

# CE

## LVD TEST REPORT

**Report No.:** STE24081211S

**Product:** UVC Air Sterilizer

**Model No.:** Q6060, (others refer to page 2)

**Prepared for:** MASSPHOTON LIMITED

**Address:** Unit 542, 5F, Building 5W, Phase One, Hong Kong Science Park, New Territories, Hong Kong

**Prepared by:** Shenzhen STE Testing Laboratory Co., Ltd.

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<b>TEST REPORT</b> <b>EN IEC 60335-1</b> <b>Household and similar electrical appliances - Safety -</b> <b>Part 1: General requirements</b>	
<b>Report Number</b> .....	STE24081211S
<b>Tested by (name + signature)</b> .....	Ada Lin / Test engineer
<b>Approved by (name + signature)</b> .....	Nick Huang / Project manager
<b>Date of issue</b> .....	August 22, 2024
<b>Total number of pages</b> .....	115
<b>Testing Laboratory</b> .....	<b>Shenzhen STE Testing Laboratory Co., Ltd.</b>
<b>Address</b> .....	3/F, Building 9, Hongde Factory, No. 63 Yuchang Road, Niuhu Community, Guanlan Street, Longhua District, Shenzhen, China
<b>Applicant's name</b> .....	<b>MASSPHOTON LIMITED</b>
<b>Address</b> .....	Unit 542, 5F, Building 5W, Phase One, Hong Kong Science Park, New Territories, Hong Kong
<b>Manufacturer's name</b> .....	<b>XUZHOU LIYU ADVANCED TECHNOLOGY CO., LTD</b>
<b>Address</b> .....	1st floor, No.1, Electronic Information Building, No. 5 Jingwei Road, Xuzhou High tech Industrial Development Zone, Xuzhou, Jiangsu 221100, China
<b>Test specification:</b>	
<b>Standard</b> .....	EN IEC 60335-1: 2023+A11: 2023 EN 62233: 2008
<b>Test procedure</b> .....	Type test
<b>Non-standard test method</b> .....	N/A
<b>Test Report Form No</b> .....	IEC60335_1BB
<b>Test Report Form(s) Originator</b> .....	TÜV SÜD Product Service GmbH
<b>Master TRF</b> .....	Dated 2023-11-23
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<b>Test item description</b> .....	UVC Air Sterilizer
<b>Trade Mark</b> .....	N/A
<b>Model/Type reference</b> .....	<b>Q6060</b> , Q6060, Q6060-A, Q6060-B, Q6060-C
<b>Ratings</b> .....	Input: 110-240V~, 50/60Hz, 90W



**Summary of testing:****Tests performed (name of test and test clause):**

The submitted samples were found to comply with the requirements of:

- EN IEC 60335-1:2023+A11:2023
- EN 62233: 2008

**Testing location:**

Shenzhen STE Testing Laboratory Co., Ltd.

3/F, Building 9, Hongde Factory, No. 63 Yuchang Road, NiuHu Community, Guanlan Street, Longhua District, Shenzhen, China

**Copy of marking plate:**

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.

**Remarks:**

1. Height of CE mark is 5mm or more, height of WEEE symbol is 7mm or more, height of other marks is 5mm or more, height of letters and numerals is 2mm or more.

<b>Test item particulars</b> ..... :	
Classification of installation and use..... :	Built-in appliance, Class I
Supply Connection..... :	Non-Detachable supply cord
<b>Possible test case verdicts:</b>	
- test case does not apply to the test object..... :	N or N/A (Not Applicable)
- 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..... :	July 15, 2024
Date (s) of performance of tests..... :	July 15, 2024 to August 22, 2024
<b>General remarks:</b>	
<p>"(See Enclosure #)" refers to additional information appended to the report.          "(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>Manufacturer's Declaration per sub-clause 4.2.5 of IEC60335-1:</b>	
The application for obtaining a CB Test Certificate includes more than one factory location and a declaration from the Manufacturer stating that the sample(s) submitted for evaluation is (are) representative of the products from each factory has been provided..... :	<input type="checkbox"/> <b>Yes</b> <input checked="" type="checkbox"/> <b>Not applicable</b>
<b>General product information</b>	
1. The UVC Air Sterilizer is used for indoor only. 2. The laboratory ambient for testing: 23.0-25.0°C , 60%-73%R.H.	

EN IEC 60335-1			
Clause	Requirement + Test	Result - Remark	Verdict
<b>5</b>	<b>GENERAL CONDITIONS FOR THE TESTS</b>		--
	Tests performed according to clause 5, e.g. nature of supply, sequence of testing, etc.		P
5.8.2	Appliances having more than one rated voltage..... :	Upper value: 110 V Lower value: 240 V	P
5.8.3	Heating Appliances and combined appliances marked with a rated power input range..... :	Upper value: ... W Lower value: .... W	N
5.8.4	Appliances with a rated voltage range and with a rated power input corresponding to the mean value of the rated voltage range	Upper calculated input: .....W Lower calculated input: .....W	N

<b>6</b>	<b>CLASSIFICATION</b>		--
6.1	Protection against electric shock: Class 0, 0I, I, II, III..... :	Class I	P
6.2	Protection against harmful ingress of water	IPX0	N

<b>7</b>	<b>MARKING AND INSTRUCTIONS</b>		--
7.1	Rated voltage or voltage range (V)..... :	See marking label	P
	Symbol for nature of supply, or..... :	See marking label	P
	Rated frequency (Hz)..... :		N
	Rated power input (W), or..... :	See marking label	P
	Rated current (A) ..... :		N
	Manufacturer's or responsible vendor's name, trademark or identification mark..... :	See marking label	P
	Model or type reference..... :	See marking label	P
	Symbol IEC 60417-5172, for class II appliances		N
	IP number, other than IPX0..... :		N
	Symbol IEC 60417-5180, for class III appliances, unless		N
	the appliance is operated by batteries only		N
	Symbol IEC 60417-5018, for class II and class III appliances incorporating a functional earth		N
	the appliance is operated by batteries only, or		N
	the appliance is powered by rechargeable batteries recharged in the appliance		N
	Appliance outlets accessible to the user and socket-outlets accessible to the user:		N
	- that are incorporated in appliances connected to the supply mains, and		N
	- that operate at rated voltage		N

EN IEC 60335-1			
Clause	Requirement + Test	Result - Remark	Verdict
	marked with their outlet load (W or A)..... :		N
	Appliances intended to be supplied from a detachable power supply part to recharge the battery marked with:		N
	- symbol ISO 7000-0790		N
	- symbol IEC 60417-6181		N
	- model or type reference of the detachable power supply part, or.....:		N
	- the substance of the following: "Use only with <model or type reference> supply unit"		N
	Symbol IEC 60417-5018, for class II and class III appliances incorporating a functional earth		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, if the working voltage exceeds extra-low voltage		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		P
	Different rated values marked with the values separated by an oblique stroke		N
	Requirement also applied to appliances for connection to both single phase and multiphase supplies		N
7.4	Appliances adjustable for different rated voltages or rated frequencies, the voltage or the frequency setting is clearly discernible		N
	frequent changes in voltage or frequency setting not required, adjustment of rated voltage or rated frequency determined from wiring diagram		N
	Wiring diagram may be on the inside of a cover that has to be removed to connect the supply conductors		N
	Wiring diagram not on a label loosely attached to the appliance		N
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		N
	the power input or current are related to the arithmetic mean value of the rated voltage range		N

EN IEC 60335-1			
Clause	Requirement + Test	Result - Remark	Verdict
	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		--
	Symbol for nature of supply placed next to rated 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
	Additional symbols give no rise to misunderstanding		P
	Symbols specified in IEC60417 and ISO7000 are used.		N
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
	For multi-phase appliances, correct mode of connection considered to be obvious if:		N
	- indicated by arrows pointing towards the terminals, or		N
	- marked in words		N
	Connection diagram is the wiring diagram		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 (letter N)		N
	- marking of protective earthing terminals (symbol IEC 60417-5019)		P
	- marking of functional earthing terminals (symbol IEC 60417-5018)		N
	- marking not placed on removable parts		P
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
	This applies also to switches which are part of a control		N
	If figures are used, the off position indicated by the figure 0		P

EN IEC 60335-1			
Clause	Requirement + Test	Result - Remark	Verdict
	The figure 0 indicates only OFF position, unless no confusion with the OFF position		P
	The figure 0 is used on a digital programming keyboard		P
7.11	Indication for direction of adjustment of controls		P
7.12	Instructions for safe use provided		P
	Details concerning precautions during user maintenance		P
	The instructions state that:		--
	- the appliance is not to be used by persons (including children) with reduced physical, sensory or mental capabilities, or lack of experience and knowledge, unless they have been given supervision or instruction		P
	- children being supervised not to play with the appliance		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		P
	Instructions for class III appliances state that it must only be supplied at SELV, unless		P
	it is a battery-operated appliance, the battery being charged outside the appliance		N
	For appliances for altitudes exceeding 2000 m, the maximum altitude is stated.....:		N
	The instructions for appliances incorporating a functional earth states that the appliance incorporates an earth connection for functional purposes		N
	The instructions for appliances intended to be connected to a supply for battery recharging state a warning to only use an external supply with the described specifications		N
	The instructions for appliances intended to be supplied from a detachable power supply part for battery recharging state the type reference of the supply part along with a warning to only use the unit provided with this appliance		N
	The instructions for appliances intended for use with batteries using metal-ion chemistries state the normal temperature range for battery charging		N
	Meaning of symbol for detachable power supply part explained, unless not used		N
7.12.1	Sufficient details for installation supplied		P

EN IEC 60335-1			
Clause	Requirement + Test	Result - Remark	Verdict
	For an appliance intended to be permanently connected to the water mains and not connected by a hose-set, this is stated		N
	If different rated voltages or different rated frequencies are marked, the instructions state what action to be taken to adjust the appliance		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 state that the fixed wiring must be protected		N
7.12.4	Instructions for built-in appliances:		--
	- dimensions of space		N
	- dimensions and position of supporting and fixing		N
	- minimum distances between parts and surrounding structure		N
	- minimum dimensions of ventilating openings and arrangement		N
	- connection to supply mains and interconnection of separate components		N
	- allow disconnection of the appliance after installation, by accessible plug or a switch in the fixed wiring, 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		P
	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:		--
	- max. inlet water pressure (Pa).....:	1 MPa	P
	- min. inlet water pressure, if necessary (Pa).....:	0.02MPa	P

EN IEC 60335-1			
Clause	Requirement + Test	Result - Remark	Verdict
	Instructions concerning new and old hose-sets for appliances connected to the water mains by detachable hose-sets		N
7.12.9	Instructions specified in 7.12 and from 7.12.1 to 7.12.8 appear together before any other instructions supplied with the appliance		P
	These instructions may be supplied with the appliance separately from any functional use booklet		P
	They may follow the description of the appliance that identifies parts, or follow the drawings/sketches		P
	In addition, instructions are also available in an alternative format such as on a website or on request from the user in a format such as a DVD		P
	In addition, instructions are also available in an alternative format such as on a website or in a format such as a DVD.....:		P
7.13	Instructions and other texts in an official language	English language	P
7.14	Marking clearly legible and durable, rubbing test as specified	The label is clearly legible after the rubbing test	P
	The signal words <b>WARNING, CAUTION, DANGER</b> if in the Latin alphabet shall be in uppercase having a height not less than		--
	– 3,5 mm for appliances normally used on the floor;		P
	– 2,0 mm for portable appliances with a printable surface of less than 10 cm <sup>2</sup> ; and		P
	– 3,0 mm for other appliances.		P
	Uppercase letter of the text explaining the signal word shall be no smaller than 1,6 mm, with other letters according to the font size of the uppercase letter.		P
	Countries that do not use the Latin alphabet need to specify the minimum size of the script to be used taking into account what is specified for the Latin alphabet.		P
	Unless contrasting colours are used, moulded in, engraved, or stamped markings shall be either raised above or have a depth below the surface of at least 0,25 mm.		P
7.15	Markings specified in 7.1 to 7.5 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		N

