UL 2157

STANDARD FOR SAFETY

Electric Clothes Washing Machines and Extractors

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UL Standard for Safety for Electric Clothes Washing Machines and Extractors, UL 2157

Fourth Edition, Dated May 28, 2018

Summary of Topics

This revision of ANSI/UL 2157 dated September 20, 2019 is being issued to incorporate several miscellaneous corrections.

Text that has been changed in any manner or impacted by UL'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 June 14, 2019.

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CSA Group
CSA C22.2 No. 169-18
Fifth Edition

Underwriters Laboratories Inc.
UL 2157
Fourth Edition

Electric Clothes Washing Machines and Extractors

May 28, 2018

(Title Page Reprinted: September 20, 2019)

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ANSI/UL 2157-2019

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This ANSI/UL Standard for Safety consists of the Fourth Edition including revisions through September 20, 2019. The most recent designation of ANSI/UL 2157 as an American National Standard (ANSI) occurred on September 20, 2019. ANSI approval for a standard does not include the Cover Page, Transmittal Pages, Title Page (front and back), or the Preface.

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CONTENTS

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SUPPLEMENT SA - OZONE GENERATING WASHING MACHINES

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SUPPLEMENT SB - SAFETY OF SMART ENABLED CLOTHES WASHING MACHINES

SUPPLEMENT SC - PLUMBING REQUIREMENTS FOR HOUSEHOLD LAUNDRY EQUIPMENT

SUPPLEMENT SD - ALTERNATIVE PATH FOR ELECTRONIC CONTROLS REQUIREMENTS

INTRODUCTION

CONSTRUCTION

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PREFACE

This is the harmonized CSA Group and UL Standard for Electric Clothes Washing Machines and Extractors. It is the fifth edition of CSA C22.2 No. 169, and the fourth edition of UL 2157. This edition of CSA C22.2 No. 169 supersedes the previous edition published in 2015. This edition of UL 2157 supersedes the previous edition published in 2015. This harmonized standard has been jointly revised on September 20, 2019. For this purpose, CSA Group and UL are issuing revision pages dated September 20, 2019.

The major differences between this edition and the previous edition include the clarification of the risk of electrical shock and fire definitions and the revision of requirements for instruction manual, operating instructions, protection against accessibility to current-carrying parts, power input and current, heating test, electric strength test, abnormal operation test, polymeric materials. The new edition also incorporates the new requirements for nichrome wire test, glass loading doors and lids, endurance test for pedestral wire flexing, botton or coin cell batteries of lithium techniologies and plumbing requirements for household laundry equipment.

This harmonized standard was prepared by the CSA Group and Underwriters Laboratories Inc. (UL). The efforts and support of the Technical Harmonization Committee for Laundry Standards and Association of Home Appliance Manufacturers (AHAM) are gratefully acknowledged.

This standard is considered suitable for use for conformity assessment within the stated scope of the standard.

This standard was reviewed by the CSA Subcommittee on Clothes Washers - Household and Commercial, under the jurisdiction of the CSA Technical Committee on Consumer and Commercial Products, and the CSA Strategic Steering Committee on Requirements for Electrical Safety, and has been formally approved by the CSA Technical Committee.

Application of Standard

Where reference is made to a specific number of samples to be tested, the specified number is to be considered a minimum quantity.

Note: Although the intended primary application of this standard is stated in its scope, it is important to note that it remains the responsibility of the users of the standard to judge its suitability for their particular purpose.

Level of Harmonization

This standard is published as an identical standard for CSA Group and UL.

An identical standard is a standard that is exactly the same in technical content except for national differences resulting from conflicts in codes and governmental regulations. Presentation is word for word except for editorial changes.

Reasons for Differences From IEC

This standard provides requirements for electric clothes washing machines and extractors for use in accordance with the electrical installation codes of Canada and the United States. This standard does not employ any IEC standard for base requirements

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Interpretations

The interpretation by the standards development organization of an identical or equivalent standard is based on the literal text to determine compliance with the standard in accordance with the procedural rules of the standards development organization. If more than one interpretation of the literal text has been identified, a revision is to be proposed as soon as possible to each of the standards development organizations to more accurately reflect the intent.

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1 Scope

1.1 This Standard applies to electric clothes washing machines and extractors intended to be used in nonhazardous locations in accordance with the Canadian Electrical Code, Part I (CE Code), and the (U.S.) National Electrical Code (NEC), on circuits having a nominal voltage not exceeding 600 V.

Note: Wherever practical, for convenience, the term "appliance" has been used in lieu of "clothes washer "or "machine".

