



UL 2157

STANDARD FOR SAFETY

Electric Clothes Washing Machines and Extractors

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

Fifth Edition, Dated October 30, 2024

Summary of Topics

This new Fifth Edition of ANSI/UL 2157 dated October 30, 2024 incorporates editorial changes including renumbering and reformatting to align with current style.

The new and revised requirements are substantially in accordance with Proposal(s) on this subject dated September 15, 2023 and May 3, 2024.

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CSA Group
CSA C22.2 No. 169:24
Sixth Edition



ULSE Inc.
UL 2157
Fifth Edition

Electric Clothes Washing Machines and Extractors

October 30, 2024



ANSI/UL 2157-2024

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ISBN 978-1-4883-5255-3 © 2024 Canadian Standards Association

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PREFACE

This is the harmonized CSA Group and UL Standard for Electric Clothes Washing Machines and Extractors. It is the sixth edition of CSA C22.2 No. 169, and the fifth edition of UL 2157. This edition of CSA C22.2 No. 169 supersedes the previous edition published in 2018. This edition of UL 2157 supersedes the previous edition published in 2018.

This harmonized standard was prepared by the CSA Group and ULSE. 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 ULSE.

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.

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), CSA C22.1-21, and the (U.S.) National Electrical Code (NEC), NFPA 70, 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, 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.

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

2.10 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.

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

2.12 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.

2.13 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.

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

NOTE: With respect to Separation of circuits, [18.3](#), this term refers to parts in both low-voltage and line-voltage circuits.

2.15 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.

2.16 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).

2.17 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 [6.2\(a\)\(1\)](#) or (2).

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

2.18 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 [6.2\(a\)\(1\)](#) or (2); when enclosure barriers, if provided, are removed.

A polymeric supplementary enclosure is evaluated as an enclosure.

2.19 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.

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

2.21 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.

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

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

2.24 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.

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

2.26 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.

2.27 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.

2.28 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.

2.29 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 W can be delivered into an external variable resistor connected between the two points at the end of 5 seconds under normal conditions and single component fault conditions; see [26.6.3.2](#) and [D14](#).

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

2.30 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.

2.31 TEMPERATURE-LIMITING DEVICE – a device that:

- a) functions only under conditions that produce abnormal temperatures; and
- b) is not intended to function during normal operation of the appliance.

2.32 TEMPERATURE-REGULATING DEVICE – a device that:

- a) regulates temperature; and
- b) functions during normal operation of the appliance.

2.33 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.

2.34 WITHIN 3 MM – falling within the dotted boundary formed by the flame cylinder with hemispherical ends as shown in [Figure 26.2](#).

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 CSA C22.2 No. 0.

3.1.3 The values given in SI (metric) units shall be normative. Any other values given shall be for information purposes only.

3.2 Reference publications

3.2.1 This Standard refers to the following publications, and where such reference is made, it shall be to the edition listed below. Such reference shall include all amendments published up to the time this referencing Standard was approved. Where reference is made to undated CSA Group Standards, such reference shall be considered to refer to the latest edition and all amendments published to that edition.

ASSE 1001-2021, *Performance Requirements for Atmospheric Type Vacuum Breakers*

ASTM B344-20, *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 D1822-21, *Standard Test Method for Determining the Tensile-Impact Resistance of Plastics*

ASTM D6670-18, *Standard Practice for Full-Scale Chamber Determination of Volatile Organic Emissions from Indoor Materials/Products*

ASTM E230/E230M-17, *Standard Specification and Temperature-Electromotive Force (emf) Tables for Standardized Thermocouples*

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

CSA B64 Series 21, *Backflow Preventers and Vacuum Breakers*

CSA C22.1-21, *Canadian Electrical Code, Part I*

CSA C22.2 No. 0:20, *General Requirements – Canadian Electrical Code, Part II*

CSA C22.2 No. 0.1:19, *General Requirements for Double-Insulated Equipment*

CSA C22.2 No. 0.2-16 (R2020), *Insulation Coordination*

CSA C22.2 No. 0.4:17 (R2022), *Bonding of Electrical Equipment*

CSA C22.2 No. 0.5:16 (R2020), *Threaded Conduit Entries*

CSA C22.2 No. 0.8:19, *Safety Functions Incorporating Electronic Technology*

CSA C22.2 No. 0.15:15 (R2020), *Adhesive Labels*

CSA C22.2 No. 0.17:22, *Evaluation of Properties of Polymeric Materials*

CSA C22.2 No. 8-13 (R2018), *Electromagnetic Interference (EMI) Filters*

CSA C22.2 No. 14-18, *Industrial Control Equipment*

CSA C22.2 No. 18.1:13 (R2022), *Metallic Outlet Boxes*

CSA C22.2 No. 18.2:06 (R2021), *Nonmetallic Outlet Boxes*

CSA C22.2 No. 18.3:12 (R2022), *Conduit, Tubing, and Cable Fittings*

CSA C22.2 No. 18.5:22, *Positioning Devices*

CSA C22.2 No. 21-18, *Cord Sets and Power Supply Cords*

CSA C22.2 No. 24:21, *Temperature-Indicating and Regulating Equipment*

CSA C22.2 No. 38-18, *Thermoset-Insulated Wires and Cables*

CSA C22.2 No. 39-13 (R2022), *Fuseholder Assemblies*

CSA C22.2 No. 42:10 (R2020), *General Use Receptacles, Attachment Plugs, and Similar Wiring Devices*

CSA C22.2 No. 42.1:13 (R2022), *Cover Plates for Flush-Mounted Wiring Devices*

CSA C22.2 No. 43:17 (2022), *Lampholders*

CSA C22.2 No. 49-18, *Flexible Cords and Cables*

CSA C22.2 No. 53:68 (R2019), *Electric Washing Machines*

CSA C22.2 No. 55:15 (R2020), *Special Use Switches*

CSA C22.2 No. 65-18, *Wire Connectors*

CSA C22.2 No. 66.1:06 (R2020), *Low Voltage Transformers – Part 1: General Requirements*

