



Standard Specification for Pipeline Expansion Joints of the Packed Slip Type for Marine Application¹

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1. Scope

1.1 This specification covers the design, manufacturing, and testing of packed slip-type expansion joints used in pipelines for accommodating axial thermal growth or contraction from the pipeline carrying fluid.

1.2 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 ASTM Standards:

A 53/A 53M Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless²

A 216/A 216M Specification for Steel Castings, Carbon, Suitable for Fusion Welding, for High-Temperature Service³

A 285/A 285M Specification for Pressure Vessel Plates, Carbon Steel, Low- and Intermediate-Tensile Strength⁴

B 650 Specification for Electrodeposited Engineering Chromium Coatings on Ferrous Substrates⁵

2.2 ANSI Standards:⁶

B16.5 Steel Pipe Flanges and Flanged Fittings

B16.25 Buttwelding Ends

B31.1 Power Piping

2.3 ASME Standards:⁷

Section V Nondestructive Examination

Section VIII, Division 1 Pressure Vessels

Section IX Welding and Brazing Qualifications

2.4 AISI Standard:

C-1018 Carbon Steel⁸

3. Classification

3.1 The expansion joints shall be of the following types, styles, classes, and forms:

3.1.1 *Type I*—Injectable semiplastic packing type, designed for injecting packing under full-line pressure.

3.1.2 *Style I*—Internally externally guided with guides integral with stuffing box.

3.1.3 *Style II*—Internally externally guided with guides integral with stuffing box and with low-friction inserts at the guide surfaces.

3.1.4 *Class I*—Single joint, single slip.

3.1.5 *Class II*—Double joint, double slip.

3.1.6 *Form I*—Weld end.

3.1.7 *Form II*—Flanged end.

3.1.8 *Form III*—Other.

4. Ordering Information

4.1 Expansion joints shall meet all the requirements of the latest issue of this specification. Where possible, the expansion joint shall be the manufacturer's standard commercial product. Additional or superior features that are not prohibited by this specification but which are a part of the manufacturer's standard product, shall be included with the expansion joint being offered. A standard commercial product is a product that has been sold or is currently being offered for sale on the commercial market through advertisements or manufacturer's catalogs, or brochures, and represents the latest production model.

4.2 Purchase order or inquiry for expansion joints to this specification shall specify the following:

4.2.1 Title, number, and latest revision of this specification.

4.2.2 Style, class, and form required.

4.2.3 Materials, other than standard as specified (see Section 8).

4.2.4 Service conditions shall specify the following:

4.2.4.1 Maximum and minimum operating temperature ($^{\circ}$ F).

¹ This specification is under the jurisdiction of 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 *Annual Book of ASTM Standards*, Vol 01.01.

³ *Annual Book of ASTM Standards*, Vol 01.02.

⁴ *Annual Book of ASTM Standards*, Vol 01.04.

⁵ *Annual Book of ASTM Standards*, Vol 02.05.

⁶ Available from American National Standards Institute (ANSI), 25 W. 43rd St., 4th Floor, New York, NY 10036.

⁷ Available from American Society of Mechanical Engineers (ASME), ASME International Headquarters, Three Park Ave., New York, NY 10016-5990.

⁸ Available from American Iron and Steel Institute (AISI), 1101 17th St., NW, Suite 1300, Washington, DC 20036.

- 4.2.4.2 Maximum operating pressure (psig).
- 4.2.4.3 Fluid handled.
- 4.2.4.4 Corrosive conditions, if applicable.
- 4.2.5 Total axial expansion or contraction.
- 4.2.6 ANSI pressure class, facing, and drilling for flanged end joint and pipe schedule or wall thickness of ends for weld end joint.
- 4.2.7 If base is required for support or main anchor on Class I expansion joint.
- 4.2.8 Drain connection, if required.
- 4.2.9 Service connection if required, noting location and type of connection.
- 4.2.10 Slip protectors, if required.
- 4.2.11 Adjustment rods for field extension or compression of the slip if required.
- 4.2.12 If hot-dip galvanizing of parts is required.
- 4.2.13 Spare parts, accessories, and special tools, if required.
- 4.2.14 Hydrostatic testing and test pressure, if required.
- 4.2.15 Radiographic or other nondestructive testing of weld joints if required.

