

STANDARD INFORMATION

Standard Number: UL 2158 / CSA C22.2 No. 112

Standard Name: Electric Clothes Dryers

Standard Edition and Issue Date: 5th / 11th Editions Dated April 6, 2018

Date of Revision: April 6, 2018

Date of Previous Revision of Standard: 4th / 10th Editions Dated December 18, 2015

EFFECTIVE DATE OF NEW/REVISED REQUIREMENTS

Effective Date: **April 6, 2020**

IMPACT, OVERVIEW, AND ACTION REQUIRED

Impact Statement: A review of all Listing Reports is necessary to determine which products comply with new/revised requirements and which products will require re-evaluation. **NOTE:** Effective immediately, this revised standard will be exclusively used for evaluation of new products unless the Applicant requests in writing that current requirements be used along with their understanding that their listings will be withdrawn on Effective Date noted above, unless the product is found to comply with new/revised requirements.

Overview of Changes:

- Component Requirements
- Fire Containment Test Revision
- Lithium Button or Coin Cell Batteries used in Wireless Remote Controls with Household Appliances
- Bottom Opening Requirement related to Electronically Protected Motors
- Electronic Media Instructions
- Addition of Overflow Test for Condensate-type Dryers, and Revision of Table 15 for Heat Pump Dryers
- Dedicated Receptacle Requirements
- Bottom opening requirements and shorted sheath heating elements
- Dryer Exhaust Duct Power Ventilator Installation Warning Instruction
- Addition to Supplement SB - Alternative Path for Electronic Controls Requirements
- Sub-Enclosure Requirements
- Entrapment Test Revision
- Clothes Dryer Surface Temperature

Specific details of new/revised requirements are found in table below.

If the applicable requirements noted in the table are not described in your report(s), these requirements will need to be confirmed as met and added to your report(s) such as markings, instructions, test results, etc. (as required).



Client Action:

Information – To assist our Engineer with review of your Listing Reports, please submit technical information in response to the new/revised paragraphs noted in the attached or explain why these new/revised requirements do not apply to your product (s).

Current Listings Not Active? – Please immediately identify any current Listing Reports or products that are no longer active and should be removed from our records. We will do this at no charge as long as Intertek is notified in writing prior to the review of your reports.



STANDARD INFORMATION

CLAUSE	VERDICT	COMMENT
		<i>Additions to existing requirements are underlined and deletions are shown lined out below.</i>
6	Info	Marking and Instructions
6.1	Info	Marking
6.1.2	Info	Appliance markings
		<i>New clause added;</i>
6.1.2.36		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 clothes washer to be connected to the receptacle, including the model number, catalog number, or other identification determined to be equivalent, shall be inserted in the blank space.
6.2	Info	Instruction manual
6.2.3	Info	Installation instructions
		<i>New clause added;</i>
6.2.3.9		The installation instructions for a Clothes Dryer that is intended to be connected to an individual exhaust duct system and to be exhausted outdoors shall include the following statements or equivalent: "WARNING: Risk of Fire. Do not install a booster fan in the exhaust duct. Note: The booster fan warning does not apply to clothes dryers intended to be installed in a multiple clothes dryer system, with an engineered exhaust duct system that is installed per the clothes dryer manufacturer's guidelines."
9	Info	Power Input and Current
		<i>New clause added;</i>
9.2		An appliance provided with a dedicated receptacle shall be tested with the receptacle loaded with the intended ampere load. A clothes washer may be used for this load, or a simulated load may be used.
10	Info	Heating
10.1	Info	General



CLAUSE	VERDICT	COMMENT
		<i>New clause added;</i>
10.1.7		An appliance provided with a dedicated receptacle shall be tested as described in Clauses 10.2.1 – 10.9.5 with the receptacle loaded with the intended ampere load during the heating test. A clothes washer may be used for this load, or a simulated load may be used.
10.10		<i>New section added;</i>
		Surface temperatures
10.10.1		An appliance shall be tested as described in Clauses 10.2.1 – 10.9.5 and shall not exceed the temperature rises specified in Table 3. A combination clothes washer and clothes dryer shall meet the temperature rise limits while tested in the drying mode.
10.10.2		All temperature rises in Table 3 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.
10.10.3		The test probe described in Figure 13 shall be applied to accessible external surfaces that are relatively flat and that allow access of the tip of the test probe, and is to be used to measure the temperature rises of the surfaces specified in Table 3. The probe shall be applied with a force of 4 N ±1 N to the surface in such a way that the best possible contact between the probe and the surface is ensured.
		Note: In the case of a portable clothes dryer, the limits apply to all surfaces shown based on the height above the floor.
11	Info	Leakage Current and Insulation Resistance
11.1	Info	Leakage current
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 shall be measured between the bonding conductor and the grounded supply conductor.
16	Info	Abnormal Operation
16.6	Info	Load fire containment
		<i>New clause added;</i>
16.6.4		Appliances that can be operated on a supporting surface shall be tested with the machine on the floor. Appliances intended to operate only when stacked, shall be tested with the appliance on top of the machine in accordance with the installation manual.
16.6.6		Accessories provided with the appliance, such as dryer racks, shall not be included in the test.



