# UL 2158

## STANDARD FOR SAFETY

## Electric Clothes Dryers

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UL Standard for Safety for Electric Clothes Dryers, UL 2158

Fourth Edition, Dated December 18, 2015

***Summary of Topics***

***The Fourth Edition of the Standard for Electric Clothes Dryers, UL 2158, has been issued to reflect the latest ANSI approval date, and to incorporate the proposals dated August 28, 2015.***

The new and revised requirements are substantially in accordance with Proposal(s) on this subject dated August 28, 2015.

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CSA Group
CSA C22.2 No. 112-15
Tenth Edition

Underwriters Laboratories Inc.
UL 2158
Fourth Edition

# Electric Clothes Dryers

December 18, 2015

ANSI/UL 2158-2015

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# PREFACE

This is the harmonized CSA Group and UL Standard for *Electric Clothes Dryers*. It is the tenth edition of CSA C22.2 No. 112 and the fourth edition of UL 2158. This edition of CSA C22.2 No. 112 supersedes the previous edition published in 2014. This UL edition supersedes the previous edition published in 2014.

The major differences between this edition and the previous edition include the addition of requirements for DC Dielectric Test Potential, updates to the safety related controls to include new technologies, addition of requirements for heat pump dryers, modification to the requirements of a high limit control, addition of requirements for a “cool down” period, clarification of the requirements for HB materials, modification of the accessibility requirements between the bottom of the appliance and the floor, addition of test procedures due to the breakdown of belts and interruption of water supply, addition of test for polymeric electrical connections (Nichrome Wire Test), addition of an alternative test procedure for electronic controls, addition of plumbing requirements from the withdrawn AHAM HLW-2PR document previously referenced and the clarification that the term “live parts” throughout the document is intended to mean “uninsulated live parts” or “live parts”.

This harmonized Standard was prepared by CSA Group and Underwriters Laboratories Inc. (UL). The efforts and support of the Association of Home Appliance Manufacturers (AHAM) are gratefully acknowledged.

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

This Standard was reviewed by the CSA Subcommittee on Clothes-Drying Machines, 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.

This standard has been approved by the American National Standards Institute (ANSI) as an American National Standard.

### 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.

### 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

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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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# Electric Clothes Dryers

## 1 Scope

1.1 This Standard applies to electric clothes dryers intended to be used in nonhazardous locations in accordance with the *Canadian Electrical Code*, Part I (CE Code, Part I) 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 dryer″ 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 households and for commercial purposes, including appliances provided with coin-, ticket-, or card-operated mechanisms, laundry centers and combination washer-dryers. This Standard applies to tumbling clothes dryers and non-tumbling clothes dryers, such as drying cabinets, as well as both vented clothes dryers and non-vented clothes dryers, such as condensation-type and heat pump clothes dryers.

1.3 This Standard does not apply to industrial and institutional type appliances. Industrial or institutional appliances are covered under the scope of *Electric Commercial Clothes-Drying Equipment,* UL 1240.

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

## 2 Normative References

2.1 Products covered by this Standard shall comply with the referenced installation codes and standards noted in this clause.

2.2 Where reference is made to any Standards, such reference shall be considered to refer to the latest editions and revisions thereto available at the time of printing unless otherwise specified.

**CSA Group**

B64.1.1-11
*Atmospheric Vacuum Breakers (AVB)*

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. 0.2-93 (R2013)
*Insulation Coordination*

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

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C22.2 No. 0.5-1982 (R2012)
*Threaded Conduit Entries*

C22.2 No. 0.8-12
*Safety Functions Incorporating Electronic Technology*

C22.2 No. 0.15-15
*Adhesive Labels*

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

C22.2 No. 14-13
*Industrial Control Equipment*

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

C22.2 No. 55-15
*Special Use Switches*

C22.2 No. 66.1-06 (R2011)
*Low-voltage Transformers – Part 1: General Requirements*

C22.2 No. 66.2-06 (R2011)
*Low-voltage Transformers – Part 2: General Purpose Transformers*

C22.2 No. 66.3-06 (R2011)
*Low-voltage Transformers – Part 3: Class 2 and Class 3 Transformers*

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

CAN/CSA-C22.2 No. 94.1-07 (R2012)
*Enclosures for Electrical Equipment, Non-Environmental Considerations*

C22.2 No. 100-14
*Motors and Generators*

C22.2 No. 140.2-96 (R2011)
*Hermetic Refrigerant Motor-Compressors*

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

C22.2 No. 169-97 (R2012)
*Electric Clothes Washing Machines and Extractors*

C22.2 No. 177-13
*Clock-Operated Switches*

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

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

CAN/CSA-C22.2 No. 198.1-06 (R2013)
*Extruded Insulating Tubing*

CAN/CSA-C22.2 No. 223-M91 (R2013)
*Power Supplies with Extra-Low-Voltage Class 2 Outputs*

C22.2 No. 236-11
*Heating and Cooling Equipment*

C22.2 No. 248.1-11
*Low-voltage fuses – Part 1: General requirements*

CAN/CSA-C22.2 No. 60335-1:11
*Safety of Household and Similar Appliances – Part 1: General Requirements*

CAN/CSA-C22.2 No. 60335-2-34-13
*Safety of Household and Similar Electrical Appliances - Part 2-34: Particular Requirements for Motor-compressors*

CAN/CSA-C22.2 No. 60065-03 (R2012)
*Audio, Video and Similar Electronic Apparatus – Safety Requirements*

CAN/CSA C22.2 No. 60950-1-07 (R2012)
*Information Technology Equipment Safety Part 1: General Requirements*

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

CAN/CSA-C361-12
*Test Method for Measuring Energy Consumption and Drum Volume of Electrically Operated Household Tumble-Type 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-E60730-1-13
*Automatic Electrical Controls for Household and Similar Use; Part 1: General Requirements*

