



Standard Specification for Kettles, Steam-Jacketed, 32 oz to 20 gal (1 to 75.7 L), Tilting, Table Mounted, Direct Connected, Gas Fired and Electric Fired¹

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This standard has been approved for use by agencies of the Department of Defense.

1. Scope

1.1 This specification covers jacketed kettles that utilize steam as a heat source for cooking food in commercial and institutional food service establishments. This specification does not cover equipment used by food processors who normally package the food that they cook.

1.2 The values stated in inch-pound units are to be regarded as the standard.

1.3 *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:

- A 167 Specification for Stainless and Heat-Resisting Chrome-Nickel Steel Plate, Sheet, and Strip²
- A 176 Specification for Stainless and Heat-Resisting Chromium Steel Plate, Sheet, and Strip²
- A 240/A 240M Specification for Heat-Resisting Chromium and Chromium-Nickel Stainless Steel Plate, Sheet, and Strip for Pressure Vessels²
- A 285/A 285M Specification for Pressure Vessel Plates, Carbon Steel, Low- and Intermediate Tensile Strength³
- A 580/A 580M Specification for Stainless Steel Wire²
- B 456 Specification for Electrodeposited Coatings of Copper Plus Nickel Plus Chromium and Nickel Plus Chromium⁴
- F 760 Specification for Food Service Equipment Manuals⁵
- F 1166 Practice for Human Engineering Design for Marine

Systems, Equipment and Facilities⁶

D 3951 Practice for Commercial Packaging⁷

2.2 ANSI Standards:⁸

- ANSI/UL 197 Commercial Electric Cooking Appliances
- ANSI Z83.11 Gas Food Service Equipment—Kettles, Steam Cookers and Steam Generators
- ANSI/NSF Std. 4 Commercial Cooking and Hot Food Storage Equipment
- ANSI 223.1 National Fuel Gas Code
- ANSI/NFPA 70 National Electrical Code
- ANSI Z1.4 Sampling Procedures and Tables for Inspection by Attributes

2.3 ASME Standards:⁹

- ASME Boiler and Pressure Vessel Code, Section IV Heating Boilers
- ASME Boiler and Pressure Vessel Code, Section VIII—Division 1 Pressure Vessels

2.4 Military Standards:¹⁰

- MIL-C-104 Crates: Wood, Lumber and Plywood Sheathed, Nailed and Bolted
- MIL-STD-167/1 Mechanical Vibration of Shipboard Equipment (Type I—Environmental, and Type II—Internally Excited)
- MIL-STD-461 Electromagnetic Emission and Susceptibility Requirements for the Control of Electromagnetic Interference
- MIL-STD-462 Electromagnetic Interference Characteristics, Measurement of
- MIL-STD-1399/300 Interface Standard for Shipboard Systems, Section 300A Electric Power, Alternating Current
- MIL-V-173 Varnish, Moisture and Fungus Resistant

¹ This specification is under the jurisdiction of ASTM Committee F26 on Food Service Equipment and is the direct responsibility of F26.02 on Cooking and Warming Equipment.

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² *Annual Book of ASTM Standards*, Vol 01.03.

³ *Annual Book of ASTM Standards*, Vol 01.04.

⁴ *Annual Book of ASTM Standards*, Vol 02.05.

⁵ *Annual Book of ASTM Standards*, Vol 15.07.

⁶ *Annual Book of ASTM Standards*, Vol 01.07.

⁷ *Annual Book of ASTM Standards*, Vol 15.09.

⁸ Available from American National Standards Institute, 11 W. 42nd St., 13th Floor, New York, NY 10036.

⁹ Available from American Society for Mechanical Engineers, United Engineering Center, 345 E. 47th St., New York, NY 10017.

¹⁰ Available from Standardization Documents Order Desk, Bldg. 4 Section D, 700 Robbins Ave., Philadelphia, PA 19111-5094, Attn: NPODS.

3. Terminology

3.1 Definitions of Terms Specific to This Standard:

3.1.1 *jacketed kettle*—as used in this specification, a tilting, deep sided vessel (steam jacketed) of 32 oz to 20 gal (1 to 75.7 L) capacity for cooking food in a liquid.

3.1.1.1 *Discussion*—These kettles can be mounted onto the purchaser's table or be specified already mounted on any of the stands or bases described in 4.1.2.2-4.1.2.5. The energy in the steam moving through the jacket is transferred to the liquid and to the food by condensation of the steam on the vessel wall.

4. Classification

4.1 Jacketed kettles covered by this specification are classified by type, capacity, style and class.

4.1.1 Capacity:

4.1.1.1 32 oz (1 L) capacity.

4.1.1.2 80 oz (2.4 L) capacity.

4.1.1.3 2½ to 3 gal (9.5 to 11.4 L) capacity.

4.1.1.4 5 to 6 gal (21 to 22.7 L) capacity.

4.1.1.5 10 to 12 gal (37.9 to 45.5 L) capacity.

4.1.1.6 20 gal (75.7 L) capacity.

4.1.2 Style:

4.1.2.1 *Style 1*—For table mounting on a counter.