CSA C22.2 No. 66.2-18, *Low Voltage Transformers – Part 2: General Purpose Transformers*

CSA C22.2 No. 66.3-06 (R2020), *Low Voltage Transformers – Part 3: Class 2 and Class 3 Transformers*

CSA C22.2 No. 72:10 (2019), *Heater Elements*

CSA C22.2 No. 74:16 (R2020), *Equipment for Use with Electric Discharge Lamps*

CSA C22.2 No. 75:17 (R2022), *Thermoplastic-Insulated Wires and Cables*

CSA C22.2 No. 77:14 (R2019), *Motors with Inherent Overheating Protection*

CSA C22.2 No. 100-14 (R2019), *Motors and Generators*

CSA C22.2 No. 107.1:16 (R2021), *Power Conversion Equipment*

CSA C22.2 No. 108:14 (R2019), *Liquid Pumps*

CSA C22.2 No. 111-18, *General Use Snap Switches*

CSA C22.2 No. 112:21, *Electric Clothes Dryers*

CSA C22.2 No. 127-18, *Equipment and Lead Wires*

CSA C22.2 No. 139:19, *Electrically Operated Valves*

CSA C22.2 No. 153:14 (R2019), *Electrical Quick Connect Terminals*

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CSA C22.2 No. 158:10 (R2019), *Terminal Blocks*

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CSA C22.2 No. 198.3:21, *Coated Electrical Sleeving*

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CSA C22.2 No. 235-04 (R2017), *Supplementary Protectors*

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CSA C22.2 No. 248.2:00 (R2019), *Low Voltage Fuses – Part 2: Class C Fuses*

CSA C22.2 No. 248.3:00 (R2019), *Low Voltage Fuses – Part 3: Class CA and CB Fuses*

CSA C22.2 No. 248.4:00 (R2019), *Low Voltage Fuses – Part 4: Class CC Fuses*

CSA C22.2 No. 248.5:00 (R2019), *Low Voltage Fuses – Part 5: Class G Fuses*

CSA C22.2 No. 248.6:00 (R2019), *Low Voltage Fuses – Part 6: Class H Non-Renewable Fuses*

CSA C22.2 No. 248.7:00 (R2019), *Low Voltage Fuses – Part 7: Class H Renewable Fuses*

CSA C22.2 No. 248.8:11 (R2020), *Low Voltage Fuses – Part 8: Class J Fuses*

CSA C22.2 No. 248.9:00 (R2019), *Low Voltage Fuses – Part 9: Class K Fuses*

CSA C22.2 No. 248.10-11 (R2020), *Low Voltage Fuses – Part 10: Class L Fuses*

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CSA C22.2 No. 4248.5:22, *Fuseholders – Part 5: Class G*

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CSA C22.2 No. 4248.9:07 (R2021), *Fuseholders – Part 9: Class K*

CSA C22.2 No. 4248.11-07 (R2021), *Fuseholders – Part 11: Type C (Edison Base)*

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IEC 61000-4-5:2014+AMD1:2017 CSV, *Electromagnetic compatibility (EMC) – Part 4-5: Testing and measurement techniques – Surge immunity test*

IEC 61000-4-6L2023 RLV, *Electromagnetic compatibility (EMC) – Part 4-6: Testing and measurement techniques – Immunity to conducted disturbances, induced by radio-frequency fields*

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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 (V_s) 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).

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

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

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 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 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 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 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.

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 mm²) and not smaller than 30 AWG (0.05 mm²). 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 ASTM E230/E230M.

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/m² with a thread count in the range of 10 – 13 × 9 – 12 threads/cm.

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 (50 – 104 °F).

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 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 [5.1.1.2](#) and [5.1.1.3](#).

5.1.1.2 After being conditioned as described in [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 (73.4 ± 3.6 °F) 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 (73.4 ± 3.6 °F).

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.

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 [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.

5.1.2.6 An appliance that is intended to comply with [17.5.3](#) shall be marked, in a location that is visible during installation and inspection with the word: "WARNING", and the following statement or the equivalent: "To reduce the risk of fire, this appliance must be fastened or otherwise secured to an uncovered concrete floor".

5.1.2.7 If an appliance employs a non-current-carrying metal part that is not grounded as provided in [22.1.5](#), the appliance shall be permanently marked with the word "WARNING" and the following or the equivalent: "Certain internal parts are intentionally not grounded and may present a risk of electric shock only during servicing. Service Personnel – Do not contact the following parts while the appliance is energized: (list of ungrounded parts)". The marking shall be located on the outside of the appliance and it shall be readily visible before any servicing operation. The marking also shall be located close to each ungrounded part and it shall be readily visible before or when the part becomes accessible.

If all approaches to ungrounded parts can be adequately covered by one marking:

- a) then only one marking, visible from the outside of the appliance and at the approach to the ungrounded parts, need be employed; or
- b) if the marking is located on the ungrounded part, only one marking need be employed.

5.1.2.8 If a manufacturer produces or assembles appliances at more than one factory, each finished appliance shall have a distinctive marking, which may be in code, by which it can be identified as the product of a particular factory.

5.1.2.9 An appliance provided with instructions for any type of user maintenance shall be marked with the word "WARNING" and the following or the equivalent:

"To reduce the risk of electric shock, disconnect this appliance from the power supply before attempting any user maintenance. Turning the controls to the OFF position does not disconnect this appliance from the power supply".

The marking shall be so located as to be visible before the maintenance is attempted.

