



ASHRAE Standard 18-2008 RA2013 (W)

Intent to Withdraw

Methods of Testing for Rating Drinking-Water Coolers with Self- Contained Mechanical Refrigeration

First Withdrawal Review (February 2018)

This standard will be submitted to the American National Standards Institute Board of Standards Review (BSR) with a notice of Intent-to-Withdraw.

This intent-to-withdraw draft has been recommended for public review by the cognizant technical committee and approved by a subcommittee of the Standards Committee. To submit a comment on this proposed withdrawal, go to the ASHRAE website at <http://www.ashrae.org/technology/page/331> and access the online comment database. The draft is subject to modification until it is approved for publication by the ASHRAE Board of Directors and ANSI. Until this time, the current edition of the standard (as modified by any published addenda on the ASHRAE Web site) remains in effect. The current edition of any standard may be purchased from the ASHRAE Bookstore at www.ashrae.org or by calling 404-636-8400 or 1-800-527-4723 (for orders in the U.S. or Canada).

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CONTENTS

ANSI/ASHRAE Standard 18-2008 (RA 2013), Methods of Testing for Rating Drinking-Water Coolers with Self-Contained Mechanical Refrigeration

SECTION	PAGE
Foreword.....	2
1 Purpose	2
2 Scope	2
3 Definitions.....	2
4 Instrumentation and Apparatus	3
5 Methods of Testing	4
6 References	7

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 reaffirmation of ANSI/ASHRAE Standard 18-2008. This standard was prepared under the auspices of 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 2013 reaffirmation were:

- *References were updated.*
- *Minor editorial changes were made.*
- *Nonmandatory language in Sections 5.2.1.2 and 5.4.1 was revised.*

1. PURPOSE

The purposes of this standard are as follows:

- a. To establish the types of equipment to which the provisions of this standard apply.
- b. To define terms describing the equipment covered and terms related to testing.
- c. To specify types of instrumentation and test apparatus required in testing.
- d. To specify methods of procedure to be used when testing for rating.
- e. To specify a uniform method for calculation of results.
- f. To specify data and results to be recorded.

2. SCOPE

2.1 This standard applies to self-contained, mechanically refrigerated drinking-water coolers as described below:

- a. Water coolers that are supplied with piped water under pressure.
- b. Water coolers that require a bottle or reservoir to store the supply of water to be cooled.
- c. Water coolers of the general type described in Section 2.1(a) or 2.1(b) that provide additional utility described by any one, or more than one, of the following:
 1. A refrigerated storage compartment with or without provisions for making ice.
 2. A means for the heating of potable water.
 3. A connection that may be used to supply cooled water to a remote dispensing means.

2.2 This standard does not apply to

- a. water coolers intended for use on central circulating-type systems or
- b. water coolers employing remote-type condensing units.

2.3 This standard does not

- a. provide methods for field or production testing or
- b. establish criteria for evaluation of equipment with respect to safety, health hazards, durability, adverse operating conditions, or other factors involved in field applications.

3. DEFINITIONS

bottle-type water cooler: a *water cooler* that employs a bottle or reservoir for storing the supply of water to be cooled; utilizes a faucet or similar means for filling glasses, cups, or other containers; and includes a waste-water receptacle.

compartment-type water cooler: a *water cooler* that, in addition to the primary function of cooling and dispensing potable water, includes a refrigerated compartment with or without provisions for making ice.

faucet-type pressure water cooler: a *pressure water cooler* that utilizes a faucet or other suitable means for filling glasses, cups, or other containers.

fountain-type pressure water cooler: a *water cooler* that utilizes a valve to control the flow of water as a projected stream from a nozzle so that the water may be consumed without utilizing glasses or cups.

hot-and-cold-type water cooler: a *pressure water cooler* that, in addition to the primary function of cooling and dispensing potable water, includes means for heating and dispensing potable water.

precooler: a device for transferring heat from the incoming potable water to the spill.

pressure water cooler: a *water cooler* that is supplied with potable water under pressure and that usually includes a means for catching waste water and for conducting such waste to a suitable disposal means.

remote-type water cooler: a *water cooler* that has the primary function of cooling potable water for delivery to remotely installed dispensing means; such remotely installed dispensing means are not considered part of the *water cooler*.

