

2002

STANDARD for

**COMMERCIAL
ELECTRIC
AMBIENT AIR-
SOURCE HEAT
PUMP WATER
HEATERS**

PREFACE

This is a draft of a performance Standard for ambient air-source heat pump water heaters with input power in excess of 6 kW. These units would be applied in commercial and institutional establishments.

The method of test is ASHRAE Standard 118.1 - 2001. Method of Testing for Rating Commercial Gas, Electric and Oil Service Water Heating Equipment. The performance standard has been modeled on those for other unitary air conditioning and heat pump equipment by Air-Conditioning and Refrigeration Institute (ARI), the Gas Appliance Manufacturers Association (GAMA) or similar organization. The draft will be submitted to not less than one of these organizations (GAMA or ARI). The goal would have the standard accepted/adopted after the deliberations of an Engineering Committee drawn from manufacturers of the covered products.

TABLE OF CONTENTS

SECTION	PAGE
Preface	1
Section 1. Purpose	3
Section 2. Scope	3
Section 3. Definitions and References	3
Section 4. Test Requirements	4
Section 5. Rating Requirements	5
Section 6. Published Ratings	5
Section 7. Marking and Nameplate Data	5
Section 8. Voluntary Conditions	5

TABLES

Table 1. Operating Conditions for Standard Rating Tests	5
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Standard for Commercial Electric Ambient Air-Source Heat Pump Water Heaters

1. Purpose

1.1 Purpose

The purpose of this standard is to establish for commercial electric ambient air-source heat pump water heater equipment: definitions and references; test requirements; rating requirements; minimum data requirements for Published Ratings; operating requirements; marking and nameplate data; and conformance conditions.

1.1.1 Intent

This standard is intended for the guidance of the industry, including manufacturers, engineers, installers, contractors and users.

1.1.2 Review and Amendment

This standard is subject to review and amendment as technology advances.

2. Scope

2.1 Scope

This standard applies to factory manufactured electric heat pump water heaters in excess of 6 kW input rating and all three-phase equipment regardless of input.

2.1.1 Classifications

This standard applies to ambient air-source heat pump water heaters that can be operated without connection to a storage tank and to heat pump water heaters that include the use of an integral tank.

2.2 Units

The primary unit values are in foot-pound units. The values given in brackets are in SI (metric) units.

3. Definitions and References

3.1 Definitions

All terms in this document shall follow the standard industry definitions in the current edition of ASHRAE Terminology of Heating, Ventilation, Air-Conditioning and Refrigeration, unless otherwise defined in this section.

Coefficient of Performance(COP) - A ratio of the water heating capacity in Btu/h (kW), to the power input in (kW), at any given set of rating conditions. <<Hmmm. I'm used to COP as "pure" Btu/Btu, kW/kw; and EER for mixed units?>>

Standard Coefficient of Performance - The coefficient of performance at Standard Rating Conditions.

Cooling capacity - the capacity associated with the change in air enthalpy Btu/h (kW).

Water heating capacity - the capacity associated with the change in temperature of the water passing through the heat pump water heater, Btu/h (kW). <<Hmmm. Shouldn't this include a reference to standard conditions?

Ambient Air-Source Heat Pump Water Heater - a device using the vapor compression cycle to transfer heat from the ambient air surrounding it to heat potable water, including all necessary ancillary equipment such as fan/blower, pump, integral storage tank, piping and controls. <<does this exclude outside air units as are used in Hawaii?

Heat pump water heater with integral tank - a heat pump water heater that includes a hot water storage tank specified and available from, the heat pump manufacturer.

Heat pump water heater without tank - means a heat pump that is not supplied with a specific water storage tank.

Ambient air - means air from the space where the heat pump is located and is the heat source for the heat pump water heater. <<this would exclude outside evaporator units as used in Hawaii>>

Published Rating - A statement of the assigned values of those performance characteristics under stated Rated Conditions by which a unit may be chosen to fit its application. These values apply to all units of like nominal size and type produced by the same manufacturer. As used herein, the term Published Rating includes the rating of all performance characteristics shown on the unit or published in specification advertising, or other literature controlled by the manufacturer, at stated Rating Conditions.

Application Rating - A rating based on tests performed at Application rating conditions (other than Standard Rating Conditions). <<out of alphabetical order...>>

Standard Rating - A rating based on tests performed at Standard Rating Conditions.

Rating Conditions - Any set of operating conditions under which a single level of performance results and which causes only that level of performance to occur.

"Shall" or "Should" - "Shall" or "Should" shall be interpreted as follows:

"Shall"- where "shall" or "shall not" is used for a provision specified, that provision is mandatory if compliance with the standard is claimed.

