Designation: F1603 – 12

An American National Standard

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

This standard is issued under the fixed designation F1603; 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 (ε) indicates an editorial change since the last revision or reapproval.

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

1. Scope

1.1 This specification covers jacketed kettles that use 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. The values given in parentheses are for information only.

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:*[2]

A167 Specification for Stainless and Heat-Resisting Chromium-Nickel Steel Plate, Sheet, and Strip (Withdrawn 2014)[3]

A176 Specification for Stainless and Heat-Resisting Chromium Steel Plate, Sheet, and Strip (Withdrawn 2015)[3]

A240/A240M Specification for Chromium and Chromium-Nickel Stainless Steel Plate, Sheet, and Strip for Pressure Vessels and for General Applications

A285/A285M Specification for Pressure Vessel Plates, Carbon Steel, Low- and Intermediate-Tensile Strength

A516/A516M Specification for Pressure Vessel Plates, Carbon Steel, for Moderate- and Lower-Temperature Service

A580/A580M Specification for Stainless Steel Wire

B456 Specification for Electrodeposited Coatings of Copper Plus Nickel Plus Chromium and Nickel Plus Chromium

D3951 Practice for Commercial Packaging

F760 Specification for Food Service Equipment Manuals

F1166 Practice for Human Engineering Design for Marine Systems, Equipment, and Facilities

F1785 Test Method for Performance of Steam Kettles

2.2 *ANSI Standards:*[4]

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 Z223.1 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:*[5]

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:*[6]

MIL-STD-167/1 Mechanical Vibration of Shipboard Equipment (Type I—Environmental, and Type II—Internally Excited)

[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] For referenced ASTM standards, visit the ASTM website, www.astm.org, or contact ASTM Customer Service at service@astm.org. For *Annual Book of ASTM Standards* volume information, refer to the standard's Document Summary page on the ASTM website.

[3] The last approved version of this historical standard is referenced on www.astm.org.

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

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

[6] Available from Standardization Documents Order Desk, Bldg. 4 Section D, 700 Robbins Ave., Philadelphia, PA 19111-5094, Attn: NPODS; or Acquisition Streamlining and Standardization Information System (ASSIST) which is the offical source of all documents listed in the DoD Index of Specfications and Standards. The ASSIST can be located at http://dsp.dla.mil.

MIL-STD-461 Requirements for the Control of Electromagnetic Interference Characteristics of Subsystems and Equipment

MIL-STD-1399/300 Interface Standard for Shipboard Systems, Section 300A Electric Power, Alternating Current

3. Terminology

3.1 *Definitions of Terms Specific to This Standard:*

3.1.1 *jacketed kettle—as used in this specification*, a tilting or stationary, 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 4.1.3. 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 size (capacity), grade, style and class.

4.1.1 *Size (Capacity):*

4.1.1.1 32 oz (1 L) capacity.

4.1.1.2 66 oz (2 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 (19 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 *Grade:*

4.1.2.1 *Grade 1*—Maximum Working Pressure Rating of 15 to 25 psig (103.4 to 172.4 KPa) or less.

4.1.2.2 *Grade 2*—Maximum Working Pressure Rating of 26 to 55 psig (179.3 to 379.2 KPa) or less.

4.1.2.3 *Grade 3*—Maximum Working Pressure Rating of 56 to 90 psig (386.1 to 620.5 KPa) or less.

4.1.3 *Style:*

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

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

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

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

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

4.1.4 *Class:*

4.1.4.1 *Class A*—Directly connected to an external steam source.

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

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

4.1.4.4 *Class D*—A separate ASME Code, Section IV heating boiler as steam source. (Typically used as steam source for multiple table top kettles.)

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 Size (capacity).

5.1.4 Grade.

5.1.5 Style.

5.1.6 Class.

5.1.7 Assurance that:

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

5.1.7.2 Electric heat unit(s) will be installed in accordance with the installation instructions and the National Electrical Code ANSI/NFPA 70.

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.

5.2.2 When required, the maximum allowable width for Style 2 through Style 5 (4.1.3.2 – 4.1.3.5).

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 (4.1.3.2 – 4.1.3.5).

5.2.5 When a wire basket (7.1.6) 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 (4.1.3).

5.2.9 When a water faucet with a swing spout is required.

5.2.10 When fill level marks are to be etched on kettle interior.

5.2.11 When insulation is required on the outside of the kettle body or steam jacket.

5.2.12 Type of gas, if applicable: natural, propane or other (specify gas composition, heating value in BTU per cubic foot and specific gravity of gas).

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

5.2.14 When other than manufacturer's standard, commercial, domestic packaging is required, specify packaging requirements (14.3).

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

5.2.16 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 A167, A176, or A240/A240M.

