



UL 474

STANDARD FOR SAFETY Dehumidifiers

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UL Standard for Safety for Dehumidifiers, UL 474

Tenth Edition, Dated June 22, 2015

Summary of Topics

The revisions dated June 24, 2015, were issued to editorially remove a statement from this transmittal page. No changes have been made to the body of the standard.

The new and revised requirements are substantially in accordance with Proposal(s) on this subject dated June 13, 2014, November 28, 2014, and December 19, 2014.

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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.

Comments or proposals for revisions on any part of the Standard may be submitted to UL at any time. Proposals should be submitted via a Proposal Request in UL's On-Line Collaborative Standards Development System (CSDS) at <http://csds.ul.com>.

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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.

2 General

2.1 Units of measurement

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

2.2 Undated references

2.2.1 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 Glossary

3.1 For the purpose of this standard, the following definitions apply.

3.2 ARC-FAULT CIRCUIT-INTERRUPTER (AFCI) – A device intended to mitigate the effects of arcing faults by functioning to deenergize the circuit where an arc-fault is detected.

3.3 COMPONENT – A device or fabricated part of the appliance covered by the scope of a safety standard dedicated to the purpose. When incorporated in an appliance, equipment otherwise typically field installed (e.g. luminaire) is considered to be a component. Unless otherwise specified, materials that compose a device or fabricated part, such as thermoplastic or copper, are not considered components.

3.4 CAPILLARY TUBE – Device made of tubing with an outer diameter of less than 3/16 in. (4.7 mm) and used to reduce the pressure of the refrigerant between the condenser and evaporator. It also regulates the refrigerant flow.

3.5 OPERATING CONTROL – A control intended to start, regulate, or operate the appliance during normal operation. An example would be a thermostat or temperature controller.

3.6 PROTECTIVE (SAFETY) CONTROL – A control intended to prevent the risk of electric shock, fire, or injury to persons, typically during abnormal operation of the appliance. An example would be a pressure limiting control.

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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.

4.2 A component shall:

- a) Comply with the safety standard covering that component;
- b) Be used in accordance with its rating(s) established for the intended conditions of use;
- c) Be used within its established use limitations or conditions of acceptability;
- d) Comply with the applicable requirements of this end product standard; and

Exception: A component of a product covered by this standard is not required to comply with a specific component requirement that:

- a) Involves a feature or characteristic not required in the application of the component in the product, or*
- b) Is superseded by a requirement in this standard, or*
- c) Is separately investigated when forming part of another component, provided the component is used within its established ratings and limitations.*

4.3 A component that is also required to perform other necessary functions, such as overcurrent protection, ground-fault circuit interruption, surge suppression, any other similar functions, or any combination thereof, shall comply additionally with the requirements of the applicable standard(s) covering products that provide those functions.

Exception: Where these other functions are not required for the application and not identified as part of markings, instructions, or packaging for the appliance, the additional component standard(s) need not be applied.

4.4 Components shall not contain liquid mercury.

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.

