



Standard Specification for Freezers, Ice Cream, Soft Serve, Shake¹

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This standard has been approved for use by agencies of the U.S. Department of Defense.

^{e1} NOTE—Corrected 2.2 and 2.3 editorially in March 2020.

1. Scope

1.1 This specification covers commercial ice cream, soft serve, and shake freezers, which freeze and dispense frozen product (dairy, yogurt, custard, etc.) on a continuous basis. Included in this specification are conventional and heat-treatment freezers.

1.2 Equipment covered under this specification may contain a substance (or be manufactured with a substance) that harms public health and environment by destroying ozone in the upper atmosphere. This specification does not purport to address environmental regulations. It is the responsibility of the user of this standard to comply with environmental regulations (see 7.5).

1.3 The values stated in inch-pound units are to be regarded as standard. The values given in parentheses are mathematical conversions to SI units that are provided for information only and are not considered standard.

1.4 *This standard does not purport to address all of the safety concerns, if any, associated with its use. It is the responsibility of the user of this standard to establish appropriate safety, health, and environmental practices and determine the applicability of regulatory limitations prior to use.*

1.5 *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.*

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

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2. Referenced Documents

2.1 ASTM Standards:²

- A176 Specification for Stainless and Heat-Resisting Chromium Steel Plate, Sheet, and Strip (Withdrawn 2015)³
- A240/A240M Specification for Chromium and Chromium-Nickel Stainless Steel Plate, Sheet, and Strip for Pressure Vessels and for General Applications
- D3951 Practice for Commercial Packaging
- F760 Specification for Food Service Equipment Manuals
- F1166 Practice for Human Engineering Design for Marine Systems, Equipment, and Facilities
- F2795 Test Method for Performance of Self-Contained Soft Serve and Shake Freezers

2.2 ANSI/UL Standard:⁴

- ANSI/UL 621 for Ice Cream Makers

2.3 ANSI/NSF International Standard:⁵

- NSF/ANSI 6 for Dispensing Freezers
- NSF/ANSI 51 for Plastic Materials and Components Used in Food Equipment

2.4 ANSI Standards:⁶

- B1.1 Unified Inch Screw Threads (UN and UNR Thread Form)
- Z1.4 Sampling Procedures and Tables for Inspection by Attributes

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 UL LLC, Inc., 333 Pfingsten Rd., Northbrook, IL 60062.

⁵ Available from NSF International, P.O. Box 130140, Ann Arbor, MI 48113-0140.

⁶ Available from American National Standards Institute, 11 W. 42nd St., 13th Floor, New York, NY 10036.

2.5 Military Standards:⁷

MIL-R-12323 Refrigerators and Related Equipment, Packaging and Packing

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

MIL-STD-1399/300 Interface Standard for Shipboard Systems Section 300A Electric Power, Alternating Current

3. Terminology

3.1 *corrosion-resistant steel*, *n*—corrosion-resisting steel shall conform to any of the 300 Series of Specification **A240/A240M**, or the 400 Series of Specification **A176**, where permitted by ANSI/NSF Std. 6.

3.2 *combination freezer*, *n*—a soft serve and shake machine employing two main compressors and two main condensers with one or more condenser fan motors and two separate freezer doors (or dispense head) (that is, one for soft serve and another for shake), designed to dispense shake and soft serve product in the same footprint.

3.3 *overrun*, *n*—the increase in volume due to the addition of air to frozen softserve and shake products, calculated by this formula:

$$\text{Overrun} = (\text{Weight of liquid mix} - (1)$$

$$\text{Weight of frozen product}) / \text{Weight of frozen product}$$

3.4 *refrigeration system type*, *n*—

3.4.1 *air cooled freezer*, *n*—a soft serve or shake freezer that uses air passing over a main condenser in the refrigeration system.

3.4.2 *heat-treatment freezers*, *n*—operate as conventional freezers and heat daily all product to 150°F (66°C) minimum for at least 30 min to destroy undesirable microorganisms.

3.4.3 *water-cooled freezer*, *n*—a soft serve or shake freezer which uses water passing through a twin tube condenser in the freezer cylinder refrigeration system.

3.5 *single spout freezer*, *n*—a freezer with a single main compressor and single main condenser with one or more condenser fan motors with single spout and a freezer door.