CAN/CSA-E60730-2-9-01 (R2011)
*Automatic Electrical Controls for Household and Similar Use; Part 2–9: Particular Requirements for Temperature Sensing Controls*

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

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**UL Standards**

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

UL 157
*Gaskets and Seals*

UL 244A
*Solid-State Controls for Appliances*

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

UL 508
*Industrial Control Equipment*

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

UL 514A
*Metallic Outlet Boxes*

UL 723
*Tests for Surface Burning Characteristics of Building Materials*

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

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

UL 746E
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UL 1694
*Tests for Flammability of Small Polymeric Component Materials*

UL 1995
*Heating and Cooling Equipment*

UL 1998
*Software in Programmable Components*

UL 2157
*Electric Clothes Washing Machines and Extractors*

UL 2158A
*Clothes Dryer Transition Duct*

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UL 5085-1
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*Low-Voltage Transformers – Part 3: Class 2 and Class 3 Transformers*

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*Safety of Household and Similar Appliances – Part 1: General Requirements*

UL 60335-2-34
*Safety of Household and Similar Electrical Appliances, Part 2-34: Particular Requirements for Motor-Compressors*

UL 60384-14
*Safety Requirements for 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 60730-2-7
*Automatic Electrical Controls for Household and Similar Use; Part 2: Particular Requirements for Timers and Time Switches*

UL 60730-2-9
*Automatic Electrical Controls for Household and Similar Use; Part 2: Particular Requirements for Temperature Sensing Controls*

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

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

**ANSI[1] Standards**

ANSI/ASTM[2] E230/E230M
*Standard Specification and Temperature-Electromotive Force (emf) Tables for Standardized Thermocouples*

ANSI/ASSE[3] 1001
*Performance Requirements for Atmospheric Type Vacuum Breakers*

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ANSI/NFPA[4] 70
*National Electrical Code*

**ASTM[2] Standard**

B344
*Standard Specification for Drawn or Rolled Nickel-Chromium and Nickel-Chromium-Iron Alloys for Electrical Heating Elements*

**Government of USA**

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

*Appendix D to Subpart B of Part 430, Uniform Test Method for Measuring the Energy Consumption of Clothes Dryers*

**IEC[5] Standards**

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

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

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

61000-4-2-08
*Electromagnetic compatibility (EMC) – Part 4-2: Testing and measurement techniques – Electrostatic discharge immunity test*

61000-4-3-10
*Electromagnetic compatibility (EMC) – Part 4-3: Testing and measurement techniques – Radiated, radio-frequency, electromagnetic field immunity test*

61000-4-4-12
*Electromagnetic compatibility (EMC) – Part 4-4: Testing and measurement techniques – Electrical fast transient/burst immunity test*

61000-4-5-14
*Electromagnetic compatibility (EMC) – Part 4-5: Testing and measurement techniques – Surge immunity test*

61000-4-6-15
*Electromagnetic compatibility (EMC) – Part 4-6: Testing and measurement techniques – Immunity to conducted disturbances, induced by radio-frequency fields*

61000-4-11-10
*Electromagnetic compatibility (EMC) – Part 4-11: Testing and measurement techniques – Voltage dips, short interruptions and voltage variations immunity tests*

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61000-4-13-09
*Electromagnetic compatibility (EMC) – Part 4-13: Testing and measurement techniques – Harmonics and interharmonics including mains signalling at a.c. power port, low frequency immunity tests*

**ULC[6] Standards**

CAN/ULC-S102-10
*Test for Surface Burning Characteristics of Building Materials and Assemblies*

[1]American National Standards Institute.

[2]American Society for Testing and Materials.

[3]American Society of Sanitary Engineering.

[4]National Fire Protection Association.

[5]International Electrotechnical Commission.

[6]Underwriters Laboratories of Canada.

## 3 Definitions

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

3.1.1 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.

3.1.2 Appliance, household type – an appliance commonly used in, but not restricted to, a single-family dwelling.

3.1.3 Appliance, permanently connected – an appliance that is connected to the electrical supply by means other than a supply cord and an attachment plug.

3.1.4 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.

3.1.5 Appliance, stationary – any appliance that is intended to be fastened in place or located in a dedicated space.

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3.1.6 Appliance, wall-insert – an appliance intended to be mounted permanently in a wall or other vertical surface of a building or cabinet.

3.1.7 Automatic – an appliance is considered to be automatically controlled if one or more of the following condition 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 can be intentionally delayed beyond normal, conventional starting; or

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

3.1.8 Baffle – a paddle inside the drum that lifts and tumbles clothes.

3.1.9 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 can serve as a portion of an enclosure and as a functional part.

3.1.10 Built-in appliance – a stationary appliance that is constructed to be permanently installed in a cabinet or wall.

3.1.11 Circuit, low-voltage – A circuit having limited voltage and energy capacity supplied by:

a) a primary battery having an output 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.**

3.1.12 Circuit, line-voltage – A circuit having characteristics in excess of those of a low-voltage circuit.

3.1.13 Combination washer-dryer – A machine utilized to wash and dry clothes within the same compartment.

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3.1.14 Control, operating – Control, the operation of which starts or regulates the appliance during normal operation.

3.1.15 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.**

3.1.16 Cool down period – Final part of the tumble dryer cycle where the drum is continuously rotated with reduced power to the heating element and with air circulation in order to reduce the possibility of spontaneous combustion of the clothes load.

**Note: Continuous rotation does not mean rotation in same direction if the intended operation is to reverse direction in normal use.**

3.1.17 Current carrying parts – Parts carrying current during normal or abnormal operation in line voltage circuits.

**Note: With respect to separation of circuits, Clause 20.3, this term refers to parts in both low-voltage and line-voltage circuits.**

3.1.18 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.

