

UL 474

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Dehumidifiers

Underwriters Laboratories Inc. (UL)
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UL Standard for Safety for Dehumidifiers, UL 474

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The following table lists the future effective dates with the corresponding item.

Future Effective Date	References
March 18, 2004	Paragraph 8.9 and Section 40A

The new and revised requirements are substantially in accordance with UL's Bulletin(s) on this subject dated July 13, 2001. The bulletin(s) is now obsolete and may be discarded.

The revisions dated March 18, 2002 include a reprinted title page (page1) for this Standard.

As indicated on the title page (page 1), this UL Standard for Safety is an American National Standard. Attention is directed to the note on the title page of this Standard outlining the procedures to be followed to retain the approved text of this ANSI/UL Standard.

As indicated on the title page (page1), this UL Standard for Safety has been adopted by the Department of Defense.

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New product submittals made prior to a specified future effective date will be judged under all of the requirements in this Standard including those requirements with a specified future effective date, unless the applicant specifically requests that the product be judged under the current requirements. However, if

the applicant elects this option, it should be noted that compliance with all the requirements in this Standard will be required as a condition of continued Listing and Follow-Up Services after the effective date, and understanding of this should be signified in writing.

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This Standard consists of pages dated as shown in the following checklist:

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Standard for Dehumidifiers

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The most recent designation of ANSI/UL 474 as an American National Standard (ANSI) occurred on November 26, 2001.

This ANSI/UL Standard for Safety, which consists of the seventh edition (with revisions through March 18, 2002), is under continuous maintenance, whereby each revision is ANSI approved upon publication. Comments or proposals for revisions on any part of the Standard may be submitted to UL at any time. Written comments are to be sent to the UL-Northbrook Standards Department, 333 Pfingsten Road, Northbrook, IL 60062.

An effective date included as a note immediately following certain requirements is one established by Underwriters Laboratories Inc. and is not part of the ANSI Standard.

The Department of Defense (DoD) has adopted UL 474 on January 18, 1994. The publication of revised pages or a new edition of this Standard will not invalidate the DoD adoption.

Revisions of this Standard will be made by issuing revised or additional pages bearing their date of issue. A UL Standard is current only if it incorporates the most recently adopted revisions, all of which are itemized on the transmittal notice that accompanies the latest set of revised requirements.

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FOREWORD

A. This Standard contains basic requirements for products covered by Underwriters Laboratories Inc. (UL) under its Follow-Up Service for this category within the limitations given below and in the Scope section of this Standard. These requirements are based upon sound engineering principles, research, records of tests and field experience, and an appreciation of the problems of manufacture, installation, and use derived from consultation with and information obtained from manufacturers, users, inspection authorities, and others having specialized experience. They are subject to revision as further experience and investigation may show is necessary or desirable.

B. The observance of the requirements of this Standard by a manufacturer is one of the conditions of the continued coverage of the manufacturer's product.

C. A product which complies with the text of this Standard will not necessarily be judged to comply with the Standard if, when examined and tested, it is found to have other features which impair the level of safety contemplated by these requirements.

D. A product that contains features, characteristics, components, materials, or systems new or different from those covered by the requirements in this standard, and that involves a risk of fire or of electric shock or injury to persons shall be evaluated using appropriate additional component and end-product requirements to maintain the level of safety as originally anticipated by the intent of this standard. A product whose features, characteristics, components, materials, or systems conflict with specific requirements or provisions of this standard does not comply with this standard. Revision of requirements shall be proposed and adopted in conformance with the methods employed for development, revision, and implementation of this standard.

E. UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. The opinions and findings of UL represent its professional judgment given with due consideration to the necessary limitations of practical operation and state of the art at the time the Standard is processed. UL shall not be responsible to anyone for the use of or reliance upon this Standard by anyone. UL shall not incur any obligation or liability for damages, including consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Standard.

F. Many tests required by the Standards of UL are inherently hazardous and adequate safeguards for personnel and property shall be employed in conducting such tests.

INTRODUCTION

1 Scope

1.1 These requirements cover movable, household, self-contained dehumidifiers employing hermetic refrigerant motor-compressors and intended for connection to single-phase, alternating-current (ac) circuits rated not more than 20 amperes, 125 volts or 15 amperes, 208 or 230 volts. The requirements also cover dehumidifiers which incorporate electric air heaters.

