



Standard Specification for Circular Metallic Bellows Type Expansion Joints for Piping Applications¹

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1. Scope

1.1 This specification establishes the minimum requirements for the mechanical design, manufacture, inspection, and testing of circular metallic bellows-type expansion joints used to absorb the dimensional changes resulting from piping thermal expansion or contraction, as well as the movement of terminal equipment and supporting structures.

1.2 Additional or better features, over and above the minimum requirements set by this specification, are not prohibited by this specification.

1.3 The layout of many piping systems provides inherent flexibility through natural changes in direction so that any displacements produce primarily bending or torsional strains, within acceptable limits. Where the system lacks this inherent flexibility the designer should then consider adding flexibility through the use of metallic bellows-type expansion joints.

1.4 The values stated in inch-pound units are to be regarded as the standard. The values given in parentheses are for information only.

2. Referenced Documents

2.1 ANSI Standards:

B16.5 Pipe Flanges and Flanged Fittings²

B16.25 Butt Welding Ends²

B31.1 Power Piping Code²

2.2 ASME Standards:

Section VIII, Division 1, Pressure Vessels³

Section IX, Welding and Brazing Qualifications³

2.3 EJMA Standard:

Standards of the Expansion Joint Manufacturer's Association⁴

2.4 Pipe Fabrication Institute Standard: ES-3 Fabrication Tolerances⁵

3. Terminology Definitions

3.1 Expansion joint definitions shall be in accordance with those in the EJMA standards.

3.2 *double expansion joint*—expansion joint consisting of two bellows joined by a common connector.

3.3 *Discussion*—The common connector is anchored to some rigid part of 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.

3.4 *gimbal expansion joint*—expansion joint designed to permit angular rotation in any plane by the use of two pairs of hinges affixed to a common floating gimbal ring.

3.5 *Discussion*—The gimbal ring, hinges, and pins are designed to restrain the thrust of the expansion joint as a result of internal pressure and extraneous forces, where applicable.

3.6 *hinged expansion joint*—expansion joint containing one bellow 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.

3.7 *Discussion*—The hinges and hinge pins are designed to restrain the thrust of the expansion joint as a result of internal pressure and extraneous forces. Hinged expansion joints should be used in sets of two or three to function properly.

3.8 *pressure balanced expansion joint*—expansion joint designed to absorb axial movement or lateral deflection, or both, while restraining the pressure thrust by means of tie devices interconnecting the flow bellows with an opposed bellows also subjected to line pressure.

3.9 *Discussion*—This type of expansion joint is intended for use where a change of direction occurs in a run of piping. The flow end of a pressure balanced expansion joint sometimes

¹ This specification is under the jurisdiction of ASTM Committee F25 on Ships and Marine Technology and is the direct responsibility of Subcommittee F25.11 on Machinery and Piping Systems.

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² Available from American National Standards Institute (ANSI), 25 W. 43rd St., 4th Floor, New York, NY 10036.

³ Available from American Society of Mechanical Engineers (ASME), ASME International Headquarters, Three Park Ave., New York, NY 10016-5990.

⁴ Available from Expansion Joint Manufacturer's Association, 25 N. Broadway, Tarrytown, NY 10591. The Standards of the Expansion Joint Manufacturer's Association are a collection of standards developed by this industry and published in one volume, herein called EJMA Standards.

⁵ Available from Pipe Fabrication Institute, 1326 Freeport Rd., Pittsburgh, PA 15238.