UL 283

STANDARD FOR SAFETY

Air Fresheners and Deodorizers

UL Standard for Safety for Air Fresheners and Deodorizers, UL 283

Fourth Edition, Dated March 20, 2025

Summary of Topics

This new Fourth edition of ANSI/UL 283 dated March 20, 2025 incorporates editorial changes including renumbering and reformatting to align with current style, including the following changes in requirements:

– Addition of Annex A Requirements for Remote and Automatic Delayed Operation

– Addition of Requirements for Universal Serial Bus (USB) and Automotive Adapter Powered Appliances; 7.2.4, 7.2.5, 11.3, 11.4, 35.1 – 35.3, 71.3, 71.4, 72.1.12, 73.17

– Addition of Requirements for Button Batteries or Coin Cell Batteries; 6.3.7

– Revisions to Clarify Requirements and Reflect Standards Writing Conventions in Preparation for a New Edition; 1.1, 1.5, Section 3, 4.5, 4.8, 4.9, 4.11, 4.15, 4.18, 4.24, 4.26, 4.28, 4.33, 4.34, 5.2, 6.1.1, 6.1.3, 6.2.1 – 6.2.8, 6.3.1 – 6.3.6, 6.4.1, 6.4.2, 6.5.1.1 – 6.5.1.7, 6.5.2.1, 6.5.3.1, 6.5.4.1, 6.5.5.1, 6.5.6.1, 6.5.7.1, 6.6.1 – 6.6.3, 6.7.2, 6.8.1, 6.9.1, 6.9.2, 6.10.2, 6.10.3, 6.11.1 – 6.11.3, 6.12.1, 6.13.1.1 – 6.13.1.5, 6.13.2.1, 6.13.3.2, Table 6.1, 6.13.3.3, 6.13.4.1 – 6.13.4.4, 6.14.1 – 6.14.6, 6.15.1, 6.15.2, 6.16.1, 6.16.2, 6.17.1, 6.18.1 – 6.18.4, 6.18.7, 6.19.1 – 6.19.3, 6.20.1 – 6.20.4, 6.21.1, 6.22.1, 6.22.2, 7.1.4, 7.1.5, 7.1.7, Figure 7.1, 7.1.12, 7.1.14 – 7.1.16, 7.2.3, 7.2.4, 7.2.6, 7.2.7, 8.2, 10.1, Figure 10.1, Table 10.1, 10.2, Figure 10.2 – Figure 10.4, Table 11.1, Figure 11.1, Table 11.2, Table 11.3, Figure 11.2, 11.2.1.2, Figure 11.3 – Figure 11.5, Figure 11.6, 12.2, 13.1, 14.1.3, 14.2.5, 17.1.1, 17.1.4, 18.3, 18.4, 20.3.2 – 20.3.4, Table 20.1, Table 20.2, 20.3.10, Table 20.3, 21.2, 22.1, 24.1.1, 24.2.2, 24.3.1, 24.3.2, Table 24.1 – Table 24.3, 24.4.1 – 24.4.4, 24.5.1, Table 25.1, 25.3 – 25.5, 25.8, 26.1, 27.3, 28.1 – 28.3, 29.1, 30.2.1 – 30.2.4, 30.3.1, 30.4.1, Table 30.1, 30.4.4, 30.5.1, 30.6.1, 30.6.2, 31.1, 32.1, 32.2, 33.3 – Table 33.1, 34.2.1, 34.2.2, 34.3.2, 34.3.4, 34.3.5, 34.3.7, Figure 34.1, 34.3.13, 34.4.1, Table 35.1, 36.1, 36.3, 36.5, Figure 36.1, Figure 36.2, 36.7, Table 37.1, 38.2, Table 40.1, 40.1.3, 40.1.5, 40.1.9, 40.2.1, Table 40.2, 41.1, 41.2, 42.1, 43.1, 44.1, 44.2, 44.5, 46.3, 47.1, 47.3, 47.4, 48.3, 48.11, 48.16, 50.1, 50.2, Table 50.1, 51.4, 52.1, 53.1.1, Figure 53.1, Figure 53.2, 54.1, 55.1, 56.2, 56.4, 57.1, 60.2, Figure 60.1, 61.1.1, 61.1.2, Table 61.1, 61.2.2, Figure 61.1 – Figure 61.3, 61.3.3, 61.4.1, 61.5.2, 61.5.3, 62.3, Table 62.1, 65.1, 65.2, 66.4, 67.1 – 67.3, Section 68 (title), 68.1.1, 68.2.1, 68.2.3, 68.3.1, 68.4.1, Figure 68.1, Table 69.1, 71.1, 72.1.1, 72.1.2, 72.1.6, 72.1.10, 72.2.2, 73.1, 73.3 – 73.5, 73.7, 73.8, Figure 73.1, Figure 73.2, 73.10, 73.11, 73.13, 73.15

The new requirements are substantially in accordance with Proposal(s) on this subject dated November 22, 2024.