1.2 This Standard applies to both cord-connected and permanently connected appliances. The appliances covered by this Standard are intended for use by the general public not specifically trained in the use of the appliance, regardless of the mode by which its operation is initiated. They are for use in household and commercial purposes, including appliances provided with coin-, ticket-, or card-operated mechanisms, wringer washers, tumbler, agitator and spinner machines, combination washer-dryers, and extractors of the centrifugal type.

1.3 This Standard does not apply to industrial and institutional type appliances. Industrial or institutional appliances are covered under the scope of Electric Washing Machines, CSA C22.2 No. 53, or Electric Commercial Clothes-Washing Equipment, UL 1206.

Note: Industrial and institutional type appliances are not intended for use by the general public, but only by trained or supervised personnel.

2 Definitions

Note: For the purpose of this Standard, the following definitions apply.

2.1 APPLIANCE, CORD-CONNECTED – an appliance that is connected to the electrical supply by a cord set or by a power-supply cord terminating in an acceptable attachment plug.

2.2 APPLIANCE, HOUSEHOLD TYPE – an appliance commonly used in, but not restricted to, a single-family dwelling.

2.3 APPLIANCE, PERMANENTLY CONNECTED – an appliance that is connected to the electrical supply by means other than a supply cord and an attachment plug.

2.4 APPLIANCE, RECESSED – an appliance intended to be:

a) supported by the floor; and

b) located immediately adjacent to a wall in the rear or located immediately adjacent to a wall, a cabinet, or another appliance on each side.

If the construction permits, a countertop can cover the appliance and adjacent cabinets and appliances. A recessed appliance is not intended for permanent attachment to the building structure or to adjacent cabinets or appliances.

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2.5 APPLIANCE, STATIONARY – any appliance that is intended to be fastened in place or located in a dedicated space.

2.6 APPLIANCE, WALL-INSERT – an appliance intended to be mounted permanently in a wall or other vertical surface of a building or cabinet.

2.7 AUTOMATIC – an appliance is considered to be automatically controlled if one or more of the following conditions applies:

a) 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 could be intentionally delayed beyond normal, conventional starting; or

d) during any single predetermined cycle of operation, automatic changing of the mechanical load could reduce the motor speed to re-establish starting-winding connections to the supply circuit.

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

2.9 BUILT-IN APPLIANCE – a stationary appliance that is constructed to be permanently installed in a cabinet or wall.

2.10 CIRCUIT, LINE-VOLTAGE – a circuit having characteristics in excess of those of a low-voltage circuit.

2.11 CIRCUIT, LOW-VOLTAGE – a circuit having limited voltage and energy capacity supplied by:

a) a primary battery having an output voltage of 30 V or less;

b) a Class 2 transformer; or

c) a Class 2 power supply.

Note 1: A circuit that is derived from a circuit that exceeds 30 V by connecting resistance or impedance, or both, in series with the supply circuit to limit the voltage and current is not considered to be a low-voltage circuit.

Note 2: The term "low voltage" as used in this clause relates to "extra low voltage" in Canada.

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2.12 CONTROL, OPERATING – control, the operation of which starts or regulates the appliance during normal operation.

2.13 CONTROL, PROTECTIVE – control, the operation of which is intended to prevent the risk of electric shock, fire, or injury to persons during normal or abnormal operation of the appliance.

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

2.14 CRITICAL COMPONENT – a component that performs one or more safety related functions whose failure would result in an increased risk of fire, electric shock or injury to persons.

2.15 CURRENT-CARRYING PARTS – parts carrying current during normal or abnormal operation in line-voltage circuits.

Note: With respect to Separation of circuits, Clause 18.3, this term refers to parts in both low-voltage and line-voltage circuits.

2.16 ELECTRICAL CONNECTION – the physical interface between two points in a circuit such as spade terminals, pin terminals, micro switch contacts, relay contacts, timer contacts, crimped connections, and connections that are welded or soldered.

2.17 ENCLOSURE – a material used to:

a) render inaccessible, by itself or in conjunction with acceptable enclosure barriers and supplementary enclosures, any or all uninsulated current-carrying parts, internal wiring, or electrical components not having their own enclosures;

b) reduce the likelihood of propagation of ignition due to electrical disturbances occurring within; or

c) both (a) and (b).

2.18 ENCLOSURE BARRIER – a material used to reduce the size of an opening in an enclosure that:

a) will not permit the entrance of a 19.1 mm diameter rod; and

b) does not comply with Clause 6.2(a)(1) or (2).

A polymeric enclosure barrier is evaluated as a functional polymeric part.

