

Standard Information

Standard Number: CAN/CSA-C22.2 No. 60335-1:16 / UL 60335-1

Standard Name: Household and Similar Electrical Appliances, Part 1: General Requirements

Standard Edition and Issue Date: 6th Edition Dated October 31, 2016

Date of Issue: October 31, 2016

Date of Previous Revision of Standard: 5th Edition Revised October 31, 2011

Effective Date of New/Revised Requirements

Effective Date: **December 31, 2018**

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requests in writing that current requirements be used along with their understanding that their listings will be withdrawn on Effective Date noted above, unless the product is found to comply with new/revised requirements.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: Numerous additions and revisions to Markings, Instructions, Constructions and Tests. 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 Required:

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 – Please immediately identify any current Listing Reports or products that are no longer active and should be removed from our records.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.

Description of New/Revised Technical Requirements

Clause	Verdict	Comment
-	Info	CAN/CSA-C22.2 No. 60335-1-11 / UL 60335-1 fifth edition was based on adoption with deviations of IEC 60335-1 edition 4.2. CAN/CSA-C22.2 No. 60335-1:16 / UL 60335-1 sixth edition is based on adoption with deviations of IEC 60335-1 edition 5.1.
-	Info	Mexico has been removed from this publication, making it a bi-National standard and no longer tri-National. Mexican deviations have been removed throughout the document so the remainder of this summary does not mention these changes further.
5.2DV		DE Modification to replace last sentence of first paragraph to the following: The test of 22.3 and 22.55DV is carried out on a new appliance.
5.13		The tests for appliances with PTC HEATING ELEMENTS and for HEATING APPLIANCES and COMBINED APPLIANCES where the heating elements are supplied via a switch mode power supply are carried out at a voltage corresponding to the specified power input. When a power input greater than the RATED POWER INPUT is specified, the factor for multiplying the voltage is equal to the square root of the factor for multiplying the power input.
5.19		If a component or part of the appliance has both a SELF RESETTING FEATURE and a NON-SELF-RESETTING FEATURE and if the NON-SELF-RESETTING FEATURE is not required in order to comply with the standard, then appliances incorporating such a component or part shall be tested with the NON-SELF-RESETTING FEATURE rendered inoperative.
7	Info	Marking and instructions
7.1		Appliances shall be marked with the – symbol IEC 60417-5180 (2003-02), for CLASS III APPLIANCES. This marking is not necessary for appliances that are operated only by batteries (primary batteries or secondary batteries that are recharged outside of the appliance). – CLASS II APPLIANCES and CLASS III APPLIANCES incorporating a functional earth shall be marked with the symbol IEC 60417-5018 (2011-07).
7.1DV.3		DR Modification to add the following (Canada Only): In Canada, warnings shall be written in English and French.

Clause	Verdict	Comment
7.4		If the appliance can be adjusted for different RATED VOLTAGES or RATED FREQUENCIES, the voltage or the frequency to which the appliance is adjusted shall be clearly discernible. If frequent changes in voltage setting or frequency setting are not required, this requirement is considered to be met if the RATED VOLTAGE or RATED FREQUENCY to which the appliance is to be adjusted can be determined from a wiring diagram fixed to the appliance. NOTE: The wiring diagram may be on the inside of a cover that has to be removed to connect the supply conductors. It is not to be on a label loosely attached to the appliance.
7.6		Symbols for functional earthing and class III appliance are added to clause.
7.8DV		DR Modification to revise first dashed item as follows: – terminals used for type X attachment, intended exclusively for the neutral conductor shall be indicated by the letter N;
7.12		For appliances intended for use at altitudes exceeding 2 000 m, the maximum altitude of use shall be stated. The instructions for appliances incorporating a functional earth shall state the substance of the following: This appliance incorporates an earth connection for functional purposes only.
7.12.1		If an appliance is intended to be permanently connected to the water mains and not connected by a hose-set, this shall be stated. For appliances marked with different RATED VOLTAGES or different RATED FREQUENCIES (separated by a /), instructions shall be included to indicate to the user or installer what action must be taken to adjust the appliance for operation at the required RATED VOLTAGE or RATED FREQUENCY.
7.12.6		If a NON-SELF-RESETTING THERMAL CUT-OUT is required in order to comply with the standard then the instructions for appliances incorporating a NON-SELF-RESETTING THERMAL CUT-OUT that is reset by disconnection of the supply mains shall contain the substance of the following: CAUTION: In order to avoid a hazard due to inadvertent resetting of the THERMAL CUT-OUT, this appliance must not be supplied through an external switching device, such as a timer, or connected to a circuit that is regularly switched on and off by the utility.
7.14		The note for the petroleum spirit is converted to normative text, but the specific chemical previously stated is removed: Now, any aliphatic solvent hexane may be used.
7.15		The symbol IEC 60417-5018 (2011-07) shall be placed next to the symbol IEC 60417-5172 (2003-02) or the symbol IEC 60417-5180 (2003-02) as appropriate.
10.1		If the power input varies throughout the operating cycle and the maximum value of the power input exceeds, by a factor greater than two, the arithmetic mean value of the power input occurring during a representative period, then the power input is the maximum value that is exceeded for more than 10 % of the representative period. Otherwise the power input is taken as the arithmetic mean value.