3.1.19 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).

3.1.20 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 7.2(a)(1) or (2).

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

3.1.21 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

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b) does not comply with Clause 7.2(a)(1) or (2);

when enclosure barriers, if provided, are removed.

A polymeric supplementary enclosure is to be evaluated as an enclosure.

3.1.22 Field wiring terminal – A terminal to which a wire can 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, are provided as a part of the appliance.

3.1.23 Flame cylinder – A projection of a vertical cylinder having a diameter of 20mm and a height of 50mm.

3.1.24 Heater assembly – An assembly of

a) a heating element;

b) electrical insulation (e.g., refractory, mica, magnesium oxide); and

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

3.1.25 Heating element – The actual electrical conducting medium that is intended to be heated by an electric current.

3.1.26 Laundry center – A machine utilized to wash and dry clothes in separate compartments.

3.1.27 Live part – Conductor or conductive part intended to be energized in normal use, including a neutral conductor.

3.1.28 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 5V flame test in CAN/CSA-C22.2 No. 0.17 and the 127 mm flame test in UL 746C.

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3.1.29 Part, decorative – A material used for no other function except appearance. A removable polymeric control knob or lever can be considered a decorative part.

3.1.30 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.

3.1.31 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.

3.1.32 Combination temperature-regulating and limiting device – 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.

3.1.33 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.

3.1.34 Temperature-regulating device – A device that:

a) regulates temperature; and

b) functions during normal operation of the appliance.

3.1.35 Tumble dryer – An appliance in which textile material is dried by tumbling in a rotating drum through which heated air is blown or drawn.

3.1.36 Tumble dryer, vented type – A tumble dryer in which the heated air is then exhausted from the appliance.

3.1.37 Tumble dryer, condensation type – A tumble dryer in which the air used for the drying process is dehumidified by cooling.

3.1.38 Within 3 mm – Falling within the dotted boundary formed by the flame cylinder with hemispherical ends, as shown in Figure 10.

3.1.39 Vulcanized fibre – A material that, if 0.8 mm thick minimum and acceptably mounted and secured, could be used as an enclosure barrier, but not as an enclosure or supplementary enclosure.

## 4 General Requirements

4.1 Combination washer-dryers and laundry centers shall comply with this Standard and also with the requirements of the Binational Standard CSA C22.2 No. 169 and UL 2157. Where more than one Standard applies, preference shall be given to that Standard considered to require the highest standard of construction or testing.

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

4.3 In Canada, the general requirements applicable to this Standard are given in the latest version of CAN/CSA C22.2 No.0, General requirements – Canadian Electrical Code, Part II.

## 5 General Conditions for the Tests

### 5.1 Voltage and frequency

5.1.1 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).

5.1.2 The test voltage ($V_t$) used during the heating tests of Clause 10 and the abnormal operation tests of Clause 16 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 Clause 5.1.1) that are different than their rated (marked) inputs.

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

*in which:*

*$W_t$ is the calculated heating circuit input in, W;*

*$W_m$ is the heating element rated (marked) input in, W;*

*$V_s$ is the supply circuit voltage specified in Clause 5.1.1; and*

*$V_m$ is the heating element rated (marked) input in, V.*

5.1.3 If it is necessary to increase the appliance test voltage beyond the voltage as specified in Clause 5.1.1, the motor shall be supplied from a separate circuit not exceeding the nominal system voltage (e.g., 120 V, 240 V).

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## 5.2 Test load

5.2.1 Unless otherwise specified, the test load shall:

a) consist of cloths as described in Clause 5.3; and

b) be soaked in water, which shall be extracted as it would be in normal use just before the cloths are placed in the appliance; or

c) be wet until they have absorbed a mass of water equal to the dry mass of the cloths.

5.2.2 The dry mass of the test cloths shall be the greater of:

a) the maximum load recommended by the manufacturer; or

b) 0.032 kg/L of clothes-drum volume. The clothes-drum volume shall be determined by a measurement or calculation method. Whenever a referee method is necessary to determine clothes-drum volume, the measurement shall be made in accordance with the method described in CAN/CSA C361 or Paragraph 3.1 of Appendix D to Subpart B of 10CFR430.

## 5.3 Test fabric

5.3.1 The fabric used for tests shall be bleached, preshrunk cotton suiting, having a warp of 21 – 23 threads per cm and a filling of 18 – 20 threads per cm. 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.

## 5.4 Thermocouples

5.4.1 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 the ANSI/ASTM E230/E230M. Whenever referee temperature measurements by thermocouples are necessary, thermocouples consisting of 30 AWG (0.05 $mm^2$) iron and constantan wires and a potentiometer-type indicating instrument shall be employed.

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### 5.5 Laundry detergent

5.5.1 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.

### 5.6 Cheesecloth for heating and abnormal tests

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

### 5.7 Test temperature

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

## 6 Marking and Instructions

### 6.1 Marking

***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 B lists acceptable French 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.*

6.1.1 General

6.1.1.1 A marking that is required to be permanent shall be moulded, die-stamped, paint-stenciled, 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.

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

6.1.1.3 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.

6.1.1.4 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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6.1.2 Appliance markings

6.1.2.1 An appliance shall be rated in volts and in amperes or watts. 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).

6.1.2.2 An appliance shall be provided with a schematic circuit diagram, attached or secured to the appliance in a location that is easily accessible for servicing, such as the back panel, the toe panel, the location of the wiring terminals, the console, or the control housing.

6.1.2.3 An appliance, as mentioned in Clause 8.2, 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″.

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

6.1.2.5 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.