2.19 ENCLOSURE, SUPPLEMENTARY – a material used to reduce the size of an opening in an enclosure that:

a) will permit the entrance of a 19.1 mm diameter rod; and

b) does not comply with Clause 6.2(a)(1) or (2); when enclosure barriers, if provided, are removed.

A polymeric supplementary enclosure is evaluated as an enclosure.

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2.20 FIELD WIRING TERMINAL – a terminal to which a wire may be connected in the field, unless the wire and a means of making the connection, such as:

a) a pressure wire connector;

b) soldering lugs;

c) a soldered loop; or

d) a crimped eyelet;

factory-assembled to the wire, is provided as a part of the appliance.

2.21 FLAME CYLINDER – a projection of a vertical cylinder having a diameter of 20 mm and a height of 50 mm.

2.22 HEATER ASSEMBLY – an assembly of:

a) a heating element;

b) electrical insulation (eg, refractory, mica, magnesium oxide); and

c) a frame or housing (eg, a metal sheath or the like) that holds the assembly together.

2.23 HEATING ELEMENT – the actual electrical conducting medium that is intended to be heated by an electric current.

2.24 MEMBRANE SWITCH – a momentary switching device in which at least one contact is on, or made of a flexible substrate.

2.25 NONCOMBUSTIBLE MATERIAL – for purposes of this Standard a noncombustible material is:

a) metal;

b) a 5VA material; or

c) a material that complies with the requirements for enclosure flammability in accordance with the 127 mm flame test in UL 746C.

2.26 PART, DECORATIVE – a material used for no other function except appearance. A removable polymeric control knob or lever may be considered a decorative part.

2.27 PART, FUNCTIONAL – a material used in such a way that deterioration or breakage of the part would result in a risk of fire, electric shock, or injury to persons.

2.28 PART, NONFUNCTIONAL – a part, such as thermal insulation or decorative material, that does not serve as electrical insulation or to support or enclose electrical components, maintain electrical spacings, or reduce the risk of injury to persons.

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2.29 RISK OF ELECTRIC SHOCK – a risk of electric shock is considered to exist if under normal conditions and single component fault conditions the potential between the part and earth ground or any other simultaneously accessible part is more than the following relevant values (these low-voltage circuits shall be supplied from an isolating source):

a) 30 V rms;

b) 42.4 V peak for sinusoidal or nonsinusoidal AC;

c) 60 V dc continuous, or 60 V peak for interrupted DC outside the range of 10 - 200 Hz; and

d) 24.8 V peak for DC interrupted at a rate of 200 Hz or less

Note 1: A low-voltage circuit and the secondary circuit of a Class 2 circuit do not involve a risk of electric shock.

Note 2: In Canada, the low-voltage circuit in Note 1 is an extra low-voltage power circuit.

2.30 RISK OF FIRE – A risk of fire is considered to exist at any two points in a circuit where a power of more than 15 watts can be delivered into an external variable resistor connected between the two points within 5 seconds under normal conditions and single component fault conditions; see Clause 26.6.3.2 and SD14.

Note: A low power circuit does not involve a risk of fire.

2.31 TEMPERATURE-REGULATING AND -LIMITING DEVICE, COMBINATION – a device that functions to:

a) regulate the temperature under normal conditions of use; and

b) limit abnormal temperatures that might result from conditions of abnormal operation of the appliance.

2.32 TEMPERATURE-LIMITING DEVICE – a device that functions:

a) only under conditions that produce abnormal temperatures; and

b) that is not intended to function during normal operation of the appliance.

2.33 TEMPERATURE-REGULATING DEVICE – a device that:

a) regulates temperature; and

b) functions during normal operation of the appliance.

2.34 VULCANIZED FIBRE – a material that, if 0.8 mm thick minimum and acceptably mounted and secured, may be used as an enclosure barrier, but not as an enclosure or supplementary enclosure.

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2.35 WITHIN 3 MM – falling within the dotted boundary formed by the flame cylinder with hemispherical ends as shown in Figure 9.

2.36 WRINGER WASHER – a clothes washer that performs only washing and wringing operations.

3 General requirements and reference publications

3.1 General requirements

3.1.1 Combination washer-dryers shall comply with this Standard and also with the requirements of CSA C22.2 No. 112 and UL 2158. Where more than one Standard applies, preference shall be given to that Standard considered to require the highest standard of construction or testing.

3.1.2 In Canada, the general requirements applicable to this Standard are provided in CAN/CSA-C22.2 No. 0.

3.2 Reference publications

3.2.1 Where reference is made to other publications, such reference shall be considered to refer to the latest edition and all amendments published to that edition up to the time when this Standard was approved.

