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An American National Standard

Standard Specification for Dehumidifier, Shipboard, Mechanically Refrigerated, Self-Contained[1]

This standard is issued under the fixed designation F 1075; 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 self-contained dehumidifiers using hermetic refrigerant motor-compressors.

1.2 The values stated in inch-pound units are to be regarded as the standard. The values given in parentheses are for information only.

1.3 The following safety hazards caveat pertains only to the test methods portion, Section 11, of this specification: *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]

B 117 Practice for Operating Salt Spray (Fog) Apparatus

B 280 Specification for Seamless Copper Tube for Air Conditioning and Refrigeration Field Service

D 1654 Test Method for Evaluation of Painted or Coated Specimens Subjected to Corrosive Environments

D 2247 Practice for Testing Water Resistance of Coatings in 100 % Relative Humidity

2.2 *ASHRAE Standard:*[3]

ASHRAE—15 Safety Code for Mechanical Refrigeration

2.3 *Official Classification Standard:*[4]

Uniform Freight Classification Ratings, Rules, and Regulations

2.4 *UL Standards:*[5]

UL 474 Dehumidifiers

UL 984 Hermetic Refrigerant Motor—Compressors

2.5 *Military Documents:*[6]

MIL-S-901 Specification Requirements for Shock Tests, High Impact (H.I.); Shipboard Machinery, Equipment, and Systems

MIL-STD-167-1 Mechanical Vibrations of Shipboard Equipment, (Type I—Environmental and Type II—Internally Excited)

MIL-D-19947 Specification for Dehumidifier, Space, Mechanically Refrigerated, Self-Contained, Naval Shipboard

3. Ordering Information

3.1 Orders for products under this specification shall include the following information, as necessary, to describe adequately the desired product:

3.1.1 Title, ASTM designation, and year of issue,

3.1.2 Quantity (number of dehumidifiers),

3.1.3 Certification if required, and

3.1.4 Additions to the specification and supplementary requirements, if required.

4. Materials and Manufacture

4.1 In addition to the requirements cited in this specification, the dehumidifiers covered by this specification shall be designed, constructed, assembled, and tested to comply with UL 474, UL 984, and ASHRAE Standard 15. In the event of differences between any of the requirements of this specification and those of other referenced documents, the requirements of this specification shall govern. The manufacturer shall certify compliance with the above standards for equipment furnished and shall be cited in the UL Electrical Appliance and Utilization Equipment product directories.

4.2 The dehumidifier shall consist of a motor-compressor, condensing unit, dehumidifying coil, air-circulating fan, and accessories, all enclosed within a metal cabinet. The dehumidifier shall be complete, self-contained with the refrigeration

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

[4] Available from Uniform Classification Agent, Tariff Publication Officer, Room 1106, 222 South Riverside Plaza, Chicago, IL 60606.

[5] Available from Underwriter's Laboratories Inc., 333 Pfingsten Rd., Northbrook, IL 60062.

[6] Available from Superintendent of Documents, U.S. Government Printing Office, Washington, DC 20402.

equipment dehydrated, and charged with the necessary operating quantity of refrigerant and oil. Each unit shall be ready for operation after removal of shipping protection, opening of valves where provided, and connection to electric power.

4.3 The motor-compressor shall be of the hermetic type and shall consist of a compressor and motor enclosed in a gastight shell. The hermetic compressor unit shall conform to UL 984 and shall be at least ⅙ hp. Equipment shall operate on 115-V, single-phase, 60-cycle alternating current. The unit shall be protected against overload by a thermal protector built into the motor. The thermal protection shall be either the manual or automatic reset type.

4.4 Piping necessary for the satisfactory operation of the equipment shall be provided by the manufacturer. Tubing shall be made of copper in accordance with Specification B 280. Piping connections shall be arranged in such a manner so as not to impair the vibration-isolation properties of absorption-type mounts, where such mounts are provided. Piping shall be securely supported to minimize strain and vibration. Piping connections shall not be made of soft solder.

4.5 Materials used in the manufacture of the equipment shall be corrosion-resistant or treated to resist corrosion. The method of manufacture shall not impair physical, structural, or corrosion-resistant properties of the components. Materials, coatings, and paint systems shall satisfactorily pass the applicable salt spray and humidity test specified in this specification.

4.6 Bolts, nuts, studs, pins, screws, and such other fastenings or fittings shall be of a corrosion-resisting material, or of a material treated in a manner to render it adequately resistant to corrosion. Screws exposed in final assembly shall be corrosion-resisting material.

4.7 Similar parts, including repair parts, or corresponding apparatus furnished on the same contract or order, or built to the same drawings, shall be strictly interchangeable without the necessity of further machining or hand fitting of any kind.

4.8 A plastic or other chemically inert container shall be provided for collecting the condensate. The container shall be of a size and configuration that will fit within the cabinet enclosure. The container shall be provided with baffles to prevent the overflow or spilling of water and shall be readily removable from the dehumidifier cabinet. A male fitting shall be provided from the container for connection of a 0.375-in. (10-mm) inside diameter flexible rubber tubing for draining the condensate (wall thickness 0.125 in. (3 mm)). The rubber tubing will not be required to be furnished by the contractor.