6.1.2.6 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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6.1.2.7 Clothes dryers employing supply terminals intended for use with supply conductors rated above 60°C shall be marked on the exterior adjacent to the supply entry with the following or equivalent wording:

″USE SUPPLY CONDUCTORS RATED___°C (___°F).″

The marking shall include both °C and °F. The temperature rating of the conductors used in the heating test (Clause 10) shall be placed in the marking.

6.1.2.8 An appliance shall be clearly and permanently marked with a warning that the appliance is intended for use only with fabrics that have been washed with water as a cleaning agent.

6.1.2.9 A warning consisting of the following shall be included in the permanent marking on an appliance:

a) for an appliance that includes a no-heat setting in its controls:

″WARNING – To reduce the risk of fire, do not use heat when drying articles containing foam rubber or similarly textured rubber-like materials″;

or the marking given in item (b).

b) for any other appliance:

″WARNING – To reduce the risk of fire, do not dry articles containing foam rubber or similarly textured rubber-like materials.″

6.1.2.10 An appliance that provides means for collection of dust and lint accumulation shall be plainly and permanently marked to indicate the necessity of keeping the lint trap cleaned out.

6.1.2.11 The markings mentioned in Clauses 6.1.2.8 to 6.1.2.10 shall be separated from other markings to reduce the likelihood of their being overlooked.

6.1.2.12 An appliance shall be permanently marked:

a) at or near the exhaust opening of the appliance with the word ″CAUTION″ and the following statement or the equivalent: ″Risk of Fire. A clothes dryer produces combustible lint. The dryer must be connected to an exhaust to the outdoors. See Installation Instructions″; and

b) on a surface readily visible to the user after installation of the appliance with the word ″CAUTION″ and the following statement or the equivalent: ″Risk of Fire. A clothes dryer produces combustible lint. The dryer must be connected to an exhaust to the outdoors. Regularly inspect the outdoor exhaust opening and remove any accumulation of lint around the outdoor exhaust opening and in the surrounding area.″

6.1.2.13 The requirements in 6.1.2.12 do not apply to condensation type tumble dryers.

6.1.2.14 For a vented laundry center or vented combination washer-dryer, the words ″A clothes dryer,″ where used in Clause 6.1.2.12, shall be changed to ″The dryer operation of a laundry center (or combination washer-dryer).″

In the markings, where the words ″clothes dryer″ appear more than once, the word ″appliance″ may be substituted for the subsequent use of the words ″clothes dryer.″

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6.1.2.15 If an appliance employs a non-current-carrying metal part that is not grounded as provided in Clause 24.1.4, 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: _____.″ (A list of ungrounded parts shall be inserted.)

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.

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

6.1.2.17 An appliance provided with instructions for any type of user maintenance other than cleaning a lint trap 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 other than cleaning the lint trap. 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.

**Note: An appliance not equipped with a lint trap may omit the reference to a lint trap in the required marking.**

6.1.2.18 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, trade name, 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.

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6.1.2.19 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.

6.1.2.20 A stationary appliance employing an attachment plug in accordance with Clause 22.3.3 shall be marked in the installation instructions, markings, or by a hang tag or equivalent: ″Connect To Individual Branch Circuit.″

6.1.2.21 A cord-connected appliance shall be clearly and permanently marked in a location that will be visible after the appliance has been installed as intended. The marking shall include a statement indicating the size of the branch circuit to which the appliance is intended to be connected and the maximum ampere rating of the overcurrent-protective device to be used in that branch circuit. (See Clause 9.)

**Note: A marking on the back of the appliance is acceptable.**

6.1.2.22 With reference to Clause 9.2, 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.

6.1.2.23 An appliance that does not comply with Clause 19.5.7 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.″

6.1.2.24 The following marking shall appear on all 120/208 V household clothes dryers:

″WARNING: DO NOT USE ON 120/240 V SUPPLY.″

The marking shall be located adjacent to the supply entry and shall be in contrasting letters not less than 6 mm high.

6.1.2.25 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.

6.1.2.26 If an appliance can be readily adapted, upon installation, for connection to a supply circuit of either of two different voltages, complete instructions, including identification of terminals, for making the connections for the different voltages shall be included in the permanent marking of the appliance.

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6.1.2.27 If an appliance is for use either on a 120 V, 2-wire circuit or on a 120/240 V, 3-wire circuit, depending on the connections to be made when the appliance is installed, there shall be a warning marking on the appliance stating that non-current-carrying metal parts are not to be connected to the grounded terminal when the appliance is used on the lower-voltage circuit.

6.1.2.28 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 Clause 6.1.2.29; 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 Clause 6.1.2.30.

6.1.2.29 With reference to the requirement in Clause 6.1.2.28(a), the minimum supply-circuit conductor ampacity shall be based on the maximum input in accordance with Clause 9.

6.1.2.30 With reference to the requirement in Clause 6.1.2.28(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 Clause 21.8.2.

6.1.2.31 An appliance intended for permanent connection shall be marked to indicate the wiring system or systems for which it is acceptable. The marking shall be located so that it will be visible when power-supply connections to the appliance are being made.

**Note: An appliance intended for permanent connection to a rigid metal conduit or armoured cable wiring system need not be marked.**

6.1.2.32 An appliance constructed in accordance with Clause 22.2.7 shall be marked, in a location visible during connection to the supply circuit, with the word ″WARNING″ and the following statement:

″To reduce the risk of electric shock or fire, do not use a flexible power-supply cord with this appliance.″

6.1.2.33 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″.

6.1.2.34 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.

6.1.2.35 A pressure wire connector intended for connection of an equipment-grounding conductor shall be identified by being marked ″G″, ″GR″, ″GND″, ″Ground″, or ″Grounding″; by the grounding symbol illustrated in Figure 8, or a similar marking; or by a marking on the wiring diagram provided on the appliance.