CSA Group Standards

B64 Series-11 (R2016)
Backflow Preventers and Vacuum Breakers

C22.1-15
Canadian Electrical Code, Part I

CAN/CSA-C22.2 No. 0-10 (R2015)
General Requirements – Canadian Electrical Code, Part II

C22.2 No. 0.1-M1985 (R2013)
General Requirements for Double-Insulated Equipment

C22.2 No. 0.2-16
Insulation Coordination

C22.2 No. 0.3-09 (R2014)
Test Methods for Electrical Wires and Cables

C22.2 No. 0.4-17
Bonding of Electrical Equipment

C22.2 No. 0.5-16
Threaded Conduit Entries

C22.2 No. 0.8-12 (R2016)
Safety Functions Incorporating Electronic Technology

C22.2 No. 0.15-15
Adhesive Labels

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CAN/CSA-C22.2 No. 0.17-00 (R2013)
Evaluation of Properties of Polymeric Materials

C22.2 No. 8-13
Electromagnetic Interference (EMI) Filters

C22.2 No. 14-13
Industrial Control Equipment

C22.2 No. 18.1-13
Metallic Outlet Boxes

C22.2 No. 18.2-06 (R2016)
Nonmetallic Outlet Boxes

C22.2 No. 18.3-12
Conduit, Tubing, and Cable Fittings

C22.2 No. 18.5-13
Positioning Devices

C22.2 No. 21-14
Cord Sets and Power Supply Cords

C22.2 No. 24-15
Temperature-Indicating and Regulating Equipment

C22.2 No. 38-14
Thermoset-Insulated Wires and Cables

C22.2 No. 39-13
Fuseholder Assemblies

C22.2 No. 42-10 (R2015)
General Use Receptacles, Attachment Plugs, and Similar Wiring Devices

C22.2 No. 42.1-13
Cover Plates for Flush-Mounted Wiring Devices

C22.2 No. 43-08 (R2013)
Lampholders

C22.2 No. 49-14
Flexible Cords and Cables

C22.2 No. 53-1968 (R2014)
Electric Washing Machines

C22.2 No. 55–15
Special Use Switches

C22.2 No. 65-13
Wire Connectors

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C22.2 No. 66.2-06 (R2015)
Low Voltage Transformers – Part 2: General Purpose Transformers

C22.2 No. 66.3-06 (R2015)
Low Voltage Transformers – Part 3: Class 2 and Class 3 Transformers

C22.2 No. 72-10 (R2014)
Heater Elements

C22.2 No. 74-16
Equipment for Use with Electric Discharge Lamps

C22.2 No. 75-14
Thermoplastic-Insulated Wires and Cables

C22.2 No. 77-14
Motors with Inherent Overheating Protection

C22.2 No. 100-14
Motors and Generators

C22.2 No. 107.1-16
Power Conversion Equipment

CSA C22.2 No. 108-14
Liquid Pumps

C22.2 No. 111-10 (R2015)
General Use Snap Switches

C22.2 No. 112-17
Electric Clothes Dryers

C22.2 No. 127-15
Equipment and Lead Wires

C22.2 No. 139-13
Electrically Operated Valves

C22.2 No. 153-14
Electrical Quick Connect Terminals

C22.2 No. 156-M1987 (R2013)
Solid-State Speed Controls

C22.2 No. 158-10 (R2014)
Terminal Blocks

C22.2 No. 177-13
Clock Operated Switches

C22.2 No. 182.3-16
Special Use Attachment Plugs, Receptacles, and Connectors

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C22.2 No. 188-13
Splicing Wire Connectors

C22.2 No. 190-14
Capacitors for Power Factor Correction

C22.2 No. 197-M1983 (R2013)
PVC Insulating Tape

CAN/CSA-C22.2 No. 198.1-06 (R2015)
Extruded Insulating Tubing

CAN/CSA-C22.2 No. 198.3-05 (R2014)
Coated Electrical Sleeving

C22.2 No. 209-M1985 (R2013)
Thermal Cut-Offs

C22.2 No. 210-15
Appliance Wiring Material Products

C22.2 No. 223-15
Power Supplies with Extra-Low-Voltage Class 2 Outputs

C22.2 No. 235-04 (R0213)
Supplementary Protectors

C22.2 No. 248.1-11 (R2016)
Low-Voltage Fuses – Part 1: General Requirements

CAN/CSA-C22.2 No. 248.2-00 (R2015)
Low Voltage Fuses – Part 2: Class C Fuses

CAN/CSA-C22.2 No. 248.3-00 (R2015)
Low Voltage Fuses – Part 3: Class CA and CB Fuses

