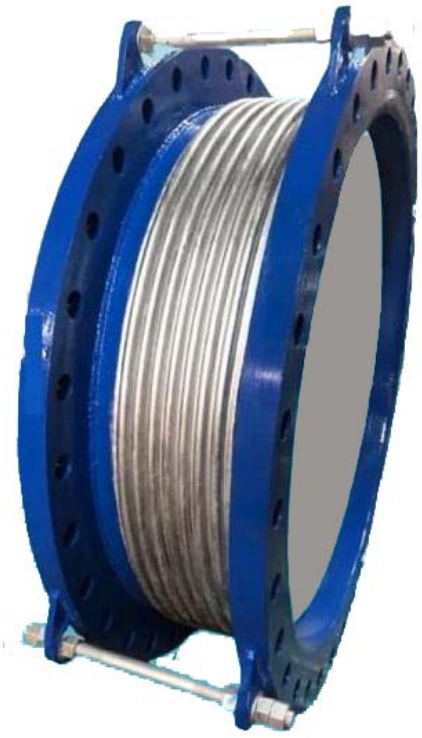
EXPANSION BELLOW



INSTRUCTION MANUAL ON INSTALLATION OPERATION AND MAINTENANCE

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INTRODUCTION

A bellows is a convoluted shell that can be compressed or extended under the application of pressure. They are elastic vessels which can retain its original shape upon the release of pressure or vacuum. Bellows are commonly used in hot and cold piping systems. Hot and cold fluid passes through the pipe line, which causes the expansion and contraction of the system, and the flowing fluid creates pressure fluctuations. This causes axial or angular movements in the piping system

PRE INSTALLATION INSPECTION

Before installation, we highly recommend inspecting expansion bellows for any damages during shipments such as dents, broken bellows, and water traces. Furthermore, you require inspecting the entire piping system before installation ensure everything is in its place. The following tips will help you to prepare the expansion joint before installation.

- Ensure that anchors, guides, and fixing points are in their place according to the system drawings.
- Ensure that the expansion bellows are supposed to be in the exact correct location and position.
- Remove all the shipping devices.
- Never use the fittings, hinges, tie rods, or gimbals to lift the expansion joints.
- Avoid any mechanical loads to the thin bellows section.
- Expansion bellows should not be subject to torsion while handling or installation.
- Store expansion bellows in a dry and clean area or in waterproof covers until they are required to put into service. Moreover, avoid any damages caused by water, chemicals, weather, soil, sand, and moisture.
- Do not stack expansion joints on top of each other.
- Expansion bellows tend to bend due to end fittings weight. Try to brace end fittings with wooden supports to eliminate the weight effect on the bellows.

INSTALLATION

The most important and critical stage for achieving an optimized system with a maximum life span is the installation. You should plan all the necessary steps for expansion joints installation. The

installation must be carried out by an expert. Followings are critical factors for the installation phase which will help you to improve the installation phase.

- Be careful while disassembling the existing parts. Extra care should be given while dealing with the thin part of the expansion bellows.
- Improper handling of the expansion bellows may lead to bellows damages.
- Compression, extension, offset, and especially torsion should be avoided.
- Ensure that expansion bellows are free from dirt and debris and the sealing surfaces on flanges are even.
- Ensure that the end fittings are clean and ready for welding
- Make sure that tie rods are mounted correctly on the lateral expansion joints.
- During the welding process, protect the expansion bellows against weld splatter and debris.
- If you implement an inner sleeve, ensure that the flow arrow on the expansion bellows is in the same direction as the system flow.
- Never apply torsion to the expansion joint to align the bolts on flanged units.
- Anchors, guides, and the fixing point must be implemented in accordance with the system drawings.
- Never try to remove tie rods, hinges, and gimbals, as they are a part of the expansion joint for proper functionality.
- Be careful to avoid any damages to the bellows while tightening bolts with wrenches.

MAINTENANCE

Maintenance is the last phase and it plays an important role in increasing the overall life span of the expansion joints. Upon installation completion, conduct a visual inspection. During the inspection, you should check if the flexible joints absorb the dimensional changes properly. Moreover, plan a periodic schedule to ensure that the expansion joints receiving routine maintenance. The frequency of the maintenance routine can determine by the system designer according to service and environmental conditions. Expansion joint maintenance routine mainly includes the visual examination of loosening fittings or any signs of external corrosion. It also includes the inspection of anchors, guides and other components for any deterioration.

DO'S AND DON'TS

Do's	Dont's
Inspect for damage during shipment, i.e., dents, broken hardware, watermarks on the carton, etc.	Do not drop or strike carton. Do not remove shipping bars until installation is

Store in a clean dry area where it will not be exposed to heavy traffic or damaging environment. Use only designated lifting lugs. Make the piping systems fit the expansion joint. By stretching, compressing, or offsetting the joint to fit the piping, the joint may be overstressed when the system is in service. It is good practice to leave one flange loose until the expansion joint has been fitted into position. Make necessary adjustment of loose flange before welding. Install joint with an arrow pointing in the direction of flow. Be sure to install a gasket between the mating flange and liner. Remove all shipping devices after the installation is complete and before any pressure test of the fully installed system. Remove any foreign material that may have become lodged between the convolutions.	complete. Do not remove any moisture-absorbing desiccant bags or protective coatings until ready for installation. Do not use hanger lugs as lifting lugs without the approval of the manufacturer. Do not use chains or any lifting device directly on the bellows or bellows cover. Do not allow weld splatter to hit unprotected bellows. Protect with wet chloride-free insulation. Do not use cleaning agents that contain chlorides. Do not use steel wool or wire brushes on bellows. Do not force-rotate one end of an expansion joint for alignment of bolt holes. Ordinary bellows are not capable of absorbing torque. Do not hydrostatic pressure test or evacuate the system before installation of all guides and anchors. Pipe hangers are not adequate guides. Do not use shipping bars to retain thrust if tested prior to installation.

Refer to EJMA Standards for proper guide spacing and anchor recommendations.

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