UL 1431

STANDARD FOR SAFETY

Personal Hygiene and Health Care Appliances

UL Standard for Safety for Personal Hygiene and Health Care Appliances, UL 1431

Third Edition, Dated March 23, 2011

Summary of Topics

This revision of UL 1431 dated March 13, 2025 includes the withdrawal and replacement of ANSI/ISA MC96.1, Temperature-Measurement Thermocouples, 50.1.15

Text that has been changed in any manner or impacted by ULSE's electronic publishing system is marked with a vertical line in the margin.

The revised requirements are substantially in accordance with Proposal(s) on this subject dated February 3, 2025.

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UL 1431

Standard for Personal Hygiene and Health Care Appliances

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

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INTRODUCTION

1 Scope

1.1 These requirements cover household electric products having personal hygienics or health care applications, such as hydromassage units, contact lens disinfectors and cleaners, and toothbrushes, rated at 250 V or less, for use on premises wiring systems in accordance with the National Electrical Code.

1.2 These requirements do not cover professional medical and dental equipment, electrically heated pads, facial saunas, sun and heat lamps, permanently-installed whirlpool baths, spas and hot tubs, shavers, hair dryers, steam and dry heat cabinets or other equipment or products that are covered by separate, individual requirements separate from this Standard.

1.3 The requirements of this Standard do not consider the complete spectrum of physiological or therapeutic effects, beneficial or otherwise, except where generally recognized limits for conditions where a potential risk of injury to persons are defined.

2 Glossary

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

2.2 ACCESSIBLE PART – A part located so that it can be contacted by a person, either directly or by means of a probe or tool during user servicing, or that is not recessed the required distance behind an opening.

2.3 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).

2.4 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.

2.5 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.

2.6 BASIC INSULATION – The insulation applied to live parts to provide basic protection against electric shock. Basic insulation does not necessarily include insulation used exclusively for functional purposes.

2.7 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.

2.8 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.

2.9 CONTROL, AUTOMATIC ACTION – An appliance coupler type of device having a cord guard and a slot configuration specified for use with heating or cooking appliances.

2.10 CONTROL, AUXILIARY – 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.

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

2.12 CONTROL, OPERATING – 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”.

2.13 CONTROL, PROTECTIVE – 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.

2.14 CONTROL, TYPE 1 ACTION – 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 has not been declared and tested under this standard.

2.15 CONTROL, TYPE 2 ACTION – 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.

2.16 DOUBLE INSULATION – An insulation system comprised of basic insulation and supplementary insulation, with the two insulations physically separated and so arranged that they are not simultaneously subjected to the same deteriorating influences (temperature, contaminants, and the like) to the same degree. See 2.6, 2.25, and 2.28.

2.17 ENCLOSURE – An external portion of a product that serves to house or support component parts or both.

2.18 ENERGIZED (LIVE) PART – A part energized with respect to some other part or with respect to earth.

2.19 FIELD-WIRING TERMINAL – Any terminal to which a supply or other wire is to be connected by an installer is a field-wiring terminal. If the wire, to be connected to the terminal, is provided as part of the unit and a pressure terminal, connector, soldering lug, soldered loop, crimped eyelet, or other means for making the connection is factory-assembled to the wire, it is not a field wiring terminal.

2.20 INTERLOCK – A device used to de-energize electrical components or stop moving parts that become exposed when an enclosure is opened or when a cover is removed.

2.21 ISOLATING TRANSFORMER – A transformer of which one or more output windings is electrically separated from the input winding and all other output windings.

2.22 LIMITED ENERGY PRIMARY CIRCUIT – A line voltage circuit that incorporates a limiting impedance in series with the supply circuit so that:

a) The circuit potential on the load side of the limiting impedance does not exceed 42.4 V peak (the peak voltage of a 30-V sine wave), under normal conditions, and

b) The maximum energy available at the load side of the limiting impedance circuit is 15 VA under any condition, including abnormal operation.

2.23 LOW VOLTAGE CIRCUIT – A circuit involving an open circuit potential of not more than 42.4 V peak (the peak voltage of a 30-V sine wave) supplied by a primary battery, by a standard Class 2 transformer, or by a combination of a transformer and fixed impedance that, as a unit, complies with all performance requirements for Class 2 transformers.