CAN/CSA-C22.2 No. 248.4-00 (R2015)
Low Voltage Fuses – Part 4: Class CC Fuses

CAN/CSA-C22.2 No. 248.5-00 (R2015)
Low Voltage Fuses – Part 5: Class G Fuses

CAN/CSA-C22.2 No. 248.6-00 (R2015)
Low Voltage Fuses – Part 6: Class H Non-Renewable Fuses

CAN/CSA-C22.2 No. 248.7-00 (R2015)
Low Voltage Fuses – Part 7: Class H Renewable Fuses

C22.2 No. 248.8-11 (R2016)
Low Voltage Fuses – Part 8: Class J Fuses

CAN/CSA-C22.2 No. 248.9-00 (R2015)
Low Voltage Fuses – Part 9: Class K Fuses

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C22.2 No. 248.10-11 (R2016)
Low Voltage Fuses – Part 10: Class L Fuses

C22.2 No. 248.11-11 (R2016)
Low Voltage Fuses – Part 11: Plug Fuses

C22.2 No. 248.12-11 (R2016)
Low Voltage Fuses – Part 12: Class R Fuses

CAN/CSA-C22.2 No. 248.14-00 (R2015)
Low Voltage Fuses – Part 14: Supplemental Fuses

CAN/CSA-C22.2 No. 248.15-00 (R2015)
Low Voltage Fuses – Part 15: Class T Fuses

CAN/CSA-C22.2 No. 250.13-14
Light emitting diode (LED) equipment for lighting applications

C22.2 No. 2459-08 (R2013)
Insulated Multi-pole Splicing Wire Connectors

CAN/CSA-C22.2 No. 4248.1-07 (R2016)
Fuseholders – Part 1: General Requirements

CAN/CSA-C22.2 No. 4248.4-07 (R2016)
Fuseholders – Part 4: Class CC

CAN/CSA-C22.2 No. 4248.5-07 (R2016)
Fuseholders – Part 5: Class G

CAN/CSA-C22.2 No. 4248.6-07 (R2016)
Fuseholders – Part 6: Class H

CAN/CSA-C22.2 No. 4248.8-07 (R2016)
Fuseholders – Part 8: Class J

CAN/CSA-C22.2 No. 4248.9-07 (R2016)
Fuseholders – Part 9: Class K

CAN/CSA-C22.2 No. 4248.11-07 (R2016)
Fuseholders – Part 11: Type C (Edison Base)

CAN/CSA-C22.2 No. 4248.12-07 (R2016)
Fuseholders – Part 12: Class R

CAN/CSA-C22.2 No. 4248.15-07 (R2016)
Fuseholders – Part 15: Class T

CAN/CSA-C22.2 No. 60950-1-07 (R2016)
Information Technology Equipment Safety – Part 1: General Requirements

CAN/CSA-C22.2 No. 61058-1-09 (R2014)
Switches for Appliances – Part 1: General Requirements

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CAN/CSA-C360-13
Energy Performance and Drum Volume of Household Electric Clothes Dryers

CAN/CSA-E60384-14:14
Fixed Capacitors for Use in Electronic Equipment Part 14: Sectional specification – Fixed Capacitors for Electromagnetic Interference Suppression and Connection to the Supply Mains

CAN/CSA-E60384-1:14
Fixed Capacitors for use in Electronic Equipment — Part 1: Generic Specification

CAN/CSA-E60691:15
Thermal Links – Requirements and Application Guide

CAN/CSA-E60730-1:15
Automatic Electrical Controls for Household and Similar Use – Part 1: General Requirements

CAN/CSA-E730-2-6-94 (R2013)
Automatic Electrical Controls for Household and Similar Use – Part 2: Particular Requirements for Automatic Electrical Pressure Sensing Controls, Including Mechanical Requirements

CAN/CSA-E730-2-7-94 (R2013)
Automatic Electrical Controls for Household and Similar Use – Part 2: Particular Requirements for Timers and Time Switches

CAN/CSA-E60730-2-8:01 (R2016)
Automatic Electrical Controls for Household and Similar Use – Part 2-8: Particular Requirements for Electrically Operated Water Valves, Including Mechanical Requirements

CAN/CSA-E60730-2-9:15
Automatic Electrical Controls for Household and Similar Use – Part 2-9: Particular Requirements for Temperature Sensing Controls

CAN/CSA-E60730-2-15:14
Automatic Electrical Controls for Household and Similar Use – Part 2-15: Particular Requirements for Automatic Electrical Air Flow, Water Flow and Water Level Sensing Controls

UL Standards

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

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

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 248-2
Low-Voltage Fuses – Part 2: Class C Fuses