CLAUSE	VERDICT	COMMENT
16.6.11		<p>For vented type tumble dryers, the appliance shall be installed freestanding and exhausted with <u>clean rigid</u> metal duct of the same size as the exhaust duct connection on the appliance. <u>The interior of the metal duct shall be cleaned so there is no excessive soot build-up before each test, or new duct shall be used for each test.</u> The duct shall consist of a total length of 4.27 m with two 90 degree bends. A sample configuration is shown in Figure 9. The exhaust duct shall consist of a 1 m straight section connected to the dryer exhaust outlet and terminating perpendicularly in a tee. The tee shall have blast gates/dampers at its outlets. The blast gates/dampers shall be connected to 0.5 m straight sections. One branch shall connect to a 90 degree bend with 2.27 m of straight duct downstream from the bend. The other branch shall connect to the suction of an exhaust blower complying with Clause 16.6.12. The discharge of the blower shall connect to a 2.27 m length of straight duct. With the concurrence of those concerned, less than 4.27 m total length and less than two 90 degree bends may be used for testing. Condensation type tumble dryers are not exhausted.</p> <p><u>Note 1: The orientation of the ducting is not specified.</u> <u>Note 2: For dryer configurations where the duct needs to be elevated based on the location of the dryer exhaust, additional ducting may be added to the test set-up.</u></p>
16.6.12		<p>An external blower shall be connected to the exhaust duct of a vented appliance as described in Clause 16.6.11. The airflow direction shall be out of the appliance and shall be adjusted to produce 3.3 ± 0.5 L/s (7 CFM) through the exhaust duct when the appliance is not operating. <u>The airflow measurement shall be taken at the center of the duct where the airflow is laminar (e.g. at the longest and straightest portion of the ducting).</u> The external blower shall be operating at the set airflow for the duration of the test. For the conditions described in Clause 16.6.14(b), the blast gate/damper to the external blower shall be closed at the start of the test and the blast gate/damper to the unrestricted duct shall be open. If the appliance internal blower ceases to function, the positions of the blast gates/damper shall be switched to open for the external blower and closed for the unrestricted exhaust duct.</p>
16.6.15		<p>The appliance shall be loaded with dry cloths, as described in Clause 5.3, that have a dry weight of 0.016 kg/L of clothes-drum volume. The test cloths shall be preconditioned by exposing the cloths to 5 wash and dry cycles, <u>with the first two wash cycles using both hot water and detergent (using any commercially available detergent).</u> The appliance shall be operated through one conditioning cycle of 15 minutes at the highest heat setting with the dry test load. The lint screen shall be cleaned after the conditioning cycle.</p>



CLAUSE	VERDICT	COMMENT
16.6.20		The flame of the torch shall be applied to the surface of the load, starting from the back and moving the torch forward while sweeping the flame across the surface from left to right. <u>The load shall be manipulated so that edges of the test cloth are available to light.</u> The aim is to ignite most of the top surface of the load. A total lighting time of 45 to 50 s to the top surface of test cloths is likely to be needed. If substantial ignition is achieved in less time, then the lighting time shall be reduced. After igniting as much of the top surface of the test cloths as possible in not more than 45 to 50 s of the sweeping motion, the flames shall be observed for no more than 20 s to verify that the test cloths are continuing to burn. Metal foil protecting plastic edges shall be removed, and the clothes-loading door shall be closed. The aluminum foil dam shall be removed after the clothes-loading door is closed, and the front panel of cheesecloth shall be placed over the front surface of the appliance.
16.7	Info	Base fire containment <i>New clause added;</i>
16.7.5		Appliances that can be operated on a supporting surface shall be tested with the machine on the floor. Appliances intended to operate only when stacked shall be tested with the appliance on top of the machine in accordance with the installation manual. <i>New clause added;</i>
16.7.7		Accessories provided with the appliance, such as dryer racks, shall not be included in the test.
16.7.12		For vent type tumble dryers, the appliance shall be installed freestanding and exhausted with <u>clean rigid</u> metal duct of the same size as the exhaust duct connection on the appliance. <u>The interior of the metal duct shall be cleaned so there is no excessive soot build-up before each test, or new duct shall be used for each test.</u> The duct shall consist of a total length of 4.27 m with two 90 degree bends. A sample configuration is shown in Figure 9. The exhaust duct shall consist of a 1 m straight section connected to the dryer exhaust outlet and terminating perpendicularly in a tee. The tee shall have blast gates/dampers at its outlets. The blast gates/dampers shall be connected to 0.5 m straight sections. One branch shall connect to a 90 degree bend with 2.27 m of straight duct downstream from the bend. The other branch shall connect to the suction of an exhaust blower complying with Clause 16.7.13. The discharge of the blower shall connect to a 2.27 m length of straight duct. With the concurrence of those concerned, less than 4.27 m total length and less than two 90 degree bends may be used for testing. Condensation type tumble dryers are not exhausted. <u>Note 1: The orientation of the ducting is not specified.</u> <u>Note 2: For dryer configurations where the duct needs to be elevated based on the location of the dryer exhaust, additional ducting may be added to the test set-up.</u>



CLAUSE	VERDICT	COMMENT
16.7.13		An external blower shall be connected to the exhaust duct of a vented appliance as described in Clause 16.7.12. The airflow direction shall be out of the appliance and shall be adjusted to produce 3.3 ± 0.5 L/s (7CFM) through the exhaust duct when the appliance is not operating. <u>The airflow measurement shall be taken at the center of the duct where the airflow is laminar (e.g. at the longest and straightest portion of the ducting).</u> The external blower shall be operating at the set airflow for the duration of the test. For the conditions described in Clause 16.7.15(b), the blast gate/damper to the external blower shall be closed at the start of the test and the blast gate/damper to the unrestricted duct shall be open. If the appliance internal blower ceases to function, the positions of the blast gates/damper shall be switched to open for the external blower and closed for the unrestricted exhaust duct.
16.7.18		The appliance shall be loaded with dry cloths, as described in Clause 5.3, that have a dry weight of 0.016 kg/L of clothes-drum volume. The test cloths shall be preconditioned by exposing the cloths to 5 wash and dry cycles, <u>with the first two wash cycles using both hot water and detergent (using any commercially available detergent).</u> The appliance shall be operated through one conditioning cycle of 15 minutes at the highest heat setting with the dry test load. The lint screen shall be cleaned after the conditioning cycle.
16.8	Info	Nichrome wire test
16.8.8		Nichrome wire [80% Nickel, 20% Chrome, 22 AWG, in accordance with ASTM B344] shall be applied to a connector or switching contact such that the adjacent <u>polymeric non-metallic combustible</u> materials will be ignited during the test.
16.8.9		A single strand of nichrome wire with an approximate length of 50 mm – 100 mm shall be formed into a coil with a diameter and length that approximates the connection under evaluation. The coil shall be inserted in place of the connection under evaluation. In the case of a multi-pin connector, a single terminal pin shall be removed from the connector such that the coil can be inserted in the worst case location (typically the lowest position). If the worst case position is not obvious, then multiple positions shall be evaluated. Insulated wire leads shall be used to supply power to the nichrome wire and shall be supported and strain-relieved to prevent the nichrome wire from shifting during testing. Alternate wrapping methods such as wrapping the connector externally may be employed if it is deemed necessary to achieve complete consumption of the adjacent material. Uninsulated terminals shall be wrapped with a non-flammable tape or sleeve prior to wrapping with nichrome wire to prevent shorting out portions of the nichrome wire. In the case of switching devices, a coil of nichrome wire shall be placed inside the device in the position of the contacts and appropriately supported to prevent movement during the test. Note: The preferred method of wrapping a coil is wrapping nichrome wire around the threads of a No. 6-18 wood screw with a nominal root diameter of 2.4 mm and a thread per 25.4 mm count of 18. <u>In the application of the nichrome wire to the part under test, the nichrome wire may be inserted into the part, or the wire may be externally wrapped around the</u>