5.1.2.10 An appliance shall have a permanent, legible marking that will be readily visible after the appliance has been installed as intended without the necessity of moving the appliance. The markings shall include the:

- a) manufacturer's name, tradename, trademark, or other descriptive marking by which the organization responsible for the product can be identified, hereinafter referred to as the "manufacturer's name";
- b) catalogue number or the equivalent;
- c) electrical rating; and
- d) date of manufacture by week, month or quarter, and year, which may be abbreviated or in an established or otherwise acceptable code.

If an appliance employs a single motor as its only energy-consuming component, the electrical ratings on the motor nameplate need not be shown elsewhere on the appliance if this nameplate is readily visible after the motor has been installed in the appliance.

5.1.2.11 An appliance that is intended to be installed in a closet shall be provided with a permanent marking that specifies the required clearances to all adjacent surfaces and the required ventilation in the door. This marking may be included with other markings on a common label provided it is:

- a) separate from the wording of all other markings on the label; and
- b) visible during installation.

5.1.2.12 A stationary appliance employing an attachment plug in accordance with [20.3.6](#) shall be marked in the installation instructions, markings, or by a hang tag or equivalent:

"Connect To Individual Branch-Circuit".

5.1.2.13 With reference to [8.3](#), an appliance that is fastened or otherwise secured at a specific location and is intended to be connected to a supply circuit protected by a 15 A or a 20 A overcurrent-protective device and that has a current rating greater than 50 % of the supply-circuit-current rating shall be permanently marked to indicate that the appliance shall be connected only to a supply circuit to which no lighting units or general-purpose receptacles are connected. The marking shall be located so that it will be readily visible when the connections to the supply circuit are made.

5.1.2.14 If an appliance employs a dual-voltage motor and if the motor nameplate is employed to give the electrical ratings of the appliance, as mentioned in [5.1.2.10](#), the appliance shall also be marked to indicate the voltage for which it shall be connected when it is in use.

5.1.2.15 If a cord-connected appliance employs a dual-voltage motor, instructions shall be provided to indicate the type of attachment plug that should be used if the appliance is reconnected for the alternative voltage.

5.1.2.16 A permanently connected appliance having one motor and other loads or more than one motor with or without other loads shall be permanently marked in a location that will be visible when connections to the power-supply circuit are made and inspected. The markings shall include:

- a) the minimum supply-circuit conductor ampacity in accordance with [5.1.2.17](#); and
- b) the maximum rating and type of supply-circuit overcurrent-protective device, such as a non-time-delay fuse or a dual-element time-delay fuse, in accordance with [5.1.2.18](#).

5.1.2.17 With reference to the requirement in [5.1.2.16\(a\)](#), the minimum supply-circuit conductor ampacity shall be based on the maximum input in accordance with Section [8](#).

5.1.2.18 With reference to the requirement in [5.1.2.16\(b\)](#), the rating of the supply-circuit overcurrent-protective device shall not exceed the rating of the fuse employed in the short-circuit test of the motor overload-protective device employed in the appliance as specified in [19.8.2](#).

5.1.2.19 An appliance provided with double insulation shall be permanently marked with the words:

"DOUBLE INSULATION – When servicing, use only identical replacement parts".

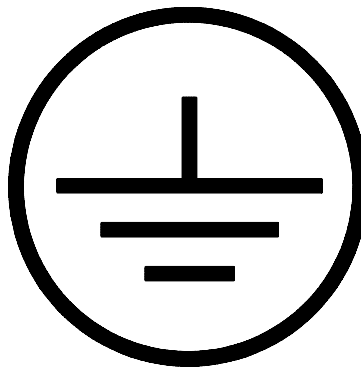
The words "DOUBLE-INSULATED" may be used instead of "DOUBLE INSULATION".

5.1.2.20 An appliance shall not be marked with a double insulation symbol (a square within a square), the words "DOUBLE INSULATION", or the equivalent unless it complies with the requirements for double-insulated appliances in accordance with CSA C22.2 No. 0.1 and UL 1097.

5.1.2.21 A marking shall state the weight of clothes (in lb and kg) that the appliance is intended to wash at one time. The weight of clothes need not be included in the marking on a washing machine if this information or its equivalent is given in the instructions for operation that the manufacturer provides with the appliance.

5.1.2.22 A pressure wire connector intended for connection of an equipment-grounding conductor shall be identified by being marked "G", "GR", "GND", "Ground", "Grounding", with the grounding symbol illustrated in [Figure 5.1](#), a similar marking; or by a marking on the wiring diagram provided on the appliance.

Figure 5.1
Grounding Symbol



IEC417, Symbol 5019

5.1.2.23 A dedicated receptacle shall have a marking immediately adjacent to it identifying its use. The marking shall include the statement:

"Not a general-use receptacle – For use with _____ only".

A description of the pedestal or drawer-type washing machine to be connected to the receptacle, including the model number, catalog number, or other identification determined to be equivalent, and the electrical rating in volts and amperes, shall be inserted in the blank space.

5.1.3 Wall-mounting kits and stands

5.1.3.1 A wall-mounting kit or an appliance stand packaged and marketed separately for the basic appliance or recommended by the appliance manufacturer for use with the basic appliance shall be permanently and legibly marked with a catalogue number or the equivalent. Information packaged with the appliance shall identify, by catalogue number:

- a) the wall-mounting kits;
- b) the appliance stands that have been investigated and found acceptable for use with the appliance; or

c) the appliance with which the wall-mounting kit or appliance stand is intended to be used.

5.1.3.2 The catalogue number mentioned in [5.1.3.1](#) shall appear in at least one of the following locations:

- a) on the wall-mounting kit or appliance stand;
- b) on the package containing the wall-mounting kit or appliance stand; or
- c) in the information furnished with the wall-mounting kit or appliance stand.