1.1 revised March 18, 2002

1.2 A product that contains features, characteristics, components, materials, or systems new or different from those covered by the requirements in this standard, and that involves a risk of fire or of electric shock or injury to persons shall be evaluated using appropriate additional component and end-product requirements to maintain the level of safety as originally anticipated by the intent of this standard. A product whose features, characteristics, components, materials, or systems conflict with specific requirements or provisions of this standard does not comply with this standard. Revision of requirements shall be proposed and adopted in conformance with the methods employed for development, revision, and implementation of this standard.

1.2 revised March 18, 2002

2 General

2.1 Components

2.1.1 Except as indicated in 2.1.2, a component of a value covered by this standard shall comply with the requirements for that component. See Appendix A for a list of standards covering components generally used in the valves covered by this standard.

2.1.2 A component is not required to comply with a specific requirement that:

- a) Involves a feature or characteristic not required in the application of the component in the product covered by this standard, or
- b) Is superseded by a requirement in this standard.

2.1.2 revised March 18, 2002

2.1.3 A component shall be used in accordance with its rating established for the intended conditions of use.

2.1.3 revised March 18, 2002

2.1.4 Specific components are incomplete in construction features or restricted in performance capabilities. Such components are intended for use only under limited conditions, such as certain temperatures not exceeding specified limits, and shall be used only under those specific conditions.

2.1.4 revised March 18, 2002

2.2 Units of measurement

2.2.1 Values stated without parentheses are the requirement. Values in parentheses are explanatory or approximate information.

2.2.1 revised March 18, 2002

2.3 Undated references

2.3.1 Any undated reference to a code or standard appearing in the requirements of this standard shall be interpreted as referring to the latest edition of that code or standard.

3 Operating Instructions

3.1 A dehumidifier shall be provided with instructions containing directions and information which the manufacturer considers necessary for use and maintenance of the appliance.

3.2 A copy of the manufacturer's instructions, or equivalent information, intended to accompany each dehumidifier, is to be furnished with the sample submitted for investigation. These instructions are to be used as a guide in the examination and test of the dehumidifier. For this purpose, a printed edition is not required initially if rough draft instructions or information as to what the instructions will include are submitted for review as part of the investigation.

CONSTRUCTION

4 General

4.1 Ferrous metal parts used to support or retain electrical components in position shall be protected against corrosion by metallic or nonmetallic coatings, such as plating or painting.

Exception: This requirement does not apply to parts, such as washers, screws, bolts, and the like, where corrosion of such unprotected parts would not affect compliance with the requirements of this standard.

5 Assembly

5.1 Opening in the enclosure of a dehumidifier shall be designed and located to reduce the risk of unintentional contact with;

- a) Uninsulated live parts,
- b) Parts which may cause injury to persons, such as fan blades and blower wheels, and
- c) Electric heater elements.

The minor dimension of such openings shall not permit passage of a 1 inch (25.4 mm) diameter hemispherically-tipped rod, applied with a force of 2.5 pounds (11.1 N). In evaluating openings, parts of the enclosure, such as covers, panels, and grilles are to be removed unless tools are required for their removal or when exposed, a moving part is made inoperative or an uninsulated electrical part is de-energized through the use of interlocking devices.

5.2 An opening is acceptable if the probe illustrated in Figure 5.1 cannot contact uninsulated live parts, film coated wire, moving parts, and heater elements. The probe is to be applied:

- a) With a force of 2.5 pounds (11.1 N) and
- b) In any possible configuration and to any depth that the size of an opening will permit.

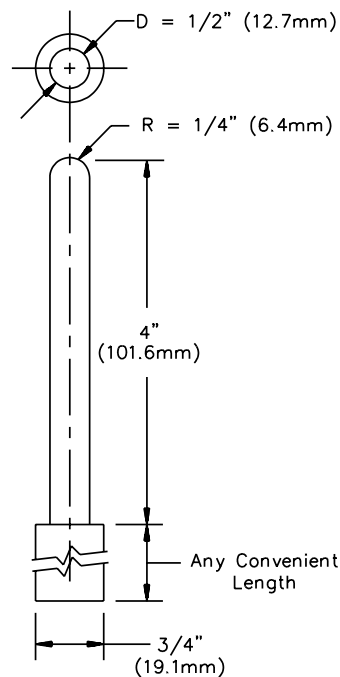
The probe is to be rotated or angled to any possible position before, during, or after insertion through the opening; and, if necessary, the configuration of the probe may be changed after the probe has been inserted through the opening.