Clause	Verdict	Comment
10.2		If the current varies throughout the operating cycle and the maximum value of the current exceeds, by a factor greater than two, the arithmetic mean value of the current occurring during a representative period, then the current is the maximum value that is exceeded for more than 10 % of the representative period. Otherwise the current is taken as the arithmetic mean value.
11.8, Table 3		Table 3 – Modified the temperature limits for the external enclosure of motor-operated appliances. 11.8DV.5 becomes c), but is extended to create a temperature rise limit for silicone rubber; A new item f) is added to provide a temperature rise limit for surfaces where adhesive is used to secure non-detachable parts used to protect against access to live parts, moisture or contact with moving parts. This temperature rise limit already existed as an absolute value (70°C) in 22.11DV.1 in the previous edition; and New item h) is added to delete footnote f) from the IEC standard (US only).
13.1DV.1		D1 Modification to add the following note: NOTE At operating temperature includes warm-up and cool-down periods.
13.1DV D1, 13.2DV.2 D2		Leakage current limits for CLASS II APPLIANCES and for parts of CLASS II CONSTRUCTION increased from 0.25mA to 0.35mA. Leakage current limits for portable CLASS I APPLIANCES decreased from 0.75mA to 0.5mA.
Table 4		a) Replace footnote a with the following: “a Appliances rated more than 250 V are tested at $2 U + 1000 V$.” b) Add superscript “c” after “BASIC INSULATION” and add footnote c: “c For wet and moist applications, special test voltages could be considered in the applicable part 2.”
14		Some impulse test voltages in table 6 were changed – some test voltages were increased while others were relaxed.
15		Changed reference to the humidity test to IEC 60068-2-75 rather than having the details directly in IEC 60335-1. IEC 60068-2-75 requires the test chamber to be five times the size of the product under test.
15.2		Compliance is checked by the following test using a spillage solution comprising water containing approximately 1 % NaCl and 0.6 % rinsing agent.
15.3		Changed reference to the humidity test to IEC 60068-2-75 rather than having the details directly in IEC 60335-1. IEC 60068-2-75 requires the test chamber to be five times the size of the product under test.

Clause	Verdict	Comment
16.2DV.1 D2,		Modification to replace all dashed items of the fourth paragraph with the following dashed items: <ul style="list-style-type: none"> – for CLASS II APPLIANCES and for parts of CLASS II CONSTRUCTION 0,25 mA – for CLASS 0, CLASS 0I and CLASS III APPLIANCES 0,5 mA – for PORTABLE CLASS I APPLIANCES 0,5 mA – for all cord connected STATIONARY CLASS I APPLIANCES 0,75mA – for other CLASS I MOTOR-OPERATED APPLIANCES 3,5mA – for other CLASS I HEATING APPLIANCES 0,75 mA or 0,75 mA per kW RATED POWER INPUT of the appliance with a maximum of 5 mA, whichever is higher
16.2DV.2 D2		Modification to replace the fifth paragraph and dashed items starting with “The values specified above are doubled” with the following: Higher leakage current values, not exceeding 3,5 mA, may be allowed by applicable part 2 standards for cord connected, STATIONARY CLASS I APPLIANCES employing radio interference filters.
19.1		Appliances incorporating voltage selector switches are subjected to the test of 19.15.
19.9		New text is added to require all unattended motor-operated appliances and combined appliances that use overload protective devices relying on electronic circuits to protect the motor windings to also be subjected to this test.
19.11.4.6		For appliances having a RATED CURRENT not exceeding 16 A, the appliance is subjected to the class 3 voltage dips and interruptions in accordance with IEC 61000-4-11. The values specified in Table 1 and Table 2 of IEC 61000-4-11 are applied at zero crossing of the supply voltage. <u>For appliances having a RATED CURRENT exceeding 16 A, the appliance is subjected to the class 3 voltage dips and interruptions in accordance with IEC 61000-4-34. The values specified in Table 1 and Table 2 of IEC 61000-4-34 are applied at zero crossing of the supply voltage.</u>
19.15		For appliances incorporating a mains voltage selector switch, this switch is set to the lowest RATED VOLTAGE position and the highest value of RATED VOLTAGE is applied.
22.5		Appliances intended to be connected to the supply mains by means of a plug shall be constructed so that in normal use there is no risk of electric shock from charged capacitors having a rated capacitance equal to or greater than 0,1 µF, when the pins of the plug are touched.
22.11DV DC		For US: – From previous clause 22.11DV D2. 22.11DV is modified to remove the adhesive aging test and refer directly to Annex DVA, which means that adhesives used for securement of non-detachable parts must comply with the applicable parts of UL 746C.