5. Materials and Manufacture

5.1 Materials:

5.1.1 Materials of construction shall conform to the requirements as specified in this specification (see Section 8) and shall be new and free from defects that would adversely affect the performance of individual components or assemblies.

5.1.2 As specified in this specification and as required, the expansion joint shall be provided with flanged or welded end connections, limit stops, stuffing boxes with integral guides, base, drain connection, service connection, slip protectors, and adjustment rods.

5.2 Manufacture:

5.2.1 *General*—Unless otherwise required by this specification, the manufacturer's standard shop practices for the fabrication of the expansion joint is acceptable, provided these practices conform to the requirements and recommendations of this specification.

5.2.2 *All Welding*—Welding procedure qualifications, welder performance qualification, welding materials, preheat, and postweld heat treatment if required, shall be in accordance with ANSI B31.1 and ASME Code Section IX.

5.2.3 *Identification*—Each completed expansion joint shall have a name plate made from a corrosion-resistant material permanently attached showing as a minimum the following:

- 5.2.3.1 Manufacturer's model number and joint size,
- 5.2.3.2 Design pressure and design temperature range,
- 5.2.3.3 Nominal traverse or movement per slip,
- 5.2.3.4 Type of packing and service fluid, and
- 5.2.3.5 Date of manufacture.

6. Joint Descriptions

6.1 Styles:

6.1.1 *Style I*—The slip of the expansion joint shall be guided with the body of the expansion joint by internal and external guides that are integral with the stuffing box. Semiplastic packing shall be injected into the stuffing box and may be contained within the stuffing box chamber by ring-type pack-

ing. All packing shall be of the self-lubricating type. The expansion joint and semiplastic packing shall be suitable for the safe injection of the packing under full-line pressure to stop leakage. Provisions for packing injection shall be by devices located radially about the stuffing box and designed to permit a maximum evacuation of packing at the bottom of the packing device when the injector is fully engaged. The number of devices with injectors for each stuffing box shall be in accordance with the manufacturer's standard practice. The design of the packing injection devices shall be such as to ensure no blowback of injectable packing or the service fluid when injecting packing under full-line pressure.

6.1.2 *Style II*—The expansion joint shall be the same as Style I except low-friction corrosion-resistant material or inserts shall be used for internal and external guiding to prevent slip scoring from pipe misalignment or vibration and to prevent corrosion of the guide surfaces.

6.2 Classes:

6.2.1 *Class I*—The expansion joint shall have slip at only one end of the joint. Class I expansion joints may or may not require a base.

6.2.2 *Class II*—The expansion joint shall have slip at both ends of the joint. Class II expansion joints shall require a base.

6.3 Forms :

6.3.1 *Form I—Welded End*: The expansion joint shall have provisions at each end of the joint for field welding to the adjoining pipe line.

6.3.2 *Form II—Flanged End*: The expansion joint shall have flanges at each end of the joint for bolting to the mating flanges of the adjoining pipe line.

6.3.3 *Form III*—The expansion joint shall have other end connections as specified for attaching to the adjoining pipe line.

7. Design

7.1 The expansion joint shall be designed to conform to applicable sections of the latest edition of ANSI B31.1 and other applicable documents as noted in Section 2.

7.2 *Compression Force*—Unless otherwise specified, the force to compress or extend the slip of the expansion joint shall not exceed 1000 lbf/in. (175 100 N/m) of nominal pipe diameter.

8. Construction

8.1 *Slip*—The slip shall be manufactured from steel pipe conforming to Specification A 53/A 53M, Grade B, or a rolled and welded cylinder from Specification A 285/A 285M, Grade C plate, or equal with the longitudinal weld seam 100 % radiographed. The minimal wall thickness of the pipe or rolled cylinder shall be equivalent to Schematic 80 pipe for all sizes to 14 in. (356 mm), inclusive and Schematic 60 for sizes 16 to 24 in. (406 to 610 mm) to preclude slip collapse as a result of external loading of the injectable packing. Heavier wall pipe may be required for expansion joints subjected to pressures above 600 psig and for pipe sizes above 24-in. (610-mm) diameter.

8.1.1 *Chrome Plate*—The slip of the expansion joints shall be chrome plated with engineering chrome in accordance with Specification B 650, Class 50.