CLAUSE	VERDICT	COMMENT
		<p><u>part under test. The intent is to achieve complete combustion of the part under test and/or adjacent materials:</u></p> <p>a) <u>When inserting the coil into the part under test, a single strand of nichrome wire with a minimum length of 100 mm shall be formed into a coil with a diameter and length that approximates the connection under evaluation. The coil shall be inserted in place of the connection under evaluation. In the case of a multi-pin connector, a single terminal pin shall be removed from the connector such that the coil can be inserted in the worst case location (typically the lowest position). If the worst case position is not obvious, then multiple positions shall be evaluated.</u></p> <p>b) <u>When externally wrapping a connector or uninsulated terminal, a minimum 50 mm of nichrome wire shall be used to achieve a minimum of three evenly spaced wraps along the length of the connector or uninsulated terminal.</u></p> <p>c) <u>Uninsulated terminals shall be wrapped with a non-flammable tape or sleeve prior to wrapping with nichrome wire to prevent shorting out portions of the nichrome wire.</u></p> <p>d) <u>In the case of switching devices, a coil of nichrome wire shall be placed inside the device in the position of the contacts and appropriately supported to prevent movement during the test. See Clause 28.4.8</u></p> <p><u>Insulated wire leads shall be used to supply power to the nichrome wire and shall be supported and strain-relieved to prevent the nichrome wire from shifting during testing.</u></p> <p><u>Note: With reference to (a) and (d), the preferred method of wrapping a coil is wrapping nichrome wire around the threads of a No. 6-18 wood screw with a nominal root diameter of 2.4 mm and a thread per 25.4 mm count of 18.</u></p> <p>The nichrome wire shall be energized such that current in the circuit is immediately increased to 11 amperes, and held constant for the duration of the test. If no ignition is detected within 20 minutes, power shall be removed from the nichrome wire. If ignition is detected, the current shall be held until burning of the polymeric material ceases naturally or there is ignition of the cheesecloth. If ignition of the cheesecloth occurs, the fire shall be extinguished as soon as possible.</p>
16.8.10		<p><u>The nichrome wire shall be energized such that current in the circuit is immediately increased to 11 A and held constant for the duration of the test. If no ignition is detected within 20 minutes, the current shall be removed from the nichrome wire. If ignition is detected, current shall be held constant until burning of the non-metallic combustible material ceases naturally or there is ignition of the cheesecloth. If ignition of the cheesecloth occurs, the fire shall be extinguished as soon as possible. If the nichrome wire fractures prematurely, the test shall be repeated.</u></p>
17	Info	Stability and Mechanical Hazards
17.6	Info	Entrapment



CLAUSE	VERDICT	COMMENT
17.6.6		<p>The force shall be applied to the door:</p> <p>a) in a manner representative of a push from inside the clothes drum, <u>and applied on the inside surface of the door at a location no further from the door hinge than the opposite side of the drum opening;</u></p> <p>b) in a direction perpendicular to the plane of the opening into the clothes drum; and</p> <p>c) at a rate of 13 to 18 N/s.</p> <p><u>Note: The test force can be applied to the outside of the door, using a pull force that is aligned with the location on the door where someone could actually push from inside the clothes drum.</u></p>
19	Info	Construction
19.2	Info	Electrical insulation
19.2.6		<p><i>New clause added;</i></p> <p>The requirements for supplemental insulation (e.g, tape, sleeving, or tubing) are not specified unless the insulation or device is required to comply with this Standard. In such cases:</p> <p>a) Insulating tape shall comply with CSA C22.2 No. 197 and UL 510;</p> <p>b) Sleeving shall comply with CAN/CSA-C22.2 No. 198.3 and UL 1441; and</p> <p>c) Tubing shall comply with CAN/CSA-C22.2 No. 198.1 and UL 224.</p>
19.7	Info	Condensation type dryers
19.7.2		<p><i>New clause added;</i></p> <p>The following overflow test shall be conducted if it is not evident that the equipment complies with the requirements of Clause 19.7.1:</p> <p>a) The appliance equipment shall be positioned as intended in use and investigated for:</p> <ol style="list-style-type: none"> 1) Overflow of a pan, trough, or the like, at a rate of 30 mL/s for a maximum period of 30 seconds; and 2) Overflow of a blocked drain at a rate of 30mL/s for a maximum of 30 seconds. <p>b) As a result of the testing, compliance with Clause 19.7.1 shall be determined by visual examination. Where visual examination is not practical, following each overflow test, the appliance shall comply with the leakage current test in Clause 11.1, except the leakage current shall not exceed 5 mA, and with the electric strength test specified in Section 14.</p>
20	Info	Internal Wiring
20.1	Info	General