self-contained, mechanically refrigerated drinking-water cooler: a factory-made assembly in one structure that includes a complete mechanical refrigerating system and that has the primary function of cooling potable water and also provides for dispensing such water, by either integral or remote means or both. In the succeeding sections of this standard, the term *water* shall mean such a self-contained, mechanically refrigerated drinking-water cooler.

shall: designates a requirement.

should: designates a recommendation.

spill: the unconsumed portion of the projected stream of cooled water from the nozzle of a *fountain-type pressure water cooler* that is caught by the collection means and discharged through a heat-transferring device to a suitable external disposal means.

stream splitter: a test device utilized to establish the percent spill.

water cooler: see *self-contained, mechanically refrigerated drinking-water cooler*.

4. INSTRUMENTATION AND APPARATUS

4.1 Temperature-Measuring Instruments. Temperature-measuring instruments shall be in accordance with Sections 4.1.1 through 4.1.3. For additional information on temperature-measuring instruments, refer to ANSI/ASHRAE Standard 41.1.¹

4.1.1 Types. Temperature measurements shall be made with instruments of any type having the following accuracies at the temperatures of use:

- a. All water temperatures $\pm 0.2^{\circ}\text{F}$ ($\pm 0.1^{\circ}\text{C}$).
- b. All air temperatures $\pm 0.2^{\circ}\text{F}$ ($\pm 0.1^{\circ}\text{C}$).

4.1.2 Scales. In no case shall the smallest scale division of the temperature-measuring instrument exceed twice the specified accuracy.

4.1.3 Calibration. All temperature-measuring instruments shall be calibrated by comparison with a certified standard in their ranges of use or shall themselves be certified as to accuracy.

4.2 Temperature Measurements. Temperatures shall be measured in accordance with Sections 4.2.1 through 4.2.4. For additional information on temperature measurements, refer to ANSI/ASHRAE Standard 41.1.¹

4.2.1 General. Temperature of water within conduits shall be measured by inserting the temperature-sensing element directly within the water stream or within a well that is inserted into the stream. Glass thermometers shall not be inserted directly into the water stream when the pressure within the conduit is great enough to affect the thermometer reading. The thermometer well and all piping between it and the water-cooler enclosure shall be well insulated.

4.2.2 Water Inlet and Outlet Temperatures. Water temperature measurements shall be taken as close as possible to the water inlet and outlet connections but not within the water-cooler enclosure. It is permissible to replace the water-dispensing means by a test device for controlling flow, measuring temperature, or establishing spill.

4.2.2.1 Pressure Water Coolers. On pressure water coolers, the thermometer well or temperature-sensing element measuring outlet water temperature shall be placed between the cooled water outlet connection and the stream splitter or other test device. Likewise, if a test device for controlling flow is installed in the inlet line to the water cooler, the thermometer well or temperature-sensing element measuring inlet water temperature shall be placed between such test device and the water-cooler inlet connection.

4.2.2.2 Bottle-Type Water Coolers. For bottle-type water coolers, when tested by the intermittent-draw

method, the temperature of each increment of outlet water withdrawn shall be determined by a temperature-sensing element immersed during the period of draw and read at the completion of the draw.

4.2.3 Ambient Temperatures

4.2.3.1 Ambient dry-bulb temperatures shall be measured at four locations, two at the 5 ft (1.5 m) level and two at the 2 ft (0.6 m) level within that portion of the controlled-temperature space that is intended for human occupancy. The placement and shielding of the temperature-sensing elements shall be such as to avoid erroneous indications that might be caused by adjacent heating or cooling devices, including the water cooler itself. Ambient air movement created by any source external to the test unit shall not exceed 50 fpm (0.3 m/s) and shall not be directed so as to affect appreciably the normal airflow through the test unit.

4.2.3.2 The difference between the maximum and minimum temperatures, taken simultaneously, shall not exceed 2°F (1.1°C).

4.2.3.3 The variation in the average of the four temperatures shall not exceed $\pm 1^{\circ}\text{F}$ ($\pm 0.6^{\circ}\text{C}$) during the period of test.

4.2.3.4 When controlled psychrometric conditions are required by an appropriate performance standard, the variation in the dew-point temperature, as determined from the average dry-bulb and wet-bulb temperatures, shall not exceed $\pm 1^{\circ}\text{F}$ ($\pm 0.6^{\circ}\text{C}$) during the period of test.