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MARCH 20, 2025

ANSI/UL 283-2025

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UL 283

Standard for Air Fresheners and Deodorizers

First Edition – March, 2004
Second Edition – March, 2008
Third Edition – June, 2015

Fourth Edition

March 20, 2025

This ANSI/UL Standard for Safety consists of the Fourth Edition.

The most recent designation of ANSI/UL 283 as an American National Standard (ANSI) occurred on March 20, 2025. ANSI approval for a standard does not include the Cover Page, Transmittal Pages, and Title Page.

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INTRODUCTION

1 Scope

1.1 These requirements cover household and commercial air fresheners and deodorizers, rated 250 volts or less for use in ordinary locations in accordance with the National Electrical Code, NFPA 70.

1.2 These requirements cover air fresheners and deodorizers for deodorizing or scenting air, or both, by the dispersal of chemicals, fragrances, or both. Air fresheners and deodorizers employing heating elements, electronic circuits, motor-operated fans (or a combination thereof), and mechanical filters are also covered by these requirements.

1.3 These requirements are intended to evaluate these appliances with respect to the risk of fire, electric shock, injury to persons, and explosiveness of atmosphere. The physiological effects of the operation of these appliances, beneficial or otherwise, are not covered by this Standard. The assigned ratings do not cover other potential risks, including the physiological effects of these appliances, in any form, nor do they indicate the efficiency or effectiveness of the intended uses of these appliances.

1.4 These requirements do not cover insect-repellent dispensers, air sterilizing appliances, air cleaning products, air filters, room ionizers, smoke scrubbers, or ultraviolet filters.

1.5 These requirements do not cover permanently connected appliances.

1.6 These requirements do not cover direct plug-in appliances with open reservoirs for the addition of either a liquid or a substance that when heated becomes a liquid.

1.7 Direct plug-in air fresheners and deodorizers provided with illumination shall be additionally evaluated to the Standard for Direct Plug-In Nightlights, UL 1786.

1.8 Electric toys are covered by the Standard for Electric Toys, UL 696.

1.9 Electric toy transformers are covered by the Standard for Toy Transformers, UL 697.

2 Units of Measurement

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

3 Referenced Publications

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.

3.2 The following publications are referenced in this Standard:

ASTM D93, *Standard Test Methods for Flash Point by Pensky-Martens Closed Cup Tester*

ASTM D412, *Standard Test Methods for Vulcanized Rubber and Thermoplastic Elastomers – Tension*

ASTM D3828, *Standard Test Methods for Flash Point by Small Scale Closed Cup Tester*

ASTM D3874, *Standard Test Method for Ignition of Materials by Hot Wire Sources*

ASTM D6450, *Standard Test Method for Flash Point by Continuously Closed Cup (CCCFP) Tester*

ASTM D7094, *Standard Test Method for Flash Point by Modified Continuously Closed Cup (MCCCFP) Tester*

ASTM F963, *Standard Consumer Safety Specification for Toy Safety*

IEC 61000-4-5, *Electromagnetic Compatibility (EMC) – Part 4-5: Testing and Measurement Techniques – Surge Immunity Test*

NFPA 70, *National Electrical Code*

UL 20, *General-Use Snap Switches*

UL 44, *Thermoset-Insulated Wires and Cables*

UL 62, *Flexible Cords and Cables*

UL 66, *Fixture Wire*

UL 83, *Thermoplastic-Insulated Wires and Cables*

UL 94, *Tests for Flammability of Plastic Materials for Parts in Devices and Appliances*

