



Standard Specification for Combination Oven Electric or Gas Fired¹

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1. Scope

1.1 This specification covers commercial combination, atmospheric pressure steaming, which includes ~~low-temperature and bio-steaming,~~ low or high temperature steaming, baking, roasting, and rethermalizing forced-air electric and gas-fired ovens.

1.2 The values stated in inch-pound units are to be regarded as the standard. The values given in parentheses are provided for information only.

1.3 The following safety hazards caveat pertains only to the test methods portion, Section 8, of this specification: *This specification 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

[D3951 Practice for Commercial Packaging](#)

[F760 Specification for Food Service Equipment Manuals](#)

[F1166 Practice for Human Engineering Design for Marine Systems, Equipment, and Facilities](#)

[F1217 Specification for Cooker, Steam](#)

[FH639F2861 Test Method for Enhanced Performance of Combination Ovens](#) ~~Oven in Various Modes~~ (Withdrawn 2012)

2.2 ANSI Standards:³

[ANSI/UL No. 197 Commercial Electric Cooking Appliances](#)

[ANSI Z83.11 Gas Food Service Equipment](#)

[ANSI B1.1 Unified Inch Screw Threads \(UN and UNR Thread Form\)](#)

[NSF/ANSI 4 Commercial Cooking, Rethermalization and Hot Food Holding and Transport Equipment](#)

2.3 Military Standards:⁴

[MIL-STD-167/1 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-1399/300 Shipboard Systems Section 300A Electric Power, Alternating Current](#)

3. Terminology

3.1 Definitions of Terms Specific to This Standard:

3.1.1 *combination oven, n*—as used in this specification, a device that combines the function of hot convection air or ~~saturated/super-heated steam,~~ the combination of both, to perform steaming, which includes ~~low-temperature and bio-steaming,~~ low or high temperature steaming, baking, roasting, rethermalizing, and proofing of various food products. In general, the term combination oven is used to describe this type of equipment which is self-contained.

3.1.2 *oven cavity, n*—portion or area of the combination oven in which food products are heated or cooked.

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

⁴ Available from Standardization Documents Order Desk, DODSSP, Bldg. 4, Section D, 700 Robbins Ave., Philadelphia, PA 19111-5098, or Acquisition Streamlining and Standardization Information System (ASSIST), which is the official source of all documents listed in the DoD Index of Specifications and Standards. The ASSIST can be located at <http://dsp.dla.mil>.

3.1.3 *pans, n*—containers used to hold the food product in the oven cavity: a full-size bake or sheet pan is nominally 18 by 26 by 1 in. (457 by 660 by 25 mm), a half-size bake or sheet pan is nominally 18 by 13 by 1 in. (305(457 by 508)330 by 25 mm), and a full-size steam pan is nominally 12 by 20 by 2.5 in. (305 by 508 by 64 mm), and a two-thirds size steam pan is nominally 13.875 by 12.750 by 2.5 in. (352 by 323 by 64 mm).

3.1.4 *steam generation, n*—as used in this specification, can be produced through three distinct methods which all conform to Grade A classification in Specification **F1217**, 0 to 2.9 psig maximum compartment pressure.

3.1.4.1 *Method 1*—Injection refers to direct placement of water onto a hot surface in the cavity for moisture production.

3.1.4.2 *Method 2*—Boiler or steam generator refers to a compartment outside the oven cavity through which water is heated for moisture production.

3.1.4.3 *Method 3*—Water bath refers to a compartment inside the oven cavity through which water is heated for moisture production.

4. Classification

4.1 Combination ovens covered by this specification are classified by capacity, type, style, and electrical class.

Capacity

4.1.1 The capacity of the combination oven is determined by the number of bake or sheet pans, or steam table pans, or both, the oven is designed for cooking or rethermalizing. For capacity classification, the minimum vertical spacing between pan supports shall be as follows: bake or sheet pans, 1 in. (25 mm); and steam pans, 2.5 in. (64 mm).

Type

4.1.2 *Type 1*—Table or countertop units.

4.1.2.1 *Class A*—Half-size.

(1) Minimum of five half-size bake or sheet pans.

(2) Minimum of three steam pans.

4.1.2.2 *Class B*—Full-Size.

(1) Minimum of seven full-size bake or sheet pans.

(2) Minimum of nine steam pans.

4.1.3 *Type 2*—Stand mounted units.

4.1.3.1 *Class A*—Half-size.

(1) Minimum of five half-size bake or sheet pans.

(2) Minimum of three steam pans.

4.1.3.2 *Class B*—Full-size.

(1) Minimum of seven full-size bake or sheet pans.

(2) Minimum of nine steam pans.

4.1.4 *Type 3*—Floor units / roll-in units.

4.1.4.1 *Class A*—Half-size.

(1) Minimum of 14 half-size bake or sheet pans.

(2) Minimum of eight steam pans.

4.1.4.2 *Class B*—Full-size.

(1) Minimum of 16 full-size bake or sheet pans.

(2) Minimum of 17 steam pans.

4.1.5 This specification does not purport to address all of the types, which may be available, but it is an overview of the most common types and classes used in the industry.

Style

4.1.6 *Style 1*—Gas-fired combination oven.

4.1.7 *Style 2*—Electric combination oven.

Electrical Class

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

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

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

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

4.1.12 *Class 5*—480 V, 60 Hz, 3 phase.