CLAUSE	VERDICT	COMMENT
20.1.5		<p>Unless it is to be investigated as an uninsulated current-carrying part or located in a low-voltage circuit not involving a risk of personal injury, insulated internal wiring of an appliance, including a bonding conductor, shall consist of wire that is acceptable for the application, when considered with respect to: <u>complying with the following:</u></p> <p>a) <u>CSA C22.2 No. 127 or C22.2 No. 210, and UL 758; the temperature and voltage to which the wiring can be subjected;</u> b) <u>CSA C22.2 No. 38 and UL 44; exposure to oil, grease, or other substances that can have a deleterious effect on the insulation;</u> c) <u>CSA C22.2 No. 75 and UL 83; exposure to moisture; and</u> d) <u>CSA C22.2 No. 49 and UL 66; or other conditions of service to which it can be subjected</u> e) <u>The appropriate CSA and UL standard(s) for other insulated conductor types specified in the Canadian Electrical Code for Wiring Methods and the National Electrical Code for Wiring Methods and Materials.</u></p> <hr/> <p><i>New clause added;</i></p> <p>Insulated internal wiring shall be acceptable for the application, when considered with respect to the following:</p>
20.1.6		<p>a) The temperature and voltage to which the wiring may be subjected; b) Exposure to oil, grease, or other substances that may have a deleterious effect on the insulation; c) Exposure to moisture; and d) Other conditions to which the wire may be subjected during normal use.</p>
21	Info	Components
21.1	Info	General requirements for components
21.1.1		<p>Except as indicated in Clause 21.1.2, a component of an appliance covered by this Standard shall: comply with the requirements for that component. See Annex A for a list of Standards covering components generally used in the appliances covered by this Standard. A component shall comply with both CSA Group and Underwriters Laboratories Inc. standards.</p> <p>a) <u>Comply with the requirements for that component. A component shall comply with both CSA Group and Underwriters Laboratories Inc. standards;</u> b) <u>Be used in accordance with its rating established for the intended conditions of use;</u> c) <u>Be used within its established use limitations or conditions of acceptability;</u> d) <u>Additionally comply with the applicable requirements of this end product Standard; and</u> e) <u>Not contain mercury.</u></p> <p><u>Note: Specific components are considered as being incomplete in construction features or restricted in performance capabilities. Such components are intended for use only under limited conditions, such as certain temperatures not exceeding</u></p>



CLAUSE	VERDICT	COMMENT
21.1.3		<p><u>specified limits, and can only be used under those specific conditions for which they have been investigated.</u></p> <p><u>component complying with a CSA Group or UL component standard other than those specified in this Standard is acceptable if the following applies:</u></p> <p>a) <u>The component also complies with the applicable component Standard specified in this standard; or</u></p> <p>b) <u>The component standard:</u></p> <ol style="list-style-type: none"><u>1) Is compatible with the ampacity and overcurrent protection requirements of the Canadian Electrical Code and National Electrical Code, where appropriate;</u><u>2) Considers long-term thermal properties of polymeric insulating materials in accordance with the Standard for Polymeric Materials – Long Term Property Evaluations, UL 746B; and</u><u>3) Ensures that any use limitations of the other component standard is identified and appropriately accommodated in the end use application.</u> <p><u>Note: For example, a component used in a household application, but intended for industrial use and complying with the relevant component standard may assume user expertise not common in household applications.</u></p>
21.1.4		<p>Specific components are considered as being incomplete in construction features or restricted in performance capabilities. Such components are intended for use only under limited conditions, such as certain temperatures not exceeding specified limits, and shall be used only under those specific conditions for which they have been investigated.</p> <p><u>A component that is also intended to perform other functions, such as over current protection, ground-fault circuit-interruption, surge suppression, any other similar functions, or any combination thereof, shall comply additionally with the requirements of the applicable CSA Group and UL standard(s) that cover devices that provide those functions, unless those other functions are:</u></p> <p>a) <u>Not required for the application; and</u></p> <p>b) <u>Not identified as part of markings, instructions, or packaging for the appliance.</u></p>
21.1.6		<p><i>New clause added;</i></p> <p>A component not anticipated by the requirements of this Standard, not specifically covered by the component standards specified in this Standard, and that involves a potential risk of electric shock, fire, or personal injury, shall be additionally investigated in accordance with the applicable CSA Group and UL standard, and shall comply with Clause 21.1.1(b) through (d).</p>



CLAUSE	VERDICT	COMMENT
		<i>New clause added;</i>
21.1.7		With respect to Clause 21.1.6, reference to construction and performance requirements in another CSA and UL end-product standard is appropriate where that standard anticipates normal and abnormal use conditions consistent with the application of clothes dryers.
21.3	Info	Capacitors
		<i>New clause added;</i>
		The component requirements for capacitors are not specified except:
21.3.1		a) Capacitors connected across the line or from line to ground shall comply with CSA C22.2 No. 8, CAN/CSA-E60384-1, or CAN/CSA-E60384-14; and UL 1283 or UL 60384-14; b) Motor starting or running capacitors shall comply with the applicable requirements of CSA C22.2 No. 190 and UL 810.
		<i>New clause added;</i>
21.3.2		Capacitors with integral enclosures complying with the standards specified in Clause 21.3.1 are considered to fulfill the requirements of Clause 21.3.3.
		<i>New section added;</i>
12.5		Heating elements
		Sheath-type heating elements shall comply with the following:
21.5.1		a) CSA C22.2 No. 72 and UL 499; or b) CSA C22.2 No. 72 and UL 1030.
		<i>New section added;</i>
21.6		Lampholders
21.6.1		Lampholders and indicating lamps shall comply with CAN/CSA-C22.2 No. 250.13 and UL 8750.
21.6.2		Lighting ballasts shall comply with CSA C22.2 No. 74 and UL 935 or UL 1029, unless the ballast forms a part of a luminaire complying with the appropriate CSA Group and UL Standards.
21.6.3		Light emitting diode (LED) light sources shall comply with CSA C22.2 No. 250.4 and UL 8750, unless the LED light source forms a part of a luminaire complying with the appropriate CSA Group and UL Standards. Individual light emitting diodes mounted on the printed wiring board of a control and intended for indicating purposes shall be evaluated with the control.