EN IEC 60335-1			
Clause	Requirement + Test	Result - Remark	Verdict
	For stationary appliances, name, trademark or identification mark and model or type reference visible after installation		P
	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
	The symbol IEC 60417-5018 placed next to the symbol IEC 60417-5172 or IEC 60417-5180		N
	Type reference of detachable power supply part placed next to symbol IEC 60417-6181		N
	Marking of outlet load close to appliance outlet or socket-outlet		N
7.16	Marking of a possible replaceable thermal link or fuse link clearly visible with regard to replacing the link	No such thermal link or fuse link	N

<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
	Use of test probe B of IEC 61032:		P
	- force not exceeding 1 N: no contact with live parts		P
	- force of 20 N: no contact with live parts		P
	- lamps behind a detachable cover not removed, if conditions met		N
	- protection against contact with live parts of the lamp cap during lamp insertion or removal		N
	Use of test probe 18 of IEC 61032 for non-commercial appliances and commercial appliances intended for public access:		N
	- force not exceeding 1 N: no contact with live parts		N
	- force of 10 N: no contact with live parts		N
	- appliance fully assembled as in normal use, no parts removed		N
	No contact with live parts protected by materials as specified		P

EN IEC 60335-1			
Clause	Requirement + Test	Result - Remark	Verdict
8.1.2	Use of test probe 13 of IEC 61032, with a force not exceeding 1 N, 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 or supporting parts		N
	For a single switching action obtained by a switching device, requirements as specified		N
	For appliances with a supply cord and without a switching device, the single switching action may be obtained by the withdrawal of the plug		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		P
	- or separated from live parts by protective impedance		N
	If protective impedance: d.c. current not exceeding 2 mA, and		N
	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 $\mu$ F		N
	- for peak values over 450 V up to and including 15 kV, discharge not exceeding 45 $\mu$ C		N
	- for peak values over 15 kV, 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
	As regards the products which have a dedicated installation panel or cover and which cannot be installed without them, compliance is checked according to 5.10 (after the installation as instructed in the installation manual). (EN IEC 60335-2-40)		N

EN IEC 60335-1			
Clause	Requirement + Test	Result - Remark	Verdict
8.2	Class II appliances and constructions constructed so that there is adequate protection against accidental contact with basic insulation and metal parts separated from live parts by basic insulation only		N
	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>		--
	Requirements and tests are specified in part 2 when necessary		N
<b>10</b>	<b>POWER INPUT AND CURRENT</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
	If the power input varies throughout the operating cycle and the maximum value of the power input exceeds, by a factor greater than two, the arithmetic mean value of the power input occurring during a representative period, the power input is the maximum value that is exceeded for more than 10 % of the representative period		N
	Otherwise the power input is the arithmetic mean value		N
	In case of doubt, the power input of the motors may be measured separately	(See appended table)	N
	In case of measurement during a representative period, duration of the representative period.....:		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 power input is related to the arithmetic mean value		N
	Appliance outlets accessible to the user and socket-outlets accessible to the user incorporated in appliances connected to the supply mains and operating at rated voltage are not loaded during test,		N
	however, their contribution to the power input is considered to be the marked outlet load per appliance outlet or socket-outlet		N
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

EN IEC 60335-1			
Clause	Requirement + Test	Result - Remark	Verdict
	If the current varies throughout the operating cycle and the maximum value of the current exceeds, by a factor greater than two, the arithmetic mean value of the current occurring during a representative period, the current is the maximum value that is exceeded for more than 10 % of the representative period		N
	Otherwise the current is the arithmetic mean value		N
	In case of doubt, the current of the motors may be measured separately	(See appended table)	N
	In case of measurement during a representative period, duration of the representative period.....:		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
	Appliance outlets and socket-outlets accessible to the user incorporated in appliances connected to the supply mains and operating at rated voltage are not loaded during test,		N
	however, their contribution to the current is considered to be the marked outlet load per appliance outlet or socket-outlet		N

<b>11</b>	<b>HEATING</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		P
	Temperature rises of windings determined by resistance method, unless		N
	the windings are non-uniform or it is 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 0.94 and 1.06 times rated voltage (V)..... :		P

EN IEC 60335-1			
Clause	Requirement + Test	Result - Remark	Verdict
11.7	Appliance outlets and socket-outlets accessible to the user loaded with a resistive load that gives the marked outlet load		P
	For appliances incorporating integral batteries or separable batteries not disconnected from the appliance during charging:		N
	- the fully discharged battery is charged for 1 h, while the appliance is operated continuously performing its intended function		N
	- the fully discharged battery is charged for 24 h or until it is fully charged, without the appliance performing its intended function		N
11.8	Temperature rises monitored continuously and not exceeding the values in table 3 .....	(see appended table)	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		N
	Protective devices do not operate, except		N
	components in protective electronic circuits tested for the number of cycles specified in 24.1.4		N

12	CHARGING OF METAL-ION BATTERIES		--
	Charging a battery that uses metal-ion chemistry does not cause any cell to exceed its operating region for charging		N
	Fully discharged battery is charged with the charging system indicated in the instructions at an ambient temperature of 20 °C ± 5 °C		N
	Test repeated at:		--
	- minimum ambient temperature, if specified to be less than 10 °C by the manufacturer (°C).....		N
	- at maximum ambient temperature, if specified to be greater than 40 °C by the manufacturer (°C)....:		N
	For all individual cells, the voltage, temperature and charging current are monitored..... :	(See appended table)	N
	For parallel configuration, analysis used to avoid measuring the individual branch currents,		N
	the test result not exceeding the specified operating region for charging		N

EN IEC 60335-1			
Clause	Requirement + Test	Result - Remark	Verdict
	Location of thermocouples for each cell temperature measurement on the outer surface, halfway along the longest dimension of the cell		N
	For each cell, the specified operating region for charging specified by the cell manufacturer is not exceeded at the temperature of the cell		N
	For batteries where cells are configured in series, the test is repeated with the charge in one battery deliberately imbalanced, the imbalance being introduced into a fully discharged battery by charging one cell to:		N
	- approximately 50 % of its full charge, or		N
	- less than 50 % of its full charge, if it is demonstrated as specified that this would occur in normal operation		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)..... :		P
	Protective impedance and radio interference filters disconnected before carrying out the tests		N
13.2	The leakage current is measured by means of the circuit described in Figure 4 of IEC 60990:2016		P
	For class 0I and class I 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 over-voltages 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
	No flashover during the test, unless		N

EN IEC 60335-1			
Clause	Requirement + Test	Result - Remark	Verdict
	of functional insulation if the appliance complies with clause 19 with the clearance short-circuited		N

15	MOISTURE RESISTANCE		--
15.1	Enclosure provides the degree of moisture protection according to classification of the appliance		P
	Compliance checked as specified in 15.1.1, taking into account 15.1.2, followed by the electric strength test of 16.3		P
	No trace of water on insulation which can result in a reduction of clearances or creepage distances below values specified in clause 29		P
15.1.1	Appliances, other than IPX0, subjected to tests as specified in IEC 60529.....:	IPX0	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
	Wall-mounted appliances, take into account the distance to the floor stated in the instructions		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

EN IEC 60335-1			
Clause	Requirement + Test	Result - Remark	Verdict
	for IPX4 appliances, the movement of the tube is limited to two times 90° from the vertical for a period of 5 min		N
	Appliances with type X attachment fitted with a flexible cord as described		N
	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		N
	Spillage solution comprising water containing approximately 1 % NaCl and 0,6 % rinsing agent		N
	Appliances with type X attachment fitted with a flexible cord as described		N
	Appliances incorporating an appliance inlet tested with or without an connector, whichever is most unfavourable		N
	Detachable parts are removed		N
	Overfilling test with additional amount of the solution, over a period of 1 min (I)..... :		N
	The appliance withstands the electric strength test of 16.3		N
	No trace of water on insulation that can result in a reduction of clearances or 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	93%, 25°C	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	No such component	N

EN IEC 60335-1			
Clause	Requirement + Test	Result - Remark	Verdict
	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 (V)..... :		P
	Three-phase appliances: test voltage 1.06 times rated voltage divided by $\sqrt{3}$ (V)..... :		N
	Leakage current measurements..... :	(see appended table)	P
	Limit values doubled if:		--
	- 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..... :		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..... :	(see appended table)	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>		--
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EN IEC 60335-1			
Clause	Requirement + Test	Result - Remark	Verdict
	Requirements and tests are specified in part 2 when necessary		N

19	ABNORMAL OPERATION		--
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
	Appliances incorporating heating elements subjected to the tests of 19.2 and 19.3, and		P
	if the appliance also has a control that limit the temperature during clause 11 it is subjected to the test of 19.4, and		P
	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		N
	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 appliances with heating elements with restricted heat dissipation; test voltage (V), power input of 0.85 times rated power input (W).....		P
19.3	Test of 19.2 repeated; test voltage (V), power input of 1.24 times rated power input (W).....		P
19.4	Test conditions as in clause 11, any control limiting the temperature during tests of clause 11 short-circuited		N

EN IEC 60335-1			
Clause	Requirement + Test	Result - Remark	Verdict
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 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
	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		P
	locking moving parts of other appliances		P
	Locked rotor, capacitors open-circuited one at a time		N
	Test repeated with capacitors short-circuited one at a time, unless		N
	the 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
	An electronic timer or programmer that operates to ensure compliance with the test before the maximum period under the conditions of Clause 11 is reached, is a protective electronic circuit		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		N
19.9	Running overload test on appliances incorporating motors intended to be remotely or automatically controlled or liable to be operated continuously		N

EN IEC 60335-1			
Clause	Requirement + Test	Result - Remark	Verdict
	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..... :	(see appended table)	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 obtained by electronic disconnection, or a device placing the appliance in a stand-by mode, subjected to the tests of 19.11.4		N
	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		P
	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:		--

EN IEC 60335-1			
Clause	Requirement + Test	Result - Remark	Verdict
	- 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 operating under conditions specified in clause 11, but supplied at rated voltage, duration of the tests as specified:		--
	a) short circuit of functional insulation if clearances or creepage distances are less than the values specified in clause 29		P
	b) open circuit at the terminals of any component		P
	c) short circuit of capacitors, unless		P
	they comply with IEC 60384-14		N
	d) short circuit of any two terminals of an electronic component, other than integrated circuits		P
	This fault condition is not applied between the two circuits of an optocoupler		N
	e) failure of triacs in the diode mode		P
	f) failure of microprocessors and integrated circuits		P
	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 device with an off position obtained by electronic disconnection, or		P
	a device that can be placed in the stand-by mode,		P
	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		P
	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		P