Exception: For film-coated wire, an opening in the motor enclosure of 3/4 inch (19.0 mm) or less is acceptable if the probe illustrated in Figure 5.2 cannot contact the wire.

5.2 revised April 23, 1996

[illegible]

Figure 5.2
Probe



PA170B

5.3 In addition to the requirements of 5.1 and 5.2, uninsulated live parts inside the enclosure which are likely to be contacted by persons performing operations, such as adjusting controls or oiling motors, shall be located, guarded, or enclosed to reduce the risk of unintentional contact. See 53.8.

5.4 Electrical components shall be located or enclosed so that water will not impinge on uninsulated live parts as a result of splashing, leakage, or condensation. See Leakage Current Test, Section 24, and Dielectric Voltage Withstand Test, Section 28, conducted following the Temperature and Pressure Test, Section 26.

5.5 A condensate drain pan and a condensate receptacle shall be constructed and located so that overflow will not wet uninsulated live parts or film-coated wire. An Overflow Test, Section 31, is to be conducted if it is not evident that the dehumidifier complies with this requirement.

5.6 A switch, lampholder, receptacle, plug connector, or other electrical component shall be secured in position and prevented from turning. See 5.7.

Exception No. 1: The requirement that a switch be prevented from turning will be waived if all of the following conditions are met:

- a) The switch is of a plunger or other type that does not tend to rotate when operated. A toggle switch is considered to be subject to forces that tend to turn the switch during operation of the switch.*
- b) Means of mounting the switch make it unlikely that intended operation of the switch will loosen it.*

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c) *Electrical spacings are not reduced below the required values if the switch rotates.*

d) *Operation of the switch is by mechanical means rather than direct contact by persons.*

Exception No. 2: A lampholder of a type in which the lamp cannot be replaced, such as a neon pilot or indicator light in which the lamp is sealed in a nonremovable jewel, need not be prevented from turning if rotation cannot reduce electrical spacings below the minimum acceptable values.

5.7 The means for preventing rotation mentioned in 5.6 is to consist of more than friction between surfaces. A toothed lock washer that provides both spring take-up and an interference lock is acceptable as means for preventing a small stem-mounted switch or other device having a single-hole mounting means from turning.

5.8 Uninsulated live parts shall be secured to the mounting surface so that they will be prevented from turning or shifting in position if such motion may result in a reduction of electrical spacings below the minimum acceptable values. Friction between surfaces is not acceptable as a means to prevent shifting or turning of live parts but a lock washer as described in 5.7 is acceptable.

5.9 Flammable or electrically conductive thermal or acoustical insulation shall not contact uninsulated live parts. See 36.2.1.

5.10 Exposed unimpregnated asbestos material shall not be used in an air handling compartment. The unprotected edge of a gasket sandwiched between two parts is considered to be exposed.

6 Enclosures

6.1 A dehumidifier enclosure shall be formed and assembled so that it will have the strength and rigidity necessary to resist the abuses to which it may be subjected without total or partial collapse resulting in reduction of electrical spacings below those specified in Section 17, or exposure of moving parts or uninsulated live parts as judged by the requirements of Assembly, Section 5. An enclosure complying with the requirements of the Impact Test – Enclosures, Section 32, and Static Load Test, Section 33, is considered to comply with this requirement. For polymeric enclosures, see Polymeric Materials – Application, Section 7.

6.2 Enclosures for individual electrical components, outer enclosures, and combinations of the two are to be considered in determining compliance with the requirement of 6.1.

6.3 Openings in the bottom of a dehumidifier shall be located or provided with barriers or baffles to reduce the risk of burning insulation, flaming particles, molten metal, and the like, from falling out of the unit. Also see 15.8 – 15.10.

6.4 Steel enclosures shall be protected against corrosion by metallic or nonmetallic coatings, such as plating or painting.

7 Polymeric Materials – Application

7.1 General

7.1.1 The requirements in 7.1.2 – 7.6.1 cover parts made of polymeric materials for use in dehumidifiers. These requirements do not apply to materials used as electrical insulation, sole support of current-carrying parts, nor to small parts, such as control knobs, buttons, insulating bushings, resilient mounts, clamps, and wiring straps.

7.1.2 Among the factors taken into consideration when judging the suitability of a polymeric material are:

- a) Flame resistance,
- b) Mechanical strength,
- c) Resistance to impact,
- d) Moisture absorptive properties, and
- e) Resistance to distortion at temperatures to which the material may be subjected under conditions of use. All of these factors are considered with respect to aging.

