



Standard Specification for Cooker, Steam¹

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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 food cookers and food reheaters which use steam as the heat source. These units are also known as steamers, steam ovens, and steam cookers which utilize steam generated by gas, electric heat, or steam coil sources, or a combination thereof, in commercial and institutional food service establishments. This specification can be used for zero-pressure steam cookers, pressure steamers, and combination pressure/pressureless steamers and does not cover steam cooking 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 SI values given in parentheses are provided for information only.

1.3 *This standard may involve hazardous materials, operations, and equipment. 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 36/A 36M Specification for Carbon Structural Steel²
- A 167 Specification for Stainless and Heat-Resisting Chromium-Nickel Steel Plate, Sheet and Strip³
- A 176 Specification for Stainless and Heat-Resisting Chromium Steel Plate, Sheet, and Strip³
- A 240/A 240M Specification for Chromium and Chromium-Nickel Stainless Steel Plate, Sheet, and Strip for Pressure Vessels and for General Applications³
- A 268/A 268M Specification for Seamless and Welded Ferritic and Martensitic Stainless Steel Tubing for General Service⁴

- A 269 Specification for Seamless and Welded Austenitic Stainless Steel Tubing for General Service⁴
- A 276 Specification for Stainless Steel Bars and Shapes³
- A 366/A 366M Specification for Steel, Sheet, Carbon, Cold-Rolled, Commercial Quality⁵
- A 478 Specification for Chromium-Nickel Stainless Steel Weaving and Knitting Wire³
- A 569/A 569M Specification for Steel, Carbon (0.15 Maximum Percent), Hot-Rolled Commercial Quality Sheet and Strip⁶
- B 108 Specification for Aluminum-Alloy Permanent Mold Castings⁷
- B 209 Specification for Aluminum and Aluminum-Alloy Sheet and Plate⁷
- D 3951 Practice for Commercial Packaging⁸
- F 760 Specification for Food Service Equipment Manuals⁹
- F 1166 Practice for Human Engineering Design for Marine Systems, Equipment and Facilities¹⁰
- F 1484 Test Method for the Performance of Steam Cookers⁹
- 2.2 *Underwriters Laboratories Standard:*¹¹
- UL/ANSI 197 Commercial Electric Cooking Appliances
- 2.3 *ANSI Standards:*¹²
- ANSI B1.1 Unified Inch Screw Threads (UN and UNR Thread Form)
- ANSI Z1.4 Sampling Procedures and Tables for Inspection by Attributes
- ANSI Z21.41 Quick-Disconnect Devices for Use With Gas Fuel Appliances
- ANSI Z21.45 Flexible Connectors of Other Than All-Metal Construction for Gas Appliances
- ANSI Z83.11 Gas Food Service Equipment

⁵ Discontinued—see 1999 *Annual Book of ASTM Standards*, Vol 01.03. Replaced by A 1008/A 1008M.

⁶ Discontinued—see 1999 *Annual Book of ASTM Standards*, Vol 01.03. Replaced by A 1011/A 1011M.

⁷ *Annual Book of ASTM Standards*, Vol 02.02.

⁸ *Annual Book of ASTM Standards*, Vol 15.09.

⁹ *Annual Book of ASTM Standards*, Vol 15.08.

¹⁰ *Annual Book of ASTM Standards*, Vol 01.07.

¹¹ Available from Underwriters Laboratories (UL), Corporate Progress, 333 Pfingsten Rd., Northbrook, IL 60062.

¹² Available from American National Standards Institute (ANSI), 25 W. 43rd St., 4th Floor, New York, NY 10036.

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

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² *Annual Book of ASTM Standards*, Vol 01.04.

³ *Annual Book of ASTM Standards*, Vol 01.03.

⁴ *Annual Book of ASTM Standards*, Vol 01.01.

ANSI/NFPA 54 National Fuel Gas Code
 ANSI Z223/NFPA 70 National Electrical Code¹³
 2.4 *NSF Standards*.¹⁴
 NSF/ANSI Standard No. 4 Commercial Cooking and Hot Food Storage Equipment
 2.5 *ASME Documents*.¹⁵
 ASME Boiler and Pressure Vessel Code, Section IV—Heating Boilers
 2.6 *Military Standards*:
 MIL-STD-167/1 Mechanical Vibration of Shipboard Equipment (Type 1—Environmental and Type 2—Internally Excited)
 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 *capacity*—the capacity of a steam cooker is determined by the number of steam table pans that it is designed to hold during cooking.

