



# LVD TEST REPORT

**Report No.:** NTS2406400S

**Product:** air pump

**Model No.:** LW-A-2001, LW-A-2001, LW-A-2002, LW-A-2003, LW-A-2004, LW-A-2005,  
LW-A-2006, LW-A-2007, LW-A-2008, LW-A-2009, LW-A-2010

**Applicant:** Shenzhen Liangwei Technology Co., Ltd

**Address:** 7F,B Building, Huafeng International Robotics Industrial Park,Gushu, Xixiang Street,  
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**Issued by:** NOWD Testing Services Co., Ltd.

**Lab Location:** 5A, Building 29B, Yintian Industrial Zone, Xixiang Street, Bao'an  
District, Shenzhen, China

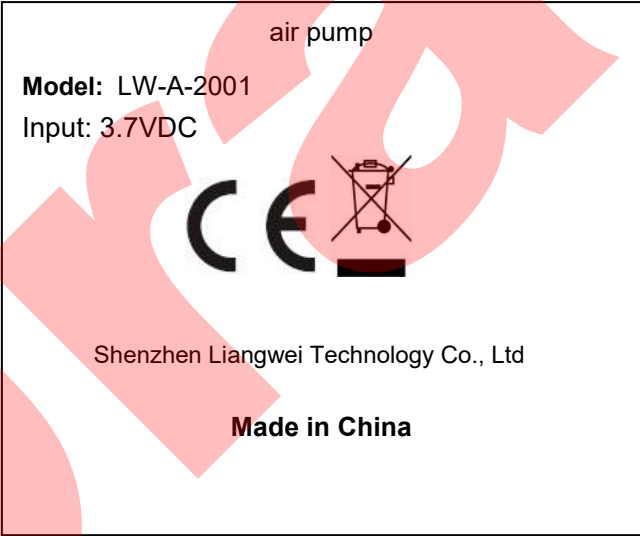
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**CE**

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<b>TEST REPORT</b>	
<b>EN 60335-1</b>	
<b>Household and similar electrical appliances - Safety</b>	
<b>Part 1: General requirements</b>	
<b>Report Number</b> .....	NTS2406400S
Tested by (+ signature) .....	Tim Tang
Compiled by (+ signature) .....	Sailor Jiang
Date of issue.....	July 05, 2024
Total number of pages.....	94 pages
<b>Testing laboratory</b> .....	NOWD Testing Services Co., Ltd.
Address .....	5A, Building 29B, Yintian Industrial Zone, Xixiang Street, Bao'an District, Shenzhen, China
Testing location .....	As above
<b>Applicant's name</b> .....	Shenzhen Liangwei Technology Co., Ltd
Address.....	7F,B Building, Huafeng International Robotics Industrial Park,Gushu, Xixiang Street, Bao'an, Shenz
Manufacturer.....	Shenzhen Liangwei Technology Co., Ltd 7F,B Building, Huafeng International Robotics Industrial Park,Gushu, Xixiang Street, Bao'an, Shenz
<b>Test specification:</b>	
Standard.....	EN 60335-1: 2012 +A11: 2014 +A13: 2017 +A14: 2019 +A1: 2019 + A2: 2019+A15: 2021
Test procedure.....	CE Attestation
Non-standard test method.....	N/A
<b>Test Report Form No</b> .....	<b>IEC60335_1Z</b>
Test Report Form(s) Originator.....	NOWD
Master TRF.....	Dated 2020-12-10
<b>This test report is specially limited to the above client company and product model only. It may not be duplicated without prior written consent of NOWD Testing Services Co., Ltd.</b>	
<b>Test item description</b> .....	air pump
Trade Mark.....	N/A
Model/Type reference.....	LW-A-2001, LW-A-2001, LW-A-2002, LW-A-2003, LW-A-2004, LW-A-2005, LW-A-2006, LW-A-2007, LW-A-2008, LW-A-2009, LW-A-2010
Ratings.....	3.7V DC

<b>Summary of testing:</b>	
<b>Tests performed (name of test and test clause):</b> <b>EN 60335-1: 2012 +A11: 2014 +A13: 2017 +A14: 2019 +A1: 2019 +A2: 2019 +A15: 2021</b> The submitted samples were found to comply with the requirements of above specification.	<b>Testing location:</b> NOWD Testing Services Co., Ltd. 5A, Building 29B, Yintian Industrial Zone, Xixiang Street, Bao'an District, Shenzhen, China

<b>Copy of marking plate</b>
<p>The artwork below may be only a draft. The use of certification marks on a product must be authorized by the respective NCBS that own these marks.</p> <p>(Additional requirements for markings. See 1.7 NOTE)</p> <div data-bbox="523 999 1166 1532" data-label="Image"></div> <p>Remark on above marking: 1, The height of CE symbols is more than 5 mm; 2, The height of WEEE symbols is more than 7 mm;</p>

<b>Test item particulars</b> .....:	
Equipment mobility.....:	<input checked="" type="checkbox"/> movable <input type="checkbox"/> hand-held <input type="checkbox"/> transportable <input type="checkbox"/> stationary <input type="checkbox"/> for building-in <input type="checkbox"/> direct plug-in
Connection to the mains.....:	<input type="checkbox"/> pluggable equipment <input type="checkbox"/> type A <input type="checkbox"/> type B <input type="checkbox"/> permanent connection <input type="checkbox"/> detachable power supply cord <input checked="" type="checkbox"/> non-detachable power supply cord <input type="checkbox"/> not directly connected to the mains
Class of equipment .....	<input checked="" type="checkbox"/> Class I <input type="checkbox"/> Class II <input type="checkbox"/> Class III <input type="checkbox"/> Not classified
Operating condition.....:	<input checked="" type="checkbox"/> continuous <input type="checkbox"/> rated operating / resting time:
<b>Possible test case verdicts:</b>	
- test case does not apply to the test object.....:	N/A (or N)
- test object does meet the requirement.....:	P (Pass)
- test object does not meet the requirement.....:	F (Fail)
<b>Testing</b> .....:	
Date of receipt of test item.....:	June 28, 2024
Date(s) of performance of tests.....:	June 28, 2024 to July 5, 2024
<b>General remarks:</b>	
<p>The test results presented in this report relate only to the object tested.</p> <p>This report shall not be reproduced, except in full, without the written approval of the Issuing testing laboratory.</p> <p>"(see Enclosure #)" refers to additional information appended to the report.</p> <p>"(see appended table)" refers to a table appended to the report.</p> <p>Throughout this report a <input type="checkbox"/> comma / <input checked="" type="checkbox"/> point is used as the decimal separator.</p>	
<b>General product information:</b>	
1, EUT is a air pump manufactured by Guangzhou Yunyang Electronic Technology Co., Ltd.	

EN 60335- 1			
Clause	Requirement + Test	Result - Remark	Verdict
<b>5</b>	<b>GENERAL CONDITIONS FOR THE TESTS</b>		--
	Tests performed according to Cl. 5, e.g. nature of supply, sequence of testing, etc.		P
<b>6</b>	<b>CLASSIFICATION</b>		--
6.1	Protection against electric shock: Class I, II, III.....:	Class I	P
6.2	Protection against harmful ingress of water		N
<b>7</b>	<b>MARKING AND INSTRUCTIONS</b>		--
7.1	Rated voltage or voltage range (V).....:	3.7V DC	P
	Nature of supply.....:	DC	P
	Rated frequency (Hz).....:		N
	Rated input or rated current.....:		P
	Manufacturer's or responsible vendor's name, trademark or identification mark.....:	See label	P
	Model or type reference.....:	See rating label	P
	Symbol 5172 of IEC 60417, for Class II appliances		N
	IP number, other than IPX0.....:	IPX0	N
	Symbol IEC 60417-5180, for class III appliances, unless		N
	the appliance is operated by batteries only		N
	Single-phase appliances: 230 V covered (EN 60335-1:2012)		N
	Multi-phase appliances: 400 V covered (EN 60335-1:2012)		N
	Symbol IEC 60417-5036, for the enclosure of electrically-operated water valves in external hose-sets for connection of an appliance to the water mains		N
7.2	Warning for stationary appliances for multiple supply		N
	Warning placed in vicinity of terminal cover		N
7.3	Range of rated values marked with the lower and upper limits separated by a hyphen		N
	Different rated values marked with the values separated by an oblique stroke		P
7.4	Appliances adjustable for different rated voltages, the voltage setting is clearly discernible		N

EN 60335- 1			
Clause	Requirement + Test	Result - Remark	Verdict
7.5	Appliances with more than one rated voltage or one or more rated voltage ranges, marked with rated input or rated current for each rated voltage or range, unless	Only one rated voltage	N
	the power input is related to the mean value of the rated voltage range		P
	Relation between marking for upper and lower limits of rated power input or rated current and voltage is clear		N
7.6	Correct symbols used		P
	Symbol for nature of supply placed next to rated voltage	DC voltage	P
	Symbol for class II appliances placed unlikely to be confused with other marking		P
	Units of physical quantities and their symbols according to international standardized system		P
7.7	Connection diagram fixed to appliances to be connected to more than two supply conductors and appliances for multiple supply, unless		N
	correct mode of connection is obvious		N
7.8	Except for type Z attachment, terminals for connection to the supply mains indicated as follows:		--
	- marking of terminals exclusively for the neutral conductor (N)		N
	- marking of protective earthing terminals (symbol 5019 of IEC 60417)		N
	- marking not placed on removable parts		N
7.9	Marking or placing of switches which may cause a hazard		P
7.10	Indications of switches on stationary appliances and controls on all appliances by use of figures, letters or other visual means.....:		P
	If figures are used, the off position indicated by the figure 0		P
	The figure 0 indicates only OFF position, unless no confusion with the OFF position		P
	Devices used to start/stop operational functions of the appliance distinguished from other manual devices by means of shape, size, surface texture, position, etc. (EN60335-1: 2012)		P
	An indication that the device has been operated is given by: (EN60335-1: 2012)		--
	• a tactile feedback, or		P
	• an audible and visual feedback		N

EN 60335-1			
Clause	Requirement + Test	Result - Remark	Verdict
7.11	Indication for direction of adjustment of controls		N
7.12	Instructions for safe use provided		P
	Details concerning precautions during user maintenance		P
	The instructions state that: (EN60335-1: 2012)		--
	- This appliance can be used by children aged from 8 years and above and persons with reduced physical, sensory or mental capabilities or lack of experience and knowledge if they have been given supervision or instruction concerning use of the appliance in a safe way and understand the hazards involved.		P
	- Children shall not play with the appliance.		P
	- Cleaning and user maintenance shall not be made by children without supervision.		P
	For a part of class III construction supplied from a detachable power supply unit, the instructions state that the appliance is only to be used with the unit provided		N
	Instructions for class III appliances state that it must only be supplied at SELV, unless		N
	it is a battery-operated appliance, the battery being charged outside the appliance		N
7.12.1	Sufficient details for installation supplied		P
	For an appliance intended to be permanently connected to the water mains and not connected by a hose-set, this is stated		N
7.12.2	Stationary appliances not fitted with means for disconnection from the supply mains having a contact separation in all poles that provide full disconnection under overvoltage category III, the instructions state that means for disconnection must be incorporated in the fixed wiring in accordance with the wiring rules		N
7.12.3	Insulation of the fixed wiring in contact with parts exceeding 50 K during clause 11; instructions stating that the fixed wiring must be protected		N
7.12.4	Instructions for built-in appliances:		N
	- dimensions of space		N
	- dimensions and position of supporting means		N
	- distances between parts and surrounding structure		N
	- dimensions of ventilation openings and arrangement		N
	- connection to supply mains and interconnection of separate components		N

EN 60335- 1			
Clause	Requirement + Test	Result - Remark	Verdict
	- plug accessible after installation, unless		N
	a switch in the fixed wiring in accordance with the wiring rules, unless		N
	a switch complying with 24.3		N
7.12.5	Replacement cord instructions, type X attachment with a specially prepared cord		N
	Replacement cord instructions, type Y attachment		N
	Replacement cord instructions, type Z attachment		N
7.12.6	Caution in the instructions for appliances incorporating a non-self-resetting thermal cut-out that is reset by disconnection of the supply mains, if this cut-out is required to comply with the standard		N
7.12.7	Instructions for fixed appliances stating how the appliance is to be fixed		N
7.12.8	Instructions for appliances connected to the water mains		N
	- max. inlet water pressure (Pa).....:		N
	- min. inlet water pressure, if necessary (Pa).....:		N
	Instructions concerning new and old hose-sets for appliances connected to the water mains by detachable hose-sets		N
7.13	Instructions and other texts in an official language.. :		P
	Languages ..... :	English	P
7.14	Marking clearly legible and durable, rubbing test as specified	After the test , no legible and durable	P
7.15	Marking on a main part	Marking label attached to outside enclosure	P
	Marking clearly discernible from the outside, if necessary after removal of a cover		P
	For portable appliances, cover can be removed or opened without a tool		P
	For stationary appliances, name, trademark or identification mark and model or type reference visible after installation	No such construction	N
	For fixed appliances, name, trademark or identification mark and model or type reference visible after installation according to the instructions		N
	Indications for switches and controls placed on or near the components. Marking not on parts which can be positioned or repositioned in such a way that the marking is misleading		P
7.16	Marking of a possible replaceable thermal link or fuse link clearly visible with regard to replacing the link		N

EN 60335- 1			
Clause	Requirement + Test	Result - Remark	Verdict
<b>8</b>	<b>PROTECTION AGAINST ACCESS TO LIVE PARTS</b>		--
8.1	Adequate protection against accidental contact with live parts		P
8.1.1	Requirement applies for all positions, detachable parts removed		P
	Lamps behind a detachable cover not removed, if conditions met		N
	Insertion or removal of lamps, protection against contact with live parts of the lamp cap		N
	Use of test probe B of IEC 61032, with a force not exceeding 1 N: no contact with live parts		P
8.1.2	Use of test probe 13 of IEC 61032 through openings in class 0 appliances and class II appliances/ constructions: no contact with live parts		P
	Test probe 13 also applied through openings in earthed metal enclosures having a non-conductive coating: no contact with live parts		P
8.1.3	For appliances other than class II, use of test probe 41 of IEC 61032, with a force not exceeding 1 N: no contact with live parts of visible glowing heating elements		N
8.1.4	Accessible part not considered live if:		--
	- safety extra-low a.c. voltage: peak value not exceeding 42.4 V		N
	- safety extra-low d.c. voltage: not exceeding 42.4 V		N
	- or separated from live parts by protective impedance		P
	If protective impedance: d.c. current not exceeding 2 mA, and		P
	a.c. peak value not exceeding 0.7 mA		N
	- for peak values over 42.4 V up to and including 450 V, capacitance not exceeding 0,1 μF		P
	- for peak values over 450 V up to and including 15 kV, discharge not exceeding 45 μC		N
	- for peak values over 15kV, the energy in the discharge not exceeding 350 mJ		N
8.1.5	Live parts protected at least by basic insulation before installation or assembly:		--
	- built-in appliances		N
	- fixed appliances		N
	- appliances delivered in separate units		N
8.2	Class II appliances and constructions constructed so that there is adequate protection against accidental contact with basic insulation and metal		P

EN 60335-1			
Clause	Requirement + Test	Result - Remark	Verdict
	parts separated from live parts by basic insulation only		
	Only possible to touch parts separated from live parts by double or reinforced insulation		N
<b>9</b>	<b>STARTING OF MOTOR-OPERATED APPLIANCES</b>		<b>N</b>
	Requirements and tests are specified in part 2 when necessary		N
<b>10</b>	<b>POWER INPUT AND CURRENT</b>		<b>--</b>
10.1	Power input at normal operating temperature, rated voltage and normal operation not deviating from rated power input by more than shown in table 1	(see appended table)	P
	Test carried out at upper and lower limits of the ranges for appliances with one or more rated voltage ranges, unless		N
	the rated power input is related to the arithmetic mean value		P
10.2	Current at normal operating temperature, rated voltage and normal operation not deviating from rated current by more than shown in table 2	(see appended table)	N
	Test carried out at upper and lower limits of the ranges for appliances with one or more rated voltage ranges, unless		N
	the rated current is related to the arithmetic mean value of the range		N
<b>11</b>	<b>HEATING</b>		<b>--</b>
11.1	No excessive temperatures in normal use		P
11.2	The appliance is held, placed or fixed in position as described..... :		P
11.3	Temperature rises, other than of windings, determined by thermocouples	By thermocouples	P
	Temperature rises of windings determined by resistance method, unless		N
	the windings makes it difficult to make the necessary connections		P
11.4	Heating appliances operated under normal operation at 1.15 times rated power input (W) ..... :		N
11.5	Motor-operated appliances operated under normal operation at most unfavourable voltage between 0.94 and 1.06 times rated voltage (V)..... :		N
11.6	Combined appliances operated under normal operation at most unfavourable voltage between		N

EN 60335-1			
Clause	Requirement + Test	Result - Remark	Verdict

	0.94 and 1.06 times rated voltage (V)..... :		
11.7	Operation duration corresponding to the most unfavourable conditions of normal use	24 h only for charging mode according to Annex B.	P
11.8	Temperature rises monitored continuously and not exceeding the values in table 3 .....	(see appended tables)	P
	If the temperature rise of a motor winding exceeds the value of table 3, or		N
	if there is doubt with regard to classification of insulation,		N
	tests of Annex C are carried out		N
	Sealing compound does not flow out		P
	Protective devices do not operate, except		P
	components in protective electronic circuits tested for the number of cycles specified in 24.1.4		N

<b>13</b>	<b>LEAKAGE CURRENT AND ELECTRIC STRENGTH AT OPERATING TEMPERATURE</b>		--
13.1	Leakage current not excessive and electric strength adequate		P
	Heating appliances operated at 1.15 times the rated power input (W)..... :		N
	Motor-operated appliances and combined appliances supplied at 1.06 times the rated voltage (V)..... :		N
	Protective impedance and radio interference filters disconnected before carrying out the tests		N
13.2	For class 0, class II and class III appliances, leakage current measured by means of the circuit described in figure 4 of IEC 60990		P
	For other appliances, a low impedance ammeter may be used		N
	Leakage current measurements..... :	(see appended table)	P
13.3	The appliance is disconnected from the supply		P
	Electric strength tests according to table 4..... :	(see appended table)	P
	No breakdown during the tests		P

<b>14</b>	<b>TRANSIENT OVERVOLTAGES</b>		--
	Appliances withstand the transient overvoltages to which they may be subjected		N
	Clearances having a value less than specified in table 16 subjected to an impulse voltage test, the test voltage specified in table 6..... :	(see appended table)	N

EN 60335-1			
Clause	Requirement + Test	Result - Remark	Verdict
	No flashover during the test, unless		N
	of functional insulation if the appliance complies with clause 19 with the clearance short-circuited		N
<b>15</b>	<b>MOISTURE RESISTANCE</b>		--
15.1	Enclosure provides the degree of moisture protection according to classification of the appliance	IPX0	N
	Compliance checked as specified in 15.1.1, taking into account 15.1.2, followed by the electric strength test of 16.3		N
	No trace of water on insulation which can result in a reduction of clearances and creepage distances below values specified in clause 29		N
15.1.1	Appliances, other than IPX0, subjected to tests as specified in IEC 60529..... :		N
	Water valves containing live parts in external hoses for connection of an appliance to the water mains tested as specified for IPX7 appliances		N
15.1.2	Hand-held appliance turned continuously through the most unfavourable positions during the test		N
	Built-in appliances installed according to the instructions		N
	Appliances placed or used on the floor or table placed on a horizontal unperforated support		N
	Appliances normally fixed to a wall and appliances with pins for insertion into socket-outlets are mounted on a wooden board		N
	For IPX3 appliances, the base of wall mounted appliances is placed at the same level as the pivot axis of the oscillating tube		N
	For IPX4 appliances, the horizontal centre line of the appliance is aligned with the pivot axis of the oscillating tube, and		N
	for appliances normally used on the floor or table, the movement is limited to two times 90° for a period of 5 min, the support being placed at the level of the pivot axis of the oscillating tube		N
	Appliances normally fixed to a ceiling are mounted underneath a horizontal unperforated support, the pivot axis of the oscillating tube located at the level of the underside of the support, and		N
	for IPX4 appliances, the movement of the tube is limited to two times 90° from the vertical for a period of 5 min		P
	Appliances with type X attachment fitted with a		N

