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SUPERSEDING
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MILITARY SPECIFICATION

ICE MAKING MACHINE, CUBE

This specification is approved for use by all Departments and Agencies of the Department of Defense.

1. SCOPE

1.1 Scope. This specification covers automatic, electric motor-driven self-contained, mechanically refrigerated, ice making machines.

* 1.2 Classification. Ice making machines shall be of the following types, sizes, and grades as specified (see 6.2). Capacities shown are for 24-hour production at 90 deg. F ambient temperature and 70 deg. F water temperature.

Type I	-	Water cooled condenser
Type II	-	Air cooled condenser
Size 1	-	200 pound capacity
Size 2	-	300 pound capacity
Size 3	-	400 pound capacity
Size 4	-	500 pound capacity
Size 5	-	600 pound capacity
Size 6	-	900 pound capacity
Size 7	-	800 pound capacity
Size 8	-	1200 pound capacity
Size 9	-	50 pound capacity
Size 10	-	100 pound capacity
Size 11	-	150 pound capacity

Beneficial comments (recommendations, additions, deletions) and any pertinent data which may be of use in improving this document should be addressed to: U.S. Army Natick Research, Development and Engineering Center, Natick, MA 01760-5014, by using the self-addressed Standardization Document Improvement Proposal (DD Form 1426) appearing at the end of this document or by letter.

AMSC N/A FSC 4110

Grade A - Carbon steel cabinet or stainless steel cabinet (300 series or 400 series)
Grade B - Stainless steel cabinet (300 series only)

2. APPLICABLE DOCUMENTS

* 2.1 Government documents. Unless otherwise specified, the following documents of the issue in effect on date of invitation for bids or request for proposal form a part of this document to the extent specified herein:

SPECIFICATIONS

FEDERAL

L-P-390	-	Plastic, Molding and Extrusion Material, Polyethylene and Copolymers (Low, Medium, and High Density)
BB-F-1421	-	Fluorocarbon Refrigerants
QQ-C-465	-	Copper Aluminum Alloys; Rod, Flat Products with Finished Edges, Shapes and Forgings
QQ-N-281	-	Nickel-Copper Alloy Bar, Rod, Plate, Sheet, Strip, Wire, Forgings, and Structural and Special Shaped Sections

MILITARY

MIL-V-173	-	Varnish, Moisture and Fungus-Resistant (for Treatment of Communications, Electronic, and Associated Equipment)
MIL-F-1183	-	Fitting, Tube, Cast Bronze, Silver-Brazing
MIL-F-3541	-	Fittings, Lubrication
MIL-R-3593	-	Refrigeration and Cooling Equipment (Excluding Household Refrigeratores), Packaging Of
MIL-C-15726	-	Copper-Nickel Alloy, Rod, Flat Products (Flat Wire, Strip, Sheet, Bar, and Plate) and Forgings
MIL-B-16541	-	Bronze, Valve: Castings
MIL-F-20042	-	Flanges, Pipe and Bulkhead, Bronze (Silver Brazing)

STANDARDS

FEDERAL

FED-STD-H28	-	Screw Thread Standards for Federal Services

MILITARY

MIL-STD-lOS	-	Sampling Procedures and Tables for Inspection by Attributes
MIL-STD-130	-	Identification Marking of U.S. Military property

MIL-STD-461	-	Electromagnetic Emission Susceptibility Requirements for the Control of Electromagnetic Interference
MIL-STD-462	-	Electromagnetic Interference Characteristics, Measurement Of

(Copies of documents required by contractors in connection with specific acquisition functions should be obtained from the contracting activity or as directed by the contracting officer.)

* 2.2 Other Publications. Unless otherwise specified, the following documents of the issue in effect on date of invitation for bids or request for proposal form a part of this document to the extent specified herein.

UNDERWRITERS LABORATORIES INC. (UL)

Standard No. 563 - Ice Makers

(Application for copies should be addressed to the Underwriters Laboratories, 333 Pfingsten Road, Northbrook, IL 60062.)

NATIONAL ELECTRICAL MANUFACTURERS ASSOCIATION (NEMA)

MG1 - Motors and Generators

(Application for copies should be addressed to the National Electrical Manufacturers' Association, 2101 L Street N.W., Washington, DC 20037.)

RUBBER MANUFACTURER'S ASSOCIATION

Engineering Standards for Multiple V-Belt Drives

(Application for copies should be addressed to the Rubber Manufacturer's Association, 444 Madison Avenue, New York, NY 10022.)

NATIONAL FIRE PROTECTION ASSOCIATION (NFPA)

Standard No. 70 - The National Electrical Code

(Application for copies should be addressed to the National Fire protection Association, 60 Batterymarch Street, Boston, MA 02110.)

AMERICAN SOCIETY FOR HEATING, REFRIGERATING AND AIR-CONDITIONING ENGINEERS (ASHRAE)

Standard No. 29 - Methods of Testing Automatic Ice Makers

(Application for copies should be addressed to the American Society for Heating, Refrigerating and Air Conditioning Engineers, 345 East 47th Street, New York, NY 10017.)

NATIONAL SANITATION FOUNDATION (NSF)

Listing of Food Service Equipment

Standard No. 12 - Automatic Ice Making Equipment

(Application for copies should be addressed to the National Sanitation Foundation, 3475 Plymouth Road, P.O. Box 1468, Ann Arbor, MI 48106.)