Clause	Verdict	Comment
22.55DV D1 and Annex DVD		For Canada: – From previous clause 22.11DV D2. new normative Annex DVD is created. The test covered by the previous edition’s clause numbers 22.11DV.2 to 22.11DV.8 is relocated to DVD.2 to DVD.6 without change, except that the test is now also applied to any parts that rely on adhesive for compliance with the standard (i.e. compliance with clause 4), such as to maintain spacings (see DVD.4 item b)).
22.39DV		D2 Modification to add the following: The screwshell of a mains-connected Edison-base lampholder shall be reliably connected to the identified (neutral) conductor.
22.40DV		D2 Modification to add the following: A cord-connected product with a motor having a rated output of more rated than 249 W (1/3 hp) shall be provided with a manually operated motor-control switch.
22.46		If programmable PROTECTIVE ELECTRONIC CIRCUITS are used to ensure compliance with this standard, the software shall contain measures to control the fault/error conditions specified in Table R.1. Software that contains measures to control the fault/error conditions specified in Table R.2 is to be specified in parts 2 for particular constructions or to address specific hazards, if necessary. These requirements are not applicable to software used for functional purpose or for compliance with Clause 11. Compliance is checked by evaluating the software in accordance with the relevant requirements of Annex R. If the software is modified, the evaluation and relevant tests are repeated if the modification influences the results of the test involving PROTECTIVE ELECTRONIC CIRCUITS. NOTE: Measures used for software to control the fault/error conditions specified in Table R.2 are inherently acceptable for measures used for software to control the fault/error conditions specified in Table R.1.
22.52DV		D1 Rather than specifying that socket outlets are to be considered in the part 2, the part 1 now points to Annex DVA for the applicable socket outlet standards.
22.53		CLASS II APPLIANCES and CLASS III APPLIANCES that incorporate functionally earthed parts shall have at least DOUBLE INSULATION or REINFORCED INSULATION between LIVE PARTS and the functionally earthed parts. Compliance is checked by inspection and test.
22.54		Button cells and batteries designated R1 shall not be accessible without the aid of a TOOL unless the cover of their compartment can only be opened after at least two independent movements have been applied simultaneously. Compliance is checked by inspection and by manual test. NOTE: Batteries are specified in IEC 60086-2.
22.55DV		D1 Addition (Canada only): 22.55DV.1 Adhesives required for compliance with Clause 4 of this standard shall be durable.