4.1.13 *Class 6*—120 V, 60 Hz, 1 phase.

4.1.14 *Class 7*—230 V, 50 Hz, 1 phase.

4.1.15 *Class 8*—400 V, 50 Hz, 3 phase.

4.1.16 *Class 9*—440 V, 60 Hz, 3 phase (shipboard use).

5. Ordering Information

5.1 Orders for combination ovens in accordance with this specification shall include the following information:

- 5.1.1 ASTM specification number and date of issue.
- 5.1.2 Quantity of ovens to be furnished.
- 5.1.3 Type and class of combination oven.
- 5.1.4 Style; if Style 1, specify gas type (see 5.2.2).
- 5.1.5 Electrical class.

5.2 The following options should be reviewed and, if 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, or other (specify heating value in BTU/ft³ specific density and constituents).
- 5.2.3 When other than manufacturer's standard, commercial, domestic packaging is required, specify packaging requirements.
- 5.2.4 When special or supplementary requirements, such as inspections, options, accessories, modifications, changes for correctional facilities use, additional nameplate data, etc., are required.
- 5.2.5 When specified, certify that samples representing each lot have been either tested or inspected as directed and required. When specified, furnish a copy of the certification, or test results, to the purchaser.
- 5.2.6 When specified, with a quick-disconnect gas supply.
- 5.2.7 When specified, provide separate water inlets for steam generator and for condensate cooling.
- 5.2.8 When specified, provide accessories, such as wire shelves, casters, oven stand, two-speed fan, wash-down hose assembly.

6. Physical Requirements

6.1 *Design and Manufacture*—The combination oven shall consist of a water tight oven cavity, sealing type of door(s), blower, air-heater(s)/heat exchanger, steam generator, condensate discharge, over pressure and under pressure venting, as required.

6.1.1 *Doors*—The door(s) shall be insulated, with replaceable gaskets, and provision to limit condensate dripping on the floor or table top surface when opening.

6.1.2 *Steam Generator*—When provided, a steam generating system may or may not include a boiler. Further, the steam source may or may not be an integral part of the combination oven. Operate the combination oven steamer at atmospheric pressure (15 psi (103 MPa) maximum absolute). Provide for boiler based steam generating system a suitable means to detect operation and low water levels. An over temperature protection of the boiler is necessary in the event of a critical low water condition. Provide a means to clean (delime or decalcify) the steam generating boiler and remove scale mineral deposits.

6.1.3 *Fan*—A fan or blower shall be provided to ensure forced air circulation within the oven cavity. The impeller shall be corrosion-resistant.

6.1.4 *Controls*:

6.1.4.1 Provide the following control functions for the operation of the combination oven:

- (1) Mode selection, such as hot air (convection), steam, or combination.
- (2) Oven temperature; and,
- (3) Cook time.

6.1.4.2 Each oven shall be equipped with a door control switch that will de-energize the blower/fan circuit when the door is opened in any operating mode except cool-down.

6.1.5 *Air Baffle*—Each oven shall have a removable air baffle.

6.1.6 *Grease Filter*—Each oven may include a grease filter. If a grease filter is supplied, the filter shall be a removable type.

6.1.7 *Over Pressure Relief*—Over pressure relief shall be provided for the oven that is no greater than 0.6 psig (41 MPa)

6.2 *Standards and Compliance*—The oven(s) shall conform to the requirements of ANSI/UL 197, ANSI Z83.11, and NSF/ANSI 4, as applicable. Acceptable evidence of meeting these requirements shall be a current listing mark, label, or symbol of a recognized independent testing laboratory and a current listing in the testing laboratory's appropriate publication.

6.2.1 Provide certification of compliance with the standards cited in this specification, if required, in the purchase document.

7. Materials

7.1 *General*—Combination ovens shall conform to the applicable documents listed in Section 2. Materials used shall be free of defects, which would affect the performance or maintainability of individual components or of the overall assembly. Materials not specified herein shall be of the same quality used for the intended purpose in commercial practice. Unless otherwise specified herein, all equipment, material, and components incorporated in the work covered by this specification are to be new or fabricated using materials produced from recovered materials to the maximum extent possible without jeopardizing the intended use. None of the above shall be interpreted to mean that the use of used products are allowed under this specification unless otherwise specified.

7.2 *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.

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

8. Performance Requirements

8.1 *Performance Testing*—When specified, test the combination oven according to the Test Method [F1639F2861](#).

9. Sampling and Quality Assurance

9.1 When specified in the contract or purchase order, perform sampling, testing and quality assurance of finished combination ovens in accordance to the requirements specified by ANSI/UL 197 and ANSI Z83.11, as applicable.

10. Product Marking

10.1 Each combination oven shall be provided with an identification plate(s) in compliance with ANSI/Z83.11 or ANSI/UL 197.

11. Instruction Material and Manuals

11.1 Each combination oven shall be furnished with an instruction manual and material, as may be required. Manuals shall comply with Specification [F760](#).

12. Packaging and Package Marking

12.1 Combination oven shall be packaged and packed in accordance with the manufacturer's standard commercial domestic packaging.

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

12.3 When specified, packaging shall be in accordance with the requirements of specification Practice [D3951](#).

13. Keywords

13.1 baking oven; combination oven; convection oven; food service equipment; oven; roasting; steamer; atmospheric steamer

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