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6.1.3 Dryers with neutral-link grounding

**Note: The CE Code, Part I, does not permit the use of neutral-link grounding on products intended to be installed in Canada.**

6.1.3.1 If a neutral-grounding link as described in Clause 24.2 is provided, instructions for the proper use of the link, which may be in the form of a circuit diagram, shall be provided on the appliance. If an appliance is for use either on a 120 V, 2-wire circuit or on a 120/240 V, 3-wire circuit, depending on the connections to be made when the appliance is installed, there shall be a warning marking on the appliance stating that non-current-carrying metal parts are not to be connected to the grounded terminal when the appliance is used on the lower voltage circuit.

6.1.3.2 An appliance intended for permanent connection to the power supply, and for which the connection between the grounding link and the grounded terminal is made at the factory in accordance with the requirements in Clause 24.2, shall be legibly marked at a location visible during installation of the appliance with the word ″WARNING″ and the following statement or the equivalent:

″Risk of Electric Shock: Appliance grounded to neutral conductor through a link. Grounding through the neutral conductor is prohibited for (1) new branch-circuit installations, (2) mobile homes, (3) recreational vehicles, and (4) areas where local codes prohibit grounding through the neutral conductor. For installations where grounding through the neutral conductor is prohibited: (1) disconnect the link from the neutral, (2) use grounding terminal or lead to ground appliance, and (3) connect neutral terminal or lead to branch-circuit neutral in usual manner (where the appliance is to be connected by means of a cord kit use 4-conductor cord for this purpose).″

6.1.3.3 An appliance intended to be connected to the power supply by a flexible cord and attachment plug, and for which the connection between the grounding link and the grounding terminal is made at the factory in accordance with the requirements of Clause 24.2, shall be legibly marked at a location visible during installation of the appliance with the word ″WARNING″ and the following or equivalent:

″Risk of Electric Shock: Appliance grounded to neutral conductor through a link. Grounding through the neutral conductor is prohibited for (1) new branch-circuit installations, (2) mobile homes, (3) recreational vehicles, and (4) areas where local codes prohibit grounding through the neutral conductor. For installations where grounding through the neutral conductor is prohibited, the 3-conductor cord or cable assembly must be replaced by a 4-conductor cord or cable assembly. See manufacturer's instructions.″

(See also Clause 6.2.3.6.)

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6.1.4 Wall-mounting kits and stands

6.1.4.1 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.

6.1.4.2 The catalogue number mentioned in Clause 6.1.4.1 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.

**6.2 Instruction manual**

6.2.1 General

6.2.1.1 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 in accordance with Clause 6.2.2;

b) installation instructions in accordance with Clause 6.2.3;

c) operating instructions in accordance with Clause 6.2.4; and, if applicable

d) user-maintenance instructions in accordance with Clause 6.2.5.

6.2.1.2 The instructions required by Clause 6.2.1.1 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.

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6.2.1.3 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 can be present during the repair and after the repair has been completed.

6.2.1.4 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.

6.2.1.5 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 appropriate.**

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

6.2.2.1 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.

6.2.2.2 The heading ″IMPORTANT SAFETY INSTRUCTIONS″ or the equivalent shall precede the list of instructions required in Clause 6.2.2.4, and the statement ″SAVE THESE INSTRUCTIONS″ or the equivalent shall either precede or follow the list (see Clause 6.2.1.4).

6.2.2.3 The instructions shall include the appropriate instructions from Clauses 6.2.2.4 and 6.2.2.5.

6.2.2.4 The instructions required by Clause 6.2.2.1 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 Clause 6.2.1.4).

**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 dry 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 allow children to play on or in the appliance. Close supervision of children is necessary when the appliance is used near children.

4) Before the appliance is removed from service or discarded, remove the door to the drying compartment.

5) Do not reach into the appliance if the drum is moving.

6) Do not install or store this appliance where it will be exposed to the weather.

7) Do not tamper with controls.

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8) 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.

9) Do not use fabric softeners or products to eliminate static unless recommended by the manufacturer of the fabric softener or product.

10) Do not use heat to dry articles containing foam rubber or similarly textured rubber-like materials.

11) Clean lint screen before or after each load.

12) Keep area around the exhaust opening and adjacent surrounding areas free from the accumulation of lint, dust, and dirt.

13) The interior of the appliance and exhaust duct should be cleaned periodically by qualified service personnel.

14) Do not place items exposed to cooking oils in your dryer. Items contaminated with cooking oils may contribute to a chemical reaction that could cause a load to catch fire. To reduce the risk of fire due to contaminated loads, the final part of a tumble dryer cycle occurs without heat (cool down period). Avoid stopping a tumble dryer before the end of the drying cycle unless all items are quickly removed and spread out so that the heat is dissipated.

**SAVE THESE INSTRUCTIONS**

6.2.2.5 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 Clause 6.2.2.4. (See Clause 6.2.1.4.)

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 service representative or personnel 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:

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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.

6.2.3 Installation instructions

6.2.3.1 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 (see Clause 6.2.1.4).

6.2.3.2 The cover or first page of the installation instructions shall include the following wording or the equivalent:

″Install the clothes dryer according to the manufacturer's instructions and local codes.″

6.2.3.3 The cover or first page of the installation instructions, for vented type tumble dryers, shall include:

a) the safety alert symbol (triangle with exclamation mark);

b) the word ″WARNING″ in black letters not less than 6.4 mm high on an orange or white background; and

c) the following wording or equivalent:

″WARNING – Risk of Fire″

″Clothes dryer installation must be performed by a qualified installer.″

″Do not install a clothes dryer with flexible plastic venting materials. If flexible metal (foil type) duct is installed, it must be of a specific type identified by the appliance manufacturer as suitable for use with clothes dryers. Flexible venting materials are known to collapse, be easily crushed, and trap lint. These conditions will obstruct clothes dryer airflow and increase the risk of fire.″

″To reduce the risk of severe injury or death, follow all installation instructions.″

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"Save these instructions."