EN 60335- 1			
Clause	Requirement + Test	Result - Remark	Verdict
	flexible cord as described		
	Detachable parts subjected to the relevant treatment with the main part		N
	However, if a part has to be removed for user maintenance and a tool is needed, this part is not removed		N
15.2	Spillage of liquid does not affect the electrical insulation	No such construction	N
	Appliances with type X attachment fitted with a highest flexible cord as described		N
	Appliances incorporating an appliance inlet tested with or without an connector in position, whichever is most unfavourable		N
	Detachable parts removed		N
	Overfilling test with additional amount of water, over a period of 1 min (l)..... :		N
	The appliance withstands the electric strength test of 16.3		N
	No trace of liquid on insulation that can result in a reduction of clearances and creepage distances below values specified in clause 29		N
15.3	Appliances proof against humid conditions		P
	Checked by test Cab: Damp heat steady state in IEC 60068-2-78		P
	Detachable parts removed and subjected, if necessary, to the humidity test with the main part		N
	Humidity test for 48 h in a humidity cabinet	25°C,93%,48h	P
	Reassembly of those parts that may have been removed		P
	The appliance withstands the tests of clause 16		P
<b>16</b>	<b>LEAKAGE CURRENT AND ELECTRIC STRENGTH</b>		--
16.1	Leakage current not excessive and electric strength adequate		P
	Protective impedance disconnected from live parts before carrying out the tests		N
	Tests carried out at room temperature and not connected to the supply		P
16.2	Single-phase appliances: test voltage 1.06 times rated voltage..... :		N
	Three-phase appliances: test voltage 1.06 times rated voltage divided by $\sqrt{3}$ ..... :		N
	Leakage current measurements	(see appended table)	P

EN 60335-1			
Clause	Requirement + Test	Result - Remark	Verdict

	Limit values doubled if:		N
	- all controls have an off position in all poles, or		N
	- the appliance has no control other than a thermal cut-out, or		N
	- all thermostats, temperature limiters and energy regulators do not have an off position, or		N
	- the appliance has radio interference filters		N
	With the radio interference filters disconnected, the leakage current do not exceed limits specified..... :	(see appended table)	N
16.3	Electric strength tests according to table 7..... :	(see appended table)	P
	Test voltage applied between the supply cord and inlet bushing and cord guard and cord anchorage as specified..... :		N
	No breakdown during the tests		P

<b>17</b>	<b>OVERLOAD PROTECTION OF TRANSFORMERS AND ASSOCIATED CIRCUITS</b>		--
	No excessive temperatures in transformer or associated circuits in event of short-circuits likely to occur in normal use	(see appended table)	N
	Appliance supplied with 1.06 or 0.94 times rated voltage under the most unfavourable short-circuit or overload likely to occur in normal use (V)..... :		N
	Basic insulation is not short-circuited		N
	Temperature rise of insulation of the conductors of safety extra-low voltage circuits not exceeding the relevant value specified in table 3 by more than 15 K		N
	Temperature of the winding not exceeding the value specified in table 8,		N
	however limits do not apply to fail-safe transformers complying with sub-clause 15.5 of IEC 61558-1		N

<b>18</b>	<b>ENDURANCE</b>		--
	Requirements and tests are specified in part 2 when necessary		N

<b>19</b>	<b>ABNORMAL OPERATION</b>		--
19.1	The risk of fire, mechanical damage or electric shock under abnormal or careless operation obviated		P
	Electronic circuits so designed and applied that a fault will not render the appliance unsafe ..... :	(see appended table)	P

EN 60335-1			
Clause	Requirement + Test	Result - Remark	Verdict
	Appliances incorporating heating elements subjected to the tests of 19.2 and 19.3, and		N
	if the appliance also has a control that limit the temperature during clause 11 it is subjected to the test of 19.4, and		N
	if applicable, to the test of 19.5		N
	Appliances incorporating PTC heating elements are also subjected to the test of 19.6		N
	Appliances incorporating motors subjected to the tests of 19.7 to 19.10, as applicable		P
	Appliances incorporating electronic circuits subjected to the tests of 19.11 and 19.12, as applicable		N
	Appliances incorporating contactors or relays subjected to the test of 19.14, being carried out before the tests of 19.11		N
	Appliances incorporating voltage selector switches subjected to the test of 19.15		N
	Unless otherwise specified, the tests are continued until a non-self-resetting thermal cut-out operates, or		N
	until steady conditions are established		P
	If a heating element or intentionally weak part becomes open-circuited, the relevant test is repeated on a second sample		N
19.2	Test of appliance with heating elements with restricted heat dissipation; test voltage (V): power input of 0.85 times rated power input..... :		N
19.3	Test of 19.2 repeated; test voltage (V): power input of 1.24 times rated power input..... :		N
19.4	Test conditions as in clause 11, any control limiting the temperature during tests of clause 11 short-circuited		N
19.5	Test of 19.4 repeated on Class 0I and I appliances with tubular sheathed or embedded heating elements. No short-circuiting, but one end of the element connected to the elements sheath		N
	The test repeated with reversed polarity and the other end of the heating element connected to the sheath		N
	The test is not carried out on appliances intended to be permanently connected to fixed wiring and on appliances where an all-pole disconnection occurs during the test of 19.4		N
19.6	Appliances with PTC heating elements tested at rated voltage, establishing steady conditions		N

EN 60335-1			
Clause	Requirement + Test	Result - Remark	Verdict
	The working voltage of the PTC heating element is increased by 5% and the appliance is operated until steady conditions are re-established. The voltage is then increased in similar steps until 1.5 times working voltage or until the PTC heating element ruptures (V).....:		N
19.7	Stalling test by locking the rotor if the locked rotor torque is smaller than the full load torque or locking moving parts of other appliances	30s	P
	Locked rotor, capacitors open-circuited one at a time		N
	Test repeated with capacitors short-circuited one at a time, unless		N
	capacitor is of class P2 of IEC 60252-1		N
	Appliances with timer or programmer supplied with rated voltage for each of the tests, for a period equal to the maximum period allowed.....:		N
	Other appliances supplied with rated voltage for a period as specified		P
	Winding temperatures not exceeding values specified in table 8	See appended table	P
19.8	Multi-phase motors operated at rated voltage with one phase disconnected	No such motors	N
19.9	Running overload test on appliances incorporating motors intended to be remotely or automatically controlled or liable to be operated continuously		N
	Motor-operated and combined appliances for which 30.2.3 is applicable and that use overload protective devices relying on electronic circuits to protect the motor windings, are also subjected to the test		N
	Winding temperatures not exceeding values as specified.....:		N
19.10	Series motor operated at 1.3 times rated voltage for 1 min (V).....:		N
	During the test, parts not being ejected from the appliance		N
19.11	Electronic circuits, compliance checked by evaluation of the fault conditions specified in 19.11.2 for all circuits or parts of circuits, unless		P
	they comply with the conditions specified in 19.11.1		N
	Appliances incorporating an electronic circuit that relies upon a programmable component to function correctly, subjected to the test of 19.11.4.8, unless		N
	restarting does not result in a hazard		N
	Appliances having a device with an off position		N

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Clause	Requirement + Test	Result - Remark	Verdict
	obtained by electronic disconnection, or a device placing the appliance in a stand-by mode, subjected to the tests of 19.11.4		
	If the safety of the appliance under any of the fault conditions depends on the operation of a miniature fuse-link complying with IEC 60127, the test of 19.12 is carried out		N
	During and after each test the following is checked:		--
	- the temperature of the windings do not exceed the values specified in table 8		P
	- the appliance complies with the conditions specified in 19.13		P
	- any current flowing through protective impedance not exceeding the limits specified in 8.1.4		N
	If a conductor of a printed board becomes open-circuited, the appliance is considered to have withstood the particular test, provided both of the following conditions are met:		--
	- the base material of the printed circuit board withstands the test of Annex E		N
	- any loosened conductor does not reduce clearance or creepage distances between live parts and accessible metal parts below the values specified in clause 29		N
19.11.1	Fault conditions a) to g) in 19.11.2 are not applied to circuits or parts of circuits meeting both of the following conditions:		--
	- the electronic circuit is a low-power circuit, that is, the maximum power at low-power points does not exceed 15 W according to the tests specified		N
	- the protection against electric shock, fire hazard, mechanical hazard or dangerous malfunction of other parts of the appliance does not rely on the correct functioning of the electronic circuit		N
19.11.2	Fault conditions applied one at a time, the appliance operated under conditions specified in cl. 11, but supplied at rated voltage, the duration of the tests as specified:		--
	a) short circuit of functional insulation if clearances or creepage distances are less than the values specified in 29		P
	b) open circuit at the terminals of any component		P
	c) short circuit of capacitors, unless		N
	they comply with IEC 60384-14		N
	d) short circuit of any two terminals of an electronic component, other than integrated circuits.		N
	This fault condition is not applied between the two circuits of an optocoupler		N

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Clause	Requirement + Test	Result - Remark	Verdict
	e) failure of triacs in the diode mode		N
	f) failure of an integrated circuit		N
	g) failure of an electronic power switching device		N
	Each low power circuit is short-circuited by connecting the low-power point to the pole of the supply source from which the measurements were made		N
19.11.3	If the appliance incorporates a protective electronic circuit which operates to ensure compliance with clause 19, the relevant test is repeated with a single fault simulated, as indicated in a) to g) of 19.11.2		N
19.11.4	Appliances having a switch with an off position obtained by electronic disconnection, or		N
	a switch that can be placed in the stand-by mode,		N
	subjected to the tests of 19.11.4.1 to 19.11.4.7, the device being set in the off position or in the stand-by mode		N
	Appliances incorporating a protective electronic circuit subjected to the tests of 19.11.4.1 to 19.11.4.7, the tests being carried out after the protective electronic circuit has operated, except that		N
	appliances operated for 30 s or 5 min during the test of 19.7 are not subjected to the tests for electromagnetic phenomena.		N
	Surge protective devices disconnected, unless		N
	They incorporate spark gaps		N
19.11.4.1	The appliance is subjected to electrostatic discharges in accordance with IEC 61000-4-2, test level 4		P
19.11.4.2	The appliance is subjected to radiated fields in accordance with IEC 61000-4-3, test level 3		P
19.11.4.3	The appliance is subjected to fast transient bursts in accordance with IEC 61000-4-4, test level 3 or 4 as specified		N
19.11.4.4	The power supply terminals of the appliance subjected to voltage surges in accordance with IEC 61000-4-5, test level 3 or 4 as specified		N
	Earthed heating elements in class I appliances disconnected		N
19.11.4.5	The appliance is subjected to injected currents in accordance with IEC 61000-4-6, test level 3		N
19.11.4.6	Appliances having a rated current not exceeding 16 A are subjected to the Class 3 voltage dips and interruptions in accordance with IEC 61000-4-11		N

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Clause	Requirement + Test	Result - Remark	Verdict
	Appliances having a rated current exceeding 16 A are subjected to the Class 3 voltage dips and interruptions in accordance with IEC 61000-4-34		N
19.11.4.7	The appliance is subjected to mains signals in accordance with IEC 61000-4-13, test level class 2		N
19.11.4.8	The appliance is supplied at rated voltage and operated under normal operation. After 60s the power supply is reduces to a level such that the appliance ceases to respond or a programmable component cease to operate.		N
	The appliance continues to operate normally or		N
	requires a manual operation to restart		N
19.12	If the safety of the appliance for any of the fault conditions specified in 19.11.2 depends on the operation of a miniature fuse-link complying with IEC 60127, the test is repeated, measuring the current flowing through the fuse-link; measured current (A); rated current of the fuse-link (A)..... :		N
19.13	During the tests the appliance does not emit flames, molten metal, poisonous or ignitable gas in hazardous amounts		P
	Temperature rises not exceeding the values shown in table 9..... :	See appended table	P
	Compliance with clause 8 not impaired		P
	If the appliance can still be operated it complies with 20.2		P
	Insulation, other than of class III appliances or class III constructions that do not contain live parts, withstands the electric strength test of 16.3, the test voltage as specified in table 4:		--
	- basic insulation..... :		N
	- supplementary insulation..... :		N
	- reinforced insulation..... :		N
	After operation or interruption of a control, clearances and creepage distances across the functional insulation withstanding the electric strength test of 16.3. the test voltage being twice the working voltage		P
	The appliance does not undergo a dangerous malfunction, and		P
	no failure of protective electronic circuits, if the appliance is still operable		N
	Appliances tested with an electronic switch in the off position, or in the stand-by mode:		N
	- do not become operational		N
	- if they become operational, do not result in a		N

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Clause	Requirement + Test	Result - Remark	Verdict
	dangerous malfunction during or after the tests of 19.11.4		
	If the appliance contains lids or doors that are controlled by one or more interlocks, one of the interlocks may be released provided that:		N
	- the lid or door does not move automatically to an open position when the interlock is released, and		N
	- the appliance does not start after the cycle in which the interlock was released		N
19.14	Appliances operated under the conditions of clause 11, any contactor or relay contact operating under the conditions of clause 11 being short-circuited		N
	For a relay or contactor with more than one contact, all contacts are short-circuited at the same time		N
	A relay or contactor operating only to ensure the appliance is energized for normal use is not short-circuited		N
	If more than one relay or contactor operates in clause 11, they are short-circuited in turn		N
19.15	For appliances with a mains voltage selector switch, the switch is set to the lowest rated voltage position and the highest value of rated voltage is applied		N

<b>20</b>	<b>STABILITY AND MECHANICAL HAZARDS</b>		--
20.1	Adequate stability		P
	Tilting test through an angle of 10°, appliance placed on an inclined plane/horizontal support, not connected to the supply mains; appliance does not overturn		P
	Tilting test repeated on appliances with heating elements, angle of inclination increased to 15°		N
	Possible heating test in overturned position; temperature rise does not exceed values shown in table 9		N
20.2	Moving parts adequately arranged or enclosed as to provide protection against personal injury		P
	Protective enclosures, guards and similar parts are non-detachable, and		N
	have adequate mechanical strength		N
	Enclosures that can be opened by overriding an interlock are considered to be detachable parts		N
	Self-resetting thermal cut-outs and overcurrent protective devices not causing a hazard, by unexpected reclosure		N
	Not possible to touch dangerous moving parts with test probe		P

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Clause	Requirement + Test	Result - Remark	Verdict

<b>21</b>	<b>MECHANICAL STRENGTH</b>		--
21.1	Appliance has adequate mechanical strength and is constructed as to withstand rough handling		P
	Checked by applying 3 blows to every point of the enclosure like to be weak, in accordance with test Ehb of IEC 60068-2-75, spring hammer test, with an impact energy of 0,5 J		P
	The appliance shows no damage impairing compliance with this standard, and		P
	compliance with 8.1, 15.1 and clause 29 not impaired		P
	If doubt, supplementary or reinforced insulation subjected to the electric strength test of 16.3		N
	If necessary, repetition of groups of three blows on a new sample		N
21.2	Accessible parts of solid insulation having strength to prevent penetration by sharp implements		P
	The insulation is tested as specified, unless		N
	the thickness of supplementary insulation is at least 1 mm hat of reinforced insulation is at least 2 mm		P
	The insulation is raised to the temperature measured during the test of Clause 11.		N
	The surface of the insulation is then scratched by means of a hardened steel pin, the end of which has the form of a cone with an angle of 40°: Its tip is rounded with a radius of 0,25 mm ± 0,02 mm.		N
	The pin is held at an angle of 80° - 85° to the horizontal and loaded so that the force exerted along its axis is 10 N ± 0,5 N.		N
	The scratches are made by drawing the pin along the surface of the insulation at a speed of approximately 20 mm/s. Two parallel scratches are made.		N
	They are spaced sufficiently apart so that they are not affected by each other, their length covering approximately 25 % of the length of the insulation.		N
	Two similar scratches are made at 90° to the first pair without crossing them.		N
	The test fingernail of Figure 7 is then applied to the scratched surface with a force of approximately 10 N. No further damage, such as separation of the material occurred. The insulation withstood the electric strength test of 16.3.		N
	The hardened steel pin is then applied perpendicularly with a force of 30 N ± 0,5 N to an		N

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Clause	Requirement + Test	Result - Remark	Verdict

	unscratched part of the surface. The insulation withstood the electric strength test of 16.3 with the pin still applied and used as one of the electrodes.		
--	--	--	--

<b>22</b>	<b>CONSTRUCTION</b>		--
22.1	Appliance marked with the first numeral of the IP system, relevant requirements of IEC 60529 are fulfilled	IPX0	N
22.2	Stationary appliance: means to provide all-pole disconnection from the supply provided, the following means being available:		--
	- a supply cord fitted with a plug	Stationary appliance	N
	- a switch complying with 24.3		N
	- a statement in the instruction sheet that a disconnection incorporated in the fixed wiring is to be provided		N
	- an appliance inlet		N
	Single-pole switches and single-pole protective devices for the disconnection of heating elements in single-phase permanently connected class I appliances, connected in the phase conductor		N
22.3	Appliance provided with pins: no undue strain on socket-outlets		N
	Applied torque not exceeding 0.25 Nm		N
	Pull force of 50N to each pin after the appliance has been placed in the heating cabinet; when cooled to room temperature the pins are not displaced by more than 1mm		N
	Each pin subjected to a tork of 0.4Nm; the pins are not rotating unless		N
	rotating does not impair compliance with the standard		N
22.4	Appliance for heating liquids and appliance causing undue vibration not provided with pins for insertion into socket-outlets		N
22.5	No risk of electric shock when touching the pins of the plug		N
	The appliance is supplied at rated voltage. Any switch is then placed in the off position and the appliance is disconnected from the supply mains at the instant of voltage peak. One second after disconnection, the voltage between the pins of the plug is measured with an instrument that does not appreciably affect the value to be measured.		N
	The voltage did not exceed 34 V.		N
22.6	Electrical insulation not affected by condensing water or leaking liquid		N

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Clause	Requirement + Test	Result - Remark	Verdict
	Electrical insulation of Class II appliances not affected if a hose ruptures or seal leaks		N
	In case of doubt, test as described		N
22.7	Adequate safeguards against the risk of excessive pressure in appliances containing liquid or gases or having steam-producing devices		N
22.8	Electrical connections not subject to pulling during cleaning of compartments to which access can be gained without the aid of a tool, and that are likely to be cleaned in normal use	No such compartments	P
22.9	Insulation, internal wiring, windings, commutators and slip rings not exposed to oil, grease or similar substances, unless		P
	the substance has adequate insulating properties		N
22.10	Not possible to reset voltage-maintained non-self-resetting thermal cut-outs by the operation of an automatic switching device incorporated within the appliance, if:		N
	- a non-self-resetting thermal cut-out is required by the standard, and		N
	- a voltage maintained non-self-resetting thermal cut-out is used to meet it		N
	Non-self-resetting thermal motor protectors have a trip-free action, unless		N
	they are voltage maintained		N
	Reset buttons of non-self-resetting controls so located or protected that accidental resetting is unlikely		N
22.11	Reliable fixing of non-detachable parts that provide the necessary degree of protection against electric shock, moisture or contact with moving parts		P
	Obvious locked position of snap-in devices used for fixing such parts		N
	No deterioration of the fixing properties of snap-in devices used in parts that are likely to be removed during installation or servicing		N
	Tests as described		P
22.12	Handles, knobs etc. fixed in a reliable manner		P
	Fixing in wrong position of handles, knobs etc. indicating position of switches or similar components not possible		P
	Axial force 15 N applied to parts, the shape being so that an axial pull is unlikely to be applied	Switch button	P
	Axial force 30 N applied to parts, the shape being so that an axial pull is likely to be applied		N