4.2.4 Refrigerated-Compartment Temperature. The average temperature in the refrigerated compartment of compartment-type water coolers shall be the average of three simultaneous compartment temperatures measured in accordance with the following procedure.

4.2.4.1 Temperatures shall be recorded at three locations as shown in the appropriate diagram of Figure 1. In case of interference, the temperature measurements may be taken not more than 1 in. (25.4 mm) from the indicated positions.

4.2.4.2 Measurements shall be taken midway between the front and the back of the refrigerated compartment.

4.2.4.3 If the interior arrangements of the refrigerated compartment do not conform with those shown in Figure 1, measurements shall be taken at selected locations that comply with the intent of Figure 1. The locations selected shall be recorded.

4.2.4.4 Temperatures shall be taken with a temperature-sensing element that possesses, or is in good thermal contact with, a metallic mass that will provide a total heat capacity not more than that of 0.705 oz (20 g) of water.

4.2.4.5 All temperature-sensing elements shall be supported in such a manner that there will be at least 0.5 in. (12.7 mm) of air space separating the thermal mass from contact with heat-conducting surfaces.

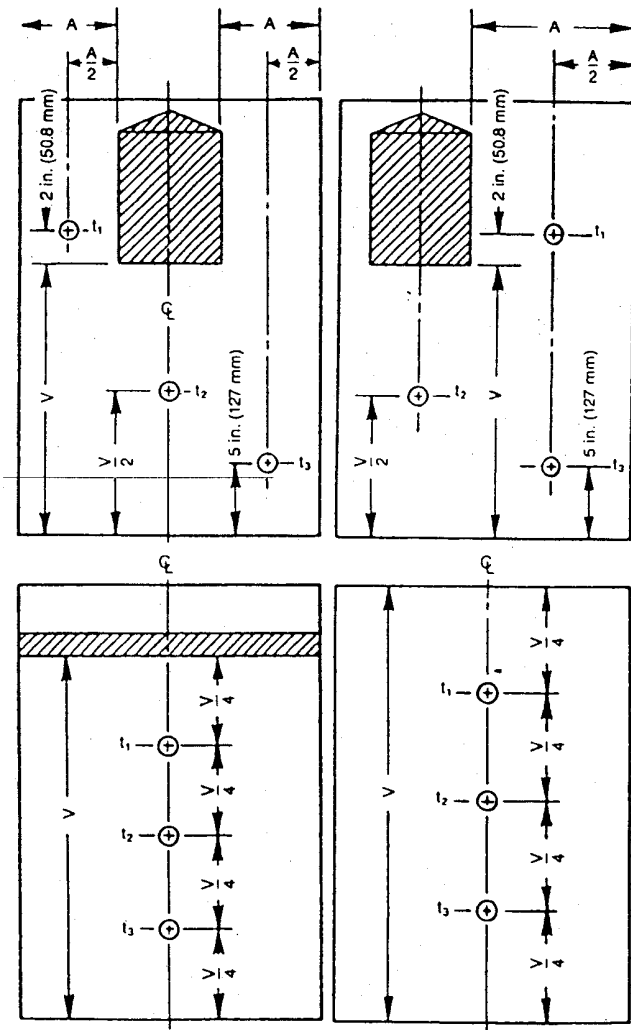


Figure 1 Locations for determination of internal refrigerated-compartment temperatures.

4.2.4.6 Leads extending from temperature-sensing elements shall be brought outside the refrigerated compartment in such a manner as to provide the least interference with air seals.

4.3 Electrical Instruments

4.3.1 Electrical measurements of supply voltage and input current shall be made with an indicating-type instrument having an accuracy of $\pm 0.5\%$ of the quantity measured.

4.3.2 Electrical measurements of input power shall be made with either an indicating- or an integrating-type instrument having an accuracy of $\pm 0.5\%$ of the quantity measured.

4.4 Electrical Measurements. Electrical measurements of volts, amperes, and watts shall be measured at the electric service connection to the *water cooler* with the meters wired into the circuit in such a way that errors due to meter power usage are minimized.

