



# Standard Specification for Fabricated (Welded) Pipe Line Strainers (Above 150 psig and 150°F)<sup>1</sup>

This standard is issued under the fixed designation F1200; the number immediately following the designation indicates the year of original adoption or, in the case of revision, the year of last revision. A number in parentheses indicates the year of last reapproval. A superscript epsilon ( $\epsilon$ ) indicates an editorial change since the last revision or reapproval.

## 1. Scope

1.1 This specification covers welded strainers in services above 150 psig or 150°F (1 MPa and 65°C). For welded strainers in services at or below these ratings and cast strainers, see Specification F1199.

1.2 This specification provides the minimum requirements for the design fabrication, rating, marking, and testing of welded pipe line strainers for services above 0°F (–18°C).

1.3 Strainers manufactured to this specification are acceptable for use in the marine environment.

1.4 The values stated in inch-pound units are to be regarded as standard. The values given in parentheses are mathematical conversions to SI units that are provided for information only and are not considered standard.

1.5 The following safety hazards caveat pertains only to the test methods portion, Section 8, 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

F1199 Specification for Cast (All Temperatures and Pressures) and Welded Pipe Line Strainers (150 psig and 150°F Maximum)

<sup>1</sup> 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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<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.

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

#### B2.1 Pipe Threads

B16.1 Cast Iron Pipe Flanges and Flanged Fittings

B16.3 Malleable Iron Threaded Fittings

B16.4 Cast Iron Threaded Fittings

B16.5 Steel Pipe Flanges and Flanged Fittings

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

B16.15 Cast Bronze Threaded Fittings

B16.24 Bronze Pipe Flanges and Flanged Fittings

B16.25 Buttwelding Ends

B31.1 Power Piping

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

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

SP-63 High Strength Wrought Welding Fittings

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

ASME Boiler and Pressure Vessel Code, Section VIII

ASME Boiler and Pressure Vessel Code, Section IX

## 3. Terminology

### 3.1 Definitions:

3.1.1 *basket or element*—the replaceable part in a strainer that performs the barrier separation of solid particles from flowing fluid. It is normally removable for cleaning and servicing and can be furnished in a wide variety of materials, particle size removal capability, straining area, and types of construction. Interchangeable baskets or elements are normally available for a given make, model, and size strainer.

3.1.2 *maximum allowable working pressure (MAWP)*—the highest internal pressure that the strainer can be subjected to in service. The maximum nonshock working pressure for which a strainer is rated by the manufacturer.

3.1.3 *maximum design temperature*—the maximum temperature (MAT) for which the strainer is rated by the manufacturer.

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

<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.mss-hq.org>.

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

3.1.4 *strainer*—a device which, when installed in a pipe line, provides a mechanical means of removing solids from a flowing liquid or gas by using a barrier element.

3.1.5 *straining open area*—the net effective open area of the clean element through which the fluid can pass.

#### 4. Classification

4.1 Strainers may be classified into three general construction categories, simplex, duplex (or multiplex), and automatic (self-cleaning), as follows:

4.1.1 *Simplex*—A strainer consisting of a single basket or element chamber that normally requires the flow through the unit to be shut down before cleaning.

4.1.1.1 Classifications of simplex strainers based on port alignment relative to basket or element chamber are *Y*, *T*, *Z*, and others.

4.1.2 *Duplex (or Multiplex)*—A strainer usually consisting of at least two basket or element chambers separated by a valve (or valving) that permits continuous flow of fluid through one chamber while the other is accessible for cleaning.

4.1.3 *Automatic (Self-Cleaning)*—A strainer providing some means for back-flushing or cleaning of the straining element while the unit is in service. It can have one or more elements and may require periodic shutdown for maintenance and inspection.

4.2 Strainers may be further classified by pressure ratings and types of port connections, port alignments relative to unit center lines, cover closures, valve types (in duplex), types of baskets or elements, materials of construction, and other features of design.

#### 5. Ordering Information

5.1 Orders for products under this specification shall include the following information as applicable. If a manufacturer's standardized product is being ordered, include all data needed by the manufacturer to define the product.