2.24 OPERATOR (USER) SERVICING – Any form of servicing that might be performed by personnel other than qualified service personnel. Some examples are:

a) The attachment of accessories by means of attachment plugs and receptacles or by means of other separable connectors not involving disassembly or use of tools.

b) Resetting of circuit breakers or replacement of fuses, and lamps that are accessible without the use of tools.

c) Routine operating adjustments necessary to adapt the product for its different intended functions.

d) Routine cleaning and changing of filters.

2.25 REINFORCED INSULATION – Improved basic insulation with such mechanical and electrical qualities that it, in itself, provides the same degree of protection against electric shock as double insulation.

2.26 SAFETY CIRCUIT – Any circuit, either in the primary or secondary, that is relied upon to reduce the risk of fire, electric shock, or unintentional contact with moving parts, for example, an interlock circuit is considered to be a safety circuit.

2.27 SECONDARY CIRCUITS – Secondary circuits are those circuits supplied from transformer output windings that are electrically separated from the input windings.

2.28 SUPPLEMENTARY (PROTECTING) INSULATION – An independent insulation provided in addition to the basic insulation to protect against electrical shock in case of mechanical rupture or electrical breakdown of the basic insulation.

2.29 HYDROMASSAGE UNITS – For the purpose of this Standard, hydromassage units are considered to be two types:

Water Pump Type – A unit that agitates the bath water by having its moving parts in direct contact with the water, is considered to be of the water pump type.

Air Blower Type – A unit that agitates the bath water by means of air that is generated by the unit, and whose moving parts do not come in contact with the water, is considered to be of the air blower type.

3 Components

3.1 General

3.1.1 A component of a product covered by this standard shall:

a) Comply with the requirements for that component as indicated in 3.2 – 3.26;

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, with the exception of fluorescent lamps.

Exception: As specified in 3.1.2 and 3.1.3.

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.

3.1.2 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,

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.

3.1.3 A component complying with a UL component standard other than those cited in 3.2 – 3.26 is acceptable if:

a) The component also complies with the applicable component standard of 3.2 – 3.26; or

b) The component standard:

3.1.4 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.

3.1.5 A component not anticipated by the requirements of this standard, not specifically covered by the component standards of 3.2 – 3.26, 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 3.1.1 b) – d).

3.1.6 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 UL 1431.

3.2 Attachment Plugs, Receptacles, Connectors, and Terminals

3.2.1 Attachment plugs, receptacles, appliance couplers, appliance inlets (motor attachment plugs), and appliance (flatiron) plugs, shall comply with the Standard for Attachment Plugs and Receptacles, UL 498. See 3.2.9.

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.

3.2.2 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 in), intended for internal wiring connections in appliances, or for the field termination of conductors to the appliance, shall comply with the Standard for Electrical Quick-Connect Terminals, UL 310.

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

3.2.3 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 the Standard for Component Connectors for Data, Signal, Control and Power Applications, UL 1977. See 3.2.9.

3.2.4 Wire connectors shall comply with the Standard for Wiring Connectors, UL 486A-UL 486B.

3.2.5 Splicing wire connectors shall comply with the Standard for Splicing Wire Connectors, UL 486C.

3.2.6 Multi-pole splicing wire connectors that are intended to facilitate the connection of hard-wired utilization equipment to the branch-circuit conductors of buildings shall comply with the Standard for Multi-Pole Splicing Wire Connectors, UL 2459. See 3.2.9.

3.2.7 Equipment wiring terminals for use with all alloys of copper, aluminum, or copper-clad aluminum conductors, shall comply with Equipment Wiring Terminals for Use with Aluminum and/or Copper Conductors, UL 486E.

3.2.8 Terminal blocks shall comply with the Standard for Terminal Blocks, UL 1059, and, if applicable, be suitably rated for field wiring.

3.2.9 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.

3.3 Batteries and Battery Chargers

3.3.1 A lithium ion (Li-On) single cell battery shall comply with the requirements for secondary lithium cells in the Standard for Lithium Batteries, UL 1642. A lithium ion muiltiple cell battery, and a lithium ion battery pack, shall comply with the applicable requirements for secondary lithium cells or battery packs in the Standard for Household and Commercial Batteries, UL 2054.

