



# Standard Specification for Fluid Conditioner Fittings in Piping Applications Above 0°F<sup>1</sup>

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## 1. Scope

1.1 This specification provides the minimum requirements for pressure-retaining components of fluid conditioner fittings. It addresses the pressure-retaining component design, fabrication, rating, marking, and testing.

1.2 This specification is not intended to override any of the present fluid conditioner fitting specifications specific to devices such as strainers, filters, and traps but should be used for devices for which a specific specification does not apply.

1.3 This specification provides sufficient requirements to allow a fluid conditioner fitting to be used in the marine environment.

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.

1.5 The following precautionary caveat pertains only to the test methods portion, Section 7, of this specification. *This standard does not purport to address all of the safety concerns, if any, associated with its use. It is the responsibility of the user of this standard to establish appropriate safety and health practices and determine the applicability of regulatory limitations prior to use.*

## 2. Referenced Documents

### 2.1 ASTM Standards:<sup>2</sup>

D93 Test Methods for Flash Point by Pensky-Martens Closed Cup Tester

F722 Specification for Welded Joints for Shipboard Piping Systems

### 2.2 ANSI Standards:<sup>3</sup>

ANSI B2.1 Pipe Threads

ANSI B16.1 Cast Iron Pipe Flanges and Flanged Fittings

ANSI B16.3 Malleable Iron Threaded Fittings

ANSI B16.4 Cast Iron Threaded Fittings

ANSI B16.5 Pipe Flanges and Flanged Fittings

ANSI B16.11 Forged Steel Fittings, Socket-Welding and Threaded

ANSI B16.15 Cast Bronze Threaded Fittings

ANSI B16.24 Bronze Pipe Flanges and Flanged Fittings

ANSI B16.25 Buttwelding Ends

ANSI B31.1 Power Piping

### 2.3 MSS Standards:<sup>4</sup>

SP-44 Steel Pipe Flanges

SP-51 150 lb Corrosion Resistant Cast Flanges and Flanged Fittings

SP-61 Pressure Testing of Steel Valves

SP-67 Butterfly Valves

### 2.4 ASME Standard:<sup>5</sup>

ASME Boiler and Pressure Vessel Code Section VIII, Division 1, Pressure Vessels

ASME Boiler and Pressure Vessel Code Section IX, Welding and Brazing Qualifications

## 3. Terminology

### 3.1 Definitions:

3.1.1 *fluid conditioner fitting*—a device, other than a valve or pipe or pipe joining fitting, installed in a pressure piping system, that monitors or provides for the monitoring of the fluid, or otherwise operates on or alters the condition of the fluid.

3.1.2 *maximum allowable working pressure (MAWP)*—the highest internal pressure at the maximum design temperature that the fluid conditioner fitting can be safely subjected to in service.

3.1.3 *maximum design temperature*—the maximum temperature for which the fluid conditioner fitting is rated by the manufacturer.

<sup>4</sup> Available from Manufacturers Standardization Society of the Valve and Fittings Industry (MSS), 127 Park St., NE, Vienna, VA 22180-4602, <http://www.msshq.com>.

<sup>5</sup> Available from American Society of Mechanical Engineers (ASME), ASME International Headquarters, Three Park Ave., New York, NY 10016-5990, <http://www.asme.org>.

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<sup>2</sup> For referenced ASTM standards, visit the ASTM website, [www.astm.org](http://www.astm.org), or contact ASTM Customer Service at [service@astm.org](mailto:service@astm.org). For *Annual Book of ASTM Standards* volume information, refer to the standard's Document Summary page on the ASTM website.

<sup>3</sup> Available from American National Standards Institute (ANSI), 25 W. 43rd St., 4th Floor, New York, NY 10036, <http://www.ansi.org>.

3.1.4 *multiplex fluid conditioner fitting*—a fluid conditioner fitting that is made up of multiples of a single unit connected by either manifolding, piping, tubes, or valves.

#### 4. Classification

4.1 *Class I*—Fluid conditioner fitting meeting the following requirements:

Service	Pressure, psig (MPa)	Temperature, °F (°C)
Liquefied flammable gas	above 150 (1.03) . . . and . . . above 0 (–18)	
Fuels	above 150 (1.03) . . . or . . . above 150 (66)	
Liquids with a flash point <sup>A</sup> 150 °F (66 °C) or below	above 225 (1.55) . . . or . . . above 150 (66)	
Liquids with a flash point above 150 °F (66 °C) <sup>B</sup>	above 225 (1.55) . . . or . . . above 400 (204)	
Steam, gases, and vapors	above 150 (1.03) . . . or . . . above 650 (343)	
Water	above 225 (1.55) . . . or . . . above 350 (177)	

<sup>A</sup> Flash point measured in accordance with Test Methods D93.

<sup>B</sup> Includes lubricating oils, hydraulic fluids, and heat transfer oils.

