



# Standard Specification for Steam Traps and Drains<sup>1</sup>

This standard is issued under the fixed designation F1139; 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<sup>2</sup> provides the minimum requirements for the design, fabrication, pressure rating, marking, and testing of steam traps and drains.

1.2 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.

1.3 The following safety hazards caveat pertains only to the test method portion 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 ANSI Standards:<sup>3</sup>

- B16.1 Cast Iron Pipe Flanges and Flanged Fittings
- B16.3 Malleable-Iron Screwed Fittings
- B16.4 Cast-Iron Screwed Fittings
- B16.5 Steel Pipe Flanges and Flanged Fittings
- B16.11 Forged Steel Fittings Socket-Welding and Threaded
- B16.15 Cast Bronze Screwed Fittings
- B16.18 Cast Bronze Solder-Joint Pressure Fittings
- B16.22 Wrought Copper and Bronze Solder-Joint Pressure Fittings
- B16.24 Bronze Flanges and Flanged Fittings
- B16.34 Steel Valves, Flanged and Butt-weld Ends
- B31.1 Power Piping

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

- SP-25 Standard Marking System for Valves, Fittings, Flanges, and Unions
- SP-51 150 lb Corrosion Resisting Cast Flanges and Flanged Fittings

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

- ANSI/ASME PTC 39.1 Condensate Removal Devices for Steam Systems
- ASME Boiler and Pressure Vessel Code, Section VIII Division I, Pressure Vessels
- ASME Boiler and Pressure Vessel Code, Section IX, Welding and Brazing Qualifications

## 3. Terminology

### 3.1 Definitions of Terms Specific to This Standard:

3.1.1 *cold condensate capacity (QC)*—maximum mass of condensate that the steam trap/drain can discharge in 1 h at a given pressure and temperature, the trap/drain being fully open (lb/h (kg/h)).

3.1.2 *drain*—device having no moving parts permitting the discharge of fluids at a fixed or adjustable rate.

3.1.3 *hot condensate capacity (QH)*—maximum mass of condensate that a steam trap/drain can discharge in 1 h at a given pressure and temperature (lb/h (kg/h)).

3.1.4 *hydrostatic proof test (P<sub>THP</sub>)*—test used in determining maximum allowable pressure (PMA) and maximum allowable temperature (TMA) (lb/in.<sup>2</sup> (kg/mm<sup>2</sup>)).

3.1.5 *maximum allowable pressure (PMA)*—maximum pressure that the shell of the steam trap/drain can withstand permanently at a given temperature (lb/in.<sup>2</sup> (kg/mm<sup>2</sup>)).

3.1.6 *maximum allowable temperature (TMA)*—maximum temperature to which the shell of the steam trap/drain can be raised permanently (°F (°C)).

3.1.7 *maximum differential pressure ( $\Delta P_{MX}$ )*—maximum difference between operating pressure and operating back pressure (lb/in.<sup>2</sup> (kg/mm<sup>2</sup>)).

<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.

Current edition approved May 1, 2015. Published June 2015. Originally approved in 1988. Last previous edition approved in 2010 as F1139 – 88 (2010). DOI: 10.1520/F1139-88R15.

<sup>2</sup> This specification was developed from Fluid Controls Institute Standards, 69-1 Pressure Rating Standards for Steam Traps and 85-1 Standard Production Test for Steam Traps.

<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.com>.

<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>.

3.1.8 *maximum operating back pressure (PMOB)*—maximum permissible pressure measured at the outlet of the steam trap/drain allowing correct functioning (lb/in.<sup>2</sup> (kg/mm<sup>2</sup>)).

3.1.9 *maximum operating pressure (PMO)*—pressure for which a steam trap/drain is rated by the manufacturer.

3.1.9.1 *Discussion*—This pressure is normally a function of the limitations related to the internal mechanism of the steam trap/drain (lb/in.<sup>2</sup> (kg/mm<sup>2</sup>)).

3.1.10 *maximum test pressure (PTMX)*—maximum pressure applied to the steam trap/drain under test including its internal mechanism (lb/in.<sup>2</sup> (kg/mm<sup>2</sup>)).

3.1.11 *minimum differential pressure (ΔPMN)*—minimum difference between operating pressure and operating back pressure (lb/in.<sup>2</sup> (kg/mm<sup>2</sup>)).

