



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.

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 and health practices and determine the applicability of regulatory limitations prior to use.*

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[A176 Specification for Stainless and Heat-Resisting Chromium Steel Plate, Sheet, and Strip \(Withdrawn 2015\)](#)³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](#)

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 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.

[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

[Standard 621 for Ice Cream Makers](#)

2.3 *ANSI/NSF International Standard:*⁵

[Standard 6 for Dispensing Freezers](#)

[Standard 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](#)

2.5 *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.

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.

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

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:

$$\text{Overrun} = (\text{Weight of liquid mix} - \text{Weight of frozen product}) / \text{Weight of frozen product} \quad (1)$$

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.

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;

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

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.

10.2 The equipment prepared for shipment shall be measured and inspected by the manufacturer for compliance with this specification.

11. Rejection and Rehearing

11.1 Material that fails to conform to the requirements of this specification may be rejected. Rejection should be reported to the producer or supplier promptly and in writing. In case of dissatisfaction with the results of the test, the producer or supplier may make claim for a rehearing.

12. Certification

12.1 Certification of compliance with the standards cited in this specification shall be provided to the purchaser if required in the purchase document. Certification specified under **8.1** will be accepted as evidence of compliance. Acceptable evidence of meeting the requirements of UL 621 shall be UL listing, or UL label, or certified test report from a recognized independent testing laboratory acceptable to the user. Acceptable evidence of meeting the requirements of NSF/ANSI 6 shall be the NSF mark on the finished Ice Cream machine and listing in the NSF

Official Listing of Food Service Equipment, or a certified test report from a recognized independent testing laboratory acceptable to the user.

13. Product Marking

13.1 Each freezer shall be provided with an identification plate(s) securely affixed to the item, in compliance with ANSI/UL No. 621.

14. Instruction Materials and Manuals

14.1 Format and content of applicable manuals shall be as indicated in Specification **F760**.

15. Packaging and Package Marking

15.1 Unless otherwise specified (see **5.1**), the complete freezer shall be packaged and marked in accordance with Practice **D3951**. In addition, the package shall be marked showing the model number, serial number, and manufacturer’s name.

16. Keywords

16.1 foodservice equipment; freezers; frozen yogurts; heat-treatment freezers; ice cream; shake; soft serve

SUPPLEMENTARY REQUIREMENTS

The supplemental requirements, which follow, apply to all federal and military procurements. Where provisions of this supplement conflict with the main body of the standard, this supplement shall prevail.

S1. Manual

S1.1 A manual complying with Specification **F760** and its supplement shall be provided.

S2. First Article Inspection

S2.1 When required, the first article inspection shall be performed on one unit. The first article may be either a first production item or a standard production item from the supplier’s current inventory, provided the item meets the requirements of the standard and is representative of the design, construction, and manufacturing technique applicable to the remaining items to be furnished under the contract.

S3. Label Plates

S3.1 Freezers shall be provided with data-name plates and instruction plates.

S3.1.1 *Data-Name Plates*—In addition to the manufacturer data plate, machines shall be provided with data-name plates readily visible to the operator during normal operating use and so as to not adversely affect the life and utility of the unit. Plates shall be attached to the front of the unit in such a manner as to meet the applicable National Sanitation Foundation sanitary requirements for this equipment. The plate shall contain the following information, which shall be stamped, engraved or applied by photosensitive means:

- National Stock Number
- Government Approved Manual Number

S3.1.2 *Instruction Plate*—An instruction plate shall be made of an ANSI/UL accepted label material and shall be attached to the front of the machine. The instruction plate shall bear instructions for start-up, operation, and shutdown.

S4. Part Identifying Number

S4.1 The following part identifying numbering procedure is for government purposes and does not constitute a requirement for the contractor. The PINs to be used for items acquired to this document are created as follows:

ASTM	-XX	-XX	-XX	-XX	-XX	-XX	
							Group
							Grade
							Class
							Size/Capacity
							Style
							Type
							ASTM #

The above is an example of the PIN for an item in accordance with ASTM Standard F_____, type XX, style XX, size/capacity XX, class XX, grade XX, group XX.

S5. Human Factors Criteria

S5.1 Human factors engineering criteria, principles, and practices, as defined in Practice **F1166**, shall be used in the design of all freezers.

S6. Preservation, Packaging and Package Marking

S6.1 When other than commercial practice or conformance to Practice **D3951** is desired, the preservation, packaging and package marking requirements shall be stated in the purchase order or contract.

