



Standard Specification for Ice Making Machines, Icemaker-Dispensers, and Ice Dispensing Equipment¹

This standard is issued under the fixed designation F2432; the number immediately following the designation indicates the year of original adoption or, in the case of revision, the year of last revision. A number in parentheses indicates the year of last reapproval. A superscript epsilon (ϵ) indicates an editorial change since the last revision or reapproval.

1. Scope

1.1 This specification covers requirements for commercial automatic ice making equipment. It covers the equipment and devices used in manufacturing and processing ice for human consumption and the attached equipment used in storing and dispensing ice in connection with this equipment.

1.2 This specification does not apply to icemakers of the tray type, ice vending machines, or icemakers and icemaker kits used in household refrigerators or freezers. This specification is not intended to cover block ice manufacturing plants.

1.3 The values stated in inch-pound units are to be regarded as the standard. The SI values given in parenthesis are provided for information only.

1.4 *This international standard was developed in accordance with internationally recognized principles on standardization established in the Decision on Principles for the Development of International Standards, Guides and Recommendations issued by the World Trade Organization Technical Barriers to Trade (TBT) Committee.*

2. Referenced Documents

2.1 *ASTM Standards:*²

[A167 Specification for Stainless and Heat-Resisting Chromium-Nickel Steel Plate, Sheet, and Strip \(Withdrawn 2014\)](#)³

[A1008/A1008M Specification for Steel, Sheet, Cold-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, Solution Hardened, and Bake Hardenable](#)

[D3951 Practice for Commercial Packaging](#)

[F760 Specification for Food Service Equipment Manuals](#)
[F1166 Practice for Human Engineering Design for Marine Systems, Equipment, and Facilities](#)

2.2 *ANSI Standard:*⁴

[Z1.4 Sampling Procedures and Tables for Inspection by Attributes](#)

2.3 *ANSI/UL Standards:*⁵

[No. 563 UL Standard For Ice Makers](#)

[No. 763 UL Standard for Operated Commercial Food Preparing Machines](#)

[No. 969 UL Standard for Marking and Labeling Systems](#)

2.4 *ARI Standards:*⁶

[Standard No. 810 Standard for Automatic Commercial Ice-makers](#)

[Standard No. 820 Standard for Ice Storage Bins](#)

2.5 *ASHRAE Standard:*⁷

[Standard No. 29 Methods of Rating and Testing Ice Makers](#)

2.6 *NSF/ANSI Standards:*⁸

[No. 12 Automatic Ice making Equipment](#)

[No. 18 Manual Food and Beverage Dispensing Equipment](#)

2.7 *Federal and Military Standards:*⁹

[MIL-STD-1399/300 Interface Standard For Shipboard Systems Section 300A Electric Power, Alternating Current](#)

[MIL-STD-167/1 Mechanical Vibrations of Shipboard Equipment \(Type I—Environmental and Type II—Internally Excited\)](#)

[MIL-STD-461 Requirements For the Control of Electromagnetic Interference Characteristics of Subsystems and Equipment](#)

¹ This specification is under the jurisdiction of ASTM Committee F26 on Food Service Equipment and is the direct responsibility of Subcommittee F26.03 on Storage and Dispensing Equipment.

Current edition approved Oct. 1, 2018. Published November 2018. Originally approved in 2004. Last previous edition approved in 2012 as F2432 – 12. DOI: 10.1520/F2432-12R18.

² For referenced ASTM standards, visit the ASTM website, www.astm.org, or contact ASTM Customer Service at service@astm.org. For *Annual Book of ASTM Standards* volume information, refer to the standard's Document Summary page on the ASTM website.

³ The last approved version of this historical standard is referenced on www.astm.org.

⁴ Available from American National Standards Institute (ANSI), 25 W. 43rd St., 4th Floor, New York, NY 10036.

⁵ Available from Underwriters Laboratories (UL), Corporate Progress, 333 Pfingsten Rd., Northbrook, IL 60062.

⁶ Available from Air-Conditioning & Refrigeration Institute (ARI) 4100 N. Fairfax Drive, Suite 200 Arlington, VA 22203.

⁷ Available from American Society of Heating, Refrigerating, and Air-Conditioning Engineers, Inc. (ASHRAE), 1791 Tullie Circle, NE, Atlanta, GA 30329.

⁸ Available from NSF International, P.O. Box 130140, 789 N. Dixboro Rd., Ann Arbor, MI 48113-0140.

⁹ Available from Standardization Documents Order Desk, DODSSP, Bldg. 4, Section D, 700 Robbins Ave., Philadelphia, PA 19111-5098.

3. Terminology

3.1 *Definitions:*

3.1.1 *Capacity:*

3.1.1.1 *ice maker*—quantity of ice produced during a 24-h period at standard rating conditions defined by ARI 810.

3.1.1.2 *ice storage bin*—theoretical amount of ice, which can be contained within an ice storage bin at standard rating conditions defined by ARI 820.

3.1.2 *harvest*—function of removing or separating the manufactured ice from the evaporator.