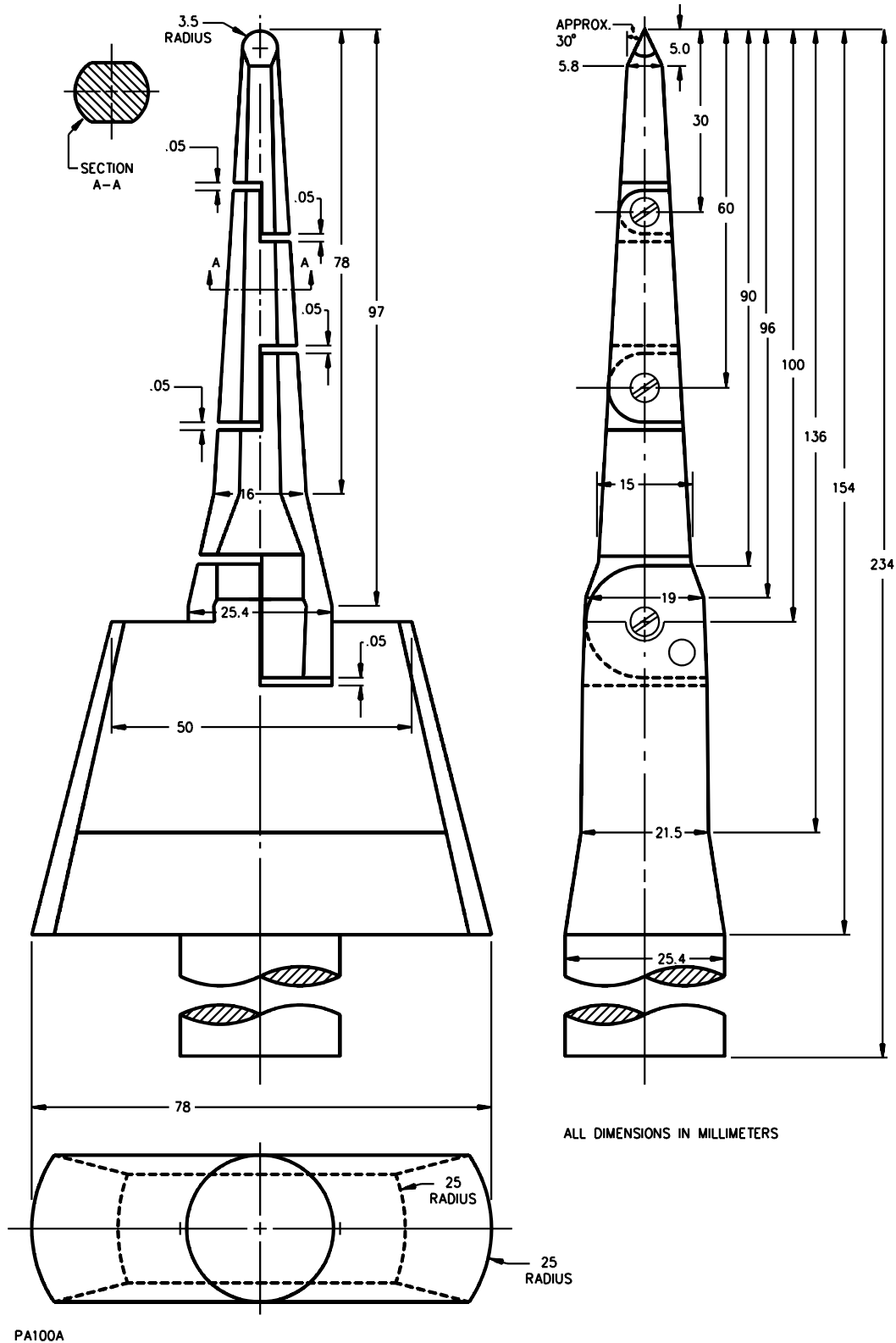
5.2 An opening is acceptable if the probe illustrated in Figure 5.1 cannot contact uninsulated live parts, film coated wire, moving parts, and heater elements. The probe is to be applied:

- 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.

Figure 5.1
Accessibility probe

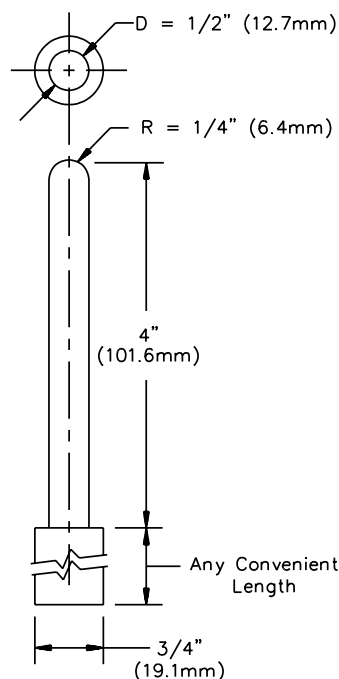


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Figure 5.2
Probe



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 55.8.