Clause	Verdict	Comment
22.55DV.2		Compliance is checked by the test of Annex DVD. NOTE: Label adhesives are not subjected to this test. Labels are covered by the requirements specified in Annex DVA.
22.56DV		D1 Addition (Canada only): Unless connected in series with gas discharge tubes, varistors shall not be connected between LIVE PARTS and accessible metal parts of appliances that have 1-15P, 5-15P, 1-20P, or 5-20P plug configurations. This does not apply to permanently connected appliances or appliances with other plug configurations.
23.3		The appliance shall not be damaged to the extent that compliance with this standard is impaired and it shall be fit for further use. In particular, the wiring and its connections shall withstand the electric strength test of 16.3, the test voltage being reduced to 1 000 V and applied between LIVE PARTS and ACCESSIBLE METAL PARTS only. In addition, not more than 10 % of the strands of any conductor of the internal wiring between the main part of the appliance and the movable part shall be broken. However, if the wiring supplies circuits that consume no more than 15 W, then no more than 30 % of the strands shall be broken.
23.5		A single layer of internal wiring insulation does not provide REINFORCED INSULATION.
23.9		Stranded conductors shall not be consolidated by soldering where they are subjected to contact pressure, unless the contact pressure is provided by spring terminals. NOTE: Soldering of the tip of a stranded conductor is allowed. Compliance is checked by inspection.
24.1DV	Info	DC Modification to replace 24.1 with 24.1DV.1 – 24.1DV.11:
24.1DV.1		Components shall comply with the safety requirements specified in the relevant standards of Annex DVA as far as they reasonably apply.
24.1DV.2		Compliance with the standard for the relevant component does not necessarily ensure compliance with the requirements of this standard.
24.1DV.3		Motors are not required to comply with the standards specified in Annex DVA. They may be tested as part of the appliance according to this standard.
24.1DV.4		Unless otherwise specified, the requirements of Clause 29 of this standard apply between LIVE PARTS of components and ACCESSIBLE PARTS of the appliance. Unless otherwise specified, components may comply with the requirements for CLEARANCES and CREEPAGE DISTANCES for FUNCTIONAL INSULATION as specified in the relevant component standard.
24.1DV.5		Unless otherwise specified, the requirements of 30.2 of this standard apply to parts of non-metallic material in components, including parts of non-metallic material supporting current-carrying connections inside components.
24.1DV.6		Components that have not been previously tested and shown to comply with the standard for the relevant component shall be tested according to the requirements of 30.2 of this standard.

Clause	Verdict	Comment
24.1DV.7		Components that have been previously tested and shown to comply with the resistance to fire requirements in the standard for the relevant component need not be retested, provided that a) the severity specified in the component standard is not less than the severity specified in 30.2 of this standard; and b) unless the pre-selection alternatives in 30.2 are used, the test report for the component states the values of t_e and t_i , as required by IEC 60695-2-11.
24.1DV.8		If the two conditions specified in 24.1DV.7 are not satisfied, the component shall be tested as part of the appliance. NOTE: There are two levels of severity specified for appliances for which 30.2.3 is applicable.
24.1DV.9		Unless components have been previously tested and found to comply with the relevant standard of Annex DVA for the number of cycles specified, they shall be tested in accordance with 24.1.1 to 24.1.9. For components mentioned in 24.1.1 to 24.1.9, no additional tests specified in the relevant standard for the component are necessary other than those specified in 24.1.1 to 24.1.9.
24.1DV.10		Components that have not been separately tested and found to comply with the relevant standard of Annex DVA, and components that are not marked or not used in accordance with their marking, shall be tested in accordance with the conditions occurring in the appliance, the number of samples being that required by the relevant standard. NOTE: For automatic controls, marking includes documentation and declaration as specified in Clause 7 of IEC 60730-1
24.1DV.11		When a standard does not exist for a component or where one exists but is not specified in Annex DVA, the appliance standard requirements apply and there are no additional tests specified.
24.1.2		The relevant standard for transformers in associated switch mode power supplies is Annex BB of IEC 61558-2-16. Clause 26 of IEC 61558-1 and Annex H of IEC 61558-1 are not applicable. The relevant standard for SAFETY ISOLATING TRANSFORMERS is IEC 61558-2-6. If they have to be tested, they are tested in accordance with Annex G.
24.1.2DV		DC Modification to add the following: A transformer relied upon to create a LIMITED POWER SOURCE shall meet the requirements of Annex DVA.