3.1.3 *remote icemaker*—icemaker intended to be connected to a field-installed condenser located remote from the icemaker.

3.1.4 *self-contained icemaker*—unitary equipment consisting of a complete factory assembled and tested refrigerating system in which all refrigerant-containing parts are permanently connected at the factory.

3.1.5 *unitary icemaker*—equipment consisting of a complete factory assembled and tested refrigeration system comprising one or more assemblies that may be shipped separately but are intended to be used together.

4. Classification

4.1 *General*—Ice machines covered by this specification are classified by types, grades, classes, sizes and styles.

4.2 *Type:*

4.2.1 *Type I*—Ice machine with or without ice storage bin.

4.2.2 *Type II*—Icemaker-dispenser machine.

4.2.3 *Type III*—Ice dispenser.

4.3 *Grade:*

4.3.1 *Grade 1*—Air-cooled condenser (self-contained).

4.3.2 *Grade 2*—Water-cooled condenser (self-contained).

4.3.3 *Grade 3*—Remote water-cooled.

4.3.4 *Grade 4*—Remote air-cooled.

4.4 *Class:*

4.4.1 *Class A*—Cubed ice.

4.4.2 *Class B*—Flaked ice.

4.4.3 *Class C*—Nugget ice.

4.4.4 *Class D*—Other ice shapes.

4.5 *Size:*

4.5.1 *Cube Ice Makers:*

Ice Maker Size	Production Capacity	
	(lb)	(kg)
1	100 and under	45.3 and under
2	101 to 150	45.8 to 68.0
3	151 to 200	68.5 to 90.7
4	201 to 250	91.1 to 113.4
5	251 to 350	113.8 to 158.7
6	351 to 450	159.2 to 204.1
7	451 to 550	204.5 to 249.8
8	551 to 650	249.9 to 294.8
9	651 to 900	295.2 to 408.2
10	901 to 1250	408.6 to 566.9
11	1251 to 1500	567.4 to 680.3
12	1501 and over	680.8 and over

4.5.2 *Flake Ice and Nugget Makers:*

Ice Maker Size	Production Capacity	
	(lb)	(kg)
1	200 and under	90.7 and under

2	201 to 300	91.1 to 136.0
3	301 to 400	136.5 to 181.4
4	401 to 550	181.8 to 249.4
5	551 to 700	249.9 to 317.5
6	701 to 1000	317.9 to 453.5
7	1001 to 1200	454.0 to 544.3
8	1201 to 2000	544.7 to 907.1
9	2001 and over	907.6 and over

NOTE 1—This specification does not purport to address all of the sizes that may be available, but is an overview of the most common sizes used in the industry today (see [Appendix X1](#)).

4.6 *Style:*

4.6.1 *Style 1*—Corrosion-resisting steel cabinet.

4.6.2 *Style 2*—Carbon steel cabinet.

4.6.3 *Style 3*—Plastic.

5. Ordering Information

5.1 *Ordering Data*—Purchasers shall select the ice making machines, icemaker-dispensers, and ice dispensing equipment and any preferred options and include the following information in the purchasing document:

5.1.1 Title, number, and date of this specification,

5.1.2 Type, grade, class, size, and style of machine required,

5.1.3 Quantity to be furnished,

5.1.4 Ice storage bin size,

5.1.5 Electrical power supply characteristics: voltage, phase, frequency (see [7.3.1](#)),

5.1.6 Accessory equipment such as water/beverage dispensing heads, spare parts, maintenance parts required, or other options available by the manufacturer, or a combination thereof,

5.1.7 When Federal/Military procurement is required, review and implement the applicable supplementary requirements (see S1.1 through S8.8.3),

5.1.8 When specified, the purchaser shall be furnished certification that samples representing each lot have been either tested or inspected as directed in this specification and the requirements have been met. When specified, a copy of the test results shall be furnished (see [14.1](#) through [14.3](#)),

5.1.9 Level of preservation and packing required if other than as stated in Practice [D3951](#) (see [17.1](#)), and

5.1.10 Labeling requirements (if different than [15.1](#)).

6. Materials and Manufacture

6.1 *General*—Ice making machines, icemaker-dispensers, and ice dispensing equipment shall conform to NSF/ANSI No. 12. Materials used shall be new and free from defects, or reclaimed and recycled conforming to the same quality standards for new materials.

6.1.1 *Stainless Steel*—Stainless steel shall conform to the 300 series of Specification [A167](#) as applicable.

6.1.2 *Carbon*—Carbon steel sheet or strip shall conform to Specification [A1008/A1008M](#) as applicable.

6.1.3 *Ozone-Depleting Compounds*—Type one ozone-depleting compounds shall not be used as a refrigerant or as a component of foam insulation and shall be the manufacturer's standard chemicals.

6.1.4 *Insulation*—Insulation used in construction shall be fabricated to efficiency requirements in accordance with ARI 820.

7. Design and Construction

7.1 *General*—Ice machines shall be the manufacturer's standard product delivered assembled, ready for mounting, connected to electricity and water, and used as applicable.