5.2 Instruction manual

5.2.1 General

5.2.1.1 A household appliance shall be provided with:

- a) instructions pertaining to a risk of fire, electric shock, or injury to persons associated with the use of the appliance;
- b) installation instructions;
- c) operating instructions; and
- d) if applicable, user-maintenance instructions.

5.2.1.2 The instructions required by [5.2.1.1](#) shall be:

- a) in separate manuals; or
- b) combined in one or more manuals, provided the instructions pertaining to a risk of fire, electric shock, or injury to persons are emphasized and in a separate format to distinguish them from the rest of the text.

5.2.1.3 The following material shall be provided as printed material:

- a) the instructions pertaining to a risk of fire, electric shock, or injury to persons as required by [5.2.1.1\(a\)](#) and [5.2.1.7](#); and
- b) a minimum set of installation and operating instructions, such as a quick start guide, that includes the required warning instructions required by [5.3](#) and [5.2.2](#).

5.2.1.4 All other instructions may be provided in electronic read-only media format only, such as a DVD, website, flash drive or CD-ROM. If any electronic media instructions are provided, the instructions and warning statements required by [5.2.1.1](#) shall also be included within the electronic media instructions.

5.2.1.5 The printed instructions material referenced in [5.2.1.3](#) shall contain detailed instructions of how to obtain a printed copy of the material contained in electronic format.

5.2.1.6 Instructions for user repair that are provided with an appliance, or that are specifically referenced by other literature or markings provided with the appliance, shall be considered with respect to the risks that might be present during the repair and after the repair has been completed.

5.2.1.7 Any heading or statement requiring the cautionary prefix "WARNING" shall be entirely in upper case letters or otherwise emphasized to distinguish it from the rest of the text.

5.2.1.8 Unless otherwise indicated, the text of all instructions shall be in the words specified or words that are equivalent, clear, and understandable. However, there shall be no substitute for the word "WARNING".

NOTE: If the appliance is such that the specific wording is unnecessary or conflicting, the wording may be omitted or modified as applicable.

5.2.2 Instructions pertaining to a risk of fire, electric shock, or injury to persons

5.2.2.1 The instructions pertaining to a risk of fire, electric shock, or injury to persons shall warn the user of reasonably foreseeable risks and state the precautions that should be taken to reduce such risks.

5.2.2.2 The heading "IMPORTANT SAFETY INSTRUCTIONS" or the equivalent shall precede the list of instructions required in [5.2.2.4](#), and the statement "SAVE THESE INSTRUCTIONS" or the equivalent shall either precede or follow the list (see [5.2.1.7](#)).

5.2.2.3 The instructions shall include the appropriate instructions from [5.2.2.4](#) and [5.2.2.5](#).

5.2.2.4 The instructions required by [5.2.2.1](#) shall include the items in the following list, as applicable, as well as any other instructions a manufacturer considers to be necessary for the appliance. The items in the list may be numbered (see [5.2.1.7](#)).

IMPORTANT SAFETY INSTRUCTIONS

WARNING – To reduce the risk of fire, electric shock, or injury to persons when using your appliance, follow basic precautions, including the following:

- 1) Read all instructions before using the appliance.
- 2) Do not wash articles that have been previously cleaned in, washed in, soaked in, or spotted with gasoline, dry-cleaning solvents, or other flammable or explosive substances, as they give off vapours that could ignite or explode.
- 3) Do not add gasoline, dry-cleaning solvents, or other flammable or explosive substances to the wash water. These substances give off vapours that could ignite or explode.
- 4) Under certain conditions, hydrogen gas may be produced in a hot-water system that has not been used for 2 weeks or more. HYDROGEN GAS IS EXPLOSIVE. If the hot-water system has not been used for such a period, before using a washing machine, turn on all hot-water faucets and let the water flow from each for several minutes. This will release any accumulated hydrogen gas. As the gas is flammable, do not smoke or use an open flame during this time.
- 5) Risk of Suffocation and Injury from Entrapment: Do not allow children to play on or in the appliance. Close supervision of children is necessary when the appliance is used near children.
- 6) Before the appliance is removed from service or discarded, remove the door.
- 7) Do not reach into the appliance if the tub or agitator is moving.
- 8) Do not install or store this appliance where it will be exposed to the weather.
- 9) Do not tamper with controls.
- 10) Do not repair or replace any part of the appliance or attempt any servicing unless specifically recommended in the user-maintenance instructions or in published user-repair instructions that you understand and have the skills to carry out.

11) Do not use replacement parts that have not been recommended by the manufacturer (e.g. parts made at home using a 3D printer).

SAVE THESE INSTRUCTIONS

5.2.2.5 The instructions pertaining to a risk of fire, electric shock, or injury to persons shall include (a) (b), or (c) below, as applicable. As an alternative, (a) or (b) may be included in the installation instructions, and (c) may be included in the user-maintenance instructions. If the instructions in (a) and (b) are included in the installation instructions, and if (c) is included in the user-maintenance instructions, a reference to these instructions shall be included as a separate item in the list required by [5.2.2.4](#) (see [5.2.1.7](#)).

a) For a grounded, cord-connected appliance:

GROUNDING INSTRUCTIONS

This appliance must be grounded. In the event of malfunction or breakdown, grounding will reduce the risk of electric shock by providing a path of least resistance for electric current. This appliance is equipped with a cord having an equipment-grounding conductor and a grounding plug. The plug must be plugged into an appropriate outlet that is properly installed and grounded in accordance with all local codes and ordinances.

WARNING – Improper connection of the equipment-grounding conductor can result in a risk of electric shock. Check with a qualified electrician or serviceman if you are in doubt as to whether the appliance is properly grounded.