4.9 Provision shall be made in the frame to permit securing the cabinet to any appropriate surface.

4.10 Identification plates shall be of a nonferrous metal or corrosion-resisting steel and shall conform to UL 474.

5. Performance Requirements

5.1 The unit shall be capable of condensing at least 1.8 gal (7 L) of water in 24 h at an ambient temperature of 90°F (32°C) dry bulb and 60 % relative humidity.

5.2 The unit shall operate satisfactorily in a maximum ambient temperature of 110°F (43°C) and a minimum relative humidity of 30 %. Under these conditions of maximal load, the temperature rise of the hermetic motor shall not exceed 158°F (70°C).

5.3 The equipment shall operate satisfactorily when inclined at an angle of 15° on each side of the vertical, in each of two vertical planes at right angles to each other.

6. Other Requirements

6.1 *Design Documentation*—A master drawing of a built configuration shall be provided for each of the following:

6.1.1 Complete dehumidifier,

6.1.2 Motor compressor,

6.1.3 Condenser, and

6.1.4 Fan and cooling coil.

6.1.5 Each master drawing shall show outline, mounting, attachment, and connection dimensions, including methods and sizes of fastenings and clearances for installation and servicing, plus supplementary data as necessary to permit installation without suppliers assistance. The drawing shall illustrate design, construction, operation (or function), and identity of parts. Where acceptance tests are required, the tests shall be identified, and approval authority and date shall be noted on the drawing. Subassembly drawings shall be provided to supplement master drawings where desirable.

6.2 *Schematic Drawings*:

6.2.1 Schematic drawings shall be provided that include all mechanical, piping and electrical circuits, and connections.

6.2.2 All symbols used for equipment components or parts shall be given a piece number and identified in the list of materials with the following information:

6.2.2.1 Piece number,

6.2.2.2 Quantity required,

6.2.2.3 Descriptive name,

6.2.2.4 Manufacturer,

6.2.2.5 Manufacturer’s model or identifying number,

6.2.2.6 Manufacturer’s drawing number, and

6.2.2.7 Weight.

6.3 *Manuals*—Manuals shall be typed in accordance with the manufacturer’s commercial practice. Photo views of the equipment shall be included as part of the general description. A section shall be provided containing reduced copies of all drawings required to amplify or illustrate the text including diagram and assembly drawings.

7. Workmanship, Finish, and Appearance

7.1 All materials forming a part of the finished product shall be new and suitable for the purpose intended. The materials shall be free from any defects that might affect the serviceability or appearance of the finished product.

7.2 Seal caps in the refrigerant system shall be provided with a gasket and shall be tight against any leaks.

7.3 Bolts, nuts, and screws shall be tight and equipment and parts shall be properly fastened and secured.

7.4 No parts or components shall be fractured, split, torn, dented, or otherwise defective.

7.5 The limiting and mounting dimensions shall be in accordance with the drawings.

7.6 There shall be no sharp or ragged edges that may be injurious to people.

8. Sampling

8.1 Sample units shall be selected from each lot offered for delivery, in accordance with Table 1 and subjected to the tests specified in 8.3.

8.2 If any unit fails in any test or is found nonconforming in any requirement, it shall be counted a defective unit, and if the number of such defective units in any sample exceeds the acceptance number shown in Table 1 for the sample, the lot represented by the sample will be rejected.

8.3 *Quality Conformance Tests*:

8.3.1 The units shall be operated for a period of at least 1 h under ambient atmosphere conditions. During the test, all refrigerant containing parts shall be leak tested by means of a halide leak detector and shall be free of any leaks. In the evidence of leakage, the unit shall be considered defective. The halogen leak detector shall have a leak index sensitivity of ½ oz per year (14 g per year).

8.3.2 Under equivalent ambient temperature, the electrical power input shall be measured and compared with the input of all other units that have been tested. If any unit requires 7 % more power than the average of all the acceptable units, it shall be counted as a defective unit and shall only be offered for delivery after the cause has been found and corrected.

9. Number of Tests and Retests

9.1 A first unit shall satisfactorily pass the tests listed in 11.1-11.3 before production units are offered for delivery.

9.2 A test for the corrosion-resistant properties of the materials, coating, and painting system used, shall be carried out as specified in 11.4.

10. Specimen Preparation

10.1 Test specimens for the corrosion test shall be prepared by the manufacturer as required, and shall be of the same material used in the dehumidifier. The film thickness of the coating or paint system applied on the test specimen shall be the same as the film thickness used on the equipment.

11. Test Methods

11.1 *Design Capacity Test*—Install the unit in an ambient temperature of 90°F (32°C) and 60 % relative humidity. Operate the unit for a period of 4 h. Under these conditions, the unit shall condense moisture at the rate of at least 1.8 gal (7 L) of water in 24 h. Record ambient temperature, relative humidity, and quantity of condensate at 20-min intervals.

