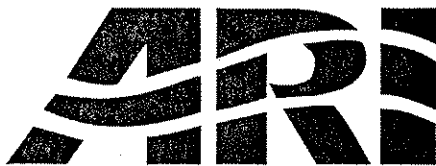


**2003
STANDARD for**

**PERFORMANCE
RATING OF
AUTOMATIC
COMMERCIAL
ICE-MAKERS**



**AIR-CONDITIONING &
REFRIGERATION
INSTITUTE**

Standard 810

IMPORTANT

SAFETY DISCLAIMER

ARI does not set safety standards and does not certify or guarantee the safety of any products, components or systems designed, tested, rated, installed or operated in accordance with this standard/guideline. It is strongly recommended that products be designed, constructed, assembled, installed and operated in accordance with nationally recognized safety standards and code requirements appropriate for products covered by this standard/guideline.

ARI uses its best efforts to develop standards/guidelines employing state-of-the-art and accepted industry practices. ARI does not certify or guarantee that any tests conducted under its standards/guidelines will be non-hazardous or free from risk.

ARI CERTIFICATION PROGRAM PROVISIONS

Scope of the Certification Program

The Certification Program includes all Automatic Commercial Ice-Makers (batch type) as defined in Section 3 and includes all Ice Storage Bins as defined in Section 3 of ARI Standard 820-2000, *Ice Storage Bins*.

Certified Ratings

The following Certification Program ratings are verified by test at the Standard Rating Conditions:

- a. Ice Harvest Rate, lb/24 h [kg/24 h]
- b. Potable Water Use Rate, gal/100 lb of ice [L/45.0 kg of ice]
- c. Condenser Water Use Rate, gal/100 lb of ice [L/45.0 kg of ice]
- d. Energy Consumption Rate, kWh/100 lb of ice [kWh/45.0 kg of ice]
- e. Bin Theoretical Storage Capacity, lb [kg] (Self-Contained Models only)

Note:

This standard supersedes ARI Standard 810-2000.

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PERFORMANCE RATING OF AUTOMATIC COMMERCIAL ICE-MAKERS

Section 1. Purpose

1.1 Purpose. The purpose of this standard is to establish for Automatic Commercial Ice-Makers: definitions; test requirements; rating requirements; minimum data requirements for Published Ratings; 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.

Section 2. Scope

2.1 Scope. This standard applies to factory-made Automatic Commercial Ice-Makers as defined in Section 3.

Section 3. Definitions

All terms in this document 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.

3.1 Automatic Commercial Ice-Maker. A factory-made assembly (not necessarily shipped in one package) 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.

3.1.1 Self-Contained Model. A model in which the ice-making mechanism and storage compartment are in an integral cabinet.

3.1.2 Split System Ice-Maker. A model in which the ice-making mechanism and condenser or condensing unit are in separate sections.

3.2 Published Rating. A statement of the assigned values of those performance characteristics, under stated rating conditions, by which a unit may be chosen to fit its application. These values apply to all units of like nominal size and type (identification) produced by the same manufacturer. The term Published Rating includes the ratings of all performance characteristics shown on the unit or

published in specifications, advertising or other literature controlled by the manufacturer, at stated Rating Conditions.

3.2.1 Application Rating. A rating based on tests performed at Application Rating conditions (other than Standard Rating Conditions).

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

3.3 Quality of Harvested Ice. The percentage of ice contained in the harvested ice (5.2.2.1)

3.4 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.

3.4.1 Standard Rating Conditions. Rating Conditions used as the basis of comparison for performance characteristics.

3.5 "Shall" or "Should." "Shall" or "should" shall be interpreted as follows:

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

3.5.2 Should. "Should" is used to indicate provisions which are not mandatory but which are desirable for good practice.

Section 4. Test Requirements

4.1 Test Requirements. The performance of Automatic Commercial Ice-Makers shall be verified by tests conducted in accordance with ASHRAE Standard 29, with the exception listed below in 4.1.4. The calorimeter test need not be performed on cube-type ice-makers as defined in the ASHRAE Handbook, *Systems and Equipment*.

4.1.1 Equipment. Automatic Commercial Ice-Makers shall be tested using all components as recommended by the manufacturer.

4.1.2 Electrical Conditions. All Standard Rating Tests shall be performed at the nameplate rated voltage(s) and frequency.

For Automatic Commercial Ice-Makers with dual nameplate voltage ratings, Standard Rating Tests shall

be performed at both voltages, or at the lower of the two voltages, if only a single Standard Rating is to be published.

4.1.3 Requirements for Split Systems. All Standard Ratings for split systems shall be determined with at least 25 ft [7.6 m] of interconnection tubing on each line. The line sizes, insulation and details of installation shall be in accordance with the manufacturer's published literature.

4.1.4 Test Set Up. The test unit shall be set up for testing per the manufacturer's written instructions provided with the unit. However, no adjustments of any kind shall be made to the test unit prior to or during the test that would affect the ice capacity, energy usage, or water usage of the test sample.

Section 5. Rating Requirements

5.1 Published Ratings. Published Ratings shall include Standard Ratings, and may also include Application Ratings.

5.2 Standard Ratings. Standard Ratings shall be established at the Standard Rating Conditions specified in 5.2.1. All Standard Ratings shall be verified by tests as required in Section 4. When the condenser or condensing unit is intended only for indoor installation, all literature pertaining to such Split System Ice-Makers shall state that they are to be installed only indoors.

For machines with adjustable size ice cube settings, Standard Ratings require the publication of ratings for the largest size cube setting and for the smallest size cube setting. Ratings for any other intermediate size cube settings may be published as Application Ratings. The ice cube size setting shall accompany all Published Ratings.

