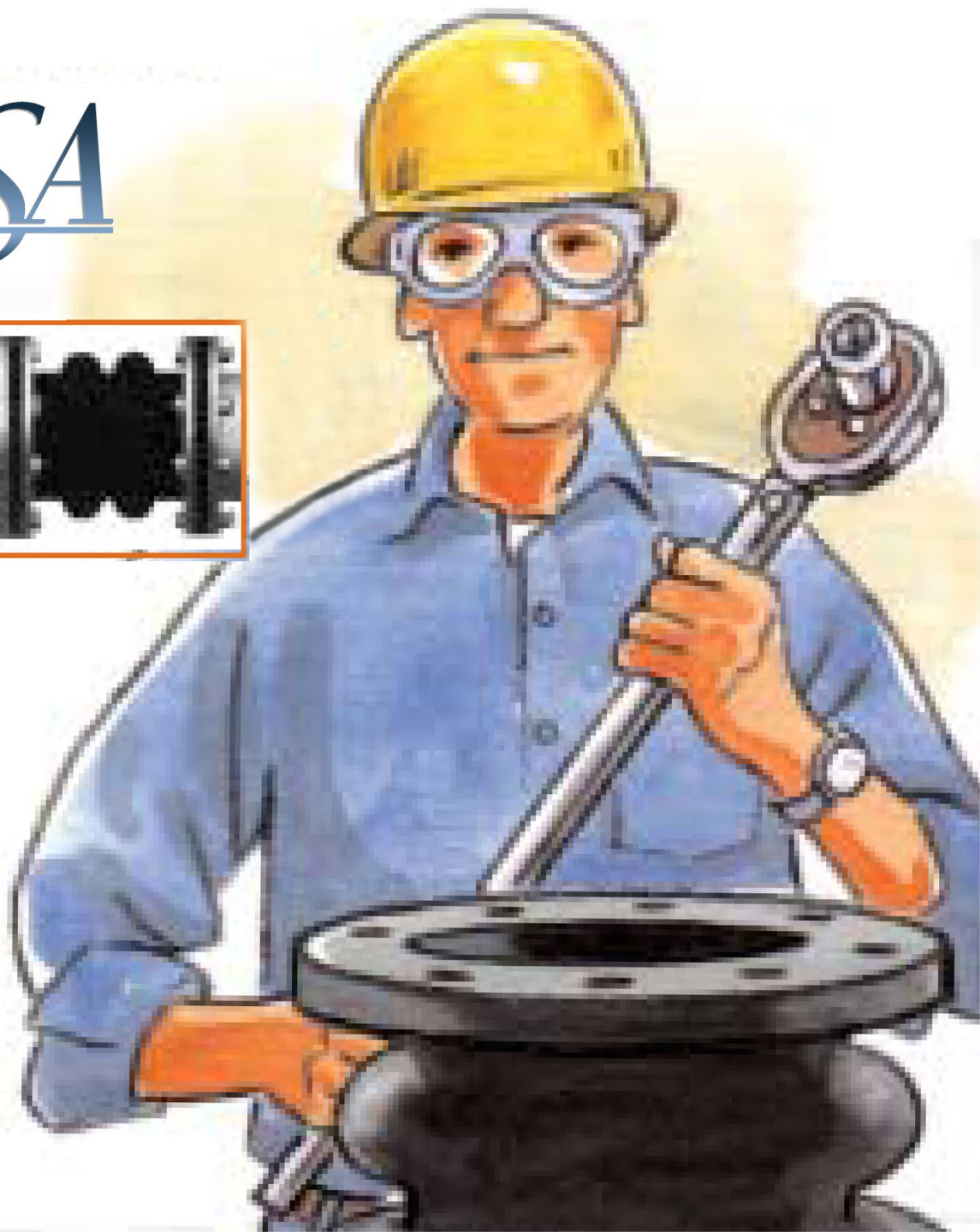
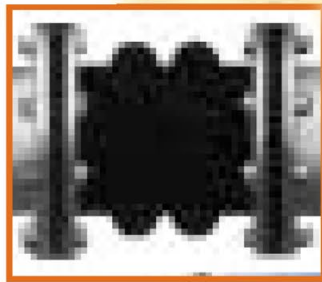
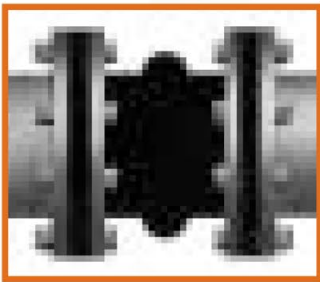