UL 101, *Leakage Current for Utilization Equipment*

UL 157, *Gaskets and Seals*

UL 224, *Extruded Insulating Tubing*

UL 244A, *Solid-State Controls for Appliances*

UL 248-1, *Low-Voltage Fuses – Part 1: General Requirements*

UL 248-5, *Low-Voltage Fuses – Part 5: Class G Fuses*

UL 310, *Electrical Quick-Connect Terminals*

UL 340, *Tests for Comparative Flammability of Liquids*

UL 429, *Electrically Operated Valves*

UL 486A-486B, *Wire Connectors*

UL 486C, *Splicing Wire Connectors*

UL 486E, *Equipment Wiring Terminals for Use with Aluminum and/or Copper Conductors*

UL 489, *Molded-Case Circuit Breakers, Molded-Case Switches, and Circuit-Breaker Enclosures*

UL 489A, *Circuit Breakers for Use in Communications Equipment*

UL 496, *Lampholders*

UL 498, *Attachment Plugs and Receptacles*

UL 498A, *Current Taps and Adapters*

UL 499, *Electric Heating Appliances*

UL 507, *Electric Fans*

UL 508, *Industrial Control Equipment*

UL 510, *Polyvinyl Chloride, Polyethylene and Rubber Insulating Tape*

UL 635, *Insulating Bushings*

UL 696, *Electric Toys*

UL 697, *Toy Transformers*

UL 723, *Test for Surface Burning Characteristics of Building Materials*

UL 746A, *Polymeric Materials – Short Term Property Evaluations*

UL 746B, *Polymeric Materials – Long Term Property Evaluations*

UL 746C, *Polymeric Materials – Use in Electrical Equipment Evaluations*

UL 758, *Appliance Wiring Material*

UL 773A, *Nonindustrial Photoelectric Switches for Lighting Control*

UL 796, *Printed-Wiring Boards*

UL 810, *Capacitors*

UL 817, *Cord Sets and Power-Supply Cords*

UL 840, *Insulation Coordination Including Clearances and Creepage Distances for Electrical Equipment*

UL 873, *Temperature-Indicating and -Regulating Equipment*

UL 917, *Clock-Operated Switches*

UL 935, *Fluorescent-Lamp Ballasts*

UL 943, *Ground-Fault Circuit-Interrupters*

UL 969, *Marking and Labeling Systems*

UL 991, *Tests for Safety-Related Controls Employing Solid-State Devices*

UL 1004-1, *Rotating Electrical Machines – General Requirements*

UL 1004-2, *Impedance Protected Motors*

UL 1004-3, *Thermally Protected Motors*

UL 1004-7, *Electronically Protected Motors*

UL 1012, *Power Units Other Than Class 2*

UL 1029, *High-Intensity-Discharge Lamp Ballasts*

UL 1030, *Sheathed Heating Elements*

UL 1059, *Terminal Blocks*

UL 1077, *Supplementary Protectors for Use in Electrical Equipment*

UL 1097, *Double Insulation Systems for Use in Electrical Equipment*

UL 1283, *Electromagnetic Interference Filters*

UL 1310, *Class 2 Power Units*

UL 1411, *Transformers and Motor Transformers for Use in Audio-, Radio-, and Television-Type Appliances*

UL 1412, *Fusing Resistors and Temperature-Limited Resistors for Radio- and Television- Type Appliances*

UL 1434, *Thermistor-Type Devices*

UL 1439, *Tests for Sharpness of Edges on Equipment*

UL 1441, *Coated Electrical Sleeving*

UL 1446, *Systems of Insulating Materials – General*

UL 1557, *Electrically Isolated Semiconductor Devices*

UL 1565, *Positioning Devices*

UL 1577, *Optical Isolators*

UL 1642, *Lithium Batteries*

UL 1786, *Direct Plug-In Nightlights*

UL 1977, *Component Connectors for Use in Data, Signal, Control and Power Applications*

UL 1998, *Software in Programmable Components*

UL 2054, *Household and Commercial Batteries*

UL 2089, *Vehicle Battery Adapters*

UL 4200A, *Products Incorporating Button Batteries or Coin Cell Batteries*

UL 4248-1, *Fuseholders – Part 1: General Requirements*

UL 4248-9, *Fuseholders – Part 9: Class K*

UL 5085-1, *Low Voltage Transformers – Part 1: General Requirements*

UL 5085-2, *Low Voltage Transformers – Part 2: General Purpose Transformers*

UL 5085-3, *Low Voltage Transformers – Part 3: Class 2 and Class 3 Transformers*

UL 8750, *Light Emitting Diode (LED) Equipment for Use in Lighting Products*

UL 60384-14, *Fixed Capacitors for Use in Electronic Equipment – Part 14: Sectional Specification: Fixed Capacitors for Electromagnetic Interference Suppression and Connection to the Supply Mains*