4.5 Water-Flow Instrument and Measurements

4.5.1 Water-flow measurement shall be made by one or more of the following methods:

- a. Liquid quantity, measuring weight, and time.
- b. Liquid flowmeter or volume- and time-measuring apparatus that has been calibrated for accuracy.

4.5.2 Time measurements shall be made with instruments having an accuracy of $\pm 0.2\%$.

4.5.3 Mass or volume measurements shall be made with apparatus having an accuracy of $\pm 0.5\%$.

4.5.4 A stream splitter, when used, shall be capable of maintaining the required spill with an accuracy of $\pm 1\%$ of fountain flow.

4.5.5 The overall accuracy of water-flow measurements shall be within $\pm 1\%$ of the measured value.

4.6 Pressure Measurements

4.6.1 Water supply line pressure, where required, shall be measured by a Bourdon-type gauge having an accuracy of ± 1.0 psi (± 6.9 kPa).

5. METHODS OF TESTING

5.1 General. The *water cooler* shall be tested with all panels and baffles in place and shall be located in a controlled-temperature room in a position corresponding to that of normal usage as specified in the manufacturer's installation instructions. When the specified manner of installation requires contact between the *water cooler* and any surface of the room structure, abnormal heat exchange through the structure shall be avoided.

Specified conditions shall be established and maintained for at least one hour. Sets of readings shall then be taken at 15-min intervals until four successive sets have been obtained within the specified tolerances.

5.2 Bottle-Type Water Coolers

5.2.1 *Bottle-type water coolers* shall be tested for rating with the controlled-temperature inlet water introduced to the cooling reservoir by a constant-level feed device in a manner that induces a minimum of flow (wiping action) across the cooling surfaces. The level in the cooling reservoir shall be maintained 4 ± 0.25 in. (101.6 ± 6.4 mm) below the uppermost level of the bottle support. The outlet water shall be withdrawn in a series of intermittent, equally spaced draws of 5 ± 0.25 fl oz (148 ± 7.4 mL) at time intervals adjusted to maintain the specified outlet water temperature. The outlet water shall be accumulated for weighing at the end of the test period.

5.2.1.1 Daily standby energy use shall be tested as a measurement of the total power (kWh) used in one 24 h period. No water shall be drawn during the test period. Ambient air temperature shall be maintained at $75^\circ\text{F} \pm 2^\circ\text{F}$ ($23.9^\circ\text{C} \pm 1.1^\circ\text{C}$).

5.2.1.2 If the water cooler has an integral automatic timer, it is permissible to set the timer to turn off the unit for not more than 10 h in the 24 h test period. The unit must operate for the last 2 h of the 24 h test to ensure that it warms up or cools down after the shutoff period.

5.2.1.3 The cooler must be no more than 6 in. (152 mm) from a wall at least 7 ft (2.1 m) high and extending horizontally at least 2 ft (0.6 m) from each side of the water cooler.

5.2.1.4 Airflow around the cooler must be natural; no artificial means of increasing the airflow shall be used. Airflow created by components integral to the water cooler itself, such as internal fans, is acceptable.

5.2.1.5 Cold-water temperature shall not exceed 50°F (10°C) and hot-water temperature shall not be less than 165°F (73.9°C). These temperatures shall be measured before conducting the 24 h standby energy use test in Section 5.2.1.1 when the respective function, compressor, or heating element turns on. Cold-water and hot-water temperatures shall be measured by drawing 5 ± 0.25 fl oz (148 ± 7.4 mL) prior to the start of the daily standby energy use test.

5.2.1.6 For those *water coolers* in which the water is transferred from the storage reservoir to the heat exchanger by use of a pump (or means other than gravity), the constant-level feed device is not required.

5.3 Pressure Water Coolers

5.3.1 When testing *pressure water coolers*, the test device for controlling flow may be located in either the water supply line or the cold-water outlet with conditions maintained within tolerances shown in Table 1.

5.3.2 For *water coolers* employing precoolers, the stream splitter shall not influence the measured temperature of the cooled water and shall discharge the spill onto the catch basin in the same area where the projected stream from the bubbler normally impinges.

5.3.3 Water withdrawal shall be continuous and shall be measured according to the requirements of Section 4.5 and

the subsections thereof. When a precooler is included, the spill and consumed water shall be measured separately to enable determination of the percent spill.