CLAUSE	VERDICT	COMMENT
		An Edison-base lampholder of:
21.6.4		a) a permanently connected appliance; or b) an appliance equipped with a polarized attachment plug; shall be wired so that the screw shell will be connected to the terminal or lead that is intended for the connection of the grounded conductor of a supply circuit.
21.6.5		A lampholder shall be constructed or installed so that uninsulated current-carrying parts other than a screw shell will not be exposed to contact by persons removing or replacing lamps in normal service. Note: If it is necessary to dismantle the appliance or remove a cover plate or other part by means of a tool in order to remove or replace a lamp, uninsulated current-carrying parts may be accessible to contact during the relamping process only.
21.6.6		Lamps shall be provided with a means to reduce the likelihood of damage, either by their location or by the provision of an acceptable guard.
21.7	Info	Motors
		Motors shall <u>comply with CSA C22.2 No. 100 and UL 1004-1 and shall</u> have inherent overheating protection in accordance with the requirements of CSA C22.2 No. 77 and UL 1004-3, except for:
21.7.1		a) appliances having a device, which can be integral with the control of the appliance, responsive to motor current, as required by the Canadian Electrical Code and the National Electrical Code, for overload and overheating, and which is sized in accordance with Clauses 21.7.4 and 21.7.5; b) motors employing impedance protection complying with the locked-rotor requirements specified in CSA C22.2 No. 77 and UL 1004-2; or c) motors employing electronic protection complying with CSA C22.2 No. 77 and UL 1004-7.
21.10	Info	Receptacles
		<i>New clause added;</i>
21.10.2		A clothes dryer intended to be stacked on a clothes washer and provided with a dedicated receptacle shall comply with the requirements in Clauses 21.10.3 – 21.10.5.
21.10.3		Only one receptacle shall be provided, it shall be located on the back of the appliance, and it shall be a 3-wire grounding-type receptacle, rated 15 or 20 A, 125 V.
21.10.4		The circuit supplying the dedicated receptacle shall have the circuit protected by supplementary overcurrent protection, such as a fuse, circuit breaker, or similar device, having a current rating not exceeding the applicable value specified in Table 18.
21.10.5		A marking identifying the clothes washer to be used with the dedicated receptacle shall be provided adjacent to the dedicated receptacle; see Clause 6.1.2.36.



CLAUSE	VERDICT	COMMENT
21.15		<i>New section added;</i> Switches and controls Switches shall comply with the following, as applicable:
21.15.1		a) C22.2 No. 55 and UL 1054; b) CAN/CSA-C22.2 No. 61058-1 and UL 61058-1; or c) C22.2 No. 111 and UL 20.
21.15.2		Membrane switches shall be evaluated with the appliance control or to the applicable requirements of this Standard. Membrane switches complying with UL 2557 are considered to fulfill the requirements of this Standard. Membrane switches, including those complying with UL 2557, shall be evaluated for use in other than low voltage circuits, when applicable.
21.16		<i>New section added;</i> Overcurrent Protection
21.16.1		Fuses shall comply with CSA C22.2 No. 248-1, UL 248-1 and the applicable part of the CSA C22.2 No. 248 and UL 248 series for the specific fuse type. Fuseholders shall comply with the following:
21.16.2		a) CSA C22.2 No. 39 or CAN/CSA-C22.2 No. 4248-1 and the applicable part of the CSA C22.2 No. 4248 series for the specific fuseholder type; and b) UL 4248-1 and the applicable part of the UL 4248 series for the specific fuseholder type.
21.16.3		Supplementary protectors shall comply with CSA C22.2 No. 235 and UL 1077.
21.17		<i>New section added;</i> Electrically operated valves Electrically operated valves shall comply with the following:
21.17.1		a) CSA C22.2 No. 139 and UL 429; or b) CAN/CSA-E60730-2-8 and UL 60730-2-8.
21.18		<i>New section added;</i> Terminals and connectors Terminals and connectors shall comply with the following:
21.18.1		a) CSA C22.2 No. 153 and UL 310 for quick connect terminals; b) CSA C22.2 No. 182.3 and UL 1977 for single and multipole connectors for use in data, signal, control and power applications; c) CSA C22.2 No. 65 and UL 486A-486B for wire connectors; d) CSA C22.2 No. 188 and UL 486C splicing wire connectors;



CLAUSE	VERDICT	COMMENT
		e) CSA C22.2 No. 158 and UL 486E for equipment wiring terminals for use with aluminium and/or copper conductors; f) CSA C22.2 No. 2459 and UL 2459 for multi-pole splicing wire connectors; or g) CSA C22.2 No. 158 and UL 1059 for terminal blocks.
21.19		New section added; Pumps
21.19.1		Pumps shall be evaluated to this Standard or comply with CSA C22.2 No. 108 and UL 778.
21.20		New section added; Insulating devices
21.20.1		The requirements for insulating devices, such as wire positioning devices or insulating bushings, are not specified unless the insulating device is required to comply with this Standard. In such cases, the insulating device shall comply with the applicable requirements of this Standard or shall be evaluated in accordance with the following standards, as applicable: a) CSA C22.2 No. 18.5 and UL 1565 for wire positioning devices; or b) UL 635 for insulating bushings.
21.20.2		Tests specified in this Standard (e.g, Strain Relief Test) shall be performed to confirm the combination of the insulating bushing and the supporting part are suitable.
21.21		New section added; Adhesives used to secure parts
21.21.1		An adhesive relied upon to reduce the risk of fire, electric shock, or injury to persons shall comply with the requirements for adhesives in CSA C22.2 No. 0.15 or UL 746C.
21.21.2		The requirement in Clause 21.21.1 also applies to an adhesive used to secure a conductive part that might, if loosened or dislodged: a) energize an accessible dead metal part; b) make a live part accessible; c) reduce spacings below the minimum acceptable values; or d) short-circuit live parts.
21.22		New section added; Transformers and power supplies
21.22.1		Transformers located in a LOW VOLTAGE CIRCUIT that do not involve a risk of fire or personal injury need not comply with the standards referenced in Clauses 21.22.2 through 21.22.5.
21.22.2		Class 2 transformers shall comply with CSA C22.2 No. 66.3 and UL 5085-3.



