



Standard Test Method for Performance of Combination Ovens¹

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1. Scope

1.1 This test method covers the evaluation of the energy consumption and cooking performance of combination ovens. The food service operator can use this evaluation to select a combination oven and understand its energy consumption.

1.2 This test method is applicable to gas and electric combination ovens that are operated in the combination mode only. For evaluation of a combination oven operated in either convection only mode or steam only mode, apply either Test Method F 1496 or Test Method F 1484, respectively.

1.3 The combination oven can be evaluated with respect to the following (where applicable):

1.3.1 Energy input rate and thermostat calibration (10.2).

1.3.2 Preheat energy consumption and time (10.3).

1.3.3 Idle energy rate (10.4).

1.3.4 Pilot energy rate (if applicable) (10.5).

1.3.5 Cooking-energy efficiency, cooking energy rate, and production capacity (10.7).

1.3.6 Water consumption and condensate temperature (10.7).

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

1.5 *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

D 3588 Practice for Calculating Heat Value, Compressibility Factor, and Relative Density of Gaseous Fuels

F 1484 Test Methods for Performance of Steam Cookers

F 1495 Specification for Combination Oven Electric or Gas Fired

F 1496 Test Method for Performance of Convection Ovens

2.2 *ASHRAE Documents:*³

ASHRAE Guideline 2-1986 (RA90) Engineering Analysis of Experimental Data

ASHRAE Guideline 2-1986 (RA90) Thermal and Related Properties of Food and Food Materials

3. Terminology

3.1 *Definitions:*

3.1.1 *combination oven, n*—device that combines the function of hot air convection (oven mode) and saturated and superheated steam heating (steam mode), or both, to perform 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. The combination oven is also referred to as a combination oven/steamer, combi or combo.

3.1.2 *condensate, n*—mixture of condensed steam and cooling water, exiting the combination oven and directed to a drain.

3.1.3 *cooking-energy efficiency, n*—quantity of energy imparted to the specified food product, expressed as a percentage of energy consumed by the combination oven during the cooking event.

3.1.4 *cooking energy rate, n*—average rate of energy consumption (Btu/h (kJ/h) or kW) during the cooking-energy efficiency tests. Refers to all loading scenarios (heavy, medium, light).

3.1.5 *energy input rate, n*—peak rate at which a combination oven consumes energy (Btu/h (kJ/h) or kW).

3.1.6 *idle energy rate, n*—combination oven's rate of energy consumption (Btu/h (kJ/h) or kW), when empty, required to maintain its cavity temperature at the specified thermostat set point.

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

¹ This test method is under the jurisdiction of ASTM Committee F26 on Food Service Equipment and is the direct responsibility of Subcommittee F26.06 on Productivity and Energy Protocol.

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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 See the *ASHRAE Handbook of Fundamentals*, available from the American Society of Heating, Refrigeration, and Air Conditioning Engineers, Inc., 1791 Tullie Circle, NE, Atlanta, GA 30329.