Non-Metallic Piping Expansion Joint Installation Procedures

Assuring Successful Service and Maximum Safety

FLUID SEALING®
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A Guide to Effective Installation of Non-Metallic Expansion Joints

Effective operation of non-metallic expansion joints depends on proper installation of all components of a well-designed piping system. This document provides guidance to maintenance operators and engineers to ensure the installation of an expansion joint meets or exceeds system requirements. It is intended to complement other plant-approved installation procedures.

NOTE: This guide presents typical Non-Metallic expansion joint installations. Contact manufacturer for specific details.

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ISBN 1-892965-20-8

Tools Required

Specific tools are required for installation of expansion joints. Additionally, always use standard safety equipment and follow good safety practices. Acquire the following equipment prior to installation:

- Calibrated torque wrench
- Tape measure
- Lubricant for elastomer flanges
- Appropriate safety equipment
- Carpenter square
- Other plant specified equipment



1 Review, Examine and clean

Confirm system operating requirements: pressure/vacuum, temperature, vibration, and movements.

Review anchors, supports, and alignment guides to assure they meet system requirements:

- Assure anchors and guides can withstand expansion joint pressure thrusts and spring rates.
- Add control units and compression sleeves when piping is not properly anchored.

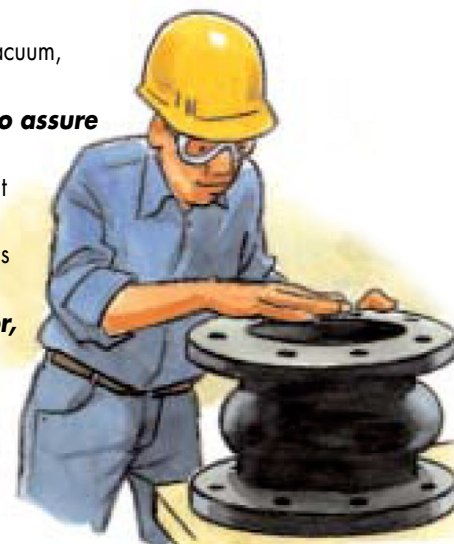
Examine expansion joint including exterior, interior, and flange faces for cuts and gouges.

Examine pipe flange faces for roughness and damage.

Remove all foreign material and debris.

Replace any components found to be defective.

If in doubt, contact manufacturer.



2 Align flanges

Position pipe flange faces to ensure axes are aligned to within 1/8 inch without using excessive force.

Use of an offset joint may be required when piping does not align properly. Consult manufacturer.

3 Install expansion joint

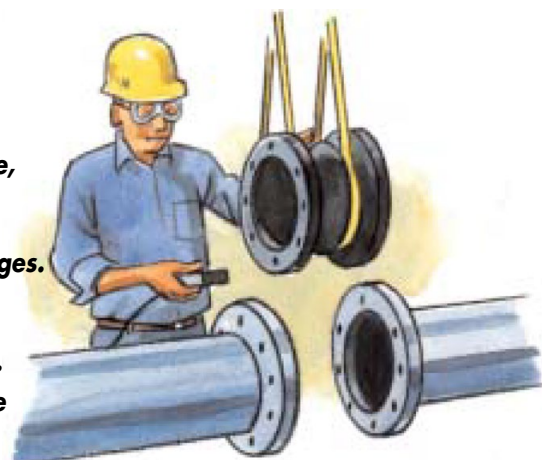
Assure expansion joint matches the specified size, material, and capabilities for the application.

If required, apply a thin layer of non-petroleum based lubricant, such as soapy water to the flanges.

Carefully install the expansion joint to assure no damage occurs, and align bolt holes.

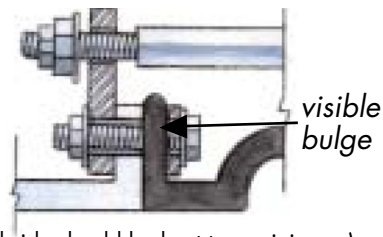
Support the expansion joint until bolted in place.

Spacer gaskets may be required with raised face pipe flanges, consult manufacturer.



