UL 979

STANDARD FOR SAFETY

Water Treatment Appliances

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UL Standard for Safety for Water Treatment Appliances, UL 979

Fourth Edition, Dated January 23, 2025

Summary of Topics

This new Fourth Edition of ANSI/UL 979 dated January 23, 2025 is being issued to reflect the ANSI approval of the standard. There are no additions or changes to requirements at this time.

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UL 979

Standard for Water Treatment Appliances

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Fourth Edition

January 23, 2025

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The most recent designation of ANSI/UL 979 as an American National Standard (ANSI) occurred on January 23, 2025. ANSI approval for a standard does not include the Cover Page, Transmittal Pages, and Title Page.

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 the Collaborative Standards Development System (CSDS) at https://csds.ul.com.

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INTRODUCTION

1 Scope

1.1 These requirements cover electrically operated water treatment appliances for household, commercial use, and industrial use. These appliances are intended for installation and use in accordance with the National Electrical Code, NFPA 70, and are rated 600 V or less.

1.2 These requirements cover appliances utilizing features that treat water through the use of cation exchange water softeners, ionization, filters, ultraviolet radiation, ozone generation, and reverse osmosis.

1.3 These requirements do not cover water treatment appliances for use with pools or spas, water distillers, aquariums, or other equipment connected to plumbing that is covered by individual requirements.

1.4 These requirements do not cover appliances for use in hazardous locations as defined in the National Electrical Code, NFPA 70.

1.5 These requirements do not cover the aesthetic effects or the effectiveness of water treatment.

2 Glossary

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

2.2 APPLIANCE – A collective term to designate all products covered by this Standard.

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, PERMANENTLY-CONNECTED – An appliance intended to be permanently connected electrically.

2.6 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.

2.7 APPLIANCE, PORTABLE – An appliance with the following characteristics:

a) The appliance is cord- and plug-connected;

b) The operating literature and installation instructions illustrate connecting the water lines to the output of a sink-type faucet. The connection to the sink-type faucet does not require tools, or the appliance is provided with its own water container;

c) The operating literature and installation instructions do not portray placing the appliance under the cabinet or a dedicated space, and they only illustrate placing the appliance on a counter top near the sink; and

d) The appliance has feet or keyhole slots and does not have non-keyhole slots or other more permanent mounting means.

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2.8 APPLIANCE, STATIONARY – An appliance connected to plumbing and not expected to be moved except during servicing or storage. A stationary appliance may have wheels or casters.

2.9 BARRIER – A partition for the insulation or isolation of electric circuits, for the isolation of electric arcs, or for isolation of moving parts or hot surfaces. In this respect, a barrier may serve as a portion of an enclosure or as a functional part.

2.10 CAPACITOR, CLASS X – Capacitor or RC unit of a type suitable for use in situations where failure of the capacitor or RC unit would not lead to danger of electrical shock but could result in a risk of fire. Examples would be units connected phase to phase or phase to neutral.

NOTE 1: X1 capacitors are generally used in circuits of permanently connected appliances. However, if the appliance is provided with a separate surge protective device that limits the impulse voltage to ≤ 2.5KV, an X2 capacitor is permitted.

NOTE 2: X2 capacitors are generally used in circuits of cord-connected appliances.

2.11 CAPACITOR, CLASS Y – Capacitor or RC unit of a type suitable for use in situations where failure of the capacitor could lead to danger of electric shock. Examples would be capacitors connected across the primary and secondary circuits where electrical isolation is required to prevent an electric shock or between hazardous live parts and accessible parts.

NOTE 1: Y1 capacitors are used in circuits where the prevention of electric shock is afforded solely by the isolation provided by the capacitor. Two Y2 capacitors connected in series is considered to provide the same level of protection as one Y1 capacitor.

NOTE 2: Y2 capacitors are used where the prevention of electric shock is provided by the combination of the capacitor and earth ground for circuits operating at voltages ≥ 150V and ≤ 300V.

NOTE 3: Y4 capacitors are used where the prevention of electric shock is provided by the combination of the capacitor and earth ground for circuits operating at voltages ≤ 150V.

2.12 CIRCUIT, HIGH-VOLTAGE – A circuit involving a potential of more than 600 V.

2.13 CIRCUIT, LINE-VOLTAGE – A circuit involving a potential of not more than 600 V and having circuit characteristics in excess of those of a low-voltage circuit.