UL 60730-1, *Automatic Electrical Controls – Part 1: General Requirements*

UL 60730-2-6, *Automatic Electrical Controls – Part 2-6: Particular Requirements for Automatic Electrical Pressure Sensing Controls Including Mechanical Requirements*

UL 60730-2-7, *Automatic Electrical Controls – Part 2-7: Particular Requirements for Timers and Time Switches*

UL 60730-2-8, *Automatic Electrical Controls – Part 2-8: Particular Requirements for Electrically Operated Water Valves, Including Mechanical Requirements*

UL 60730-2-9, *Automatic Electrical Controls – Part 2-9: Particular Requirements for Temperature Sensing Controls*

UL 60730-2-15, *Automatic Electrical Controls – Part 2-15: Particular Requirements for Automatic Electrical Air Flow, Water Flow and Water Level Sensing Controls*

UL 60730-2-22, *Automatic Electrical Controls – Part 2-22: Particular Requirements for Thermal Motor Protectors*

UL 60950-1, *Information Technology Equipment – Safety – Part 1: General Requirements*

UL 61058-1, *Switches for Appliances – Part 1: General Requirements*

UL 61800-5-1, *Adjustable Speed Electrical Power Drive Systems – Part 5-1: Safety Requirements - Electrical, Thermal and Energy*

UL 62368-1, *Audio/Video, Information and Communication Technology Equipment – Part 1: Safety Requirements*

4 Glossary

4.1 For the purpose of this Standard, the following definitions apply.

4.2 AIR FRESHENER – An appliance that is intended to scent the air in a relatively small area by the dispersal of chemicals, fragrances, or both. Some appliances employ a mechanical filter.

4.3 APPLIANCE COUPLER – A single-outlet, female contact device for attachment to a flexible cord as part of a detachable power-supply cord to be connected to an appliance inlet (motor attachment plug).

4.4 APPLIANCE INLET (MOTOR ATTACHMENT PLUG) – A male contact device mounted on an end product appliance to provide an integral blade configuration for the connection of an appliance coupler or cord connector.

4.5 APPLIANCE (FLATIRON) PLUG – An appliance coupler type of device having a cord guard and a slot configuration specified for use with heating or cooking appliances.

4.6 APPRECIABLY DEPLETED – A reduction in total consumable volume of greater than 15 % during operation of the unit over the entire life of the fragrance a stated by the manufacturer.

4.7 ASKAREL – A generic term for a group of nonflammable synthetic chlorinated hydrocarbons used as electrical insulating media. Askarels of various compositional types are used. Under arcing conditions, the gases produced, while consisting predominantly of noncombustible hydrogen chloride, can include varying amounts of combustible gases depending upon the askarel type.

4.8 AUTOMATIC CONTROL – A control in which at least one aspect is non-manual.

4.9 AUXILIARY CONTROL – A device or assembly of devices that provides a functional utility, is not relied upon as an operational or protective control, and therefore is not relied upon for safety. For example, an efficiency control not relied upon to reduce the risk of electric shock, fire, or injury to persons during normal or abnormal operation of the end product is considered an auxiliary control.

4.10 AUTOMATICALLY CONTROLLED APPLIANCE – An appliance is considered to be automatically controlled if:

a) The repeated starting of the appliance, beyond one complete predetermined cycle of operation to the point where some form of limit switch opens the circuit, is independent of any manual control;

b) During any single predetermined cycle of operation, the motor is caused to stop and restart one or more times;

c) Upon energizing the appliance, the initial starting of the motor is capable of being intentionally delayed beyond normal, conventional starting; or

d) During any single predetermined cycle of operation, automatic changing of the mechanical load is capable of reducing the motor speed to the degree required to reestablish starting-winding connections to the supply circuit.

4.11 CHILD-APPEALING FEATURE – A feature that has entertaining audio or visual effects, or that depicts (logos, decals, art work, etc.) or resembles in physical form or function articles commonly recognized as appealing to or intended for use by children under 5 years of age. This includes, but is not limited to, features that depict or resemble cartoon characters, toys, guns, watches, musical instruments, vehicles, toy animals, food or beverages, or that play musical notes or have flashing lights or other entertaining features.

