

GLOSSARY OF BELLOWS

Generic terms commonly used: Bellows, Expansion Joints, Flexible Couplings.

ANCHOR, DIRECTIONAL. A directional or sliding anchor, is one which is designed to absorb loading in one direction while permitting motion in another. It may be either a main or intermediate anchor, depending upon the application involved. When designed for this purpose, a directional anchor may also function as a pipe alignment guide. In the design of a directional anchor, an effort should be made to minimize the friction between its moving or sliding parts, since this will reduce the loading on the piping and equipment and ensure proper functioning of the anchor.

ANCHOR, MAIN. A main anchor is one which must withstand the full bellows thrust due to pressure, flow, spring forces, etc.

ANCHOR, INTERMEDIATE. An intermediate anchor is one which must withstand the thrust due to flow, spring forces, etc., but not the thrust due to pressure.

BELLOWS. The flexible element of an expansion joint consisting of one or more convolutions and the end tangents, if any.

CONTROL RODS. Devices, usually in the form of rods or bars, attached to the expansion joint assembly whose primary function is to distribute movement between the two bellows of a universal expansion joint. Control rods are not designed to restrain pressure thrusts.

CONVOLUTION. The smallest flexible unit of a bellows. The total movement capacity of a bellows is proportional to the number of convolutions.

COVER. A device used to provide limited protection of the exterior surface of the bellows of an expansion joint from foreign objects or mechanical damage. A cover is sometimes referred to as a shroud.

DOUBLE EXPANSION JOINTS. A double expansion joint consists of two bellows joined by a common connector which is anchored to some rigid part on the installation by means of an anchor base. The anchor base may be attached to the common connector either at installation or at time of manufacture. Each bellows acts as a single expansion joint and absorbs the movement of the pipe section in which it is installed, independently of the other bellows. Double expansion joints should not be confused with universal expansion joints.

EQUALIZING AND REINFORCING RINGS. Devices used on some expansion joints fitting snugly in the roots of the convolutions. The primary purpose of these devices is to reinforce the bellows against internal pressure. Equalizing rings are made of cast iron, carbon steel, stainless steel or other suitable alloys and are approximately "T" shaped in cross section. Reinforcing rings are fabricated from tubing or solid round bars of carbon steel, stainless steel, or other suitable alloys.

EXPANSION JOINTS. Any device containing one or more bellows used to absorb dimensional changes, such as those caused by thermal expansion or contraction of a pipeline, duct, or vessel.

FLANGED ENDS. The ends of an expansion joint equipped with flanges for the purpose of bolting the expansion joint to the mating flanges of adjacent equipment or piping.

GIMBAL EXPANSION JOINTS. A gimbal expansion joint is designed to permit angular rotation in any plane by the use of two pairs of hinges affixed to a common floating gimbal ring. The gimbal ring, hinges and pins must be designed to restrain the thrust of the expansion joint due to internal pressure and extraneous forces, where applicable.

GROMMET. A PTFE (preferred) or rubber sleeve put in the flange bolt holes through which the tie bars are fitted, before fitment, to avoid galvanic corrosion risks. Different metals of tie bars and the flanges themselves can cause galvanic effects leading to corrosion. PTFE is preferred, as it is UV resistant and thus long life and also can withstand environmental corrosion better than rubber.

HINGED EXPANSION JOINT. A hinged expansion joint contains one bellows and is designed to permit angular rotation in one plane only, by the use of a pair of pins through hinge plates attached to the expansion joint ends. The hinges and hinge pins must be designed to restrain the thrust of the expansion joint due to internal pressure and extraneous forces, where applicable. Hinged expansion joints should be used in sets of two or three to function properly.

INTERNAL SLEEVE. A device which minimizes contact between the inner surface of the bellows of an expansion joint and the fluid flowing through it. These devices have also been referred to as liners, telescoping sleeves, etc. The shape is the "top hat" form, which holds the sleeve in place by clamping the rim between the two upstream flanges.

