



Standard Test Method for Performance of Convection Ovens¹

This standard is issued under the fixed designation F1496; 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.

1. Scope

1.1 This test method covers the energy consumption and cooking performance evaluation of convection ovens. The test method is also applicable to convection ovens with limited moisture injection. The results of applying it can be used by the food service operator to select a convection oven and to understand its energy consumption and performance.

1.2 This test method applies to general purpose, full-size, and half-size convection ovens and bakery ovens used primarily for baking food products. It is not applicable to ovens used primarily for slow cooking and holding food product, to large roll-in rack-type ovens, or to ovens that can operate in a steam-only mode (combination ovens).

1.3 This test method is intended to be applied to convection ovens that operate close to their rated input in the dry heating mode, with the circulating fan operating at its maximum speed.

NOTE 1—Ovens that can operate in steam-only mode should be evaluated using ASTM F2861.

1.4 The oven's energy consumption and cooking performance are evaluated in this test method specifically with respect to the following:

- 1.4.1 Thermostat calibration (10.2),
- 1.4.2 Energy input rate and preheat energy consumption and time (10.3),
- 1.4.3 Pilot energy rate (if applicable) (10.4),
- 1.4.4 Idle energy rate (10.5),
- 1.4.5 Cooking energy efficiency and production capacity (10.6),
- 1.4.6 Cooking uniformity (10.7),
- 1.4.7 White sheet cake browning (10.8), and
- 1.4.8 Bakery steam mode, if applicable (10.9).

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

1.6 *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

- D3588 Practice for Calculating Heat Value, Compressibility Factor, and Relative Density of Gaseous Fuels
- F2092 Specification for Convection Oven Gas or Electric
- F2093 Test Method for Performance of Rack Ovens
- F2861 Test Method for Enhanced Performance of Combination Oven in Various Modes

2.2 ASHRAE Documents:³

- 1989 ASHRAE Handbook of Fundamentals, Chapter 6, Table 2—Thermodynamic Properties of Water at Saturation
- ASHRAE Guideline 2-1986 (RA90) "Engineering Analysis of Experimental Data"

3. Terminology

3.1 Definitions:

3.1.1 *average preheat rate*—rate ($^{\circ}\text{F}/\text{min}$) at which cavity temperature is heated from ambient temperature to the oven's thermostat set point.

3.1.2 *bakery steam mode*—a single injection of water/steam into the baking cavity at the start of a bake cycle. Injection time not to exceed 60 seconds per baking event.

3.1.3 *convection oven*—an appliance for cooking food by forcing hot air over the surface of the food using a fan in a closed cavity.

3.1.4 *cook time*—time required to cook potatoes during a cooking energy efficiency test.

3.1.5 *cooking energy*—energy consumed (kBtu or kWh) by the oven as it cooks potatoes during the cooking energy efficiency tests.

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.

Current edition approved June 1, 2013. Published July 2013. Originally approved in 1993. Last previous edition approved in 2012 as F1496 – 12. DOI: 10.1520/F1496-13.

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 Society of Heating, Refrigerating, and Air-Conditioning Engineers, Inc. (ASHRAE), 1791 Tullie Circle, NE, Atlanta, GA 30329.