



Standard Test Method for Performance of Convection Ovens¹

This standard is issued under the fixed designation F 1496; 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 results of applying it can be used by the food service operator to select a convection oven and to understand its energy consumption.

1.2 This test method applies to general purpose, full-size, and half-size convection 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 designed specifically to cook only one food product (for example, specialty ovens).

1.3 This test method is intended to be applied to convection ovens operated close to rated input in the dry heating mode, with the circulating fan operating at its maximum speed and without any injection of moisture into the oven cavity.

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), and
- 1.4.7 White sheet cake browning (10.8).

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:

¹ This test method is under the jurisdiction of ASTM Committee F-26 on Food Service Equipment and is the direct responsibility of Subcommittee F26.06 on Productivity and Energy Protocol.

Current edition approved Oct. 10, 1999. Published January 2000. Originally published as F 1496 – 93. Last previous edition F 1496 – 93.

D 3588 Practice for Calculating Heat Value, Compressibility Factor, and Relative Density of Gaseous Fuels²

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

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

3.1.4 *cooking energy*—energy consumed (kBtu or kWh) by the oven as it cooks potatoes during heavy-, medium-, or light-load cooking energy efficiency tests.

3.1.5 *cooking energy efficiency*—the ratio of the quantity of energy absorbed by the food product to the quantity of energy input to the oven during a cooking energy efficiency test expressed as a percent.

3.1.6 *cooking energy rate*—average rate of the oven's energy consumption (kBtu/h or kW) during a cooking energy efficiency test.

3.1.7 *fan and control energy rate*—the rate of energy consumption (kW and kBtu/h) by an oven's controls and fan motor.

3.1.8 *heavy load*—load (lb) during a cooking energy efficiency test consisting of approximately 14.5 lb (6.6 kg) of potatoes on each of five sheet pans spaced evenly in a full-size oven (7.25 lb (3.29 kg) of potatoes per sheet pan in a half-size oven).

3.1.9 *idle energy rate*—oven's rate of energy consumption (kBtu/h or kW), when empty, to maintain its cavity temperature at the thermostat set point.

² Annual Book of ASTM Standards, Vol 05.06.

³ Available from American Society of Heating, Refrigerating, and Air Conditioning Engineers, Inc., 1791 Tullie Circle, NE, Atlanta, GA 30329. Phone (404) 636-8400.

