



STANDARD

ANSI/ASHRAE Standard 29-2015
(Supersedes ANSI/ASHRAE Standard 29-2009)

Method of Testing Automatic Ice Makers

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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

ASHRAE Standard 29 was first published in 1988 and was reaffirmed in 1999 and 2005 and revised in 2009.

This 2015 revision incorporates clarification in Section 5 to instrumentation, test equipment, and data acquisition. Detail is added to Section 6 for water and air temperature requirements during test. More specific instruction is provided in Section 7 for ice capacity determination sampling. Finally, Normative Annex A includes revisions for determination of calorimeter constant and heat of fusion for ice product for continuous-type ice makers.

1. PURPOSE

This standard prescribes a method of testing automatic ice makers by

- a. specifying procedures to be used when testing automatic ice makers,
- b. establishing the types of equipment to which the provisions of the standard apply,
- c. defining terms describing the equipment covered and terms related to testing,
- d. specifying the type of instrumentation and test apparatus required in testing,
- e. specifying a uniform method for calculation of results, and
- f. specifying data and results to be recorded.

2. SCOPE

This standard does not include automatic ice makers installed in household refrigerators, combination refrigerator-freezers, and household freezers.

3. DEFINITIONS

automatic ice maker: a factory-made assembly consisting of a condensing unit and ice-making section operating as an integrated unit, with means for making and harvesting ice. It may also include means for storing or dispensing ice, or both. The automatic ice maker may be composed of one or more sections for shipping purposes.

batch-type ice maker: an ice maker having alternate freezing and harvesting periods. Also referred to as a *cube-type ice maker*.

continuous-type ice maker: an ice maker that continually freezes and harvests ice at the same time.

dump water: water drainage from an ice maker to control the clarity of ice or to prevent scaling.

pure ice: ice made by using water with less than 5 ppm of solids concentration.

4. CLASSIFICATION

4.1 Method of Rejecting Heat

- 4.1.1 Water-cooled condenser.
- 4.1.2 Air-cooled condenser.

4.2 Type of Ice Harvested

- 4.2.1 Ice in irregular shapes of chips, flakes, ribbons, or wafers.
- 4.2.2 Uniformly shaped ice of not over 56 g (2 oz).

5. INSTRUMENTS AND APPARATUS

5.1 Test Room

5.1.1 Ambient Temperature. With the ice maker at rest, the vertical ambient temperature gradient in any metre (foot) of vertical distance from 51 mm (2 in.) above the floor or supporting platform to a height of 2.1 m (7 ft), or to a height of 0.3 m (1 ft) above the top of the cabinet within the clearances specified in Section 6.5, whichever is greater, shall not exceed 0.91°C/m (0.5°F/ft).

5.1.2 Air Circulation. With the ice maker at rest, ambient air movement created by any source external to the unit shall not impinge upon the air inlet openings with a velocity greater than 0.25 m/s (50 fpm).

5.1.3 Test Room Operation. No changes to the test room shall be made during operation of the ice maker under test that would impact the vertical ambient temperature gradient or the ambient air movement specified in Sections 5.1.1 and 5.1.2.

5.2 Temperature-Measuring Instruments

5.2.1 Types. Temperature shall be measured with instruments of a type having the specified accuracies at the temperatures of use.

5.2.2 Accuracy and readability each shall be within $\pm 0.56^\circ\text{C}$ (1.0°F).

5.2.3 Where accuracy greater than $\pm 0.56^\circ\text{C}$ (1.0°F) is specified, the instrument shall be calibrated by comparison with a certified standard in the range of use or shall itself be certified as to accuracy, and the resolution shall be at least equal to the accuracy requirement unless otherwise specified.

5.3 Electrical Instruments

5.3.1 Accuracy and readability shall each be within $\pm 2.0\%$ of the quantity measured.

5.3.2 Input power shall be measured with an integrating watt-hour meter graduated to 0.01 kWh.

5.4 Water-Measuring Instruments

5.4.1 Flow shall be measured by one or more of the following methods and have accuracy and readability each of $\pm 2.0\%$ of the quantity measured:

- a. Liquid quantity, measuring either weight or volume
- b. Integrating-type liquid flow meter