3.1.2 *pans*—containers used to hold the food product in the oven cavity. A full size steam table pan is nominally 12¾ by 20¾ by 2½ in. (324 by 527 by 64 mm).

3.1.3 *steam cooker—as used in this specification*, is a device with one or more food steaming compartments in which the energy in steam is transferred to the food by direct contact. The pressure occurring in the food compartment of these steamers during cooking ranges from 0 to 15 psig.

4. Classification

4.1 Steam cookers covered by this specification are classified by type, grade, class, size, style, and capacity:

4.2 *Type*:

4.2.1 *Type IA*—Table or countertop units with permanent water connection.

4.2.2 *Type IB*—Table or countertop units without water connection (connectionless steamer).

4.2.3 *Type II*—Floor mounted on an open stand.

4.2.4 *Type III*—Floor mounted on a cabinet base.

4.3 *Grade*:

4.3.1 *Grade A*—0 to 2.9 psig compartment pressure.

4.3.2 *Grade B*—3.0 to 9.9 psig compartment pressure.

4.3.3 *Grade C*—10.0 to 15 psig compartment pressure.

NOTE 1—These pressure values refer to the continuous pressure or the maximum pressure reached during a cooking cycle.

4.4 *Class*:

4.4.1 *Class 1*—208 V, 60 Hz, 1 phase.

4.4.2 *Class 2*—208 V, 60 Hz, 3 phase.

4.4.3 *Class 3*—240 V, 60 Hz, 1 phase.

4.4.4 *Class 4*—240 V, 60 Hz, 3 phase.

4.4.5 *Class 5*—480 V, 60 Hz, 1 phase.

4.4.6 *Class 6*—480 V, 60 Hz, 3 phase.

4.4.7 *Class 7*—120 V, 60 Hz, 1 phase.

4.4.8 *Class 8*—220 V, 60 Hz, 3 phase.

4.4.9 *Class 9*—230 V, 50 Hz, 1 phase.

4.4.10 *Class 10*—400 V, 50 Hz, 3 phase.

4.4.11 *Class 11*—440 V, 60 Hz, 3 phase (shipboard use).

4.5 *Size*:

4.5.1 *Size a*—One-compartment steamer.

4.5.2 *Size b*—Two-compartment steamer.

4.5.3 *Size c*—Three-compartment steamer.

4.6 *Style*:

4.6.1 The steam used in the food compartments must be made from potable water and can be supplied from a self-contained electric, gas-fired, or steam coil steam generator, or from an external potable steam source.

4.6.2 *Style i*—Directly connected to an external steam source.

4.6.3 *Style ii*—Self-contained steam coil steam generator.

4.6.4 *Style iii*—Self-contained gas-fired steam generator.

4.6.5 *Style iv*—Self-contained electric steam generator.

4.7 *Capacity*:

4.7.1 Maximum three full size pans.

4.7.2 Maximum five full size pans.

4.7.3 Maximum six full size pans.

4.7.4 Maximum ten full size pans.

4.7.5 Maximum 12 full size pans.

4.7.6 Maximum 16 full size pans.

4.7.7 Maximum 18 full size pans.

4.7.8 Maximum 24 full size pans.

5. Ordering Information

5.1 An order for a steam cooker under this specification shall include the following information:

5.1.1 ASTM specification number and year of issue,

5.1.2 Quantity to be furnished,

5.1.3 Type,

5.1.4 Grade,

5.1.5 Class,

5.1.6 Size,

5.1.7 Style, and

5.1.8 Capacity.

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

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

5.2.2 Type of gas, if applicable: natural, propane, other (specify dry gas energy content in Btu per cubic feet and specific gravity).

5.2.3 Electrical power supply connection if applicable; power cord with plug or conduit connection and size.

5.2.4 If required, the ability to cook frozen food without thawing it first.

5.2.5 When other than manufacturer's standard, commercial, domestic packaging is required, specify packaging requirements.

¹³ Available from National Fire Protection Association (NFPA), 1 Batterymarch Park, Quincy, MA 02269-9101.

¹⁴ Available from NSF International, P.O. Box 130140, 789 N. Dixboro Rd., Ann Arbor, MI 48113-0140.

¹⁵ Available from American Society of Mechanical Engineers (ASME), ASME International Headquarters, Three Park Ave., New York, NY 10016-5900.

5.2.6 Specify special requirements, such as inspections, accessories, additional nameplate data, anchorable feet, etc.

5.2.7 If required, specify an automatic cold water steam condenser on the steam cooker's drain line.

5.2.8 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.