"Should" - where "should" is used to indicate provisions which are not mandatory but which are desirable as good practice.

3.2 References

Listed here are all standards, handbooks and other publications essential to the formation and implementation of the Standard. All references in this clause are considered as part of the Standard.

ASHRAE* Standard
118.1-2001

Method of Testing for Rating Commercial Gas, Electric and Oil Service Water Heating Equipment.

*American Society of Heating, Refrigerating, and Air-Conditioning Engineers Inc. 1791 Tullie Circle N.E., Atlanta, Georgia 30329, U.S.A.

4. Test Requirements

4.1 Test Requirements

Standard Ratings shall be established at the Standard Rating Conditions specified in clause 4.2 and 4.3. Standard Ratings shall be verified by tests conducted in accordance with ASHRAE 118.1-2001

4.2 Standard Water Heating Capacity Rating

Table 1 indicates the operating conditions for Standard Water Heating Rating tests to determine values of standard water heating capacity.

4.3 Standard Ratings

Table 1 indicates the operating conditions for Standard Cooling Rating tests. Standard Cooling Ratings shall be net values, including the effects of circulating fan heat. Standard input ratings shall be the total power input to the compressor(s) and fan plus controls and other items (such as onboard pumps) included as part of the unit model number. Units not supplied with a water pump are to include pump power input as per ASHRAE Standard 118.1 Clause 7. <<good>>

4.4 Electrical Conditions

Standard rating tests shall be performed at the nameplate rated voltage and frequency. For units with dual nameplate voltage ratings, standard rating tests shall be performed at both voltages, or at the lower voltage if only a single rating is to be published.

4.5 Equipment

The filter and any other grilles, deflecting vanes, fittings and other Standard equipment of the heat pump water heater shall be in place during all tests, unless otherwise specified in the manufacturers instructions to the user.

4.6 Air Flow Rate

Heat pump airflow rate shall be that specified by the manufacturer where the fan drive is adjustable. Where non-adjustable, it shall be the airflow rate inherent in the unit when operated with all of the resistance elements (ie. inlets, louvers, any ductwork or attachments) considered by manufacturer to be normal installation practice. Once established, the evaporator air circuit shall remain unchanged throughout all tests, unless automatic adjustment of airflow rate by system function is made.

4.7 Water Flow Rate

Heat pump water heater flow rate shall be that specified by the manufacturer. If a range of flow rates are provided use the minimum value for the tests.

5. Rating Requirements

5.1 Rating Requirements

Standard ratings for water heating capacity and total cooling capacity shall be published. Power input ratings shall be expressed in increments or multiples of 500 W.

5.2 Values of Standard Capacity Ratings

Capacity ratings are to be expressed in multiples of 1000 Btu/h for ratings in range up to 135,000 Btu/h; in multiples of 2000 Btu/h for ratings in range from 135,000 Btu/h to 400,000 Btu/h; and in multiples of 5000 Btu/h for ratings in range above 400,000 Btu/h.

5.3 Values of Coefficient of Performance

Standard measures of COP, whenever published, for water heating shall be expressed in multiples of 0.1.

5.4 Application Ratings

Ratings at other than Standard Conditions in Table 1 may be published as Application ratings, and shall be based on data determined by methods prescribed in Clause 4.1 and their

values expressed as specified in Clauses 5.1, 5.2 and 5.3.

5.5 Tolerances

To comply with this Standard, measured test results shall not be less than 95% of the Published Rating for COP and capacity and shall not exceed 105% of Published Ratings for power input.

6. Published Ratings

Published ratings shall include all standard ratings.

Claims to ratings within the scope of this standard shall include wording "Rated in accordance with _____ standard _____."

Claims to ratings outside scope of this standard shall include wording "Outside scope of _____ standard _____."

Application ratings shall include a statement of the conditions at which the application ratings apply.

Total water heating capacity and total cooling capacity used in published specifications, literature or advertising, controlled by the manufacturer and rated under this standard shall be expressed in Btu/h (W)

7. Marking and Nameplate Data

7.1 Marking and Nameplate Data

As a minimum, the nameplate shall display the manufacturer's name, model designation and electrical characteristics.

8. Voluntary Conditions

8.1 Conformance

While conformance with this Standard is voluntary, conformance shall not be claimed or implied for equipment within its Purpose and Scope unless such claims meet all the requirements of this standard.

Table 1 : Operating Conditions for Standard Rating Tests

Evaporator Entering Air Temperature in °F (°C)		Condenser Entering Water Temperature in °F (°C)
Dry-bulb	Wet Bulb	
80 (26.7)	67 (19.4)	55 (12.8)
80 (26.7)	67 (19.4)	110 (43.3)