6.2.3.4 The installation instructions for vented type tumble dryers shall also include statements concerning how the appliance is to be exhausted. The instructions shall state:

a) that the appliance shall not be exhausted into a chimney, a wall, a ceiling, an attic, a crawl space, or a concealed space of a building;

b) that only rigid or flexible metal duct shall be used for exhausting;

c) in Canada, that only those foil-type flexible ducts, if any, specifically identified for use with the appliance by the manufacturer shall be used. In the United States, that only those foil-type flexible ducts, if any, specifically identified for use with the appliance by the manufacturer and that comply with the UL 2158A, shall be used;

d) in Canada, that the exhaust duct shall be 102 mm in diameter. In the United States, the required exhaust duct diameter;

e) the maximum duct length and number of bends;

f) that the total length of flexible metal duct shall not exceed 2.4 m; and

g) that the duct shall not be assembled with screws or other fastening means that extend into the duct and catch lint.

**Note: Exhausting refers to removal of moist air from the drying compartment to the environment through an opening in the appliance housing.**

6.2.3.5 Where the appliance installation instructions indicate that the appliance is not restricted from being connected by means of a power-supply cord kit, the instructions shall indicate that only a power-supply cord kit rated _____ V min, _____ A, and marked for use with clothes dryers shall be used. The specified ampere rating for the cord shall be 30, 40, or 50 A as applicable. The instructions shall also specify:

a) the number of conductors (3 or 4);

b) the type of terminations (tinned leads, closed-loop terminals, open-end spade lugs with upturned ends, or the like) that the cord kit is to employ; and

c) that only a 4-conductor cord shall be used when the appliance is installed in a location where grounding through the neutral conductor is prohibited. Grounding through the neutral conductor is prohibited for (1) new branch-circuit installations, (2) mobile homes, (3) recreational vehicles, and (4) areas where local codes prohibit grounding through the neutral conductors.

6.2.3.6 The installation instructions for an appliance that is marked with the warning specified in Clause 6.1.3.3 shall include explicit instructions for changing from a 3-conductor cord or cable assembly to a 4-conductor cord or cable assembly when the appliance is to be used in a location where grounding through the neutral conductor is prohibited. Grounding through the neutral conductor is prohibited for (1) new branch-circuit installations, (2) mobile homes, and (3) recreational vehicles, and (4) areas where local codes prohibit grounding through the neutral conductor. The instructions shall specify the:

a) size of the conductors and the type of cord or cable to be used;

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b) size and the configuration of attachment plug to be used; and

c) means of strain relief to be used.

With regard to cord replacement, and except as specified in Clause 6.2.3.7, the instructions shall:

1) indicate that only a 4-conductor power-supply cord kit rated _____ V min, _____ A, and marked for use with clothes dryers shall be used; and

2) specify the type of terminations (tinned leads, closed-loop terminals, open-end spade lugs with upturned ends, or similar terminations) that the cord kit is to employ.

The specified ampere rating for the cord shall be 30, 40, or 50 A as applicable.

6.2.3.7 For an appliance equipped with a factory-connected flexible cord that leaves the appliance enclosure through an opening that is not sized in accordance with Clause 22.3.5, the cord replacement instructions specified in Clause 6.2.3.5 shall identify the specific cord kit that is to be used. The identification shall include a part number or the name of the cord-kit manufacturer and a distinctive catalogue number.

6.2.3.8 The installation instruction for 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.

6.2.3.9 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 Clause 24.1.4 shall include the following or 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: ____.″ A list of ungrounded parts shall be inserted.

6.2.3.10 The installation instructions of an appliance that does not comply with Clause 19.5.7 shall include the following or equivalent:

″To reduce the risk of fire, this appliance must be fastened or otherwise secured to an uncovered concrete floor.″

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6.2.4 Operating instructions

6.2.4.1 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 Clause 6.2.1.4).

6.2.4.2 The operating instructions 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: The statement in item (b) may be omitted if the IMPORTANT SAFETY INSTRUCTIONS required by Clauses 6.2.2.1 through 6.2.2.5 are included in the operating instruction manual immediately prior to the operating instructions.**

6.2.5 User-maintenance instructions

6.2.5.1 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.

6.2.5.2 The user-maintenance instructions shall be preceded by the heading ″USER-MAINTENANCE INSTRUCTIONS″ or the equivalent (see Clause 6.2.1.4).

6.2.5.3 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 Clause 24.1.4 shall include the following or 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: ___.″(A list of ungrounded parts shall be inserted.)

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6.2.6 Appliance stand and wall-mounting kit instructions

6.2.6.1 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 information so that the kit or stand can be installed as intended.

6.2.6.2 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 Clause 6.2.1.4).

## 7 Protection Against Accessibility to Current-Carrying Parts

7.1 Where an opening in an enclosure has a minor dimension (see Clause 7.5):

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 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 1, to reduce the likelihood of electric shock resulting from unintentional contact with such a part or wire.

7.2 A motor with an integral enclosure that has an opening with a minor dimension (see Clause 7.5):

a) less than 19.1 mm shall be acceptable, if:

1) film-coated wire cannot be contacted by the probe illustrated in Figure 2;

2) in a directly accessible motor (see Clause 7.6), an uninsulated current-carrying part cannot be contacted by the probe illustrated in Figure 3; and

3) in an indirectly accessible motor (see Clause 7.6), an uninsulated current-carrying part cannot be contacted by the probe illustrated in Figure 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 1.