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Clause	Requirement + Test	Result - Remark	Verdict
22.13	Unlikely that handles, when gripped as in normal use, make the operators hand touch parts having a temperature rise exceeding the value specified for handles which are held for short periods only		P
22.14	No ragged or sharp edges creating a hazard for the user in normal use, or during user maintenance		P
	No exposed pointed ends of self tapping screws etc., liable to be touched by the user in normal use or during user maintenance		P
22.15	Storage hooks and the like for flexible cords smooth and well rounded		N
22.16	Automatic cord reels cause no undue abrasion or damage to the sheath of the flexible cord, no breakage of conductors strands, no undue wear of contacts		N
	Cord reel tested with 6000 operations, as specified		N
	Electric strength test of 16.3, voltage of 1000 V applied		N
22.17	Spacers not removable from the outside by hand or by means of a screwdriver or a spanner	No such spacer	N
22.18	Current-carrying parts and other metal parts resistant to corrosion		P
22.19	Driving belts not relied upon to provide the required level of insulation, unless	No such parts	N
	constructed to prevent inappropriate replacement	Non-corrosive material	N
22.20	Direct contact between live parts and thermal insulation effectively prevented, unless		N
	material used is non-corrosive, non-hygroscopic and non-combustible	No such material use for insulation	N
22.21	Wood, cotton, silk, ordinary paper and fibrous or hygroscopic material not used as insulation, unless		P
	impregnated		N
	This requirement does not apply to magnesium oxide and mineral ceramic fibres used for the electrical insulation of heating elements		N
22.22	Appliances not containing asbestos		P
22.23	Oils containing polychlorinated biphenyl (PCB) not used		P
22.24	Bare heating elements, except in class III appliances or class III constructions that do not contain live parts, adequately supported		N
	In case of rupture, the heating conductor is unlikely to come in contact with accessible metal parts		N
22.25	Sagging heating conductors, except in class III appliances or class III constructions that do not		N

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Clause	Requirement + Test	Result - Remark	Verdict
	contain live parts, cannot come into contact with accessible metal parts		
22.26	For class III constructions the insulation between parts operating at safety extra-low voltage and other live parts complies with the requirements for double or reinforced insulation		P
22.27	Parts connected by protective impedance separated by double or reinforced insulation	No such protective impedance	N
22.28	Metal parts of Class II appliances conductively connected to gas pipes or in contact with water: separated from live parts by double or reinforced insulation		N
22.29	Class II appliances permanently connected to fixed wiring so constructed that the required degree of access to live parts is maintained after installation		N
22.30	Parts serving as supplementary or reinforced insulation fixed so that they cannot be removed without being seriously damaged, or		P
	so constructed that they cannot be replaced in an incorrect position, and so that if they are omitted, the appliance is rendered inoperable or manifestly incomplete		P
22.31	Clearances and creepage distances over supplementary and reinforced insulation not reduced below values specified in clause 29 as a result of wear.		P
	Creepage distances and clearances over supplementary or reinforced insulation not reduced below the values specified for supplementary insulation if wires, screws etc. becomes loose		P
22.32	Supplementary and reinforced insulation constructed or protected against pollution so that clearances or creepage distances are not reduced below the values in clause 29		P
	Supplementary insulation of natural or synthetic rubber resistant to ageing, or arranged and dimensioned so that creepage distances are not reduced below values specified in 29.2		N
	Ceramic material not tightly sintered, similar materials or beads alone not used as supplementary or reinforced insulation		N
	Insulating material in which heating conductors are embedded is considered to be basic insulation, not reinforced insulation		N
	Oxygen bomb test at 70 °C for 96 h and 16 h at room temperature		N
22.33	Conductive liquids that are or may become accessible in normal use and conductive liquids that		N

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Clause	Requirement + Test	Result - Remark	Verdict
	are in contact with unearthed accessible metal parts are not in direct contact with live parts		
	Electrodes not used for heating liquids		N
	For class II constructions, conductive liquids that are or may become accessible in normal use and conductive liquids that are in contact with unearthed accessible metal parts, not in direct contact with basic or reinforced insulation, unless		N
	the reinforced insulation consists of at least 3 layers		N
	For class II constructions, conductive liquids which are in contact with live parts, not in direct contact with reinforced insulation, unless		N
	the reinforced insulation consists of at least 3 layers		N
	An air layer not used as basic or supplementary insulation in a double insulation system if likely to be bridged by leaking liquid		N
22.34	Shafts of operating knobs, handles, levers etc. not live, unless		P
	the shaft is not accessible when the part is removed		N
22.35	For other than class III constructions, handles, levers and knobs, held or actuated in normal use, not becoming live in the event of a failure of basic insulation		P
	Such parts being of metal, and their shafts or fixings are likely to become live in the event of a failure of basic insulation, are either adequately covered by insulation material or their accessible parts are separated from their shafts or fixings by supplementary insulation		N
	This requirement does not apply to handles, levers and knobs on stationary appliances, other than those of electrical components, provided they are reliably connected to an earthing terminal or earthing contact, or separated from live parts by earthed metal		N
	Insulating material covering metal handles, levers and knobs withstand the electric strength test of 16.3 for supplementary insulation		P
22.36	For appliances other than class III, handles continuously held in the hand in normal use so constructed that when gripped as in normal use, the operators hand is not likely to touch metal parts, unless		P
	they are separated from live parts by double or reinforced insulation		P
22.37	Capacitors in Class II appliances not connected to accessible metal parts and their casings, if of		P

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Clause	Requirement + Test	Result - Remark	Verdict
	metal, separated from accessible metal parts by supplementary insulation, unless		
	the capacitors comply with 22.42		N
22.38	Capacitors not connected between the contacts of a thermal cut-out		N
22.39	Lamp holders used only for the connection of lamps		N
22.40	Motor-operated appliances and combined appliances intended to be moved while in operation, or having accessible moving parts, fitted with a switch to control the motor. The actuating member of the switch being easily visible and accessible		P
	If the appliance cannot operate continuously, automatically or remotely without giving rise to a hazard, appliances for remote operation being fitted with a switch for stopping the operation. The actuating member of the switch being easily visible and accessible		P
22.41	No components, other than lamps, containing mercury	No mercury	P
22.42	Protective impedance consisting of at least two separate components	No protective impedance	N
	Values specified in 8.1.4 not exceeded if any one of the components are short-circuited or open-circuited		N
	Resistors checked by the test of 14.1 a) in IEC 60065		N
	Capacitors checked by the tests for class Y capacitors in IEC 60384-14		N
22.43	Appliances adjustable for different voltages, accidental changing of the setting of the voltage unlikely to occur		N
22.44	Appliances not having an enclosure that is shaped or decorated like a toy	No such enclosure	P
22.45	When air is used as reinforced insulation, clearances not reduced below the values specified in 29.1.4 due to deformation as a result of an external force applied to the enclosure		P
22.46	For programmable protective electronic circuits used to ensure compliance with the standard, the software contains measures to control the fault/error conditions in table R.1		N
	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		N
	These requirements are not applicable to software used for functional purpose or compliance with		N

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Clause	Requirement + Test	Result - Remark	Verdict
	clause 11		
22.47	Appliances connected to the water mains withstand the water pressure expected in normal use		N
	No leakage from any part, including any inlet water hose		N
22.48	Appliances connected to the water mains constructed to prevent backsiphonage of non-potable water		N
22.49	For remote operation, the duration of operation shall be set before the appliance can be started, unless		N
	the appliance switches off automatically or can operate continuously without hazard		N
22.50	Controls incorporated in the appliance take priority over controls actuated by remote operation		N
22.51	A control on the appliance being manually adjusted to the setting for remote operation before the appliance can be operated in this mode		N
	There is a visual indication showing that the appliance is adjusted for remote operation		N
	These requirements not necessary on appliances that can operate as follows, without giving rise to a hazard:		N
	- continuously, or		N
	- automatically, or		N
	- remotely		N
22.52	Socket-outlets on appliances accessible to the user in accordance with the socket-outlet system used in the country in which the appliance is sold		N

<b>23</b>	<b>INTERNAL WIRING</b>		--
23.1	Wireways smooth and free from sharp edges		P
	Wires protected against contact with burrs, cooling fins etc.		P
	Wire holes in metal well rounded or provided with bushings		N
	Wiring effectively prevented from coming into contact with moving parts		P
23.2	Beads etc. on live wires cannot change their position, and are not resting on sharp edges or corners	No such materials	N
	Beads inside flexible metal conduits contained within an insulating sleeve		N
23.3	Electrical connections and internal conductors movable relatively to each other not exposed to		P

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Clause	Requirement + Test	Result - Remark	Verdict
	undue stress		
	Flexible metallic tubes not causing damage to insulation of conductors		N
	Open-coil springs not used		N
	Adequate insulating lining provided inside a coiled spring, the turns of which touch one another		N
	No damage after 10 000 flexings for conductors flexed during normal use or		N
	100 flexings for conductors flexed during user maintenance		N
	Electric strength test of 16.3, 1000 V between live parts and accessible metal parts		N
	Not more than 10% of the strands of any conductor broken, and		N
	not more than 30% for wiring supplying circuits that consume no more than 15W		N
23.4	Bare internal wiring sufficiently rigid and fixed	No such bare internal wire	N
23.5	The insulation of internal wiring subjected to the supply mains voltage withstanding the electrical stress likely to occur in normal use		N
	Basic insulation electrically equivalent to the basic insulation of cords complying with IEC 60227 or IEC 60245, or		N
	no breakdown when a voltage of 2000 V is applied for 15 min between the conductor and metal foil wrapped around the insulation		N
23.6	Sleeving used as supplementary insulation on internal wiring retained in position by clamping at both ends, or		P
	be such that it can only be removed by breaking or cutting		P
23.7	The colour combination green/yellow used only for earthing conductors		N
23.8	Aluminium wires not used for internal wiring		P
23.9	Stranded conductors not consolidated by soldering where they are subjected to contact pressure, unless		N
	the contact pressure is provided by spring terminals		N
23.10	The insulation and sheath of internal wiring, incorporated in external hoses for the connection of an appliance to the water mains, at least equivalent to that of light polyvinyl chloride sheathed flexible cord (60227 IEC 52)		N

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Clause	Requirement + Test	Result - Remark	Verdict
<b>24</b>	<b>COMPONENTS</b>		--
24.1	Components comply with safety requirements in relevant IEC standards		P
	List of components..... : (see appended table)		P
	If components have not been tested and found to comply with relevant IEC standard for the number of cycles specified, they are tested in accordance with 24.1.1 to 24.1.9		P
	For components mentioned in 24.1.1 to 24.1.9 no additional tests specified in the relevant component standard are necessary other than those specified in 24.1.1 to 24.1.9		N
	Components not tested and found to comply with relevant IEC standard and components not marked or not used in accordance with its marking, tested under the conditions occurring in the appliance		P
	Lampholders and starterholders that have not being tested and found to comply with the relevant IEC standard, tested as a part of the appliance and additionally according to the gauging and interchangeability requirements of the relevant IEC standard		N
	No additional tests specified for nationally standardized plugs such as those detailed in IEC/TR 60083 or connectors complying with the standard sheets of IEC 60320-1 and IEC 60309		P
24.1.1	Capacitors likely to be permanently subjected to the supply voltage and used for radio interference suppression or for voltage dividing, complying with IEC 60384-14		N
	If the capacitors have to be tested, they are tested according to Annex F		N
24.1.2	Safety isolating transformers complying with IEC 61558-2-6		N
	If they have to be tested, they are tested according to Annex G		N
24.1.3	Switches complying with IEC 61058-1, the number of cycles of operation being at least 10 000		N
	If they have to be tested, they are tested according to Annex H		N
	If the switch operates a relay or contactor, the complete switching system is subjected to the test		N
	If the switch only operates a motor starting relay complying with IEC 60730-2-10 with the number of cycles of a least 10 000 as specified, the complete switching system need not be tested		N

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Clause	Requirement + Test	Result - Remark	Verdict
24.1.4	Automatic controls complying with IEC 60730-1 with relevant part 2. The number of cycles of operation being:		N
	- thermostats: 10 000		N
	- temperature limiters: 1 000		N
	- voltage maintained non-self-resetting thermal cut-outs 1000		N
	- other non-self-resetting thermal cut-outs : 30		N
	- timers: 3 000		N
	- energy regulators: 10 000		N
	The number of cycles for controls operating during clause 11 need not be declared, if the appliance meets the requirements of this standard when they are short-circuited		N
	Thermal motor protectors are tested in combination with their motor under the conditions specified in Annex D	Not operated in the motor.	N
24.1.5	Appliance couplers complying with IEC 60320-1		N
	However, appliances classified higher than IPX0, the appliance couplers complying with IEC 60320-2-3		N
	Interconnection couplers complying with IEC 60320-2-2		N
24.1.6	Small lamp holders similar to E10 lampholders complying with IEC 60238, the requirements for E10 lampholders being applicable		N
24.1.7	If the remote operation of the appliance is via a telecommunication network, the relevant standard for the telecommunication interface circuitry in the appliance is IEC 62151		N
24.1.8	The relevant standard for thermal links is IEC 60691		N
	Thermal links not complying with IEC 60691 are considered to be an intentionally weak part for the purposes of Clause 19		N
24.1.9	Contactors and relays, other than motor starting relays, tested as part of the appliance		N
	They are also tested in accordance with Clause 17 of IEC 60730-1, the number of cycles of operations in 24.1.4 selected according to the contactor or relay function in the appliance.....:		N
24.2	Appliances not fitted with:		N
	- switches or automatic controls in flexible cords		N
	- devices causing the protective device in the fixed wiring to operate in the event of a fault in the appliance		N

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Clause	Requirement + Test	Result - Remark	Verdict
	- thermal cut-outs that can be reset by soldering, unless		N
	the solder has a melting point of at least 230 °C		N
24.3	Switches intended for all-pole disconnection of stationary appliances are directly connected to the supply terminals and having a contact separation in all poles, providing full disconnection under overvoltage category III conditions		N
24.4	Plugs and socket-outlets for extra-low voltage circuits and heating elements, not interchangeable with plugs and socket-outlets listed in IEC/TR 60083 or IEC 60906-1 or with connectors and appliance inlets complying with the standard sheets of IEC 60320-1		P
24.5	Capacitors in auxiliary windings of motors marked with their rated voltage and capacitance and used accordingly		N
	Voltage across capacitors in series with a motor winding does not exceed 1,1 times rated voltage, when the appliance is supplied at 1,1 times rated voltage under minimum load		N
24.6	Working voltage of motors connected to the supply mains and having basic insulation that is inadequate for the rated voltage of the appliance, not exceeding 42 V		N
	In addition, the motors comply with the requirements of Annex I		N
24.7	Detachable hose-sets for connection of appliances to the water mains comply with IEC 61770		N
	They are supplied with the appliance		N
	Appliances intended to be permanently connected to the water mains not connected by a detachable hose-set		N
24.8	Motor running capacitors in appliances for which 30.2.3 is applicable and that are permanently connected in series with a motor winding, not causing a hazard in event of a failure		N
	One or more of the following conditions are to be met:		N
	- the capacitors are of class P2 according to IEC 60252-1		N
	- the capacitors are housed within a metallic or ceramic enclosure		N
	- the distance of separation of the outer surface to adjacent non-metallic parts exceeds 50 mm		N
	- adjacent non-metallic parts within 50 mm withstand the needle-flame test of Annex E		N

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Clause	Requirement + Test	Result - Remark	Verdict
	- adjacent non-metallic parts within 50 mm classified as at least V-1 according to IEC 60695-11-10		P
<b>25</b>	<b>SUPPLY CONNECTION AND EXTERNAL FLEXIBLE CORDS</b>		--
25.1	Appliance not intended for permanent connection to fixed wiring, means for connection to the supply:		--
	- supply cord fitted with a plug		P
	- an appliance inlet having at least the same degree of protection against moisture as required for the appliance		N
	- pins for insertion into socket-outlets		N
25.2	Appliance not provided with more than one means of connection to the supply mains		N
	Stationary appliance for multiple supply may be provided with more than one means of connection, provided electric strength test of 1250 V for 1 min between each means of connection causes no breakdown		N
25.3	Appliance intended to be permanently connected to fixed wiring provided with one of the following means for connection to the supply mains:		N
	- a set of terminals allowing the connection of a flexible cord		N
	- a fitted supply cord		N
	- a set of supply leads accommodated in a suitable compartment		N
	- a set of terminals for the connection of cables of fixed wiring, cross-sectional areas specified in 26.6, and the appliance allows the connection of the supply conductors after the appliance has been fixed to its support		N
	- a set of terminals and cable entries, conduit entries, knock-outs or glands, allowing connection of appropriate types of cable or conduit, and the appliance allows the connection of the supply conductors after the appliance has been fixed to its support		N
	For a fixed appliance constructed so that parts can be removed to facilitate easy installation, this requirement is met if it is possible to connect the fixed wiring without difficulty after a part of the appliance has been fixed to its support		N
25.4	Cable and conduit entries, rated current of appliance not exceeding 16 A, dimension according to table 10 (mm).....:		N
	Introduction of conduit or cable does not reduce		N

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Clause	Requirement + Test	Result - Remark	Verdict
	clearances or creepage distances below values specified in clause 29		
25.5	Method for assemble supply cord with the appliance:		—
	- type X attachment		N
	- type Y attachment		P
	Type Z attachment is allowed for appliances intended for household use only		N
	Type X attachment, other than those with a specially prepared cord, not used for flat twin tinsel cords		N
	For multi-phase appliances supplied with a supply cord and that are intended to be permanently connected to fixed wiring, the supply cord is assembled to the appliance by type Y attachment		N
25.6	Plugs fitted with only one flexible cord		N
25.7	Supply cords for appliances other than class III appliances shall be one of the following types		—
	- rubber sheathed cord (60245 IEC 53)		N
	- Polychloroprene sheathed cords(60245 IEC 57)		N
	- crosslinked PVC insulated and sheathed cord (60245 IEC 88)		N
	- polyvinyl chloride sheathed. Not used if they are likely to touch metal parts having a temperature rise exceeding 75 K during the test of clause 11		N
	<ul style="list-style-type: none"> <li>light polyvinyl chloride sheathed cord (60227 IEC 52), for appliances ≤ 3 kg</li> </ul>		N
	<ul style="list-style-type: none"> <li>ordinary polyvinyl chloride sheathed cord (60227 IEC 53), for other appliances</li> </ul>		N
	- heat resistant polyvinyl chloride sheathed. Not used for type X attachment other than specially prepared cords		N
	<ul style="list-style-type: none"> <li>heat-resistant light polyvinyl chloride sheathed cord (60227 IEC 56), for appliances ≤ 3 kg</li> </ul>		N
	<ul style="list-style-type: none"> <li>heat-resistant polyvinyl chloride sheathed cord (60227 IEC 57), for other appliances</li> </ul>		N
	Supply cords for class III appliances adequately insulated		N
	Test with 500 V for 2 min for supply cords of class III appliances that contain live parts		N
25.8	Nominal cross-sectional area of supply cords according to table 11; rated current (A); cross-sectional area (mm²)..... :		N
25.9	Supply cord not in contact with sharp points or edges		N
25.10	Supply cord of class I appliances have a		N