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

A 167 - Corrosion-Resisting Chrominum-Nickel, Steel, Plate, Sheet and Strip
A 176 - Stainless and Heat-Resisting Chrominum-Nickel Steel Sheet and Strip
A 366 - Steel Carbon, Cold-Rolled Sheet, Commercial Quality
B 61 - Steam or Valve Bronze Castings
B 88 - Seamless Copper Water Tube
B 148 - Aluminum Bronze Sand Castings
B 150 - Aluminum Bronze Rod, Bar, and Shapes
B 280 - Seamless Copper Tube for Air Conditioning Refrigeration Field Service
B 584 - Copper Alloy Sand Castings for General Applications

(Application for copies should be addressed to the American Society for Testing and Materials, 1916 Race Street, Philadelphia, PA 19103.)

AIR-CONDITIONING AND REFRIGERATION INSTITUTE (ARI)

Standard No. 810 - Standard for Automatic Commercial Ice-Makers

(Application for copies should be addressed to the Air-Conditioning and Refrigeration Institute, 1501 Wilson Boulevard, Arlington, VA 22209.)

(Technical society and technical association documents are generally available for reference from libraries. They are also distributed among technical groups and using Federal agencies.)

* 2.3 Order of precedence. In the event of conflict between the text of this document and the references cited herein (except for associated detail specifications, specification sheets, or MS standards), the text of this document shall take precedence. Nothing in this document, however, shall supersede applicable laws and regulations unless a specific exemption has been obtained.

3. REQUIREMENTS

3.1 Standard product. The ice making machine delivered under this document shall be the contractor's standard commercial product except for changes

necessary to meet the document requirements. All like items furnished on any one contract, including parts and subassemblies thereof, shall be new and interchangeable.

* 3.2 Design. The ice making shall be a complete self-contained unit composed of an ice-making section and a storage bin. The machine shall have a means of a harvesting and storing ice, a water circulating system, motor or motor drives, and all necessary piping, wiring, control and safety devices, with automatic control of ice level in storage bin. All parts shall be located to permit repair or replacement. All operating parts subject to vibration shall be mounted on vibration elimination units to prevent the transmission of vibration during normal use. All accessories, including fans, reduction gears, harvesting equipment, and pumps shall be directly connected, V-belt drive (see 3.6.1.1.1), or chain driven except that the evaporator drum, when provided, may be driven by chain from a reduction gear. All chain drives shall be guarded. When the ice machine is operated, all mechanical and electrical controls and parts shall function according to design, and the condensing unit shall not leak when tested in accordance with 4.4.4. When specified for Navy shipboard use (see 6.2), the equipment shall operate satisfactorily when rolled 15 degrees each side of the vertical in each of two vertical planes at right angles to each other with no spillage of water or ice when tested as specified in 4.4.8. When specified for Navy shipboard use (see 6.2), all types, sizes, and grades of ice making machines shall be equipped with key locking devices on the ice bin covers. Two keys shall be provided with each dispenser. When specified for Navy shipboard use (see 6.2), the dimensional design shall be such that the machines will pass through a door or hatch having clear dimensions of 26 inches by 66 inches, with corners having an 8-inch radius. Minor disassembly of components to accomplish clearance dimensions is permitted, but this shall not include disassemble of refrigeration or electrical components.

3.2.1. Controls. Controls shall be designed to include a device to automatically operate the ice making machine. The controls shall automatically stop the ice making process when the predetermined level of ice in the storage bin is reached and automatically restart the ice making process when the amount of ice is reduced below the predetermined level. Controls shall be designed for operation on a nominal 208/230 volt, 1-phase, 60 Hz system or a 115 volt, 1-phases, 60 Hz system (see 3.6.12). When 50 Hz system is specified (see 6.2), controls shall comply with the operational and electrical requirements. Controls rated at 115 volt, 1-phase, 60 Hz system may be used with a 50 Hz frequency system provided that the power is obtained from either a hot line and neutral or through a transformer and that the overall performance of the system is not affected. Relays and transformers or any other component necessary for a complete control system shall be furnished as an integral part of the end item.

* 3.2.2 Capacity. The ice making machine shall be capable of making and harvesting ice under the conditions in table I when tested in accordance with

4.4.2. Ice produced shall be cube ice (see 6.2). Cube ice normally refers to a fairly uniform product that is hard, solid, usually but not necessarily clear, and generally weighs less than 2 ounces per piece, as distinguished from flake, crushed, or fragmented ice. When specified for Navy shipboard use (see 6.2), the ice making machine shall be capable of making and harvesting ice having a cooling value of not less than 122 British thermal units (BTU) per pound under the conditions in table I when tested in accordance with 4.4.2. The ice may be formed by any method and in any shape consistent with the manufacturer's standard product.