Do not modify the plug provided with the appliance – if it will not fit the outlet, have a proper outlet installed by a qualified electrician.

b) For a permanently connected appliance:

GROUNDING INSTRUCTIONS

This appliance must be connected to a grounded metal, permanent wiring system, or an equipment-grounding conductor must be run with the circuit conductors and connected to the equipment-grounding terminal or lead on the appliance.

c) For a double-insulated, cord-connected appliance:

SERVICING A DOUBLE-INSULATED APPLIANCE

In a double-insulated appliance, two systems of insulation are provided instead of grounding. No grounding means is provided on a double-insulated appliance, nor should a means for grounding be added to the appliance. Servicing requires extreme care and knowledge of the system, and should be done only by qualified service personnel. Replacement parts for a double-insulated appliance must be identical to those parts being replaced. A double-insulated appliance is marked with the words "DOUBLE INSULATION" or "DOUBLE INSULATED". The double-insulation symbol (a square within a square) may also be marked on the appliance.

5.3 Installation instructions

5.3.1 The installation instructions shall include all the information needed to install the appliance for use as intended, and shall be preceded by the heading "INSTALLATION INSTRUCTIONS" or the equivalent.

5.3.2 The installation instructions of an appliance that is intended to comply with [17.5.3](#) shall also include the warning marking required by [5.1.2.6](#).

5.3.3 The installation instructions of an appliance that is intended to be installed in a closet shall specify the required clearances to all adjacent surfaces and the required ventilation in the door.

5.3.4 The installation instructions of an appliance that employs non-current-carrying metal parts within the enclosure that are accessible during installation and not grounded in accordance with [22.1.5](#) shall include the warning marking required by [5.1.2.7](#).

5.4 Operating instructions

5.4.1 The operating instructions shall include all the information needed to operate an appliance as intended, and shall be preceded by the heading "OPERATING INSTRUCTIONS" or the equivalent (see [5.2.1.7](#)).

5.4.2 The operating instruction shall:

- a) explain and describe the location, function, and operation of each user-operated control of the appliance; and
- b) include the statement:

"WARNING – To reduce the risk of fire, electric shock, or injury to persons, read the IMPORTANT SAFETY INSTRUCTIONS before operating this appliance".

NOTE: This statement may be omitted if the IMPORTANT SAFETY INSTRUCTIONS required by [5.2.2.1](#) to [5.2.2.5](#) are included in the operating instruction manual immediately prior to the operating instructions.

5.4.3 For vertical axis machines, the operating instructions shall be provided with instructions to the user on how to properly wash water-resistant and water-repellant type clothing, or not to wash water-resistant or water repellent-type clothing. These instructions shall include the following or equivalent:

"WARNING: Failure to closely follow these instructions may result in an abnormal vibrating and out-of-balance condition that could result in physical injury, property damage, and/or appliance damage."

5.5 User-maintenance instructions

5.5.1 The user-maintenance instructions shall include explicit instructions for all cleaning and servicing that is intended to be performed by the user, such as lubrication, adjustments, or removal of lint, dust, or dirt.

5.5.2 The user-maintenance instructions shall be preceded by the heading "USER-MAINTENANCE INSTRUCTIONS" or the equivalent (see [5.2.1.7](#)).

5.5.3 The user maintenance instructions of an appliance that employs non-current-carrying metal parts within the enclosure that are accessible during user servicing and not grounded in accordance with [22.1.5](#) shall include the warning marking required by [5.1.2.7](#).

5.6 Appliance stand and wall-mounting kit instructions

5.6.1 Installation instructions for an appliance stand or wall-mounting kit shall include a complete list and description of all parts that are included with the kit or stand, and a complete and detailed description of any additional readily available part, such as a nail, a screw, or a piece of lumber, that is needed but not included with the kit or stand. The instructions shall be included with the wall-mounting kit or appliance stand, and shall contain sufficient detail so that the kit or stand can be installed as intended.

5.6.2 The appliance stand and wall-mounting kit instructions shall be preceded by the heading "APPLIANCE STAND AND WALL-MOUNTING KIT INSTRUCTIONS" or the equivalent (see [5.2.1.7](#)).

6 Protection against accessibility to current-carrying parts

6.1 Where an opening in an enclosure has a minor dimension (see [6.5](#):

- a) less than 25.4 mm, an uninsulated current-carrying part or film-coated wire shall not be contacted by the probe illustrated in [Figure 6.1](#); or
- b) of 25.4 mm or more, an uninsulated current-carrying part or film-coated wire shall be positioned from the opening as specified in [Table 6.1](#), to reduce the likelihood of electric shock resulting from unintentional contact with such a part or wire.

Table 6.1
Minimum Acceptable Distance from an Opening to a Part that Might Involve a Risk of Electric Shock

Minor dimensions of opening, ^a mm	Minimum distance from opening to part, mm
≤19.1	114.0
25.4	165.0
31.8	190.0
38.1	318.0
47.6	394.0
54.0	444.0
>54.0 ≤ 152.0	762.0

^a See [6.5](#)

NOTES:
1 – Between 19.1 mm and 54.0 mm, interpolation is used to determine a value between values specified in the table.
2 – Any dimension less than 25.4 mm applies to a motor only.

6.2 A motor with an integral enclosure that has an opening with a minor dimension (see [6.5](#)):

- a) less than 19.1 mm is acceptable, if:
- 1) film-coated wire cannot be contacted by the probe illustrated in [Figure 6.2](#);
 - 2) in a directly accessible motor (see [6.6](#)), an uninsulated current-carrying part cannot be contacted by the probe illustrated in [Figure 6.3](#); and
 - 3) in an indirectly accessible motor (see [6.6](#)), an uninsulated current-carrying part cannot be contacted by the probe illustrated in [Figure 6.4](#); and
- b) of 19.1 mm or more is acceptable, if an uninsulated current-carrying part or film-coated wire is spaced from the opening as specified in [Table 6.1](#).