INTERNALLY GUIDED EXPANSION JOINT. An internally guided expansion joint is designed to provide axial guiding within the expansion joint by incorporating a

heavy internal guide sleeve, with or without the use of bearing rings. The use of such expansion joints will assure installation without initial lateral or angular misalignment and can be installed in pipelines where reverse flow will be encountered. NOTE: The use of an internally guided expansion joint does not eliminate the necessity of using adequate external pipe guides.

LIMIT RODS. Devices, usually in the form of rods or bars, attached to the expansion joint assembly whose primary function is to restrict the bellows movement range (axial, lateral and angular) during normal operation. They are designed to prevent over-extension or over-compression of the bellows while restraining the full pressure loading and dynamic forces generated by a main anchor failure.

PANTOGRAPH LINKAGES. A scissor-like device. A special form of control rod attached to the expansion joint assembly whose primary function is to positively distribute the movement equally between the two bellows of the universal joint throughout its full range of movement. Pantograph linkages, like control rods, are not designed to restrain pressure thrusts.

PIPE ALIGNMENT GUIDE. A pipe alignment guide is a form of framework fastened to some rigid part of the installation which permits the pipeline to move freely along the axis of the pipe. Pipe alignment guides are designed primarily for use in applications involving lateral deflection and angular rotation.

PIPE SECTION. A pipe section is that portion of a pipeline between two anchors. All dimensional changes in a pipe section are absorbed between two anchors.

PLANAR PIPE GUIDE. A planar pipe guide is one which permits transverse movement and/or bending of the pipeline in one plane. It is commonly used in applications involving lateral deflection or angular rotation resulting from "L" or "Z" shaped piping configurations.

PRESSURE BALANCED EXPANSION JOINT. A pressure balanced expansion joint is designed to absorb axial movement and/or lateral deflection while restraining the pressure thrust by means of tie devices interconnecting the flow bellows with an opposed bellows also subjected to line pressure. This type of expansion joint is normally used where a change of direction occurs in a run of piping but can be designed as an in-line device where no change of direction is necessary. The flow end of a pressure balanced expansion joint sometimes contains two bellows separated by a common connector, in which case it is called a universal pressure balanced expansion joint.

PURGE CONNECTIONS. Purge connections, where required, are usually installed at the sealed end of each internal sleeve of an expansion joint for the purpose of injecting a liquid or gas between the bellows and the internal sleeve to keep the area clear of erosive and corrosive media and/or solids that could pack the convolutions. Purging may be continuous, intermittent or just on start-up or shut down, as required. These are sometimes called aeration connections.

SHIPPING DEVICES. Rigid support devices installed on an expansion joint to maintain the overall length of the assembly for shipment. These devices may also be used to pre-compress, pre-extend or laterally offset the bellows.

SINGLE EXPANSION JOINT. The simplest form of expansion joint, of single bellows construction, designed to absorb all of the movements of the pipe section in which it is installed.

SWING EXPANSION JOINT. A swing expansion joint is designed to absorb lateral deflection and/or angular rotation in one plane. Pressure thrust and extraneous forces are restrained by the use of a pair of swing bars, each of which is pinned to the expansion joint ends.

TANGENTS. The straight un-convoluted portions at the end of the bellows.

TIE RODS or TIE BARS. Devices, usually in the form of rods or bars, attached to the expansion joint assembly whose primary function is to continuously restrain the full pressure thrust during normal operation while permitting only lateral deflection. Angular rotation can be accommodated only if two tie rods are used and located 90 degrees opposed to the direction of rotation.

UNIVERSAL EXPANSION JOINT. A universal expansion joint is one containing two bellows joined by a common connector for the purpose of absorbing any combination of the three basic movements, i.e. axial movements, lateral deflection, and angular rotation. Universal expansion joints are usually furnished with control rods to distribute the movement between the two bellows of the expansion joint and stabilize the common connector. This definition does not imply that only a universal expansion joint can absorb combined movements.

WELD ENDS. The ends of an expansion joint equipped with pipe suitably bevelled for welding to adjacent equipment or piping.

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