EN IEC 60335-1			
Clause	Requirement + Test	Result - Remark	Verdict
	appliances operated for 30 s or 5 min during the test of 19.7 are not subjected to the tests for electromagnetic phenomena.		P
	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		P
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		P
	An open circuit test voltage of 2 kV is applicable for the line-to-line coupling mode		N
	An open circuit test voltage of 4 kV is applicable for the line-to-earth coupling		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		P
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		P
	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		P
19.11.4.8	The appliance is supplied at rated voltage and operated under normal operation. After 60s the power supply is reduced to a level such that the appliance ceases to respond or parts controlled by the programmable component cease to operate		P
	The appliance continues to operate normally, or		P
	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

EN IEC 60335-1			
Clause	Requirement + Test	Result - Remark	Verdict
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		N
	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 (V).....:	1000	P
	- supplementary insulation (V).....:	1750	N
	- reinforced insulation (V).....:	3000	P
	After operation or interruption of a control, clearances and creepage distances across the functional insulation withstand the electric strength test of 16.3, the test voltage being twice the working voltage		N
	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:		--
	- do not become operational, or		N
	- if they become operational, do not result in a dangerous malfunction during or after the tests of 19.11.4		N
	If the appliance contains lids or doors that are controlled by one or more interlocks, one of the interlocks may be released provided that:		--
	- 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		P
	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		P

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

20	STABILITY AND MECHANICAL HAZARDS		--
20.1	Appliances having adequate stability		N
	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		N
	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		N
	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 closure		N
	Not possible to touch dangerous moving parts with the test probe described		N

21	MECHANICAL STRENGTH		--
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	(see appended table)	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

EN IEC 60335-1			
Clause	Requirement + Test	Result - Remark	Verdict
	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
	Test not applicable if the thickness of supplementary insulation is at least 1 mm and reinforced insulation at least 2 mm		N
	The insulation is tested as specified, and does withstand the electric strength test of 16.3		N

22	CONSTRUCTION		--
22.1	Appliance marked with the first numeral of the IP system, relevant requirements of IEC 60529 are fulfilled		P
22.2	Stationary appliance: means to ensure all-pole disconnection from the supply being provided:		--
	- a supply cord fitted with a plug, or		N
	- a switch complying with 24.3, or		N
	- a statement in the instruction sheet that a disconnection incorporated in the fixed wiring is to be provided, or		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 01 and class I appliances, connected to 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 torque of 0.4Nm; the pins are not rotating, unless		N
	rotating does not impair compliance with this standard		N
22.4	Appliance for heating liquids and appliance causing undue vibration not provided with pins for insertion into socket-outlets		N

EN IEC 60335-1			
Clause	Requirement + Test	Result - Remark	Verdict
22.5	No risk of electric shock when touching the pins of the plug, for appliances having a capacitor with rated capacitance equal to or greater than 0,1μF, the appliance being disconnected from the supply at the instant of voltage peak	No capacitor	N
	Voltage not exceeding 34 V (V)..... :		N
	If compliance relies on the operation of an electronic circuit, the electromagnetic phenomena tests of 19.11.4.3 and 19.11.4.4 are applied		N
	The discharge test is then repeated three times, voltage not exceeding 34 V (V)..... :		N
22.6	Electrical insulation not affected by condensing water or leaking liquid		P
	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		N
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

EN IEC 60335-1			
Clause	Requirement + Test	Result - Remark	Verdict
	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		N
	Fixing in wrong position of handles, knobs etc. indicating position of switches or similar components not possible		N
	Axial force 15 N applied to parts, the shape being so that an axial pull is unlikely to be applied		N
	Axial force 30 N applied to parts, the shape being so that an axial pull is likely to be applied		N
22.13	Unlikely that handles, when gripped as in normal use, make the operator's hand touch parts having a temperature rise exceeding the value specified for handles which are held for short periods only		N
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 or other fasteners, likely 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		P
22.16	Automatic cord reels cause no undue abrasion or damage to the sheath of the flexible cord, no breakage of conductors strands and 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		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		N
	constructed to prevent inappropriate replacement		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		N

EN IEC 60335-1			
Clause	Requirement + Test	Result - Remark	Verdict
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		N
22.24	Bare heating elements, except in class III appliances or class III constructions that do not contain live parts, adequately supported	No bare heating elements	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 contain live parts, cannot come into contact with accessible metal parts		N
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		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		N
	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		N
22.31	Neither clearances nor creepage distances over supplementary and reinforced insulation reduced below values specified in clause 29 as a result of wear		N
	Neither clearances nor creepage distances between live parts and accessible parts reduced below values for supplementary insulation if wires, screws etc. become loose		N

EN IEC 60335-1			
Clause	Requirement + Test	Result - Remark	Verdict
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		N
	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
	Ceramic and similar porous 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 are in contact with unearthed accessible metal parts are not in direct contact with live parts, or		P
	unearthed metal parts separated from live parts by basic insulation only		N
	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		N

EN IEC 60335-1			
Clause	Requirement + Test	Result - Remark	Verdict
	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 and cordless 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		N
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		N
	they are separated from live parts by double or reinforced insulation		N
22.37	Capacitors in Class II appliances not connected to accessible metal parts and their casings, if of metal, separated from accessible metal parts by supplementary insulation, unless		N
	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		N
	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		N
22.41	No components, other than lamps, containing mercury		P
22.42	Protective impedance consisting of at least two separate components		N

EN IEC 60335-1			
Clause	Requirement + Test	Result - Remark	Verdict
	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		P
22.45	When air is used as reinforced insulation, clearances not reduced below the values specified in 29.1.3 due to deformation as a result of an external force applied to the enclosure		N
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 clause 11		N
22.47	Appliances connected to the water mains withstand the water pressure expected in normal use		P
	No leakage from any part, including any inlet water hose		P
22.48	Appliances connected to the water mains constructed to prevent backsiphonage of non-potable water		P
22.49	For remote operation, the duration of operation is to 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	There is a control on the appliance 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

EN IEC 60335-1			
Clause	Requirement + Test	Result - Remark	Verdict
	These requirements not necessary on appliances that can operate as follows, without giving rise to a hazard:		--
	- 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
22.53	Class II appliances and class III appliances that incorporate functionally earthed parts have at least double insulation or reinforced insulation between live parts and the functionally earthed parts		N
22.54	Button cells and batteries designated R1 not accessible without the aid of a tool, unless		N
	the cover of their compartment can only be opened after at least two independent movements have been applied simultaneously		N
22.55	Devices operated to stop the intended function of the appliance, if any, are be distinguished from other manual devices by means of shape, size, surface texture or position .....		N
	The requirement concerning position does not preclude use of a push on push off switch		N
	An indication when the device has been operated is given by:		N
	- tactile feedback from the actuator or from the appliance, or		N
	- reduction in heat output; or		N
	- audible and visible feedback		N
22.56	Detachable power supply part provided with the part of class III construction		N
22.57	The properties of non-metallic materials do not degrade from exposure to UV-C radiation, as specified in annex T		N
	This requirement does not apply to glass, ceramics or similar materials		N
22.59	Protective extra-low voltage circuits separated by at least supplementary insulation from circuits operating at safety extra-low voltage		N
22.60	Functional earthing terminals and functional earthing contacts not connected to the neutral terminal		N
22.61	Appliance outlets complying with the standard sheets in IEC 60320-3 accessible to the user and socket outlets accessible to the user are single phase, if:		N

EN IEC 60335-1			
Clause	Requirement + Test	Result - Remark	Verdict
	- they are incorporated in appliances connected to the supply mains, and		N
	- they operate at rated voltage		N
	Current rating not exceeding 16 A (A).....:		N
	Appliance outlets accessible to the user, other than those supplying accessories, and socket-outlets accessible to the user are protected by one of the following:		P
	- a circuit breaker for equipment complying with IEC 60934, or		P
	- a non-user replaceable fuse-link		N
	Current rating of protective device not exceeding current rating of the appliance outlet or socket-outlet (A).....:		N
	Protective device placed behind a non-detachable cover		N
	Current rating of appliance outlets and socket-outlets marked with the outlet load in watts, obtained from the market outlet load divided by the rated voltage (A)..... :		N
22.62	Remote communication through public networks does not impair compliance with this standard		N
	The requirement does only apply to remote communication where the download of software or the transmission of data:		N
	a) includes measures according to normative Annex R necessary for compliance with 22.46, or		N
	Includes means necessary for compliance with Clauses 8 to 32		N
	b) only affects the software part that is not covered by a), but where compliance might be impaired due to improper separation of partitioning from the software or data in a)		N
	The requirement does not apply to appliances:		N
	- where all measures to comply with this standards are independent of software,		N
	- using remote communication through public networks for the send-only transmission of data, or		P
	- that only provide event driven messages or push remote monitoring		P
	Compliance checked by inspection of the product and the technical documentation, and by the requirements and tests in normative Annex U		P

EN IEC 60335-1			
Clause	Requirement + Test	Result - Remark	Verdict
<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		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 undue stress		N
	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		N
23.5	The insulation of internal wiring subjected to the supply mains voltage withstanding the electrical stress likely to occur in normal use		P
	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		P
	For class II construction, the requirements for supplementary insulation and reinforced insulation apply,		N

EN IEC 60335-1			
Clause	Requirement + Test	Result - Remark	Verdict
	Except that the sheath of a cord complying with IEC 60227 or IEC 60245 may provide supplementary insulation.		N
	A single layer of internal wiring insulation does not provide reinforced insulation		P
23.6	Sleeving used as supplementary insulation on internal wiring retained in position by clamping at both ends, or		N
	be such that it can only be removed by breaking or cutting		N
23.7	The colour combination green/yellow only used 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		P
	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

<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
	Motors not required to comply with IEC 60034-1, they are tested as part of the appliance		N
	Relays tested as part of the appliance, or		N
	alternatively acc. to IEC 60730-1, and meeting the additional requirements in IEC 60335-1		N
	The requirements of Clause 29 apply between live parts of components and accessible parts of the appliance		N
	Components can comply with the requirements for clearances and creepage distances for functional insulation in the relevant component standard		P
	30.2 of this standard apply to parts of non-metallic material in components including parts of non-metallic material supporting current-carrying connections		P

EN IEC 60335-1			
Clause	Requirement + Test	Result - Remark	Verdict
	Components that have not been previously tested to comply with the IEC standard for the relevant component are tested according to the requirements of 30.2		P
	Components that have been previously tested to comply with the resistance to fire requirements in the IEC standard for the relevant component need not be retested provided the specified conditions are met		P
	If these conditions are not satisfied, the component is tested as part of the appliance.		P
	Power electronic converter circuits not required to comply with IEC 62477-1, they are tested as part of the appliance		N
	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		P
	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, comply with IEC 60384-14		N
	If the capacitors have to be tested, they are tested according to Annex F		N
24.1.2	Transformers in associated switch mode power supplies comply with Annex BB of IEC 61558-2-16		N
	Safety isolating transformers comply with IEC 61558-2-6		N