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 32, and Dielectric Voltage Withstand Test, Section 36, conducted following the Temperature and Pressure Test, Section 34.

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 39, 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.*

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 43.2.1.

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 24, 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 Static Load Test, Section 40, 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 15.2 – 15.4.

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 The requirements in 7.2 – 7.6 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.

7.2 Among the factors that shall be taken into consideration when judging the acceptability of nonmetallic material are resistance to:

- a) Mechanical damage,
- b) Impact,
- c) Moisture absorption,
- d) Combustion, and
- e) Distortion at temperatures to which the material may be subjected under conditions of normal or abnormal use.

7.3 A polymeric material enclosure of ignition sources shall comply with the requirements in the Standard for Polymeric Materials – Use in Electrical Equipment Evaluations, UL 746C, as applicable to polymeric enclosures.

Exception No. 1: A minimum impact of 5 foot-pounds (6.8 J) shall apply to all dehumidifiers when determining the impact resistance of a polymeric material enclosure of live parts.

Exception No. 2: A minimum impact of 1.5 foot-pounds (2.0 J) shall apply to all dehumidifiers when determining the impact resistance of a polymeric material enclosure of hazardous moving parts.

Exception No. 3: An enclosure of Class 2 circuits shall be treated as a decorative part. See 7.5.

7.4 When determining compliance with the enclosure requirements of the Standard for Polymeric Materials – Use in Electrical Equipment Evaluations, UL 746C:

- a) A dehumidifier is to be considered an unattended appliance.
- b) A dehumidifier is to be considered a stationary appliance.
- c) A dehumidifier shall be considered subject to normal room temperature environmental conditions.

7.5 Decorative parts constructed of polymeric materials shall comply with the flammability requirements in the Standard for Polymeric Materials – Use in Electrical Equipment Evaluations, UL 746C, as applicable to decorative parts of enclosures.

7.6 Except where superseded by other requirements in this standard or UL 746C, polymeric materials shall have a flammability classification of V-0 minimum, when tested in accordance with the Standard for Tests for Flammability of Plastic Materials for Parts in Devices or Appliances, UL 94.

Exception No. 1: A higher level of flammability may be required due to the alternate path of enclosure requirements in Section 5 of UL 746C.

Exception No. 2: Parts of a portable dehumidifier are not required to be made of a material classed V-0, minimum, provided the part does not occupy a volume greater than 0.122 in³ (2 cm³), does not have any dimension greater than 2.4 in (60.1 mm), and is located so it cannot propagate flame from one area to another or bridge between a possible source of ignition and other ignitable parts.

7.7 Polymeric materials that serve as direct or indirect support of live parts, an electrical or mechanical barrier shall comply with the requirements for electric insulation in the Standard for Polymeric Materials – Use in Electrical Equipment Evaluations, UL 746C.

7.8 Ignitions sources within the unit are considered to be:

- a) High voltage un-insulated terminals;
- b) High voltage printed circuit board traces;
- c) High voltage open coils/windings;
- d) High voltage open contacts; and
- e) High voltage wiring not employing VW-1 insulation.

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 cordset or power supply cord shall comply with the Standard for Cord Sets and Power Supply Cords, UL 817.

8.3 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	5 – 15P
20	125	5 – 20P
15	250	6 – 15P

^a Standard for Wiring Devices – Dimensional Requirements, ANSI/NEMA WD6.

8.4 A cord-connected single phase dehumidifier shall be provided with a factory installed AFCI protection to reduce the risk of fire due to arcing faults in the power-supply cord. The AFCI shall be installed as an integral part of the attachment plug or located in the supply cord within 12 in. (300 mm) of the attachment plug.

8.5 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 34, and during the Temperature Test – Electric Heat, Section 35.