7.3 The probes referenced in Clauses 7.1 and 7.2 and illustrated in Figures 1, 2, 3, and 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 Figures 1 and 3 shall be applied in any possible configuration and, if necessary, the configuration shall be changed after insertion through the opening.

7.4 The probes referenced in Clauses 7.1 and 7.2 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.

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7.5 With reference to the requirements in Clauses 7.1 and 7.2, 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.

7.6 With reference to the requirements in Clause 7.2:

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.

7.7 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 (e.g., screwdriver) for opening or removal; or

b) for coin or ticket collection on coin-, ticket-, or card-operated appliances.

7.8 With reference to the requirements in Clauses 7.1 and 7.2, insulated brush caps are not required to be additionally enclosed.

7.9 The requirements in Clauses 7.1 and 7.2 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 above the surface upon which the appliance rests, the tip of the probe illustrated in Figure 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 1.

7.10 Wire screens, expanded metal mesh, or the like, together with methods of fastening them, shall be the subject of investigation.

## 8 Starting of Motor-Operated Appliances

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

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8.2 For the test in Clause 8.1, 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 Clause 6.1.2.3.

8.3 To determine whether an appliance complies with the requirements in Clause 8.1, the appliance shall be connected to a supply circuit of the rated test voltage and rated frequency through a fuse, of other than the time-delay type, which has a rating equal to the minimum rating of a branch circuit to which the appliance can be properly connected in accordance with the CE Code, Part I and the NEC. If the manufacturer recommends that the appliance be used on a larger branch circuit, the current rating of the fuse or fuses shall be the same as that of the recommended branch circuit.

8.4 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.

## 9 Power Input and Current

9.1 The current input shall not be more than 105% or less than 90% of the marked rating with the appliance connected to a supply circuit of rated voltage and frequency. The appliance shall be loaded with its rated load and the power input measured with the appliance at normal operating temperatures.

9.2 Unless marked in accordance with Clause 6.1.2.22, 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.

## 10 Heating

### 10.1 General

10.1.1 An appliance shall be tested as described in Clauses 10.2.1 to 10.9.5, 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 2.

10.1.2 A motor-protective, thermal, or overcurrent-protective device shall neither operate nor open the circuit during the heating test.

10.1.3 All temperature rises in Table 2 are based on an assumed ambient temperature of 25°C. An observed temperature shall be corrected by addition (if the ambient temperature is lower than 25°C) or by subtraction (if the ambient temperature is higher than 25°C) of the difference between 25°C and the ambient temperature.

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10.1.4 A temperature is considered to be constant when three successive readings taken at intervals of 10% of the previously elapsed duration of the test, but not less than 5 min intervals, indicate no change.

10.1.5 Ordinarily, coil or winding temperatures shall be measured by thermocouples, unless the:

a) coil is inaccessible because of mounting, such as a coil immersed in sealing compound; or

b) coil-wrap includes thermal insulation of more than two layers, up to a 0.8 mm maximum, of cotton, paper, rayon, or the like.

10.1.6 For a thermocouple-measured temperature of a coil of an ac motor other than a universal motor (refer to Table 2 Items 11 and 14) having a frame diameter of 178 mm or less (see Note c in Table 2), the thermocouple shall be mounted on the integrally applied insulation of the conductor.

**10.2 Cord reels**

10.2.1 Supply-cord reels shall be tested with the supply cord unreeled to 1/3 of its full extension, and the cord insulation temperatures shall be determined at the centre of the cord reel, the terminal end, and between the outer two layers on the reel.

**10.3 Appliances intended for closet installation**

10.3.1 An appliance that is:

a) intended to be installed in a closet; and

b) marked in accordance with Clause 6.1.2.19;

shall be tested in an enclosure that is constructed of nominal 9.5 mm thick flat-black-painted plywood and consists of a bottom, a back, two sides, a top, and a door. The spacings to each enclosure surface, and the door ventilation, shall be as specified by the manufacturer.

**10.4 Wall-insert or recessed appliances**

10.4.1 A wall-insert or recessed appliance shall be mounted in an enclosure constructed of nominal 9.5 mm thick plywood painted black. The enclosure shall consist of a bottom, a back, two sides, and a top. The top shall be omitted for the test on a recessed appliance if its construction is such that a countertop could not be used. Each of these areas shall be brought into as intimate contact with the corresponding surface of the appliance as the configuration of the appliance will permit. Temperatures shall be measured at points on each of these enclosing surfaces.

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### 10.5 Appliances other than closet, wall-insert or recessed

10.5.1 An appliance that is not intended to be installed in a:

a) closet (Clause 10.3); or

b) wall or recess (Clause 10.4);

shall be placed on a horizontal surface and located within an enclosure formed by three flat-black-painted, vertical surfaces of nominal 9.5 mm thick plywood. The enclosure surfaces shall be located as close to the back and both sides of the appliance as possible and shall extend not less than 610 mm beyond the physical limits of the front and the top of the appliance.

### 10.6 Household clothes dryer

10.6.1 A household appliance shall be operated through the complete program cycle(s) that give the highest temperature rises. The test shall be conducted for 3 cycles. For the heating test, the drum shall be normally loaded with damp cloths, as described in Clause 5.2, at the beginning of each drying cycle, and operation shall be continued until temperatures have become constant. The interval between cycles shall not be longer than that necessary for removing the dried cloths from the drum and reloading it with damp cloths. If the appliance is provided with a heat-control switch or thermostat-adjustment means, the control shall be adjusted to give maximum temperatures. The lint screen shall have 25% of its surface area blocked, in the area representing lint build-up, and the accumulated lint during testing shall be removed between cycles.

### 10.7 Commercial clothes dryer

10.7.1 A commercial appliance shall be operated continuously through the cycles as specified in Clause 10.6.1 until maximum temperatures have been obtained.