For features that do not depict or resemble the items listed above, the following additional factors will be considered in determining whether a direct plug-in air freshener or deodorizer has a feature that is commonly recognized as one that is designed or intended primarily to provide visual appeal and attraction to children ages 5 and under:

a) The manufacturer's intent to market the product with visual appeal and attraction to, and with the intent to invite or entice interaction by, children under 5 years of age, as evidenced by a review of any of the following:

1) Product labeling;

2) Product packaging (for example, depictions of the product being used in children's rooms, or being handled directly by children);

3) Advertising materials;

4) Promotional materials; and

5) Other materials accompanying the product;

b) The nature of any designs or depictions on the product, or the nature of the design or the shape of a component of the product, based on a consideration of the following:

1) Whether the designs or depictions, or the design or shape of the component, reflects a seasonal or holiday theme commonly recognized as appealing to adults and commonly recognized as being consistent with trends in the marketplace for seasonally themed merchandise for the home; or

2) Whether the designs or depictions, or the design or shape of the component, reflects an embellishment or motif that is commonly recognized as appealing primarily to children under the age of 5, and not intended for mass appeal to both adults and children.

4.12 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.

4.13 CONSUMABLE – A substance that is depletable, disposable, or both, in any form that remains or transforms through operation into pellets, gel, or liquid, that either functions in conjunction with an accessory that attaches to the appliance (that is, deodorizer or air freshener), or is directly inserted into the appliance.

4.14 CONTAINER – A receptacle in which the consumable is held or carried during use in the appliance.

4.15 DEODORIZER – An appliance that is intended to treat the air in a relatively small area by the dispersal of chemicals, fragrances, or both. Some appliances employ a mechanical filter.

4.16 CORD CONNECTOR – A female contact device wired on flexible cord for use as an extension from an outlet to make a detachable electrical connection to an attachment plug or, as an appliance coupler, to an equipment inlet.

4.17 DIRECT PLUG-IN APPLIANCE – An appliance that has integral blades for direct insertion into a receptacle rated either 15 or 20 A, 125 V. Some appliances are provided with a polarized, parallel blade receptacle.

4.18 ENCLOSURE – That part of the appliance that:

a) Renders inaccessible all or any parts of the appliance that present a risk of electric shock or injury to persons due to total or partial collapse with a resulting reduction of spacings, loosening or displacement of parts, or serious defects;

b) Retards propagation of flame initiated by electrical disturbances occurring within; or

c) Both (a) and (b).

4.19 FAN BLADE – A component of an impeller.

4.20 FLASH POINT – The minimum temperature of a liquid at which vapor is evolved in a large enough quantity to form a flammable mixture with air.

4.21 FRAGRANCE – Any consumable that is designed to produce a vapor that has an odor.

4.22 IMPELLER – An assembly of blades about an integral hub.

4.23 LOW VOLTAGE – Not greater than 30 Vrms or 42.4 V peak or 42.4 V dc.

4.24 MANUAL CONTROL – A device that requires direct human interaction to activate or rest the control.

4.25 MOUNTING MEANS – Hardware to mount the appliance to the building structure or to an outlet box.

4.26 OPERATING CONTROL – A device or assembly of devices, the operation of which starts or regulates the end product during normal operation. For example, a thermostat, the failure of which a thermal cutout/limiter or another layer of protection would mitigate the potential hazard, is considered an operating control. Operating controls are also referred to as "regulating controls".

4.27 PORTABLE APPLIANCE – A direct plug-in appliance or an appliance provided with a power-supply cord for connection to the supply circuit, that is capable of being easily moved by hand from place to place.

4.28 PROTECTIVE CONTROL – A device or assembly of devices, the operation of which is intended to reduce the risk of electric shock, fire or injury to persons during normal and reasonably anticipated abnormal operation of the appliance. For example, a thermal cutout/limiter, or any other control/circuit relied upon for normal and abnormal conditions, is considered a protective control. Protective controls are also referred to as "limiting controls" and "safety controls".

NOTE: During the evaluation of the protective control/circuit, the protective functions are verified under normal and single-fault conditions of the control.

4.29 RESERVOIR – A vessel that holds the consumable in the appliance. The reservoir is intended to be refilled by the consumer during use of the appliance.