5.2.9 If Type 430 corrosion-resistant steel is not desired in 6.4.

5.2.10 *Type of Controls*—Electro-mechanical, solid state, or programmable/computer controlled.

5.2.11 When specified, a fan and baffle shall be provided in a steam cooking compartment:

5.2.11.1 Fan shall be operated by a single speed or two-speed motor.

5.2.11.2 Air baffle or fan guard may be provided to maintain uniformity of temperature within the cooking cavity.

5.2.11.3 When provided, the baffle or fan guard shall be removable for cleaning of fan or blower.

5.2.12 *Water Resistance:*

5.2.12.1 When specified, control components and electrical wiring shall be resistant to moisture and condensation due to steam from "blow-down" of boiler or accidental leakage.

5.2.12.2 When specified, all control components and exposed electrical wiring shall be resistant to cleaning by a water spray hose connected to domestic city water supply.

5.2.13 When specified, the steam cooker shall be provided with "Hold" or "Cook and Hold" feature.

5.2.14 When specified, with a quick-disconnect gas supply, an approved quick disconnect (socket and plug) conforming to ANSI Z21.41, and a flexible metal connector conforming to ANSI Z21.45 and consisting of a male pipe thread fitting on one end and a union with female thread on the opposite end shall be provided with the steam cooker.

5.2.15 When specified, additional accessories such as: wire shelves, casters, oven stand, legs, wash-down hose assembly, and faucets shall be provided.

6. Materials

6.1 *General:*

6.1.1 Steam cookers shall conform to the documents listed in 2.1 and 2.3.

6.1.2 Materials used shall be free from defects, which would affect the performance or maintainability of individual components, or of the overall assembly.

6.1.3 Materials not specified herein shall be of the same quality used for the intended purpose in commercial practice.

6.1.4 Use of used or rebuilt products is not allowed under this specification.

6.2 *Door*—The door shall be constructed of Types 302 or 304 corrosion-resistant steel conforming to Specifications A 167, or A 240/A 240M. Aluminum alloy Types 356 or 319 conforming to Specification B 108 or Type 6061 aluminum alloy conforming to Specification B 209 may also be used alone or in combination with the corrosion-resisting steels described.

6.3 *Food Cooking Compartment*—Compartment shall be constructed of Types 302, 304, or 316 corrosion-resistant steel conforming to Specifications A 167 or A 240/A 240M, or aluminum alloy Type 3003-0 conforming to Specification B 209. Pan racks shall be fabricated from Types 302, 304, or 316 corrosion-resistant steel conforming to Specifications A 276 or A 478.

6.4 *Exterior*—Unless otherwise specified, material shall be Types 302, 304, 316, or 430 corrosion-resistant stainless steel conforming to Specification A 240/A 240M or to Specifications A 167 or A 176 as applicable, and thickness shall be 20 gage minimum (0.0375 in. U.S. revised standard gage).

6.5 *Hardware and Fittings*—Unless otherwise specified, all hardware and fittings shall be corrosion-resistant or suitably processed to resist corrosion in accordance with the manufacturer's standard practice.

6.6 *Threaded Parts*—All threaded parts shall conform to ANSI B1.1.

7. Design and Construction

7.1 *General:*

7.1.1 Steam cookers shall conform to UL/ANSI No. 197, ANSI Z83.11, NSF/ANSI No. 4, and ANSI Z223/NFPA 70, as applicable.

7.1.2 Steam cooker shall be delivered assembled and ready for connection to steam, water, or gas piping, and electrical supply, as applicable.

7.1.3 Steam cookers are to be equipped with a suitable drain and steam exhaust termination.

7.1.4 All supply and drain connections shall be designed so that the steamer may be connected while maintaining a flush rear or side surface.

7.1.5 Cooking shall be accomplished by direct action of steam at the pressure specified under type designation.

7.1.6 Steamers shall be vented to remove substantially all the air from the steam chamber prior to the cooking process.

7.1.7 *Door*—Steamers with a pressurized cooking compartment shall have the door and the door latch designed to prevent opening until the steam supply is shut off and the remaining pressure in the compartment is released.

7.1.8 *Food Cooking Compartment:*

7.1.8.1 Each compartment shall have removable pan racks for supporting the appropriate number of steam table pans.

7.1.8.2 Pan racks shall be capable of supporting, without permanent deformation, a load of 15 lb per square foot in each pan.

7.1.8.3 Pan rack design shall permit easy loading and unloading of the pans (empty or loaded, hot or cold) by sliding (see 8.1).