UL 248-3
Low-Voltage Fuses – Part 3: Class CA and CB Fuses

UL 248-4
Low-Voltage Fuses – Part 4: Class CC Fuses

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

UL 248-6
Low-Voltage Fuses – Part 6: Class H Non-Renewable Fuses

UL 248-7
Low-Voltage Fuses – Part 7: Class H Renewable Fuses

UL 248-8
Low-Voltage Fuses – Part 8: Class J Fuses

UL 248-9
Low-Voltage Fuses – Part 9: Class K Fuses

UL 248-10
Low-Voltage Fuses – Part 10: Class L Fuses

UL 248-11
Low-Voltage Fuses – Part 11: Class Plug Fuses

UL 248-12
Low-Voltage Fuses – Part 12: Class R Fuses

UL 248-14
Low-Voltage Fuses – Part 14: Supplemental Fuses

UL 248-15
Low-Voltage Fuses – Part 15: Class T Fuses

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UL 248-17
Low-Voltage Fuses – Part 17: Class CF Fuses

UL 248-18
Low-Voltage Fuses – Part 18: Class CD Fuses

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 Conductors and/or Copper Conductors

UL 496
Lampholders

UL 498
Attachment Plugs and Receptacles

UL 508
Industrial Control Equipment

UL 510
Polyvinyl Chloride, Polyethylene, and Rubber Insulating Tape

UL 514A
Metallic Outlet Boxes

UL 514B
Conduit, Tubing, and Cable Fittings

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

UL 514D
Cover Plates for Flush-Mounted Wiring Devices

UL 635
Insulated Bushings

UL 723
Test for Surface Burning Characteristics of Building Materials

UL 746A
Polymeric Materials – Short Term Property Evaluations

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UL 746B
Polymeric Materials – Long Term Property Evaluations

UL 746C
Polymeric Materials – Use in Electrical Equipment Evaluations

UL 746E
Polymeric Materials – Industrial Laminates, Filament Wound Tubing, Vulcanized Fibre, and Materials Used in Printed Wiring Boards

UL 758
Appliance Wiring Material

UL 778
Motor-Operated Water Pumps

UL 810
Capacitors

UL 817
Cord Sets and Power-Supply Cords

UL 840
Insulation Coordination Including Clearances and Creepages Distances for Electrical Equipment

UL 873
Temperature-Indicating and – Regulating Equipment

UL 906
Outline of Investigation for Solenoids

UL 917
Clock-Operated Switches

UL 935
Fluorescent-Lamp Ballasts

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

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UL 1004-7
Electronically Protected Motors

UL 1012
Power Units Other Than Class 2

UL 1029
High-Intensity Discharge Lamp Ballast

UL 1030
Sheathed Heating Elements

UL 1054
Special-Use Switches

UL 1059
Terminal Blocks

UL 1077
Supplementary Protectors for Use in Electrical Equipment

UL 1097
Double Insulation Systems for Use in Electrical Equipment

UL 1206
Electric Commercial Clothes-Washing Equipment

UL 1283
Electromagnetic Interference Filters

UL 1310
Class 2 Power Units

UL 1434
Thermistor Type Devices

UL 1441
Coated Electrical Sleeving

UL 1565
Positioning Devices

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

UL 1694
Tests for Flammability of Small Polymeric Component Materials

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

UL 1998
Software in Programmable Components

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UL 2158
Electric Clothes Dryers

UL 2459
Insulated Multi-Pole Splicing Wire Connectors

UL 2557
Outline of Investigation for Membrane Switches

UL 4248-1
Fuseholders – Part 1: General Requirements

UL 4248-4
Fuseholders – Part 4: Class CC

UL 4248-5
Fuseholders – Part 5: Class G

UL 4248-6
Fuseholders – Part 6: Class H

UL 4248-8
Fuseholders – Part 8: Class J

UL 4248-9
Fuseholders – Part 9: Class K

UL 4248-11
Fuseholders – Part 11: Type C (Edison Base) and Type S Plug Fuse

UL 4248-12
Fuseholders – Part 12: Class R

UL 4248-15
Fuseholders – Part 15: Class T

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 60691
Thermal-Links – Requirements and Application Guide

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

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

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

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

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

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

UL 60950-1
Information Technology – Safety – Part 1; General Requirements

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

ASSE (American Society of Sanitary Engineering) Standards

ASSE 1001-2008
Performance Requirements for Atmospheric Type Vacuum Breakers

ASTM International Standards

ASTM B 344-14
Standard Specification for Drawn or Rolled Nickel-Chromium and Nickel-Chromium-Iron Alloys for Electrical Heating Elements

ASTM D638M-96
Test Method for Tensile Properties of Plastics (Metric)

ASTM D6670-13
Standard Practice for Full-Scale Chamber Determination of Volatile Organic Emissions from Indoor Materials/Products

ASTM E230/E230M-12
Standard Specification and Temperature-Electromotive Force (emf) Tables for Standardized Thermocouples

Government of USA

Code of Federal Regulations, Title 10, Part 430, as amended from time to time (referenced as 49 CFR 430).