7.2 Material classification

7.2.1 Materials are designated with respect to flammability characteristics and are identified as 5V, V-0, V-1, or V-2, HF-1, or HF-2, HB, and HBF materials. Flammability characteristics are to be established by tests specified in Sections 41 – 44.

7.2.1 revised March 31, 1998

7.3 Ignition sources

7.3.1 As used in 7.4.1 – 7.6.1, possible ignition sources within the unit are considered to be arcing parts and film-coated wire not enclosed in metal or in 5V material.

7.3.1 revised March 31, 1998

7.4 Enclosures

7.4.1 An enclosure is to be considered as that part of the dehumidifier which, by itself or in conjunction with barriers:

- a) Renders inaccessible any or all uninsulated and insulated live parts and moving parts, and/or
- b) Prevents propagation of the flame due to electrical disturbances occurring within.

7.4.2 Polymeric Materials used as enclosures shall comply with the requirements of Table 7.1 and Sections 41 – 49.

7.5 Functional and structural parts

7.5.1 For the purpose of these requirements, a functional or structural part is a part used to maintain the intended relative position of fixed or moving parts, or to maintain the integrity of the assembly.

Table 7.1
Polymeric enclosures

Table 7.1 revised March 31, 1998

	Material is used to enclose insulated live parts ^a	Material is used to enclose insulated live parts
Flammability tests ^b Section 43 or 44	X	—
Flammability test ^c Section 41	—	X
Impact test, Section 32	X	X
Static load test, Section 33	X	X
Volume resistivity test Section 47	X ^d	—
Mold stress, Section 45	X	X
High current arc		
Ignition test Section 48	X ^e	—
Water absorption test Section 46	X	—
Air-oven aging, Section 49	X	X
^a Film-coated wire is considered as an uninsulated live part. ^b A material classed as 5V, V-0, V-1, or V-2. ^c A material classed as HB. ^d Not required if the spacings between uninsulated live parts and the material complies with the spacing requirements of Table 17.1. ^e Not required if uninsulated arcing parts are located 1/2 inch (12.7 mm) minimum from the enclosure and if uninsulated nonarcing parts are located 1/4 inch (6.4 mm) from the enclosure. X-Required test		

7.5.2 Polymeric materials used as functional parts or structural parts shall be subjected to the following:

- a) Flammability tests according to the methods described for 5V, V-0, V-1, or V-2 materials, Sections 43 and 44.

Exception: A material classified as HB (see Section 42) may be employed if it is not exposed to ignition sources or if it is isolated from ignition sources in accordance with the requirements in 7.5.3 and 7.5.4.

- b) Mold Stress Relief Test, Section 45.

- c) Impact test of 5 foot-pounds (6.8 J) if the part is not located within the confines of the cabinet.

d) Water Absorption Test, Section 46.

e) Volume Resistivity Test, Section 47, if the material is used as indirect support of uninsulated live parts.

Exception: This test need not be conducted if the spacings between uninsulated live parts and the polymeric part comply with the requirements for Electrical Spacings, Section 17.

f) High Current Arc Ignition Test, Section 48, if the material is used as indirect support of live parts.

Exception: This test need not be conducted if uninsulated arcing parts are located at least 1/2 inch (12.7 mm) from the polymeric part and if uninsulated nonarcing parts are located at least 1/8 inch (3.2 mm) from the polymeric part.

g) Air Oven Aging, Section 49.

7.5.2 revised March 18, 2002

7.5.3 A HB material located below an ignition source and within Space A of Figure 7.1 may be isolated by means of a horizontal barrier, extending at least to the boundary surface of the space. A material located above the ignition source and within Space B of Figure 7.1 may be isolated by means of a barrier, extending at least to the boundary surface of the space, and located so that the minimum distance between the material and ignition source of 4 inches (102 mm).

7.5.3 revised March 31, 1998

7.5.4 A HB material located essentially in the vertical plane and adjacent to an ignition source is considered isolated from the ignition source if it is separated from it by a distance of 4 inches (102 mm). A barrier may be used for the isolation provided the size of the barrier is such that the minimum straight-line distance between the material and ignition source is 4 inches. See Figure 7.1.

7.5.4 revised March 31, 1998

7.5.5 If required by 7.5.3 or 7.5.4, a barrier shall be formed of metal or of a 5V material and shall be mechanically secured in place.