TABLE I. capacity conditions

Type	Size	Ambient air temp. (deg. F)	Potable water supply temp. (deg. F)	Condenser inlet water temp. (deg. F)	Minimum capacity for 60 Hz machines (lb/24 hr)	Minimum capacity for 50 Hz machines (lb/24 hr)
I	1	90	70	70	200	167
I	2	90	70	70	300	250
I	3	90	70	70	400	333
I	4	90	70	70	500	417
I	5	90	70	70	600	500
I	6	90	70	70	900	750
I	7	90	70	70	800	667
I	8	90	70	70	1200	1000
I	9	90	70	70	50	42
I	10	90	70	70	100	83
I	11	90	70	70	150	125
II	1	90	70	None	200	167
II	2	90	70	None	300	250
II	3	90	70	None	400	333
II	4	90	70	None	500	417
II	5	90	70	None	600	500
II	6	90	70	None	900	750
II	7	90	70	None	800	667
II	8	90	70	None	1200	1000
II	9	90	70	None	50	42
II	10	90	70	None	100	83
II	11	90	70	None	150	125

* 3.2.3 Performance. The ice making machines shall operate without malfunction or failure of any component and shall not exceed motor ratings and temperatures when operated for a minimum of 2 continuous hours at the specified voltage in an ambient air temperature of 104 deg. F and supplied with potable water and condenser water (type I machines) at a temperature of 80 deg. F when tested as specified in 4.4.3.

* 3.2.4 Dimensions. Ice making machines shall conform to the maximum dimensions shown in table II.

TABLE II. Maximum overall dimensions (inches)

Size	Length	Depth [1]	Height [2] [3]
1	36	38	72
2	49	34	73
3	49	38	96
4	49	38	96
5	53	38	96
6	73	35	100
7	45	35	96
8	53	35	98
9	18	24	36
10	32	27	45
11	36	38	72

[1] When specified for Navy shipboard use (see 6.1), maximum overall depth shall be 25 3/4 inches.

[2] When specified for Navy shipboard use (see 6.2), maximum overall height without legs shall be 72 inches.

[3] When legs are specified for Navy shipboard use (see 3.6.9.1).

3.3 Electromagnetic compatibility. When specified (see 6.2), the ice making machine shall comply with conducted (CE05) and radiated (RE02) emission limits in accordance with part 10, class C3, group I of MIL-STD-461. Ice making machines are specifically exempt from Short Duration Interference tests (see 4.4.7).

3.4 Codes and standards. The ice making machines shall comply with the applicable requirements of Underwriters Laboratories Standard No. 563 and the applicable requirements of the National Sanitation Foundation Standard No. 12 (see 4.3, 4.3.1, and 4.3.2).

* 3.5 Materials. Materials not definitely specified shall be of the quality normally used by the contractor for his ice making machines provided that the completed item complies with all provisions of this document. Unless otherwise specified herein, commercial tolerances shall apply to metal thicknesses and diameters. Recycled materials may be used (see 6.4).

* 3.5.1 Refrigerants. The refrigerants shall be type 12, 22, or 502 conforming to BB-F-1421.

3.5.2 Copper tube. Hard copper tube shall be seamless, conforming to type K or L of ASTM B 88. Soft copper tubing shall be seamless, standard commercial refrigerant tube in accordance with ASTM B 280.

3.5.3 Steel.

3.5.3.1 Stainless. The stainless steel sheet or strip, when used, in grade A cabinets shall conform to either the 300 series of ASTM A 167 or the 400 series of ASTM A 176. For grade B cabinets, the stainless sheet or strip shall conform to any type in tho 300 series of ASTM A 167.

3.5.3.2 Carbon. Low carbon steel sheet or strip shall conform to ASTM A 366.

* 3.5.4 Insulation. Insulation shall be non-moisture-absorbing material, shall be homogeneous throughout, and shall have "K" factors specified below using a 70 deg. F mean temperature and expressed in terms of British thermal units per hour (BTUH) per square foot per inch of thickness per degree Fahrenheit temperature difference. Loose fill type insulation is not acceptable. The insulation shall be of a type that is not combustible or will not support combustion and will not release toxic fumes when exposed to a high temperature.

* 3.5.4.1 Pre-expanded insulation. Pre-expanded insulation shall be polystyrene or polyurethane material having a manufacturer’s commercial rated "K" factor of not more than 0.26 for polystyrene ant O.15 for polyurethane, with a core density of not less than 1.7 pounds per cubic foot when tested as specified in 4.4.5.

* 3.5.4.2 Foamed-in-place insulation. Foamed-in-place insulation shall be polyurethane material having a manufacturers commercial rated "K" factor of not more than 0.15 and a core density of not less than 1.7 pounds pair cubic foot when tested as specified in 4.4.5.

* 3.5.4.3 Semi-rigid insulation. Semi-rigid insulation shall be "B" fiber or finer industrial type fiberglass with a manufacturer’s commercial rated "K" factor of not more than 0.26 and a manufacturer’s commercial rated density of at least 1.0 but not more than 3.0 pounds per cubic foot and shall be held together with a thermosetting binder.

3.5.5 Fasteners. Screws, bolts, nuts, ant other fasteners shall be stainless steel, or zinc, or nickel plated low carbon steel. Threads shall conform to FED-STD-H28.

* 3.5.6 Plastics. The plastic shall conform to type I, class H, grade 1 of L-P-390, or that material as normally supplied by the manufacturer.

3.6 Construction. The ice making section (All components except the ice storage bin) shall be totally enclosed In a structurally sound sheet metal

housing (framed or unframed) with removable service panels. The machine shall show no signs of failure after a 3-inch drop when tested in accordance with 4.4.1. Joints between dissimilar metals that may become wet in service shall be protected against electrolytic or galvanic corrosion by proper selection of materials, coatings, isolating, gasketing, or similar means. Any bolts, nuts, pins, screws, and other fastenings and fittings of metal shall be of the same material as the materials being joined or shall be cathodic to the materials being joined.