8.6 A dehumidifier intended for use for water damage restoration of commercial/household properties shall employ an outdoor-use power-supply cord. The flexible cord shall be Type SOW, SOOW, STW, STOW, STOOW, SEW, SEOW, SEOOW, SJOW, SJOOW, SJTW, SJTOW, SJTOOW, SJEW, SJEOW, or SJEOWW.

8.7 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.

8.8 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.

Exception: A dehumidifier intended for use for water damage restoration of commercial/household properties shall have a power supply cord not less than 6 feet (1.83 m) nor more than 25 feet (7.6 m).

8.9 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.

8.10 To determine the acceptability of the strain relief means required by 8.9, 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.

8.11 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.

8.12 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 49.

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.

9.3 All splices and connections shall be mechanically secured and electrically bonded. A soldered connection shall be made mechanically secure before being soldered.

9.4 Splices shall:

- a) Be secured in position and located within the confines of the dehumidifier enclosure or
- b) Located in a separate enclosure so that they are not subject to flexing, motion, or vibration due to air movement.

Strain relief shall be provided on the conductors if the wiring is likely to be moved during routine service operations, such as oiling motors.

9.5 In determining compliance with 9.4, grilles, covers, panels, and the like, which may be removed without the use of tools are not considered as forming part of the splice enclosure.

9.6 A splice shall be provided with electrical insulation equivalent to that of the wires involved. Thermoplastic tape wrapped over sharp ends of conductors is not acceptable. Splicing devices, such as pressure wire connectors, may be employed if they comply with the Standard for Wire Connectors, UL 486A.

9.7 Quick-connecting assemblies shall:

- a) Comply with the Standard for Electrical Quick-Connect Terminals, UL 310, or
- b) Form a secure electrical connection, such as by detents in the mating parts, and shall be capable of carrying the current as determined during the Temperature and Pressure Test, Section 25, and the Temperature Test – Electric Heat, Section 35. Securement of the connections may be determined by engagement/disengagement tests as specified in the Standard for Electrical Quick-Connect Terminals, UL 310.

9.8 Wire binding screws shall thread into metal. At terminals, stranded conductors shall be secured by soldered or pressure-type terminal connectors, or the conductors shall be soldered or otherwise assembled to prevent loose strands after assembly. Soldered connections shall be made mechanically secure before being soldered. Open-slot type connectors shall not be used unless they are constructed to prevent disconnection resulting from loosening of the clamping means. The shanks of terminal connectors shall be protected by electrical insulation if the spacings may be reduced below the minimum acceptable values by loosening of the clamping means. The insulating material shall be secured in position. The thickness of the insulation on the shanks shall be not less than 0.028 inch (0.71 mm) except as permitted by 24.1.6.

9.9 Holes in walls, panels, or barriers through which insulated wires or cords pass and on which they may bear shall be provided with one of the following:

- a) Smoothly rounded bushings; or
- b) Smooth, rounded surfaces upon which the wires or cords may bear to reduce the risk of abrasion of the insulation; or
- c) Wire insulating bushings that comply with the Standard for Insulating Bushings, UL 635.

9.10 Wiring that is color-coded green or green with one or more yellow stripes shall be used only for grounding conductors. Wiring used for other purposes shall not be identified with these color codes.

9.11 Wire shall have insulation rated for the potential involved and the temperatures to which it may be subjected. Compliance shall be judged on the basis of the temperatures measured in the Temperature and Pressure Test, Section 34, and Temperature Test – Electric Heat, Section 35.

Exception: If it can be determined that the wiring will not be exposed to heat from radiating sources or heated components, and if the ampacity of the conductors is in accordance with Table 9.1, the temperature tests on the wiring may be waived.

Table 9.1
Wiring materials ampacities

Wire Size		
mm ²	AWG	Ampacity
0.41	22	4
0.66	20	7
0.82	18	10
1.3	16	13
2.1	14	18
3.3	12	25
5.3	10	30

Note – The ampacities shown apply to appliance wiring materials. For types of wiring other than appliance wiring materials, the ampacity shall be determined from Table 310-16 and 310-17 in the National Electrical Code, ANSI/NFPA 70, for the type of wiring employed.