3.6 *twin single spout freezer*, *n*—a freezer employing either of the below configurations (Twin Twist freezer “A” or “B”) but with two single spout doors which can only dispense from one Freezer Cylinder.

3.7 *twin twist freezer “A”*, *n*—a freezer using two main compressors and two main condensers with one or more condenser fan motors and a freezer door (3 spout) which the center spout draws from both freezer cylinders.

3.8 *twin twist freezer “B”*, *n*—a freezer with single main compressor and single main condenser, with one or more

condenser fan motors, with a freezer door (3 spout) which the center spout draws product from both freezer cylinders.

4. Classification

4.1 *General*—Ice cream freezers covered by this specification are classified by Type, Style (was group), Size/Capacity (was size), Class (new – was covered under 7.1.1 – Electrical Input), Grade (updated to include what was Class), and Group (new –added to cover mounting options which should be part of the specification section for this equipment).

4.2 *Type*:

4.2.1 *Type I*—Commercial soft-serve freezer.

4.2.2 *Type II*—Commercial shake freezer.

4.2.3 *Type III*—Combination commercial soft-serve and shake freezer.

4.3 *Style*:

4.3.1 *Style 1*—One freezing cylinder.

4.3.2 *Style 2*—Two freezing cylinders.

4.3.3 *Style 3*—Three freezing cylinders.

4.3.4 *Style 4*—Four freezing cylinders.

4.4 *Size/Capacity*:

4.4.1 *Size/Capacity 1*—1.0 to 4.9 gal/h (3.8 to 18.6 L/h) finished product output.⁸

4.4.2 *Size/Capacity 2*—5.0 to 9.9 gal/h (18.9 to 37.5 L/h) finished product output.⁸

4.4.3 *Size/Capacity 3*—10.0 to 14.9 gal/h (37.9 to 56.4 L/h) finished product output.⁸

4.4.4 *Size/Capacity 4*—15.0 to 19.9 gal/h (56.8 to 75.3 L/h) finished product output.⁸

4.4.5 *Size/Capacity 5*—20.0 to 29.9 gal/h (75.7 to 113.2 L/h) finished product output.⁸

4.4.6 *Size/Capacity 6*—30.0 to 39.9 gal/h (113.6 to 151.0 L/h) finished product output.⁸

4.5 *Class*:

4.5.1 *Class a*—120 V, 60 Hz, 1 Ph.

4.5.2 *Class b*—208 V, 60Hz, 1 Ph.

4.5.3 *Class c*—240 V, 60 Hz, 1 Ph.

4.5.4 *Class d*—208 to 230 V, 60 Hz, 1 Ph.

4.5.5 *Class e*—208 V, 60Hz, 3 Ph.

4.5.6 *Class f*—240 V, 60 Hz, 3 Ph.

4.5.7 *Class g*—208 to 230 V, 60 Hz, 3 Ph.

4.5.8 *Class h*—460 V, 60Hz, 3 Ph.

4.5.9 *Class i*—480 V, 60 Hz, 3 Ph.

4.5.10 *Class j*—230 V, 50 Hz, 3 Ph.

4.5.11 *Class k*—380 to 415 V, 50 Hz, 3 Ph.

4.5.12 *Class m*—380 V, 60 Hz, 3 Ph.

4.5.13 *Class n*—440 V, 60 Hz, 3 Ph (shipboard use).

4.6 *Grade*:

4.6.1 *Grade A*—Non-heat-treatment freezer with air-cooled condenser.

4.6.2 *Grade B*—Non-heat-treatment freezer with water-cooled condenser.

4.6.3 *Grade C*—Heat-treatment freezer with air-cooled condenser.

⁷ Available from Standardization Documents Order Desk, Bldg. 4 Section D, 700 Robbins Ave., Philadelphia, PA 19111-5094, Attn: NPODS.

⁸ Per freezing cylinder. Combination freezers may require two size ratings, for example: 15 soft serve/20 shake.

4.6.4 *Grade D*—Heat-treatment freezer with water-cooled condenser.

4.7 *Group*:

4.7.1 *Group a*—Floor with caster.

4.7.2 *Group b*—Floor with legs.

4.7.3 *Group c*—Floor with brackets.