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

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

3.3.4 Primary batteries (non-rechargeable) that comply with the relevant UL standard and 3.1 are considered to fulfill the requirements of this Standard.

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

a) Standard for Class 2 Power Units, UL 1310; or

b) Standard for Information Technology Equipment – Safety – Part 1: General Requirements, 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) Standard for Audio/Video, Information and Communication Technology Equipment – Part 1: Safety Requirements, UL 62368-1 with an output marked "Class 2", or that complies with the limited power source (LPS) requirements and is marked "LPS".

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

a) Standard for Power Units Other Than Class 2, UL 1012; or

b) Standard for Information Technology Equipment – Safety – Part 1: General Requirements, UL 60950-1; or

c) Standard for Audio/Video, Information and Communication Technology Equipment – Part 1: Safety Requirements, UL 62368-1.

3.4 Boxes and Raceways

3.4.1 Electrical boxes and the associated bushings and fittings, and raceways, of the types specified in Chapter 3 of NFPA 70 and that comply with the relevant UL standard (such as UL 514A, UL 514C, UL 514D) and 3.1, General, are considered to fulfill the requirements of this standard.

3.5 Capacitors and Filters

3.5.1 The component requirements for a capacitor are not specified. A capacitor complying with the Standard for Capacitors, UL 810.

3.5.2 Electromagnetic interference filters with integral enclosures that comply with the Standard for Electromagnetic Interference Filters, UL 1283.

3.6 Controls

3.6.1 General

3.6.1.1 Auxiliary controls shall be evaluated using the applicable requirements of this end product standard and the parameters in Section 26.

3.6.1.2 Operating (regulating) controls shall be evaluated using the applicable component standard requirements specified in 3.6.2 – 3.6.7, and if applicable, the parameters in Section 26, unless otherwise specified in this end product standard.

3.6.1.3 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 the:

a) Standard for Tests for Safety-Related Controls Employing Solid-State Devices, UL 991; and Standard for Software in Programmable Components, UL 1998; or

b) Standard for Automatic Electrical Controls for Household and Similar Use; Part 1: General Requirements, UL 60730-1.

3.6.1.4 Protective (limiting) controls shall be evaluated using the applicable component standard requirements specified in 3.6.2 – 3.6.7, and if applicable, the parameters in Section 26, unless otherwise specified in this end product standard.

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

a) Standard for Tests for Safety-Related Controls Employing Solid-State Devices, UL 991; or

b) Standard for Automatic Electrical Controls for Household and Similar Use, UL 60730-1, except Clause H 11.12 (Controls using software).

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

a) Standard for Tests for Safety-Related Controls Employing Solid-State Devices, UL 991; and Standard for Software in Programmable Components, UL 1998; or

b) Standard for Automatic Electrical Controls for Household and Similar Use; Part 1: General Requirements, UL 60730-1.

3.6.1.7 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 54.

3.6.2 Electromechanical and Electronic Controls

3.6.2.1 A control, other than as specified in 3.6.3 – 3.6.7, shall comply with the:

a) Standard for Solid-State Controls for Appliances, UL 244A;

b) Standard for Temperature-Indicating and -Regulating Equipment, UL 873; or

c) Standard for Automatic Electrical Controls for Household and Similar Use; Part 1: General Requirements, UL 60730-1.

3.6.3 Liquid Level Controls

3.6.3.1 A liquid level control shall comply with the:

a) Standard for Solid-State Controls for Appliances, UL 244A;

b) Standard for Temperature-Indicating and -Regulating Equipment, UL 873;

c) Standard for Industrial Control Equipment, UL 508; or

d) Standard for Automatic Electrical Controls for Household and Similar Use; Part 1: General Requirements, UL 60730-1; and the

1) Standard for Automatic Electrical Controls for Household and Similar Use; Part 2: Particular Requirements for Automatic Electrical Water Level Controls of the Float Type for Household and Similar Applications, UL 60730-2-16A; or

2) Standard for Automatic Electrical Controls for Household and Similar Use; Part 2: Particular Requirements for Automatic Electrical Water and Air Flow Sensing Controls, Including Mechanical Requirements, UL 60730-2-18.