5.3.4 Water-Cooled Condensers. The condenser water flow-control device shall be set according to the manufacturer's installation instructions. When such instructions are not furnished, the flow-control device shall be left unchanged from the manufacturer's setting. All tests shall be made without change of flow-control setting from the setting established for the rating test.

5.3.4.1 Water supply line pressure to a water-cooled condenser shall be maintained at 35 ± 2 psig (241.2 ± 13.8 kPa) or the pressure specified in the applicable standard.

5.3.4.2 Condenser cooling water shall be measured in accordance with Section 4.5 and the subsections thereof.

5.4 Compartment-Type Water Coolers. *Compartment-type water coolers* shall be tested in accordance with Section 5.7 or 5.8, whichever applies, except for the following:

5.4.1 It is acceptable for the outlet water temperature to vary, provided it does not exceed the established value by more than 2°F (1.1°C).

5.4.2 Tests shall be conducted for a period of at least one hour after the outlet water and compartment temperature readings begin to hold or cycle steadily.

5.4.3 For *compartment-type coolers* tested at a steady flow rate, the outlet water temperature readings shall be taken every three min.

5.4.4 The outlet water temperature readings shall be averaged, and the total quantity of water drawn shall be measured.

TABLE 1 Capacity Test Measurements and Data to Be Recorded

Item No.	Description	Units	Test Reading Tolerances*
1	Drinking-water temperature ingoing	°F (°C)	±0.5°F (±0.3°C)
2	Drinking-water temperature outgoing	°F (°C)	±0.5°F (±0.3°C)
3	Ambient temperature	°F (°C)	±1.0°F (±0.6°C)
4	Condenser-water temperature ingoing	°F (°C)	±1.0°F (±0.6°C)
5	Applied voltage at unit		±2%
6	Percent spill	%	
7	Quantity of drinking water cooled	lb, gal, or gph (kg, L, or L/h)	**
8	Quantity of drinking water spilled through precooler	lb, gal, or gph (kg, L, or L/h)	±1% of fountain flow
9	Condenser-water temperature outgoing	°F (°C)	See Section 5.3.4
10	Quantity of condenser water	lb, gal, or gph (kg, L, or L/h)	See Section 5.3.4
11	Total power input	Wh or W	±2%
12	Current draw	Amp	±2%
13	Compartment temperature	°F (°C)	±1.0°F (±0.6°C)
14	Length of test	min and/or h	See Sections 4.5.2 and 5.2.1

* Maximum deviation of arithmetic average of individual readings for specified value.

** Flow rate shall be maintained within ±2% of the value established.

5.5 Hot-and-Cold-Type Water Coolers. A hot-and-cold-type water cooler shall be tested in accordance with the procedure applicable to the type of water cooler except that water-cooling tests shall be made with the hot-water portion cycling “no load” (without draw) and the hot-water temperature control set at the maximum value. Hot-water dispenser capacity tests shall be made with the cold-water portion cycling “no load” (without draw) at the prescribed cold-water temperature.

5.6 Remote-Type Water Coolers

5.6.1 A remote-type water cooler that is designed to receive and discharge ventilating air through a single side of the cooler and that is designed for installation within a wall or other enclosure shall be tested as a pressure water cooler within a test enclosure complying with the requirements of Figure 2. Only one face of the enclosure shall permit the entry and exit of ventilating air; this face shall coincide with the face of the water cooler through which the ventilating air is supplied and discharged. The open face of the test enclosure shall be covered with a grille having an open area in accordance with the applicable standard, or, if no such standard applies, the grille supplied by the manufacturer of the water cooler shall be used.

5.6.2 A remote-type water cooler that is designed for installation within a wall or other enclosure and for straight-through ventilation shall be tested as a pressure water cooler within a test enclosure complying with the requirements of Figure 2, except that both the front and rear faces of the enclosure

shall be open. Both open faces of the test enclosure shall be covered with grilles having an open area in accordance with the applicable standard, or, if no such standard applies, the grilles supplied by the manufacturer of the water cooler shall be used.

5.6.3 A remote-type water cooler that is designed for installation in the open (not in an enclosure) shall be tested as a pressure water cooler without the enclosure shown in Figure 2. The use of grilles shall be in accordance with the applicable standard, or, if no such standard applies, grilles, if supplied by the manufacturer, shall be installed.