CLAUSE	VERDICT	COMMENT
		General purpose transformers shall comply with:
21.22.3		a) CSA C22.2 No. 66.2; and b) UL 5085-2.
		Class 2 power supplies shall comply with:
21.22.4		a) CSA C22.2 No. 223 and UL 1310; or b) For power supplies with non-linear transformers, CAN/CSA-C22.2 No. 60950-1 and UL 60950-1.
		Power supplies other than Class 2 power supplies shall comply with:
21.22.5		a) CSA C22.2 No. 107.1 and UL 1012; or b) For power supplies with non-linear transformers, CAN/CSA-C22.2 No. 60950-1 and UL 60950-1.
21.23		<i>New section added;</i> Button or coin cell batteries of lithium technologies
21.23.1		The battery compartment of an appliance or any accessory, such as a wireless control, incorporating one or more coin cell batteries of lithium technologies, shall comply with UL 4200A, if the appliance or any accessory: a) is intended for use with one or more single cell batteries having a diameter of 32 mm (1.25 in) maximum with a diameter greater than its height; and b) the appliance is intended for household use.
22	Info	Supply Connection and External Flexible Cords
22.2	Info	Permanently connected appliances <i>New clause added;</i>
22.2.1		Electrical boxes and the associated bushings and fittings, and raceways, of the types specified in the Canadian Electrical Code for Wiring Methods and the National Electrical Code for Wiring Methods and Materials, that comply with the relevant CSA Group and UL Standards, and Section 22, are considered to fulfill the requirements of this Standard. Note: Examples of relevant standards are CSA C22.2 No. 18.1 and UL 514A, CSA C22.2 No. 18.2 and UL 514C, CSA C22.2 No. 18.3 and UL 514B, and CSA C22.2 No. 42.1 and UL 514D.
22.3	Info	Cord-connected appliances <i>New clause added;</i>
22.3.1		A power supply cord shall comply with CSA C22.2 No. 21 and UL 817.



CLAUSE	VERDICT	COMMENT
		<i>New clause added;</i>
22.3.2		Flexible cords and cables shall comply with CSA C22.2 No. 49 and UL 62. Flexible cords or cables are considered to fulfill this requirement when preassembled into a power supply cord complying with Clause 22.3.1.
		<i>New clause added;</i>
22.3.3		Attachment plugs and appliance couplers shall comply with CSA C22.2 No. 42 and UL 498. Attachment plugs and appliance couplers are considered to fulfill this requirement when preassembled into a power supply cord complying with Clause 22.3.1.
24	Info	Provision for Grounding
24.1	Info	General
		<i>New clause added;</i>
24.1.9		In Canada, bonding of electrical equipment forming part of an appliance shall comply with CAN/CSA-C22.2 No. 0.4.
28	Info	Polymeric Materials
28.1	Info	General
		<p>Polymeric material employed to support a live part, in direct contact with an uninsulated live part, or in the vicinity of within 0.8 mm from an uninsulated live part <u>as noted below</u> shall be rated for use at the operating temperature involved and shall have the following material properties determined in accordance with CAN/CSA-C22.2 No. 0.17 and UL 746C:</p> <p>a) volume resistivity of at least 50×10⁶ ohm-cm:</p> <p><u>1) This volume resistivity requirement is applicable to polymeric materials that serve as insulation between uninsulated live parts of opposite polarity, or between uninsulated live parts and dead metal parts that may be grounded in service or any surface exposed to user contact.</u></p> <p><u>2) In lieu of volume resistivity requirement the leakage current test of Clause 10 may be conducted to determine compliance.</u></p> <p>b) comparative tracking index (CTI) of at least 175 volts (PLC 3 – see note (a) of Table 12) for a moderately contaminate environment. <u>This CTI requirement is applicable when the polymeric material surface is:</u></p> <p><u>1) in contact with uninsulated live parts of opposite polarity that are spaced less than 12.7 mm (over surface), or in contact with an uninsulated live part that is spaced less than 12.7 mm (over surface) from either a dead metal part that may be grounded in service, or any surface exposed to user contact;</u></p> <p><u>2) located less than 0.8 mm (through air) from an uninsulated live part; or</u></p> <p><u>3) located less than 0.8 mm (through air) from uninsulated live parts of opposite polarity that are spaced less than 12.7 mm (over surface), or an uninsulated live part that is spaced less than 12.7 mm (over surface) from either a dead</u></p>



CLAUSE	VERDICT	COMMENT
		<p><u>metal part that may be grounded in service, or any surface exposed to user contact; and</u></p> <p><u>Note: See the Figurative examples in UL 746C, Figure 6.1, examples 2, 3, and 4, or AN/CSA-C22.2 No. 0.17 if additional clarification is needed.</u></p> <p>c) a high current arc ignition (HAI) and hot-wire ignition (HWI) as specified in Table 12:</p> <p><u>1) The HAI requirement is applicable for a polymeric material that is in contact with uninsulated live parts; or within 0.8 mm from a non-arcing uninsulated live part, or within 12.7 mm from an arcing uninsulated live part.</u></p> <p><u>2) The HWI requirement is applicable to a polymeric material that is in contact with, or within 0.8 mm from an uninsulated live part.</u></p>
28.4	Info	Flammability
28.4.2		In reference to Clause 28.4.1, materials not classified 5VA or 5VB may be tested in accordance with the 5V flame test in CAN/CSA-C22.2 No. 0.17 and the 127 mm flammability test described in UL 746C using parts moulded from the polymeric material.
28.4.3		If a metal or 5VA polymeric material sub-enclosure houses all insulated or uninsulated live parts that involve a risk of fire, the overall polymeric outer enclosure may be classed 5VA, 5VB, V-0, V-1, V-2, or HB. To determine if live parts presenting a risk of fire are adequately housed within the sub-enclosure, no insulated or uninsulated live parts shall be contacted as determined by application of the probe as shown in Figure 1 to the sub-enclosure (See also Clause 28.4.4).
28.4.4		In addition to complying with the relevant requirements of Clause 28.4.3, the use of HB rated materials as the enclosure is acceptable if all electrical connections, other than welded connections, presenting a risk of fire within the polymeric enclosure comply with Clause 28.4.7 including connections to the components specified in Clause 28.4.6.
28.4.5		In reference to Clauses 28.4.3 and 28.4.4, live parts and electrical connections within a low-power circuit, where the maximum power available does not exceed 15 W, are not considered to present a risk of fire.
28.4.6		In reference to Clause 28.4.4, this requirement is not applicable to connections within snap switches, lampholders with switching mechanisms, appliance inlets and outlets, receptacles, and special-use switches that comply with the applicable standard (C22.2 No. 111 and UL 20; C22.2 No. 43 and UL 496; C22.2 No. 42 and UL 498; or C22.2 No. 55 and UL 1054) with respect to resistance to ignition, resistance to arcing, or overload and endurance testing.