2.14 CIRCUIT, LOW-VOLTAGE – A circuit involving a peak open-circuit potential of not more than 42.4 V supplied by a primary battery, by a Class 2 transformer, or by a combination of a transformer and a fixed impedance that as a unit complies with all performance requirements for a Class 2 transformer. A circuit derived from a line-voltage circuit by connecting a resistance in series with the supply circuit as a means of limiting the voltage and current, is not considered to be a low-voltage circuit.

2.15 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.

2.16 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.

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

2.18 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.

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

2.20 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 risk of electric shock, fire, or injury to persons, is considered an operating control.

2.21 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. (During the testing of the protective control/circuit, the protective functions are verified under normal and single-fault conditions of the control.)

2.22 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.

2.23 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.

2.24 DANGEROUS MALFUNCTION – Unintended operation of the appliance that may impair safety. Operating Control functions whose failure would result in a Dangerous Malfunction would be considered Safety Critical Functions. See 30.5.

NOTE: Control functions whose failure might result in a Dangerous Malfunction would include:

a) Unexpected operation of the appliance where the operation would result in risk of electric shock, fire or mechanical hazard.

b) Unattended energization of a heating appliance where the user has placed flammable materials near the appliance based on the assumption the appliance would remain off.

2.25 ENCLOSURE – A part that by itself or in conjunction with barriers:

a) Renders inaccessible all or any parts that may otherwise present a risk of electric shock;

b) Reduces the risk of contact with parts that may cause injury to persons; or

c) Prevents propagation of flame due to electrical disturbances occurring within. A cabinet that serves to enclose electrical components or wiring is considered to be an enclosure.

2.26 FIELD WIRING TERMINAL – A terminal to which a supply or other wire can be connected by an installer in the field.

2.27 MAXIMUM WORKING PRESSURE – The maximum operating pressure recommended by the manufacturer.

2.28 MOTOR, ACCESSIBLE – A motor that may be contacted without opening or removing any part and that is located so as to be accessible to contact.

2.29 MOTOR, INACCESSIBLE – A motor that is accessible only by opening or removing a part of the outer enclosure, such as a panel or service door, which can be removed without the use of tools, or a

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motor that is located in such a position or is otherwise guarded or enclosed so that it is unlikely to be contacted.

2.30 OPPOSITE POLARITY – A difference of potential between two points, where shorting of these two points would result in a condition involving overload, rupturing of printed wiring-board tracks, components or fuses, and similar components.

2.31 PRESSURE-RELIEF DEVICE – A pressure-actuated valve or rupture member designed to relieve excessive pressures automatically.

2.32 PRESSURE VESSEL – A component of the system intended to hold water under pressure higher than atmospheric pressure.

2.33 RISK OF ELECTRIC SHOCK – A risk of electric shock is considered to exist within a circuit unless the circuit meets one of the following criteria. The circuit shall be supplied by an isolating source such that the following items are met:

a) The following voltage limits shall be met:

1) The voltage does not exceed 30 V rms;

2) The voltage does not exceed 42.4 V peak;

3) The voltage does not exceed 60 V dc continuous; or

4) The voltage does not exceed 24.8 V peak for DC interrupted at a rate of 200 Hz or less with approximately 50 % duty cycle.

b) When protective impedance is used, the current available through a 1500 ohm resistor between the part or parts and either pole of the supply source does not exceed 0.7 mA peak or 2 mA DC:

1) For frequencies exceeding 1 kHz, the limit of 0.7 mA (peak value) is multiplied by the value of the frequency in kHz but shall not exceed 70 mA peak;

2) For voltages over 42.4 V peak and up to and including 450 V (peak value) the capacitance shall not exceed 0.1 µF.

2.34 SAFETY CRITICAL FUNCTION (SCF) – Control, protection and monitoring functions which are being relied upon to reduce the risk of fire, electric shock or casualty hazards.

2.35 ULTRAVIOLET (UV) LAMP SYSTEM – Appliances that directly generates ultraviolet radiation within the equipment for cleaning and disinfection purposes.

2.36 ULTRAVIOLET (UV) RADIATION – Electromagnetic energy with a wavelength of 200 – 400 nm.

NOTE: For ultraviolet (UV) radiation, the range between 100 nm and 400 nm is commonly subdivided into: UV-A (Near UV), from 315 nm to 400 nm; UV-B, from 280 nm to 315 nm; and UV-C, from 100 nm to 280 nm.