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Clause	Requirement + Test	Result - Remark	Verdict
	green/yellow core for earthing		
25.11	Conductors of supply cords not consolidated by soldering where they are subject to contact pressure, unless		N
	the contact pressure is provided by spring terminals		N
25.12	Insulation of the supply cord not damaged when moulding the cord to part of the enclosure	No such constructions	N
25.13	Inlet openings so constructed as to prevent damage to the supply cord		N
	If the enclosure at the inlet opening is not of insulating material, a non-detachable lining or bushing complying with 29.3 for supplementary insulation provided		N
	If unsheathed supply cord, a similar additional bushing or lining is required, unless the appliance is		N
	class 0, or		N
	a class III appliance not containing live parts		N
25.14	Supply cords moved while in operation adequately protected against excessive flexing		N
	Flexing test:		N
	- applied force (N) .....		N
	- number of flexings .....		N
	The test does not result in:		N
	- short-circuit between the conductors, such that the current exceeds a value of twice the rated current		N
	- breakage of more than 10% of the strands of any conductor		N
	- separation of the conductor from its terminal		N
	- loosening of any cord guard		N
	- damage to the cord or the cord guard		N
	- broken strands piercing the insulation and becoming accessible		N
25.15	For appliances with supply cord and appliances to be permanently connected to fixed wiring by a flexible cord, conductors of the supply cord relieved from strain, twisting and abrasion by use of cord anchorage		N
	The cord cannot be pushed into the appliance to such an extent that the cord or internal parts of the appliance can be damaged		N
	Pull and torque test of supply cord, values shown in table 12: mass (kg); pull (N); torque (not on automatic cord reel) (Nm)..... :		N

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Clause	Requirement + Test	Result - Remark	Verdict
	Cord not damaged and max. 2 mm displacement of the cord		N
25.16	Cord anchorages for type X attachments constructed and located so that:		N
	- replacement of the cord is easily possible		N
	- it is clear how the relief from strain and the prevention of twisting are obtained		N
	- they are suitable for different types of cord		N
	- cord cannot touch the clamping screws of cord anchorage if these screws are accessible, unless		N
	they are separated from accessible metal parts by supplementary insulation		N
	- the cord is not clamped by a metal screw which bears directly on the cord		N
	- at least one part of the cord anchorage securely fixed to the appliance, unless		N
	it is part of a specially prepared cord		N
	- screws which have to be operated when replacing the cord do not fix any other component, unless		N
	the appliance becomes inoperative or incomplete or the parts cannot be removed without a tool		N
	- if labyrinths can be bypassed the test of 25.15 is nevertheless withstood		N
	- for class 0, 0I and I appliances they are of insulating material or are provided with an insulating lining, unless		N
	failure of the insulation of the cord does not make accessible metal parts live		N
	- for class II appliances they are of insulating material, or		N
	if of metal, they are insulated from accessible metal parts by supplementary insulation		N
	After the test of 25.15, under the conditions specified, the conductors have not moved by more than 1 mm in the terminals		N
25.17	Adequate cord anchorages for type Y and Z attachment, test with the cord supplied with the appliance		N
25.18	Cord anchorages only accessible with the aid of a tool, or		N
	Constructed so that the cord can only be fitted with the aid of a tool		N
25.19	Type X attachment, glands not used as cord anchorage in portable appliances		N

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Clause	Requirement + Test	Result - Remark	Verdict
	Tying the cord into a knot or tying the cord with string not used		N
25.20	The insulated conductors of the supply cord for type Y and Z attachment additionally insulated from accessible metal parts		N
25.21	Space for supply cord for type X attachment or for connection of fixed wiring constructed:		N
	- to permit checking of conductors with respect to correct positioning and connection before fitting any cover		N
	- so there is no risk of damage to the conductors or their insulation when fitting the cover		N
	- for portable appliances, so that the uninsulated end of a conductor, if it becomes free from the terminal, prevented from contact with accessible metal parts		N
	2 N test to the conductor for portable appliances; no contact with accessible metal parts		N
25.22	Appliance inlet:		N
	- live parts not accessible during insertion or removal		N
	Requirement not applicable to appliance inlets complying with IEC 60320-1		N
	- connector can be inserted without difficulty		N
	- the appliance is not supported by the connector		N
	- is not for cold conditions if temp. rise of external metal parts exceeds 75 K, unless the supply cord is not likely to touch such metal parts		N
	- located so that pollution by food or liquid is unlikely to occur during normal use. (AS/NZS 60335.2.14)		N
25.23	Interconnection cords comply with the requirements for the supply cord, except that:		N
	- the cross-sectional area of the conductors is determined on the basis of the maximum current during clause 11		N
	- the thickness of the insulation may be reduced		N
	If necessary, electric strength test of 16.3		N
25.24	Interconnection cords not detachable without the aid of a tool if compliance with the standard is impaired when they are disconnected		N
25.25	Dimensions of pins that are inserted into socket-outlets compatible with the dimensions of the relevant socket-outlet.		N

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Clause	Requirement + Test	Result - Remark	Verdict
	Dimensions of pins and engagement face in accordance with the dimensions of the relevant plug in IEC/TR 60083		N
<b>26</b>	<b>TERMINALS FOR EXTERNAL CONDUCTORS</b>		--
26.1	Appliances provided with terminals or equally effective devices for connection of external conductors		N
	Terminals only accessible after removal of a non-detachable cover, except		N
	for class III appliances that do not contain live parts		N
	Earthing terminals may be accessible if a tool is required to make the connections and means are provided to clamp the wire independently from its connection		N
26.2	Appliances with type X attachment and appliances for the connection of cables to fixed wiring provided with terminals in which connections are made by means of screws, nuts or similar devices, unless		N
	the connections are soldered		N
	Screws and nuts not used to fix any other component, except		N
	internal conductors, if so arranged that they are unlikely to be displaced when fitting the supply conductors		N
	If soldered connections used, the conductor so positioned or fixed that reliance is not placed on soldering alone, unless		N
	barriers provided so that neither clearances nor creepage distances between live parts and other metal parts reduced below the values for supplementary insulation if the conductor becomes free at the soldered joint		N
26.3	Terminals for type X attachment and for connection to fixed wiring so constructed that the conductor is clamped between metal surfaces with sufficient contact pressure and without damaging the conductor		N
	Terminals fixed so that when the clamping means is tightened or loosened:		N
	- the terminal does not loosen		N
	- internal wiring is not subjected to stress		N
	- clearances and creepage distances are not reduced below the values in 29		N
	Compliance checked by inspection and by the test of subclause 9.6 of IEC 60999-1, the torque applied being equal to two-thirds of the torque specified		N

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Clause	Requirement + Test	Result - Remark	Verdict
	(Nm)..... :		
	No deep or sharp indentations of the conductors		N
26.4	Terminals for type X attachment, except those having a specially prepared cord and those for the connection of cables of fixed wiring, no special preparation of conductors such as by soldering, use of cable lugs, eyelets or similar, and		N
	so constructed or placed that conductors prevented from slipping out when clamping screws or nuts are tightened		N
26.5	Terminals for type X attachment so located or shielded that if a wire of a stranded conductor escapes, no risk of accidental connection to other parts that result in a hazard		N
	Stranded conductor test, 8 mm insulation removed		N
	No contact between live parts and accessible metal parts and,		N
	for class II constructions, between live parts and metal parts separated from accessible metal parts by supplementary insulation only		N
26.6	Terminals for type X attachment and for connection to fixed wiring suitable for connection of conductors with required cross-sectional area according to table 13; rated current (A); nominal cross-sectional area (mm <sup>2</sup> )..... :		N
	If a specially prepared cord is used, terminals need only be suitable for that cord		N
26.7	Terminals for type X attachment, except in class III appliances not containing live parts, accessible after removal of a cover or part of the enclosure		N
26.8	Terminals for the connection to fixed wiring, including the earthing terminal, located close to each other		N
26.9	Terminals of the pillar type constructed and located as specified		N
26.10	Terminals with screw clamping and screwless terminals not used for flat twin tinsel cords, unless		N
	conductors ends fitted with means suitable for screw terminals		N
	Pull test of 5 N to the connection		N
26.11	For type Y and Z attachment, soldered, welded, crimped or similar connections may be used		N
	For Class II appliances, the conductor so positioned or fixed that reliance is not placed on soldering, welding or crimping alone		N

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Clause	Requirement + Test	Result - Remark	Verdict
	If soldering, welding or crimping alone used, barriers provided so that clearances and creepage distances between live parts and other metal parts are not reduced below the values for supplementary insulation if the conductor becomes free		N
<b>27</b>	<b>PROVISION FOR EARTHING</b>		--
27.1	Accessible metal parts of Class 0I and I appliances permanently and reliably connected to an earthing terminal or earthing contact of the appliance inlet		N
	Earthing terminals and earthing contacts not connected to the neutral terminal		N
	Class 0, II and III appliances have no provision for earthing	Class III	P
	Safety extra-low voltage circuits not earthed, unless		N
	protective extra-low voltage circuits		N
27.2	Clamping means adequately secured against accidental loosening		N
	Terminals used for the connection of external equipotential bonding conductors allow connection of conductors of 2.5 to 6 mm <sup>2</sup> , and		N
	do not provide earthing continuity between different parts of the appliance		N
	Conductors cannot be loosened without the aid of a tool		N
27.3	For detachable parts that are plugged into another part of the appliance, and having an earth connection, the earth connection made before and separated after current-carrying connections when removing the part		N
	For appliances with supply cord, current-carrying conductors become taut before earthing conductor, if the cord slips out of the cord anchorage		N
27.4	No risk of corrosion resulting from contact between parts of the earthing terminal and the copper of the earthing conductor or other metal		N
	Parts providing earthing continuity, other than parts of a metal frame or enclosure, have adequate resistance to corrosion		N
	If of steel, these parts provided with an electroplated coating with a thickness at least 5 µm		N
	Adequate protection against rusting of parts of coated or uncoated steel, only intended to provide or transmit contact pressure		N
	In the body of the earthing terminal is a part of a frame or enclosure of aluminium or aluminium		N

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Clause	Requirement + Test	Result - Remark	Verdict
	alloys, precautions taken to avoid risk of corrosion		
27.5	Low resistance of connection between earthing terminal and earthed metal parts		N
	This requirement does not apply to connections providing earthing continuity in the protective extra-low voltage circuit, provided the clearances of basic insulation are based on the rated voltage of the appliance		N
	Resistance not exceeding 0,1 $\Omega$ at the specified low-resistance test ( $\Omega$ ).....:		N
27.6	The printed conductors of printed circuit boards not used to provide earthing continuity in hand-held appliances.		N
	They may be used to provide earthing continuity in other appliances if at least two tracks are used with independent soldering points and the appliance complies with 27.5 for each circuit		N

<b>28</b>	<b>SCREWS AND CONNECTIONS</b>		--
28.1	Fixings, electrical connections and connections providing earthing continuity withstand mechanical stresses		P
	Screws not of soft metal liable to creep, such as zinc or aluminium		P
	Diameter of screws of insulating material min. 3 mm	4mm	P
	Screws of insulating material not used for any electrical connection or connections providing earthing continuity		N
	Screws used for electrical connections or connections providing earthing continuity screw into metal		N
	Screws not of insulating material if their replacement by a metal screw can impair supplementary or reinforced insulation		N
	Type X attachment, screws to be removed for replacement of supply cord or for user maintenance, not of insulating material if their replacement by a metal screw can impair basic insulation		N
	For screws and nuts; torque-test as specified in table 14.....:	See Appendix table	N
28.2	Electrical connections and connections providing earthing continuity constructed so that contact pressure is not transmitted through non-ceramic insulating material liable to shrink or distort, unless		N
	there is resiliency in the metallic parts to compensate for shrinkage or distortion of the		N

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Clause	Requirement + Test	Result - Remark	Verdict
	insulating material		
	This requirement does not apply to electrical connections in circuits of appliances for which:		N
	<ul style="list-style-type: none"> <li>30.2.2 is applicable and that carry a current not exceeding 0,5 A</li> </ul>		N
	<ul style="list-style-type: none"> <li>30.2.3 is applicable and that carry a current not exceeding 0,2 A</li> </ul>		N
28.3	Space-threaded (sheet metal) screws only used for electrical connections if they clamp the parts together		N
	Thread-cutting (self-tapping) screws and thread rolling screws only used for electrical connections if they generate a full form standard machine screw thread		N
	Thread-cutting (self-tapping) screws not used if they are likely to be operated by the user or installer		N
	Thread-cutting, thread rolling and space threaded screws may be used in connections providing earthing continuity provided it is not necessary to disturb the connection:		N
	- in normal use,		N
	- during user maintenance,		N
	- when replacing a supply cord having a type X attachment, or		N
	- during installation		N
	At least two screws being used for each connection providing earthing continuity, unless		N
	the screw forms a thread having a length of at least half the diameter of the screw		N
28.4	Screws and nuts that make mechanical connection secured against loosening if they also make electrical connections or connections providing earthing continuity		N
	This requirement does not apply to screws in the earthing circuit if at least two screws are used, or		N
	if an alternative earthing circuit is provided		N
	Rivets for electrical connections or connections providing earthing continuity secured against loosening if the connections are subjected to torsion		N
<b>29</b>	<b>CLEARANCES, CREEPAGE DISTANCES AND SOLID INSULATION</b>		--
	Clearances, creepage distances and solid insulation withstand electrical stress		P
	For coatings used on printed circuits boards to protect the microenvironment (Type 1) or to provide		N

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Clause	Requirement + Test	Result - Remark	Verdict
	basic insulation (Type 2), Annex J applies..... :		
	The microenvironment is pollution degree 1 under type 1 protection		N
	For type 2 protection, the spacing between the conductors before the protection is applied is not less than the values specified in Table 1 of IEC 60664-3		P
	These values apply to functional, basic, supplementary and reinforced insulation..... :		N
29.1	Clearances not less than the values specified in table 16, taking into account the rated impulse voltage for the overvoltage categories of table 15, unless..... :	(see appended table)	P
	for basic insulation and functional insulation they comply with the impulse voltage test of clause 14		N
	However, if the distances are affected by wear, distortion, movement of the parts or during assembly, the clearances for rated impulse voltages of 1500V and above are increased by 0,5 mm and the impulse voltage test is not applicable		N
	Impulse voltage test not applicable:		--
	- when the microenvironment is pollution degree 3		N
	- for basic insulation of class 0 and class 01 appliances		N
	Appliances are in overvoltage category II		N
	A force of 2 N is applied to bare conductors, other than heating elements		N
	A force of 30 N is applied to accessible surfaces		N
29.1.1	Clearances of basic insulation withstand the overvoltages, taking into account the rated impulse voltage		N
	The values of table 16 or the impulse voltage test of clause 14 are applicable..... :	(see appended table)	N
	Clearance at the terminals of tubular sheathed heating elements may be reduced to 1,0 mm if the microenvironment is pollution degree 1		N
	Lacquered conductors of windings considered to be bare conductors		N
29.1.2	Clearances of supplementary insulation not less than those specified for basic insulation in table 16..... :	(see appended table)	N
29.1.3	Clearances of reinforced insulation not less than those specified for basic insulation in table 16, using the next higher step for rated impulse voltage..... :	(see appended table)	N
	For double insulation, with no intermediate		N

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Clause	Requirement + Test	Result - Remark	Verdict
	conductive part between basic and supplementary insulation, clearances are measured between live parts and the accessible surface, and the insulation system is treated as reinforced insulation		
29.1.4	Clearances for functional insulation are the largest values determined from:		P
	- table 16 based on the rated impulse voltage.....:	(see appended table)	P
	- table F.7a in IEC 60664-1, frequency not exceeding 30 kHz		N
	- clause 4 of IEC 60664-4, frequency exceeding 30 kHz		N
	If values of table 16 are largest, the impulse voltage test of clause 14 may be applied instead, unless		N
	the microenvironment is pollution degree 3, or		N
	the distances can be affected by wear, distortion, movement of the parts or during assembly		N
	However, clearances are not specified if the appliance complies with clause 19 with the functional insulation short-circuited		N
	Lacquered conductors of windings considered to be bare conductors		P
	However, clearances at crossover points are not measured		P
	Clearance between surfaces of PTC heating elements may be reduced to 1mm		N
29.1.5	Appliances having higher working voltages than rated voltage, clearances for basic insulation are the largest values determined from:		N
	- table 16 based on the rated impulse voltage.....:		N
	- table F.7a in IEC 60664-1, frequency not exceeding 30 kHz		N
	- clause 4 of IEC 60664-4, frequency exceeding 30 kHz		N
	If clearances for basic insulation are selected from Table F.7a of IEC 60664-1 or Clause 4 of IEC 60664-4, the clearances of supplementary insulation are not less than those specified for basic insulation		N
	If clearances for basic insulation are selected from Table F.7a of IEC 60664-1, the clearances of reinforced insulation dimensioned as specified in Table F.7a are to withstand 160% of the withstand voltage required for basic insulation		N
	If clearances for basic insulation are selected from Clause 4 of IEC 60664-4, the clearances of reinforced insulation are twice the value required for basic insulation		N

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Clause	Requirement + Test	Result - Remark	Verdict
	If the secondary winding of a step-down transformer is earthed, or if there is an earthed screen between the primary and secondary windings, clearances of basic insulation on the secondary side not less than those specified in table 16, but using the next lower step for rated impulse voltage		N
	Circuits supplied with a voltage lower than rated voltage, clearances of functional insulation are based on the working voltage used as the rated voltage in table 15		N
29.2	Creepage distances not less than those appropriate for the working voltage, taking into account the material group and the pollution degree..... :	(see appended table)	P
	Pollution degree 2 applies, unless		P
	- precautions taken to protect the insulation; pollution degree 1		N
	- insulation subjected to conductive pollution; pollution degree 3		N
	A force of 2 N is applied to bare conductors, other than heating elements		P
	A force of 30 N is applied to accessible surfaces		P
	In a double insulation system, the working voltage for both the basic and supplementary insulation is taken as the working voltage across the complete double insulation system		N
29.2.1	Creepage distances of basic insulation not less than specified in table 17..... :	(see appended table)	P
	However, if the working voltage is periodic and has a frequency exceeding 30 kHz, the creepage distances are also determined from table 2 of IEC 60664-4, these values being used if exceeding the values in table 17..... :		N
	Except for pollution degree 1, corresponding creepage distance not less than the minimum specified for the clearance in table 16, if the clearance has been checked according to the test of clause 14..... :		N
29.2.2	Creepage distances of supplementary insulation at least those specified for basic insulation in table 17, or..... :		N
	Table 2 of IEC 60664-4, as applicable..... :		N
29.2.3	Creepage distances of reinforced insulation at least double those specified for basic insulation in table 17, or..... :		N
	Table 2 of IEC 60664-4, as applicable..... :		N
29.2.4	Creepage distances of functional insulation not less	(see appended table)	P