### 10.8 Drum light

10.8.1 If the appliance employs a drum light that is ON only at the end of a cycle after the door is opened, the test shall be continued after the last cycle with the door open until temperatures affected by the drum light have become constant but for no more than 1 h. The door shall be opened to the position when the drum light first turns ON.

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### 10.9 Exhaust duct system

10.9.1 Clause 10.9 does not apply to non- vented clothes dryers.

10.9.2 During the heating test, the appliance shall be connected to an exhaust duct system.

10.9.3 The exhaust duct shall be metal and of the same size as the exhaust duct connection on the appliance. The exhaust duct system shall consist of a centre section approximately 3.35 m long, a 90° elbow connected to each end of the centre section, and an additional straight section approximately 460 mm long connected to each elbow. These dimensions are not specified, but the total length of the exhaust duct system, not including elbows, shall be the maximum length recommended by the manufacturer or 4.27 m, whichever is longer. One end of the exhaust duct system shall be long enough to pass through the test enclosure and to be connected to the appliance.

10.9.4 A 7.6 mm water column (w.c.) static pressure shall be applied at the outlet of the exhaust duct system during the test. The 7.6 mm w.c. static pressure shall be adjusted at the start of the test to ±0.51 mm w.c.. The w.c. static pressure shall be determined by averaging the measurements taken from four static pressure taps spaced at 90° intervals around the circumference of the exhaust duct and located 305 mm from the outlet end of the exhaust duct system.

10.9.5 If the application of a 7.6 mm w.c. static pressure results in abnormal operation of the appliance, such as the functioning of a temperature-limiting control, the test shall be conducted at the maximum w.c. static pressure against which the appliance will continue to operate normally.

## 11 Leakage Current and Insulation Resistance

### 11.1 Leakage current

11.1.1 When tested as described in Clauses 11.1.2 to 11.1.6, the leakage current of an appliance rated 240 V or less, single phase, that is:

a) moved, or can be moved easily from one place to another in normal use, shall not be more than 0.5 mA; or

b) not moved easily from one place to another in normal use, or fastened or otherwise secured at a specific location, shall not be more than 0.75 mA.

**Note: Leakage current refers to all currents, including capacitively coupled currents, that can be conveyed between exposed conductive surfaces of an appliance and ground or other exposed surfaces of the appliance.**

11.1.2 Appliances having sheathed heating elements may exceed the leakage current specified in Clause 11.1.1 for a period not exceeding 5 min, but shall not exceed 2.5 mA. The 5 min period shall be measured during the warm-up period and again during the cool down period from the first excursion above the value specified in Clause 11.1.1 until the value is less than and remains less than the value in Clause 11.1.1.

11.1.3 All exposed conductive surfaces shall be tested for leakage currents. The leakage currents shall be measured from the accessible surface or parts individually as well as collectively where simultaneously accessible to the grounded supply conductor, and from one surface or part to another where both are simultaneously accessible.

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11.1.4 Parts shall be considered to be exposed surfaces unless guarded by an enclosure that has been investigated and found to be acceptable to reduce the risk of electric shock (see Clauses 7 and 18).

11.1.5 Surfaces are considered to be simultaneously accessible if they can be readily contacted by one or both hands of a person at the same time.

11.1.6 These measurements do not apply to terminals operating at voltages that are not considered to involve a risk of electric shock. If all accessible surfaces are bonded together and connected to the bonding conductor of the power-supply cord, the leakage current can be measured between the bonding conductor and the grounded supply conductor.

11.1.7 If a conductive surface other than metal is used for the enclosure or part of the enclosure, the leakage current shall be measured using a metal foil with an area of 100 × 200 mm in contact with the surface. If the surface is less than 100 × 200 mm, the metal foil shall be the same size as the surface. The metal foil shall not remain in place long enough to affect the temperature of the appliance.

11.1.8 The measurement circuit for leakage current shall be as illustrated in Figure 5. The meter that is actually used for a measurement need only indicate the same numerical value for a particular measurement as would the defined instrument. The meter used need not have all the attributes of the defined instrument. The measurement instrument is defined as:

a) a meter that has an input impedance of 1 500 Ω shunted by a capacitance of 0.15 µf;

b) a meter that indicates 1.11 times the average of the full-wave rectified composite waveform of the voltage across the resistor or current through the resistor; and

c) an instrument in which the measurement circuitry has a frequency response ratio (over a range of 0 – 100 kHz) of indicated to actual value of current that is equal to the ratio of the impedance of a 1 500 Ω resistor shunted by a 0.15 µf capacitor to 1 500 Ω. At an indication of 0.5 or 0.75 mA, the measurement shall not have an error of more than 5% at 60 Hz.

11.1.9 Unless the meter is used to measure leakage from one part of an appliance to another, it shall be connected between accessible parts and the grounded supply conductor.

11.1.10 A sample of the appliance shall be tested for leakage current starting with the as-received condition. ″As-received″ is defined as not having previously been energized except as can occur as part of the production-line testing. The bonding conductor of the appliance, if any, shall also be open at the grounding terminal or attachment plug. The supply voltage shall be adjusted to the voltage specified in Clause 5.1. The test sequence, with reference to the measuring circuit (Figure 5), shall be as follows:

a) with switch S1 open, the appliance shall be connected to the measuring circuit. The leakage current shall be measured using both positions of switch S2, and with the appliance switching devices in all their normal operating positions;

b) switch S1 shall then be closed, energizing the appliance, and within 5 s, the leakage current shall be measured using both positions of switch S2 and with the appliance switching devices in all their normal operating positions; and

c) the leakage current shall be monitored until temperatures become constant. Both positions of switch S2 shall be used in determining this measurement. The appliance shall be operated as described in Clause 10.

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