6.3 *Steam Jacket*—Jacket shall be constructed of Type 304, 304L, 316, or 316L corrosion resistant steel conforming to Specifications A167 or A240/A240M.

6.3.1 *Class B Steam Jackets*—Class B jackets shall be fabricated from material conforming to Specification A285/A285M or A516/A516M material and skirted with Type 302 or 304 corrosion resistant steel conforming to Specifications A167 or A240/A240M.

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 A240/A240M or to Specifications A167 or A176, as applicable, and thickness shall be 20 gauge minimum [0.0375 in. (1 mm) U.S. revised standard gauge].

6.5 *Kettle Mount/Support Base*—All exterior surfaces shall be chrome plated in accordance with Specification B456 or Type 304, 316, or 430 corrosion resistant steel conforming to Specifications A167, A176, or A240/A240M, as applicable.

6.6 *Controls Console of Class B and C Kettles*—All exposed surfaces of the console and kettle base shall be Type 304, 316, or 430 corrosion resistant steel conforming to Specifications A240/A240M, A167, or A176, as applicable.

7. Design and Construction

7.1 *General*—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 rated for the following allowable working pressure (WP):

7.1.1.1 *Direct Connected Kettles*—Minimum 25 psi (1.76 kg/cm^2).

7.1.1.2 *Self-Generating Kettles*—Minimum 30 psi (2.19 kg/cm^2).

7.1.1.3 Design and construction of the steam chamber of Class A, Class B and Class C kettles shall be in accordance with the ASME Boiler and Pressure Vessel Code, Section VIII, Division 1 with a National Board Registration number.

7.1.1.4 Design and construction of the steam chamber of Class D steam generator shall be in accordance with the ASME Boiler and Pressure Vessel Code, Section IV for Heating Boilers with CSD controls and National Board Registration.

7.1.2 *Insulation Casing*—When insulation is required, it shall be contained in a cylindrical casing designed to conform to the kettle body and steam jacket. The clearance between the inner and outer liner of the casing shall be sufficiently wide to keep the exterior surface of the kettle from exceeding 140°F (60°C) during operation. The outer liner shall be corrosion-resistant steel conforming to Specification A167, A176, or A240/A240M. The top of the casing shall be attached to the kettle's canopy with stainless steel fasteners or rivets. The bottom of the casing shall terminate below the steam jacket.

7.1.3 *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.

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

7.1.4 *Safety Relief Valve:*

7.1.4.1 Class A, 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 constructed in accordance with the applicable requirements of the ASME Boiler and Pressure Vessel Code Section VIII, Division 1.

7.1.4.2 Class D steam generators shall be provided with a safety valve on the steam jacket or on the steam outlet pipe. Valve shall be constructed in accordance with the applicable requirements of the ASME Boiler and Pressure Vessel Code Section IV.

7.1.4.3 Valve shall be positioned so that its discharge port will vent steam downward.

7.1.4.4 The relief pressure of the valve shall be equal to or less than the maximum working pressure of the kettle.

7.1.5 *Swing Spout Water Supply*—Each kettle shall be provided with a swing spout with a companion on/off valve when specified. The swing spout assembly should be made of stainless steel, conforming to Specification A167, or chromium plated, in accordance with Specification B456. The bracket and swing spout shall be positioned so that the outlet end of the spout is a minimum of ½ in. (13 mm) above the top rim of the kettle. The swing spout supplied with tilting kettles shall be mounted independent of the kettle body.

7.1.6 *Basket Insert*—When specified, each kettle shall be provided with a basket insert. 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 A167, A176, A240/A240M, or Type 304 or 316 wire in accordance with Specification A580/A580M, 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 ¼ in. (6.4 mm) or ⅜ in. (9.5 mm) diameter unless otherwise specified. A contour-fitted nylon bag with a stainless steel spreader ring shall be furnished with each basket.

7.1.7 *Tilt Mechanism:*

7.1.7.1 *Hand 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.

(1) When specified, a locking system shall be provided to prevent accidental tilting. This lock shall have an easy release mechanism to tilt the kettle.

7.1.7.2 *Crank Tilt Mechanism*—Shall be provided when specified. The tilt mechanism shall provide the smooth, quick-acting, self-locking, easy tilting operation of a liquid-filled kettle, of greater than 90° from normal operating position, and it shall hold the kettle at any position as it is being raised or

lowered. Tilting shall be controlled by either a power mechanism or a crank handle, or a handwheel attached to the gear box.

7.1.8 *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.

7.1.9 *Control Box*—Controls for operation of the fuel supply shall be located in a protective housing designed to prevent the entry of spillage from the kettle. This housing shall be corrosion-resistant steel conforming to Specification A167, A176, or A240/A240M, and it shall be located on the outside of the kettle and permit easy access to the controls.