5.7 Capacity Test for Ratings

5.7.1 Test Procedure. Items 1 through 6 listed in Table 1 shall be established at values specified in the applicable rating standard and maintained constant within the limits in Table 1. The duration of test and readings of all items except percent spill shall be taken as specified in Section 5.2.1.

5.7.2 Rating Conditions. For cooling capacity, base rate capacity, and heating capacity, the values in Table 2 shall be used.

5.7.3 Capacity for Rating. The capacity of the water cooler, expressed in gph (L/h), is computed from the quantity of drinking water cooled during the test and corrected to exact rating conditions as follows:

$$Q_C = \frac{W_m}{8.3} \left(\frac{t_1 - t_2}{t_3 - t_4} \right) \quad \text{(I-P)}$$

$$Q_C = W_m \left(\frac{t_1 - t_2}{t_3 - t_4} \right) \quad \text{(SI)}$$

where

- Q_C = capacity for rating, gph (L/h)
- W_m = total net weight of drinking water cooled during one hour, lb/h (kg/h)
- t_1 = measured ingoing water temperature, °F (°C)
- t_2 = measured outgoing water temperature, °F (°C)
- t_3 = rating value of ingoing water temperature, °F (°C)
- t_4 = rating value of outgoing water temperature, °F (°C)

The value of the capacity for rating Q_C shall be determined and recorded together with the data listed in Table 1.

5.8 Hot-Water-Dispenser Capacity Test

5.8.1 With the cold-water portion of the dispenser cycling no load and the hot-water temperature controller set to deliver water at or above the rating temperature for capacity, draws of approximately 6 fl oz (177.6 mL) water shall be drawn at equal intervals with sufficient frequency to utilize the full capacity of the hot-water portion. This water shall be accumulated for a period of 30 min, during which time the outlet water temperature shall be stabilized within a tolerance of ±2°F (±1.1°C), and the equivalent number of exact 6 fl oz (177.6 mL) draws at the rating temperature shall be determined and recorded.

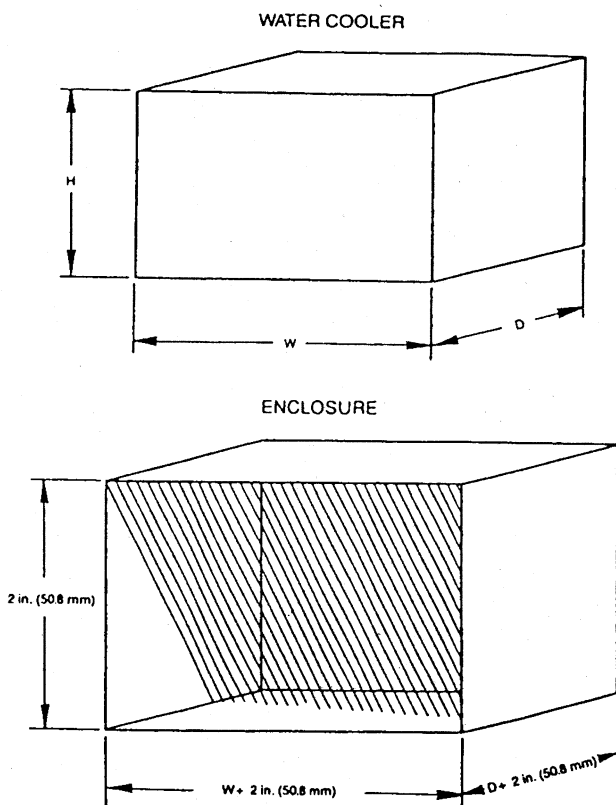


Figure 2 Test enclosure for remote-type water cooler.