Figure 6.2
Probe for Film-Coated Wire

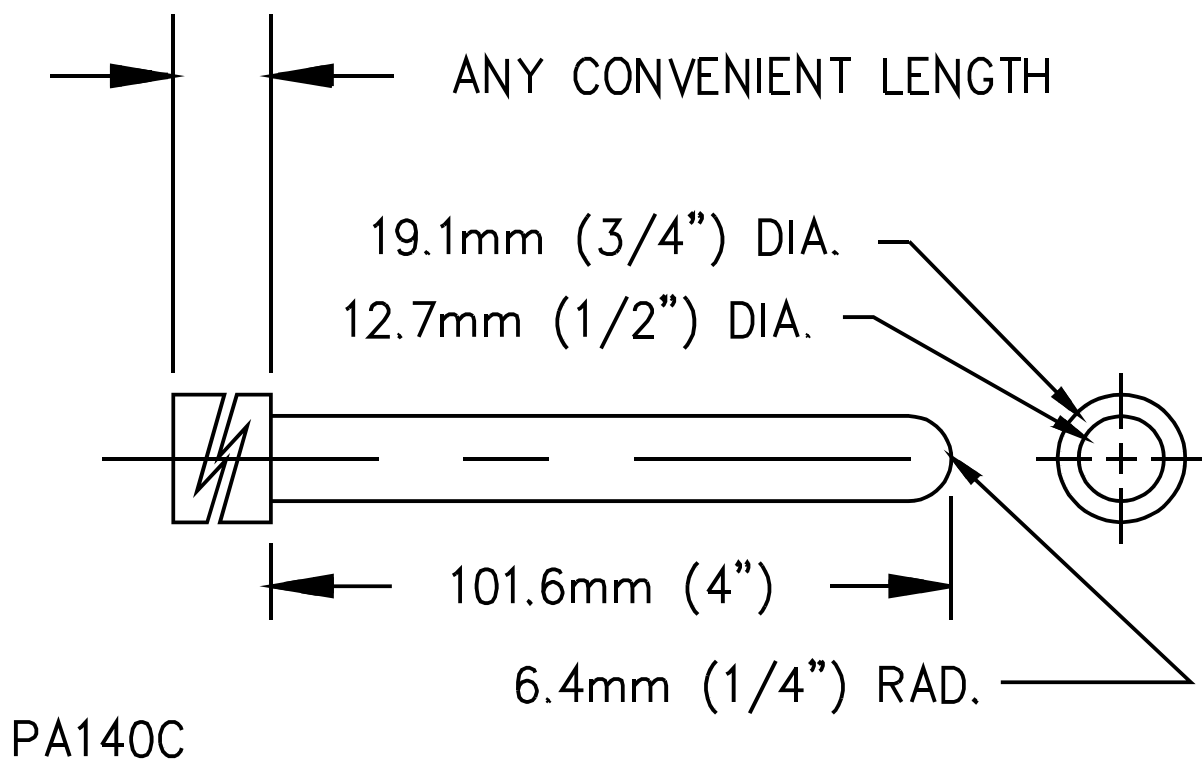
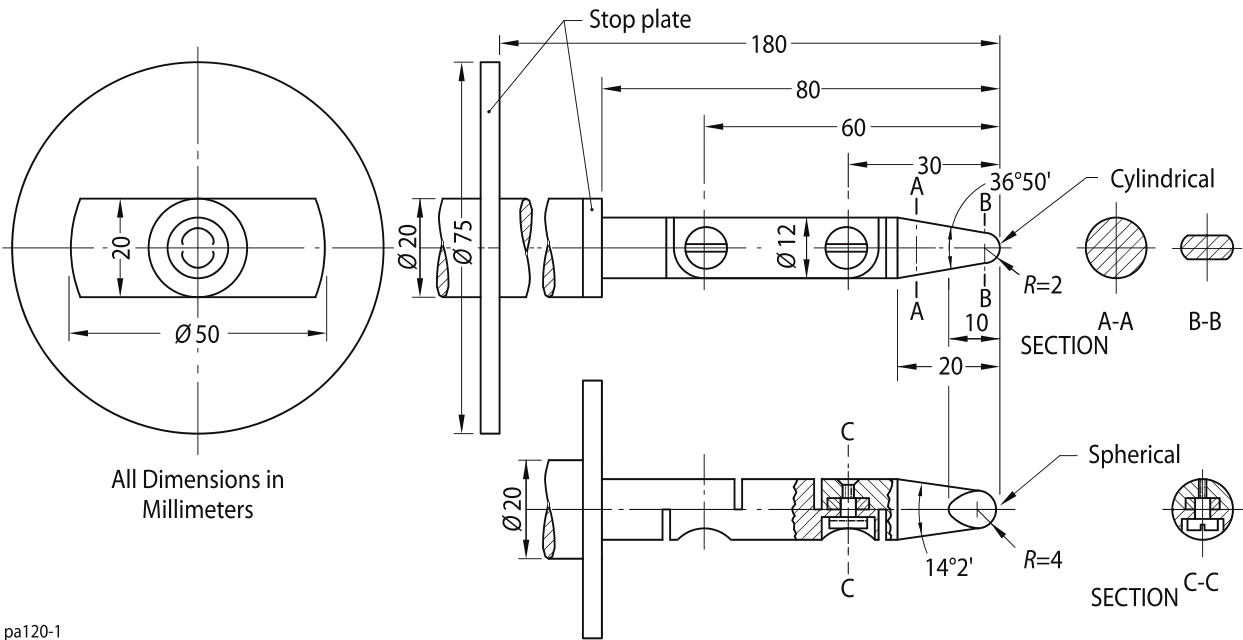