7.5.5 revised March 31, 1998

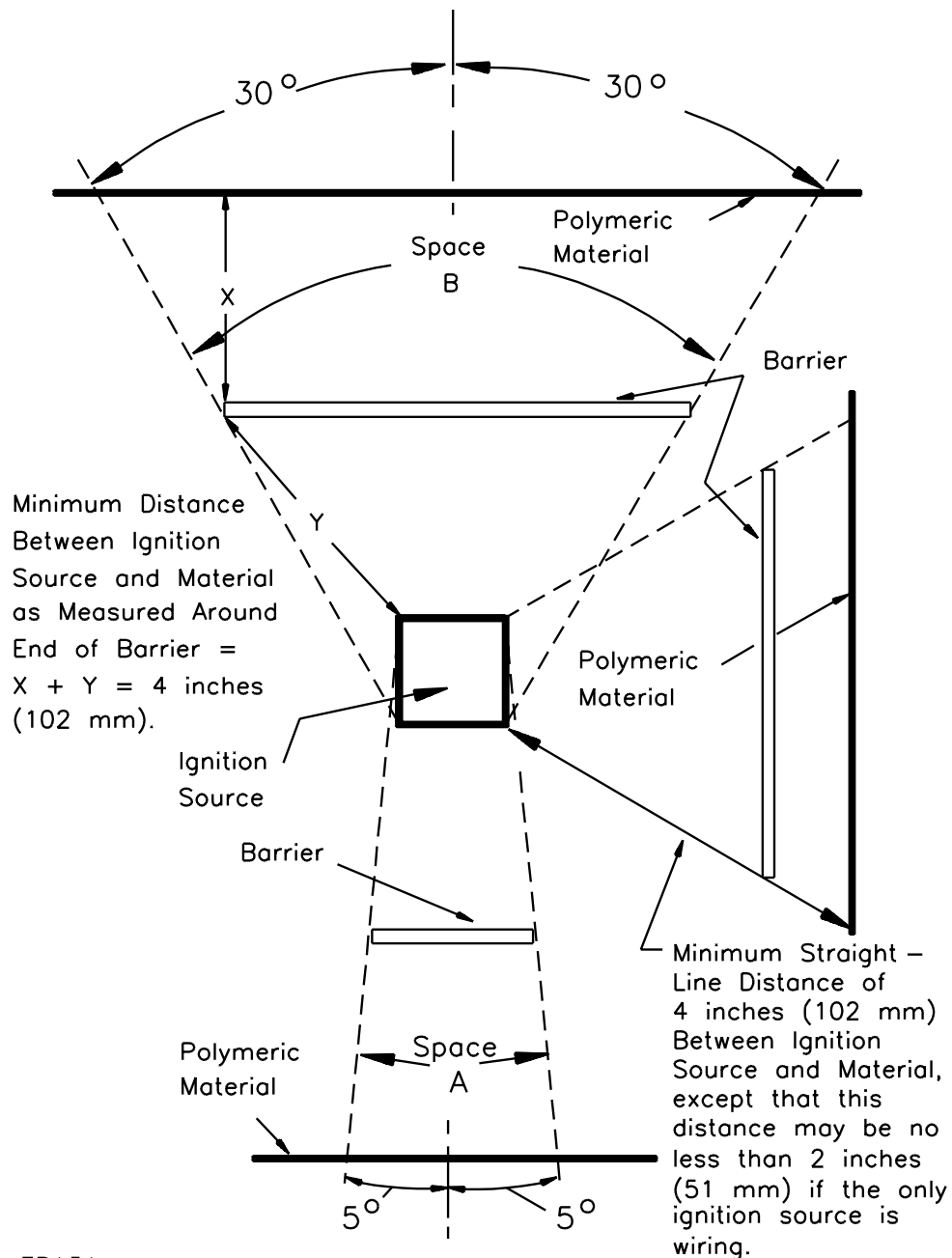
7.6 Nonfunctional parts

7.6.1 Polymeric materials used for parts that do not serve as electrical insulation, or to support or enclose electrical components, or to maintain electrical spacings, shall comply with the requirements of the flammability tests according to the methods 5V, V-0, V-1, V-2, HF-1, or HF-2.

Exception: A material classified as HB may be employed if it is not exposed to ignition sources or if it is isolated from ignition sources in accordance with 7.5.3 and 7.5.4.

7.6.1 revised March 31, 1998

Figure 7.1
Exposure to ignition source



EB151

Space A – Represents the volume below the ignition source determined by a straight line that moves about the ignition source while remaining at an angle of 5 degrees from the vertical and is always so oriented that the volume is a maximum.