3.6.4 Motor and Speed Controls

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

a) Standard for Solid-State Controls for Appliances, UL 244A;

b) Standard for Temperature-Indicating and -Regulating Equipment, UL 873;

c) Standard for Industrial Control Equipment, UL 508;

d) Standard for Adjustable Speed Electrical Power Drive Systems – Part 5-1: Safety Requirements – Electrical, Thermal and Energy, UL 61800-5-1; or

e) Standard for Automatic Electrical Controls for Household and Similar Use; Part 1: General Requirements, UL 60730-1.

3.6.5 Pressure Controls

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

a) Standard for Temperature-Indicating and -Regulating Equipment, UL 873;

b) Standard for Industrial Control Equipment, UL 508;

c) Standard for Automatic Electrical Controls for Household and Similar Use; Part 1: General Requirements, UL 60730-1; and the Automatic Electrical Controls for Household and Similar Use; Part 2: Particular Requirements for Automatic Electrical Pressure Sensing Controls Including Mechanical Requirements, UL 60730-2-6, or

d) Standard for Limit Controls, UL 353.

3.6.6 Temperature Controls

3.6.6.1 A temperature control shall comply with the:

a) Standard for Solid-State Controls for Appliances, UL 244A;

b) Standard for Temperature-Indicating and -Regulating Equipment, UL 873;

c) Standard for Industrial Control Equipment, UL 508; or

d) Standard for Automatic Electrical Controls for Household and Similar Use; Part 1: General Requirements, UL 60730-1; and the Standard for Automatic Electrical Controls for Household and Similar Use; Part 2: Particular Requirements for Temperature Sensing Controls, UL 60730-2-9.

Exception: A thermostat used in a heating pad assembly that complies with Section 59 of this end product standard is considered to meet the intent of this requirement.

3.6.6.2 A temperature sensing positive temperature coefficient (PTC) or negative temperature coefficient (NTC) thermistor, that performs the same function as an operating or protective control shall comply with the Standard for Thermistor-Type Devices, UL 1434.

3.6.6.3 A thermal cutoff shall comply with the Standard for Thermal-Links (Thermal Cutoffs) for Use in Electrical Appliances and Components, UL 60691.

3.6.7 Timer Controls

3.6.7.1 A timer control shall comply with the:

a) Standard for Solid-State Controls for Appliances, UL 244A; or

b) Standard for Automatic Electrical Controls for Household and Similar Use; Part 1: General Requirements, UL 60730-1; and the Standard for Automatic Electrical Controls for Household and Similar Use; Part 2: Particular Requirements for Timers and Time Switches, UL 60730-2-7.

3.7 Cords, Cables, and Internal Wiring

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

3.7.2 Flexible cords and cables shall comply with the Standard for Flexible Cords and Cables, UL 62. Flexible cord and cables are considered to fulfill this requirement when pre-assembled in a cord set or power supply cord complying with the Standard for Cord Sets and Power Supply Cords, UL 817.

3.7.3 Internal wiring composed of insulated conductors shall comply with the Standard for Appliance Wiring Material, UL 758.

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

a) Standard for Thermoset-Insulated Wires and Cables, UL 44;

b) Standard for Thermoplastic-Insulated Wires and Cables, UL 83;

c) Standard for Fixture Wire, UL 66; or

d) The appropriate UL standard(s) for other insulated conductor types specified in Chapter 3 (Wiring Methods and Materials) of NFPA 70.

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.

3.8 Cord Reels

3.8.1 A cord reel shall comply with the special-use cord reel requirements of the Standard for Cord Reels, UL 355.

3.9 Film-Coated Wire (Magnet Wire)

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

3.9.2 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 the Standard for Systems of Insulating Materials – General, UL 1446.

3.10 Gaskets and Seals

3.10.1 Gaskets and seals shall comply with the Standard for Gaskets and Seals, UL 157 if they are used to prevent wetting of live parts as determined by the performance testing of this end product standard.