4.30 RISK OF ELECTRIC SHOCK – A risk of electric shock exists at any part when:

a) The potential between the path and earth ground or any other accessible part is more than 30 V rms (42.4 V peak); and

b) The continuous current flow through a 1500 ohm resistor connected across the potential exceeds 0.5 mA.

4.31 SEAL – A component made of elastomers, composite gasket material, flexible cellular material, thermoplastics, and thermoplastic elastomers that exclude or hold within an enclosure consumables that are liquid, solid, or vapor.

4.32 STATIONARY APPLIANCE – A direct plug-in appliance or an appliance provided with a power-supply cord for connection to the supply circuit, that is intended to be fastened in place or located in a dedicated place.

4.33 TYPE 1 ACTION CONTROL – The actuation of an automatic control for which the manufacturing deviation and the drift (tolerance before and after certain conditions) of its operating value, operating time, or operating sequence have not been declared and tested under this Standard.

4.34 TYPE 2 ACTION CONTROL – The actuation of an automatic control for which the manufacturing deviation and the drift (tolerance before and after certain conditions) of its operating value, operating time, or operating sequence have been declared and tested under this Standard.

4.35 USER SERVICING – Any form of servicing, such as routine cleaning and replacement of a fuse, lamp, or a consumable, that is performed by personnel other than those trained to maintain the appliance.

CONSTRUCTION

5 General

5.1 An appliance shall employ materials that are intended for the application.

5.2 Thermoplastic material used for a part of an appliance having any dimension (length, width, or height) greater than 305 mm (12 inches) shall be classified minimum HB.

6 Components

6.1 General

6.1.1 A component of a product covered by this Standard shall:

a) Comply with the requirements for that component as indicated in 6.2 – 6.22 or the individual component section;

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) Additionally comply with the applicable requirements of this end product Standard; and

e) Not contain mercury.

NOTE: 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.

Exception No. 1: 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.

Exception No. 2: A component complying with a UL component standard other than those cited in 6.2 – 6.22 is acceptable if:

a) The component also complies with the applicable component standard of 6.2 – 6.22 or the individual component section; or

b) The component standard:

1) Is compatible with the ampacity and overcurrent protection requirements NFPA 70, where appropriate;

2) Considers long-term thermal properties of polymeric insulating materials in accordance with UL 746B; and

3) Any use limitations of the other component standard are identified and appropriately accommodated in the end use application. For example, a component used in a household application, but intended for industrial use and complying with the relevant component standard may assume user expertise not common in household applications.

6.1.2 A component that is also intended to perform other functions, such as over current protection, ground-fault circuit-interruption, surge suppression, any other similar functions, or any combination thereof, shall comply additionally with the requirements of the applicable UL standard(s) that cover devices 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.

6.1.3 A component not anticipated by the requirements of this Standard, not specifically covered by the component standards of 6.2 – 6.22 or individual component sections, and that involves a potential risk of electric shock, fire, or personal injury, shall be additionally investigated in accordance with the applicable UL standard, and shall comply with 6.1.1 (b) – (d).

6.1.4 With regard to a component being additionally investigated, reference to construction and performance requirements in another UL end product standard is appropriate where that standard anticipates normal and abnormal use conditions consistent with the application of this Standard.

6.2 Attachment plugs, receptacles, connectors, and terminals

6.2.1 Attachment plugs, receptacles, appliance couplers, appliance inlets (motor attachment plugs), and appliance (flatiron) plugs shall comply with UL 498. See 6.2.8.

Exception: Attachment plugs and appliance couplers integral to cord sets or power supply cords are covered under the requirements of UL 817 and need not comply with UL 498.

6.2.2 Quick-connect terminals, both connectors and tabs, for use with one or two 22 – 10 AWG copper conductors, having nominal widths of 2.8, 3.2, 4.8, 5.2, and 6.3 mm (0.110, 0.125, 0.187, 0.205, and 0.250 inch), intended for internal wiring connections in appliances, or for the field termination of conductors to the appliance, shall comply with UL 310.

Exception: Other sizes of quick-connect terminals shall be investigated with respect to crimp pull out, insertion-withdrawal, and temperature rise, and all tests shall be conducted in accordance with UL 310.

6.2.3 Single and multipole connectors for use in data, signal, control, and power applications within and between electrical equipment and that are intended for factory assembly to copper or copper alloy conductors or for factory assembly to printed-wiring boards shall comply with UL 1977. See 6.2.8.