3.6.1 Condensing unit. The condensing unit shall be designed to operate on the specified frequency and voltage (see 3.6.12 and 6.2). The use of any transformer to obtain the specified voltage is prohibited.

3.6.1.1 Compressor. The compressor shall be open, semi-hermetic, or hermetic type, mechanically or thermally sealed. Open type and mechanically sealed, and hermetic type compressors shall be furnished with suction and discharge shutoff valves. The assembled refrigeration system shall be completely dehydrated and charged with the amount of refrigerant (see 3.5.1) and refrigeration oil as necessary for operation.

* 3.6.1.1.1 Open type compressor. When open type compressors are used, they shall be V-belt driven. V-belts shall be static conductive and conform to the Engineering Standards for Multiple V-belt Drives of the Rubber Manufacturer's Association. The seal of open type compressors shall be replaceable without the use of special tools and without the replacing or removal of the crankshaft.

* 3.6.1.1.2 Compressor motor. Unless otherwise specified (see 6.2), compressor motors, up to and including 3/4 horsepower, shall operate on a nominal 115 volt, 1 phase 60-Hz system, and compressor motors over 3/4 horse-power shall operate on a nominal 208/230 volt, 1-phase, 60 Hz system. Automatic starters shall be supplied for all motors over 1-horsepower. When specified for Navy shipboard use (see 6.2), compressor motors shall operate on a nominal 115 volt, 1-phase, 60 Hz system. All motors shall be equipped with thermal overload protection on each phase.

* 3.6.1.2 Condenser. The type II ice making machine condenser shall be air cooled constructed of copper, aluminum, or steel or A combination thereof. The type I ice making machine condenser shall be water cooled, of the shell and coil type, or the multipass shell and tube type, or the tube in tube type with provisions for cleaning the water circuit without opening the refrigerant circuit. The shell shall be steel, and tubes and coils shall be copper. The water cooled condenser shall be equipped with a water regulating valve. When type I units are specified for Navy shipboard use (see 6.2), the condenser shall be water cooled and designed for use with sea water at an entering temperature of 85 deg. F and a condensing temperature of not more than 110 deg. F. Water velocities in tho condenser shall meet the condensing capacity with sea water entering the condenser at 90 deg. F. The condenser shall be a type in which the tubes can be mechanically cleaned, shall be installed so that the tubes

may be cleaned without removing the condenser from the equipment, and shall be accessible from the front. All parts in contact with sea water shall be made of copper-nickel (90-10) conforming to MIL-C-15726, aluminum bronze conforming to QQ-C-465, ASTM B 584 alloy 1 B, ASTM B 148 alloy 9 D, ASTM B 150 alloy 2, or valve bronze conforming to ASTM B 61, except the condenser sea water tubes shall be copper-nickel (90-10) conforming to MIL-C-15726. The heads may be acetal polycarbonate plastic or material approved by the contracting officer. The condenser shall be provided with specific devices to purge both the refrigerant and water circuits and for draining the water circuit. A water-regulating valve shall be provided with each condenser. The valve shall be of direct-acting or pilot type actuated by condenser gas pressure to modulate the flow of water required for the condenser. The valve shall be selected to regulate water flow from shutoff to required capacity within a maximum operating gas pressure rise of 40 pounds per square inch (psi). The valve shall be adjustable within an operating range of 90 to 140 psi refrigerant gas pressure for R-12 or for other refrigerants when used. The capacity of the water-regulating valve shall at least equal the water requirement of the condenser, based on available inlet water pressure of 35 psi and a pressure drop across the valve of not more than 10 psi. The valve body shall be made of valve bronze conforming to MIL-B-16541. In addition, the internal metal parts subject to corrosion or erosion shall be made of nickel-copper conforming to QQ-N-281. The valve shall have either flange connections conforming to MIL-F-20042 or union ends conforming to MIL-F-1183. The strainer body shall be valve bronze of ASTM B 61, (90-10) copper-nickel, monel , or other materials satisfactory to the using or contracting activity. The valve shall be constructed in such a manner as to prevent the possibility of entry of sea water to the refrigerant system in the event of derangement. A strainer of No. 20 mesh nickel-copper screen of substantial area shall be provided for the protection of the valve. The strainer basket shall be readily removable for cleaning without disassembly of connecting piping. The strainer shall be not less than 3/4-inch nominal diameter.

3.6.1.2.1 Receivers. Receivers, if used, shall be fitted with a back seating outlet valve, a plugged 1/8 inch National Pipe Thread (NPT) opening, and with a fusible plug. Combination water cooled receiver-condensers are acceptable for type I machines.

3.6.2 Evaporator. Parts of the evaporator contacting ice shall be stainless steel specified in 3.5.3.1, anodized aluminum, or other nontoxic, corrosion-resistant material.

3.6.3 Cutting and harvesting blades. Cutting and harvesting blades and components shall be fabricated of stainless steel specified in 3.5.3.1 or other nontoxic corrosion-resistant materials.

* 3.6.4 Water circulator or pump. The water circulator or pump, when provided, shall have adequate capacity to provide a continuous equal volume of water over the entire ice making surface. Pumps either shall be self-draining

type or shall be provided with a brass drain plug that is accessible without major dismantlement of the unit.

