



Standard Specification for Steam Traps and Drains¹

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1. Scope

1.1 This specification² 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 the standard. The values given in parentheses are for information only.

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:

- B16.1 Cast Iron Pipe Flanges and Flanged Fittings³
- B16.3 Malleable-Iron Screwed Fittings³
- B16.4 Cast-Iron Screwed Fittings³
- B16.5 Steel Pipe Flanges and Flanged Fittings³
- B16.11 Forged Steel Fittings Socket-Welding and Threaded³
- B16.15 Cast Bronze Screwed Fittings³
- B16.18 Cast Bronze Solder-Joint Pressure Fittings³
- B16.22 Wrought Copper and Bronze Solder-Joint Pressure Fittings³
- B16.24 Bronze Flanges and Flanged Fittings³
- B16.34 Steel Valves, Flanged and Butt-welded Ends³
- B31.1 Power Piping³

2.2 MSS Standards:

- SP-25 Standard Marking System for Valves, Fittings, Flanges, and Unions⁴
- SP-51 150 lb Corrosion Resisting Cast Flanges and Flanged Fittings⁴

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² 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.

³ Available from American National Standards Institute, 11 W. 42nd St., 13th Floor, New York, NY 10036.

⁴ Available from Manufacturer's Standardization Society of the Valve and Fittings Industry, Inc., 1815 N. Fort Myers Dr., Arlington, VA 22209.

2.3 ASME Standards:

- ANSI/ASME PTC 39.1 Condensate Removal Devices for Steam Systems⁵
- ASME Boiler and Pressure Vessel Code, Section VIII, Division I, Pressure Vessels⁵
- ASME Boiler and Pressure Vessel Code, Section IX, Welding and Brazing Qualifications⁵

3. Definitions of Terms Specific to This Standard

3.1 *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)).

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

3.3 *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)).

3.4 *hydrostatic proof test (PTHP)*—test used in determining maximum allowable pressure (PMA) and maximum allowable temperature (TMA) (lb/in.²(kg/mm²)).

3.5 *maximum allowable pressure (PMA)*—maximum pressure that the shell of the steam trap/drain can withstand permanently at a given temperature (lb/in.²(kg/mm²)).

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

3.7 *maximum differential pressure (ΔPMX)*—maximum difference between operating pressure and operating back pressure (lb/in.²(kg/mm²)).

3.8 *maximum operating back pressure (PMOB)*—maximum permissible pressure measured at the outlet of the steam trap/drain allowing correct functioning (lb/in.²(kg/mm²)).

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

3.9.1 *Discussion*—This pressure is normally a function of the limitations related to the internal mechanism of the steam trap/drain (lb/in.²(kg/mm²)).

3.10 *maximum test pressure (PTMX)*—maximum pressure applied to the steam trap/drain under test including its internal mechanism (lb/in.²(kg/mm²)).

3.11 *minimum differential pressure (ΔPMN)*—minimum difference between operating pressure and operating back

⁵ Available from American Society of Mechanical Engineers, 345 E. 47th St., New York, NY 10017.

pressure (lb/in.²(kg/mm²)).

3.12 *operating back pressure (POB)*—pressure measured at the outlet of the steam trap/drain under operating conditions (lb/in.²(kg/mm²)).

3.13 *operating differential pressure (ΔP)*—difference between the operating pressure and the operating back pressure (lb/in.²(kg/mm²)).

3.14 *operating pressure (PO)*—pressure measured at the inlet of the steam trap/drain under operating conditions (lb/in.²(kg/mm²)).

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

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

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

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

3.18 *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.

3.18.1 *Discussion*—Most steam traps will also pass noncondensable 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 3.5.

4.1.5 Capacity, lb/h (kg/h) (QC or QH). See 3.17 and 3.18.

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 3.12.

4.1.10 Maximum allowable pressure, psig (kPa). See 3.14.

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

5.2.1.11 MSS SP-51.

5.2.2 Weld design details, welding, and nondestructive testing shall be in accordance with Section VIII, Division 1, of the ASME Boiler and Pressure Vessel Code. Welders and weld procedures shall be qualified in accordance with Section IX of the ASME Boiler and Pressure Vessel Code.

6. Requirements

6.1 *Pressure Rating and Design*:

6.1.1 The maximum allowable pressure (PMA) and maximum allowable temperature (TMA) rating for steam traps/drains conforming to this specification shall be established by at least one of the following methods:

6.1.1.1 Proof test in accordance with the requirements prescribed in paragraph UG-101 of Section VIII of the ASME Boiler and Pressure Vessel Code. If burst-type tests as outlined in 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 maximum allowable pressure shall be the maximum pressure to which the component was subjected