EN IEC 60335-1			
Clause	Requirement + Test	Result - Remark	Verdict
	If they have to be tested, they are tested according to Annex G		N
24.1.3	Switches comply 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
24.1.4	Automatic controls comply with IEC 60730-1 with the relevant part 2. The number of cycles of operation being at least:		--
	- thermostats:	10 000	P
	- temperature limiters:	1 000	N
	- self-resetting thermal cut-outs:	300	N
	- voltage maintained non-self-resetting thermal cut-outs:	1 000	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		N
	For water valves containing live parts and that are incorporated in external hoses for connection of an appliance to the water mains, the degree of protection declared for subclause 6.5.2 of IEC 60730-2-8 is IPX7		N
	Thermal cut-outs of the capillary type comply with the requirements for type 2.K controls in IEC 60730-2-9		N
24.1.5	Appliance couplers comply with IEC 60320-1		N
	However, for class II appliances classified higher than IPX0, the appliance couplers comply with IEC 60320-2-3		N
	Interconnection couplers comply with IEC 60320-2-2		N

EN IEC 60335-1			
Clause	Requirement + Test	Result - Remark	Verdict
24.1.6	Small lamp holders similar to E10 lampholders comply with IEC 60238, the requirements for E10 lampholders being applicable		N
24.1.7	For remote operation of the appliance 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		P
	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
24.1.10	Lamps and lamp systems that have not been previously tested and found to comply with the exempt group classification of IEC 62471:2006 GLS regarding E <sub>s</sub> and E <sub>UVA</sub> :		N
	- tested as part of the appliance		N
	- comply with the requirements of Clause 32 under the conditions occurring in the appliance		N
	Unless otherwise specified, the following components are considered to comply with the specified GLS classification:		N
	- visible light indicators		N
	- infrared sources used for signalling or communication		N
	- seven-segment indicators		N
	- liquid crystal displays		N
	- organic LED displays (OLED)		N
	- plasma displays		N
24.1.11	Cord sets required to be provided with the appliance comply with IEC 60799		N
	Cord sets with cords complying to IEC 62821-3 allowed		N
24.2	Appliances not fitted with:		--
	- 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

EN IEC 60335-1			
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 have 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		N
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:		--
	- 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

EN IEC 60335-1			
Clause	Requirement + Test	Result - Remark	Verdict
	- adjacent non-metallic parts within 50 mm withstand the needle-flame test of Annex E		N
	- adjacent non-metallic parts within 50 mm classified as at least V-1 according to IEC 60695-11-10		N
	For capacitors complying with IEC 60252-1:2010 including IEC 60252-1:2010/AMD1:2013, damp heat test for 5.14 of that standard with severity parameters as specified		N

<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, the current rating and voltage rating of the plug being not less than the corresponding ratings of its associated appliance		N
	- an appliance inlet having at least the same degree of protection against moisture as required for the appliance, or		P
	- pins for insertion into socket-outlets		N
25.2	Appliance not provided with more than one means of connection to the supply mains		P
	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

EN IEC 60335-1			
Clause	Requirement + Test	Result - Remark	Verdict
	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).....:		P
	Introduction of conduit or cable does not reduce clearances or creepage distances below values specified in clause 29		P
25.5	Method for assembling the supply cord to the appliance:		--
	- type X attachment		N
	- type Y attachment		N
	- type Z attachment is allowed		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, other than for class III appliances, being one of the following types:		
	- rubber sheathed (at least 60245 IEC 53)		N
	- polychloroprene sheathed (at least 60245 IEC 57)		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		--
	<ul style="list-style-type: none"> <li>light polyvinyl chloride sheathed cord (60227 IEC 52), for appliances not exceeding 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>		P
	- heat resistant polyvinyl chloride sheathed. Not used for type X attachment other than specially prepared cords		--
	<ul style="list-style-type: none"> <li>heat-resistant light polyvinyl chloride sheathed cord (60227 IEC 56), for appliances not exceeding 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

EN IEC 60335-1			
Clause	Requirement + Test	Result - Remark	Verdict
	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 not less than table 11; rated current (A); cross-sectional area (mm <sup>2</sup> )..... :		P
25.9	Supply cords not in contact with sharp points or edges		P
25.10	Supply cord of class I appliances have a green/yellow core for earthing		P
	In multi-phase appliances, the colour of the neutral conductor of the supply cord is blue.		N
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		N
25.13	Inlet openings so constructed as to prevent damage to the supply cord		N
	If it is not evident that the supply cord can be introduced without risk of damage, 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, as described:		--
	- applied force (N)..... :		N
	- number of flexings..... :		N
	The test does not result in:		--
	- 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

EN IEC 60335-1			
Clause	Requirement + Test	Result - Remark	Verdict
	- 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:		--
	- fixed appliances: pull 100 N; torque (not on automatic cord reel) (Nm)..... :		N
	- other appliances: values shown in table 12: mass (kg); pull (N); torque (not on automatic cord reel) (Nm)..... :		N
	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:		--
	- 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 supply 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

EN IEC 60335-1			
Clause	Requirement + Test	Result - Remark	Verdict
	- 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
	Tying the cord into a knot or tying the cord with string not used		N
25.20	The conductors of the supply cord for type Y and Z attachment insulated from accessible metal parts		N
25.21	Space for supply cord for type X attachment or for connection of fixed wiring constructed:		--
	- 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 inlets:		--
	- live parts not accessible during insertion or removal		P
	Requirement not applicable to appliance inlets complying with IEC 60320-1		P
	- connector can be inserted without difficulty		P
	- the appliance is not supported by the connector		P
	- not for cold conditions if temp. rise of external metal parts exceeds 75 K during clause 11, unless		N
	the supply cord is unlikely to touch such metal parts		N

EN IEC 60335-1			
Clause	Requirement + Test	Result - Remark	Verdict
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 this 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
	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		P
	Terminals only accessible after removal of a non-detachable cover, except		P
	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

EN IEC 60335-1			
Clause	Requirement + Test	Result - Remark	Verdict
	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 of cables of fixed wiring so constructed that the conductor is clamped between metal surfaces with sufficient contact pressure but without damaging the conductor		N
	Terminals fixed so that when the clamping means is tightened or loosened:		--
	- the terminal does not become loose		N
	- internal wiring is not subjected to stress		N
	- neither clearances nor creepage distances are reduced below the values in clause 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 (Nm)..... :		N
	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 of cables of fixed wiring suitable for connection of conductors with 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

EN IEC 60335-1			
Clause	Requirement + Test	Result - Remark	Verdict
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 of 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
	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		P
	Earthing terminals and earthing contacts not connected to the neutral terminal		P
	Class 0, II and III appliances have no provision for protective earthing		N
	Class II appliances and class III appliances can incorporate an earth for functional purposes		N
	Safety extra-low voltage circuits not earthed, unless		N
	protective extra-low voltage circuits		N
27.2	Clamping means of earthing terminals adequately secured against accidental loosening		P
	Terminals for the connection of external equipotential bonding conductors allow connection of conductors of 2.5 to 6 mm <sup>2</sup> , and		P
	- do not provide earthing continuity between different parts of the appliance, and		P

EN IEC 60335-1			
Clause	Requirement + Test	Result - Remark	Verdict
	- conductors cannot be loosened without the aid of a tool		P
	Requirements not applicable to class II appliances and class III appliances that incorporate an earth for functional purposes		N
27.3	For a detachable part having an earth connection and being plugged into another part of the appliance, the earth connection is made before and separated after current-carrying connections when removing the part		N
	For appliances with supply cords, current-carrying conductors become taut before earthing conductor, if the cord slips out of the cord anchorage		P
	Requirements not applicable to class II appliances and class III appliances that incorporate an earth for functional purposes		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		P
	Parts providing earthing continuity, other than parts of a metal frame or enclosure, have adequate resistance to corrosion		P
	If of steel, these parts provided with an electroplated coating with a thickness at least 5 μm		P
	Adequate protection against rusting of parts of coated or uncoated steel, only intended to provide or transmit contact pressure		P
	In the body of the earthing terminal is a part of a frame or enclosure of aluminium or aluminium alloys, precautions taken to avoid risk of corrosion		P
	Requirements not applicable to class II appliances and class III appliances that incorporate an earth for functional purposes		N
27.5	Low resistance of connection between earthing terminal and earthed metal parts		P
	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		P
	Requirements not applicable to class II appliances and class III appliances that incorporate an earth for functional purposes		N
	Resistance not exceeding 0,1 Ω at the specified low-resistance test (Ω).....:	0.026Ω < 0.1Ω	P

EN IEC 60335-1			
Clause	Requirement + Test	Result - Remark	Verdict
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
	Requirements not applicable to class II appliances and class III appliances that incorporate an earth for functional purposes		N

28	SCREWS AND CONNECTIONS		--
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		N
	Screws of insulating material not used for any electrical connections or connections providing earthing continuity		N
	Screws used for electrical connections or connections providing earthing continuity screwed into metal		P
	Screws not of insulating material if their replacement by a metal screw can impair supplementary or reinforced insulation		P
	For 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 impairs basic insulation		N
	For screws and nuts; torque-test as specified in table 14.....:	(see appended table)	P
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		P
	there is resiliency in the metallic parts to compensate for shrinkage or distortion of the insulating material		N
	This requirement does not apply to electrical connections in circuits of appliances for which:		--
	<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

EN IEC 60335-1			
Clause	Requirement + Test	Result - Remark	Verdict
	<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:		--
	- 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		P
	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 basic insulation (Type 2), Annex J applies.....:		N
	The microenvironment is pollution degree 1 under type 1 protection		N

EN IEC 60335-1			
Clause	Requirement + Test	Result - Remark	Verdict
	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		N
	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
	For appliances intended for use at altitudes exceeding 2 000 m, the clearances in Table 16 is increased according to the relevant multiplier values in Table A.2 of IEC 60664-1		N
	Impulse voltage test is not applicable:		--
	- when the microenvironment is pollution degree 3, or		N
	- for basic insulation of class 0 and class 01 appliances, or		N
	- to appliances intended for use at altitudes exceeding 2 000 m		N
	Appliances are in overvoltage category II		P
	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
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

EN IEC 60335-1			
Clause	Requirement + Test	Result - Remark	Verdict
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 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		N
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		N
	However, clearances at crossover points are not measured		N
	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:		--
	- 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

EN IEC 60335-1			
Clause	Requirement + Test	Result - Remark	Verdict
	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
	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		N
	A force of 30 N is applied to accessible surfaces		N
	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)	N
	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

EN IEC 60335-1			
Clause	Requirement + Test	Result - Remark	Verdict
29.2.2	Creepage distances of supplementary insulation at least those specified for basic insulation in table 17, or..... :	(see appended table)	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..... :	(see appended table)	N
	Table 2 of IEC 60664-4, as applicable..... :		N
29.2.4	Creepage distances of functional insulation not less than specified in table 18..... :	(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 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		N
	Compliance checked:		--
	- by measurement, in accordance with 29.3.1, or		N
	- by an electric strength test in accordance with 29.3.2, or		N
	- for insulation, other than single layer internal wiring insulation, 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
	- by an assessment of the thermal quality of the material according to 29.3.3 combined with an electric strength test in accordance with 23.5, for each single layer internal wiring insulation touching each other, 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

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

30	RESISTANCE TO HEAT AND FIRE		--
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 tested 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 30.1)	P
	Parts supporting live parts tested 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)..... :	(see appended table 30.1)	P
	Parts of thermoplastic material providing supplementary or reinforced insulation tested at 25 °C plus the maximum temperature rise determined during clause 19, if higher; temperature (°C)..... :	(see appended table 30.1)	P
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		P

EN IEC 60335-1			
Clause	Requirement + Test	Result - Remark	Verdict
	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		N
30.2.1	Parts of non-metallic material subjected to the glow-wire test of IEC 60695-2-11 at 550°C	(see appended table 30.2)	P
	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 with appropriate severity level:	(see appended table 30.2)	N
	- 750 °C, for connections carrying a current exceeding 0,5 A during normal operation		N
	- 650 °C, for other connections		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