Figure 6.3
IEC Accessibility Probe with Stop Plate



pa120-1

Dimensions in mm

Material: metal, except where otherwise specified

Linear: dimensions in mm

Tolerances on dimensions without specific tolerance:

on angles: 0/-10'

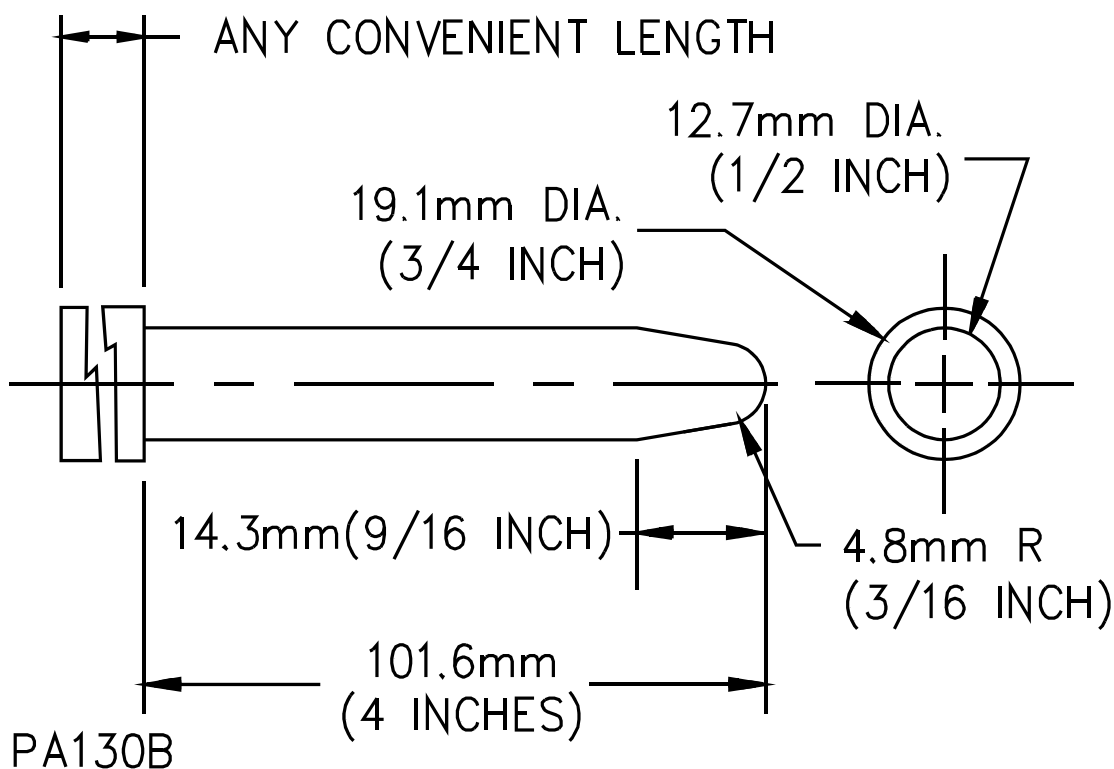
on linear dimensions:

up to 25 mm: 0/0,05

over 25 mm: ±0,2

Both joints shall permit movement in the same plane and the same direction through an angle of 90° with a 0 to +10° tolerance.

Figure 6.4
Probe for Uninsulated Current-Carrying Parts



6.3 The probes referenced in [6.1](#) and [6.2](#) and illustrated in [Figure 6.1](#), [Figure 6.2](#), [Figure 6.3](#), and [Figure 6.4](#) shall be applied to any depth that the opening will permit and shall be rotated or angled before, during, and after insertion through the opening to any position that is necessary to examine the enclosure. The probes illustrated in [Figure 6.1](#) and [Figure 6.4](#) shall be applied in any possible configuration and, if necessary, the configuration shall be changed after insertion through the opening.

6.4 The probes referenced in [6.1](#) and [6.2](#) shall be used as measuring instruments to determine the accessibility provided by an opening, and not as instruments to measure the strength of a material. They shall be applied with the minimum force necessary to determine accessibility.

6.5 With reference to the requirements in [6.1](#) and [6.2](#), the minor dimension of an opening is the diameter of the largest cylindrical probe having a hemispherical tip that can be inserted through the opening.

6.6 With reference to the requirements in [6.2](#):

a) an indirectly accessible motor is a motor that is:

- 1) accessible only by opening or removing a part of the outer enclosure, such as a guard or panel, that can be opened or removed without using a tool; or
- 2) located at such a height or is otherwise guarded or enclosed so that it is unlikely to be contacted; and

b) a directly accessible motor is a motor that:

- 1) can be contacted without opening or removing any part; or

2) is located so as to be accessible to contact.

6.7 Terminals, wires, or other current-carrying parts shall not be exposed by the removal of covers:

- a) that open for cleaning and do not require the use of a tool (eg, screwdriver) for opening or removal; or
- b) for coin or ticket collection on coin-, ticket-, or card-operated appliances.

6.8 With reference to the requirements in [6.1](#) and [6.2](#), insulated brush caps are not required to be additionally enclosed.

6.9 The requirements in [6.1](#) and [6.2](#) apply to the back of a freestanding appliance and to the back and sides of a recessed appliance. For the bottom of a freestanding or recessed appliance if the front, sides, and back of the appliance can be positioned no more than 38.1 mm (1.5 in) above the surface upon which the appliance rests, the tip of the probe, illustrated in [Figure 6.1](#), shall be inserted up to 150 mm inside the plane of the opening created between the bottom edge of the appliance and the supporting surface. If the distance between the bottom edge of the appliance and supporting surface is greater than 38.1 mm, accessibility through the opening created between the bottom of the appliance and the supporting surface shall be evaluated in accordance with [Table 6.1](#).