TABLE 2 Standard Rating Conditions

Type of Water Cooler	For Cooling Capacity, Base Rate Capacity, and Heating Capacity ¹				Spill
	Temperature				
	Ambient °F (°C)	Inlet Water °F (°C)	Cooled Water °F(°C)	Heated Water ² °F(°C)	
Bottle	90.0 (32.2)	90.0 (32.2)	50.0 (10.0)	165.0 (73.9)	Not applicable
Point of use	90.0 (32.2)	80.0 (26.7)	50.0 (10.0)	165.0 (73.9)	Not applicable
Pressure when utilizing precooler or nonprecooler drain (bubbler service)	90.0 (32.2)	80.0 (26.7)	50.0 (10.0)	165.0 (73.9)	60
Pressure when not utilizing precooler or other heat transferring device	90.0 (32.2)	80.0 (26.7)	50.0 (10.0)	165.0 (73.9)	Not applicable
Compartment	Standard Rating Conditions for water cooling noted above shall apply. During the Standard Rating test, there shall be no melting of ice, nor shall the average temperature exceed 46.0°F (7.8°C) in the refrigerated compartment.				

¹ Voltage for the above tests shall be at nameplate voltages in accordance with AHRI Standard 110.²

² This temperature shall be referred to as the *standard rating temperature (heating)*.

5.8.1.1 Inlet water and ambient temperatures shall be within the tolerances specified in Table 1.

5.8.2 The hot-water dispenser capacity is the number of exact 6 fl oz (177.6 mL) draws per hour determined in accordance with Section 5.8.1.

5.8.2.1 Outlet hot-water temperature shall be measured in the manner described in Section 4.2.2.2.

5.9 Energy Use for Bottle-Type Water Coolers. Daily standby energy use, *Es* (kWh), for a 24 h period shall be mea-

sured in accordance with Sections 5.2.1.1, 5.2.1.2, 5.2.1.3, 5.2.1.4, and 5.2.1.5.

6. REFERENCES

1. ANSI/ASHRAE 41.1-1986 (RA 2006), *Standard Method for Temperature Measurement*. Atlanta: ASHRAE.
2. ANSI/AHRI Standard 110-2002, *Air-Conditioning and Refrigeration Equipment Nameplate Voltages*. Arlington, VA: ASHRAE.

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ASHRAE is concerned with the impact of its members' activities on both the indoor and outdoor environment. ASHRAE's members will strive to minimize any possible deleterious effect on the indoor and outdoor environment of the systems and components in their responsibility while maximizing the beneficial effects these systems provide, consistent with accepted standards and the practical state of the art.

ASHRAE's short-range goal is to ensure that the systems and components within its scope do not impact the indoor and outdoor environment to a greater extent than specified by the standards and guidelines as established by itself and other responsible bodies.

As an ongoing goal, ASHRAE will, through its Standards Committee and extensive technical committee structure, continue to generate up-to-date standards and guidelines where appropriate and adopt, recommend, and promote those new and revised standards developed by other responsible organizations.

Through its *Handbook*, appropriate chapters will contain up-to-date standards and design considerations as the material is systematically revised.

ASHRAE will take the lead with respect to dissemination of environmental information of its primary interest and will seek out and disseminate information from other responsible organizations that is pertinent, as guides to updating standards and guidelines.

The effects of the design and selection of equipment and systems will be considered within the scope of the system's intended use and expected misuse. The disposal of hazardous materials, if any, will also be considered.

ASHRAE's primary concern for environmental impact will be at the site where equipment within ASHRAE's scope operates. However, energy source selection and the possible environmental impact due to the energy source and energy transportation will be considered where possible. Recommendations concerning energy source selection should be made by its members.

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About ASHRAE

ASHRAE, founded in 1894, is an international organization of some 50,000 members. ASHRAE fulfills its mission of advancing heating, ventilation, air conditioning, and refrigeration to serve humanity and promote a sustainable world through research, standards writing, publishing, and continuing education.

For more information or to become a member of ASHRAE, visit www.ashrae.org.

To stay current with this and other ASHRAE standards and guidelines, visit www.ashrae.org/standards.

ASHRAE also offers its standards and guidelines on CD-ROM or via an online-access subscription that provides automatic updates as well as historical versions of these publications. For more information, visit the Standards and Guidelines section of the ASHRAE Online Store at www.ashrae.org/bookstore.

IMPORTANT NOTICES ABOUT THIS STANDARD

To ensure that you have all of the approved addenda, errata, and interpretations for this standard, visit www.ashrae.org/standards to download them free of charge.

Addenda, errata, and interpretations for ASHRAE standards and guidelines will no longer be distributed with copies of the standards and guidelines. ASHRAE provides these addenda, errata, and interpretations only in electronic form in order to promote more sustainable use of resources.