4.1.2.2 *Style 2*—Table mounted on an open leg equipment stand.

4.1.2.3 *Style 3*—Table mounted on an enclosed cabinet stand.

4.1.2.4 *Style 4*—Table mounted on a 28 to 30-in. (711 to 762-mm) high enclosed cabinet base.

4.1.2.5 *Style 5*—Table mounted on a 28 to 30-in. (711 to 762-mm) high enclosed cabinet base with a Class D steam source.

4.1.3 Class:

4.1.3.1 *Class A*—Directly connected to an external heat source.

4.1.3.2 *Class B*—Self-contained, gas-fired steam generator.

4.1.3.3 *Class C*—Self-contained, electric steam generator.

4.1.3.4 *Class D*—Separate ASME Code, Section IV steam generator.

5. Ordering Information

5.1 An order for a kettle(s) under this specification shall specify:

5.1.1 ASTM specification number and date of issue.

5.1.2 Quantity to be furnished.

5.1.3 Type.

5.1.4 Style.

5.1.5 Class.

5.1.6 Assurance that gas fired unit(s) will be installed in accordance with the installation instructions and the National Fuel Gas Code ANSI Z223.1.

5.2 The following options should be reviewed and, if any are desired, they should also be included in the order.

5.2.1 When a cover is required for a tilting type kettle.

5.2.2 When required, the maximum allowable width for Style 2 through Style 5 (4.1.2.2-4.1.2.5).

5.2.3 When required, for Style 1 kettles, the desired pouring height to the table top (7.2.2).

5.2.4 When two identical side by side kettles are desired in Style 2, 3, 4 or 5 (4.1.2.2-4.1.2.5).

5.2.5 When a wire basket (7.1.7) is required.

5.2.6 When Federal/Military procurement(s) is involved, refer to the supplement pages.

5.2.7 When Class B and C kettles are to be shipped from the factory without the supply of water in the jacket (7.3.2 and 7.3.3).

5.2.8 If type 430 corrosion-resistant steel is not desired for the enclosed cabinet Styles 3 and 4 (4.1.2).

5.2.9 Type of gas, if applicable: natural, propane or other (specify BTU per cubic foot).

5.2.10 Electrical power supply characteristics, if applicable: voltage, frequency, phase, kW input, or amp load, as applicable.

5.2.11 When other than manufacturer's standard, commercial, domestic packaging is required, specify packaging requirements (14.1).

5.2.12 When special or supplement requirements such as inspections, accessories, mounting patterns, utility connections, etc.

5.2.13 When specified, a certification to ensure that samples representing each lot have been either tested or inspected as directed and the requirements have been met. When specified, a copy of the certification or test results, or both, shall be furnished to the purchaser.

6. Materials

6.1 *General*—Steam jacketed kettles shall conform to the following:

6.2 *Kettle*—The kettle vessel shall be constructed of Type 304, 304L, 316 or 316L corrosion resistant steel conforming to Specifications A 167, A 176 or A 240.

6.3 *Steam Jacket*—Jacket shall be constructed of Type 304, 304L, 316 or 316L corrosion resistant steel conforming to Specifications A 167 or A 240.

6.3.1 *Class B Steam Jackets*—Class B jackets shall be fabricated from material conforming to Specification A 285 material and skirted with Type 302 or 304 corrosion resistant steel conforming to Specifications A 167 or A 240.

6.4 *Exterior of Style 3, 4 and 5 Kettle Stands and Bases*—Unless otherwise specified, material shall be Types 302, 304, 316 or 430 corrosion resistant steel conforming to Specification A 240 or to Specifications A 167 or A 176, as applicable, and thickness shall be 20 gage minimum [0.0375 in. (1 mm) U.S. revised standard gage].

6.5 *Kettle Mount/Support Base*—All exterior surfaces shall be chrome plated in accordance with Specification B 456 or Type 304 or 316 corrosion resistant steel conforming to Specifications A 167, A 176 or A 240, as applicable.

6.6 *Controls Console of Class B and C Kettles*—All exposed surfaces of the console shall be Type 304, 316, or 430 corrosion resistant steel conforming to Specifications A 240, A 167 or A 176 as applicable.

7. Design and Construction

7.1 *General*—Jacketed kettles shall conform to ANSI/UL No. 197, ANSI Z83.11, ANSI/NSF Std. 4, ANSI Z223.1,

ANSI/NFPA 70, as applicable. Kettle shall be delivered assembled, ready for connection to steam, water, electricity or gas piping, as applicable. The kettles are to be equipped with a suitable drain and exhaust steam termination, if applicable. The height from the floor to the top rim of the kettle shall not exceed 46 in. (1150 mm).

7.1.1 *Jacketed Steam Chamber*—The steam containing part of the kettle shall be built to the following allowable working pressure (WP):

7.1.1.1 *Direct Connected Kettles*—Minimum 25 psi (1.76 kg/cm²).

7.1.1.2 *Self-Generating Kettles*—Minimum 30 psi (2.19 kg/cm²).

7.1.1.3 Design and construction of the steam chamber shall be in accordance with the ASME Boiler and Pressure Vessel Code, Section VIII, Division 1.