9.12 Parallel conductor appliance wiring material of the integral type shall not be ripped more than 3 inches (76 mm) unless the minimum thickness of the conductor insulation after ripping is at least 0.058 inch (1.47 mm) in thickness. If the material has conductor insulation not less than 0.028 inch (0.71 mm) after ripping and is within a separate metal enclosure or equivalent, the length of rip is not limited.

9.13 The internal wiring of a dehumidifier shall comply with the Standard for Thermoplastic-Insulated Wires and Cables, UL 83; the Standard for Thermoset-Insulated Wires and Cables, UL 44; the Standard for Appliance Wiring Material, UL 758; or the Standard for Flexible Cords and Cables, UL 62. Also see 9.15 and 9.16.

9.14 The insulation of wires or cords connected to a fan motor that requires lubrication shall be of an oil-resistant type, such as Type SJO, SJTO, SPT-3 cord or appliance wiring materials having oil-resistant insulation.

9.15 Except as indicated in 9.16, 16 AWG (1.3 mm²) or smaller appliance wiring material shall have an insulation thickness not less than 0.058 inch (1.47 mm) and 14 AWG (2.1 mm²) appliance wiring material shall have an insulation thickness not less than 0.070 inch (1.78 mm).

9.16 Internal wiring having an insulation thickness not less than 0.028 inch (0.71 mm), or rubber insulated appliance wiring material having an insulation thickness not less than 0.043 inch (1.1 mm) may be used if:

- a) Contained in separate metal enclosures, conduit, or electrical metallic tubing or

- b) Contained in electrical insulating tubing having a wall thickness not less than 0.028 inch (0.71 mm²) for 16 (1.3 mm²) conductors and 0.043 inch (1.1 mm²) for 14 AWG (2.1 mm²) conductors.

Wires not longer than 3 inches (76 mm) may extend outside of such protective enclosures to facilitate connection to electrical components.

Exception: Internal wiring having 0.028 inch (0.71 mm) conductor insulation need not be provided with protective enclosures or additional insulation if all of the following conditions are met:

- a) Wiring is not subject to movement by air or vibration. See 9.1.*
- b) Individual leads are bunched together to form a cable, if practicable.*
- c) Wiring is secured to fixed surfaces at intervals to reduce the likelihood of hooking slack wiring during routine service, such as oiling motors, adjusting controls, and the like.*
- d) Wiring is located in a compartment that is provided with a complete base pan or similar bottom closure. See 6.3.*
- e) Wiring cannot be contacted through openings in the outer enclosure or cabinet when judged in accordance with 5.1 and 5.2.*

9.17 A conductor of a motor circuit having two or more thermal- or overcurrent-protected motors wired for connection to one supply line shall comply with one or more of the following:

- a) Have an ampacity of not less than one-third the ampacity of the power supply cord,
- b) Be 18 AWG (0.82 mm²) or larger and not more than 4 feet (1.2 m) in length, provided that the circuit will be protected by a fuse or circuit breaker rated not more than 60 amperes,
- c) Serve as a jumper lead between controls, provided that either the length of the lead does not exceed 3 inches (76.2 mm), or the conductor is located in an electrical control enclosure, or
- d) Withstand the conditions of the Limited Short-Circuit Test, Section 44.

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10 Bonding for Grounding

10.1 A dehumidifier shall have provision for the grounding of all exposed or accessible noncurrent-carrying metal parts which are likely to become energized and which may be contacted by the user or by service personnel during service operations which are likely to be performed while the dehumidifier is energized.