2.37 USER SERVICING – Any form of servicing that can be performed by personnel other than those who are trained to maintain the particular appliance. Some examples of user servicing are:

a) Attaching accessories by means of attachment plugs and receptacles or by means of other separable connectors;

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b) Replacing lamps and fuses and resetting circuit breakers located in an operator-access area unless the lamps, fuses, or circuit breakers are marked to indicate replacement or resetting only by qualified service personnel;

c) Making routine operating adjustments necessary to adapt the appliances for its different intended functions; and

d) Any operation described or implied in the operator's manual, whether or not tools are required.

2.38 VOLTAGE FOLDBACK – A circuit design feature intended to protect the power supply output transistors. When overcurrent is drawn by the load, the supply reduces the output voltage and current to within the safe power dissipation limit of the output transistors.

2.39 WORKING VOLTAGE – The highest voltage to which the insulation or the component under consideration is, or can be, subjected when the equipment is operating under conditions of normal use. Overvoltages that originate outside the equipment are not taken into account.

3 Safety Critical Functions

3.1 Any function involved in the control, protection, and monitoring of safety-related attributes of a unit whereby a loss/malfunction of its functionality would represent an unacceptable risk of fire, electric shock, or casualty hazards would be considered a Safety Critical Function.

3.2 Electronic circuits that manage a Safety Critical Function (SCF) shall be:

a) Reliable as defined as being able to maintain the SCF in the event of single defined component faults; and

b) Not susceptible to electromagnetic environmental stresses encountered in the anticipated environments of the appliance.

3.3 Functions specified in the table represent the common safety critical circuit functions of typical water treatment units. It is not intended to represent all possible Safety Critical Functions.

Table 3.1
Safety Critical Functions

Function[a]	Hazard	Location of parameters and tests
Motor running overload protection	Risk of fire or electric shock	34.3
Motor locked rotor protection	Risk of fire or electric shock	34.3
Motor short circuit protection	Risk of fire or electric shock	34.3

[a] Functions specified in the table represent the common safety critical circuit functions of water treatment equipment. It is not intended to represent all possible safety critical functions. Any function involved in the control, protection, and monitoring of safety-related attributes of a pump whereby a loss/malfunction of its functionality would represent an unacceptable risk of fire, electric shock, or casualty hazards would be considered a Safety Critical Function.

4 Units of Measurement

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

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5 Referenced Publications

5.1 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.

5.2 The following publications are referenced in this Standard:

ASTM A653/A653M, *Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process*

ASTM A90/A90M, *Standard Test Method for Weight (Mass) of Coating on Iron and Steel Articles With Zinc or Zinc-Alloy Coatings*

ASTM E230/E230M, *Standard Specification and Temperature-Electromotive Force (emf) Tables for Standardized Thermocouples*

IEC 60127-1, *Miniature Fuses – Part 1 Definitions for Miniature Fuses and General Requirements for Miniature Fuse-Sinks*

IEC 61000-4-2, *Electromagnetic Compatibility (EMC) – Part 4-2: Testing and Measurement Techniques – Electrostatic Discharge Immunity Test*

IEC 61000-4-3, *Electromagnetic Compatibility (EMC) – Part 4-3: Testing and Measurement Techniques – Radiated, Radio-frequency, Electromagnetic Field Immunity Test*

IEC 61000-4-4, *Electromagnetic Compatibility (EMC) – Part 4-4: Testing and Measurement Techniques – Electrical Fast Transient/burst Immunity Test*

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

IEC 61000-4-6, *Electromagnetic Compatibility (EMC) – Part 4-6: Testing and Measurement Techniques – Immunity to Conducted Disturbances, Induced by Radio-Frequency Fields*

IEC 61000-4-11, *Electromagnetic Compatibility (EMC) – Part 4-11: Testing and Measurement Techniques – Voltage Dips, Short Interruptions and Voltage Variations Immunity Tests for Equipment with Input Current up to 16 A per Phase*

IEC 61000-4-13, *Electromagnetic Compatibility (EMC) – Part 4-13: Testing and Measurement Techniques – Harmonics and Interharmonics Including Mains Signaling at ac Power Port, Low Frequency Immunity Tests*

IEC 62471, *Photobiological Safety of Lamps and Lamp System*

IES RP-271, *Standard for Recommended Practice for Photobiological Safety for Lamps and Lamp Systems – General Requirements*

NFPA 70, *National Electrical Code*

UL 20, *General-Use Snap Switches*

UL 50, *Enclosures for Electrical Equipment, Non-Environmental Considerations*

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

UL 310, *Electrical Quick-Connect Terminals*

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 499, *Electric Heating Appliances*