EN IEC 60335-1			
Clause	Requirement + Test	Result - Remark	Verdict
	- comply with the needle-flame test of Annex E, or	(see appended table 30.2/30.2.4)	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..... :		P
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 parts, within a distance of 3 mm,		P
	subjected to the glow-wire test of IEC 60695-2-11 with a test severity of 850 °C	(see appended table 30.2)	P
	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 850 °C		N
30.2.3.2	Parts of non-metallic material supporting connections, such as switch contacts and the like in other components, and		P
	Parts of non-metallic material supporting connections, and		P
	parts of non-metallic material within a distance of 3mm,		P
	subjected to the glow-wire test of IEC 60695-2-11 with appropriate severity level:	(see appended table 30.2)	P
	- 750 °C, for connections carrying a current exceeding 0,2 A during normal operation		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:		--
	- 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

EN IEC 60335-1			
Clause	Requirement + Test	Result - Remark	Verdict
	<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:		--
	- 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:		--
	- parts that withstood the glow-wire test of IEC 60695-2-11 of 750 °C or 650 °C as appropriate, but produce a flame that persist longer than 2 s, or		N
	- 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:		--
	- 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

EN IEC 60335-1			
Clause	Requirement + Test	Result - Remark	Verdict
30.2.4	Base material of printed circuit boards subjected to the needle-flame test of Annex E		N
	Test not applicable to conditions as specified..... :		N

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

32	RADIATION, TOXICITY AND SIMILAR HAZARDS		--
32.1	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
32.2	Appliance do not present an optical radiation hazard due to their operation in normal use		N
	Requirement does not apply to lamps and lamp systems that comply with 24.1.10		N
	Compliance checked as follows		N
	appliance supplied at rated voltage (V).....: Note: Generally 50 Hz is the most unfavourable frequency.		N
	- Radiation assessment at or recalculated to 200 mm distance or at fixed use distance, measurement as described in IEC 62471:2006		N
	- For lamps or lamp systems intended to illuminate objects, tested at the GLS assessment distance producing 500 lux as described in IEC 62471:2006		N
	- Appliance complies with exempt group classification requirements of IEC 62471:2006 regarding actinic ultraviolet hazard (E <sub>s</sub> ) and near-UV hazard (E <sub>UVA</sub> )		N

EN IEC 60335-1			
Clause	Requirement + Test	Result - Remark	Verdict
<b>A</b>	<b>ANNEX A (INFORMATIVE) ROUTINE TESTS</b>		--
	Description of routine tests to be carried out by the manufacturer		N
<b>B</b>	<b>ANNEX B (NORMATIVE) APPLIANCES POWERED BY RECHARGEABLE BATTERIES THAT ARE RECHARGED IN THE APPLIANCE</b>		N
	The following modifications to this standard are applicable to:		N
	- battery-operated appliances and remote controls employing non-rechargeable batteries (primary batteries)		N
	- battery-operated appliances and remote controls employing rechargeable batteries (secondary batteries)		N
	- detachable and separable batteries for battery-operated appliances		N
B.3.1.1	Battery-operated appliance operated under the following conditions:		N
	- for appliances operated with detachable or separable batteries disconnected from the appliance for charging, appliance operated to perform its intended function with a fully charged battery, the battery being the model or type reference of the battery provided or indicated in the instructions		N
	- for appliances operated with integral or separable batteries not disconnected from the appliance for charging, and that cannot perform their intended function while batteries are being charged, appliance operated to perform its intended function with a fully charged battery		N
	- for appliances operated with replaceable batteries, including integral replaceable batteries, or non-rechargeable batteries, appliance operated to perform its intended function with the artificial source described in B5.3, upper limit short circuit current capacity specified in Table B.1		N
B.3.6.1	Non-rechargeable battery: battery is supplied in a fully charged state and cannot be recharged after		N
5.2	Tests of B.19.1 to B.19.6 carried out on separate samples		N
5.8.1	This subclause is not applicable		N
5.8.2	This subclause is not applicable		N

EN IEC 60335-1			
Clause	Requirement + Test	Result - Remark	Verdict
5.8.3	This subclause is not applicable		N
5.8.4	This subclause is not applicable		N
B.5.1	Before starting a test requiring a fully charged battery, battery fully charged, disconnected from source and allowed to rest between 2 h and 6 h		N
B.5.2	Specification of a rated voltage implies the use of a fully charged battery		N
	For battery-operated appliances, where the supply terminal connecting the battery have no indication of polarity, the more unfavourably polarity applied, unless		N
	such a connection unlikely to occur due to the construction of the appliance		N
B.5.3	When specified that a battery provided with or intended for the appliance may be replaced by an artificial source, that source consists of a DC power supply or a specially constructed battery, output of each as described in Table B.1 for the relevant battery type		N
6.1	Battery-operated appliances without a supply connection or a functional earth connection not classified with respect to protection against electric shock		N
7.1	Battery-operated appliances and remote controls containing batteries marked with the:		N
	- name, trademark or identification mark of the manufacturer or responsible vendor		N
	- model or type reference		N
	- IP number according to degree of protection against ingress of water, other than IPX0.....:		N
	- type reference of the battery, if battery either not recharged in the appliance or non-rechargeable		N
	Appliances incorporating replaceable batteries marked with:		N
	- battery type reference		N
	- battery voltage (V).....:		N
	- polarity of the terminals, unless		N
	incorrect insertion of battery by the user unlikely to occur due to the construction of the appliance		N
	If more than one battery type can be used with the appliance, appliance marked with the type reference of at least one of the battery types that can be used, together with:		N
	- symbol ISO 7000-0790 (2004-01), or		N



EN IEC 60335-1			
Clause	Requirement + Test	Result - Remark	Verdict
	- the substance of the following:		N
	See instruction manual for additional battery types.		N
	If appliances use more than one battery, appliance marked to indicate correct polarity connection of the batteries		N
	If relevant, positive terminal indicated by symbol IEC 60417-5005 (2002-10), and		N
	negative terminal indicated by symbol IEC 60417-5006 (2002-10)		N
	Detachable and separable batteries marked with:		N
	- name, trade mark or identification mark of the manufacturer or responsible vendor		N
	- model or type reference		N
	- IP number according to degree of protection against ingress of water, other than IPX0.....:		N
	Detachable and separable batteries disconnected from the appliance for charging the battery marked with:		N
	- symbol ISO 7000-0790 (2004-01)		N
	- symbol IEC 60417-6413 (2019-05)		N
	- model or type reference of the battery charger, or the substance of the following:		N
	Use only with <model or type reference> battery charger.....:		N
	If more than one battery charger can be used to charge a detachable and separable battery disconnected from the appliance for charging, battery marked with the type reference of at least one of the battery charges that can be used, together with		N
	either symbol ISO 7000-0790 (2004-01), or the substance of the following:		N
	See instruction manual for additional battery chargers.		N
	Batteries that are user replaceable, other than general purpose batteries, marked with the:		N
	- name, trademark or identification mark of the manufacturer or responsible vendor		N
	- model or type reference		N
	- nominal voltage (V).....:		N
7.6	Additional symbols		N
7.12	Instructions provided with the appliance		N

EN IEC 60335-1			
Clause	Requirement + Test	Result - Remark	Verdict
	For appliances intended for use at altitudes exceeding 2 000 m, maximum altitude stated		N
	If necessary, appropriate details on precautions during user maintenance stated		N
	The instructions state the substance of the following:		N
	This appliance is not intended for use by persons (including children) with reduced physical, sensory or mental capabilities, or lack of experience and knowledge, unless they have been given supervision or instruction concerning use of the appliance by a person responsible for their safety. Children should be supervised to ensure that they do not play with the appliance.		N
	For appliances incorporating batteries intended to be removed for charging or intended to be replaced by the user and that can be contained in the small parts cylinder, the instructions state the substance of the following:		N
	WARNING: Keep out of reach of children. Swallowing can lead to chemical burns, perforation of soft tissue, and death. Severe burns can occur within 2 h of ingestion. Seek medical attention immediately.		N
	For appliances intended for use with batteries that use metal-ion chemistries, the instructions state the normal temperature range for charging		N
	For battery-operated appliances, the instructions contain the following information, as applicable:		N
	- battery type		N
	- details regarding safe disposal of used batteries		N
	- how to deal with leaking batteries		N
	For battery-operated appliances, the instructions contain the substance of the following:		N
	- do not expose the appliance or battery to excessive temperatures		N
	- be aware of the risk of terminals of the battery-operated appliance or battery being short-circuited by metal objects		N
	For battery-operated appliances containing non-rechargeable batteries, the instructions state the substance of the following:		N
	This appliance contains non-rechargeable batteries, these batteries are not to be recharged.		N

EN IEC 60335-1			
Clause	Requirement + Test	Result - Remark	Verdict
	For battery-operated appliances containing non-user-replaceable batteries, the instructions state the substance of the following:		N
	This appliance contains batteries that are only replaceable by skilled persons.		N
	For battery-operated appliances containing non-replaceable batteries, the instructions state the substance of the following:		N
	This appliance contains batteries that are non-replaceable. When the battery is at end of life, the appliance shall be properly disposed of.		N
	For battery-operated appliances incorporating batteries intended to be removed for charging or replaced by the user, the instructions include, as applicable, the substance of the following:		N
	- rechargeable batteries are to be removed from the appliance before being charged		N
	- different types of batteries or new and used batteries are not to be mixed		N
	- exhausted batteries are to be removed from the appliance and safely disposed of		N
	- if the appliance is to be stored unused for a long period, the batteries should be removed		N
	- do not use non-rechargeable batteries in place of rechargeable batteries		N
	- do not use modified or damaged batteries		N
	For battery-operated appliances incorporating batteries intended to be removed for charging or replaced by the user, the instructions include, as applicable, the following information:		N
	battery type reference		N
	- orientation of the battery with regard to polarity		N
	- method of replacing batteries including maintaining correct polarity		N
	For battery-operated appliances incorporating batteries intended to be removed prior to disposal of the appliance, the instructions include details regarding their safe removal and disposal		N
	For battery-operated appliances that use detachable and separable batteries disconnected from the appliance for charging, the instructions include the model or type reference of the battery charger to be used, along with the substance of the following:		N

EN IEC 60335-1			
Clause	Requirement + Test	Result - Remark	Verdict
	WARNING: Use only with <model or type reference> battery charger.		N
	If the symbol for battery charger is used, its meaning is explained		N
7.15	Markings specified for batteries intended to be replaced by the user are in or adjacent to the battery compartment		N
	Marking to indicate correct polarity connection of the batteries specified for appliances using more than one general purpose battery is in or adjacent to the battery compartment		N
	Type reference of battery charger placed next to symbol IEC 60417-6413 (2019-05)		N
8	This clause is not applicable to the appliance functional part of a battery-operated appliance and its batteries, providing the battery circuits do not have an earth or mains connection		N
10.1	This subclause is not applicable		N
10.2	This subclause is not applicable		N
11.1	Battery operated appliances, their surroundings, and batteries not attaining excessive temperatures in normal use		N
	Compliance tested under the conditions specified in B.11.1, 11.2, 11.3, 11.7 and 11.8		N
11.4	This subclause is not applicable		N
11.5	This subclause is not applicable		N
11.6	This subclause is not applicable		N
B.11.1	Battery-operated appliances tested under the conditions of normal operation		N
	For appliances operated with detachable or separable batteries disconnected for charging, appliance operated until depletion of battery and test repeated with fully charged battery until it depletes or until temperature rises have stabilized as specified, whichever occurs first		N
	For appliances incorporating integral or separable batteries not disconnected for charging, and that cannot perform while batteries are being charged, appliance operated until depletion of batteries		N
	For appliances operated with replaceable or non-rechargeable batteries, appliance operated until the minimum capacity of the battery as specified in Table B.1 has been delivered or until steady conditions are established, whichever occurs first		N