Exception: The following need not be grounded:

- a) Adhesive-attached metal-foil markings, screws, and the like, which are located on the outside of cabinets and isolated from electrical components or wiring by grounded metal parts so that they are not likely to become energized.*
- b) Isolated metal parts, which are positively separated from wiring and uninsulated live parts.*
- c) Panels and covers which are insulated from electrical components and wiring by an insulating barrier of vulcanized fiber, varnished cloth, phenolic composition, or similar materials not less than 0.028 inch (0.71 mm) thick, and secured in place. If material having a lesser thickness is used, consideration shall be given to such factors as its electrical, mechanical, and flammability properties when compared with materials in thicknesses specified above.*

10.2 If a component such as a switch can become separated from its normal grounding means for purposes of testing or adjustment while the equipment is energized, it shall be provided with a grounding conductor not requiring removal for such service.

10.3 A separate component bonding conductor shall be of copper, a copper alloy, or other material suitable for use as an electrical conductor. Ferrous metal parts in the grounding path shall be protected against corrosion by metallic or nonmetallic coatings, such as enameling, galvanizing, plating, or painting. A separate bonding conductor or strap shall:

- a) Be protected from mechanical damage or be located within the confines of the outer enclosure or frame and
- b) Not be secured by a removable fastener used for any purpose other than bonding for grounding unless the bonding conductor is unlikely to be omitted after removal and replacement of the fastener.

10.4 The bonding shall be by a positive means, such as clamping, riveting, bolted or screwed connection, welding, or brazing. The bonding connection shall penetrate nonconductive coatings, such as paint or vitreous enamel. Bonding around a resilient mount shall not depend on the clamping action of rubber or other nonmetallic material except as indicated in 10.7.

10.5 With reference to 10.4, a bolted or screwed connection that incorporates a star washer under the screwhead or a serrated screwhead is acceptable for penetrating nonconductive coatings. If the bonding means depends upon screw threads, two or more screws or two full threads of a single screw shall engage the metal.

10.6 An internal connection for bonding internal parts to the enclosure for grounding (but not for the grounding wire in a power supply cord) may employ a quick-connect terminal of the specified dimensions in Table 10.1 provided the connector is not likely to be displaced.

Table 10.1
Dimensions for quick-connect terminal

Terminal dimensions, inch (mm)
0.020 by 0.187 by 0.250 (0.51 by 4.75 by 6.4)
0.032 by 0.187 by 0.250 (0.81 by 4.75 by 6.4)
0.032 by 0.205 by 0.250 (0.81 by 5.2 by 6.4)
0.032 by 0.250 by 0.312 (0.81 by 6.4 by 7.9)

10.7 A connection that depends upon the clamping action exerted by rubber or other nonmetallic material may be acceptable if it complies with the provisions of the Current Overload Test – Bonding Conductors and Connections, Section 42, and the Limited Short-Circuit Test, Section 44, under any intended degree of compression permitted by a variable clamping device and also following exposure to the effects of oil, grease, moisture, and thermal degradation which may occur in service. Also, the effect of assembling and disassembling such a clamping device for maintenance purposes is to be considered with particular emphasis on the likelihood of the clamping device being reassembled in its intended fashion.

10.8 A bonding conductor or strap shall have a cross-sectional area not less than 18 AWG (0.82 mm²).

Exception: A smaller conductor may be used if the bonding conductor and connection comply with the provisions of the Current Overload Test – Bonding Conductors and Connections, Section 42, and the Limited Short-Circuit Test, Section 44.

ELECTRICAL COMPONENTS

11 Capacitors

11.1 Capacitors shall comply with the Standard for Capacitors, UL 810 or shall comply with 11.2 – 11.5.

11.2 A motor starting or running capacitor shall be housed within an enclosure or container that will protect the plates against mechanical damage and that will reduce the risk of emission of flame or molten material resulting from capacitor failure. The container shall be of metal providing the strength and protection not less than that of uncoated steel not less than 0.51 mm (0.020 in) thick.

Exception: When the capacitor is mounted within the enclosure of the dehumidifier or within an enclosure that houses other parts of the dehumidifier, the individual container of a capacitor may be of:

- a) Sheet metal having a thickness less than that specified, or*
- b) Material other than metal.*

11.3 If the container of an electrolytic capacitor is metal, the container shall be considered to be a live part and shall be provided with moisture-resistant electrical insulation to isolate it from dead metal parts and to reduce the risk of contact during servicing operations. The insulating material shall be not less than 1/32 inch (0.8 mm) thick except as indicated in 24.1.6.