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Clause	Requirement + Test	Result - Remark	Verdict
	than specified in table 18.....:		
	However, if the working voltage is periodic and has a frequency exceeding 30 kHz, the creepage distances are also determined from table 2 of IEC 60664-4, these values being used if exceeding the values in table 18.....:		N
	Creepage distances may be reduced if the appliance complies with clause 19 with the functional insulation short-circuited		N
29.3	Supplementary and reinforced insulation have adequate thickness, or a sufficient number of layers, to withstand the electrical stresses		P
	Compliance checked:		P
	- by measurement, in accordance with 29.3.1, or		N
	- by an electric strength test in accordance with 29.3.2, or		N
	- by an assessment of the thermal quality of the material combined with an electric strength test, in accordance with 29.3.3, and		N
	for accessible parts of reinforced insulation consisting of a single layer, by measurement in accordance with 29.3.4, or		N
	- as specified in subclause 6.3 of IEC 60664-4 for insulation that is subjected to any periodic voltage having a frequency exceeding 30 kHz		N
29.3.1	Supplementary insulation have a thickness of at least 1 mm		N
	Reinforced insulation have a thickness of at least 2 mm		N
29.3.2	Each layer of material withstand the electric strength test of 16.3 for supplementary insulation		N
	Supplementary insulation consist of at least 2 layers		N
	Reinforced insulation consist of at least 3 layers		N
29.3.3	The insulation is subjected to the dry heat test Bb of IEC 60068-2-2, followed by		N
	the electric strength test of 16.3		N
	If the temperature rise during the tests of clause 19 does not exceed the value specified in table 3, the test of IEC 60068-2-2 is not carried out		N
29.3.4	Thickness of accessible parts of reinforced insulation consisting of a single layer not less than specified in table 19..... :		N
<b>30</b>	<b>RESISTANCE TO HEAT AND FIRE</b>		--

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Clause	Requirement + Test	Result - Remark	Verdict
30.1	External parts of non-metallic material,		P
	parts supporting live parts, and		P
	parts of thermoplastic material providing supplementary or reinforced insulation		P
	sufficiently resistant to heat		P
	Ball-pressure test according to IEC 60695-10-2		P
	External parts: at 40 °C plus the maximum temperature rise determined during the test of clause 11, or at 75 °C, whichever is the higher; temperature (°C) .....	(see appended table)	P
	Parts supporting live parts: at 40°C plus the maximum temperature rise determined during the test of clause 11, or at 125°C, whichever is the higher; temperature (°C).....		N
	Parts of thermoplastic material providing supplementary or reinforced insulation, 25°C plus the maximum temperature rise determined during clause 19, if higher; temperature (°C).....		N
30.2	Parts of non-metallic material resistant to ignition and spread of fire		P
	This requirement does not apply to:		--
	parts having a mass not exceeding 0,5 g, provided the cumulative effect is unlikely to propagate flames that originate inside the appliance by propagating flames from one part to another, or		N
	decorative trims, knobs and other parts unlikely to be ignited or to propagate flames that originate inside the appliance		P
	Compliance checked by the test of 30.2.1, and in addition:		P
	- for attended appliances, 30.2.2 applies		N
	- for unattended appliances, 30.2.3 applies		P
	For appliances for remote operation, 30.2.3 applies		N
	For base material of printed circuit boards, 30.2.4 applies		P
	The tests are carried out on parts of non-metallic material that have been removed from the appliance		P
	When the glow-wire test is carried out, the parts are placed in the same orientation as they would be in normal use		P
	These tests are not carried out on the insulation of wires.		P
30.2.1	Parts of non-metallic material subjected to the glow-	(See appended tabel)	P

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Clause	Requirement + Test	Result - Remark	Verdict
	wire test of IEC 60695-2-11 at 550 °C		
	However, test not carried out if the material is classified as having a glow-wire flammability index according to IEC 60695-2-12 of at least 550 °C, or		N
	the material is classified at least HB40 according to IEC 60695-11-10		N
	Parts for which the glow-wire test cannot be carried out need to meet the requirements in ISO 9772 for material classified HBF		N
30.2.2	Appliances operated while attended, parts of non-metallic material supporting current-carrying connections, and		N
	parts of non-metallic material within a distance of 3mm of such connections,		N
	subjected to the glow-wire test of IEC 60695-2-11		N
	The test severity is:		--
	- 750 °C, for connections carrying a current exceeding 0,5 A during normal operation		N
	- 650 °C, for other connections	(See appended tabel)	N
	Glow-wire applied to an interposed shielding material, if relevant		N
	The glow-wire test is not carried out on parts of material classified as having a glow-wire flammability index according to IEC 60695-2-12 of at least:		--
	- 750 °C, for connections carrying a current exceeding 0,5 A during normal operation		N
	- 650 °C, for other connections		N
	The glow-wire test is also not carried out on small parts. These parts are to:		--
	- comprise material having a glow-wire flammability index of at least 750 °C, or 650 °C as appropriate, or		N
	- comply with the needle-flame test of Annex E, or		N
	- comprise material classified as V-0 or V-1 according to IEC 60695-11-10..... :		N
	Glow-wire test not applicable to conditions as specified..... :		N
30.2.3	Appliances operated while unattended, tested as specified in 30.2.3.1 and 30.2.3.2		P
	The tests are not applicable to conditions as specified..... :		N
30.2.3.1	Parts of non-metallic material supporting connections carrying a current exceeding 0,2 A during normal operation, and		P
	parts of non-metallic material, other than small		P

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Clause	Requirement + Test	Result - Remark	Verdict
	parts, within a distance of 3 mm,		
	subjected to the glow-wire test of IEC 60695-2-11 with a test severity of 850 °C	(see appended table)	P
30.2.3.2	Parts of non-metallic material supporting connections, and		P
	parts of non-metallic material within a distance of 3mm,		P
	subjected to glow-wire test of IEC 60695-2-11		P
	The test severity is:		--
	- 750 °C, for connections carrying a current exceeding 0,2 A during normal operation	(see appended table)	P
	- 650 °C, for other connections		N
	Glow-wire applied to an interposed shielding material, if relevant		N
	However, the glow-wire test of 750 °C or 650 °C as appropriate, is not carried out on parts of material fulfilling both or either of the following classifications:		N
	- a glow-wire ignition temperature according to IEC 60695-2-13 of at least:		N
	<ul style="list-style-type: none"> <li>• 775 °C, for connections carrying a current exceeding 0,2 A during normal operation</li> </ul>		N
	<ul style="list-style-type: none"> <li>• 675 °C, for other connections</li> </ul>		N
	- a glow-wire flammability index according to IEC 60695-2-12 of at least:		N
	- 750 °C, for connections carrying a current exceeding 0,2 A during normal operation		N
	- 650 °C, for other connections		N
	The glow-wire test is also not carried out on small parts. These parts are to:		N
	- comprise material having a glow-wire ignition temperature of at least 775 °C or 675 °C as appropriate, or		N
	- comprise material having a glow-wire flammability index of at least 750 °C or 650 °C as appropriate, or		N
	- comply with the needle-flame test of Annex E, or		N
	- comprise material classified as V-0 or V-1 according to IEC 60695-11-10		N
	The consequential needle-flame test of Annex E applied to non-metallic parts that encroach within the vertical cylinder placed above the centre of the connection zone and on top of the non-metallic parts supporting current-carrying connections, and parts of non-metallic material within a distance of 3 mm of such connections if these parts are those:		N
	- parts that withstood the glow-wire test of IEC 60695-2-11 of 750 °C or 650 °C as appropriate, but		N

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Clause	Requirement + Test	Result - Remark	Verdict
	produce a flame that persist longer than 2 s, or		
	- parts that comprised material having a glow-wire flammability index of at least 750 °C or 650 °C as appropriate, or		N
	- small parts, that comprised material having a glow-wire flammability index of at least 750 °C or 650 °C as appropriate, or		N
	- small parts for which the needle-flame test of Annex E was applied, or		N
	- small parts for which a material classification of V-0 or V-1 was applied		N
	However, the consequential needle-flame test is not carried out on non-metallic parts, including small parts, within the cylinder that are:		N
	- parts having a glow-wire ignition temperature of at least 775 °C or 675 °C as appropriate, or		N
	- parts comprising material classified as V-0 or V-1 according to IEC 60695-11-10, or		N
	- parts shielded by a flame barrier that meets the needle-flame test of Annex E or that comprises material classified as V-0 or V-1 according to IEC 60695-11-10		N
30.2.4	Base material of printed circuit boards subjected to the needle-flame test of Annex E	(see appended table)	P
	Test not applicable to conditions as specified..... :		N

<b>31</b>	<b>RESISTANCE TO RUSTING</b>		--
	Relevant ferrous parts adequately protected against rusting		P
	Tests specified in part 2 when necessary		N

<b>32</b>	<b>RADIATION, TOXICITY AND SIMILAR HAZARDS</b>		--
	Appliance does not emit harmful radiation or present a toxic or similar hazard due to their operation in normal use		P
	Compliance is checked by the limits or tests specified in part 2, if relevant		N

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Clause	Requirement + Test	Result - Remark	Verdict

<b>A</b>	<b>ANNEX A (INFORMATIVE)</b> <b>ROUTINE TESTS</b>		--
	Description of routine tests to be carried out by the manufacturer		P

<b>B</b>	<b>ANNEX B (NORMATIVE)</b> <b>APPLIANCES POWERED BY RECHARGEABLE BATTERIES</b>		--
	The following modifications to this standard are applicable for appliances powered by batteries that are recharged in the appliance		P
	This annex does not apply to battery air pumps		N
3.1.9	Appliance operated under the following conditions:		--
	- the appliance, supplied by its fully charged battery, operated as specified in relevant part 2	Considered charge mode only	N
	- the battery is charged, the battery being initially discharged to such an extent that the appliance cannot operate		P
	- if possible, the appliance is supplied from the supply mains through its battery air pump, the battery being initially discharged to such an extent that the appliance cannot operate. The appliance is operated as specified in relevant part 2		N
	- if the appliance incorporates inductive coupling between two parts that are detachable from each other, the appliance is supplied from the supply mains with the detachable part removed		N
3.6.2	Part to be removed in order to discard the battery is not considered to be detachable		N
5.B.101	Appliances supplied from the supply mains tested as specified for motor-operated appliances		N
7.1	Battery compartment for batteries intended to be replaced by the user, marked with battery voltage and polarity of the terminals		N
	The positive terminal indicated by symbol IEC 60417-5005 and the negative terminal by symbol IEC 60417-5006		N
7.6	Symbols 60417-5005 and IEC 60417-5006		N
7.12	The instructions give information regarding charging		N
	The instructions for appliances incorporating batteries intended to be replaced by the user includes required information		N

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Clause	Requirement + Test	Result - Remark	Verdict
	Details about how to remove batteries containing materials hazardous to the environment given		N
7.15	Markings placed on the part of the appliance connected to the supply mains		N
8.2	Appliances having batteries that according to the instruction may be replaced by the user need only have basic insulation between live parts and the inner surface of the battery compartment		N
	If the appliance can be operated without batteries, double or reinforced insulation required		N
11.7	The battery is charged for the period stated in the instructions or 24 h..... :	24h	P
19.1	Appliances subjected to tests of 19.B.101, 19.B.102 and 19.B.103		P
19.10	Not applicable		N
19.B.101	Appliances supplied at rated voltage for 168 h, the battery being continually charged		P
19.B.102	For appliances having batteries that can be removed without the aid of a tool, short-circuit of the terminals of the battery, the battery being fully charged,		N
19.B.103	Appliances having batteries replaceable by the user supplied at rated voltage under normal operation with the battery removed or in any position allowed by the construction		N
21.B.101	Appliances having pins for insertion into socket-outlets have adequate mechanical strength		N
	Part of the appliance incorporating the pins subjected to the free fall test, procedure 2, of IEC 60068-2-31, the number of falls being:		N
	- 100, if the mass of the part does not exceed 250 g (g)..... :		N
	- 50, if the mass of the part exceeds 250 g..... :		N
	After the test, the requirements of 8.1, 15.1.1, 16.3 and clause 29 are met		N
22.3	Appliances having pins for insertion into socket-outlets tested as fully assembled as possible		N
25.13	An additional lining or bushing not required for interconnection cords in class III appliances or class III constructions operating at safety extra-low voltage not containing live parts		N
30.2	For parts of the appliance connected to the supply mains during the charging period, 30.2.3 applies		P
	For other parts, 30.2.2 applies		P

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Clause	Requirement + Test	Result - Remark	Verdict
<b>C</b>	<b>ANNEX C (NORMATIVE)</b> <b>AGEING TEST ON MOTORS</b>		<b>N</b>
	Tests, as described, carried out when doubt with regard to the temperature classification of the insulation of a motor winding		N
	Test conditions as specified		N
<b>D</b>	<b>ANNEX D (NORMATIVE)</b> <b>THERMAL MOTOR PROTECTORS</b>		<b>N</b>
	Applicable to appliances having motors that incorporate thermal motor protectors necessary for compliance with the standard		N
	Test conditions as specified		N
<b>E</b>	<b>ANNEX E (NORMATIVE)</b> <b>NEEDLE-FLAME TEST</b>		--
	Needle-flame test carried out in accordance with IEC 60695- 11-5, with the following modifications:		--
7	Severities		--
	The duration of application of the test flame is 30 s ± 1 s		P
9	Test procedure		--
9.1	The specimen so arranged that the flame can be applied to a vertical or horizontal edge as shown in the examples of Figure 1		P
9.2	The first paragraph does not apply		N
	If possible, the flame is applied at least 10 mm from a corner		P
9.3	The test is carried out on one specimen		P
	If the specimen does not withstand the test, the test may be repeated on two additional specimens, both withstanding the test		N
11	Evaluation of test results		--
	The duration of burning not exceeding 30 s		N
	However, for printed circuit boards, the duration of burning not exceeding 15 s	PCB	P
<b>F</b>	<b>ANNEX F (NORMATIVE)</b> <b>CAPACITORS</b>		<b>N</b>

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Clause	Requirement + Test	Result - Remark	Verdict
	Capacitors likely to be permanently subjected to the supply voltage, and used for radio interference suppression or voltage dividing, comply with the following clauses of IEC 60384-14, with the following modifications:		N
1.5	Terms and definitions		N
1.5.3	Class X capacitors tested according to subclass X2		N
1.5.4	This subclause is applicable		N
1.6	Marking		N
	Items a) and b) are applicable		N
3.4	Approval testing		N
3.4.3.2	Table 3 is applicable as described		N
4.1	Visual examination and check of dimensions		N
	This subclause is applicable		N
4.2	Electrical tests		N
4.2.1	This subclause is applicable		N
4.2.5	This subclause is applicable		N
4.2.5.2	Only table 11 is applicable		N
	Values for test A apply		N
	However, for capacitors in heating appliances the values for test B or C apply		N
4.12	Damp heat, steady state		N
	This subclause is applicable		N
	Only insulation resistance and voltage proof are checked		N
4.13	Impulse voltage		N
	This subclause is applicable		N
4.14	Endurance		N
	Subclauses 4.14.1, 4.14.3, 4.14.4 and 4.14.7 are applicable		N
4.14.7	Only insulation resistance and voltage proof are checked		N
	No visible damage		N
4.17	Passive flammability test		N
	This subclause is applicable		N
4.18	Active flammability test		N
	This subclause is applicable		N

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Clause	Requirement + Test	Result - Remark	Verdict
<b>G</b>	<b>ANNEX G (NORMATIVE)</b> <b>SAFETY ISOLATING TRANSFORMERS</b>		<b>N</b>
	The following modifications to this standard are applicable for safety isolating transformers:		N
7	Marking and instructions		N
7.1	Transformers for specific use marked with:		N
	-name, trademark or identification mark of the manufacturer or responsible vendor.....:		N
	-model or type reference.....:		N
17	Overload protection of transformers and associated circuits		N
	Fail-safe transformers comply with subclause 15.5 of IEC 61558-1		N
22	Construction		N
	Subclauses 19.1 and 19.1.2 of IEC 61558-2-6 are applicable		N
29	Clearances, creepage distances and solid insulation		N
29.1, 29.2, 29.3	The distances specified in items 2a, 2c and 3 in table 13 of IEC 61558-1 apply		N
	For insulated winding wires complying with subclause 19.12.3 of IEC 61558-1 there are no requirements for clearances or creepage distances		N
	For windings providing reinforced insulation, the distance specified in item 2c of table 13 of IEC 61558-1 is not assessed		N
	For safety isolating transformers subjected to periodic voltages with a frequency exceeding 30 kHz, the clearances, creepage distances and solid insulation values specified in IEC 60664-4 are applicable, if greater than the values specified in items 2a, 2c and 3 in table 13 of IEC 61558-1		N
<b>H</b>	<b>ANNEX H (NORMATIVE)</b> <b>SWITCHES</b>		--
	Switches comply with the following clauses of IEC 61058-1, as modified below:		--
	The tests of IEC 61058-1 carried out under the conditions occurring in the appliance		N
	Before being tested, switches are operated 20 times without load		N
8	Marking and documentation		N
	Switches are not required to be marked		N

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Clause	Requirement + Test	Result - Remark	Verdict
	However, a switch that can be tested separately from the appliance marked with the manufacturer's name or trade mark and the type reference		N
13	Mechanism		N
	The tests may be carried out on a separate sample		N
15	Insulation resistance and dielectric strength		N
15.1	Not applicable		N
15.2	Not applicable		N
15.3	Applicable for full disconnection and micro-disconnection		N
17	Endurance		N
	Compliance is checked on three separate appliances or switches		N
	For 17.2.4.4, the number of cycles declared according to 7.1.4 is 10 000, unless		N
	otherwise specified in 24.1.3 of the relevant part 2 of IEC 60335..... :		N
	Switches for operation under no load and which can be operated only by a tool, and		N
	switches operated by hand that are interlocked so that they cannot be operated under load,		N
	are not subjected to the tests		N
	However, switches without this interlock are subjected to the test of 17.2.4.4 for 100 cycles of operation		N
	Subclauses 17.2.2 and 17.2.5.2 not applicable		N
	The ambient temperature during the test is that occurring in the appliance during the test of Clause 11 in IEC 60335-1		N
	The temperature rise of the terminals not more than 30 K above the temperature rise measured in clause 11 of IEC 60335-1 (K)..... :		N
20	Clearances, creepage distances, solid insulation and coatings of rigid printed board assemblies		N
	This clause is applicable to clearances and creepage distances for functional insulation, across full disconnection and micro-disconnection, as stated in table 24		N
I	<b>ANNEX I (NORMATIVE)</b> <b>MOTORS HAVING BASIC INSULATION THAT IS INADEQUATE FOR THE RATED VOLTAGE OF THE APPLIANCE</b>		<b>N</b>

EN 60335-1			
Clause	Requirement + Test	Result - Remark	Verdict
	The following modifications to this standard are applicable for motors having basic insulation that is inadequate for the rated voltage of the appliance:		N
8	Protection against access to live parts		N
8.1	Metal parts of the motor are considered to be bare live parts		N
11	Heating		N
11.3	The temperature rise of the body of the motor is determined instead of the temperature rise of the windings		N
11.8	The temperature rise of the body of the motor, where in contact with insulating material, not exceeding values in table 3 for the relevant insulating material		N
16	Leakage current and electric strength		N
16.3	Insulation between live parts of the motor and its other metal parts is not subjected to the test		N
19	Abnormal operation		N
19.1	The tests of 19.7 to 19.9 are not carried out		N
19.1.101	Appliance operated at rated voltage with each of the following fault conditions:		N
	- short circuit of the terminals of the motor, including any capacitor incorporated in the motor circuit		N
	- short circuit of each diode of the rectifier		N
	- open circuit of the supply to the motor		N
	- open circuit of any parallel resistor, the motor being in operation		N
	Only one fault simulated at a time, the tests carried out consecutively		N
22	Construction		N
22.1.101	For class I appliances incorporating a motor supplied by a rectifier circuit, the d.c. circuit being insulated from accessible parts of the appliance by double or reinforced insulation		N
	Compliance checked by the tests specified for double and reinforced insulation		N
<b>J</b>	<b>ANNEX J (NORMATIVE)</b> <b>COATED PRINTED CIRCUIT BOARDS</b>		<b>N</b>
	Testing of protective coatings of printed circuit boards carried out in accordance with IEC 60664-3 with the following modifications:		N
5.7	Conditioning of the test specimens		N