4.2 *Class II*—All other fluid conditioner fittings.

#### 5. Materials and Manufacture

5.1 Pressure-retaining parts shall be constructed of materials listed in Section VIII, Division 1 of the ASME Boiler and Pressure Vessel Code (hereafter called the ASME Code) or ANSI B31.1. Nonmetallic materials may be used for pressure-retaining parts provided the material is suitable for the intended service and is compatible with the fluid to be conducted.

5.2 Fluid conditioner fittings intended for flammable service with nonmetallic materials or metallic materials having a solidus to liquidus temperature below 1700 °F (927 °C) shall pass the prototype fire test in 7.2.

5.3 Bolting materials shall be at least equal to those listed in Table 1 of ANSI B16.5 or Table 126.1 of ANSI B31.1. Bolts, screws, and fasteners in contact with interior fluid shall be compatible with the fluid. Carbon steel bolting shall not be used in services rated above 500 °F (260 °C).

5.4 Gaskets and seals shall be of materials suitable for the intended service.

5.5 The pressure ratings established under this specification are based on materials of high quality produced under regular control of chemical and mechanical properties by a recognized process. The manufacturer shall be prepared to submit a certificate of compliance verifying that his product has been so produced and that it has been manufactured from material whose chemical and mechanical properties are at least equal to the requirements of the appropriate specification.

5.6 For materials not having values of allowable stress tabulated in Section VIII, Division 1 of the ASME Boiler and Pressure Vessel Code, allowable stresses shall be determined in accordance with the procedures outlined in Subsection C and Appendix P of that section. Where it can be shown that the values of allowable stress listed for a particular material in one product form (because of similar chemistry, physical properties, heat treatment, and so forth) are applicable to the same material in an unlisted product form, the listed values of allowable stress may be used.

5.7 Cast iron shall be limited to services below 450 °F (232 °C). Cast iron fittings conforming to ANSI B2.1 and ANSI B16.4 are limited to Class 125 and 250.

5.8 Users are cautioned to exercise care in the selection of materials, as some fluids may react chemically with some materials used in these products.

#### 6. Other Requirements

6.1 The maximum allowable working pressure (MAWP) of fluid conditioner fittings covered under this specification shall be established by at least one of the following methods:

6.1.1 Proof test in accordance with the requirements prescribed in paragraph UG-101 of Section VIII, Division 1 of the ASME Boiler and Pressure Vessel Code. If burst-type tests as outlined in paragraph UG-101(m) are used, it is not necessary to rupture the component. In this case, the value of *B* to be used in determining the MAWP shall be the maximum pressure to which the component was subjected without rupture.

6.1.2 Design calculations in accordance with the requirements prescribed in Section VIII, Division 1 of the ASME Boiler and Pressure Vessel Code.

6.2 Where welded construction is used, weld joint design details shall be in accordance with Section VIII, Division 1 of the ASME Boiler and Pressure Vessel Code except as noted in 6.3. Supplemental radiography requirements are presented in 7.3. Welders and weld procedures shall be qualified in accordance with Section IX of the ASME Boiler and Pressure Vessel Code. Except for fillet welds, all welds shall be full penetration welds extending through the entire thickness of the shell.

6.3 Welds on fluid conditioner fittings greater than 6-in. (152-mm) internal diameter or 1.5-ft<sup>3</sup> (0.042-m<sup>3</sup>) net internal volume and rated above 600 psi (4.14 MPa) or 400 °F (204 °C) shall be of the following types as listed in Table UW-12 of the ASME Boiler and Pressure Vessel Code: Type (1) for Category A joints; Types (1) or (2) for Category B joints; and all Category C and D joints shall be full penetration welds extending through the entire thickness of the vessel wall or nozzle wall. Welded joint categories are defined under UW-3 of the ASME Boiler and Pressure Vessel Code.

6.4 Post-weld heat treatment shall be in accordance with Section VIII, Division 1 of the ASME Boiler and Pressure Vessel Code, except that fluid conditioner fittings greater than 6-in. (152-mm) internal diameter or 1.5-ft<sup>3</sup> (0.042-m<sup>3</sup>) net internal volume, rated above 600 psi (4.14 MPa) or 400 °F (204 °C), and fabricated of carbon or low alloy steel, shall be post-weld, heat-treated regardless of thickness.

6.5 Inlet and outlet connections consisting of welded flange end fittings shall be in accordance with Specification F722. Pipe end connections for fluid conditioner fittings shall be in accordance with one of the specifications listed in 2.2 or 2.3. Where radiography is required by 7.3.2, all welded inlet and outlet connections shall be butt-weld joints as required by Specification F722 for Class 1 piping systems. Threaded inlet and outlet connections shall be in accordance with 6.6.

6.6 Threaded pipe connections shall be limited to the following services: