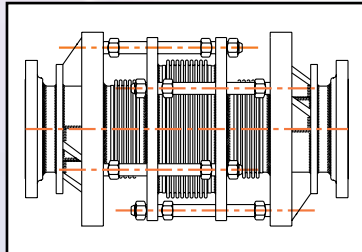




FMH EXPANSION JOINTS

EXPANSION JOINT TYPES (cont.)

IN-LINE PRESSURE BALANCED EXPANSION JOINT



This expansion joint is another unique design that absorbs axial, lateral and angular movements while eliminating pressure thrust loads on the piping and without a change in direction of the piping. Through the use of a balancing bellows

and a tie rod linkage arrangement, the pressure thrust forces are eliminated. The larger balancing bellows must have a cross-sectional area twice that of the line bellows. The tie rod linkage functions in much the same way as in the Elbow Pressure Balanced Expansion Joint and will cause the larger balancing bellows to extend as the line bellows compresses and vice-versa. The spring forces are determined in much the same way as the Elbow Pressure Balanced Expansion Joint. These expansion joints are used in cases where main anchoring is not practical or pressure thrust loads are too high for delicate equipment such as turbines or pumps. These expansion joints are also used in straight pipe runs such as a short run between two vessels.



EXPANSION JOINT ACCESSORIES

The standard expansion joints listed in this catalog are designed to meet the requirements of most expansion joint applications, however, there are a number of accessories that are available that provide essential, as well as, recommended protection of the bellows. These accessories may be applied to both the Single as well as the Universal type expansion joints listed in this catalog and should be added to the part number when selecting the proper expansion joint.

INTERNAL FLOW LINERS (L)

Internal flow liners are devices that protect the internal surface of the bellows. In order to properly size a liner, the expected lateral and angular movement should be provided. In cases where a liner is required and the unit has different end fittings, the direction of flow should be specified. In applications that require a heavy liner, the designation HL should be used in the expansion joint part number. Internal flow liners are necessary in expansion joint applications where the bellows are exposed to the following conditions:

- Smooth flow conditions are required to minimize friction losses or pressure drop.
- Flow velocities exceed the following values:
 - Air, Steam and other gases:
 - Up to 6" diameter - 4 ft./sec./inch of diameter
 - Over 6" diameter - 25 ft./sec.
 - Water and other liquids:
 - Up to 6" diameter - 2 ft./sec./inch of diameter
 - Over 6" diameter - 10 ft./sec.
- Turbulent flow is generated within ten pipe diameters of the expansion joint by changes in flow direction, valves, tee or elbow sections or cyclonic devices. A heavy wall liner is required for this condition.
- Erosion is possible due to particles in the flow such as catalyst or ash. A heavy wall liner is required for this condition.
- If the flow is reversible a heavy wall liner is required.
- For high temperature applications, an internal liner can lower the operating temperature of the bellows and provide better material characteristics. In order to further enhance this benefit, the expansion joint should not be externally insulated, however, insulation or purging may also be applied between the liner and bellows.