7.1.2 *Covers*—When specified, kettle shall be provided with a one piece lift-off cover. Cover design shall be such that there is no permanent distortion as a result of normal use, or accumulation of liquid or debris on the cover which could contaminate the food zone during opening or closing of the cover.

7.1.3 *Operating Handles*—Kettle rim shall have a lug(s) for a handle to tilt the kettle, if applicable.

7.1.4 *Safety Relief Valve*—Class B and Class C kettles shall be provided with a safety valve on the steam jacket or on the steam inlet pipe to the jacket. Valve shall be positioned so that its discharge port will vent steam downward. Valve shall be constructed in accordance with the applicable requirements of the ASME Boiler and Pressure Vessel Code Section VIII, Division 1 of Pressure Vessels. The relief pressure of the valve shall be equal to the maximum working pressure of the kettle and be set by its manufacturer.

7.1.5 *Tilt Mechanism*—The tilt mechanism, through its operating handle, shall provide the user a smooth pull against resistance to tilt a kettle that is filled to capacity. When the pull on the operating handle is relaxed the kettle shall return to its upright position. Kettle shall be tiltable to past 90° from normal operating position. All exterior surfaces shall be chrome plated per Specification B 456 or Type 304 or 316 corrosion resistant steel.

7.1.6 *Kettle Mount/Support Base*—Design of the base shall be such that the kettle can be mounted on a counter top or equipment stand or an enclosed cabinet base.

7.1.7 *Basket Insert*—When specified, each kettle shall be provided with a basket strainer. The length and diameter of the basket shall fit inside the insides of the kettle body and shall be fitted with handles. The basket shall be fabricated of Type 304 or 316 corrosion resistant steel perforated sheet metal conforming to Specifications A 167, A 176, A 240, or Type 304 or 316 wire in accordance with Specification A 580, as applicable. For wire baskets, the space between wires shall not be greater than 3/8 in. (9.5 mm). For perforated baskets, holes shall be 3/8 in. (9.5 mm) diameter unless otherwise specified.

7.1.8 *Safety Cut-Off*—Class B and Class C kettles shall be equipped with a device to de-energize the circuit to the heat source when the kettle is tilted.

7.2 *General by Style:*

7.2.1 *Kettle Mountings*—Mountings shall be capable of supporting the weight of the kettle plus the weight of 2½ times the kettle's water capacity, without deformation.

7.2.2 *Style 1*—Information about the pouring height and pour path for a kettle in the fully tilted position shall be available, if it is requested (5.2.3).

7.2.3 *Style 2, 3 and 4, with Class A Kettle(s)*—Table-top or front-mounted steam control valve(s) shall be provided for each direct steam kettle together with all necessary steam trap(s), strainer, check valve and piping. These shall all be pre-piped for a single point utility connection. There shall be provided a hot and cold water valve and a water fill swing spout from which the kettle(s) can be filled directly.

7.2.4 *Style 2 and 3*—Stand shall have a slide-out combination drain drawer/pan support which is also removable. The drain drawer shall be furnished with a flexible drain hose and splash shield. Unit shall have adjustable feet.

7.2.5 *Style 4*—The unit shall have a full table top with a drain trough equipped with a drain connection. There shall also be a movable drain catch pan which fits into the drain trough and incorporates a splash shield.

7.2.6 *Style 5*—The unit shall be an assembly consisting of a kettle and a separate Class D steam generator which shall be located in a 28 to 30-in. (711 to 762-mm) high cabinet base under the kettle.

7.3 *Steam Source:*

7.3.1 *Class A—External Steam Source*—Tilting kettle shall pivot on attached vertical support arms which are mounted to a suitable table top. The steam supply to the steam jacket shall be through the support arms.

7.3.2 *Class B, Gas Fired*—Steam for the jacket shall be provided by a self-contained gas fired steam generator which uses a fixed amount of water containing the necessary additive(s) and rust inhibitor. The steam generator shall have a Btu input rating sufficient to enable the kettle to meet the performance requirements of Section 8.

7.3.3 *Class C, Electric Fired*—Steam for the jacket shall be provided by a self-contained electric fired steam generator which uses electric elements submerged in a fixed amount of water containing the necessary additive(s) and rust inhibitor. Wattage rating of the heating elements shall be sufficient to enable the kettle to meet the performance requirement of Section 8.

7.3.4 *Class D, Separate Steam Generator*—The steam generator shall be designed, manufactured, inspected and tested in accordance with the ASME Boiler Code Section IV. The entire assembly shall have certification and listing in accordance with ANSI/UL 197 or ANSI/Z83.11 as applicable. The steam output of the generator shall be at the pressure and flow rate required by the kettle(s) to meet the performance requirements of Section 8.

8. Performance Requirements

8.1 *Capacity*—The kettle shall be tested to determine compliance to the manufacturer's stated capacity by filling the kettle with 70 ± 5°F (21 ± 2.8°C) water from a container of known capacity.

8.2 *Heating Time*—The water in a kettle filled to its rated capacity with 70 ± 5°F (21 ± 2.8°C) water and with the kettle