Clause	Verdict	Comment
24.1.3		<p>The relevant standard for switches is IEC 61058-1. The number of cycles of operation declared for 7.1.4 of IEC 61058-1 shall be at least 10 000. If they have to be tested, they are tested in accordance with Annex H.</p> <p>NOTE: The declared number of operating cycles is only applicable for switches required for compliance with this standard.</p> <p>If the switch operates a relay or contactor, the complete switching system is subjected to the test. If the switch only operates a motor starting relay complying with IEC 60730-2-10 with the number of cycles of operation declared for 6.10 and 6.11 of IEC 60730-1 of at least 10 000 cycles, the complete switching system need not be tested.</p>
24.1.4		<p>THERMAL CUT-OUTS of the capillary type shall comply with the requirements for type 2.K controls in IEC 60730-2-9.</p>
24.1.4DV		<p>DC Modification to replace the second paragraph and all of the dashed items with the following:</p> <p>The number of cycles of operation declared for 6.10 and 6.11 of IEC 60730-1 shall not be less than 2000 for automatic self-resetting thermal motor protectors on motors rated greater than 1 Hp, 300 for all other automatic self-resetting thermal motor protectors, and 6000 for all other automatic controls.</p>
24.1.7DV		<p>DC Modification to replace 24.1.7 with the following:</p> <p>If the REMOTE OPERATION of the appliance is via a telecommunication network, the relevant standard for the telecommunications network interface circuitry in the appliance is as specified in Annex DVA.</p>
24.1.8DV		<p>DC Modification to replace 24.1.8 with the following:</p> <p>THERMAL LINKS that do not comply with the applicable standard of Annex DVA are considered to be an INTENTIONALLY WEAK PART for the purposes of Clause 19.</p>
24.4DV		<p>DC Modification to replace 24.4 with the following:</p> <p>Plugs and socket-outlets and those for EXTRA-LOW VOLTAGE circuits used as terminal devices for heating elements shall not be interchangeable with general use plugs and socket-outlets or with connectors and appliance inlets complying with the standard sheets of IEC 60320-1.</p> <p>NOTE 1: General use refers to plug and socket-outlet configurations permitted under national wiring rules.</p> <p>NOTE 2: Reference to IEC 60320-1 is for connector and appliance inlet configuration comparison purposes only.</p>
24.8		<p>Motor running capacitors in appliances for which 30.2.3 is applicable and that are permanently connected in series with a motor winding shall not cause a hazard in the event of a capacitor failure.</p> <p>The requirement is considered to be met by one or more of the following conditions:</p> <ul style="list-style-type: none"> – the capacitors are of class of safety protection P2 according to IEC 60252-1; – the capacitors are housed within a metallic or ceramic enclosure that will prevent the emission of flame or molten material resulting from failure of the capacitor;

Clause	Verdict	Comment
		<p>NOTE: The enclosure may have an entry or exit hole for the wiring connecting the capacitor to the motor.</p> <ul style="list-style-type: none"> – the distance of separation of the outer surface of the capacitor to adjacent non-metallic parts exceeds 50 mm; – adjacent non-metallic parts within 50 mm of the outer surface of the capacitor withstand the needle-flame test of Annex E; – adjacent non-metallic parts within 50 mm of the outer surface of the capacitor are classified as at least V-1 according to IEC 60695-11-10, provided that the test sample used for the classification was no thicker than the relevant part of the appliance. <p>Compliance is checked by inspection, measurement or the appropriate flammability requirement.</p>
24.8DV		<p>DC Modification to replace the first dashed item with the following:</p> <ul style="list-style-type: none"> – the capacitors are of class of safety protection S2 or S3 according to IEC 60252-1 or are of class of safety protection according to relevant standards of Annex DVA;
25.1DV.1		<p>DR Modification to add 25.1DV.1.1– 25.1DV.1.2:</p> <p>25.1DV.1.1 The SUPPLY CORD of appliances incorporating a screwshell type lampholder, general use socket outlet, or single-pole switch used as the 22.2 disconnect device shall be fitted with a polarized attachment plug.</p> <p>25.1DV.1.2 The SUPPLY CORD of appliances with a polarized attachment plug shall have its identified neutral conductor connected to the grounded (neutral) contact of the plug.</p> <p>25.1DV.2 DR Modification to add the following note:</p> <p>NOTE: A grounding-type attachment plug fulfils the requirement for a polarized attachment plug.</p>
25.2DV		<p>D1 Modification to add the following:</p> <p>Multiple supply mains connections may be permitted only as specified in part 2 standards.</p>
25.3DV.1		<p>D2 Modification to replace the third dashed item with the following:</p> <ul style="list-style-type: none"> – A set of SUPPLY LEADS accommodated in a suitable compartment. Leads shall be: <ul style="list-style-type: none"> • a minimum 152 mm long; • no more than two standard AWG wire sizes smaller than the intended supply conductor; and • completely insulated if not every installation would require use of the lead.