CLAUSE	VERDICT	COMMENT
28.4.8		Electrical connections are not required to comply with Clause 28.4.7 when all mating parts of the electrical connection are provided with a component (e.g. contacts within a switch or relay, connections within a motor, etc.) that complies with the relevant component standard. Electrical connections that are mated to the component from the appliance are required to comply with Clause 28.4.7.
28.4.9		The requirements in Clause 28.4.7 shall not apply to welded or soldered connections. And connections within Class 2 circuits.
28.4.13		With reference to Clause 28.4.12 and Figure 11, the flame cylinder shall be placed above the center of each connection zone and on top of any non-metallic parts that are supporting current-carrying connections as shown in Examples 1-3 of Figure 11. In the case of uninsulated connections, the flame cylinder shall be placed above the center of each connection zone and directly on top of current-carrying conductors as shown in Examples 4-6 of Figure 11. The flame cylinder shall project through all metallic and non-metallic material. If "C" is intended to act as a barrier to "D" <u>or if the flame cylinder extends beyond the outer enclosure of the appliance,</u> then the adequacy of the barrier shall be demonstrated by testing as described in Clause 16.8.

New table added;

Surface temperatures

Table 3

Surface	Temperature rise ^e		
	Surfaces of appliances situated not more than 915 mm above the floor after installation		Surfaces situated more than 915 mm above the floor after installation ^{d, f}
	Front surfaces ^g	Other surfaces ^d	
Bare metal	40	45	45
Coated metal ^b	45	55	55
Glass and ceramic	55	60	60
Rubber, plastic and plastic coating > 0,4 mm ^{a, c}	60	65	65

^a When the thickness of plastic coating does not exceed 0.4 mm, the temperature rise limits of coated metal or glass and ceramic apply.
^b Metal is considered coated when a coating having a minimum thickness of 90 µm made by enamel or non-substantially plastic coating is used.
^c The temperature rise limit applies also for plastic material having a metal finish of thickness less than 0.1 mm.
^d If these values are exceeded the test is allowed to be repeated with the machine moved away from the test corner wall, the test is repeated for 1 cycle.
^e Temperature rises are not measured on:
 – the underside of appliances intended to be used on a working surface or floor;
 – the rear surface of appliances which, according to the instructions, shall be placed against a wall; and
 – the hot water supply fittings and hoses
^f For top horizontal surfaces less than 1830 mm from the floor, the temperature rise limits for front surfaces not more than 915



CLAUSE	VERDICT	COMMENT
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mm above the floor apply.
⁹ For door handles and knobs, regardless of installation height above the floor, the temperature rise limits for front surfaces not more than 915 mm above the floor apply.

Production line test conditions

Table 14

Appliance Rating, V	Condition A			Condition B		
	Potential, V		Time, s	Potential, V		Time, s
	<u>AC</u>	<u>DC</u>		<u>AC</u>	<u>DC</u>	
≤ 250	1 000	1 400	60	1 200	1 700	60
> 250 ≤650	1 000+2v	1 400+2.8V	60	1 200+2.4v	2 700+3.4V	60

V = maximum marked voltage.

New table added;

Supplementary overcurrent protective device current rating

Table 18

Maximum supplementary overcurrent protective device rating	Minimum cord conductor size rating		Minimum internal conductor size	
	AWG	(mm ²)	AWG	(mm ²)
A				
10	18	(0.82)	18 ^a	(0.82)
13	16	(1.3)	18 ^a	(0.82)
15	14	(2.1)	14	(2.1)
18	14	(2.1)	12	(3.3)
20	12	(3.3)	12	(3.3)

^a Rated 90°C or 6 A maximum.

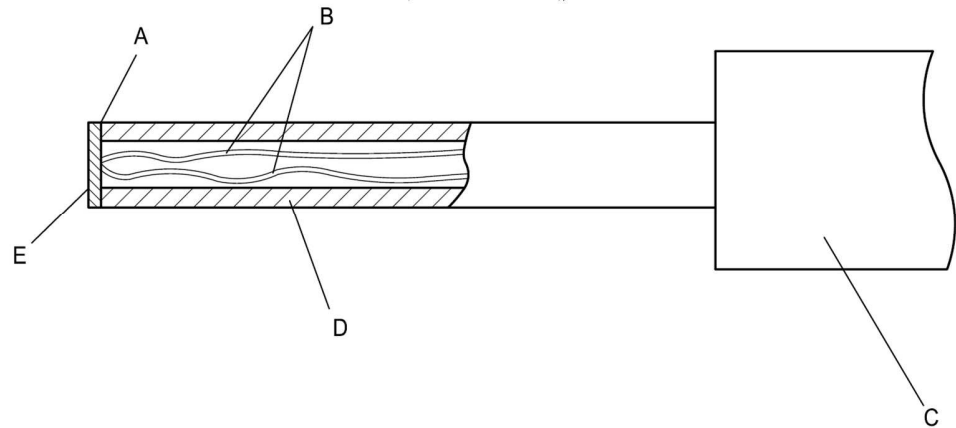
New figure added;

Figure 13

Probe for measuring surface temperature
 (from IEC 60335-2-11, IEC 807/02)
 (See Clause 10.10.3.)



CLAUSE	VERDICT	COMMENT
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Key

- A Adhesive
- B Thermocouple wires 0,3 mm diameter to IEC 60584-1 Type K (chrome alumel)
- C Handle arrangement permitting a contact force of $4\text{ N} \pm 1\text{ N}$
- D Polycarbonate tube: inside diameter 3 mm, outside diameter 5 mm
- E Tinned copper disc: 5 mm diameter, 0,5 mm thick

Note: The contact face of the disc is flat.

Supplement SB	Info	Alternative Path for Electronic Controls Requirements
SB4	Info	Components
SB4.2	Info	Capacitors
		<i>New clause added;</i>
SB4.2.1		A capacitor connected between two line conductors in a primary circuit, or between one line conductor and the neutral conductor, or between primary and accessible secondary circuits, or between the primary circuit and protective earth (equipment grounding conductor connection) shall comply with one of the subclasses specified in UL 60384-14 and CAN/CSA-E60384-14 and shall be used in accordance with its rating. Details for the Damp Heat, Steady State Test are specified in 4.12 of UL 60384-14 and CAN/CSA-E60384-14.
		<i>New section added;</i>
SB4.3		Isolation devices
SB4.3.1		An optical isolator that is relied upon to provide isolation between primary and secondary circuits or between other circuits as required by this Standard shall be constructed in accordance with UL 1577 and CSA Component Acceptance Notice No. 5A, and shall be able to withstand for 1 minute, without breakdown, an a.c. dielectric voltage withstand potential of 2500 volts between the input and output circuits, as specified in the Electric Strength Test, Section 14 in this Standard.