3.6.5 Water tank or pump. Water tanks or pump, if provided, shall be stainless steel specified in 3.5.3.1 or other corrosion-resistant material suitable for this purpose.

* 3.6.6 Dehydrator. A dehydrator shall be installed in each condensing unit and shall be accessible for removal ant replacement.

3.6.7 Tubing. Tubing shall be as specified in 3.5.2. All tube connections shall be solder, except that flared connections shall be provided on expansion valve, inlet, and outlet connections; receiver outlet valve; and other locations normal to the manufacturer's standard product. Refrigerant and water lines shall be insulated with flexible plastic foam material to prevent condensation. Hot gas ant hot liquid refrigerant lines need not be insulated.

* 3.6.8 Cabinet. The cabinet for the grade B ice making machine shall be fabricated on stainless steel specified in 3.5.3.1 having a nominal thickness of 20 gage (0.0355 inch). The grade A ice making machine cabinet shall be fabricated of carbon steel specified in 3.5.3.2 having a nominal thickness of 22 gage (0.0299 inch) or series 300 or 400 stainless steel have a nominal thickness of 22 gage (0.0299 inch) or series 300 or 400 stainless steel having a nominal thickness of 20 gage (0.0355 inch). The frame, when used, shall be not less than 14 gage (0.0747 inch) by 1.5 by 1.5 inch angle or 14 gage (0.0747 inch) by 1.5 by 0.5 inch channel steel welded or securely bolted into an integral unit. The cabinet shall be located adjacent to or above the ice storage bin. When adjacent, the cabinet shall be provided with legs, skids, or means for setting directly on the floor or shipboard deck.

* 3.6.9 Storage bin. Unless otherwise specified (see 6.2), the ice storage bin shall have sufficient capacity for 12 hours of ice production. The ice storage bin shall be lined with stainless steel specified in 3.5.3.1 or plastic conforming to 3.5.6. For Navy use, the ice storage bin shall be lined with the 300 stainless steel specified in 3.5.3.1. The thickness of the liner shall be not less than 0.025 inch except when foamed-in-place insulation is used, in which case the thickness of the liner shall be a minimum of 0.0125 inch. The ice storage bin shall be insulated with material as specified in 3.5.4. The insulation thickness shall be determined by the manufacturer with the requirement that the computed overall heat transfer coefficient, "U", is not more than 0.10 BTUH for the top and four sides, and not more than 0.07 BTUH for the bottom of the ice storage bin. The computed "U" value shall be "K" of the insulation value divided by tho thickness of the insulation used. Rigid insulation, preformed or foamed-in-place, shall be used for the bottom of the ice storage bin and may be used throughout the ice storage bin. When semi-rigid insulation is used for the top and four sides, it shall be cut and trimmed for the shape and space to be filled, so as to require forcing in place. An insulated ice access door shall be provided and equipped with the necessary handle, latch, and trim. All joints and corners shall be welded and

ground smooth with all inside seams filled. The drainage opening of the bin shall be provided with a fitting of stainless steel or other noncorrosive material, either welded or scaled with a gasket. The bin inner liner shall not leak when tested as specified in 4.2.2.2.2. The bin shall be provided with 6-inch legs, minimum. Unless otherwise specified (see 6.2), for Army use, the storage bin shall have the capacities shown below:

- 150 pound production - 300 pound bin.
- 400 pound production - 500 pound bin.
- 800 pound production - 800 pound bin.

* 3.6.9.1 Legs. When specified for Navy shipboard use (see 6.2), the storage bin, or the cabinet and the storage bin when separate, shall be provided with four removable legs suitable for bolting to the deck. Legs shall be 8 inches +/- 1/2 inch long. Legs shall be fabricated from 14 gage minimum stainless steel 300 series specified in 3.5.3.1 and shall be adequately reinforced. The bottom flange of each leg shall be provided with clearance holes for 1/2-inch diameter hold-down bolts. Each hold-down bolt shall be accessible from the front for mounting and dismounting the ice maker. Legs shall attach directly to the bin bottom through a structural member or suitable reinforcing plate. Attaching holes in the bin bottom may be tapped (minimum depth one bolt diameter plus one thread) or captive nuts may be utilized.

3.6.10 Ice crushing mechanism. When specified (see 6.2), an automatic ice crushing mechanism shall be furnished with the machine.

3.6.11 Welding, brazing, and soldering. System water plumbing, refrigeration line or components to be joined by welding, brazing, or soldering shall be the manufacturer’s standard commercial practice. Ice contact areas shall conform to NSF Standard No. 12.

3.6.12 Electrical requirements. Unless otherwise specified (see 6.2), electrical components shall be a nominal 115 volt l-phase, 60 Hz system or a 208/230 volt, l-phase, 60 Hz system or a combination of both. Transformers, when supplied as part of the system, shall not be used to step-up or step-down the voltage for and item use and where specifically prohibited (see 3.6.1), but are permitted as part of the control system (see 3.2.1). When 50 Hz frequency is specified (see 6.2) and end item is to be operated on that frequency, all systems shall be rated at that frequency. Motors shall conform to NEMA MGl.

3.6.13 Fungus resistance. When specified (see 6.2), electrical connections, including terminal and circuit connections, components, and circuit elements shall be coated with varnish conforming to MIL-V-173 except for the following:

[a] Components and elements inherently lnert to fungi or hermetically sealed need not be treated.