Clause	Verdict	Comment
25.5		<p>SUPPLY CORDS shall be assembled to the appliance by one of the following methods:</p> <ul style="list-style-type: none"> – TYPE X ATTACHMENT; – TYPE Y ATTACHMENT; – TYPE Z ATTACHMENT, if allowed in the relevant part 2. <p>TYPE X ATTACHMENTS, other than those having a specially prepared cord, shall not be used for flat twin tinsel cords.</p> <p>For multi-phase appliances that are supplied with a SUPPLY CORD and that are intended to be permanently connected to the fixed wiring, the SUPPLY CORD shall be assembled to the appliance by a TYPE Y ATTACHMENT.</p> <p>Compliance is checked by inspection.</p>
25.7DV	Info	DC Modification to replace 25.7 with 25.7DV.1 – 25.7DV.6:
25.7DV.1		<p>SUPPLY CORDS for appliances other than CLASS III APPLIANCES shall be one of the following types:</p> <ul style="list-style-type: none"> a) flexible cords and cable of the types indicated in the standards of Annex DVA; or b) cord sets and power SUPPLY CORDS of the types indicated in the standards of Annex DVA.
25.7DV.2		Unless otherwise specified in a part 2 standard, a heater cord is required where the temperature measured during the test of Clause 11 exceeds 121 °C on any surface that the cord is likely to touch when the appliance is used as intended.
25.7DV.3		SUPPLY CORDS for CLASS III APPLIANCES shall be adequately insulated.
25.7DV.4		Compliance is checked by inspection, by measurement, and for CLASS III APPLIANCES that contain LIVE PARTS, by the test of 25.7DV.5.
25.7DV.5		A voltage of 500 V shall be applied for 2 min between the conductor and metal foil wrapped around the insulation, the insulation being at the temperature measured during the test of Clause 11. There shall be no breakdown during this test.
25.7DV.6		An appliance having an appliance inlet for connection to the mains shall be provided with a detachable power SUPPLY CORD (cord set).
Table 11		<p>Added note:</p> <p>b Cords having the cross-sectional areas indicated in the parentheses may be used for PORTABLE APPLIANCES if their length does not exceed 2 m.</p>
25.8DV	Info	DR Modification to replace 25.8, including Table 11, with 25.8DV.1 – 25.8DV.2:
25.8DV.1		Ampacities of SUPPLY CORDS and attachment plugs shall not be less than the current rating of the appliance and shall be suitable for the application in accordance with national electrical installation requirements.
25.8DV.2		Compliance is checked by inspection.
25.10DV	Info	DR Modification to replace 25.10 with 25.10DV.1 – 25.10DV.3:
25.10DV.1		The earthing conductor of the SUPPLY CORD of CLASS I APPLIANCES shall have green/yellow or solid green insulation and be connected to the earthing terminal of the appliance, and for appliances not intended for permanent connection to the fixed wiring, to the earthing contact of the plug.

Clause	Verdict	Comment
25.10DV.2		The colour of the neutral conductor of the SUPPLY CORD, if any, shall be identified according to the national electrical codes.
25.10DV.3		Compliance is checked by inspection.
25.11		Conductors of SUPPLY CORDS shall not be consolidated by soldering where they are subjected to contact pressure, unless the contact pressure is provided by spring terminals. NOTE: Soldering of the tip of a stranded conductor is allowed.
25.13		Inlet openings for SUPPLY CORDS shall be constructed so that the sheath of the SUPPLY CORD can be introduced without risk of damage. If it is not evident from the construction of the appliance that the SUPPLY CORD can be introduced without risk of damage, a NON-DETACHABLE LINING or NON-DETACHABLE BUSHING shall be provided that complies with 29.3 for SUPPLEMENTARY INSULATION. If the SUPPLY CORD is unsheathed, a similar additional bushing or lining is required, unless the appliance is a CLASS 0 APPLIANCE or a CLASS III APPLIANCE that does not contain LIVE PARTS. Compliance is checked by inspection.
25.13		Appliances provided with a SUPPLY CORD, and appliances intended to be permanently connected to fixed wiring by a flexible cord, shall have a cord anchorage. The cord anchorage shall relieve conductors from strain, including twisting, at the terminals and protect the insulation of the conductors from abrasion. It shall not be possible to push the cord into the appliance to such an extent that the cord or internal parts of the appliance could be damaged. Compliance is checked by inspection, by manual test and by the following test. A mark is made on the cord at a distance of approximately 20 mm from the cord anchorage or other suitable point. The mark is made while the cord is subjected to a pull force of – 100 N, for FIXED APPLIANCES regardless of the mass of the appliance; – the value as shown in Table 12, for other appliances. The cord is then pulled, without jerking, for 1 s in the most unfavourable direction with the force specified. The test is carried out 25 times. The cord, unless on an automatic cord reel, is then subjected to a torque that is applied as close as possible to the appliance. The torque is specified in Table 12 and is applied for 1 min.
25.15		Appliances provided with a SUPPLY CORD, and appliances intended to be permanently connected to fixed wiring by a flexible cord, shall have a cord anchorage. The cord anchorage shall relieve conductors from strain, including twisting, at the terminals and protect the insulation of the conductors from abrasion. It shall not be possible to push the cord into the appliance to such an extent that the cord or internal parts of the appliance could be damaged. Compliance is checked by inspection, by manual test and by the following test. A mark is made on the cord at a distance of approximately 20 mm from the cord