7.1.10 *Safety Cut-Off*—Class B and Class C kettles shall be equipped with a device to de-energize the heat source (electric power to the elements or gas to the burners) when the kettle is tilted.

7.1.11 *Thermostat*—Class B and C kettles shall have a control that will maintain a desired temperature in the liquid being heated in the kettle. It shall be marked with an "off" or "0" position, or it may have a separate "on/off" switch. An indicating light shall show when the heating system is energized.

7.1.12 *Standards*—Jacketed kettles shall conform to ANSI/UL 197, ANSI/NSF Std. 4, and ANSI/NFPA 70 for electric heated kettles and ANSI Z83.11, ANSI/NSF Std. 4, ANSI Z223.1, and ANSI/NFPA 70 for gas heated kettles.

7.1.12.1 *Proof of Compliance*—Evidence of compliance with ANSI/UL 197, ANSI Z83.11, ASME Boiler and Pressure Vessel Code, Section IV or VIII, or both, and ANSI/NSF Std. 4 shall be a listing in a third-party certification agency listing book, or a certified test report from a nationally recognized testing laboratory acceptable to the purchaser.

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. A hot and cold water valve and a water fill swing spout from which the kettle(s) can be filled directly shall be provided when ordered.

7.2.4 *Style 2*—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 Btu input rating shall be 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.

7.4 *Tilting Mechanism:*

7.4.1 Tilting kettles shall have a trunion(s) to enable tilting.

7.4.2 Tilt mechanism, when provided, shall be mounted on the trunnion.

7.4.3 The tilt mechanism shall be on the trunnion to the right unless specified otherwise.

7.4.4 All moving parts except the crank handle (or hand wheel) shall be enclosed in a suitable enclosure fabricated from corrosion resistant steel conforming to Specification A167 or A176.

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 cover in place shall, when tested in accordance with Test Method F1785, reach 210°F (99°C) in no more than 10 min for sizes up through 6 gal (22.7 L) and in sizes over 10 gal reach 210°F (99°C) in no more than 15 min.

8.3 *Energy Utilization Test*—The kettle shall be tested in accordance with Test Method F1785 to determine its energy utilization.

9. Sampling and Quality Assurance

9.1 *Sampling*—When specified in the contract or purchase order, sampling for the inspection and tests contained in the main body of this specification shall be performed in accordance with ANSI Z1.4.

9.2 The kettles prepared for shipment shall be measured and inspected by the manufacturer for compliance with this specification.

10. Test Method

10.1 This test should be performed and results reported per Test Method F1785.

11. Inspection, Rejection, and Rehearing

11.1 *Performance Compliance*—One production item selected at random from the initial production lot shall be tested in accordance with applicable performance tests of this specification. Performance results of tests conducted under this specification shall be recorded in a permanent file and the information shall be accessible to customers upon demand. Any subsequent change in design that would relate to performance shall require a new test record and evaluation of minimum requirements.

11.2 *Component and Material Inspection*—Incoming components and materials shall be inspected to the design parameters as specified in drawings or purchase documents, or both.

11.3 *Rejection and Rehearing*—Kettles that fail to conform to the requirements of this specification should be rejected. Rejection should be reported to the producer or supplier promptly and in writing. In case of dissatisfaction with the results of the inspection, the producer or supplier may make claim for a rehearing.

12. Product Marking

12.1 Each kettle shall be provided with an identification plate or adjacent plates securely affixed to the item. The plate(s) shall comply with ANSI Z83.11 or ANSI/UL 197 as applicable.

13. Manuals

13.1 Format and content of applicable manuals shall be as indicated in Specification F760.

14. Packaging and Package Marking

14.1 The complete kettle shall be packaged and packed in accordance with the manufacturer's standard commercial domestic packaging.

14.2 The package shall be marked showing the name of the product, model number, serial number and manufacturer's name.

14.3 When specified, packaging shall be in accordance with the requirements of Practice D3951.

15. Keywords

15.1 food service equipment; heating boiler; kettle; steam cooking; steam generator; steam jacketed

SUPPLEMENTARY REQUIREMENTS

SUPPLEMENTAL REQUIREMENTS FOR FEDERAL/MILITARY PROCUREMENT

S1. Where provisions of this supplement conflict with the main body, this supplement will prevail.

S2. *Manual*—A manual complying with Specification F760 and supplement shall be provided.

S3. *First Article Inspection*—When required, the first article inspection shall be performed on one unit. The first article may be either a first production item or a standard production item from the supplier's current inventory, provided the item meets the requirement of the specification and is representative of the design, construction, and manufacturing technique applicable to the remaining items to be furnished under the contract.

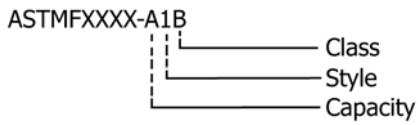
S4. *Data Nameplate*—A nameplate shall contain the following:

S4.1 National stock number (NSN).