7.1.8.4 When specified, the pan support racks in the compartment shall be suitable for supporting the maximum number of 1 in. or 4 in. high 12³/₄- by 20³/₄-in. stainless steel pans.

7.1.8.5 When specified applicable, the cooking compartment shall be designed, manufactured, inspected, and tested per the ASME Pressure Vessel Code, Section VIII—Division 1.

7.1.9 *Controls and Indicators:*

7.1.9.1 Each steamer shall have an indicator which shows that the device is energized.

7.1.9.2 When the cooking compartment pressure is 1 psig or greater, a compartment pressure indicator shall be provided.

7.1.9.3 Each cooking compartment shall be provided with a 60-min (minimum) timer which will give an audible signal at the end of a cooking cycle. When the timer is activated it will start the steam supply to the compartment and shut off the steam when the selected cooking cycle time has elapsed.

7.2 *Design and Construction of the Steam Source:*

7.2.1 *Style i Steam Cooker*—This type of steam cooker is supplied with steam that is used for cooking food in the steam compartment.

7.2.1.1 The incoming steam line shall be equipped with a steam line strainer, a steam pressure-reducing valve, a pressure gage or indicator, and an ASME Code stamped pressure relief valve.

7.2.1.2 The pressure-reducing valve shall be of adequate steam flow capacity.

7.2.1.3 The pressure reducing valve shall be factory set to reduce the incoming steam line pressure to the steamer operating pressure.

7.2.1.4 The pressure indicator and safety relief valve shall be downstream of the pressure-reducing valve.

7.2.1.5 Steam pressure to the inlet of the pressure-reducing valve shall not exceed 50 psig operating pressure.

7.2.2 *Style ii Steam Cooker:*

7.2.2.1 The unit shall be equipped with a steam-to-water heat exchanger called a steam-coil steam generator which uses steam to produce clean, nontoxic steam at the pressure and flow rate required by the steam cooking compartment.

7.2.2.2 The steam generator shall be designed, manufactured, inspected, and inlet pressure limited per the applicable ASME Code, if required or if specified.

7.2.2.3 The entire assembly (steam cooker with the steam coil steam generator) shall comply with UL/ANSI 197.

7.2.3 *Style iii Steam Cooker:*

7.2.3.1 Each unit shall be equipped with a gas-fired steam generator.

7.2.3.2 The steam generator shall be designed, manufactured, inspected and tested per the applicable ASME Code, if required or if specified.

7.2.3.3 The entire assembly (steam cooker with the gas-fired steam generator) shall comply with ANSI/Z83.11.

7.2.3.4 The steam output of the steam generator shall be at the pressure and flow rate required by the steam cooking compartment.

7.2.4 *Style iv Steam Cooker:*

7.2.4.1 Each unit shall be equipped with an electrically fired steam generator.

7.2.4.2 The steam generator shall be designed, manufactured, inspected and tested per the applicable ASME Code, if required or if specified.

7.2.4.3 The entire assembly (steam cooker with the electric fired steam generator) shall comply with UL/ANSI 197.

7.2.4.4 The steam output of the steam generator shall be at the pressure and flow rate required by the steam cooking compartment.

7.3 Acceptable evidence of meeting the requirements of NSF/ANSI Standard 4, UL/ANSI 197, or ANSI Z83.11 shall be one of the following:

7.3.1 Display of the NSF listing mark and UL or CSA listing mark adjacent to the ANSI standard to which the product has been certified, on the steam cooker.

7.3.2 A certified test report from a nationally recognized testing laboratory acceptable to the user for whom the steam cooker is being procured that the product has been tested and conforms to the appropriate ANSI Standard.

8. Performance Requirements

8.1 *Pan Rack*—Pan racks shall not become dislodged and shall lie flat without binding against its supports, either before or after heating. When withdrawn 50 % of its length (and loaded per 7.1.8.2), the rack will not deflect more than 0.5 in. when measured 6 in. from the compartment face.

8.2 When specified in the contract or purchase order, performance testing shall be performed and reported in accordance with Test Method F 1484.

9. Sampling and Quality Assurance

9.1 *Sampling*—When specified in the contract or purchase order, sampling for inspection should be performed in accordance with ANSI Z1.4.

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

10. Product Marking

10.1 Each steam cooker shall be provided with an identification plate in compliance with ANSI/Z83.11 or UL/ANSI 197, and NSF/ANSI Standard 4.

11. Manuals

11.1 Each steam cooker shall be furnished with an installation and operating instructions manual. Manual shall comply with Specification F 760.