3.11 Ground-Fault, Arc-Fault, and Leakage Current Detectors / Interrupters

3.11.1 Ground-fault circuit-interrupters (GFCI) for protection against electrical shock shall comply with the Standard for Ground-Fault Circuit-Interrupters, UL 943. The following statement, or equivalent, shall be included as a marking near the GFCI, or as an instruction in the manual: " Press the TEST button (then RESET button) every month to assure proper operation."

3.11.2 Appliance-leakage-current interrupters (ALCI) for protection against electrical shock shall comply with Appliance-Leakage-Current Interrupters, UL 943B.

Note – An ALCI is not considered an acceptable substitute for a GFCI when NFPA 70 requires a GFCI.

3.11.3 Equipment ground-fault protective devices shall comply with the Standard for Ground-Fault Sensing and Relaying Equipment, UL 1053, and the applicable requirements of the Standard for Ground-Fault Circuit-Interrupters, UL 943.

3.11.4 Arc-fault circuit-interrupters (AFCI) shall comply with the Standard for Arc-Fault Circuit-Interrupters, UL 1699. See Section 23.

3.11.5 Leakage-current detector-interrupters (LCDI) and any shielded cord between the LCDI and appliance shall comply with the Standard for Arc-Fault Circuit-Interrupters, UL 1699. See Section 23.

3.12 Heaters, Heating Elements and Pads

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

a) Standard for Electric Heating Appliances, UL 499; or

b) Standard for Sheathed Heating Elements, UL 1030.

Exception: Heating wire (e.g. rope heater) that complies with the Standard for Appliance Wiring Material, UL 758, and the requirements of this end product standard are considered to fulfill this requirement.

3.12.2 Thermistor-type heaters (e.g. PTC and NTC heaters) shall comply with the Standard for Thermistor-Type Devices, UL 1434.

3.12.3 A heating pad assembly shall comply with the applicable requirements in the Standard for Electric Heating Pads, UL 130.

3.13 Insulation Systems

3.13.1 Materials used in a Class 105 (A) insulation system shall comply with Section 28.3.

3.13.2 Materials used in an insulation system that operates above Class 105 (A) temperatures shall comply with the Standard for Systems of Insulating Materials - General, UL 1446.

3.13.3 All insulation systems employing integral ground insulation shall comply with the requirements specified in the Standard for Systems of Insulating Materials – General, UL 1446.

3.14 Light Sources and Associated Components

3.14.1 Lampholders and indicating lamps shall comply with the Standard for Lampholders, UL 496.

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

3.14.2 Lighting ballasts shall comply with the:

a) Standard for Fluorescent-Lamp Ballasts, UL 935; or

b) Standard for High-Intensity Discharge Lamp Ballasts, UL 1029.

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

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

3.14.3 Light emitting diode (LED) light sources shall comply with the Standard for Light Emitting Diode (LED) Light Sources For Use In Lighting Products, UL 8750.

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

Exception No. 2: Individual LED light sources mounted on printed wiring boards and intended for indicating purposes need not comply with UL 8750, but shall comply with the applicable requirements of this end product standard.

3.15 Marking and Labeling Systems

3.15.1 A marking and labeling system shall comply with UL 969 (Marking and Labeling Systems) under the specified environmental conditions.

3.16 Motors and Motor Overload Protection

3.16.1 General

3.16.1.1 General-purpose type motors having a NEMA frame size shall comply with the requirements specified in 3.16.2. This includes fractional HP motors rated up to 1 HP (typically NEMA frame sizes 42, 48, or 56), and integral HP motors rated 1 HP and greater (typically NEMA frame sizes 140 – 449T).

3.16.1.2 Motors not enclosed, or partially enclosed, by the end product enclosure shall comply with the requirements specified in 3.16.2.

3.16.1.3 Component type motors completely enclosed within the end product enclosure shall comply with the requirements specified in 3.16.2 or 3.16.3.

3.16.1.4 Motors located in a low voltage circuit are evaluated for the risk of fire and personal injury in accordance with the applicable requirements of this end product standard.

3.16.1.5 Low voltage component fans that comply with the Standard for Electric Fans, UL 507 used for air handling only are considered to meet the requirements of this end product standard.

3.16.2 General-purpose type motors

3.16.2.1 A general-purpose type motor shall comply with the Standard for Rotating Electrical Machines – General Requirements, UL 1004-1.