Clause	Verdict	Comment
		<p>anchorage or other suitable point. The mark is made while the cord is subjected to a pull force of</p> <ul style="list-style-type: none"> – 100 N, for FIXED APPLIANCES regardless of the mass of the appliance; – the value as shown in Table 12, for other appliances. <p>The cord is then pulled, without jerking, for 1 s in the most unfavourable direction with the force specified. The test is carried out 25 times.</p> <p>The cord, unless on an automatic cord reel, is then subjected to a torque that is applied as close as possible to the appliance. The torque is specified in Table 12 and is applied for 1 min.</p>
25.22DV		<p>DC Modification to replace the first dashed item with the following:</p> <ul style="list-style-type: none"> – be located or enclosed so that LIVE PARTS are not accessible during insertion or removal of the connector. This requirement is not applicable to appliance inlets complying with the appliance inlet standards listed in Annex DVA.
25.25DV		<p>DC Modification to replace 25.25 with 25.25DV.1 – 25.25DV.2:</p> <p>25.25DV.1 The dimensions of pins of appliances that are inserted into socket-outlets shall be compatible with the dimensions of the relevant socket-outlet. Dimensions of the pins and engagement face are to be in accordance with the dimensions of the relevant plug / socket outlet standards of Annex DVA.</p> <p>25.25DV.2 Compliance is checked by measurement.</p>
28.2DV		<p>D1 Modification to replace 28.2 with 28.2DV.1 – 28.2DV.2:</p> <p>28.2DV.1 Electrical connections and connections providing earthing continuity shall be constructed so that contact pressure is not transmitted through non-ceramic insulating material that is liable to shrink or to distort, unless there is sufficient resiliency in the metallic parts to compensate for any possible shrinkage or distortion of the insulating material. This requirement does not apply to electrical connections in circuits supplied by a LIMITED POWER SOURCE.</p> <p>28.2DV.2 Compliance is checked by inspection.</p>

Clause	Verdict	Comment
29		<p>CLEARANCES, CREEPAGE DISTANCES and solid insulation</p> <p>Appliances shall be constructed so that the CLEARANCES, CREEPAGE DISTANCES and solid insulation are adequate to withstand the electrical stresses to which the appliance is liable to be subjected.</p> <p>Compliance is checked by the requirements and tests of 29.1 to 29.3.</p> <p>If coatings are used on printed circuit boards to protect the microenvironment (type 1 protection) or to provide BASIC INSULATION (type 2 protection), Annex J applies. The microenvironment is pollution degree 1 under type 1 protection. For type 2 protection, the spacing between the conductors before the protection is applied shall not be less than the values as specified in Table 1 of IEC 60664-3. These values apply to FUNCTIONAL INSULATION, BASIC INSULATION, SUPPLEMENTARY INSULATION as well as REINFORCED INSULATION.</p> <p>NOTE 1: The requirements and tests are based on IEC 60664-1 from which further information can be obtained.</p> <p>NOTE 2: The assessment of CLEARANCES, CREEPAGE DISTANCES and solid insulation has to be carried out separately.</p>
29.1		<p>CLEARANCES shall not be less than the values specified in Table 16, taking into account the RATED IMPULSE VOLTAGE for the overvoltage categories of Table 15, unless, for BASIC INSULATION and FUNCTIONAL INSULATION, they comply with the impulse voltage test of Clause 14. However, if the construction is such that the distances could be affected by wear, by distortion, by movement of the parts or during assembly, the CLEARANCES for RATED IMPULSE VOLTAGES of 1 500 V and above are increased by 0,5 mm and the impulse voltage test is not applicable.</p> <p>For appliances intended for use at altitudes exceeding 2 000 m, the CLEARANCES in Table 16 shall be increased according to the relevant multiplier values in Table A.2 of IEC 60664-1. The impulse voltage test is not applicable when the microenvironment is pollution degree 3 or for BASIC INSULATION of CLASS 0 APPLIANCES and CLASS 0I APPLIANCES or to appliances intended for use at altitudes exceeding 2 000 m.</p> <p>Deleted note 5.</p>