CLAUSE	VERDICT	COMMENT
SB4.3.2		A power switching semiconductor device that is relied upon to provide isolation to ground shall be constructed in accordance with UL 1577 and CSA Component Acceptance Notice No. 5A. The dielectric voltage withstand tests required by UL 1557 shall be conducted at a dielectric potential of 2500 volts for 1 minute, as specified in the Electric Strength Test, Section 14 in this Standard.
SB4.4		<i>New section added;</i> Switch mode power supplies
SB4.4.1		Bridging components – switch mode power supplies
SB4.4.1.1		Components connected between the primary and secondary circuits of an isolating device such as a switching transformer, or between primary and secondary earth reference points, shall be evaluated to provide the specified level of isolation for the application under normal and abnormal (single component fault) conditions.
SB4.4.1.2		A capacitor connected between primary and accessible secondary circuits shall comply with Clause SB4.2. This circuit assembly shall consist of a single Class Y1 capacitor or two Class Y2 capacitors connected in series.
SB4.4.2		Switch mode power supply insulation system
SB4.4.2.1		Insulation used within a transformer of a switch mode power supply, that is rated Class E or higher, shall comply with UL 1446 and CAN/CSA-C22.2 No. 0, for the specified temperature class of the insulation system, or UL 2353 and Annex U of CAN/CSA-C22.2 No. 60950-1.
SB4.5		<i>New section added;</i> Transformers
SB4.5.1		General-purpose transformers shall comply with UL 5085-1 and UL 5085-2 or CSA C22.2 No. 66. Note: A transformer that complies with UL 1411, and that is used in a circuit involving an audio or video component, complies with the intent of this requirement.
SB4.5.2		Class 2 and Class 3 transformers shall comply with UL 5085-1 and UL 5085-3 or CSA C22.2 No. 66.
SB13	Info	General Conditions for the Tests
SB13.3	Info	Test results determined by overcurrent protection operation
SB13.3.2		If safety of the appliance depends upon the operation of a miniature fuse-link complying with CSA C22.2 No. 248-1 <u>IEC 60127-1 – Miniature Fuses – Part 1: Definitions for miniature fuses and general requirements for miniature fuse-links</u> and UL 248-1, during any of the fault conditions specified in Clause SB15.1.11, the test shall be repeated but with the miniature fuse-link replaced by an ammeter. If the current measured:



CLAUSE	VERDICT	COMMENT
		<p>a) Does not exceed 2.1 times the rated current of the fuse-link, the circuit is not considered to be adequately protected and the test is carried out with the fuse-link short-circuited;</p> <p>b) Is at least 2.75 times the rated current of the fuse-link, the circuit is considered to be adequately protected; and</p> <p>c) Is between 2.1 times and 2.75 times the rated current of the fuse-link, the fuse link is shortcircuited and the test is carried out:</p> <ol style="list-style-type: none"> 1) for the relevant period or for 30 minutes, whichever is the shorter, for quick acting fuselinks; and 2) for the relevant period or for 2 minutes, whichever is the shorter, for time lag fuselinks.
SB15	Info	Abnormal Operation and Fault Tests
		<i>New section added;</i>
SB15.2		Transformer overload test
		<p>Three transformers shall be placed on a tissue-paper covered soft wood surface and each covered with a layer of cheesecloth. A one-ampere cartridge fuse shall be connected in series from the core and the shield, if applicable, of each transformer to ground. Each transformer shall be protected by an overcurrent device. The device shall be the same as provided in the unit to protect the transformer, or if none is provided, shall be a branch circuit type and sized based upon the available energy to the end-product using percentages of the intended branch-circuit overcurrent device, but not less than a 30 A normal-acting protective device. With all secondaries simultaneously short-circuited, each transformer shall be energized for 7 hours or until ultimate results occur. Results are in compliance when:</p>
SB15.2.1		<p>a) The ground fuse remains intact;</p> <p>b) Each transformer withstands the potential specified in the Electric Strength Test, Section 14, while still warm from this test; and</p> <p>c) There is no ignition of the cheesecloth or tissue paper.</p> <p>Note: The test may be conducted with the transformer(s) installed in the end product.</p>
		<i>New section added;</i>
SB15.3		Switch mode power supply overload test
		<p>Each output winding, or section of a tapped winding, shall be overloaded in turn, one at a time, while the other windings are kept loaded or unloaded, whichever load conditions of normal use is the least favorable.</p>
SB15.3.1		
		<p>Overloading shall be conducted by connecting a variable resistor (or an electronic load) across the power supply output. The resistor shall be adjusted as quickly as possible and readjusted, if necessary, after 1 minute to maintain the applicable overload. No further readjustments shall then be permitted.</p>
SB15.3.2		



CLAUSE	VERDICT	COMMENT
SB15.3.3		For this test, any protective devices such as a fuse, manual reset circuit protector, or thermal protector are allowed to remain in the circuit.
SB15.3.4		If overcurrent protection is provided by an overcurrent protection device, the overload test current shall be the maximum current which the overcurrent protection device is just capable of passing for 1 hour. If this value cannot be derived from the specification, it shall be established by test.
SB15.3.5		If no overcurrent protection is provided, the maximum overload shall be the maximum power output obtainable from the power supply.
SB15.3.6		In case of voltage foldback, the overload shall be slowly increased to the point which causes the output voltage to collapse. The overload shall then be established at the point where the output voltage recovered and held for the duration of the test.
SB15.3.7		The duration of the test shall be for 7 hours or until ultimate results are reached. At the conclusion of the test, there shall be no charring or burning of electrical insulation, and no opening of any protective device or any circuit component.
		CUSTOMERS PLEASE NOTE: This Table and column "Verdict" can be used in determining how your current or future production is or will be in compliance with new/revised requirements.