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Clause	Requirement + Test	Result - Remark	Verdict
	When production samples are used, three samples of the printed circuit board are tested		N
5.7.1	Cold		N
	The test is carried out at -25 °C		N
5.7.3	Rapid change of temperature		N
	Severity 1 is specified		N
5.9	Additional tests		N
	This subclause is not applicable		N
<b>K</b>	<b>ANNEX K (NORMATIVE)</b> <b>OVERVOLTAGE CATEGORIES</b>		<b>N</b>
	The information on overvoltage categories is extracted from IEC 60664-1		N
	Overvoltage category is a numeral defining a transient overvoltage condition		N
	Equipment of overvoltage category IV is for use at the origin of the installation		N
	Equipment of overvoltage category III is equipment in fixed installations and for cases where the reliability and the availability of the equipment is subject to special requirements		N
	Equipment of overvoltage category II is energy consuming equipment to be supplied from the fixed installation		N
	If such equipment is subjected to special requirements with regard to reliability and availability, overvoltage category III applies		N
	Equipment of overvoltage category I is equipment for connection to circuits in which measures are taken to limit transient overvoltages to an appropriate low level		N
<b>L</b>	<b>ANNEX L (INFORMATIVE)</b> <b>GUIDANCE FOR THE MEASUREMENT OF CLEARANCES AND CREEPAGE DISTANCES</b>		<b>N</b>
	Information for the determination of clearances and creepage distances		N
<b>M</b>	<b>ANNEX M (NORMATIVE)</b> <b>POLLUTION DEGREE</b>		<b>P</b>

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Clause	Requirement + Test	Result - Remark	Verdict
	The information on pollution degrees is extracted from IEC 60664-1		P
	Pollution		P
	The microenvironment determines the effect of pollution on the insulation, taking into account the macroenvironment		P
	Means may be provided to reduce pollution at the insulation by effective enclosures or similar		P
	Minimum clearances specified where pollution may be present in the microenvironment		N
	Degrees of pollution in the microenvironment		P
	For evaluating creepage distances, the following degrees of pollution in the microenvironment are established:		P
	- pollution degree 1: no pollution or only dry, non-conductive pollution occurs. The pollution has no influence		N
	- pollution degree 2: only non-conductive pollution occurs, except that occasionally a temporary conductivity caused by condensation is to be expected		P
	- pollution degree 3: conductive pollution occurs or dry non-conductive pollution occurs that becomes conductive due to condensation that is to be expected		N
	- pollution degree 4: the pollution generates persistent conductivity caused by conductive dust or by rain or snow		N

<b>N</b>	<b>ANNEX N (NORMATIVE)</b>		--
	<b>PROOF TRACKING TEST</b>		
	The proof tracking test is carried out in accordance with IEC 60112 with the following modifications:		P
7	Test apparatus		N
7.3	Test solutions		N
	Test solution A is used		N
10	Determination of proof tracking index (PTI)		--
10.1	Procedure		--
	The proof voltage is 100V, 175V, 400V or 600V...:	175V	P
	The test is carried out on five specimens		N
	In case of doubt, additional test with proof voltage reduced by 25V, the number of drops increased to 100		N

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Clause	Requirement + Test	Result - Remark	Verdict
10.2	Report		N
	The report states if the PTI value was based on a test using 100 drops with a test voltage of (PTI-25) V		N
<b>O</b>	<b>ANNEX O (INFORMATIVE)</b> <b>SELECTION AND SEQUENCE OF THE TESTS OF CLAUSE 30</b>		<b>P</b>
	Description of tests for determination of resistance to heat and fire		P
<b>P</b>	<b>ANNEX P (INFORMATIVE)</b> <b>GUIDANCE FOR THE APPLICATION OF THIS STANDARD TO APPLIANCES USED IN WARM DAMP EQUABLE CLIMATES</b>		--
	Modifications applicable for class 0 and 01 appliances having a rated voltage exceeding 150V, intended to be used in countries having a warm damp equable climate and that are marked WDaE		--
	Modifications may also be applied to class 1 appliances having a rated voltage exceeding 150V, intended to be used in countries having a warm damp equable climate and that are marked WdaE, if liable to be connected to a supply mains that excludes the protective earthing conductor		--
5.7	The ambient temperature for the tests of clauses 11 and 13 is 40 +3/0 °C		N
7.1	The appliance marked with the letters WDaE		N
7.12	The instructions state that the appliance is to be supplied through a residual current device (RCD) having a rated residual operating current not exceeding 30 mA		N
	The instructions state that the appliance is considered to be suitable for use in countries having a warm damp equable climate, but may also be used in other countries		N
11.8	The values of Table 3 are reduced by 15 K		N
13.2	The leakage current for class I appliances not exceeding 0,5 mA		N
15.3	The value of t is 37 °C		N
16.2	The leakage current for class I appliances not exceeding 0,5 mA (mA):		N
19.13	The leakage current test of 16.2 is applied in addition to the electric strength test of 16.3		N
<b>Q</b>	<b>ANNEX Q (INFORMATIVE)</b> <b>SEQUENCE OF TESTS FOR THE EVALUATION OF ELECTRONIC CIRCUITS</b>		--

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Clause	Requirement + Test	Result - Remark	Verdict
	Description of tests for appliances incorporating electronic circuits		P
<b>R</b>	<b>ANNEX R (NORMATIVE) SOFTWARE EVALUATION</b>		<b>N</b>
	Programmable electronic circuits requiring software incorporating measures to control the fault/error conditions specified in table R.1 or R.2 validated in accordance with the requirements of this annex		N
R.1	Programmable electronic circuits using software		N
	Programmable electronic circuits requiring software incorporating measures to control the fault/error conditions specified in table R.1 or R.2 constructed so that the software does not impair compliance with the requirements of this standard		N
R.2	Requirements for the architecture		N
	Programmable electronic circuits requiring software incorporating measures to control the fault/error conditions specified in table R.1 or R.2 use measures to control and avoid software-related faults/errors in safety-related data and safety-related segments of the software		N
R.2.1.1	Programmable electronic circuits requiring software incorporating measures to control the fault/error conditions specified in table R.2 have one of the following structures:		N
	- single channel with periodic self-test and monitoring		N
	- dual channel (homogenous) with comparison		N
	- dual channel (diverse) with comparison		N
	Programmable electronic circuits requiring software incorporating measures to control the fault/error conditions specified in table R.1 have one of the following structures:		N
	- single channel with functional test		N
	- single channel with periodic self-test		N
	- dual channel without comparison		N
R.2.2	Measures to control faults/errors		N
R.2.2.1	When redundant memory with comparison is provided on two areas of the same component, the data in one area is stored in a different format from that in the other area		N

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Clause	Requirement + Test	Result - Remark	Verdict
R.2.2.2	Programmable electronic circuits with functions requiring software incorporating measures to control the fault/error conditions specified in table R.2 and that use dual channel structures with comparison, have additional fault/error detection means for any fault/errors not detected by the comparison		N
R.2.2.3	For programmable electronic circuits with functions requiring software incorporating measures to control the fault/error conditions specified in table R.1 or R.2, means are provided for the recognition and control of errors in transmissions to external safety-related data paths		N
R.2.2.4	For programmable electronic circuits with functions requiring software incorporating measures to control the fault/error conditions specified in table R.1 or R.2, the programmable electronic circuits incorporate measures to address the fault/errors in safety-related segments and data indicated in table R.1 and R.2 as appropriate		N
R.2.2.5	For programmable electronic circuits with functions requiring software incorporating measures to control the fault/error conditions specified in table R.1 or R.2, detection of a fault/error occur before compliance with clause 19 is impaired		N
R.2.2.6	The software is referenced to relevant parts of the operating sequence and the associated hardware functions		N
R.2.2.7	Labels used for memory locations are unique		N
R.2.2.8	The software is protected from user alteration of safety-related segments and data		N
R.2.2.9	Software and safety-related hardware under its control is initialized and terminates before compliance with clause 19 is impaired		N
R.3	Measures to avoid errors		N
R.3.1	General		N
	For programmable electronic circuits with functions requiring software incorporating measures to control the fault/error conditions specified in table R.1 or R.2, the following measures to avoid systematic fault in the software are applied		N
	Software that incorporates measures used to control the fault/error conditions specified in table R.2 is inherently acceptable for software required to control the fault/error conditions specified in table R.1		N
R.3.2	Specification		N
R.3.2.1	Software safety requirements:	Software Id:	N

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Clause	Requirement + Test	Result - Remark	Verdict
	The specification of the software safety requirements includes the descriptions listed		N
R.3.2.2	Software architecture		N
R.3.2.2.1	The specification of the software architecture includes the aspects listed - techniques and measures to control software faults/errors (refer to R.2.2); - interactions between hardware and software; - partitioning into modules and their allocation to the specified safety functions; - hierarchy and call structure of the modules (control flow); - interrupt handling; - data flow and restrictions on data access; - architecture and storage of data; - time-based dependencies of sequences and data	Document ref. No:	N
R.3.2.2.2	The architecture specification is validated against the specification of the software safety requirements by static analysis		N
R.3.2.3	Module design and coding		N
R.3.2.3.1	Based on the architecture design, software is suitably refined into modules		N
	Software module design and coding is implemented in a way that is traceable to the software architecture and requirements		N
R.3.2.3.2	Software code is structured		N
R.3.2.3.3	Coded software is validated against the module specification by static analysis		N
	The module specification is validated against the architecture specification by static analysis		N
R.3.3.3	Software validation		N
	The software is validated with reference to the requirements of the software safety requirements specification		N
	Compliance is checked by simulation of:		N
	- input signals present during normal operation		N
	- anticipated occurrences		N
	- undesired conditions requiring system action		N

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Clause	Requirement + Test	Result - Remark	Verdict

TABLE R.1 <sup>e</sup> – GENERAL FAULT/ERROR CONDITIONS				
Component <sup>a</sup>	Fault/error	Acceptable measures <sup>b,c</sup>	Definitions See IEC 60730-1	Verdict
1 Central processing unit (CPU)				N
1.1 Registers	Stuck at	Functional test, or periodic self-test using either: - static memory test, or - word protection with single bit redundancy	H.2.16.5 H.2.16.6 H.2.19.6 H.2.19.8.2	N
1.2 VOID				N
1.3 Programme counter	Stuck at	Functional test, or Periodic self-test, or Independent time-slot monitoring, or Logical monitoring of the programme sequence	H.2.16.5 H.2.16.6 H.2.18.10.4 H.2.18.10.2	N
2 Interrupt handling and execution	No interrupt or too frequent interrupt	Functional test, or time-slot monitoring	H.2.16.5 H.2.18.10.4	N
3 Clock	Wrong frequency (for quartz synchronized clock: harmonics/sub-harmonics only)	Frequency monitoring, or time slot monitoring	H.2.18.10.1 H.2.18.10.4	N
4 Memory				N
4.1 Invariable memory	All single bit faults	Periodic modified checksum, or multiple checksum, or word protection with single bit redundancy	H.2.19.3.1 H.2.19.3.2 H.2.19.8.2	N
4.2 Variable memory	DC fault	Periodic static memory test, or word protection with single bit redundancy	H.2.19.6 H.2.19.8.2	N
4.3 Addressing (relevant to variable and invariable memory)	Stuck at	Word protection with single bit redundancy including the address	H.2.19.8.2	N
5 Internal data path	Stuck at	Word protection with single bit redundancy	H.2.19.8.2	N

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Clause	Requirement + Test		Result - Remark	Verdict
5.1 VOID				N
5.2 Addressing	Wrong address	Word protection with single bit redundancy including the address	H.2.19.8.2	N
6 External communication	Hamming distance 3	Word protection with multi-bit redundancy, or CRC – single work, or Transfer redundancy, or Protocol test	H.2.19.8.1 H.2.19.4.1 H.2.18.2.2 H.2.18.14	N
6.1 VOID				N
6.2 VOID				N
6.3 Timing	Wrong point in time  Wrong sequence	Time-slot monitoring, or scheduled transmission Time-slot and logical monitoring, or Comparison of redundant communication channels by either: - reciprocal comparison - independent hardware comparator Logical monitoring, or time-slot monitoring, or Scheduled transmission	H.2.18.10.4 H.2.18.18 H.2.18.10.3  H.2.18.15 H.2.18.3 H.2.18.10.2 H.2.18.10.4 H.2.18.18	N
7 Input/output periphery	Fault conditions specified in 19.11.2	Plausibility check	H.2.18.13	N
7.1 VOID				N
7.2 Analog I/O				N
7.2.1 A/D and D/A-converter	Fault conditions specified in 19.11.2	Plausibility check	H.2.18.13	N
7.2.2 Analog multiplexer	Wrong addressing	Plausibility check	H.2.18.13	N
8 VOID				N
9 Custom chips <sup>d</sup> e.g. ASIC, GAL, gate array	Any output outside the static and dynamic functional specification	Periodic self test	H.2.16.6	N
NOTE A Stuck-at fault model denotes a fault model representing an open circuit or a non-varying signal level. A DC fault model denotes a stuck-at fault model incorporating short circuit between signal lines.				

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Clause	Requirement + Test	Result - Remark	Verdict

- <sup>a</sup> For fault/error assessment, some components are divided into their sub-functions.
- <sup>b</sup> For each sub-function in the table, the Table R.2 measure will cover the software fault/error.
- <sup>c</sup> Where more than one measure is given for a sub-function, these are alternatives.
- <sup>d</sup> To be divided as necessary by the manufacturer into sub-functions.
- <sup>e</sup> Table R.1 is applied according to the requirements of R.1 to R.2.2.9 inclusive.

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Clause	Requirement + Test	Result - Remark	Verdict

**TABLE R.2 – SPECIFIC FAULT/ERROR CONDITIONS**

Component <sup>a</sup>	Fault/error	Acceptable measures <sup>b, c</sup>	Definitions	Document reference for applied measure	Document reference for applied test	Verdict
1 CPU 1.1 Registers	DC fault	Comparison of redundant CPUs by either: – reciprocal comparison – independent hardware comparator, or internal error detection, or redundant memory with comparison, or periodic self-tests using either – walkpat memory test – Abraham test – Transparent GALPAT test; or word protection with multi-bit redundancy, or static memory test and word protection with single bit redundancy	H.2.18.15 H.2.18.3 H.2.18.9 H.2.19.5 H.2.19.7 H.2.19.1 H.2.19.2.1 H.2.19.8.1 H.2.19.6 H.2.19.8.2			N
1.2 Instruction decoding and execution	Wrong decoding and execution	Comparison of redundant CPUs by either: – reciprocal comparison – independent hardware comparator, or internal error detection, or periodic self-test using equivalence class test	H.2.18.15 H.2.18.3 H.2.18.9 H.2.18.5			N

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Clause	Requirement + Test		Result - Remark			Verdict
Component <sup>a</sup>	Fault/error	Acceptable measures <sup>b, c</sup>	Definitions	Document reference for applied measure	Document reference for applied test	Verdict
1.3 Programme counter	DC fault	Periodic self-test and monitoring using either: – independent time-slot and logical monitoring – internal error detection, or comparison of redundant functional channels by either: – reciprocal comparison – independent hardware comparator	H.2.16.7  H.2.18.10.3  H.2.18.9  H.2.18.15 H.2.18.3			N
1.4 Addressing	DC fault	Comparison of redundant CPUs by either: – reciprocal comparison – independent hardware comparator; or internal error detection; or periodic self-test using – a testing pattern of the address lines; or – a full bus redundancy – a multi bus parity including the address	H.2.18.15 H.2.18.3  H.2.18.9 H.2.16.7 H.2.18.22  H.2.18.1.1 H.2.18.1.2			N
1.5 Data paths instruction decoding	DC fault and execution	Comparison of redundant CPUs by either: – reciprocal comparison, or – independent hardware comparator, or – internal error detection, or – periodic self-test using a testing pattern, or – data redundancy, or – multi-bit bus parity	H.2.18.15 H.2.18.3  H.2.18.9 H.2.16.7  H.2.18.2.1 H.2.18.1.2			N

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Clause	Requirement + Test	Result - Remark	Verdict

Component <sup>a</sup>	Fault/error	Acceptable measures <sup>b, c</sup>	Definitions	Document reference for applied measure	Document reference for applied test	Verdict
2 Interrupt handling and execution	No interrupt or too frequent interrupt related to different sources	Comparison of redundant functional channels by either – reciprocal comparison, – independent hardware comparator, or – independent time-slot and logical monitoring	H.2.18.15 H.2.18.3 H.2.18.10.3			N
3 Clock	Wrong frequency (for quartz synchronized clock: harmonics/sub-harmonics only)	Frequency monitoring, or time-slot monitoring, or comparison of redundant functional channels by either: – reciprocal comparison – independent hardware comparator	H.2.18.10.1 H.2.18.10.4 H.2.18.15 H.2.18.3			
4 Memory 4.1 Invariable memory	99,6 % coverage of all information errors	Comparison of redundant CPUs by either: – reciprocal comparison – independent hardware comparator, or redundant memory with comparison, or periodic cyclic redundancy check, either – single word – double word, or word protection with multi-bit redundancy	H.2.18.15 H.2.18.3 H.2.19.5 H.2.19.4.1 H.2.19.4.2 H.2.19.8.1			N

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Clause	Requirement + Test	Result - Remark	Verdict

Component <sup>a</sup>	Fault/error	Acceptable measures <sup>b, c</sup>	Definitions	Document reference for applied measure	Document reference for applied test	Verdict
4.2 Variable memory	DC fault and dynamic cross links	Comparison of redundant CPUs by either: – reciprocal comparison – independent hardware comparator, or redundant memory with comparison, or periodic self-tests using either: – walkpat memory test – Abraham test – transparent GALPAT test, or word protection with multi-bit redundancy	H.2.18.15 H.2.18.3 H.2.19.5 H.2.19.7 H.2.19.1 H.2.19.2.1 H.2.19.8.1			N
4.3 Addressing (relevant to variable and invariable memory)	DC fault	Comparison of redundant CPUs by either: – reciprocal comparison, or – independent hardware comparator, or full bus redundancy testing pattern, or periodic cyclic redundancy check, either: – single word – double word, or word protection with multi-bit redundancy including the address	H.2.18.15 H.2.18.3 H.2.18.1.1 H.2.18.22 H.2.19.4.1 H.2.19.4.2 H.2.19.8.1			N

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Clause	Requirement + Test		Result - Remark			Verdict
Component <sup>a</sup>	Fault/error	Acceptable measures <sup>b, c</sup>	Definitions	Document reference for applied measure	Document reference for applied test	Verdict
5 Internal data path 5.1 Data	DC fault	Comparison of redundant CPUs by either – reciprocal comparison – independent hardware comparator, or word protection with multi-bit redundancy including the address, or data redundancy, or testing pattern, or protocol test	H.2.18.15 H.2.18.3 H.2.19.8.1 H.2.18.2.1 H.2.18.22 H.2.18.14			N
5.2 Addressing	Wrong address and multiple addressing	Comparison of redundant CPUs by: – reciprocal comparison – independent hardware comparator, or word protection with multi-bit redundancy, including the address, or full bus redundancy; or testing pattern including the address	H.2.18.15 H.2.18.3 H.2.19.8.1 H.2.18.1.1 H.2.18.22			N
6 External communication 6.1 Data	Data corruption of up to Hamming distance 4	CRC – double word, or data redundancy or comparison of redundant functional channels by either – reciprocal comparison; or – independent hardware comparator	H.2.19.4.2 H.2.18.2.1 H.2.18.15 H.2.18.3			N

