

**ANSI/ASHRAE Standard 146-2011
(Supersedes ANSI/ASHRAE Standard 146-2006)**



ASHRAE STANDARD

Methods of Testing and Rating Pool Heaters

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NOTE

Approved addenda, errata, or interpretations for this standard can be downloaded free of charge from the ASHRAE Web site at www.ashrae.org/technology.

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FOREWORD

This is a revision of Standard 146-2006. This standard was prepared under the auspices of the American Society of Heating, Refrigerating and Air-Conditioning Engineers, Inc. (ASHRAE). It may be used in whole or in part by an association or government agency with due credit to ASHRAE. Adherence is strictly on a voluntary basis and merely in the interests of obtaining uniform standards throughout the industry.

The changes made for the 2011 revision are as follows:

- *Appendices were indicated as informative only.*
- *References were updated.*
- *Citations in the body of the standard were updated to be consistent with their references in Section 13.*

1. PURPOSE

The purpose of this standard is to provide methods of testing and rating pool heaters.

2. SCOPE

2.1 This standard provides methods of testing for heating capacity and energy efficiency.

2.2 This standard applies to heaters operated by gas, oil, or electricity, including heat pumps using ambient air as a heat source.

3. DEFINITIONS

apparatus: as used in this standard, test room facilities and instrumentation.

coefficient of performance (COP): as applied to a heat pump, the ratio of heat output in kilowatts (Btu/h) to the total power input in kilowatts (Btu/h).

coil, outdoor: the heat exchanger that absorbs heat from the outdoor air.

equipment: as used in this standard, the equipment to be tested.

heat output: the rate at which heat is passed to the water in kilowatts (Btu/h) under specified conditions of operation.

heating capacity: the rate at which heat is passed to the water in kilowatts (Btu/h) when the pool heater is operating at rated input and achieving the rated thermal efficiency or COP.

pool heater: equipment designed for heating nonpotable water contained at atmospheric pressure in swimming pools, spas, hot tubs, and similar applications.

rated input: the energy-using capacity of a pool heater as specified by the manufacturer and as specified in Section 8 of this standard.

standard conditions: the conditions of temperature and pressure at which the higher heating value of gas is reported, namely, 15.556°C (60°F) and 101.325 kPa (29.921 in. of mercury).

standard COP: the ratio of heat output in kilowatts (Btu/h) to total power input in kilowatts (Btu/h) as defined when a heat pump pool heater is operating at standard rating conditions.

standard rating conditions: the temperature, pressure, and water-flow-rate conditions (specified in Section 8) at which the pool heater input and efficiency are reported.

thermal efficiency: the ratio of heat output in kilowatts (Btu/h) to total power input in kilowatts (Btu/h) when a gas-fired, oil-fired, or electrical-resistance pool heater is operated at specific conditions.

total power input: for electrical pool heaters, the total electrical input to the equipment in kilowatts.

4. CLASSIFICATIONS

Pool heaters are classified by energy source and include

- a. gas-fired pool heaters;
- b. oil-fired pool heaters;
- c. air-to-water heat pump pool heaters employing a compressor, water-cooled condenser, and outdoor air coil in a single-package assembly; and
- d. electric resistance pool heaters.

5. REQUIREMENTS

The pool heaters for which compliance with this standard is claimed shall be tested and calculations made to verify capacity and efficiency using the following procedures as appropriate:

- a. a steady-state heating capacity test for a pool heater at standard rating conditions;
- b. a steady-state efficiency test for a gas, oil, and electric resistance pool heater or coefficient of performance (COP) for a heat pump pool heater;
- c. a standby energy consumption test for all pool heaters except heat pump pool heaters.

6. INSTRUMENTS

6.1 General. Instruments are required for the following measurements with the minimum precision noted. Instruments shall be calibrated at a minimum of once a year. A record shall be kept containing, as a minimum, the date of calibration, the method of calibration, and the reference standard used.

6.2 Temperature. Temperature-measuring devices and any associated instrumentation systems shall be in accordance with ANSI/ASHRAE Standard 41.1, *Standard Method*