Clause	Verdict	Comment
29.1.4		<p>The CLEARANCES for FUNCTIONAL INSULATION are the largest values determined from</p> <ul style="list-style-type: none"> – Table 16 based on the RATED IMPULSE VOLTAGE; – Table F.7a in IEC 60664-1 based on the steady-state voltage or recurring peak voltage expected to occur across it, if the frequency of the steady-state voltage or recurring peak voltage does not exceeds 30 kHz; – Clause 4 of IEC 60664-4 based on the steady-state voltage or recurring peak voltage expected to occur across it, if the frequency of the steady-state voltage or recurring peak voltage exceeds 30 kHz. If the values of Table 16 are largest, the impulse voltage test of Clause 14 may be applied instead unless the microenvironment is pollution degree 3 or the construction is such that the distances could be affected by wear, by distortion, by movement of the parts or during assembly. However, CLEARANCES are not specified if the appliance complies with Clause 19 with the FUNCTIONAL INSULATION short-circuited. <p>Lacquered conductors of windings are considered to be bare conductors. However, CLEARANCES at crossover points are not measured.</p> <p>The CLEARANCE between surfaces of PTC HEATING ELEMENTS may be reduced to 1 mm.</p> <p>Compliance is checked by measurement and by a test if necessary.</p>
29.1.5		<p>For appliances having higher WORKING VOLTAGES than RATED VOLTAGE, for example on the secondary side of a step-up transformer, or if there is a resonant voltage, the CLEARANCES for BASIC INSULATION are the largest values determined from</p> <ul style="list-style-type: none"> – Table 16 based on the RATED IMPULSE VOLTAGE; – Table F.7a in IEC 60664-1 based on the steady-state voltage or recurring peak voltage expected to occur across it, if the frequency of the steady-state voltage or recurring peak voltage does not exceed 30 kHz; – Clause 4 of IEC 60664-4 based on the steady-state voltage or recurring peak voltage expected to occur across it, if the frequency of the steady-state voltage or recurring peak voltage exceeds 30 kHz.
29.2.1, 29.2.2, 29.2.3, 29.2.4		<p>Added requirements for minimum basic, supplementary, reinforced and functional insulation creepage distances for circuits operating at greater than 30 kHz and a new requirement (note 4 of tables 17 and 18) that minimum values are to be determined through interpolation for working voltages up to 630 V.</p>
29.2, Table 17		<p>Note 1 is replaced such that it excludes creepage distances for basic insulation in double insulation constructions.</p>
29.3		<p>The third dashed item is split into two to separately cover thermal quality assessment for single layer internal wiring.</p>
29.3, 29.3.4		<p>Added minimum thickness and thermal quality assessment requirements for accessible parts of reinforced solid insulation not complying with the thickness requirements in 29.3.1. Also added requirements for supplementary and reinforced solid insulation subjected to higher frequencies.</p>

Clause	Verdict	Comment
30.2.3.2		Added option for pre-selection of materials with a glow wire flammability index and added exemption for small parts, but also require consequential needle flame test for parts within 3mm of some of these parts.
Annex B		The existing Annex B is split into Annexes B and S as follows: o Annex B is for appliances powered by rechargeable batteries that are recharged in the appliance o Annex S is for battery-operated appliances powered by batteries that are non-rechargeable or not recharged in the appliance
Annex D		Updated for consistency with the locked rotor/moving parts test in 19.7.
Annex D, DDV.1		D2 – New deviation to direct to the standards listed in Annex DVA.
Annex F, FDV		D2 Modification to first paragraph: Replace “IEC 60384-14” with “UL 60384-14 and CAN/CSA E60384-14”.
Annex G, 29		Added requirements for minimum clearance, creepage distances and solid insulation for transformers operating at greater than 30 kHz.
Annex R		This Annex and associated clause 22.46 were completely rewritten.
Annex DVA		Made normative since the reference from clause 24 made this informative annex normative anyway. Updated standard list.
Annex DVD		See changes related to 22.11DV.
		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.