UL 507, *Electric Fans*

UL 508, *Industrial Control Equipment*

UL 508A, *Industrial Control Panels*

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

UL 514A, *Metallic Outlet Boxes*

UL 514C, *Nonmetallic Outlet Boxes, Flush-Device Boxes, and Covers*

UL 514D, *Cover Plates for Flush-Mounted Wiring Devices*

UL 542, *Fluorescent Lamp Starters*

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UL 635, *Insulating Bushings*

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 778, *Motor-Operated Water Pumps*

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 867, *Electrostatic Air Cleaners*

UL 935, *Fluorescent-Lamp Ballasts*

UL 943, *Ground-Fault Circuit-Interrupters*

UL 943B, *Appliance Leakage-Current Interrupters*

UL 969, *Marking and Labeling Systems*

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 1053, *Ground-Fault Sensing and Relaying Equipment*

UL 1059, *Terminal Blocks*

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

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

UL 1283, *Electromagnetic Interference Filters*

UL 1310, *Class 2 Power Units*

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

UL 1434, *Thermistor-Type Devices*

UL 1441, *Coated Electrical Sleeving*

UL 1446, *Systems of Insulating Materials – General*

UL 1449, *Surge Protective Devices*

UL 1557, *Electrically Isolated Semiconductor Devices*

UL 1565, *Positioning Devices*

UL 1577, *Optical Isolators*

UL 1581, *Reference Standard for Electrical Wires, Cables, and Flexible Cords*

UL 1642, *Lithium Batteries*

UL 1699, *Arc-Fault Circuit-Interrupters*

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

UL 2054, *Household and Commercial Batteries*

UL 2111, *Overheating Protection for Motors*

UL 2353, *Single- and Multi-Layer Insulated Winding Wire*

UL 2459, *Insulated Multi-Pole Splicing Wire Connectors*

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*

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UL 60065, *Audio, Video and Similar Electronic Apparatus – Safety Requirements*

UL 60335-1, *Household and Similar Electrical Appliances, Part 1: General Requirements*

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 60691, *Thermal-Links – Requirements and Application Guide*

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

UL 60730-2-2, *Automatic Electrical Controls for Household and Similar Use; Part 2: Particular Requirements for Thermal Motor Protectors*

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 60730-2-18, *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 60730-2-22, *Automatic Electrical Controls – Part 2-22: Particular Requirements for Thermal Motor Protectors*

UL 60947-1, *Low-Voltage Switchgear and Controlgear – Part 1: General Rules*

UL 60947-4-1, *Low-Voltage Switchgear and Controlgear – Part 4-1: Contactors and Motor-Starters – Electromechanical Contactors and Motor-Starters*

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

UL 61010-1, *Electrical Equipment for Measurement, Control, and Laboratory Use – 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*

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CONSTRUCTION

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 – 6.26;

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; and

d) Additionally comply with the applicable requirements of this end product standard.

Exception No. 1: A component of an appliance covered by this end product 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.

Exception No. 2: A component that complies with a UL component standard other than those specified in 6.2 – 6.26 is acceptable if the UL component standard:

a) Is compatible with the ampacity and overcurrent protection requirements in NFPA 70, where applicable;

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

c) 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 UL component standard(s) need not be applied.

6.1.3 A component not anticipated by the requirements of this end product standard, not specifically covered by the component standards in 6.2 – 6.26, and that involves a 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).

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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 the requirements of this end product standard.

6.1.5 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.

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 6.2.9.

Exception No. 1: Attachment plugs and appliance couplers integral to cord sets or power supply cords are investigated in accordance with the requirements of UL 817 are not required to comply with UL 498.

Exception No. 2: A fabricated pin terminal assembly need not comply with UL 498 if it complies with Accessibility, Section 10; Mechanical Assembly, Section 13; Live Parts, Section 17; Electrical Insulation, Section 18; Spacings, Section 22, of this end product standard; and the applicable performance requirements when tested in the end product.

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 No. 1: 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.

Exception No. 2: A connector that complies with UL 310 may be used with an appropriately sized tab that complies with Tabs Used in Electrical Quick-Connect Terminals, Section 20. The connector is the part of a quick-connect terminal that is pushed onto the male tab, and the tab is the part that receives the female connector.

6.2.3 Single and multiple 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 6.2.9.

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 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 UL 2459. See 6.2.9.

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

6.2.8 Terminal blocks shall comply with UL 1059, and, if applicable, be suitably rated for field wiring.

Exception: A fabricated part performing the function of a terminal block need not comply with UL 1059 if the part complies with the requirements of Wiring Terminals and Leads, 15.3; Live Parts, Section 17;

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