7.2 The ice machine shall have a means of harvesting and storing ice, a water circulating system, motor or motor drives, and all necessary piping, wiring, control and safety devices, and accessories required to provide an automatic operating ice making machine with automatic control of ice level in storage bin. Storage bins shall be sized accordingly, with respect to production capacities, and be compatible with the ice making machine or icemaker-dispenser. Ice dispensing equipment shall be units with a means of dispensing ice by actuation of a lever or button device. All parts of ice making machines, icemaker-dispensers, and ice dispensing equipment shall be located to permit repair or replacement.

7.2.1 *Exterior Cabinet*—Equipment shall be designed, constructed, and tested to be in compliance with ANSI/UL 563 and NSF/ANSI No. 12 or NSF/ANSI No. 18 as applicable.

7.3 Electrical Requirements:

7.3.1 *Nominal Input Power*—Unless otherwise specified (see 5.1.5), the machine shall be designed to operate on one of the following:

- 7.3.1.1 120 V, 60 Hz, single phase.
- 7.3.1.2 208 to 230 V, 60 Hz, single phase.
- 7.3.1.3 208 to 230 V, 60 Hz, three phase.
- 7.3.1.4 220 to 240 V, 50 Hz, single phase.

7.3.2 *Electrical Motors*—All electric motors shall have bearings that require no additional lubrication.

7.4 *Refrigeration Unit*—The refrigeration unit shall be an integral part of the ice making machine or icemaker-dispenser. The assembled refrigeration unit shall be completely self-contained, completely wired, and completely dehydrated and charged with the proper amount and type of refrigerant and oil necessary for operation. The refrigerating system shall be fitted with a means of recovering and adding refrigerant to the system. The compressor and compressor motor shall be of the type and size to obtain the capabilities listed in 4.5.1 and 4.5.2. Motors shall be protected against damage from overloads and voltage fluctuations when starting or running by means of a thermal overload protector. When 50 Hz frequency is specified, the motor shall be specifically designed for operation on that frequency.

7.5 *Storage Bin*—Storage bins shall be insulated with material as specified in 6.1.4. Bins shall be available in various sizes to meet the storage and usage requirements of associated ice making machines. Bin selection shall be specified in the contract or purchase order (see 5.1.4).

7.5.1 *Ice Storage Bin Size*—The table below lists typical bin sizes. This specification does not purport to address all of the sizes that may be available, but is an overview of the most common sizes used in the industry today (see Appendix X1).

Ice Bin Size	Capacity	
	(lb)	(kg)
1	200 and under	90.7 and under
2	201 to 300	91.1 to 136.0
3	301 to 400	136.5 to 181.4

4	401 to 550	181.8 to 249.4
5	501 to 600	227.2 to 272.1
6	601 to 800	272.6 to 362.8
7	801 to 1000	363.3 to 453.5
8	1001 and over	454.0 and over

7.6 *Capacities*—The ice making machines and icemaker-dispensers shall have the ice making capacity as listed in 4.5 under the conditions specified in 11.1.

7.7 *Legs*—Floor style units shall be mounted on NSF/ANSI No. 12 approved 6-in. (152-mm) legs. Counter or dresser style units shall be mounted on NSF/ANSI No. 12 approved 4-in. (102-mm) legs.

8. Performance Requirements

8.1 Ice makers shall conform to ANSI/UL 563 and ASHRAE 29. Ice storage bins shall conform to ARI 820.

9. Workmanship, Finish, and Appearance

9.1 All components and assemblies of the machines shall be free from dirt and other extraneous materials, burrs, slivers, tool and grind marks, dents, and cracks. Castings, molded parts, and stampings shall be free of voids, sand pits, blowholes, and sprues. External surfaces shall be free from kinks, dents, and other deformities. Forming and welding shall not cause damage to the metal and shall be done neatly and accurately.

10. Sampling

10.1 A representative production model shall be selected for performing testing.

10.2 When specified in the contract or purchase order, sampling for inspection shall be performed in accordance with ANSI Z1.4.

11. Test Methods

11.1 *Performance and Operational Testing*—Equipment shall be designed, constructed, and tested to be in compliance with ANSI/UL 563, NSF/ANSI No. 12, ASHRAE 29, ARI 810, and ARI 820. Inability of the machines to operate as specified shall constitute failure of the test.

12. Inspection

12.1 *End Item Testing*—When specified in the contract or purchase order, one production item selected at random from each lot shall be tested by the manufacturer in accordance with the applicable paragraphs of Section 11. Performance results shall be recorded in a permanent file, and the information shall be available to the customer upon demand. Any subsequent change in design that would relate to performance shall require a new test record.

12.2 *Component and Material Inspection*—Incoming components and materials shall be inspected by the manufacturer to the design parameters as specified on drawings or purchase documents, or both.

13. Rejection and Rehearing

13.1 Material that fails to conform to the requirements of this specification may be rejected. Rejection should be reported