6.2.4 Wire connectors shall comply with UL 486A-486B.

6.2.5 Splicing wire connectors shall comply with UL 486C.

6.2.6 Wiring terminals for use with all alloys of copper, aluminum, or copper-clad aluminum conductors shall comply with UL 486E.

6.2.7 Terminal blocks shall comply with UL 1059.

6.2.8 Female devices (such as receptacles, appliance couplers, and connectors) that are intended, or that may be used, to interrupt current in the end product shall be suitably rated for current interruption of the specific type of load when evaluated with its mating plug or connector. For example, an appliance coupler that can be used to interrupt the current of a motor load shall have a suitable horsepower rating when tested with its mating plug.

6.3 Batteries and battery chargers

6.3.1 A lithium ion (Li-On) single cell battery shall comply with the requirements for secondary lithium cells in UL 1642. A lithium ion multiple cell battery and a lithium ion battery pack shall comply with the applicable requirements for secondary lithium cells or battery packs in UL 2054.

6.3.2 Rechargeable nickel cadmium (Ni-Cad) cells and battery packs shall comply with the applicable construction and performance requirements of this end product Standard.

6.3.3 Rechargeable nickel metal-hydride (Ni-MH) battery cells and packs shall comply with construction and performance requirements of this end product Standard or with the applicable requirements for secondary cells or battery packs in UL 2054.

6.3.4 Primary batteries (non-rechargeable) that comply with the relevant UL standard and with 6.1, General, are considered to fulfill the requirements of this Standard.

6.3.5 A Class 2 battery charger shall comply with one of the following:

a) UL 1310;

b) UL 60950-1, with an output marked "Class 2" or that complies with the limited power source (LPS) requirements and is marked "LPS"; or

c) UL 62368-1, with an output marked "Class 2" or that complies with the limited power source (LPS) requirements and is marked "LPS".

6.3.6 A non-Class 2 battery charger shall comply with one of the following:

a) UL 1012;

b) UL 60950-1; or

c) UL 62368-1.

6.3.7 The battery compartment of an appliance or any accessory, such as a wireless control, incorporating one or more button batteries or coin cell batteries shall comply with UL 4200A if the appliance or any accessory:

a) Is intended for use with one or more single cell batteries having a diameter of 32 mm (1.25 inches) maximum with a diameter greater than its height; and

b) The appliance is intended for household use.

Exception No. 1: This requirement is not applicable to appliances and accessories intended for use where the battery is not intended to be replaced and is not referenced in instructions and markings.

Exception No. 2: This requirement is not applicable to appliances and accessories where the battery compartment would be located at least 2.1 m (7 feet) above the floor when the fan is installed as intended.

6.4 Capacitors and filters

6.4.1 The component requirements for a capacitor are not specified. A capacitor complying with UL 810 is considered to fulfill the requirements of 16.1.

6.4.2 Electromagnetic interference filters with integral enclosures that comply with UL 1283 are considered to fulfill the requirements of 16.1.

6.5 Controls

6.5.1 General

6.5.1.1 Auxiliary controls shall be evaluated using the applicable requirements of this end product Standard and the parameters in Section 24, Controls – End Product Test Parameters.

6.5.1.2 Operating (regulating) controls shall be evaluated using the applicable component standard requirements specified in 6.5.2 – 6.5.7 and, if applicable, the parameters in Section 24, Controls – End Product Test Parameters, unless otherwise specified in this end product Standard.

6.5.1.3 Operating controls that rely upon software for the normal operation of the end product where deviation or drift of the control may result in a hazard, such as a speed control unexpectedly changing its output, shall comply with:

a) UL 991 and UL 1998; or

b) UL 60730-1.

6.5.1.4 Protective (limiting) controls shall be evaluated using the applicable component standard requirements specified in 6.5.2 – 6.5.7 and, if applicable, the parameters in Section 24, Controls – End Product Test Parameters, unless otherwise specified in this end product Standard.

6.5.1.5 Solid-state protective controls that do not rely upon software as a protective component shall comply with:

a) UL 991; or

b) UL 60730-1, except for the requirements for controls using software.

6.5.1.6 Protective controls that rely upon software as a protective component shall comply with:

a) UL 991 and UL 1998; or

b) UL 60730-1.