4 Install and tighten bolts

Step 1 – Insert bolts with washers through retaining rings on the arched side of the expansion joint and then through to the mating flanges in a cross pattern. (Where there is not enough room for a bolt, **fully threaded rod** can be used with nut on each end. All thread past the nut on arched side should be kept to a minimum.)



Step 2 – Attach and tighten nuts (with washers) until hand tight.

Step 3 – Torque each bolt to full torque with the cross-bolt pattern until the outside edge of the expansion joint flange bulges slightly.

When control units are required install gusset plates on the outboard side of the mating flange. Insert rods through the outside hole in the plate.

Note: The number and distribution of control rods must meet manufacturer approved or design specified minimums. FSA Technical Handbook minimums shall apply if not specified otherwise.

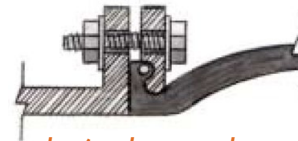
When required, install a compression sleeve while the control rod is inserted into the gusset plate.

Place the nuts and the metal and/or elastomer washers on the control rods. Lock the nuts at the locations specified by the manufacturer.

5a Bolt torque - Joints with full-faced elastomer flanges



5b Bolt torque - Joints with beaded-ends (spherical designs) or PTFE Bellows type



Tighten bolts in two to three successive steps with a cross-bolt tightening pattern to the nominal torque shown on the table below.

Tighten bolts so expansion joint flange outside edge bulges slightly between the retaining rings and the mating flange to assure leak-free operation.

Periodically re-torque bolts after system start-up.

NOMINAL BOLT TORQUE Full-Faced Elastomer Flanges			
Pipe Size		Torque	
in	mm	ft-lbs	Nm
1-2	25-50	30-50	40-68
2.5-5	60-125	50-70	68-95
6-8	150-200	90-120	120-160
10-12	250-300	110-140	150-160
14-16	350-400	130-160	175-215
18-24	450-600	150-200	200-270
26-40	650-1000	200-300	270-410
42-54	1050-1400	300-400	410-540
60-72	1500-1800	400-500	540-680

Use visible flange edge bulge to gauge.

Tighten bolts in two to three successive steps with a cross-bolt tightening pattern to the nominal torque shown on the table below to assure leak-free operation.

Note: Never tighten to the point of metal-to-metal contact between the joint and mating flanges. Over-tightening can cause deformation of the expansion joint sealing bead and premature failure.

Periodically re-torque bolts after system start-up.

NOMINAL BOLT TORQUE Beaded-Ends (Spherical) or PTFE Bellows			
Pipe Size		Torque	
in	mm	ft-lbs	Nm
1-1.25	25-32	30-45	40-60
1.5-2	40-50	30-45	40-60
2.5	65	35-50	47-68
3-5	80-125	45-60	60-80
6-8	150-200	50-65	68-88
10-12	250-300	55-75	75-100
14-16	350-400	60-80	80-110
18	450	70-90	95-120
20	500	75-95	95-120
24	600	80-100	110-175
30	750	95-130	120-175

Note 1: Recommended Torque values are for reference only and may require more or less torque due to flange facing, and other variables. **Caution:** Mating flange material or equipment may dictate lower torque values. Consult the Manufacturer for specific recommendations.

Note 2: The Flange Bolts should be re-tightened after about one week of operation and checked periodically, thereafter.

6 Maintenance and storage

Inspect the expansion joint periodically to confirm satisfactory installation and operation and remove any debris on and around the expansion joint.

Periodically re-torque bolts.

Apply plant-approved maintenance procedures as required.

When welding near the expansion joint, cover with a blanket or other protective device to prevent damage.

Storage: Expansion joints should be stored in a relatively dry, dark, cool warehouse location. Storage near ozone producing equipment should be avoided. Store flange face down evenly supported on a pallet or wooden platform. Do not store other heavy items on top of an expansion joint. A minimum five-year shelf-life may be expected with ideal conditions. If storage must be outdoors, the expansion joint should be placed on a wooden platform above possible water line and covered with a tarpaulin. It should not be in contact with the ground.



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For further details on piping expansion joint installation, please refer to the FSA Technical Handbook – Non-Metallic Expansion Joints and Flexible Pipe Connectors available from the Fluid Sealing Association.

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