4.7.4 *Group d*—Countertop with legs.

4.7.5 *Group e*—Countertop with brackets.

4.7.6 *Group f*—Countertop with seal (sealed to countertop).

5. Ordering Information

5.1 *Ordering Data*—Purchasers shall select the preferred options permitted herein and include the following information in procurement documents:

5.1.1 Title, number, and date of this specification;

5.1.2 Type, style, size/capacity, class, grade, and group of freezer required (see 4.1);

5.1.3 When hardware and fittings are to be other than as specified (see 6.2);

5.1.4 If sampling and inspection procedures are required, see 10.2;

5.1.5 Level of preservation and packing required if other than as stated in Practice D3951 (see 13.1);

5.1.6 When Federal/Military procurement is required, review and implement the applicable supplementary requirements (see Supplementary Requirements S1 and S2);

5.1.7 Type of refrigerant, insulation, and other manufacturing processes required (see 7.5); and

5.1.8 When a certification report is required.

5.2 *Freezer Selection and Application*—Prior to the use of Section 4 classifications, the purchaser will ensure the user is not restricted by some aspect of the freezer design such as weight or external dimensions that would prevent the unrestricted use of the classifications listed in Section 4.

5.3 *Freezer Availability*—Although Section 4 lists a wide range of types, styles/capacities, classes, grades, and groups for commercial types of freezers, not all combinations may be available.

5.4 *Supplementary Requirements*—The supplementary requirements shall apply only when specified by the purchaser in the contract or order.

6. Materials

6.1 *General*—Freezers shall conform to the applicable documents listed in Section 2. Materials used shall be free from defects that would affect the performance or maintainability of individual components or of the overall assembly. Materials not specified herein shall be of the same quality used for the intended purpose in commercial practice. Unless otherwise specified herein, all equipment, material, and articles incorporated in the work covered by this specification are to be new or fabricated using materials produced from recovered materials to the maximum extent possible without jeopardizing the intended use. None of the preceding shall be interpreted to mean that the use of used or rebuilt products are allowed under this specification unless otherwise specified.

6.2 *Hardware and Fittings*—Unless otherwise specified (see 5.1.3), all hardware and fittings shall be corrosion-resistant or suitably processed to resist corrosion in accordance with the manufacturer's standard practice.

6.3 *Threaded Parts*—All threaded parts shall conform to ANSI B1.1.

7. Design and Construction

7.1 *Electrical Components*:

7.1.1 *Electric Motors*—All electric motors shall have bearings that require no additional lubrication.

7.2 *Steel Fabrication*—The steel used in fabrication shall be free from kinks, sharp bends, and other conditions that would be deleterious to the finished product. Manufacturing processes shall not reduce the strength of the steel to a value less than intended by the design. Manufacturing processes shall be done neatly and accurately. All bends shall be made by controlled means to ensure uniformity of size and shape.

7.3 *Lubrication*—All bearings (unless lifetime lubricated), gears, and sliding parts shall have provision and instructions for lubrication. Bearings or parts in the food zone requiring lubrication shall be identified in the operator's manual and acceptable food grade lubricants shall be specified by the manufacturer.

7.4 *Interchangeability*—All units of the same classification furnished with similar options under a specific contract shall be identical to the extent necessary to ensure interchangeability of component parts, assemblies, accessories, and spare parts.

7.5 Use of ozone-depleting chemicals must comply with national regulations.

7.5.1 *Refrigerants*—Unless otherwise specified (see 5.1), shall be the manufacturer's standard chemical(s).

8. Performance Requirements

8.1 *Performance Standard Compliance*—Ice cream freezers shall conform to the requirements of UL 621, and NSF/ANSI 6.

8.2 *Performance Testing*—When specified in the contract or purchase order, performance testing shall be performed in accordance with Test Method F2795.

9. Workmanship, Finish, and Appearance

9.1 All components and assemblies of the freezer shall be free of 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, blow holes, and sprues. External surfaces shall be free of sharp edges and corners. All sheet metals used in the fabrication of the freezer 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 and Quality Assurance

10.1 *Sampling*—When specified in the contract or purchase order, sampling for the inspection and tests contained in the main body of this specification shall be performed in accordance with ANSI Z1.4.