

FLEXICAN BELLOWS & HOSES PVT. LTD.
(Formerly Zaverchand, Gaekwad Ltd, Baroda)

**INSTALLATION RECOMMENDATIONS
FOR FLEXICAN METAL BELLOWS EXPANSION JOINTS**

I) FORCES EXERTED BY EXPANSION JOINTS :

Two significant forces which are unique in expansion joint are, spring force and pressure thrust force. In addition to normal pipe systems force, the anchors in system should be designed considering expansion joint significant forces. An expansion joint must be installed so as its both ends are getting anchored.

i) SPRING FORCE :

Spring force is a force required to deflect an expansion joint the specific amount for which it is designed. In order for an expansion joint to operate properly, this spring force must be restrained by anchor/fixed point. The magnitude of spring force is determined by the expansion joint spring rate and the amount of the movement to which the expansion joint is based.

ii) PRESSURE THRUST FORCE :

Pressure thrust force is a condition created by installation of flexible unit, such as an expansion joint into the rigid piping system which is under pressure. Pressure thrust force is function of the system pressure and mean diameter of the Bellow. In case of internal positive pressure the convolutions are pushed out causing the bellows to open / extend or increase in the length. The force required to maintain the bellow at its proper length is equal to this pressure thrust and can be substantially higher than other system forces, combined.

II) MAIN ANCHORE :

The main anchor should be designed to withstand the force and moments imposed upon it by pipe section to which it is attached in the pipe section containing un-restrained expansion joint, these will be due to full bellow pressure thrust, media flow, the force and/or moments required to deflect expansion joint their full rated movements should be considered.

In certain application it may be necessary to consider the weight of the pipe section and its contents as well as other force and/or moments due to wind loading etc.

The following are suggested main anchor location in the systems, containing expansion Bellows :

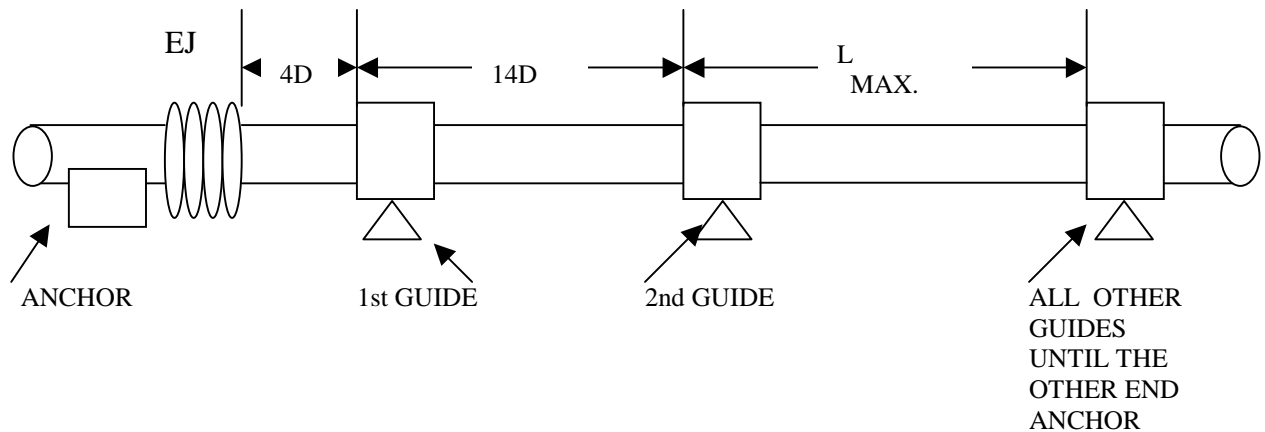
- a) At a change of direction of flow.
- b) Between two expansion joints of different sizes installed in the same straight run
- c) At the entrance of the side branch containing the expansion joint, into main line.
- d) Whether a shut or pressure return valve is in the pipe run between two expansion joints.
- e) At the blind end of pipe.