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Clause	Requirement + Test		Result - Remark			Verdict
Component <sup>a</sup>	Fault/error	Acceptable measures <sup>b, c</sup>	Definitions	Document reference for applied measure	Document reference for applied test	Verdict
6.2 Addressing	Wrong address and multiple addressing	CRC – double word, including the address, or full bus redundancy of data and address, or comparison of redundant communication channels by either: – reciprocal comparison; or – independent hardware comparator	H.2.19.4.2  H.2.18.1.1  H.2.18.15 H.2.18.3			N
6.3 Timing	Wrong point in time  Wrong sequence	Time-slot and logical monitoring, or comparison of redundant communication channels by either: – reciprocal comparison; or – independent hardware comparator Time-slot and logical monitoring, or comparison of redundant communication channels by either: – reciprocal comparison; or – independent hardware comparator	H.2.18.10.3  H.2.18.15 H.2.18.3  H.2.18.10.3  H.2.18.15 H.2.18.3			N

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Clause	Requirement + Test		Result - Remark			Verdict
Component <sup>a</sup>	Fault/error	Acceptable measures <sup>b, c</sup>	Definitions	Document reference for applied measure	Document reference for applied test	Verdict
7 Input/output periphery 7.1 Digital I/O	Fault conditions specified in 19.11.2	Comparison of redundant CPUs by either: – reciprocal comparison – independent hardware comparator, or input comparison, or multiple parallel outputs, or output verification, or testing pattern, or code safety	H.2.18.15 H.2.18.3  H.2.18.8 H.2.18.11 H.2.18.12 H.2.18.22 H.2.18.2			N
7.2 Analog I/O 7.2.1 A/D and D/A converter	Fault conditions in 19.11.2	Comparison of redundant CPUs by either: – reciprocal comparison – independent hardware comparator, or input comparison, or multiple parallel outputs, or output verification, or testing pattern	H.2.18.15 H.2.18.3  H.2.18.8 H.2.18.11 H.2.18.12 H.2.18.22			N
7.2.2 Analog multiplexer	Wrong addressing	Comparison of redundant CPUs by either: – reciprocal comparison – independent hardware comparator, or input comparison or testing pattern	H.2.18.15 H.2.18.3  H.2.18.8 H.2.18.22			N

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Clause	Requirement + Test	Result - Remark	Verdict

Component <sup>a</sup>	Fault/error	Acceptable measures <sup>b, c</sup>	Definitions	Document reference for applied measure	Document reference for applied test	Verdict
8 Monitoring devices and comparators	Any output outside the static and dynamic functional specification	Tested monitoring, or redundant monitoring and comparison, or error recognizing means	H.2.18.21 H.2.18.17 H.2.18.6			N
9 Custom chips <sup>d</sup> e.g. ASIC, GAL, gate array	Any output outside the static and dynamic functional specification	Periodic self-test and monitoring, dual channel (diverse) with comparison, or error recognizing means	H.2.16.7 H.2.16.2 H.2.18.6			N

NOTE A DC fault model denotes a stuck-at fault model incorporating short circuits between signal lines.

- <sup>a</sup> For fault/error assessment, some components are divided into their sub-functions.
- <sup>b</sup> For each sub-function in the table, the software measure will cover the Table R.1 fault/error.
- <sup>c</sup> Where more than one measure is given for a sub-function, these are alternatives.
- <sup>d</sup> To be divided as necessary by the manufacturer into sub-functions.

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Clause	Requirement + Test	Result - Remark	Verdict
<b>S</b>	<b>ANNEX S (INFORMATIVE)</b>		--
	<b>GUIDANCE FOR THE APPLICATION OF THIS STANDARD ON MEASUREMENT OF POWER INPUT AND CURRENT BASED ON THE REQUIREMENTS OF 10.1 AND 10.2 CONCERNING THE REPRESENTATIVE PERIOD</b>		
	Flowchart giving guidance on measurement of power input and current concerning the representative period		--
<b>T</b>	<b>ANNEX T (NORMATIVE)</b>		--
	<b>UV-C RADIATION EFFECT ON NON-METALLIC MATERIALS</b>		
	This annex provides requirements for non-metallic materials subject to direct or reflected UV-C radiation (100 nm to 280 nm) exposure and whose mechanical and electrical properties are relied upon for compliance with this standard		N
	This annex does not apply to glass, ceramic and similar materials		N
	The conditioning and tests are carried out on non-metallic material specimens prepared according to the relevant standard for the test method		N
	The conditioning apparatus and test procedure are as specified in ISO 4892-1 and ISO 4892-2		N
	<b>Modifications to the clauses of ISO 4892-1:2016:</b>		--
5.1	Irradiance		N
5.1.1	The UV-C emitter is a low pressure mercury lamp with a quartz envelope having a continuous spectral irradiance of 10 W/m <sup>2</sup> at 254 nm		N
5.2	Temperature		--
5.2.5	The black-panel temperature is 63 °C ± 3 °C		N
5.3	Humidity and wetting		--
5.3.1	Humidification of the chamber air is specified in part 2 when necessary		N
9	Test report		N
	This clause is not applicable		N
	<b>Modifications to the clauses of ISO 4892-2:2013:</b>		--
7	Procedure		--
7.1	General		--
	At least three test specimens of each non-metallic material providing mechanical support or impact resistance are exposed in each run		N

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Clause	Requirement + Test	Result - Remark	Verdict
	Ten samples of the insulated internal wiring are exposed in each run		N
	When the internal wiring is provided in more than one colour, the colour having the heaviest organic pigment loading is used		N
7.2	Mounting the test specimens		--
	The specimens are attached to the specimen holders such that they are not subject to any applied stress		N
7.3	Exposure		--
	Before placing the specimens in the test chamber, the apparatus is operating under the specified exposure conditions and programmed to operate continuously, conditions are maintained throughout the exposure		N
	The test specimens and, if used, the irradiance-measuring instrument are exposed for 1 000 h		N
7.4	Measurement of radiant exposure		--
	If used, a radiometer is mounted and calibrated such that it measures the irradiance at the exposed surface of the test specimen		N
7.5	Determination of changes in properties after exposure		--
	The non-metallic material properties and test methods for parts providing mechanical support or impact resistance are specified in Table T.1		N
	The non-metallic material properties and test method for electrical insulation of internal wiring are specified in Table T.2		N
8	Exposure report		--
	This clause is not applicable		N
<b>U</b>	<b>ANNEX U (NORMATIVE)</b> <b>APPLIANCES INTENDED FOR REMOTE COMMUNICATION THROUGH PUBLIC NETWORKS</b>		--
	The measures given in this annex are intended to avoid unauthorized access and the effects of transmission failures via remote communication through public networks, where compliance with this standard could be impaired		N
	However, in general, it does not cover aspects concerning confidentiality of data and consumer privacy		N
U.1	Terms and definitions		--
U.1.1	Definitions relating to remote functionality		--

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Clause	Requirement + Test	Result - Remark	Verdict
	Definitions used in this appendix as described		N
U.2	Marking and instructions		--
U.2.1	If there is provision for software download, instructions are provided on how or where to obtain the unique name or code given by the manufacturer, that identifies the current version of the software running in the appliance		N
	The instructions also include the necessary steps the user must follow for the software update procedure		N
U.3	Construction		--
U.3.1	Software enabling communication with a public network is partitioned into modules separate from software which is necessary to comply with the other requirements of this standard		N
U.3.2	Remote communication is established, implemented and terminated by the appliance via software that provides:		N
	- data integrity protection concerning:		--
	• data corruption		N
	• address corruption		N
	• wrong timing or sequence		N
	• permanent "auto-sending" or repetition		N
	• interruption of data transfer		N
	- means to detect and respond to communication in which, for any reason, a message being communicated is incomplete, truncated, contains errors or has the correct format but delivers information that is outside the range expected for that type of message		N
	- measures to control the fault/error conditions specified in Table R.1		N
U.3.3	Measures provided to protect against hazards arising from the reception of messages from several sources simultaneously or sequentially		N
U.3.4	Remote communication is not enabled prior to authorization		N
	Authorization is based on authentication using cryptographic techniques to ensure the identity of both parties		N
	For the purposes of this requirement, communication between two entities for preparation of the authentication and authorization process is not considered remote communication		N

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Clause	Requirement + Test	Result - Remark	Verdict
U.3.5	Measures are taken to prevent unauthorized access and to detect transmission faults/errors in the remote communication		N
U.3.6	The safe operation of an appliance does not depend on remote communication		N
	In case of doubt, remote communication rendered inoperative for the relevant tests of this standard		N
U.3.7	Cryptographic techniques are implemented to provide data integrity protection once authorization for remote communication is established		N
	Cryptographic techniques employed are part of the appliance including its accessories, do not rely upon part of the router or similar data transmission device, and are performed prior to transmission		N
U.3.8	Provisions are taken to ensure that software updates provided by the manufacturer and transmitted to the appliance via remote communication are verified prior to its installation:		--
	- against corruption through communication		N
	- that the software version is compatible with the appliance for which the software version was designed		N
	The software which performs the above-mentioned checks contains measures to control the fault/error conditions specified in Table R.1		N
U.3.9	Permission for each installation of software in the appliance is given by the person responsible for the appliance		N
	User activation of a mode that enables automatic software updates is permitted		N
U.3.10	The installation of software does not impair compliance with the requirements of this standard during or after installation		N

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Clause	Requirement + Test	Result - Remark	Verdict

<b>ZA</b>	<b>ANNEX ZA, SPECIAL NATIONAL CONDITIONS</b>		--
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<b>ATTACHMENT TO TEST REPORT IEC 60335-1</b> <b>EUROPEAN GROUP DIFFERENCES AND NATIONAL DIFFERENCES</b> Household and similar electrical appliances – Safety – Part 1: GENERAL REQUIREMENTS	
<b>Differences according to.....:</b>	EN 60335- 1:2012
<b>Attachment Form No.....:</b>	EU_GD_IEC60335_1R
<b>Attachment Originator.....:</b>	Nemko AS
<b>Master Attachment.....:</b>	2012-03
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<b>CENELEC COMMON MODIFICATIONS</b>			
6.1	Delete "class 0" and "class 01"		N
7.1	Single-phase appliances to be connected to the supply mains: 230 V covered		N
	Multi-phase appliances to be connected to the supply mains: 400 V covered		N
7.10	Devices used to start/stop operational functions of the appliance distinguished from other manual devices by means of shape, size, surface texture, position, etc.		P
	An indication that the device has been operated is given by:		--
	<ul style="list-style-type: none"> <li>a tactile feedback, or</li> </ul>		P
	<ul style="list-style-type: none"> <li>an audible and visual feedback</li> </ul>		P
7.12	The instructions include the substance of the following:		--
	- this appliance can be used by children aged from 8 years and above and persons with reduced physical, sensory or mental capabilities or lack of experience and knowledge if they have been given supervision or instruction concerning use of the appliance in a safe way and understand the hazards involved		P
	- children shall not play with the appliance		P
	- cleaning and user maintenance shall not be made by children without supervision		P
7.12.Z1	The specific instructions related to the safe operation of this appliance is collated together in the front section of the user instructions		P

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Clause	Requirement + Test	Result - Remark	Verdict
	The height of the characters, measured on the capital letters, is at least 3 mm		P
	These instructions are also available in an alternative format, e.g. on a website		P
8.1.1	Also test probe 18 of EN 61032 is applied		N
	The appliance being in every possible position during the test		N
	The force on the probe in the straight position is increased to 10 N when probe 18 is used		N
	When using test probe 18 the appliance is fully assembled as in normal use without any parts removed, and		N
	parts intended to be removed for user maintenance are also not removed		N
8.2	Compliance is checked by applying the test probes of EN 61032		N
	For built-in appliances and fixed appliances, the test probe B and probe 18 of EN 61032 are applied only after installation		N
11.8	Footnotes to "External enclosure of motor-operated appliances" to be taken into account		N
15.1.2	Appliances with an automatic cord reel tested with the cord in the most unfavourable position so that the reeling of the wet cord may affect electrical insulation during operation, the cord not being dried before reeling		N
20.2	When using the test probe similar to test probe B with a circular stop face, the accessories and detachable covers are removed		N
	Test probe 18 applied with a force of 2,5N on the appliance fully assembled		N
24.1	Components comply with the safety requirements specified in the relevant standards as far as they reasonably apply		P
	The requirements of Clause 29 of this standard apply between live parts of components and accessible parts of the appliance.		N
	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		P
	Components that have not been previously tested or do not comply with the standard for the relevant component are tested according to the requirements of 30.2		P

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Clause	Requirement + Test	Result - Remark	Verdict
	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:		--
	- the severity specified in the component standard is not less than the severity specified in 30.2, and		N
	- the test report for the component states whether it complied with the standard for the relevant component with or without flame, flames not exceeding 2 s during the test are ignored		N
	Unless components have been previously tested and found to comply with the relevant standard for the number of cycles specified, they are tested in accordance with 24.1.1 to 24.1.9		P
	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		N
	Components that have not been separately tested and found to comply with the relevant standard, and		P
	components that are not marked or not used in accordance with their marking,		P
	are tested in accordance with the conditions occurring in the appliance, the number of samples being that required by the relevant standard		P
	Lamp holders and starter holders that have not been previously tested and found to comply with the relevant standard are tested as a part of the appliance and additionally comply with the gauging and interchangeability requirements of the relevant standard under the conditions occurring in the appliance		N
	Where the relevant standard specifies these gauging and interchangeability requirements at elevated temperatures, the temperatures measured during the tests of Clause 11 are used		N
	Plugs and socket-outlets and other connecting devices of interconnection cords are not interchangeable with plugs and socket-outlets listed in IEC/TR 60083 or IEC 60906-1, or		N
	with connectors and appliance inlets complying with the standard sheets of IEC 60320-1,		N
	if direct supply to these parts from the supply mains gives rise to a hazard		N
24.1.7	If the remote operation of the appliance is via a telecommunication network, the relevant standard for the telecommunication interface circuitry in the appliance is EN 41003		N

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Clause	Requirement + Test	Result - Remark	Verdict
	Compliance with Clause 8 of this standard is not impaired by connecting the appliance to a device covered by EN 41003		N
24.Z1	For motor running capacitors (IEC 60252-1 type P2) with a metallic enclosure having an overpressure fuse the flame testing of internal plastic parts supporting current carrying connections as required in 30.2.2 and 30.2.3.1 is not necessary		N
25.6	Supply cords of single-phase portable appliances having a rated current not exceeding 16 A, fitted with a plug complying with the following standard sheets of IEC/TR 60083:		--
	- for Class I appliances: standard sheet C2b, C3b or C4..... :		N
	- for Class II appliances: standard sheet C5 or C6..... :		N
25.7	Rubber sheathed cords (60245 IEC 53) are not suitable for appliances intended to be used outdoors or when they are liable to be exposed to significant amount of ultraviolet radiation		N
	Halogen-free thermoplastic compound sheathed supply cords have properties at least those of:		N
	• halogen-free thermoplastic compound sheathed cords (H03Z1Z1H2-F or H03Z1Z1-F), for appliances having a mass not exceeding 3 kg		N
	• halogen-free thermoplastic compound sheathed cords (H05Z1Z1H2-F or H05Z1Z1-F), for other appliances		N
	Cross-linked halogen-free compound sheathed supply cords have properties at least those of cross-linked halogen-free compound sheathed cords (H07ZZ-F)		N
26.11	Conductors connected by soldering are not considered to be positioned or fixed so that reliance is not placed upon the soldering alone to maintain them in position unless they are held in place near the terminals independently of the solder		P
29.3.Z1	Appliance constructed so that if there is a possibility of damaging the insulation during installation, the insulation withstands the scratch and penetration test of 21.2		N
32	Compliance regarding electromagnetic fields is checked according to EN 50366 or EN 62233	Considered charge mode only	P
Annex I, 19.1.101	The appliance is supplied at rated voltage and operated under normal operation with each of the fault conditions specified		N

EN 60335- 1			
Clause	Requirement + Test	Result - Remark	Verdict
	The duration of the test is as specified in 19.7		N

Draft

Tables:

10.1	TABLE: Power input deviation					N
Input deviation of/at:	Prated (W)	P (W)	dP	Required dP	Remark	
					Max setting	

10.2	TABLE: Current deviation					N
Current deviation of/at:	I rated (A)	I measured (A)	dI	required dI	remark	

11.8(1)	TABLE: Heating test, thermocouples			P
Test voltage (V).....:			3.7VDC	—
Ambient, t1 (°C).....:			24.3	
Ambient, t2 (°C).....:			24.2	—
Thermocouple locations	dT (K)		Max. dT (K)	
AC Plug near pin	13.2		50	
Power cord	12.1		50	
Enclosure	21.2		cl. 30	
Internal wire	7.3		50	
Enclosure surface	3.6		75	
Test floor	2.5		65	
<i>Remark:</i>				

11.8 (2)	TABLE: Heating test, resistance method					N
Test voltage (V).....:					—	
Ambient, t1 (°C).....:					—	
Ambient, t2 (°C).....:					—	
Temperature rise of winding	R <sub>1</sub> (Ω)	R <sub>2</sub> (Ω)	dT (K)	Max. dT (K)	Insulation class	
<i>Remark:</i>						

Tables:

13.2	TABLE: Leakage current		P
	Heating appliances: 1.15 x rated input..... :	--	—
	Motor-operated and combined appliances: 1.06 x rated voltage..... :		—
Leakage current between		I (mA)	Max. allowed I (mA)
L/N and controller enclosure		0.005	0.35
L/N and power supply enclosure		0.009	0.35
L/N and motor enclosure		0.012	0.35
supplementary information:			

13.3	TABLE: Electric strength		P
Test voltage applied between:		Test voltage (V)	Breakdown
L/N and controller enclosure		3000V	No
L/N and power supply enclosure		3000V	No
L/N and motor enclosure		3000V	No
supplementary information:			

14	TABLE: Transient overvoltages					N
Clearance between:		CI (mm)	Required CI (mm)	Rated impulse voltage (V)	Impulse test voltage (V)	Flashover (Yes/No)
--		--	--	--	--	--

16.2	TABLE: Leakage current		P
	Single phase appliances: 1.06 x rated voltage	1.06 x240Vac = 254.4 Vac	—
	Three phase appliances 1.06 x rated voltage divided by $\sqrt{3}$ ..... :	--	—
Leakage current between		I (mA)	Max. Allowed I (mA)
L/N and controller enclosure		0.008	0.25
L/N and power supply enclosure		0.012	0.25
L/N and motor enclosure		0.020	0.25
supplementary information:			

16.3	TABLE: Electric strength		P
Test voltage applied between:		Test Voltage (V)	Breakdown

Tables:

L/N and controller enclosure	3000V	No
L/N and power supply enclosure	3000V	No
L/N and motor enclosure	3000V	No
supplementary information:		

<b>17</b>	<b>TABLE: Overload protection of transformers and associated circuits</b>					<b>N</b>
ambient temperature (°C) .....					--	—
No.	component No.	fault	test voltage (V)	test time	result	
--	--	--	--	--	--	

<b>19.7</b>	<b>TABLE: Abnormal operation, locked rotor/moving parts</b>					<b>N</b>
Temperature rise of winding		R <sub>1</sub> (Ω)	R <sub>2</sub> (Ω)	dT (K)	Max. dT (K)	Insulation class
--		--	--	--	--	--
Remark :						