S7. Manufacturer’s Certification

S7.1 If the manufacturer has successfully furnished the same equipment on a previous contract within the past three years further inspection will not be required. The manufacturer shall certify in writing that the equipment to be furnished is the same as that previously furnished and approved, and that no major design changes have been made to the equipment.

S8. Naval Shipboard Requirements

S8.1 The following additional requirements apply when equipment is to be used for shipboard purposes.

S8.1.1 *Power Compatibility*—Unless otherwise specified (see **5.1**), freezers shall be compatible with shipboard Type I, 440-Vac, 60-Hz, 3-phase, 3-wire, ungrounded or 115-Vac, 60 Hz, single phase, alternating current for shipboard as specified in MIL-STD-1399/300.

S8.1.2 *High Voltage Label*—On equipment rated 440 VAC or higher, a “Danger High Voltage” label shall be affixed to the equipment outer case assembly, on or adjacent to each service access cover adjacent to one of the fasteners which secure the cover. The warning label shall also be placed near the high voltage components inside the equipment. The label shall include, but is not limited to:

- a. A warning of high voltage.
- b. The power supply must be disconnected before servicing.
- c. Access covers must be in place during use.
- d. Service should be done by authorized personnel.

S8.1.3 *Condenser*—Shipboard freezers shall have an air-cooled condenser constructed of either copper, aluminum, or steel.

S8.1.4 *Access*—Freezers shall pass through a 26 in. (660 mm) wide by 66 in. (1676 mm) shipboard hatch without major disassembly. Machines for submarines shall pass through a 25-in. (635 mm) diameter circular hatch without major disassembly. Access must be provided from the front of unit for replacement of components or parts and to accomplish any maintenance related work.

S8.1.5 *Mounting*—The freezers shall be provided with four removable legs suitable for bolting to the deck. Legs shall be 6 + ½ in. (152 + 13 mm) long fabricated from 14 gauge minimum stainless steel 300 series adequately reinforced. Counter or dresser mounted freezers shall be provided with four type 300 series stainless steel round legs, each a minimum 1-in. (25 mm) in diameter, 4 in. (102 mm) in length, for securing the unit to the dresser.

S8.1.6 *Environmental Suitability*—Freezers, shall be capable of withstanding ships vibration and motion. Controls, switches, moving parts and electrical circuits shall operate

under shipboard conditions without malfunction, binding, excessive looseness, or damage (see S8.1.8.3).

S8.1.7 *Inclined Operation*—Freezers shall operate satisfactorily on surface ships when inclined at an angle of 15° each side of the vertical in each of two vertical planes at right angles to each other, with no spillage of fluid or product. For submarines the angle of inclination shall be 30°.

S8.1.8 *Quality Assurance Provisions:*

S8.1.8.1 *EMI Control Tests*—When specified, freezers shall be tested by the contractor in accordance with test methods of MIL-STD-461 for surface ships and submarines. The first article or the initial production unit, as applicable, shall be tested. The contractor shall furnish written certification that the equipment meets the requirements of MIL-STD-461. Non-conformance with the requirements specified shall constitute failure of the test.

S8.1.8.2 *Inclined Operational Test*—The freezers shall be bolted to a test platform similar to shipboard installation and inclined at an angle of 15° (30° for submarines). The machine shall be filled to 75 % capacity with product, then be operated for 60 s each at each side of the vertical, in each of two vertical planes at right angles to each other. Any non-conformance with specified requirements of S8.1.7 shall constitute failure of this test.

S8.1.8.3 *Shipboard Environmental Test*—When specified, the freezers, under normal operating conditions, shall be tested in accordance with MIL-STD-167/1, Type I equipment. The machine shall be secured to the test machine in the same manner that it will be secured on shipboard. Failure of the machine to perform its function during or after testing, or meeting the requirements of S8.1.6, shall constitute failure of this test. The government reserves the right to witness all tests of machines procured for Naval shipboard use, whether performed by the supplier or an independent testing agency.

APPENDIX

(Nonmandatory Information)

X1. ADDED FEATURES

X1.1 Most manufacturers offer additional features that extend the versatility of the freezers. The variety of options are impossible to list but a good source of general information can be found in the literature available at restaurant or food service equipment dealers. Some of the more common and popular options are faucets, syrup rails, spinners, foot pedals, air mix

pumps, separate hopper refrigeration, and standby controls.

X1.2 Typically, these options are added to basic models at additional cost. Any additional options that are required can be written into the procurement contract as desired.

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