12. Packaging and Package Marking

12.1 The steam cooker shall be packaged and packed in accordance with the manufacturer's standard commercial domestic packaging. The package shall be marked showing the name of the product, model number, serial number, and manufacturer's name. When specified, packaging shall be in accordance with the requirements of Specification D 3951.

13. Added Features

13.1 Typically, features are added to basic models at an additional cost. Any options that are required can be written into the procurement contract as desired .

14. Keywords

14.1 food service equipment; pressure cooker; steam cooker; steam cooking device; steamer; steaming pans

SUPPLEMENTARY REQUIREMENTS

FOR FEDERAL/MILITARY PROCUREMENT

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

S1. Manual

S1.1 A manual complying with Specification F 760 and Supplement shall be provided.

S2. First Article Inspection

S2.1 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 requirements of the specification and is representative of the design, construction, and manufacturing technique applicable to the remaining items to be furnished under the contract.

S3. Data Nameplate

- S3.1 A nameplate shall contain the following:
 - S3.1.1 A. National Stock Number (NSN), and
 - S3.1.2 Government approved manual number.

S4. Part Identifying Number

S4.1 The following part identifying numbering procedure is for government purposes and does not constitute a requirement for the contractor. These classes are the same as those in Section 4. The PINs to be used for items acquired to this ASTM document are as follows:

ASTM FXXXX	—	I	A	2	a	i	4
Type	—						
Grade		—					
Class			—				
Size				—			
Style					—		
Capacity						—	

S5. Preservation, Packaging and Package Marking

S5.1 When other than normal commercial practice or conformance to Specification D 3951 is desired, the preservation, packaging, and package marking requirements shall be stated in the purchase order or contract.

S6. Mounting

S6.1 Steamers shall be provided with four (4) removable legs suitable for bolting to the ship deck.

S6.2 Legs shall be fabricated from 300 series stainless steel tubing, with a minimum thickness of 0.071 in. (1.80 mm).

S6.3 *Minimum Leg Lengths:*

S6.3.1 Stand for Type I Steamers: $27 \pm \frac{1}{2}$ in. (686 ± 13 mm).

S6.3.2 Stand for Type II and III Steamers: $8 \pm \frac{1}{2}$ in. (203 ± 13 mm).

S6.3.3 Other leg lengths may be specified when ordering.

S7. Interior Finish

S7.1 The interior finish of the steamer shall be stainless steel or removable liners fabricated from stainless steel.

S8. Naval Shipboard Requirements

S8.1 *Electromagnetic Compatibility*—When specified, steam cookers shall be designed and equipped for electromagnetic compatibility in accordance with MIL-STD-461 for surface ship and submarines. The contractor shall furnish written certification that the equipment meets the emission and susceptibility requirements when tested in accordance with test methods of MIL-STD-461.

S8.2 *Inclined Operation*—When specified, the units shall operate satisfactorily, along with no spillage of product, when the steam cooker is inclined for 30 seconds at an angle of 15° (30° for submarines) on 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.

S8.3 *Environmental Suitability*—Steam cookers shall be capable of withstanding ship's 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.

S8.4 *Access*—Unless otherwise specified, units for naval surface vessels shall pass through a 26 in. (66 cm) wide and 66 in. (168 cm) high shipboard hatch without major disassembly. Equipment for submarines shall pass through a 25 in. (64 cm) diameter circular hatch. Major disassembly of a steam cooker intended for submarine installation is permissible.

S8.5 *Service Access*—This unit shall be designed for access of all utility connections and major serviceable components from the front of the unit.

S8.6 *Power*—Unless otherwise specified, equipment shall be supplied in 440 volts, 60 hertz, 3 phase, 3 wire ungrounded system in accordance with MIL-STD-1399/300.

S8.7 *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 which 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:

S8.7.1 A warning of high voltage.

S8.7.2 The power supply must be disconnected before servicing.

S8.7.3 Access covers must be in place during use.

S8.7.4 Service should be done by authorized personnel.

S8.8 *Human Factors Criteria*—Human factors engineering criteria principles, and practices, as defined in Specification F 1166, shall be used in the design.

S8.9 *Instruction Plate:*

S8.9.1 An instruction plate shall include instruction for startup, operation and shutdown.

S8.9.2 The instruction plate shall be located at a clearly visible location in front of the steam cooker.

S8.9.3 The instruction plate material shall comply with the same requirements as nameplate material per UL/ANSI 197.

S8.10 *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.

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