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IEC (International Electrotechnical Commission) Standards

IEC 60127-1:2015
Miniature Fuses – Part 1: Definitions for Miniature Fuses and General Requirements for Miniature Fuse-links

IEC 60695-2-11:2014
Fire Hazard Testing – Part 2-11: Glowing/Hot-Wire Based Test Methods – Glow-Wire Flammability Test Method for End-Products

IEC 60695-2-12:2010
Fire Hazard Testing – Part 2-12: Glowing/Hot-Wire Based Test Methods – Glow Wire Flammability Test Method for Materials

IEC 60695-2-13:2010
Fire Hazard Testing – Part 2-13: Glowing/Hot-Wire Based Test Methods – Glow Wire Ignitability Test Method for Materials

IEC 60695-11-10:2013
Fire Hazard Testing – Part 11-10: Test Flames – 50 W Horizontal and Vertical Flame Test Methods

ISO (International Organization for Standardization) Standards

ISO 16000-9:2011
Indoor Air – Part 9: Determination of the Emission of Volatile Organic Compounds from Building Products and Furnishing – Emission Test Chamber Method

ISO/IEC 28360:2015
Information Technology – Office Equipment – Determination of Chemical Emission Rates from Electronic Equipment

NFPA (National Fire Protection Association) Standards

NFPA 70
National Electrical Code

4 General Conditions for the Tests

4.1 Voltage and frequency

4.1.1 Unless otherwise specified in the requirements, all tests shall be conducted with the appliance connected to a supply circuit with a rated frequency and a voltage (Vs) of:

a) 120 V for an appliance rated from 110 to 120 V;

b) 240 V for an appliance rated from 220 to 240 V; or

c) the maximum rated voltage of the appliance for an appliance rated other than as mentioned in (a) or (b).

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4.1.2 The test voltage, (Vt), used during the heating tests of Clause 11 and the abnormal operation tests of Clause 19 shall be adjusted so that the calculated (see formula below) heating circuit input (Wt) is achieved. This compensates for heating elements with inputs at Vs (see Clause 4.1.1) that are different than their rated (marked) inputs.

$$W_t = Wm(V_s/V_m)^2$$

where

W_t = the calculated heating circuit input, W

W_m = the heating element rated (marked) input, W

V_s = the supply circuit voltage specified in Clause 4.1.1

V_m = the heating element rated (marked) input, V

4.1.3 If it is necessary to increase the appliance test voltage beyond the voltage as specified in Clause 4.1.1, the motor shall be supplied from a separate circuit not exceeding the nominal system voltage (eg, 120 V, 240 V).

4.2 Test load

4.2.1 Unless otherwise specified, the test load shall:

a) consist of cloths as described in Clause 4.3; and

b) have a dry mass equal to the manufacturer's recommended load or 0.048 kg/L of clothes-drum volume, whichever is greater.

Note: Whenever a referee method is necessary to determine clothes-drum volume, the measurement is made in accordance with the method described in CAN/CSA-C360 or the U.S. Department of Energy (DOE) Energy Conservation Program for Consumer Products – Paragraph 3.1 of Appendix J to Subpart B of 10 CFR 430, Uniform Test Method for Measuring the Energy Consumption of Automatic and Semi-Automatic Clothes Washers.

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4.3 Test fabric

4.3.1 The fabric used for tests shall be bleached, preshrunk cotton suiting, having a warp of 55 ± 2 threads per 25.4 mm and a filling of 48 ± 2 threads per 25.4 mm. Individual cloths shall be 610 × 915 mm, double hemmed to a size of approximately 560 × 865 mm. A small number of smaller cloths, 305 × 305 mm, double hemmed to a size of 255 × 255 mm, may be used if necessary to make the total weight of cloth correct.

4.4 Thermocouples

4.4.1 Thermocouples shall consist of wires not larger than 24 AWG (0.21 mm^2). The thermocouple wire shall conform with the requirements for Special Tolerances thermocouples as listed in the Tolerances on Initial Values of EMF versus Temperature tables in ANSI/ASTM E230/E230M.

Note: When thermocouples are used in the determination of temperatures in connection with the heating of electrical devices, it is common practice to employ thermocouples consisting of 30 AWG (0.05 mm^2) iron and constantan wires and a potentiometer-type indicating instrument; such equipment is used whenever referee temperature measurements by thermocouples are necessary.