6.5.1.7 An electronic, non-protective control that is simple in design need only be subjected to the applicable requirements of this end-product Standard. A control that does not include an integrated circuit or microprocessor, but does consist of a discrete switching device, capacitors, transistors, and resistors, is considered simple in design. See Section 48, Abnormal Operation Test.

6.5.2 Electromechanical and electronic controls

6.5.2.1 A control other than as specified in 6.5.3 – 6.5.7 shall comply with:

a) UL 244A;

b) UL 873; or

c) UL 60730-1.

6.5.3 Liquid level controls

6.5.3.1 A liquid level control shall comply with:

a) UL 244A;

b) UL 873;

c) UL 508; or

d) UL 60730-1 and UL 60730-2-15.

6.5.4 Motor and speed controls

6.5.4.1 A control used to start, stop, regulate or control the speed of a motor shall comply with:

a) UL 244A;

b) UL 873;

c) UL 508;

d) UL 61800-5-1; or

e) UL 60730-1.

6.5.5 Pressure controls

6.5.5.1 A pressure control shall comply with one of the following:

a) UL 873;

b) UL 508; or

c) UL 60730-1 and UL 60730-2-6.

6.5.6 Temperature controls

6.5.6.1 A temperature control shall comply with:

a) UL 244A;

b) UL 873;

c) UL 508; or

d) UL 60730-1 and UL 60730-2-9.

6.5.7 Timer controls

6.5.7.1 A timer control shall comply with:

a) UL 244A; or

b) UL 60730-1 and UL 60730-2-7.

6.6 Cords, cables, and internal wiring

6.6.1 A cord set or power supply cord shall comply with UL 817.

6.6.2 Flexible cords and cables shall comply with UL 62. Flexible cords and cables are considered to fulfill this requirement when preassembled in a cord set or power supply cord complying with UL 817.

6.6.3 Internal wiring composed of insulated conductors shall comply with UL 758.

Exception No. 1: Insulated conductors need not comply with UL 758 if they comply with one of the following:

a) UL 44;

b) UL 83;

c) UL 66; or

d) The appropriate UL standard(s) for other insulated conductor types specified in the requirements for Wiring Methods and Materials in NFPA 70.

NOTE: The Wiring Methods and Materials requirements of NFPA 70 can be found in Chapter 3.

Exception No. 2: Insulated conductors for specialty applications (e.g. data processing or communications) and located in a low-voltage circuit not involving the risk of fire or personal injury need not comply with UL 758.

6.7 Film-coated wire (magnet wire)

6.7.1 The component requirements for film coated wire and Class 105 (A) insulation systems are not specified.

6.7.2 Film coated wire in intimate combination with one or more insulators and incorporated in an insulation system rated Class 120 (E) or higher shall comply with the magnet wire requirements in UL 1446.

6.8 Gaskets and seals

6.8.1 Gaskets and seals that comply with UL 157 are considered to fulfill the requirements of 9.2 and Section 62, Resistance to Deterioration Test.

6.9 Heaters and heating elements

6.9.1 Electric resistance heating elements shall comply with the construction requirements of:

a) UL 499; or

b) UL 1030.

Exception: Heating wire (e.g. rope heater) that complies with UL 758 and the requirements of this end product Standard is considered to fulfill this requirement.

6.9.2 Thermistor-type heaters (e.g. PTC and NTC heaters) shall comply with UL 1434.

6.10 Insulation systems

6.10.1 Materials used in a Class 105 (A) insulation system shall comply with Section 33, Insulation Systems.

6.10.2 Materials used in an insulation system that operates above Class 105 (A) temperatures shall comply with UL 1446.

6.10.3 All insulation systems employing integral ground insulation shall comply with the requirements specified in UL 1446.

6.11 Light sources and associated components

6.11.1 Lampholders and indicating lamps shall comply with UL 496.

Exception: Lampholders forming part of a luminaire that complies with an appropriate UL luminaire standard are considered to fulfill this requirement.

6.11.2 Lighting ballasts shall comply with:

a) UL 935; or

b) UL 1029.

Exception No. 1: Ballasts forming part of a luminaire that complies with an appropriate UL luminaire standard are considered to fulfill this requirement.

Exception No. 2: Ballasts for other light sources shall comply with the appropriate UL standard(s).

6.11.3 Light emitting diode (LED) light sources shall comply with UL 8750.

Exception No. 1: LED light sources forming part of a luminaire that complies with an appropriate UL luminaire standard are considered to fulfill this requirement.