Space B – Represents the volume above the ignition source determined in the same manner as Space A, except that the angle is 30 degrees from the vertical.

8 Supply Connections

8.1 A dehumidifier shall be equipped with a flexible power-supply cord having an equipment grounding conductor and with a grounding-type attachment plug.

8.2 A dehumidifier shall employ a grounding-type attachment plug that complies with the American National Standards designated in Table 8.1. The marked ampere rating of a dehumidifier shall not exceed 80 percent of the ampere rating of the attachment plug.

Table 8.1
Attachment plug rating

Amperes,-volts	ANSI designation ^a
15,125	C73.11-1972
20,125	C73.12-1972
15,250	C73.20-1972

^a As part of the Standard for Plugs and Receptacles, C73-1973 Series.

8.3 A dehumidifier shall employ a Type S, SO, ST, STO, SJ, SJO, SJT, SJTO, SE, SEO, SEOO, SOO, STOO, SJE, SJEO, SJEOO, SJOO, or SJTOO power supply cord rated for use at a voltage not less than the rated voltage of the dehumidifier. The ampacity of the cord as given in the National Electrical Code, ANSI/NFPA 70, shall be not less than that required by the ampere input measured during the Temperature and Pressure Test, Section 26, and during the Temperature Test – Electric Heat, Section 27.

8.3 revised March 18, 2002

8.4 The grounding conductor of a power supply cord shall be finished a continuous green color or a continuous green color with one or more yellow stripes, and no other conductor of the power supply cord shall be so identified. The grounding conductor shall be secured to the frame or enclosure of the dehumidifier by a positive means (see 10.4) that is not likely to be removed during any servicing operation not involving the power supply cord. The grounding conductor shall be connected to the grounding pin of the attachment plug cap.

8.4 revised March 18, 2002

8.5 The length of the power supply cord shall be not less than 6 feet (1.83 m) nor more than 10 feet (3.0 m). The length is to be measured between the attachment plug and the point at which the cord exits the dehumidifier cabinet.

8.6 The power supply cord shall be provided with strain relief means so that a stress on the cord will not be transmitted to terminals, splices, or internal wiring. If a metallic strain relief means is provided, it shall not contact uninsulated live parts or reduce electrical spacings within the enclosure if the cord is moved inward.

8.7 To determine the acceptability of the strain relief means required by 8.6, a 35 pounds-mass (15.9 kg) weight is to be suspended from the cord and supported by the dehumidifier so that the strain relief means will be stressed from any angle which the design of the dehumidifier permits. The load is to be applied for 1 minute. The strain relief is not acceptable if there is such movement of the cord as to indicate that stress would have resulted on the connections.

8.8 The edges of the entry hole for the power supply cord, including the cord entry hole in a bushing, shall be smooth and rounded without burrs, fins, or sharp edges which might damage the cord insulation. Within the dehumidifier, the power supply cord shall be routed to prevent damage to the cord insulation.

8.9 Means shall be provided to prevent a flexible cord from being pushed into the product through the cord-entry hole when such displacement results in:

- a) Subjecting the cord to mechanical damage,
- b) Exposing the cord to a temperature higher than that for which the cord is rated,
- c) Reducing spacings, such as to a metal strain-relief clamp, below the minimum required values; or
- d) Damaging internal connections or components.

The cord shall comply with the Push-Back Relief Test, Section 40A.

Added 8.9 effective March 18, 2004

9 Internal Wiring

9.1 All wires and cords used in a dehumidifier shall be routed and supported to reduce the risk of damage due to:

- a) Sharp edges,
- b) Surfaces and parts which operate at temperatures in excess of that for which the wire insulation is rated,
- c) Moving parts, and
- d) Parts which can be expected to vibrate, such as motors, motor-compressors, refrigerant lines, and the like. Clamping means shall have smooth, rounded surfaces.

Exception: Wires and cords may contact a vibrating part provided:

- a) The wiring is securely fastened to the part at the point of contact so as to restrict movement,*
- b) The part does not have burrs, fins, or sharp edges which might abrade the insulation, and*
- c) Vibration does not place a stress on the wiring or wiring connections.*

9.2 All wires and cords shall be routed and supported so that they will not be immersed in water unless the insulation is specifically intended for this purpose. The wiring arrangement shall prevent water caused by condensation from entering wiring enclosures and electrical enclosures.