S4.2 Government approved manual number.

S5. *Part Identifying Number*—The part identifying number (PIN) that corresponds to the capacity, style and class of units covered by this specification, combine to form the specification part numbers for the kettles.

S5.1 *PIN Example*—For cataloging purposes, the PIN for the units is assigned as follows:



(Type not necessary as there is only one type—tilting.)

Size (Capacity):

A – 32 oz (946.3 mL).
B – 80 oz (2365.84 mL).
C – 2½ to 3 gal (9.5 to 11.4 L).
D – 5 to 6 gal (18.9 to 22.7 L).
E – 10 to 12 gal (37.9 to 45.4 L).
F – 20 gal (75.7 L).

Grade:

1 – 15 to 25 psig max. pressure.
2 – 26 to 55 psig max. pressure.
3 – 56 to 90 psig max. pressure.

Style:

1 – Table mounted on a counter.
2 – Table mounted on an open leg equipment stand.
3 – Table mounted on an enclosed cabinet stand.
4 – Table mounted on a 28 to 30-in. (711 to 762-mm) high enclosed cabinet base.
5 – Table mounted on a 28 to 30-in. (711 to 762-mm) high enclosed cabinet base with Class D steam source.

Class:

A – Directly connected to an external steam source.
B – Self-contained, gas-fired steam generator.
C – Self-contained, electric steam generator.
D – Separate ASME code, Section IV steam generator.

S6. *Preservation, Packaging and Package Marking*—When other than normal commercial practice or conformance to Practice D3951 is desired, the preservation, packaging and package marking requirements shall be stated in the purchase order.

S7. *Naval Shipboard Requirements:*

S7.1 *Safety Valve*—Kettle safety relief valves shall be set by the manufacturer to a maximum allowable working pressure of 55 psig. The safety relief valve shall be in accordance with construction specifications for National Board Registered pressure vessel. Class A or Class B kettle safety valves shall be provided with a minimum of an 18-in. (457 mm) long brass pull chain with a finger pull ring attached or an operating lever that essentially serves the same purpose. Class C, electric kettles, safety valves shall be provided with a minimum allowable length of an operating lever as determined by the ASME Boiler and Pressure Vessels code.

S7.2 *Heating Elements*—Class C kettles for shipboard shall have field replaceable heating elements.

S7.3 *Electromagnetic Compatibility*—When specified, Class C electric kettles shall be designed and equipped for electro-magnetic compatibility in accordance with MIL-STD-461 for Class A4 for surface ships and Class A5 for submarines. The contractor shall furnish written certification that the equipment shall meet the emission and susceptibility requirements when tested in accordance with MIL-STD-461.

S7.4 *Inclined Operation*—When specified, the units shall operate satisfactorily for 30 s when inclined at an angle of 15° each side of the vertical in each of two vertical planes at right angles to each other. This test shall be run for 30 complete cycles in each of the two vertical planes.

S7.5 *Environmental Suitability*—Kettles shall be capable of withstanding ship vibration and motion. When specified, the unit, under normal operating conditions, shall be tested in accordance with MIL-STD-167/1, Type I equipment. The unit shall be secured to the test machine in the same manner that it will be secured on board ship. The unit shall operate without malfunction.

S7.6 *Access*—Unless otherwise specified, units for naval surface vessels shall pass through a 26-in. wide shipboard hatch without major disassembly. For submarines, the unit shall pass through a 25-in. diameter circular hatch without major disassembly.

S7.7 *Power*—Unless otherwise specified, equipment shall be supplied in 440 V, 60 Hz, three phase, three wire ungrounded system in accordance with MIL-STD-1399/300.

S7.7.1 *High Voltage Label*—On equipment rated 440 VAC or higher, a “Danger High Voltage” label shall be affixed to the equipment outer case assembly, on or adjacent to each service access cover adjacent to one of the fasteners that secure the cover. The warning label shall also be placed near the high voltage components inside the equipment. The label shall include, but is not limited to:

S7.7.1.1 A warning of high voltage.

S7.7.1.2 The power supply must be disconnected before servicing.

S7.7.1.3 Access covers must be in place during use.

S7.7.1.4 Service should be done by authorized personnel.

S7.8 *Human Factors Criteria*—Human factors engineering criteria, principles, and practices, as defined in Practice F1166, shall be used in the design.

S7.9 *Instruction Plate*—an instruction plate shall include instructions for start-up, operation, and shut-down.

S7.10 *Manufacturer’s Certification*—If the manufacturer has successfully furnished the same equipment on a previous contract within the past three years, further inspection will not be required. The manufacturer shall certify in writing that the equipment to be furnished is the same as that previously furnished and approved, and that no major design changes have been made to the equipment.