

Standard Test Method for Performance of Rack Ovens¹

This standard is issued under the fixed designation F2093; 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 evaluates the energy consumption and baking performance of rack ovens. The food service operator can use this evaluation to select a rack oven and understand its energy performance.

1.2 This test method is applicable to thermostatically controlled, gas and electric rack ovens.

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

- 1.3.1 Energy input rate (10.2),
- 1.3.2 Thermostat calibration (10.3),
- 1.3.3 Preheat energy and time (10.4),
- 1.3.4 Idle energy rate (10.5),
- 1.3.5 Pilot energy rate, if applicable (10.6),
- 1.3.6 White sheet cake browning (10.7), and
- 1.3.7 Steam performance (10.8), and
- 1.3.8 Baking energy efficiency and production capacity (10.9).

1.4 The values stated in inch-pound units are to be regarded as standard.

1.5 *This test method may involve hazardous materials, operations, and equipment. 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
- F1496 Test Method for Performance of Convection Ovens

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, 2011. Published July 2011. Originally approved in 2001. Last previous edition approved in 2006 as F2093 – 06. DOI: 10.1520/F2093-11.

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.

2.2 ANSI Document:³

ANSI Z83.11 American National Standard for Gas Food Service Equipment

2.3 ASHRAE Documents:⁴

ASHRAE Fundamentals 1997

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

3. Terminology

3.1 Definitions of Terms Specific to This Standard:

3.1.1 *bake time, n*—time required to bake the frozen pies specified in 7.3.

3.1.2 *baking cavity, n*—that portion of the appliance in which food products are heated or cooked.

3.1.3 *baking energy, n*—energy consumed by the rack oven as it is used to bake frozen pies under full-load conditions.

3.1.4 *baking energy efficiency, n*—quantity of energy imparted to the pies, expressed as a percentage of energy consumed by the rack oven during the baking event.

3.1.5 *baking energy rate, n*—average rate of energy consumption (Btu/h or kW) during the baking energy efficiency tests.

3.1.6 *duty cycle, n*—defined as percent (%) of burner time on divided by a complete on/off cycle during idle energy mode at 400°F.

3.1.7 *idle energy rate, n*—the rate of energy consumed (Btu/h or kW) by the rack oven while “holding” or “idling” the baking cavity at the thermostat set point.

3.1.8 *measured energy input rate, n*—peak rate at which a rack oven consumes energy (Btu/h or kW), typically reflected during preheat.

3.1.9 *mini-rack oven, n*—an appliance that bakes by forcing air within a closed cavity, either fitted with a mechanism for rotating an internal rack which accommodates 8 pans at 4 in. spacing or a fixed 8 pans at 4 in. spacing within the cavity.

³ Available from American National Standards Institute (ANSI), 25 W. 43rd St., 4th Floor, New York, NY 10036, <http://www.ansi.org>.

⁴ Available from American Society of Heating, Refrigerating, and Air-Conditioning Engineers, Inc. (ASHRAE), 1791 Tullie Circle, NE, Atlanta, GA 30329, <http://www.ashrae.org>.