III) PIPE GUIDE AND SUPPORT :

Correct alignment of the pipe adjoining an expansion joint is of vital important to its proper function. Although the expansion joints are designed and manufactured for a long and satisfactory life, maximum service will be obtained only when pipe has recommended number of guides and is anchored and supported in accordance with good piping practice. Proper supporting of the pipe line is required not only to support pipe itself, but also to provide support at each end of the expansion joint. Pipe guides are necessary to ensure proper alignment of movements to the expansion joints and to prevent bucking of the lines.

i) PIPE GUIDE LOCATION :

When location pipe guide for application involving axial movements only, it is generally recommended to locate expansion joint near to the anchor point. The guide is recommended to be located in accordance with figure given below.



First pipe guide must be located within a distance of four pipe diameters from the end of the bellows and the second guide must be located within a distance of fourteen pipe diameters from the first guide. The remaining guides should be placed at calculated spacing per EJMA B-2-2-2 or on the basis of 7 pinned Euler column.

For systems subjected to the lateral movements or angular movements directional anchor or planer guides are recommended.

The above piping guides and supports are suggesting and minimum requirement. However additional piping supports and guides are often required between the guides in accordance with Standard Piping Practice.

VI) EXPANSION JOINT INSTALLATION :

'FLEXICAN' Metal Bellows Expansion Joints have been designed to absorb a specified amount of movement by flexing of the thin gauge bellows. If proper care is not exercised in the installation of the expansion joint, cycle life and pressure capacity could be reduced leading to premature failure.

It is important that the expansion joint is installed at the length location specified. They should never be extended or compressed in order to make-up for deficiencies in length nor should they be off-set to accomodate misaligned pipe, without our consent. The bellows are thin flexing elements. The installer must recognize this and take every possible measure to protect it during the installation. Please avoid denting, weld spatter, are strikes or possibility of allowing foreign material to interfere with proper flexing of the bellows. With reasonable care during the storage, handing and installation the user will be assured of the reliability desinged and built into the expansion joints.

RECOMMENATIONS :

The following recommendations are included to avoid common error that occure during the installation. When in doubt about the installation procedure, please contact us for clarifications before installing expansion joint.

I) PLEASE DO THIS :

1. Inspect Expansion Joint for any damage during the transit.
2. Store the expansion joint in clean and dry area where it will not be exposed to damaging environment.
3. Use only designated lifting lugs when provided. Lugs are normally provided in heavy design in large size.
4. Make the piping system fit the expansion joint. By stretching, compressing or off setting the expansion joint to fit the piping, the Expansion joint may be over stressed when the system is in services.
5. It is advisable that leave one flange loose on the adjacent piping when possible, until the expansion joint has been fitted in the position. Make necessary adjustment of this loose flange before welding.
6. Install the expansion joint with arrow point in direction of the flow. This is especially important in case of expansion joint with internal protective sleeves. In case of telescopic protection liner sleeve, install smallest ID sleeve liner pointing in the direction of the flow.
7. Remove the shipping devices only after the installation is completed and just before any pressure test of the fully installed system.
8. Remove any foreign materials that may have become lodged between the convolutions.
9. Refer to and follow the proper guide spacing and anchor recommendations of standard piping practice, and that given herein this booklet.

10. Set nuts of Tie Rods / Limit Rods / Control Rods per setting mark shown on the respective rod, after installation but before putting into operation.

II) PLEASE DO NOT THIS :

1. Do not drop or strike expansion joint.
2. Do not remove shipping bars until installation is completed, proper Guides and Anchors provided.
3. Do not use hanger lugs or shipping bars as lifting lugs.
4. Do not use loose chains or any lifting devices directly on the bellows membrane.
5. Do not allow weld splatter to hit bellows membrane.
6. Do not use cleaning agent which contains chlorides.
7. Do not use steel wool and wire brushed on the bellow membrane.
8. Do not hydrostatic pressure test or evacuate the system before proper installation of all guides and anchors.
9. Do not use shipping bars to restrain the pressure thrust during the testing.
10. Do not use pipe hangers as guides.
11. Do not exceed rated test pressure of the Expansion Joint, in any case.