[b] Components and elements whose operation will be adversely affected by the application of varnish shall not be treated.

3.6.14 Lubrication. All moving parts and surfaces requiring lubrication shall be provided with accessible means for applying the required lubricants. Fan shaft bearings shall be lubricated from one general location and shall be clearly identified. The equipment shall be designed to operate efficiently ant satisfactorily when lubricated with standard Military lubricants (see 6.3). Grease fittings shall conform to MIL-F-3541.

* 3.6.15 Caution plates. Where the use of high pressure lubrication equipment (1,000 pounds psi or higher) will damage grease seals, a suitable warning plate or permanent decal shall be affixed to the equipment in a conspicuous location.

3.6.16 Initial lubrication service. When specified (see 6.2), equipment shall be serviced, before delivery to the Government, with winter grades of standard Army or Navy lubricants (see 6.3) designed for use in the temperature range of 0 deg. to plus 42 deg. F. After the lubrication services, each item of equipment shall be tagged in a conspicuous place to indicate the temperature range and grades of lubricants used. Points requiring lubrication shall be accessible. Otherwise the ice cube machines shall be serviced before delivery in accordance with standard commercial practice.

3.7 Finish. Unless otherwise specified (see 6.2), exterior surfaces shall have the manufacturer's standard commercial finish, provided it conforms to NSF 12 requirements.

3.8 Data name plate. The ice maker shall be furnished with a data name plate in accordance with the applicable requirements of MIL-STD-130 except the requirements for; [a] Methods of applying, [b] Identification tags, [c] Information not required, and [d] Optional marking information shall not apply. The data name plate shall be made of minimum 20 gauge corrosion resisting metal, ant attached to the ice maker by rivets, screws, or by welding, in such a manner as to meet the applicable National Sanitation Foundation requirements for this equipment. The plate shall bear the following information which shall be stamped, engraved, or applied by photosensitive means:

National Stock Number
Procurement Instrument Identification Number
Specification Data
Manufacturer's Name, Address, ant Telephone Number
Supplier's Name, Address, and Telephone Number (List only if different from Manufacturer)
Manufacturer's Model Number
DGSC Approved Manual Number (see 6.2)

Each plate shall be placed so as to be readily visible to the operator during normal operation and use, and so as to not adversely affect the life or utility of the ice maker.

* 3.9 Instruction plate. Instruction plates made of corrosion-resisting metal shall be attached to each refrigerator unit. The instruction plates shall have the wiring diagram and refrigerator cycle diagram. The plates shall contain instructions for start-up, operating, shut-down, and preventative maintenance procedures and shall identify the type of refrigerant supplied in the system. In addition, information required by UL 563 shall also appear on the cabinet.

3.10 Workmanship. The finished ice making machine shall be clean, end all forming and cutting shall be done accurately and cleanly. All scale and flux deposits shall removed from the finished welds. All exposed welds shall be ground smooth to match the adjacent surfaces. All nuts, bolts, and screws shall be tight. There shall be no rough or sharp edges, slivers, or burrs on the finished items.

4. QUALITY ASSURANCE PROVISIONS

4.1 Responsibility for inspection. Unless otherwise specified in the contract or purchase order, the contractor is responsible for the performance of all inspection requirements as specified herein. Except as otherwise specified in the contract or the purchase order, the contractor may use his own or any other facilities suitable for the performance of the inspection requirements specified herein, unless disapproved by the Government. The Government reserves the right to perform any of the inspections set forth in this document where such inspections are deemed necessary to assure supplies and services conform to prescribed requirements.

* 4.1.1 Responsibility for compliance. All items must meet all requirements of sections 3 and 5. The inspection set forth in this document shall become a part of the contractor’s overall inspection system or quality program. The absence of any inspection requirement in the document shall not relieve the contractor of the responsibility of assuring that all products or supplies submitted to the Government for acceptance comply with all requirements of the contract. Sampling in quality conformance does not authorize submission of known defective material, either indicated or actual, nor does it commit the Government to acceptance of defective material.

* 4.1.2 Responsibility for dimensional requirements. Unless otherwise specified in the contract or purchase order, the contractor is responsible for assuring that all specified dimensions have been met. When dimensions cannot be examined on the end item, inspection shall be made at any point or at all points in the manufacturing process necessary to assure compliance with all dimensional requirements.

4.2 Quality conformance inspection. Unless otherwise specified, sampling for inspection shall be performed in accordance with MIL-STD-105.

4.2.1 Component and material inspection. In accordance with 4.1, components and materials shall be inspected in accordance with all the requirements of referenced documents, unless otherwise excluded, amended, modified, or qualified in this document or applicable purchase document.

4.2.2 In-process inspection.

4.2.2.1 In-process examination. Examination shall be made of the following operations to establish that no deviations are made from the specified requirements. Whenever nonconformance is noted, corrections shall be made to the operations and all items processed.

[a] Joints between dissimilar metals protected as specified in 3.6.
[b] Units dehydrated per 3.6.1.1.
[c] Insulation is installed in accordance with 3.6.9.
[d] When required, fungus coating applied per 3.6.13.
[e] Lubricated per 3.6.16 (if required).

4.2.2.2 In-process testing.

* 4.2.2.2.1 Density of insulation. Prior to beginning each day's production of ice makers, one sample of the insulation to be used in that day's production shall be tested as specified in 4.4.5 for conformance to the applicable density requirements as specified in 3.5.4.1 and 3.5.4.2. Failure to conform to the density requirements shall be cause for rejection of the lot.