- 5.1.1 Make.
- 5.1.2 Model (simplex or duplex).
- 5.1.3 Port size.
- 5.1.4 Port connections.
- 5.1.5 Maximum allowable working pressure/temperature rating.
- 5.1.6 Body and cover material.
- 5.1.7 Type of cover closure.
- 5.1.8 Basket (element) material.
- 5.1.9 Basket hole size.
- 5.1.10 Optional design features.
- 5.1.11 Certification (see 6.4, 8.1.2.1, and Section 9).
- 5.1.12 Nondestructive examination requirements (see 8.2).
- 5.1.13 This ASTM standard designation number.
- 5.1.14 Additional requirements or testing as contracted by the manufacturer and purchaser.

5.2 If a product is to be specified by performance criteria rather than model description, then the following should be specified:

- 5.2.1 Maximum allowable clean pressure loss at a given flow capacity of a given liquid at a given viscosity.
- 5.2.2 Temperature and pressure.

5.2.3 Straining area.

5.2.4 Minimum basket rupture differential pressure (see 7.9).

5.2.5 Maximum valve seepage rates (see 7.8).

5.2.6 Certification (see 6.4, 8.1.2.1, and Section 9).

5.2.7 For self-cleaning strainers, specify basket cleaning effectiveness and endurance testing.

5.3 In general, the standard product description should not be mixed with the performance criteria because conflicting specifications can result (for example, maximum allowable pressure loss inconsistent with product size).

#### 6. Materials and Manufacture

6.1 Strainer housings, as well as any pressure-retaining parts, including bolting used for pressure retention, shall be constructed of materials listed in Section VIII, Division 1 of the ASME Boiler and Pressure Vessel Code (hereafter called ASME Code) or ANSI/ASME B3.1. Bolts, screws, and fasteners in contact with interior fluid shall be of appropriate corrosion-resistant material.

6.2 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 manufactured from material whose chemical and mechanical properties are at least equal to the requirements of an acceptable standard or specification.

6.3 For materials not having values of allowable stress tabulated in Section VIII, Division 1 of the ASME 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, mechanical 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.

6.4 Seals and parts, other than pressure-retaining parts and bolting used for pressure retention, shall be of materials suitable for the service.

6.5 Users are cautioned against applications with fluids which may react chemically with any materials used in these products in contact with the fluid.

#### 7. Other Requirements

7.1 The maximum allowable working pressure (MAWP) and maximum design temperature rating of strainers covered under this specification shall be established by at least one of the following methods:

7.1.1 Proof test in accordance with the requirements prescribed in paragraph UG-101 of Section VIII of the ASME 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. Safety of personnel shall be given

serious consideration when conducting proof tests. Components that have been subjected to a proof test shall not be offered for sale.

7.1.2 Design calculations in accordance with the requirements prescribed in Section VIII, Division 1 of the ASME Code.

7.1.3 Extensive and successful performance experience under comparable service conditions with similar materials may be used as a basis for rating provided all other provisions of this specification are met.

7.2 Strainers may be cast, forged, or fabricated of plates, tubes, or pipes. Welding on pressure-retaining components shall be as specified below.

7.3 Welded joint design details shall be in accordance with Section VIII, Division 1 of the ASME Code except as noted in 7.4 and 7.5. Supplemental radiography requirements are presented in Section 8 of this specification. Welders and weld procedures shall be qualified in accordance with Section IX of the ASME Code. Except for fillet welds, all welds shall be full penetration welds extending through the entire thickness of the shell.

7.4 Inlet and outlet connections consisting of welded flanges and fittings shall be in accordance with Specification F722. Pipe end connections for strainers shall be in accordance with one of the standards listed in 2.2 or 2.3. Where radiography is required by 8.2.2, all welded inlet and outlet connections shall be butt-weld joints as required by Specification F722 for Class 1 piping systems.

7.5 Welds on strainers 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) shall be of the following types as listed in Table UW-12 of the ASME 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 Code.