EN IEC 60335-1			
Clause	Requirement + Test	Result - Remark	Verdict
19.1	For battery-operated appliances, instead of the tests specified, tests of 19.2, 19.4, 19.7, 19.9, 19.11, 19.12, 19.14, 19.15, B.19.1 to B.19.5		N
	Detachable and separable batteries also subjected to the test of B.19.6		N
	For battery-operated appliances, tests carried out under normal operation		N
19.2	Appliances with heating elements tested under the conditions specified in Clause 11 but with restricted heat dissipation		N
19.7	Battery-operated appliance switched on and operated under stalled conditions by:		N
	- locking the rotor of appliances for which the locked rotor torque is smaller than the full load torque		N
	- locking moving parts of other appliances		N
	If an appliance has more than one motor, test carried out for each motor separately		N
	Test conducted at both $I_{sc}$ (high) and $I_{sc}$ (low), if testing with the artificial source described in B.5.3		N
	Test conducted:		N
	- until the test sample achieves a steady condition, including returning to room temperature, or		N
	- until at a time period of at least 3 h has elapsed		N
19.11	Electronic circuits checked by evaluation of the fault conditions specified in 19.11.2 for all circuits or parts of circuits, unless they comply with the conditions specified in 19.11.1		N
	Appliances having a device with an off position obtained by electronic disconnection, or a device that can place the appliance in a stand-by mode, subjected to the tests of 19.11.4		N
	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, test of 19.12 carried out, and		N
	the appliance complies with the conditions specified in 19.13		N
	If a conductor of a printed circuit board becomes open-circuited, the appliance is considered to have withstood the particular test, provided that the base material of the printed circuit board withstands the test of normative Annex E		N
19.11.2	When any of the fault conditions simulated, duration of test until steady conditions		N

EN IEC 60335-1			
Clause	Requirement + Test	Result - Remark	Verdict
19.11.4	Appliances having a device with an off position obtained by electronic disconnection, or a device that can be placed in the stand-by mode, subjected to the tests of 19.11.4.1 and 19.11.4.2		N
	Tests carried out with the appliance supplied by a fully charged battery, 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 and 19.11.4.2		N
	Tests carried out after the protective electronic circuit has operated during the relevant tests of Clause 19 except 19.2 and 19.11.3		N
19.11.4.8	Battery operated appliances are supplied with a fully charged battery, operated under normal operation for 60 s, and then subjected to a 60 s interruption of the battery current		N
	When battery current restored, the appliance:		N
	- continues to operate normally from the same operation cycle point reached before the battery supply was interrupted, or		N
	- does not continue operating without requiring manual intervention to restart from the same operating cycle point reached before the battery supply was interrupted, or		N
	- does not continue operating without requiring manual intervention to restart from the part of the cycle selected by the user		N
19.13	During tests, no flames, molten metal or poisonous or ignitable gas in hazardous amounts and temperature rises not exceeding the values shown in Table 9..... :		N
	No explosion or ignition of the battery during or after the test		N
	Venting of cells permitted through their vents		N
	After the tests, and when the appliance has cooled to room temperature, compliance with B.22.3 and B.22.5 not impaired and the appliance complies with 20.2 and Clause 29, if still operable		N
	For appliances immersed in or filled with conducting liquid in normal use, appliance immersed in or filled with water for 24 h before the test of B.22.5		N
	No dangerous malfunction and no failure of protective electronic circuits, if still operable		N

EN IEC 60335-1			
Clause	Requirement + Test	Result - Remark	Verdict
	Appliances tested with an electronic switch in the off position:		N
	- do not become operational, or		N
	- do not result in a dangerous malfunction during or after the tests of 19.11.4, if they become operational		N
	In an appliance containing lids or doors controlled by one or more interlocks, one of the interlocks may be released if both of the following conditions are fulfilled:		N
	- no movement to an open position when released		N
	- no restart after the cycle in which it was released		N
19.15	For battery-operated appliances incorporating a manual voltage selector switch intended to select battery voltage, switch set to lowest voltage position and highest voltage applied		N
B.19.1	Supply terminals of a battery-operated appliance having an indication of polarity connected to the battery terminals of opposite polarity, unless		N
	connection by the user unlikely to occur		N
B.19.2	For battery-operated appliances with provision for multiple batteries, one or more of the batteries reversed and appliance operated, if reversal by the user of battery polarity allowed by the construction		N
B.19.3	For battery-operated appliances with motor(s), terminals of each motor short circuited one at a time, where the resistance of the short-circuit does not exceed 10 mΩ and while operated under the conditions of Clause 11		N
	Test conducted until steady conditions are achieved, including returning to room temperature or until a time period of at least 3 h		N
B.19.4	Test conducted with all the cells of the battery fully charged and, for batteries consisting of more than one cell, one cell fully discharged on a detachable or separable battery connected to the appliance or on an appliance containing an integral battery		N
	Main discharge connections of the battery shorted with a resistance not to exceed 10 mΩ, conducted until a non-self-resetting protection device operates or an intentionally weak part becomes permanently open-circuited or until the test sample returns to room temperature		N
B.19.5	Battery-operated appliance and any cords except supply cords, as appropriate, tested with the battery connected, under the following fault conditions applied one at a time:		N

EN IEC 60335-1			
Clause	Requirement + Test	Result - Remark	Verdict
	- any cord provided between the battery-operated appliance and a separable battery is short-circuited at the point along its length likely to produce the most adverse effects		N
	- for appliances having replaceable batteries that are replaceable and that can be removed without the aid of a tool, and having terminals that can be short-circuited by a thin straight bar, the terminals of the battery are short-circuited		N
	- charging terminals of the battery-operated appliance that are simultaneously accessible with the test probe 13 of IEC 61032 are short circuited so as to produce the most unfavourable result		N
	Battery-operated appliance switched on and no additional mechanical load applied		N
	Tests conducted until the test sample achieves a steady condition, including returning to room temperature or, until a time period of at least 3 h		N
	Resistance of short circuit not exceeding 10 mΩ		N
B.19.6	For detachable and separable batteries, combinations of terminals simultaneously accessible by applying the test probe 13 of IEC 61032 short circuited so as to produce the most unfavourable result		N
B.20.1	The enclosure of a battery-operated appliance incorporating an integral battery that uses metal-ion chemistry withstands the pressure generated when a cell vents during failure		N
	Compliance checked by inspection after the tests of Clause 19 for batteries with a capacity less than 0,2 Ah, and measurement or test as specified		N
B.20.2	The enclosure of detachable and separable batteries that use metal-ion chemistries withstands the pressure generated when a cell vents during failure; tests as specified		N
	Compliance checked by inspection after the tests of Clause 19 for batteries with a capacity less than 0,2 Ah, and measurement or test as specified		N
21.1	Battery-operated appliances have adequate mechanical strength and are constructed to withstand rough handling expected in normal use		N
	Appliance fitted with fully charged batteries and rigidly supported subjected to test Ehb of IEC 60068-2-75, three blows of 0,5 J applied to every point of the appliance enclosure likely to be weak		N

EN IEC 60335-1			
Clause	Requirement + Test	Result - Remark	Verdict
	If necessary, blows also applied to handles, levers, knobs and similar parts and to signal lamps and their covers, but only if the lamps or covers protrude from the enclosure by more than 10 mm or if their surface area exceeds 4 cm <sup>2</sup>		N
	Lamps within the appliance and their covers only tested if likely to be damaged in normal use		N
	When applying the release cone to the guard of a visibly glowing heating element, the hammer head passing through the guard does not strike the heating element		N
	In case of doubt, defect neglected and the group of three blows applied to the same place on a new sample which then withstands the test		N
	Hand-held battery-operated appliances also subjected to test free-fall - procedure 1, of IEC 60068-2-31, under the specified conditions		N
	Free-fall test does not cause the appliance to catch fire, leak fluid visible from the outside or explode and meets the requirements of Clause 20, Clause 29, B.22.3 and B.22.5 where short circuit of functional insulation will impair compliance with this standard		N
B.21.1	Separable and detachable batteries, when not connected to the appliance, have adequate mechanical strength and are constructed to withstand rough handling expected in normal use		N
	Fully charged battery, rigidly supported, subject to test Ehb of IEC 60068-2-75, three blows of 0,5 J applied to every point of the battery enclosure likely to be weak		N
	In case of doubt, defect neglected and the group of three blows applied to the same place on a new sample which then withstands the test		N
	Detachable and separable batteries subjected to the test free-fall - procedure 1, of IEC 60068-2-31, under the conditions as specified		N
	Free-fall test does not damage the battery or cause it to catch fire, leak fluid visible from the outside or explode and meets the requirements of Clause 20, Clause 29, B.22.4 and B.22.5 where short circuit of functional insulation will impair compliance with this standard		N
	For batteries using metal-ion chemistry:		N
	- open circuit voltage of the battery 24 h after the tests not less than 90 % of the voltage measured immediately prior to the tests		N

EN IEC 60335-1			
Clause	Requirement + Test	Result - Remark	Verdict
	- cells only vented through their vents		N
22.11	Non-detachable parts that protect against electric shock, moisture or contact with moving parts reliably are fixed and withstand the mechanical stress occurring during normal use		N
	Snap-in devices used for fixing such parts have an obvious locked position		N
	Fixing properties of snap-in devices used in parts that are likely to be removed during installation or servicing reliable		N
22.20	Direct contact between current carrying parts and thermal insulation that would impair compliance with this standard effectively prevented, unless		N
	such material is noncorrosive, non-hygroscopic and non-combustible		N
	Not applicable to glass-wool thermal insulation		N
22.24	Not applicable to battery-operated appliances that do not contain parts requiring protection against simultaneous contact according to B.22.3		N
22.25	Not applicable to battery-operated appliances that do not contain parts requiring protection against simultaneous contact according to B.22.3		N
22.26	This subclause is not applicable		N
22.27	This subclause is not applicable		N
22.28	This subclause is not applicable		N
22.29	This subclause is not applicable		N
22.30	This subclause is not applicable		N
22.31	This subclause is not applicable		N
22.32	This subclause is not applicable		N
22.33	Conductive liquids that are or may become accessible in normal use and conductive liquids that are in contact with accessible metal parts are not in direct contact with current carrying parts or unearthed metal parts that are separated from current carrying parts by basic insulation only or with other current carrying parts such that compliance with B.22.3 and B.22.4 would be impaired		N
22.34	This subclause is not applicable		N
22.35	This subclause is not applicable		N
22.36	This subclause is not applicable		N
22.37	This subclause is not applicable		N