4.2.2.2.2 Inner liner leak test. Before being inserted, the inner liner of the Storage bin with the drain plugged shall be tested as specified in 4.4.6. The inspection lot shall be the number of inner liners offered for inspection at one time. The sample unit shall be one inner liner. The inspection level shall be S-2 and the acceptable quality level (AQL), expressed in terms of defects per hundred units, shall be 6.5.

4.2.3 End item inspection. The inspection lot shall consist of all ice making machines of one type, size, and grade offered for inspection at one time. The sample unit shall be one ice making machine.

* 4.2.3.1 Visual examination. Examination shall be made of the ice making machine for defects set forth in table III. The inspection level shall be II and the AQL, expressed in terms of defects per hundred unit, shall be 2.5 for major defects and 6.5 for total (major and minor combined) defects.

TABLE III. End item visual defects

Examine	Defect	Classification	
		Major	Minor
Finish	Burrs, rough edges, or slivers	101	
	Not manufacturer's standard finish		201
Design, construction and workmanship, general (applicable to all components and assemblies)	Design not type specified	102	
	Any component missing or not type specified	103	
	Parts not convenient for repair or replacement	104	
	Any component fractured, split, punctured, torn, dented, creased, loose, bowed, or sprung	105	
	Circulation of water is not equal over ice making surface (visual determination)	106	
	Forming and cutting not accurate or clearly performed		
Fan shaft	Fan shaft bearing lubrication point not identified		203
Caution plates	Caution plates missing or not as specified, when required	107	
Wiring	Wiring diagram not affixed as specified		204
	Wire not coded or marked as specified		205
Welding	Scale or flux deposits not removed		206
Lubrication	Lubrication tags missing or not as specified		207
Data-name plate	Omitted or not as specified		208
	Information incomplete or not legible		209
	Not located so as to be readily visible to operator		210
Instruction plate	Missing, incomplete, not legible, not specified type, not affixed, or not of specified material		211
Storage bin	Not as specified	212	

4.2.3.2 Dimensional examination. Examination shall be made of the ice making machine for the dimensions specified in table II. Any dimension not within specified requirements shall be classified as a defect. The inspection level shall be S-2 and the AQL, expressed in terms of defects per hundred units, shall be 4.0.

* 4.2.3.3 End item testing. Each ice making machine shall be tested in accordance with 4.4.4; failure to pass the test shall be cause for rejection of the ice making machine. Sample ice making machines shall be tested as specified in 4.4.1 thru 4.4.3 using an inspection level of S-1; failure to pass any test shall be cause for rejection of the lot. When applicable (see 3.3), the test specified in 4.4.7 shall be performed on one production unit (see 6.5); failure to pass this test shall be cause for rejection of the inspection lot. When specified (see 3.2), one representative unit from the first production lot shall be tested as specified in 4.4.8. If the representative unit passes the test specified in 4.4.8, subsequent lots produced without design, material, or manufacturing changes may be accepted without repetition of that test.

4.2.4 Packaging inspection. The inspection shall be in accordance with the quality assurance provisions of MIL-R-3593.

4.3 Certification compliance examination. Certifications, certified test reports, or listing marks for codes and standards, as applicable, submitted in accordance with 3.4, shall be examined and validated as proof of compliance.

4.3.1 Underwriters Laboratories, Inc. (UL). Acceptable evidence of meeting the requirements of the underwriters Laboratories standard specified in 3.4 shall be the UL label, a UL listing mark, or a certified test report from a recognized independent testing laboratory acceptable to the Government, indicating that the offered ice makers have been tested and conform to the applicable requirements of the specified standard (see 3.4).

4.3.2 National Sanitation Foundation (NSF). Acceptable evidence of meeting the requirements of the National Sanitation Foundation standard specified in 3.4 shall be one of the following:

[a] A listing in the current edition of the NSF "Listing of Food Service Equipment" and display of the NSF seal on the finished ice maker.

[b] A certification for the ice maker issued by NSF under their special one-time contract evaluation/certification service.

[c] A certified test report acceptable to the contracting officer with the advice of the Army Surgeon General, from an independent testing laboratory, indicating that the ice makers have been tested and conform to the specified NSF standard (see 3.4).

4.4 Methods of inspection.

4.4.1 Drop test. The ice making machine shall be raised once on each side and dropped onto a concrete floor from a height of 3 inches from the concrete floor and then operated to determine compliance with requirements of 3.6. Inability of the unit to operate, refrigerant leaks, structural damage to cabinet, or inability of controls to function properly shall constitute failure of this test.

4.4.2 Capacity test. The ice making machine shall be tested in accordance with the methods prescribed in ASHRAE 29 and conditions specified in 3.2.2. Inability of the unit to meet the capacity requirements of 3.2.2 shall constitute failure of this test.

4.4.3 Performance test. The ice making machine shall be operated for at least 2 continuous hours in accordance with the high ambient conditions test method prescribed in section 6 of ARI 810 and under the conditions specified in 3.2.3. The control test temperature must be maintained within +/- 2 deg. F. Nonconformance with 3.2.3 shall constitute failure of this test.

