



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, 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:

- 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 276 Specification for Stainless Steel Bars and Shapes³
- A 366/A 366M Specification for Commercial Steel (CS), Sheet, Carbon, (0.15 Maximum Percent) Cold-Rolled Quality³
- A 569/A 569M Specification for Steel, Carbon (0.15 Maximum Percent), Hot-Rolled Sheet and Strip Commercial Quality³
- D 3951 Practice for Commercial Packaging⁴
- F 760 Specification for Food Service Equipment Manuals⁵
- F 1166 Practice for Human Engineering Design for Marine Systems, Equipment and Facilities⁶

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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 15.09.

⁵ Annual Book of ASTM Standards, Vol 15.07.

⁶ Annual Book of ASTM Standards, Vol 01.07.

F 1639 Test Method for Performance of Combination Ovens⁵

2.2 ANSI Standards:

- ANSI/UL No. 197 Commercial Electric Cooking Appliances⁷
- ANSI Z83.11 Gas Food Service Equipment⁷
- ANSI/NFPA 70 National Electric Code⁷
- ANSI Z21.41 Quick Disconnect Devices for Use with Gas Fuel⁷
- ANSI Z21.45 Standard for Flexible Connectors of Other Than All-Metal Construction for Gas Appliances⁷
- ANSI/NFPA Z223.1 National Fuel Gas Code⁷
- ANSI B1.1 Unified Inch Screw Threads (UN and UNR Thread Form)⁷
- ANSI/NSF 4 Commercial Cooking, Rethermalization and Hot Food Holding and Transport Equipment⁷

2.3 Military Standards:

- MIL-STD-167/1 Shipboard Equipment (Type I-Environmental and Type II-Internally Excited)⁸
- MIL-STD-461 Electromagnetic Emission and Susceptibility Requirements for the Control of Electromagnetic Interference⁸
- MIL-STD-1399/300 Shipboard Systems Section 300A Electric Power, Alternating Current⁸

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, or both, to perform steaming, which includes low-temperature and bio-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.

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

⁷ Available from American National Standards Institute, 11 W. 42nd St., 13th Floor, New York, NY 10036.

⁸ Available from Standardization Documents Order Desk, Bldg. 4, Section D, 700 Robbins Ave., Philadelphia, PA 19111-5094, Attn: NPODS.

pan is nominally 18 by 13 by 1 in. (305 by 508 by 25 mm), and a steam pan is nominally 12 by 20 by 2.5 in. (305 by 508 by 64 mm).

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.

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 BTU/ft³).

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.