3.1.12 *operating back pressure (POB)*—pressure measured at the outlet of the steam trap/drain under operating conditions (lb/in.<sup>2</sup> (kg/mm<sup>2</sup>)).

3.1.13 *operating differential pressure (ΔP)*—difference between the operating pressure and the operating back pressure (lb/in.<sup>2</sup> (kg/mm<sup>2</sup>)).

3.1.14 *operating pressure (PO)*—pressure measured at the inlet of the steam trap/drain under operating conditions (lb/in.<sup>2</sup> (kg/mm<sup>2</sup>)).

3.1.15 *operating temperature (TO)*—temperature measured at the inlet of the steam trap/drain under operating conditions (°F (°C)).

3.1.16 *performance characteristics tests*—tests carried out to determine the operational characteristics of a particular design of steam trap/drain.

3.1.17 *production tests*—tests carried out by the manufacturer to confirm that the steam trap/drain functions correctly.

3.1.17.1 *Discussion*—These tests may be witnessed by the purchaser or his representative. In this case, these tests are referred to as acceptance tests.

3.1.18 *steam trap*—self-contained valve that automatically drains the condensate from a steam containing enclosure while remaining tight to live steam, or if necessary, allowing steam to flow at a controlled or adjusted rate.

3.1.18.1 *Discussion*—Most steam traps will also pass non-condensable gases while remaining tight to live steam.

#### 4. Ordering Information

4.1 Orders for products under this specification shall include the following information as applicable:

4.1.1 Performance characteristics required—See Section 7.

4.1.2 Certification of performance characteristics if required. See Section 7.

4.1.3 Nominal pipe size.

4.1.4 Maximum operating pressure, psig (kPa). See 3.1.5.

4.1.5 Capacity, lb/h (kg/h) (QC or QH). See 3.1.17 and 3.1.18.

4.1.6 Connection type (that is, threaded, socket weld, flanged). See 5.2.1.

4.1.7 *Materials*—external and internal.

4.1.8 Type of trap/drain.

4.1.9 Maximum test pressure, psig (kPa). See 3.1.12.

4.1.10 Maximum allowable pressure, psig (kPa). See 3.1.14.

4.1.11 Pressure differential (operating, maximum, or minimum, or combination thereof).

4.1.12 *Notice for Acceptance Test*—If the purchaser wishes to witness the production tests, this shall be specified in the order. See 8.2.

#### 5. Materials and Manufacture

##### 5.1 Materials:

5.1.1 The pressure ratings established under this specification are based upon materials of high quality produced under regular control of chemical and mechanical properties by a recognized process. The manufacturer shall be prepared to certify that his product has been so produced and that the mechanical and chemical properties thereof, as proved by test specimens and nondestructive testing or as documented by certifications from the producer or recognized distributor of these materials, are at least equal to the requirements of the appropriate specifications.

5.1.2 Housings of traps/drains, and other parts or bolting, or combination thereof, used for pressure retention, shall be constructed of materials in accordance with ANSI/ASME B31.1 or Section VIII, Division 1 of the ASME Boiler and Pressure Vessel Code.

5.1.3 Seals and parts, in addition to pressure containing parts and bolting used for pressure retention, shall be of materials suitable for the service.

5.1.4 Users are cautioned against applications with fluids that may react chemically with any materials used in these products.

5.1.5 For materials not having values of allowable stress tabulated in Section VIII, Division 1, allowable stresses shall be determined in accordance with the procedures outlined in Subsection C and Appendix P of Section VIII of the ASME Boiler and Pressure Vessel Code. 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, directional 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.

##### 5.2 Manufacture:

5.2.1 Steam traps/drains with end fittings in compliance with the following standards may be used within the pressure-temperature ranges permitted by the applicable standard provided the trap/drain housing (less end fittings) is satisfactory for these conditions:

5.2.1.1 ANSI B16.1,

5.2.1.2 ANSI B16.3,

5.2.1.3 ANSI B16.4,

5.2.1.4 ANSI B16.5,

5.2.1.5 ANSI B16.11,

5.2.1.6 ANSI B16.15,

5.2.1.7 ANSI B16.18,

5.2.1.8 ANSI B16.22,

5.2.1.9 ANSI B16.24,

5.2.1.10 ANSI B16.34, and