



Standard Test Method for Performance of Commercial Patio Heaters¹

This standard is issued under the fixed designation F2644; 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 heating performance and energy consumption of commercial radiant patio heaters. The food service operator can use this evaluation to select a commercial patio heater and understand its energy performance and effective heated area.

1.2 This test method is applicable to commercial gas and electric radiant patio heaters.

1.3 The patio heater can be evaluated with respect to the following:

- 1.3.1 Energy input rate (10.2),
- 1.3.2 Preheat energy consumption and time (10.3),
- 1.3.3 Temperature distribution (10.4), and
- 1.3.4 Effective heated area (10.4).

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

D3588 Practice for Calculating Heat Value, Compressibility Factor, and Relative Density of Gaseous Fuels

2.2 ANSI Documents:³

ANSI Z83.19 Gas-Fired High-Intensity Infrared Heaters
ANSI Z83.20 Gas-Fired Low-Intensity Infrared Heaters

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 August 2013. Originally approved in 2007. Last previous edition approved in 2007 as F2644 – 07. DOI: 10.1520/F2644-07R13.

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

2.3 ASHRAE Documents:⁴

ASHRAE 55–1992 Thermal Environmental Conditions for Human Occupancy

3. Terminology

3.1 Definitions:

3.1.1 *boundary, n*—the edge of the area being warmed under a patio heater that corresponds to 3°F above the design environment mean radiant temperature.

3.1.2 *design environment, n*—unheated environment for which test unit's performance is to be evaluated. Design environment is specified as having a mean radiant temperature of 60°F.

3.1.3 *effective heated area, n*—the amount of square footage that can be warmed to a specified temperature (3°F above the design environment mean radiant temperature) under a patio heater.

3.1.4 *energy input rate, n*—peak rate at which a patio heater consumes energy (kW or Btu/h), typically reflected during preheat.

3.1.5 *heating index, n*—the quotient of the effective heated area and the measured energy input rate.

3.1.6 *mean radiant temperature, n*—the uniform surface temperature of an imaginary black enclosure in which an occupant would exchange the same amount of radiant heat as in the actual non-uniform space.

NOTE 1—Since all environments radiate thermal energy, the mean radiant temperature can be determined for an unheated as well as a heated environment.

3.1.7 *operative temperature, n*—the uniform temperature of an imaginary black enclosure in which an occupant would exchange the same amount of heat by radiation plus convection as in the actual non-uniform environment. Operative temperature is numerically the average of the air temperature (T_a) and the mean radiant temperature (T_r), weighted by their respective heat transfer coefficients (h_c and h_r) (see ASHRAE 55–1992):

$$T_o = \frac{(h_c \times T_a + h_r \times T_r)}{(h_c + h_r)}$$

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>.