6.10 The accessibility of protective devices shall be determined by the following requirements.

6.11 A protective device, such as a fuse, the functioning of which requires renewal or replacement, shall be in a readily accessible location.

6.12 A protective device shall be wholly inaccessible from outside the appliance without opening a door or cover.

NOTE: The operating handle of a circuit breaker, the operating button of a manually operable motor protector, and similar parts may project outside the appliance enclosure.

6.13 A door or cover of an enclosure shall be hinged or otherwise attached in an equivalent manner if it gives access to any overload-protective device, the functioning of which requires renewal, or if it is necessary to open the cover in connection with the operation of the protective device.

6.14 Means shall be provided for holding the door or cover over a fuseholder in a closed position, and the door or cover shall be tight fitting.

6.15 The construction and installation of a fuseholder shall be such that an uninsulated current-carrying part other than the screw shell or clips will not be exposed to contact by persons removing or replacing fuses.

7 Starting of Motor-Operated Appliances

7.1 An appliance shall start and operate normally on a circuit protected by an ordinary (not a time-delay) fuse.

7.2 For the test in [7.1](#), a time-delay fuse shall be employed if the appliance.

- a) will start and operate normally on a circuit protected by a time-delay fuse; and
- b) is marked in accordance with [5.1.2.2](#).

7.3 To determine whether an appliance complies with the requirements in [7.1](#), the appliance shall be connected to a supply circuit of the rated test voltage and rated frequency. The appliance shall be started three times with the control(s) set to that part of the cycle resulting in the highest starting current. The appliance shall be allowed to come to full speed after each start, and to come to rest between successive starts. The performance is unacceptable if the fuse opens or an overload protector provided as part of the appliance trips.

8 Power Input and Current

8.1 The current input shall not be more than 110 % of the marked rating with the appliance connected to a supply circuit of rated voltage and frequency. During a representative period, such as filling with water, washing, rinsing, water extraction, spinning or braking, where the power input is the highest, the current input is the arithmetic mean value of that representative period.

8.2 An appliance provided with a dedicated receptacle shall be tested with the receptacle loaded with the intended ampere load. A pedestal or drawer-type clothes washer may be used for this load, or a simulated load may be used.

8.3 Unless marked in accordance with [5.1.2.13](#), the rating of an appliance that is fastened or otherwise secured at a specific location and intended to be connected to a supply circuit protected by a 15 A or a 20 A overcurrent-protective device shall not exceed 50 % of the supply-circuit-current rating.

9 Heating

9.1 General

9.1.1 An appliance shall be tested as described in [9.2](#) to [9.11](#), and shall not:

- a) reach a temperature, at any point, high enough to result in a risk of fire or to damage any material used in the appliance; or
- b) exceed the temperature rises specified in [Table 9.1](#).

Table 9.1
Maximum Acceptable Temperature Rises

Location		°C (°F)
1	Varnished-cloth insulation	60 (140)
2	Fuses	
	a) Class J, L, T and CC	
	1) tube	100 (212)
	2) ferrule or blade	85 (185)
	b) Others	65 ^a (149 ^a)
3	Fibre employed as electrical insulation	65 (149)
4	Wood or other combustible material, including the inside surfaces of the test enclosure and the surface supporting the appliance	65 (149)
5	Class A insulation systems on coil windings of an ac motor having a frame diameter of more than 178 mm, a dc motor, and a universal motor in	b, c, d
	a) an open motor	

Table 9.1 Continued on Next Page



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Table 9.1 Continued

Location		°C (°F)
	1) thermocouple method	
	2) resistance method	65 (149)
	b) a totally enclosed motor	75 (167)
	1) thermocouple method	70 (158)
	2) resistance method	80 (176)
6	Phenolic composition employed as electrical insulation or as a part, the malfunction of which could result in a risk of injury to persons	125 ^e (257 ^e)
7	Insulated wires and cords	35 ^{e,f} (95 ^{e,f})
8	At any point within a terminal box or wiring compartment of a permanently connected appliance	35 (95)
9	Sealing compound	40 less than melting point
10	Capacitors	
	a) electrolytic	40 ^g (104 ^g)
	b) other types	65 ^h (149 ^h)
11	Class A insulation systems on coil windings of an ac motor having a frame diameter of 178 mm or less, not including a universal motor in	b, c, d
	a) an open motor; thermocouple or resistance method	75 (167)
	b) a totally enclosed motor; thermocouple or resistance method	80 (176)
12	Class 130 insulation systems, other than as specified in 13 and 14(a); thermocouple method	80 (176)
13	Class B insulation systems on coil windings of an ac motor having a frame diameter of more than 178 mm, of a dc motor, and of a universal motor in	b, c, d
	a) an open motor	
	1) thermocouple method	85 (185)
	2) resistance method	95 (203)
	b) a totally enclosed motor	
	1) thermocouple method	90 (194)
	2) resistance method	100 (212)
14	Class B insulation systems on coil windings of an ac motor having a frame diameter of 178 mm or less, not including a universal motor in	b, c, d
	a) an open motor and on vibrator coils; thermocouple or resistance method	95 (203)
	b) a totally enclosed motor; thermocouple or resistance method	100 (212)
15	Class F insulation systems on coil windings of an ac motor having a frame diameter of more than 178 mm, of a dc motor, and of a universal motor in	d
	a) an open motor	
	1) thermocouple method	110 (230)
	2) resistance method	120 (248)
	b) a totally enclosed motor	
	1) thermocouple method	115 (239)
	2) resistance method	125 (257)
15A	Class F insulation systems on coil windings of an ac motor having a frame diameter of 178 mm or less, not including a universal motor,	d
	a) an open motor thermocouple or resistance method	120 (248)

Table 9.1 Continued on Next Page



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