4.4.4 Operational test. The ice making machine shall be operated through one ice making and harvesting cycle to determine compliance with 3.2. Prior to the system operation, the condensing unit shall be leak tested with a halide or electronic leak detector. The maximum permissible leak shall be 0.5 ounce per year. Inability of the unit to operate through one complete cycle or pass the leak test shall constitute failure of this test.

4.4.5 Density test for insulation.

4.4.5.1 Free rise method. The sample shall be a 6-inch cube cut from the center of a minimum 8-inch free foam cube of insulation. The 6-inch cube shall be weighed and the density calculated as follows:

Density (lb; ft3) - Weight of a 6-inch cube (lb) X 8

Any nonconformance shall constitute failure of this test.

* 4.4.5.2 In-place method. The weight of the ice storage bin and the volume area to be foamed shall be determined. The top, bottom and four sides shall than be foamed and the ice storage bin weighed. The foam density shall then be calculated as follows:

Density= Bin weight (lb) after foaming - Bin weight (lb) before foaming
(lb/ft3) Bin foamed volume area

Any nonconformance shall constitute failure of this test.

4.4.6 Inner liner leak test. The inner liner of the storage bin with the drain plugged shall be placed in jig or frame, and the liner fillet with water. The inner liner shall be examined for leaks to determine compliance with 3.6.9. Inability of the inner liner to hold water without leaks shall constitute s defect.

4.4.7 Electromagnetic compatibility. When electromagnetic compatibility required, the unit shall be tested by the contractor in accordance with test methods CE05 and RE02 of MIL-STD-462. The Government reserves the right to witness tests performed by the contractor or an independent testing agency. The contractor shall furnish the contracting officer written certification that the Interference Control Plan, the EMI/EMC Test Plan, the Electromagnetic Compatibility Test Report and the requirements meet MIL-STD-461.

* 4.4.8 Roll test. When specified for Navy shipboard use (see 6.2), the ice making machine shall be bolted to a table or platform. The ice making machine shall be placed in operation. When the storage bin is approximately half full of ice, the machine shall be rolled to one side 15 degrees from the vertical, then back through the vertical position to a position 15 degrees on the opposite side, then back to the vortical position. One complete cycle of motion, from vertical to one side through vertical to opposite side and back to vertical, shall be 1 minute of continuous motion. This portion of the test shall last for 15 complete cycles of the motion (15 minutes). The machine shall then be subjected to 15 continuous cycles of the above described motion in the front to back direction. Failure of the machine to operate or improper operation, as a result of this test, shall constitute failure of this test.

5. PACKAGING

5.1 Preservation and Packaging. Preservation and packaging s•hall be level A, B or C, as specified (see 6.2).

5.1.1 Levels A, B ant C. Each ice making machine shall be preserved and packaged in accordance with the applicable requirements of MIL-R-3593.

5.2 Packing. Packing shall be level A, B or C, as specified (see 6.2).

5.2.1 Levels A, B and C packing. Each ice making machine shall be packed in accordance with the applicable requirements of MIL-R-3593.

5.3 Marking. In addition to any special marking required by the contract or purchase order, interior packages, shipping containers, and unboxed equipment shall be marked in accordance with MIL-R-3593.

6. NOTES

6.1 Intended use. The ice making machine is intended to be used in dining facilities, hospitals, and other military installations, and for Navy shipboard use where a continuous supply of cubed ice is needed.

* 6.2 Ordering data. Acquisition documents should specify the following:

[a] Title, number, and date of this document.
[b] Type, size, and grade required (see 1.2).
[c] Size of ice cubes when a specified size is required (see 3.2.2).
[d] Whether electromagnetic compatibility is required (see 3.3).
[e] When electrical characteristics other than specified are required, the contracting office shall provide voltage, phase, cycle, and other necessary requirements to facilitate operation and installation.
[f] When ice storage bin capacity is other than specified (see 3.6.9).
[g] When ice crushing mechanism is required (see 3.6.10).
[h] When fungus treatment is required (see 3.6.13).
[i] When initial lubrication service is other than commercial (see 3.6.16).
[j] Finish if other than specified (see 3.7).
[k] Government approved manual number to be included on data-name plate (see 3.8).
[l] Selection of applicable levels of preservation and packaging (see 5.1 and 5.2).
[m] When the ice making machine is for Navy shipboard use.
[n] When the ice making machine is for use in the Army dining facilities (see 3.6.9).

6.3 Standard lubricants. When requested by the contractor, a list of standard Military lubricants applicable to the equipment covered by this document should be furnished.

[a] For Army use, this information is contained in Department of the Army Supply bulletin SB 38-5-3, "List of Standard Lubricants, Hydraulic Fluids, Liquid Fuels and Preservative Materials."

[b] For Navy use, this information is contained in appendix A, "Lubricants Used by the Navy Department," of Bureau of Ships Pamphlet NBS 431, "Lubricants, General Information; Requirements, and Test Methods Relating to Qualification of Military Symbol Oils" .

6.4 Recycled material. It is encouraged that recycled material be used when practical, as long as it meets the requirement of the document (sec 3.5).

6.5 Electromagnetic compatability test. Performance of this test should be limited to one successful demonstration of compliance with the electromagnetic compatability requirements of this specification for each contract.

6.6 Changes from Previous issue. The margins of this document are marked with an asterisk to indicate where changes (additions, modifications, corrections, deletions) from the previous issue have been made. This was done