EN IEC 60335-1			
Clause	Requirement + Test	Result - Remark	Verdict
B.22.1	User accessible interfaces between elements of a battery system (not mains connections) do not employ appliance couplers according to IEC 60320 (all parts) or IEC 60309-2		N
	User accessible interfaces between elements of a battery system (not mains connections) do not employ connectors of the following types unless the battery system is adequately protected against the use of an incorrect supply:		N
	- barrel connectors with outside diameters of 6,5 mm or less		N
	- concentric connectors with a diameter of 3,5 mm or less according to IEC 60603-11		N
	Compliance checked by inspection, measurement and for determining adequacy of protection against use of an incorrect supply, by the test as specified		N
	Source selected such that its current capability does not limit the charging of the battery		N
	During the application of incremental voltages, the appliance is either operating normally or, if not, does not emit flames, molten metal, or poisonous or ignitable gas in hazardous amounts and temperature rises do not exceed the values shown in Table 9		N
	No explosion or ignition of the battery during or after the test		N
	Venting of cells permitted through their vents		N
B.22.2	External surfaces of detachable and separable batteries protected against excessive heat from heat sources (directly or via heated discharge air) present during operation of the appliance		N
B.22.3	Battery-operated appliances so constructed and enclosed that there is adequate protection against simultaneous contact with two or more conductive parts where the:		N
	- voltage between them exceeds 42,4 V		N
	- current between the conductive parts exceeds 2 mA for DC or 0,7 mA peak for when ripple exceeds 10 %		N
	Compliance checked with test probe B and test probe 18 of IEC 61032 as described		N
	Detachable parts except lamps behind a detachable cover removed during the tests with test probe B, however		N

EN IEC 60335-1			
Clause	Requirement + Test	Result - Remark	Verdict
	during insertion or removal of lamps located behind a detachable cover, protection against simultaneous contact with parts having a voltage between them exceeding 42,4 V ensured		N
	During the tests with test probe 18, appliance fully assembled as in normal use, no parts removed		N
	However, test probe 18 not applied to appliances for commercial use, unless		N
	intended to be installed in an area open to the public		N
	Not possible to touch two or more conductive parts of opposite polarity with the probes if the voltage between them exceeds 42,4 V and the current between them exceeds 2 mA for DC or 0,7 mA peak for when ripple exceeds 10 %		N
	Current measured using the circuit in Figure 4 of IEC 60990:2016		N
B.22.4	Separable and detachable batteries so constructed and enclosed that there is adequate protection against simultaneous contact with two or more conductive parts where the:		N
	- voltage between them exceeds 42,4 V		N
	- current between the conductive parts exceeds 2 mA		N
	Compliance checked with test probe B and test probe 18 of IEC 61032 as described		N
	During the tests with:		N
	- test probe B, all detachable parts removed		N
	- test probe 18, no parts removed		N
	However, test probe 18 not applied to appliances for commercial use, unless		N
	intended to be installed in an area open to the public		N
	Not possible to touch two or more conductive parts of opposite polarity with the probes if the voltage between them exceeds 42,4 V and the current between them exceeds 2 mA		N
	Current measured using the circuit in Figure 4 of IEC 60990:2016		N
B.22.5	Insulating materials providing protection against simultaneous contact with two or more conductive parts are adequate when:		N
	- they are within 1,0 mm of the conductive parts		N

EN IEC 60335-1			
Clause	Requirement + Test	Result - Remark	Verdict
	- the voltage between the conductive parts exceeds 42,4 V peak		N
	- the current between the conductive parts exceeds 2 mA for DC or 0,7 mA peak for when ripple exceeds 10 %		N
	Insulating material subjected to voltage test as specified at 750 V or 1,2 times the working voltage plus 700 V, whichever greater, in accordance with IEC 61180 (V).....:		N
	No breakdown during the test		N
	Current measured using the circuit in Figure 4 of IEC 60990:2016		N
B.22.6	Vents of cells not obstructed such that their operation is defeated if venting is relied upon compliance with this standard		N
23.3	Instead of the electric strength test of 16.3, battery-operated appliances comply with B.22.3		N
23.5	For battery-operated appliances compliance is checked by the test of B.22.5		N
24.1	Batteries are not required to comply with IEC 62133-1:2017 or IEC 62133-2:2017, they are tested as part of the appliance according to this standard		N
24.1.1	This subclause is not applicable		N
24.1.3	Switches in battery-operated appliances have adequate breaking capacity and withstand, without excessive wear or other harmful effect, the mechanical, electrical, and thermal stresses occurring in the battery-operated appliance		N
	Tests as described and according to the relevant standard for switches, IEC 61058-1-1:2016 for mechanical switches and IEC 61058-1-2:2016 for electronic switches		N
	Required cycles of operation completed, no electrical or mechanical failure		N
	At the end of the tests:		N
	- switch contacts operating properly in the "on" and "off" positions		N
	- temperature rise of the switch terminals not increased by more than 30 K above the temperature rise measured in Clause 11		N
B.24.1	The relevant standards for non-acid based electrolyte cells employed in batteries are IEC 62133-1:2017 for nickel systems and IEC 62133-2:2017 for lithium systems		N

EN IEC 60335-1			
Clause	Requirement + Test	Result - Remark	Verdict
	A battery that uses metal-ion chemistry is additionally subjected to the tests of subclauses 7.3.8.1 (vibration) and 7.3.8.2 (mechanical shock) of IEC 62133-2:2017		N
25.9	The requirement also applies to interconnection cords of battery-operated appliances		N
25.14	The requirement also applies to interconnection cords of battery-operated appliances		N
25.15	The requirement also applies to interconnection cords of battery-operated appliances		N
B.25.1	Insulated conductors of interconnection cords of battery-operated appliances comply with the requirements for internal wiring and are provided with at least 0,5 mm thick outer sheath made of insulating material equivalent to that of supply cords described in 25.7		N
B.26.1	Terminal devices in an appliance for the connection of the flexible leads or flexible cord connecting a separable battery so located or shielded that there is no risk of incorrect connection		N
27.1	The battery-operated appliance does not have a provision for a protective earth but may incorporate a functional earth.		N
29.1	Clearances not less than the values specified in Table 16, taking into account the rated impulse voltage		N
	For battery-operated appliances, the rated impulse voltage is 500 V for working voltages less than 50 V and 1 500 V for all other working voltages		N
	However, if the construction, including between parts of opposite polarity for connecting the battery, is such that the distances could be affected by wear, by distortion, by movement of the parts or during assembly, the clearances for rated impulse voltages of 1 500 V are increased by 0,5 mm and the impulse voltage test is not applicable		N
B.29.1.1	For parts requiring protection against simultaneous contact according to B.22.3 and B.22.4, the sum total of the clearances between each of these parts and their nearest accessible surface is not less than two times the Table 16 clearance taking into account the rated impulse voltage		N
	For the purpose of this determination, at least one of the clearances is not less than 1,0 mm.		N

EN IEC 60335-1			
Clause	Requirement + Test	Result - Remark	Verdict
B.29.2.1	For parts requiring protection against simultaneous contact according to B.22.3 and B.22.4, the sum total of the creepage distances between each of these parts and their nearest accessible surface is not less than two times the Table 17 creepage distances.		N
	For the purpose of this determination, at least one of the creepage distances is not less than 1,0 mm		N
30.1	External parts of non-metallic material, the deterioration of which might cause the battery-operated appliance, separable battery or detachable battery to fail to comply with this annex, are sufficiently resistant to heat		N

<b>C</b>	<b>ANNEX C (NORMATIVE) AGEING TEST ON MOTORS</b>		N
	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) THERMAL MOTOR PROTECTORS</b>		N
	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) NEEDLE-FLAME TEST</b>		N
	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		N
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		N
9.2	The first paragraph does not apply		N
	If possible, the flame is applied at least 10 mm from a corner		N
9.3	The test is carried out on one specimen		N

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

<b>F</b>	<b>ANNEX F (NORMATIVE) CAPACITORS</b>		--
	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:		--
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		--
	Items a) and b) are applicable		N
3.4	Approval testing		--
3.4.3.2	Table 3 is applicable as described		N
4.1	Visual examination and check of dimensions		--
	This subclause is applicable		N
4.2	Electrical tests		--
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		--
	This subclause is applicable		N
	Only insulation resistance and voltage proof are checked		N
4.13	Impulse voltage		--
	This subclause is applicable		N
4.14	Endurance		--
	Subclauses 4.14.1, 4.14.3, 4.14.4 and 4.14.7 are applicable		N

EN IEC 60335-1			
Clause	Requirement + Test	Result - Remark	Verdict
4.14.7	Only insulation resistance and voltage proof are checked		N
	No visible damage		N
4.17	Passive flammability test		--
	This subclause is applicable		N
4.18	Active flammability test		--
	This subclause is applicable		N

<b>G</b>	<b>ANNEX G (NORMATIVE) SAFETY ISOLATING TRANSFORMERS</b>		--
	The following modifications to this standard are applicable for safety isolating transformers:		--
7	Marking and instructions		--
7.1	Transformers for specific use marked with:		--
	-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		--
	Fail-safe transformers comply with subclause 15.5 of IEC 61558-1		N
22	Construction		--
	Subclauses 19.1 and 19.1.2 of IEC 61558-2-6 are applicable		N
29	Clearances, creepage distances and solid insulation		--
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) SWITCHES</b>		--
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EN IEC 60335-1			
Clause	Requirement + Test	Result - Remark	Verdict
	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		--
	Switches are not required to be marked		N
	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		--
	The tests may be carried out on a separate sample		N
15	Insulation resistance and dielectric strength		--
15.1	Not applicable		N
15.2	Not applicable		N
15.3	Applicable for full disconnection and micro-disconnection		N
17	Endurance		--
	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		--

EN IEC 60335-1			
Clause	Requirement + Test	Result - Remark	Verdict
	Clause 20 is applicable to clearances across full disconnection and micro-disconnection		N
	It is also applicable to creepage distances for functional insulation, across full disconnection and micro-disconnection, as stated in Table 24		N

<b>I</b>	<b>ANNEX I (NORMATIVE) MOTORS HAVING BASIC INSULATION THAT IS INADEQUATE FOR THE RATED VOLTAGE OF THE APPLIANCE</b>		--
	The following modifications to this standard are applicable for motors having basic insulation that is inadequate for the rated voltage of the appliance:		--
8	Protection against access to live parts		--
8.1	Metal parts of the motor are considered to be bare live parts		N
11	Heating		--
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		--
16.3	Insulation between live parts of the motor and its other metal parts is not subjected to the test		N
19	Abnormal operation		--
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:		--
	- 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		--
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

EN IEC 60335-1			
Clause	Requirement + Test	Result - Remark	Verdict
	Compliance checked by the tests specified for double and reinforced insulation		N
<b>J</b>	<b>ANNEX J (NORMATIVE) COATED PRINTED CIRCUIT BOARDS</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		--
	When production samples are used, three samples of the printed circuit board are tested		N
5.7.1	Cold		--
	The test is carried out at -25 °C		N
5.7.3	Rapid change of temperature		--
	Severity 1 is specified		N
5.9	Additional tests		--
	This subclause is not applicable		N
<b>K</b>	<b>ANNEX K (NORMATIVE) OVERVOLTAGE CATEGORIES</b>		--
	The information on overvoltage categories is extracted from IEC 60664-1		P
	Overvoltage category is a numeral defining a transient overvoltage condition		P
	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		P
	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) GUIDANCE FOR THE MEASUREMENT OF CLEARANCES AND CREEPAGE DISTANCES</b>		P