5.2.1 Standard Rating Conditions. The conditions of test for Standard Ratings are as follows:

Ambient temperature: 90.0°F [32.2°C] (For a Split System Ice-Maker, the condenser air inlet temperature shall be 90.0°F [32.2°C] with the indoor ambient temperature 90.0°F [32.2°C])

Water inlet temperature: 70.0°F [21.1°C]

Water inlet pressure: 30.0 ± 3.0 psig
[207 ± 21.0 kPa]

5.2.2 Values of Standard Ratings. Standard Ratings shall include:

5.2.2.1 Ice Harvest Rate. The amount of 32°F [0.0°C] ice harvested, stated in lb/24 h [kg/24 h] (corrected to 144 Btu/lb [335 kJ/kg] per Section 4), stated in multiples of 1. Cube-type Ice-Makers are considered as producing 100% Quality of Harvested Ice.

5.2.2.2 Condenser Water Use Rate. The amount of water used by the condensing unit (if water cooled), stated in gal/100 lb [L/45.0 kg] of ice, as determined in 5.2.2.1, stated in multiples of 1.

5.2.2.3 Potable Water Use Rate. The amount of potable water used in making ice, including blow down, stated in gal/100 lb [L/45.0 kg] of ice, as determined in 5.2.2.1, stated in multiples of 0.1.

5.2.2.4 Energy Consumption Rate. Total energy input rate, stated in kWh/100 lb [kWh/45.0 kg] of ice as determined in 5.2.2.1, stated in multiples of 0.1. For Split Systems Ice-Makers, total power input shall include condenser fan power.

5.2.2.5 Bin Theoretical Storage Capacity For Self-Contained Model Ice-Makers only, the theoretical storage capacity and the storage effectiveness of the ice storage bin shall be determined in accordance with ARI Standard 820. For these models, the internal volume is the volume calculated up to the intended shut-off level. The intended shut-off level is defined as the height of the thermostat bulb; the bottom of the curtain or the height of the electric eye, depending upon the mechanism used to shut off the Ice-Maker.

5.3 Application Ratings. Ratings at conditions other than those specified in 5.2.1 may be published as Application Ratings, and shall be based on data determined by the test requirements prescribed in Section 4.

5.4 Tolerances. To comply with this standard, Published Ratings shall be based on data obtained in accordance with the provisions of Sections 4 and 5 of this standard and shall be such that any production unit, when tested, will have an ice harvest rate not less than 95% of the Published Rating and an energy consumption rate not more than 105% of the Published Rating. The water use rates shall not be more than 110% of the Published Ratings.

Section 6. Minimum Data Requirements for Published Ratings

6.1 *Minimum Data Requirements for Published Ratings.* As a minimum, Published Ratings shall include all Standard Ratings. All claims to ratings within the scope of this standard shall include the statement "Rated in accordance with ARI Standard 810". All claims to ratings outside the scope of this standard shall include the statement "Outside the scope of ARI Standard 810". Wherever Application Ratings are published or printed, they shall include a statement of the conditions at which the ratings apply.

Section 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.

Nameplate voltages for 60 Hertz systems shall include one or more of the equipment nameplate voltage ratings shown in Table 1 of ARI Standard 110. Nameplate voltages for 50 Hertz systems shall include one or more of the utilization voltages shown in Table 1 of IEC Standard Publication 60038.

Section 8. Conformance Conditions

8.1 *Conformance.* While conformance with this standard is voluntary, Conformance shall not be claimed or implied for products or equipment within the standard's Purpose (Section 1) and Scope (Section 2) unless such product claims meet all of the requirements of the standard and all of the testing and rating requirements are measured and reported in complete compliance with the standard. Any product that has not met all the requirements of the standard cannot reference, state, or acknowledge the standard in any written, oral, or electronic communication.

APPENDIX A. REFERENCES - NORMATIVE

A1 Listed here are all standards, handbooks, and other publications essential to the formation and implementation of the standard. All references in this appendix are considered as part of this standard.

A1.1 ARI Standard 110-2002, *Air-Conditioning and Refrigerating Equipment Nameplate Voltages*, 2002, Air-Conditioning and Refrigeration Institute, 4100 North Fairfax Drive, Suite 200, Arlington, VA 22203, U.S.A.

A1.2 ARI Standard 820-2000, *Ice Storage Bins*, 2000, Air-Conditioning and Refrigeration Institute, 4100 North Fairfax Drive, Suite 200, Arlington, VA 22203, U.S.A.

A1.3 ASHRAE Handbook, *Systems and Equipment*, 2000, American Society of Heating, Refrigerating, and Air-Conditioning Engineers, Inc., 1791 Tullie Circle N.E., Atlanta, GA 30329, U.S.A.

A1.4 ASHRAE Standard 29-1988 (RA99), *Methods of Testing Automatic Ice-Makers*, 1999, American Society of Heating, Refrigerating, and Air-Conditioning Engineers, Inc., 1791 Tullie Circle N.E., Atlanta, GA 30329, U.S.A.

A1.5 ASHRAE *Terminology of Heating, Ventilation, Air-Conditioning and Refrigeration*, Second Edition, 1991, American Society of Heating, Refrigerating and Air-Conditioning Engineers, Inc., 1791 Tullie Circle N.E., Atlanta, GA 30329, U.S.A.

A1.6 IEC Standard Publication 60038, *IEC Standard Voltages*, 1983, International Electrotechnical Commission, 3, rue de Varembe, P.O. Box 131, 1211 Geneva 20, Switzerland.

APPENDIX B. REFERENCES – INFORMATIVE

None