4.5 Laundry detergent

4.5.1 Whenever laundry detergent is required for a test in this Standard it shall be AHAM detergent or any other powdered laundry detergent having similar properties.

4.6 Laundry bleach

4.6.1 Whenever laundry bleach is specified in this Standard, commercially available liquid chlorine bleaches for household use shall be acceptable.

4.7 Cheesecloth for heating and abnormal tests

4.7.1 Whenever cheesecloth is required for a test in this Standard, the cloth shall be bleached cheesecloth running approximately 34 g/m^2 with a thread count in the range of 10 – 13 × 9 – 12 threads/cm.

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4.8 Test temperature

4.8.1 The tests shall be conducted in a draught-free location and in general at an ambient temperature in the range of 10–40°C.

5 Marking and Instructions

5.1 Marking

***Advisory Note**: In Canada, there are two official languages. Therefore, it is necessary to have CAUTION, WARNING, and DANGER markings in both English and French. Annex A lists acceptable translations of the markings specified in this Standard. When a product is not intended for use in Canada, cautionary markings may be provided in English only.*

5.1.1 General

5.1.1.1 A marking that is required to be permanent shall be moulded, die-stamped, paint-stencilled, stamped, or etched metal that is permanently secured, or indelibly stamped on a pressure-sensitive label secured by adhesive. Pressure-sensitive labels and adhesive shall comply with CAN/CSA-C22.2 No. 0.15 and UL 969. If a pressure-sensitive label would be exposed to fabric softeners, bleach, or detergent because of its location, the label shall comply with Clauses 5.1.1.2 and 5.1.1.3.

5.1.1.2 After being conditioned as described in Clause 5.1.1.3, a pressure-sensitive label or a label secured by cement or adhesive, immediately following removal from each test medium and after being exposed to room temperature for 24 h following removal from each medium, shall:

a) demonstrate good adhesion and not have curled edges;

b) resist defacement or removal as demonstrated by scraping across the test panel with a flat metal blade 0.8 mm thick held at right angles to the test panel; and

c) be legible and resist defacement when rubbed with thumb or finger pressure.

5.1.1.3 Three samples of the label applied to test surfaces as in the intended application shall be conditioned for 24 h in a controlled atmosphere maintained at 23 ± 2°C with a 50 ± 5% relative humidity. The samples shall then be immersed for 48 h in a solution representative of service use, maintained at the temperature the solution would attain in service, but not less than 23 ± 2°C.

5.1.1.4 A marking required to be permanent shall be located on a part that would require the use of a tool for removal.

5.1.1.5 A cautionary marking intended to instruct the operator shall be legible and visible to the operator during normal operation of the appliance. A marking giving servicing instructions shall be legible and visible when such servicing is being performed.

5.1.1.6 A cautionary marking shall be prefixed by the word “CAUTION”, “WARNING”, or “DANGER” in letters not less than 3.2 mm high. The remaining letters of such marking shall not be less than 1.6 mm high.

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5.1.2 Appliance markings

5.1.2.1 An appliance shall be rated in volts and in amperes. The number of phases shall be included in the ratings if the appliance is intended for connection to a polyphase circuit, and the ratings shall include the frequency expressed in hertz (Hz).

5.1.2.2 An appliance, as mentioned in Clause 7.2, that will not start and operate normally when connected to a circuit protected by a 15 A fuse of other than the time-delay type, but that will start and operate normally when connected to a circuit protected by a 15 A time-delay fuse, shall be plainly and permanently marked with the following or the equivalent:

“If connected to a circuit protected by fuses, use time-delay fuses with this appliance”.

5.1.2.3 If replaceable fuses are provided, the maximum size in amperes of the fuse required shall be permanently marked on the appliance.

5.1.2.4 Appliances having field wiring terminals shall be marked with one of the following:

a) “Use copper conductors only”

if the terminal is acceptable only for connection to copper wire;

b) “Use aluminum conductors only”

if the terminal is acceptable only for connection to aluminum wire;

c) “Use copper or aluminum conductors “or “Use copper, copper-clad aluminum, or aluminum conductors” if the terminal is acceptable only for connection to either copper or aluminum wire; or

d) “Use copper-clad aluminum or copper conductors”

if the terminal is acceptable only for connection to either copper or copper-clad aluminum wire.

5.1.2.5 A heating element rated more than 1 A and intended to be replaceable in the field shall be marked with:

a) its rating in V and A or in V and W;

b) the manufacturer’s part number; or

c) an equivalent means of identification.

The marking shall withstand the environment involved.

Note: An open-wire heating element need not be marked if it is part of an assembly that is marked as required.

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