11.4 A capacitor employing a liquid dielectric medium more combustible than askarel shall be protected against expulsion of the dielectric medium when tested in accordance with the applicable performance requirements of this standard, including faulted overcurrent conditions based on the circuit in which it is used. See Short Circuit Test, Section 44.

Exception: If the available fault current is limited by other components in the circuit, such as a motor start winding, the capacitor may be tested using a fault current less than the test current specified in Table 44.1 but not less than the current established by dividing the circuit voltage by the impedance of the other component(s).

11.5 Capacitors intended for connection directly across the line shall comply with the requirements of the Standard for Capacitors and Suppressors for Radio- and Television-Type Appliances, UL 1414.

12 Current-Carrying Parts

12.1 All current-carrying parts of a dehumidifier shall be of silver, copper, a copper alloy, or other material acceptable for use as an electrical conductor.

Exception: Multimetallic thermal elements and heater elements of a thermal protector need not be inherently resistant to corrosion.

12.2 Aluminum may be used as a current-carrying part if investigated and found to be treated to resist oxidation and corrosion.

12.3 Ferrous metal parts, if provided with a corrosion resistant coating, or stainless steel may be used for a current-carrying part:

- a) If permitted in accordance with the applicable component standard or
- b) Within a motor, but the use of ferrous materials not inherently protected or provided with a corrosion resistant coating is not acceptable for current-carrying parts elsewhere in the dehumidifier.

13 Electric Heaters

13.1 Heater elements

13.1.1 A heater element shall be protected against mechanical damage and shall be guarded so that flammable material will be protected against coming in contact with it.

13.1.2 A sheath-type element employing a copper or steel sheath at least 0.016 inch (0.41 mm) thick is considered to be protected.

13.1.3 The supporting means for an open type element shall not permit sagging or loosening due to:

- a) Continuous heating of the element or
- b) Flexing of the element supports or related wiring due to alternate heating and cooling of the element that may result in a reduction of required electrical spacings, contact with flammable materials, or short circuiting to dead metal parts.

13.1.4 Metal tubing forming a heater element enclosure shall be constructed of corrosion resistant material or shall be plated, dipped, or coated to resist external corrosion, and shall be acceptable for the temperatures to which it is subjected. See 13.1.5.

13.1.5 Uncoated copper tubing may be employed for temperatures of 200°C (392°F) and lower; metallic coated copper tubing is acceptable for temperatures below the melting temperature of the coating. Uncoated or oxide-coated steel tubing is not considered acceptable as a heater sheath. Plated steel tubing may be employed if the coating is determined to be corrosion resistant and will withstand the temperatures to which it may be subjected. Aluminum tubing may be employed if the alloy withstands a burnout test without melting or other failure. Stainless steel tubing of the austenitic grades, such as ASTM Type 304, is generally acceptable.

13.1.6 Insulating materials, such as washers and bushings, which are integral parts of a heating element shall be of a moisture resistant material which will not be damaged by the temperatures to which they may be subjected in the dehumidifier.

13.1.7 Insulating material employed in a heating element shall be acceptable as the sole support of live parts. Magnesium oxide may be used in conjunction with other insulating materials if located and protected so that the risk of mechanical damage is reduced and if not subjected to the absorption of moisture. When it is necessary to investigate a material, consideration is to be given to such factors as mechanical strength, dielectric voltage withstand, insulation resistance, heat resistant qualities, and the degree to which it is enclosed or protected. All of these factors are to be considered with respect to thermal aging. See 14.1.

13.1.8 A heater case or terminal seal of rubber, neoprene, or thermoplastic materials shall have acceptable aging properties for temperatures measured during heating tests. See Accelerated Aging Test – Electric Heaters, Section 45.