<b>19.11</b>	<b>TABLE: abnormal operation tests</b>					<b>N</b>
ambient temperature (°C) :					22.5°C	—
No.	component No.	fault	test voltage (V)	test time	result	
--	--	--	--	--	--	
Remark : s-c: short circuit; o-c: open circuit;						

Tables:

24.1	TABLE: COMPONENTS					P
Object / part No.	manufacturer/ trademark	type/model	technical data	standard	mark(s) of conformity <sup>1)</sup>	
Enclosure	CHIMEI	ABS	HB	EN 60335-1	Test with appliance	
Heating elements	Guangzhou Yunyang Electronic Technology Co., Ltd.(Wuhan) Co., Ltd	LW-A-2001	220-240V 50Hz, 1400-1600W	EN 60335-1	Test with appliance	
Internal wire	HONG JIAN  ENTERPRISE CO.,LTD	1015	T105 600V 20/22AWG	EN 60335-1	Tested in appliance / UL E188132	
<sup>1)</sup> an asterisk indicates a mark which assures the agreed level of surveillance						

Tables:

28.1	TABLE: TORQUE FOR TESTING SCREWS AND NUTS			P
Use of screws	Diameter of screw (mm)	Column number (I, II, or III)	Torque (Nm)	Verdict
Fixed enclosure	3.76	II	1.2	P

29.1	TABLE: Clearances					N
	Overvoltage category :	--			—	
		Type of insulation:				
Rated impulse voltage (V):	Min. cl (mm)	Basic	Functional	Supplementary	Reinforced	Verdict / Remark
330	<b>0,5</b>	---	---	---	---	N
500	0,5	---	---	---	---	N
800	0,5	---	---	---	---	N
1500	0,5	---	---	---	---	N
2500	1,5				---	N
4000	<b>3,0</b>	---	---	---	---	N
6000	5,5	---	---	---	---	N
8000	8,0	---	---	---	---	N
10000	11,0	---	---	---	---	N

\*) The value is increased to 0,8mm for pollution degree 3

\*\*) If the construction is affected by wear, distortion, movement of the parts or during assembly, the value is increased by 0,5 mm

Tables:

29.2	TABLE: Creepage distances, basic, supplementary and reinforced insulation										P
Working voltage (V)	Creepage distance (mm)							Type of insulation			Verdict
	Pollution degree										
	1	2			3						
		Material group			Material group						
		I	II	IIIa/IIIb	I	II	IIIa/IIIb	B*)	S*)	R*)	
≤50	0,2	0,6	0,9	1,2	1,5	1,7	1,9	—	—	—	N
≤50	0,2	0,6	0,9	1,2	1,5	1,7	1,9	—	—	—	N
≤50	0,4	1,2	1,8	2,4	3,0	3,4	3,8	—	—	—	N
>50 and ≤125	0,3	0,8	1,1	<b>1,5</b>	1,9	2,1	2,4	—	—	—	P
>50 and ≤125	0,3	0,8	1,1	<b>1,5</b>	1,9	2,1	2,4	—	—	—	P
>50 and ≤125	0,6	1,6	2,2	<b>3,0</b>	3,8	4,2	4,8	—	—	—	P
>125 and ≤250	0,6	1,3	1,8	2,5	3,2	3,6	<u>4,0**)</u>	—	—	—	N
>125 and ≤250	0,6	1,3	1,8	2,5	3,2	3,6	<u>4,0</u>	—	—	—	N
>125 and ≤250	1,2	2,6	3,6	5,0	6,4	7,2	<u>8,0</u>	—	—	—	N
>250 and ≤400	1,0	2,0	2,8	4,0	5,0	5,6	6,3	—	—	—	N
>250 and ≤400	1,0	2,0	2,8	4,0	5,0	5,6	6,3	—	—	—	N
>250 and ≤400	2,0	4,0	5,6	8,0	10,0	11,2	12,6	—	—	—	N
>400 and ≤500	1,3	2,5	3,6	5,0	6,3	7,1	8,0	—	—	—	N
>400 and ≤500	1,3	2,5	3,6	5,0	6,3	7,1	8,0	—	—	—	N
>400 and ≤500	2,6	5,0	7,2	10,0	12,6	14,2	16,0	—	—	—	N
>500 and ≤800	1,8	3,2	4,5	6,3	8,0	9,0	10,0	—	—	—	N
>500 and ≤800	1,8	3,2	4,5	6,3	8,0	9,0	10,0	—	—	—	N
>500 and ≤800	3,6	6,4	9,0	12,6	16,0	18,0	20,0	—	—	—	N
>800 and ≤1000	2,4	4,0	5,6	8,0	10,0	11,0	12,5	—	—	—	N
>800 and ≤1000	2,4	4,0	5,6	8,0	10,0	11,0	12,5	—	—	—	N
>800 and ≤1000	4,8	8,0	11,2	16,0	20,0	22,0	25,0	—	—	—	N
>1000 and ≤1250	3,2	5,0	7,1	10,0	12,5	14,0	16,0	—	—	—	N
>1000 and ≤1250	3,2	5,0	7,1	10,0	12,5	14,0	16,0	—	—	—	N
>1000 and ≤1250	6,4	10,0	14,2	20,0	25,0	28,0	32,0	—	—	—	N
>1250 and ≤1600	4,2	6,3	9,0	12,5	16,0	18,0	20,0	—	—	—	N
>1250 and ≤1600	4,2	6,3	9,0	12,5	16,0	18,0	20,0	—	—	—	N
>1250 and ≤1600	8,4	12,6	18,0	25,0	32,0	36,0	40,0	—	—	—	N

Tables:

>1600 and ≤2000	5,6	8,0	11,0	16,0	20,0	22,0	25,0		—	—	N
>1600 and ≤2000	5,6	8,0	11,0	16,0	20,0	22,0	25,0	—		—	N
>1600 and ≤2000	11,2	16,0	22,0	32,0	40,0	44,0	50,0	—	—		N
>2000 and ≤2500	7,5	10,0	14,0	20,0	25,0	28,0	32,0		—	—	N
>2000 and ≤2500	7,5	10,0	14,0	20,0	25,0	28,0	32,0	—		—	N
>2000 and ≤2500	15,0	20,0	28,0	40,0	50,0	56,0	64,0	—	—		N
>2500 and ≤3200	10,0	12,5	18,0	25,0	32,0	36,0	40,0		—	—	N
>2500 and ≤3200	10,0	12,5	18,0	25,0	32,0	36,0	40,0	—		—	N
>2500 and ≤3200	20,0	25,0	36,0	50,0	64,0	72,0	80,0	—	—		N
>3200 and ≤4000	12,5	16,0	22,0	32,0	40,0	45,0	50,0		—	—	N
>3200 and ≤4000	12,5	16,0	22,0	32,0	40,0	45,0	50,0	—		—	N
>3200 and ≤4000	25,0	32,0	44,0	64,0	80,0	90,0	100,0	—	—		N
>4000 and ≤5000	16,0	20,0	28,0	40,0	50,0	56,0	63,0		—	—	N
>4000 and ≤5000	16,0	20,0	28,0	40,0	50,0	56,0	63,0	—		—	N
>4000 and ≤5000	32,0	40,0	56,0	80,0	100,0	112,0	126,0	—	—		N
>5000 and ≤6300	20,0	25,0	36,0	50,0	63,0	71,0	80,0		—	—	N
>5000 and ≤6300	20,0	25,0	36,0	50,0	63,0	71,0	80,0	—		—	N
>5000 and ≤6300	40,0	50,0	72,0	100,0	126,0	142,0	160,0	—	—		N
>6300 and ≤8000	25,0	32,0	45,0	63,0	80,0	90,0	100,0		—	—	N
>6300 and ≤8000	25,0	32,0	45,0	63,0	80,0	90,0	100,0	—		—	N
>6300 and ≤8000	50,0	64,0	90,0	126,0	160,0	180,0	200,0	—	—		N
>8000 and ≤10000	32,0	40,0	56,0	80,0	100,0	110,0	125,0		—	—	N
>8000 and ≤10000	32,0	40,0	56,0	80,0	100,0	110,0	125,0	—			N
>8000 and ≤10000	64,0	80,0	112,0	160,0	200,0	220,0	250,0	—	—		N
>10000 and ≤12500	40,0	50,0	71,0	100,0	125,0	140,0	160,0		—	—	N
>10000 and ≤12500	40,0	50,0	71,0	100,0	125,0	140,0	160,0	—		—	N
>10000 and ≤12500	80,0	100,0	142,0	200,0	250,0	280,0	320,0	—	—		N

\*) , B=Basic, S=Supplementary and R=Reinforced

\*\*), Lacquered conductors of windings are considered to be bare conductors, but **creepage distances** need not be greater than the associated **clearance** specified in table 16 taking into account 29.1.1. So the limit is 1.5mm minimum.

Tables:

29.2	TABLE: Creepage distances, functional insulation							P
Working voltage (V)	Creepage distance (mm)							Verdict / Remark
	Pollution degree							
	1	2			3			
		Material group			Material group			
		I	II	IIIa/IIIb	I	II	IIIa/IIIb	
≤50	0,2	0,6	0,8	1,1	1,4	1,6	1,8	N
>50 and ≤125	0,3	0,7	1,0	<b>1,4</b>	1,8	2,0	2,2	P
>125 and ≤250	0,4	1,0	1,4	2,0	2,5	2,8	<u>3,2</u>	N
>250 and ≤400	0,8	1,6	2,2	3,2	4,0	4,5	5,0	N
>400 and ≤500	1,0	2,0	2,8	4,0	5,0	5,6	6,3	N
>500 and ≤800	1,8	3,2	4,5	6,3	8,0	9,0	10,0	N
>800 and ≤1000	2,4	4,0	5,6	8,0	10,0	11,0	12,5	N
>1000 and ≤1250	3,2	5,0	7,1	10,0	12,5	14,0	16,0	N
>1250 and ≤1600	4,2	6,3	9,0	12,5	16,0	18,0	20,0	N
>1600 and ≤2000	5,6	8,0	11,0	16,0	20,0	22,0	25,0	N
>2000 and ≤2500	7,5	10,0	14,0	20,0	25,0	28,0	32,0	N
>2500 and ≤3200	10,0	12,5	18,0	25,0	32,0	36,0	40,0	N
>3200 and ≤4000	12,5	16,0	22,0	32,0	40,0	45,0	50,0	N
>4000 and ≤5000	16,0	20,0	28,0	40,0	50,0	56,0	63,0	N
>5000 and ≤6300	20,0	25,0	36,0	50,0	63,0	71,0	80,0	N
>6300 and ≤8000	25,0	32,0	45,0	63,0	80,0	90,0	100,0	N
>8000 and ≤10000	32,0	40,0	56,0	80,0	100,0	110,0	125,0	N
>10000 and ≤12500	40,0	50,0	71,0	100,0	125,0	140,0	160,0	N

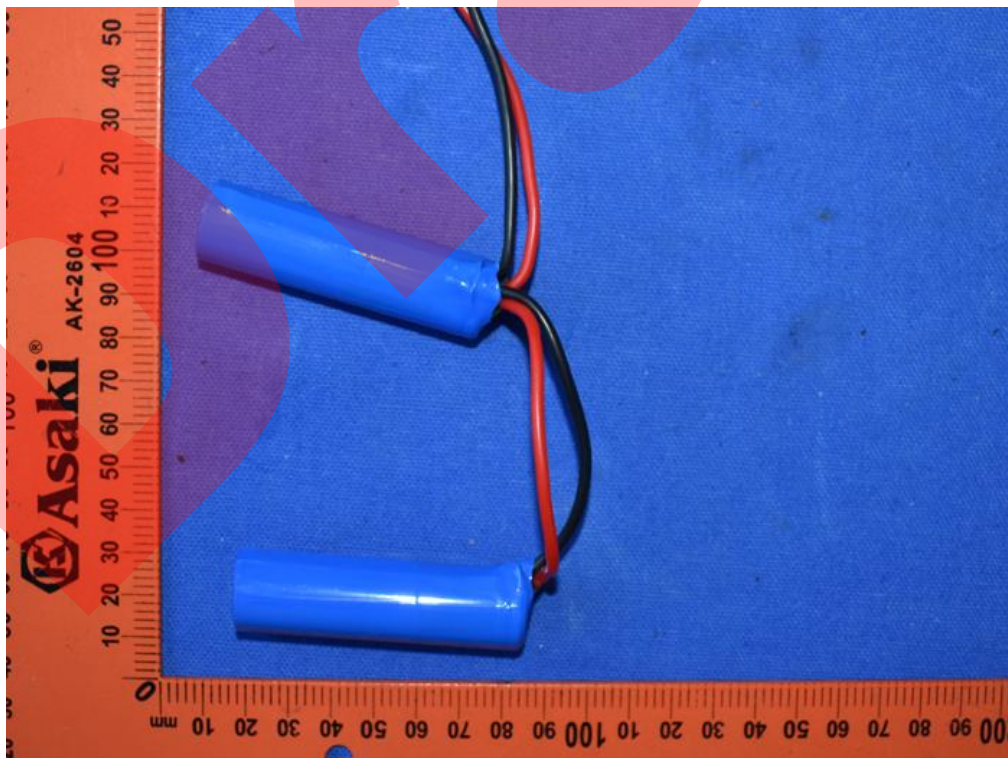
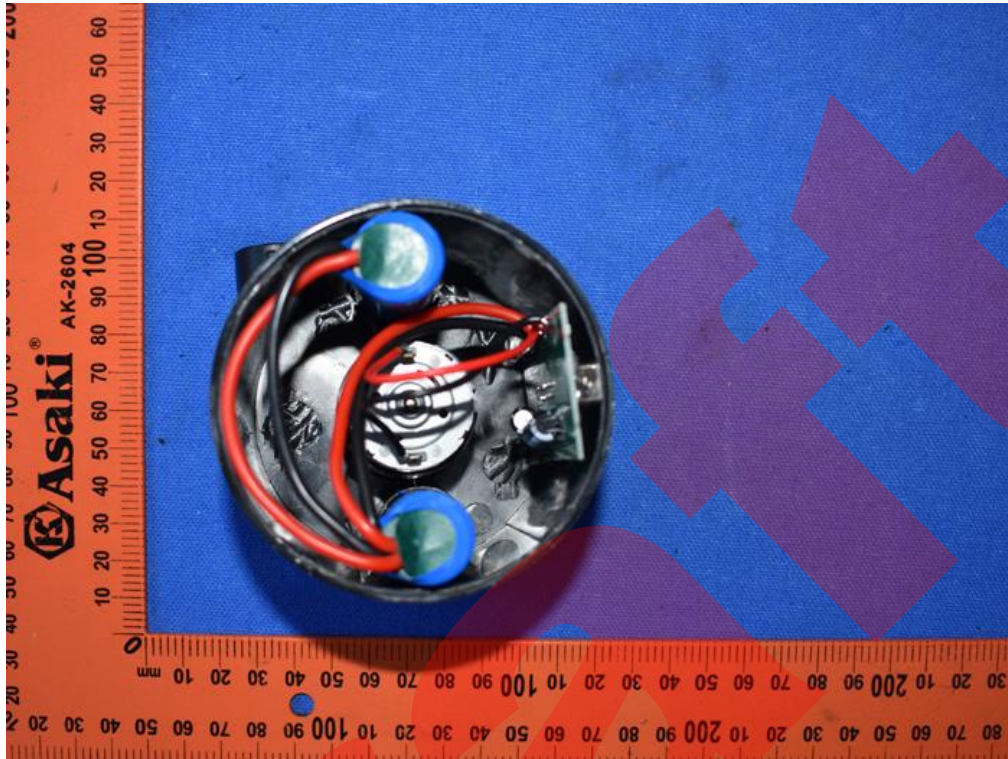
Tables:

TABLE 30 RESISTANCE TO HEAT, FIRE AND TRACKING (appended table)													P	
Component	Manufacturer	Type	Ball pressure test				Tracking test [CTI/ PTI]	Glow wire test					Needle-flame test	Verdict
			75°C	cl. 11 +40°C	125°C	cl. 19 +25°C		GWT 550°C	GWT 650°C	GWT 750°C	GWFI 850°C	GWIT		
Plastic enclosure	See table 24.1	See table 24.1	X 1.4 mm	--	--	--	--	--	X No flame	--	--	--	P	
PCB	See table 24.1	See table 24.1	--	--	X 0.8 mm	--	--	--	--	--	--	X	P	

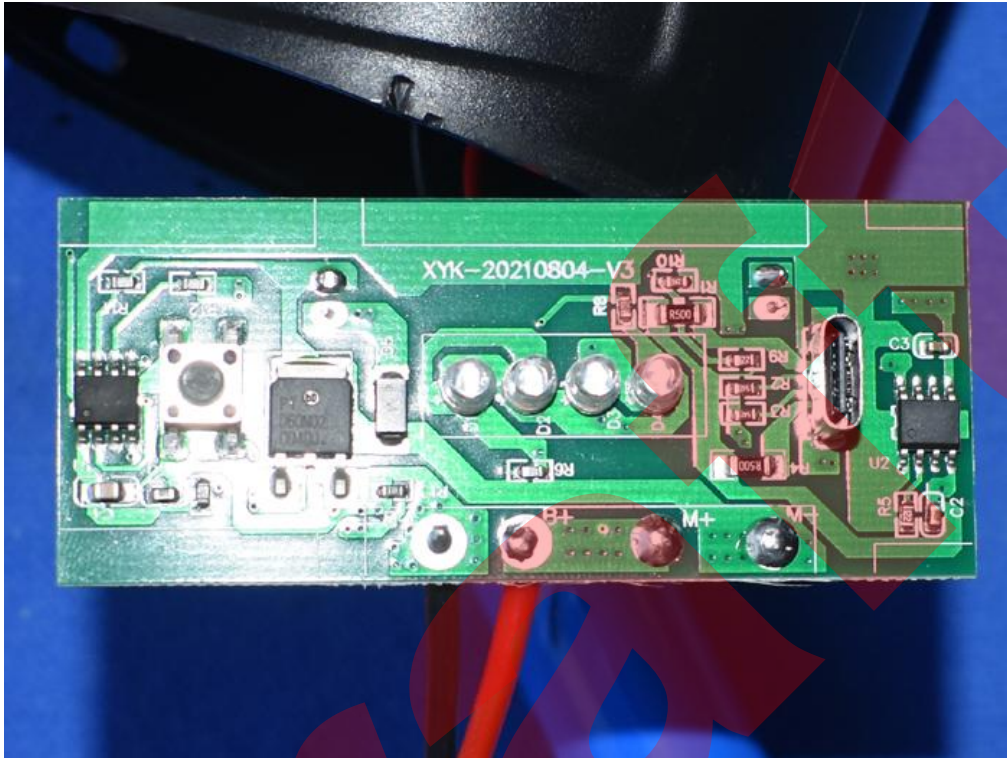
Remark:

1. Allowed impression diameter is  $\leq 2.0\text{mm}$  for ball pressure test ;
2. According to the clause 30.1, the test is done at 550°C and no flame appears;
3. According to the clause 30.2.3.1, the test is done at 850°C and no flame duration 30s in the test.
4. According to the clause 30.2.3.2, the test is done at 750°C and no flame appears in the test. No need to do the needle flame test.
5. According to the clause 30.2.3.2, the test is done at 750°C and needle flame is not necessary since the ti is not more than 2s.
6. According to the clause 30.2.3.2, the component has operating current less than 0,2A during normal operation. No flame appears in the glow wire test at 750° C. No need to do the needle flame test.

Product Photos:



*Product Photos:*



==== End of Test Report ====