7.6 Post-weld heat treatment shall be in accordance with Section VIII, Division 1 except as noted in 7.6.1.

7.6.1 Strainers fabricated of carbon or low alloy steel, 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), shall be post-weld, heat-treated regardless of thickness.

7.7 Threaded pipe connections shall be limited to the following pressures:

¾ in. (19 mm) NPS and below . . .	1500 psig (10.34 MPa) max
1 in. (25 mm) NPS and below . . .	1200 psig (8.27 MPa) max
2 in. (50 mm) NPS and below . . .	600 psig (4.14 MPa) max
3 in. (76 mm) NPS and below . . .	400 psig (2.76 MPa) max

7.7.1 Threaded pipe joints above 2-in. (50-mm) nominal pipe size (NPS) shall not be used in systems that require radiographic examination listed in 8.2.2.

7.8 Duplex (or multiplex) strainer valve seepage rates shall be minimized to prevent undue spillage of fluid under normal operating conditions while the element is being serviced or cleaned in accordance with the manufacturer's procedures. Maximum seepage rates with a specified liquid at a specified pressure and temperature may be as contracted by the manufacturer and purchaser (see 5.2.5), and provision may be made to include a test to determine acceptability before acceptance for a given application.

7.9 Baskets or elements shall withstand a minimum of 10-psi (0.069-MPa) differential pressure without rupturing or such other differential pressure as contracted by manufacturer and purchaser (see 5.2.4) for the application involved.

## 8. Test Methods

8.1 Test all strainers by one of the following methods:

8.1.1 Conduct a hydrostatic test at 1½ times the 100°F (38°C) rated MAWP of the strainer. Perform the test with water or other liquid having a maximum viscosity of 40 SSU at 125°F (52°C) with a maximum pressure test temperature of 125°F (52°C). The minimum duration of the test shall be 15 s for strainers less than 2-in. (50-mm) NPS, 1 min for strainers 2½ through 8 in. (63 through 203 mm), and 3 min for larger sizes. The purpose of this test is to detect leaks and structural imperfections. No visible leakage is permitted.

8.1.2 Strainers of 2-in. (50-mm) NPS and smaller with other than flanged connections may, at the option of the manufacturer, be air tested to the lesser of 1.2 times MAWP or 80 psig (0.55 MPa). The minimum duration of the test shall be 15 s. Visually detectable leakage is not acceptable.

8.1.2.1 If this option is exercised, the manufacturer shall be able to certify that a prototype of the same size strainer was subjected to a hydrostatic test in accordance with 8.1.1.

8.2 Examine welds as follows:

8.2.1 Visually examine all welds in accordance with ANSI B31.1.

8.2.2 Welded inlet and outlet connections of a strainer that are equal to or greater than 4-in. (100-mm) nominal diameter or 0.375-in. (9.5-mm) nominal wall thickness in the following services shall be 100 % radiographically examined in accordance with UW-51 of the ASME Code.

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.

8.2.3 All butt-welds on strainers 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) shall be fully radiographed in accordance with UW-51 of the ASME Code.

## 9. Certification

9.1 When specified in the purchase order or contract, the manufacturer's certification shall be furnished to the purchaser stating that samples representing each lot have been manufactured, tested, and inspected in accordance with this

specification and the requirements have been met. When specified in the purchase order or contract, a report of the test results shall be furnished.

## 10. Product Marking

10.1 Each strainer shall have a securely attached name plate or other permanent marking indicating:

10.1.1 Manufacturer's name or trademark.

10.1.2 Maximum allowable working pressure.

10.1.3 Size (end connection NPS size).

10.1.4 Direction of flow (by an arrow or the word "inlet," "outlet," or both).

10.1.5 ASTM designation number of this specification.

10.1.5.1 An "X" shall be placed after the ASTM designation if the welds are radiographed in accordance with Section 8 of this specification.

## 11. Quality Assurance

11.1 The strainer manufacturer shall maintain the quality of the strainers that are designed, tested, and marked in accordance with this specification. At no time shall a strainer be sold indicating that it meets the requirements of this specification if it does not meet the requirements herein.

## 12. Keywords

12.1 cast strainers; marine strainer; strainer; welded strainers

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