

# SAFETY RECOMMENDATIONS

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This section was prepared in order to better inform the user of those factors which many years of experience have shown to be essential for the successful installation and performance of piping systems containing bellows expansion joints.

### INSPECTION PRIOR TO START-UP OR PRESSURE TEST

Expansion joints are usually considered to be non-repairable items and generally do not fall into the category for which maintenance procedures are required. However, immediately after the installation is complete a careful visual inspection should be made of the entire piping system to ensure that there is no evidence of damage, with particular emphasis on the following:

1. Are anchors, guides, and supports installed in accordance with the system drawings?
2. Is the proper expansion joint in the proper location?
3. Are the flow direction and pre-positioning of the expansion joint correct?
4. Have all of the expansion joint shipping devices been removed?
5. If the system has been designed for gas, and is to be tested with water, has provision been made for proper support of the additional dead weight load on the piping and expansion joint? Some water may remain in the bellows convolutions after the test. If this is detrimental to the bellows or system operation, means should be provided to remove this water.
6. Are all guides, pipe supports and the expansion joints free to permit pipe movement?
7. Has any expansion joint been damaged during handling and installation?
8. Is any expansion joint misaligned? This can be determined by measuring the joint overall length, inspection of the convolution geometry, and checking clearance at critical points on the expansion joint and at other points in the system.
9. Are the bellows and other movable portions of the expansion joint free of foreign objects?

### INSPECTION DURING AND IMMEDIATELY AFTER PRESSURE TEST

**WARNING: EXTREME CARE MUST BE EXERCISED WHILE INSPECTING ANY PRESSURIZED SYSTEM OR COMPONENT.**

A visual inspection of the system should include the following:

1. Evidence of leakage or loss of pressure.
2. Distortion or yielding of anchors, expansion hardware, the bellows and other piping components.
3. Any unanticipated movement of the piping due to pressure.
4. Evidence of instability in the bellows.
5. The guides, expansion joints, and other movable parts of the system should be inspected for evidence of binding.
6. Any evidence of abnormality or damage should be reviewed and evaluated by competent design authority.

### PERIODIC INSERVICE INSPECTION

**WARNING: EXTREME CARE MUST BE EXERCISED WHILE INSPECTING ANY PRESSURIZED SYSTEM OR COMPONENT.**

1. Immediately after placing the system in operation, a visual inspection should be conducted to insure that the thermal expansion is being absorbed by the expansion joints in the manner for which they were designed.
2. The bellows should be inspected for evidence of unanticipated vibration.
3. A program of periodic inspection should be planned and conducted throughout the operating life of the system. The frequency of these inspections should be determined by the service and environmental conditions involved. Such inspections can pinpoint the more obvious potential problems such as external corrosion, loosening of threaded fasteners, and deterioration of anchors, guides and other hardware. It must be understood that this inspection programme, without any other backup information cannot give evidence of damage due to fatigue, stress corrosion or general internal corrosion. These can be the cause of sudden failures and generally occur without any visual or audible warning.
4. When any inspection reveals evidence of malfunction, damage or deterioration, this should be reviewed by competent design authority for resolution. Additionally, any changes in the system operating conditions such as pressure, temperature, movement, flow, velocity, etc that may adversely affect the expansion joint should be reported to, and evaluated by, a competent design authority.