3.16.3 Component type motors

3.16.3.1 Component type motors shall comply with either 3.16.3.2 or 3.16.3.3.

3.16.3.2 The motor shall comply with the Standard for Rotating Electrical Machines – General Requirements, UL 1004-1 except as noted in Table 3.1.

Table 3.1
Superseded requirements

UL 1004-1 Exempted Requirement	Superseded by UL 1431 Requirements
Cord-Connected Motors, Section 15	11.2
Factory Wiring Terminals and Leads, Section 17	Section 15
Electrical Insulation, Section 22	Section 19
Non-Metallic Functional Parts, Section 28	Sections 8, 19
Solid-State Controls, 7.2	3.6
Non-metallic enclosure thermal aging, 9.1.4	8.5
Motor enclosure, 9.2 – 9.4	Section 8
Grounding, Sections 10 and 11	Section 30
Ventilation Openings, Section 12: only applicable where the openings are on surfaces considered to be the appliance enclosure	8.5
Accessibility of Uninsulated Live Parts, Film-Coated Wire, and Moving Parts, Section 13	8.7- 8.19
Protection Against Corrosion, Section 14	Section 10
Switch, Section 27 is not applicable to centrifugal starting switches	Section 25
With the exception of Sections 35 and 40 (Resilient Elastomer Mounting and Electrolytic Capacitor Tests, respectively), the performance tests of UL 1004-1 are not applicable	All applicable performance tests.
Only the following marking requirements specified in 43.1 of UL 1004-1 are applicable: manufacturer's name or identification; rated voltage; rated frequency; number of phases if greater than 1; and multi-speed motors, other than a shaded-pole or a permanent-split-capacitor motor, shall be marked with the amperes and horsepower at each speed	68.1

3.16.3.3 The motor shall comply with the applicable component requirements in Section 3, the following construction requirements, and the applicable performance requirements (when tested in conjunction with the end product), of this end product standard:

a) Protection against corrosion, Section 10.
b) Terminal compartment, Section 11

c) Insulating Material, Section 19.

d) Internal wiring, Section 15.

e) Grounding, Section 30.

f) Spacings, Section 29.

3.16.4 Motor Overload Protection

3.16.4.1 Thermal protection devices integral with the motor shall comply with the:

a) Standard for Overheating Protection for Motors, UL 2111;

b) Standard for Thermally Protected Motors, UL 1004-3; or

c) Standard for Automatic Electrical Controls for Household and Similar Use, Part 1: General Requirements, UL 60730-1; and the Standard for Automatic Electrical Controls for Household and Similar Use; Part 2 Particular Requirements for Thermal Motor Protectors, UL 60730-2-2; in conjunction with the Standard for Thermally Protected Motors, UL 1004-3 (to evaluate the motor-protector combination).

3.16.4.2 Impedance protection shall comply with the:

a) Standard for Overheating Protection for Motors, UL 2111; or

b) Standard for Impedance Protected Motors, UL 1004-2.

3.16.4.3 Electronic protection integral to the motor shall comply with the Standard for Electronically Protected Motors, UL 1004-7.

3.16.4.4 Except as indicated in 3.16.4.3, electronically protected motor circuits shall comply with one of the following. See 3.6.4 for basic control requirements.

a) Standard for Tests for Safety-Related Controls Employing Solid-State Devices, UL 991. When the protective electronic circuit is relying upon software as a protective component, it shall comply with the requirements in the standard for tests for Software in Programmable Components, UL 1998. If software is relied upon to perform a safety function, it shall be considered software Class 1;

b) Standard for Automatic Electrical Controls for Household and Similar Use, Part 1: General Requirements, UL 60730-1. If software is relied upon to perform a safety function, it shall be considered software Class B; or

c) Standard for Adjustable Speed Electrical Power Drive Systems – Part 5-1: Safety Requirements – Electrical, Thermal and Energy, UL 61800-5-1.

Exception: Compliance with the above standards is not required for an electronically protected motor circuit if there is no risk of fire, electric shock, or casualty hazard during abnormal testing with the motor electronic circuit rendered ineffective; compliance with the applicable requirements of this end product standard is then required.