TABLE 1 Sampling for Quality Conformance Inspection

Lot Size	Sample Size	Defective Units	
Number of Units	Number of Units	Acceptance Number	Rejection Number
1–6	11	. . .	. . .
7–15	7	0	1
16–25	10	0	1
26–40	13	0	1
41–65	17	1	2
66–110	22	1	2
111–180	28	2	3
181–300	35	2	3
301–500	45	3	4

11.2 *Overload Test*—Install the unit in an ambient temperature of 110°F (43°C) and not less than 30 % relative humidity. The unit shall operate without tripping the compressor motor overload device or without breakdown. Continue the test until steady conditions have been observed for at least 4 h. Record ambient temperature, relative humidity, and voltage at service connection every 20 min. Determine the temperature of the compressor-motor winding at the end of the 4-h test period. The temperature rise shall not exceed 158°F (70°C). Measure and compute the temperature rise of the running winding in the compressor-motor by the resistance method.

11.3 *Inclination Test*—Incline the unit at an angle of 15° on each side of the vertical in each of two vertical planes at right angles to each other and operate at least 1 h in each plane with no abnormal variations in temperature. Collect and drain condensate from the evaporator into the container without any spillage in any of the inclined positions.

11.4 *Corrosion Resistant Test*—Test the test specimens in a corrosion environment in accordance with Practice B 117 (Salt Spray Apparatus) and Practice D 2247 (100 % relative humidity test). The time duration of each test shall be 240 h. Evaluate the test specimens in accordance with Test Method D 1654. The rating number shall not be less than 6, and the rust creep shall not be greater than ⅛ in. (3 mm) normal to the scribe marks for acceptance.

12. Inspection

12.1 Unless otherwise specified in the purchase order or contract, the manufacturer is responsible for the performance of all inspection and test requirements specified in this specification. Except as otherwise specified in the purchase order or contract, the manufacturer may use his own or any other suitable facilities for the performance of the inspection and test requirements unless disapproved by the purchaser at the time the order is placed. The purchaser shall have the right to perform any of the inspections and tests set forth in this specification when such inspections and tests are deemed necessary to assure that the material conforms to the prescribed requirements.

13. Rejection

13.1 Material that fails to conform to the requirements of this specification when inspected or tested by the purchaser or his agent may be rejected.

14. Certification

14.1 When specified in the purchase order or contract, a manufacturer's or supplier's certification shall be furnished to the purchaser stating that the equipment was manufactured, sampled, tested, and inspected in accordance with this specification and has been found to meet the requirements. When specified in the purchase order or contract, drawings shall be provided that are sufficiently complete to reflect compliance with specification requirements for the equipment, and a report of the test results shall be furnished.

15. Packaging and Package Marking

15.1 *Preservation and Packaging*—Preservation and packaging shall be sufficient to afford adequate protection against

corrosion, deterioration, and physical damage during shipment from the supply source to the using activity and until installation and may conform to the suppliers commercial practice when such meets these requirements. Manuals furnished with basic equipment shall be packaged in sealed, waterproof containers.

15.2 *Packing*—Packing shall be accomplished in a manner that will ensure acceptance by common carrier at the lowest rate and will afford protection against physical or mechanical damage during direct shipment from the supply source to the using activity for early installation. The shipping containers or method of packing shall conform to the Uniform Freight Classification Rules and Regulations or other carrier regulations as applicable to the mode of transportation and may conform to the suppliers commercial practice when such meets these requirements.

15.3 *Marking*—Shipment marking information shall be provided on interior packages and exterior shipping containers in accordance with the contractor's commercial practice.

16. Supersession

16.1 This specification is intended to supersede military Specification MIL-D-19947.

17. Keywords

17.1 dehumidifier; hermetic refrigerant motor-compressor; mechanically refrigerated dehumidifier; self-contained dehumidifier

SUPPLEMENTARY REQUIREMENTS

The following supplementary requirements are applicable to DoD procurements and shall apply only when specified by the purchaser in the contract or order.

S1. Dimensions, Mass, and Permissible Variations

S1.1 *Size*—The unit shall permit passing through a circular opening 21 in. (530 mm) in diameter and a rectangular opening 18 by 30 in. (460 by 760 mm).

S2. Design Requirements

S2.1 *Shock*—The dehumidifier shall be designed to meet shock requirements in accordance with MIL-S-901, for Grade B equipment.

S2.2 *Vibration*—The dehumidifier shall be designed to withstand conditions in accordance with MIL-STD-167-1 for Type I and Type II vibration of shipboard equipment.

S3. First Article Testing

S3.1 A first unit shall satisfactorily pass the tests listed in S3.2 and S3.3 before production units are offered for delivery.

S3.2 *Shock Testing*—A first unit shall be subjected to and shall meet Grade B shock requirements in accordance with MIL-S-901.

S3.3 *Vibration Testing*—A first unit shall be subjected to and shall withstand vibration testing in accordance with MIL-STD-167-1 for Type I and Type II equipment.

S4. First Article Test Report

S4.1 A first article test report shall be submitted certifying compliance with the requirements specified in this specification.