EN IEC 60335-1			
Clause	Requirement + Test	Result - Remark	Verdict
	Information for the determination of clearances and creepage distances		P

<b>M</b>	<b>ANNEX M (NORMATIVE) POLLUTION DEGREE</b>		--
	The information on pollution degrees is extracted from IEC 60664-1		P
	Pollution		--
	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		P
	Degrees of pollution in the microenvironment		--
	For evaluating creepage distances, the following degrees of pollution in the microenvironment are established:		--
	- 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) PROOF TRACKING TEST</b>		--
	The proof tracking test is carried out in accordance with IEC 60112 with the following modifications:		--
7	Test apparatus		--
7.3	Test solutions		--
	Test solution A is used		P
10	Determination of proof tracking index (PTI)		--
10.1	Procedure		--

EN IEC 60335-1			
Clause	Requirement + Test	Result - Remark	Verdict
	The proof voltage is 100V, 1724V, 400V or 600V.:		P
	The test is carried out on five specimens		P
	In case of doubt, additional test with proof voltage reduced by 224V, the number of drops increased to 100		N
10.2	Report		--
	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) SELECTION AND SEQUENCE OF THE TESTS OF CLAUSE 30</b>		P
	Description of tests for determination of resistance to heat and fire		P

<b>P</b>	<b>ANNEX P (INFORMATIVE) 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

EN IEC 60335-1			
Clause	Requirement + Test	Result - Remark	Verdict
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) SEQUENCE OF TESTS FOR THE EVALUATION OF ELECTRONIC CIRCUITS</b>		--
	Description of tests for appliances incorporating electronic circuits		P

<b>R</b>	<b>ANNEX R (NORMATIVE) SOFTWARE EVALUATION</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		--
	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		--
	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:		--
	- 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:		--
	- 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		--

EN IEC 60335-1			
Clause	Requirement + Test	Result - Remark	Verdict
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
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 occurs before compliance with clause 19 is impaired		N
	For appliances intended for remote communication through public networks, where normative Annex U is applicable as determined by 22.62, detection of a fault/error occurs before compliance with normative Annex U 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		--
R.3.1	General		--
	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

EN IEC 60335-1			
Clause	Requirement + Test	Result - Remark	Verdict
	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		--
R.3.2.1	Software safety requirements:	Software Id:	N
	The specification of the software safety requirements includes the descriptions listed		N
R.3.2.2	Software architecture		--
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		--
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		--
	The software is validated with reference to the requirements of the software safety requirements specification		N
	Compliance is checked by simulation of:		--
	- input signals present during normal operation		N

EN IEC 60335-1			
Clause	Requirement + Test	Result - Remark	Verdict
	- anticipated occurrences		N
	- undesired conditions requiring system action		N
R.3.4	Management items		N
R.3.4.1	Management of software versions		N
	A software version management system at the module level is put in place		N
R.3.4.2	Software modification		N
R.3.4.2.1	Software modifications are based on a modification request which details the following:		N
	- the hazards which may be affected		N
	- the proposed change		N
	- the reasons for change		N
R.3.4.2.2	An analysis is carried out to determine the impact of the proposed modification on functional safety		N
R.3.4.2.3	A detailed specification for the modification is generated including the necessary activities for verification and validation, such as a definition of suitable test cases		N
R.3.4.2.4	The modification is carried out as planned		N
R.3.4.2.5	The assessment of the modification is carried out based on the specified verification and validation activities, which may include:		N
	- a reverification of changed software modules		N
	- a reverification of affected software modules		N
	- a revalidation of the complete system		N
	All details of modification activities are documented		N
R.3.4.2.6	- a reverification of changed software modules		N

EN IEC 60335-1			
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	Document reference for applied measure	Document reference for applied test	Ver-dict
1 CPU 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						—
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 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

EN IEC 60335-1						
Clause	Requirement + Test		Result - Remark			Verdict
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
5.1 VOID						—
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						—
6.2 VOID						—
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						—
7.2 Analog I/O 7.2.1 A/D and D/A-converter	Fault conditions specified in 19.11.2	Plausibility check	H.2.18.13	—	—	N

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

7.2.2 Analog multiplexer	Wrong addressing	Plausibility check	H.2.18.13	—	—	N
8 VOID						—
9 Custom chips <sup>d</sup> e.g. ASIC, GAL, gate array	Any output outside the static and dynamic functional specificatio n	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.

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

EN IEC 60335-1			
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			
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			
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			
1.4 Addressing	DC fault	Comparison of redundant CPUs by either: – reciprocal comparison	H.2.18.15			

EN IEC 60335-1						
Clause	Requirement + Test		Result - Remark			Verdict
		<ul style="list-style-type: none"> <li>– independent hardware comparator; or</li> <li>internal error detection; or</li> <li>periodic self-test using                             <ul style="list-style-type: none"> <li>– a testing pattern of the address lines; or</li> <li>– a full bus redundancy</li> <li>– a multi bus parity including the address</li> </ul> </li> </ul>	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			
1.5 Data paths instruction decoding	DC fault and execution	Comparison of redundant CPUs by either: <ul style="list-style-type: none"> <li>– reciprocal comparison, or</li> <li>– independent hardware comparator, or</li> <li>– internal error detection, or</li> <li>– periodic self-test using a testing pattern, or</li> <li>– data redundancy, or</li> <li>– multi-bit bus parity</li> </ul>	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			
2 Interrupt handling and execution	No interrupt or too frequent interrupt related to different sources	Comparison of redundant functional channels by either <ul style="list-style-type: none"> <li>– reciprocal comparison,</li> <li>– independent hardware comparator, or</li> <li>– independent time-slot and logical monitoring</li> </ul>	H.2.18.15 H.2.18.3 H.2.18.10.3			
3 Clock	Wrong frequency (for quartz synchroniz ed clock: harmonics/ sub- harmonics only)	Frequency monitoring, or time-slot monitoring, or comparison of redundant functional channels by either: <ul style="list-style-type: none"> <li>– reciprocal comparison</li> <li>– independent hardware comparator</li> </ul>	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: <ul style="list-style-type: none"> <li>– reciprocal comparison</li> <li>– independent hardware comparator, or</li> <li>redundant memory with comparison, or</li> <li>periodic cyclic redundancy check, either                             <ul style="list-style-type: none"> <li>– single word</li> </ul> </li> </ul>	H.2.18.15 H.2.18.3 H.2.19.5 H.2.19.4.1			

EN IEC 60335-1						
Clause	Requirement + Test		Result - Remark		Verdict	
		– double word, or word protection with multi-bit redundancy	H.2.19.4.2 H.2.19.8.1			
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			
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			
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			
5.2 Addressing	Wrong address and	Comparison of redundant CPUs by:				

EN IEC 60335-1						
Clause	Requirement + Test		Result - Remark			Verdict
	multiple addressing	<ul style="list-style-type: none"> <li>– reciprocal comparison</li> <li>– independent hardware comparator, or</li> <li>word protection with multi-bit redundancy, including the address, or</li> <li>full bus redundancy; or</li> <li>testing pattern including the address</li> </ul>	H.2.18.15 H.2.18.3 H.2.19.8.1 H.2.18.1.1 H.2.18.22			
6 External communication						
6.1 Data	Data corruption of up to Hamming distance 4	<ul style="list-style-type: none"> <li>CRC – double word, or data redundancy or comparison of redundant functional channels by either</li> <li>– reciprocal comparison; or</li> <li>– independent hardware comparator</li> </ul>	H.2.19.4.2 H.2.18.2.1  H.2.18.15 H.2.18.3			
6.2 Addressing	Wrong address and multiple addressing	<ul style="list-style-type: none"> <li>CRC – double word, including the address, or</li> <li>full bus redundancy of data and address, or</li> <li>comparison of redundant communication channels by either:</li> <li>– reciprocal comparison; or</li> <li>– independent hardware comparator</li> </ul>	H.2.19.4.2 H.2.18.1.1  H.2.18.15 H.2.18.3			
6.3 Timing	Wrong point in time  Wrong sequence	<ul style="list-style-type: none"> <li>Time-slot and logical monitoring, or</li> <li>comparison of redundant communication channels by either:</li> <li>– reciprocal comparison; or</li> <li>– independent hardware comparator</li> <li>Time-slot and logical monitoring, or</li> <li>comparison of redundant communication channels by either:</li> <li>– reciprocal comparison; or</li> <li>– independent hardware comparator</li> </ul>	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			
7 Input/output						

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

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

<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.

<b>S</b>	<b>ANNEX S (INFORMATIVE) 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		N

<b>T</b>	<b>ANNEX T (NORMATIVE) 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>		N
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		N
5.2.5	The black-panel temperature is 63 °C ± 3 °C		N
5.3	Humidity and wetting		N
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>		N
7	Procedure		N
7.1	General		N
	At least three test specimens of each non-metallic material providing mechanical support or impact resistance are exposed in each run		N

EN IEC 60335-1			
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		N
	The specimens are attached to the specimen holders such that they are not subject to any applied stress		N
7.3	Exposure		N
	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
7.4	Measurement of radiant exposure		N
	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		N
	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		N
	This clause is not applicable		N
<b>U</b>	<b>ANNEX U (NORMATIVE) 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		N
U.1.1	Definitions relating to remote functionality		N
	Definitions used in this appendix as described		N

EN IEC 60335-1			
Clause	Requirement + Test	Result - Remark	Verdict
U.2	Marking and instructions		N
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		N
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:		N
	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
	- 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

EN IEC 60335-1			
Clause	Requirement + Test	Result - Remark	Verdict
	For the purposes of this requirement, communication between two entities for preparation of the authentication and authorization process is not considered remote communication		N
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:		N
	- 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



EN 62233			
Clause	Requirement + Test	Result - Remark	Verdict

Annex EN 62233: 2008			
Clause	Requirement + Test	Result - Remark	Verdict

EMF- ELECTROMAGNETICS FIELDS			
	The tested product also complies with the requirements of EN 62233:2008		P
	Limit .....100%	Measured max. : 4.346%	P



**Appendix tables**

10.1	TABLE: Power input deviation					P
Input deviation of/at:	P rated (W)	P measured (W)	$\Delta P$	Required $\Delta P$	Remark	
110V~, 50Hz	90	85.2	-5.33%	-10%; +5% or 20W	Normal working	
240V~, 50Hz	90	92.1	2.33%	-10%; +5% or 20W	Normal working	
Supplementary information:						

10.2	TABLE: Current deviation					N
Current deviation of/at:	I rated (A)	I measured (A)	$\Delta I$	Required $\Delta I$	Remark	
Supplementary information:						

11.8	TABLE: Heating test			P
	Test voltage (V).....:	1.06x240V		—
	Ambient (°C).....:	22.4°C		—
Thermocouple locations:		Max. temperature rise measured, $\Delta T$ (K)	Max. temperature rise limit, $\Delta T$ (K)	
AC Inlet		26.7	T85-25=60	
Ambient of Switch		30.2	T85-25=60	
Enclosure		37.5	60	
Motor enclosure		46.8	85	
PCB		43.4	T130-25=105	
Relay		29.1	85	
Internal wire		29.5	80 (T105)	
Test corner		6.8	65	
Supplementary information:				

11.8	TABLE: Heating test, resistance method					N
	Test voltage (V).....:				—	
	Ambient, t1 (°C).....:				—	
	Ambient, t2 (°C).....:				—	
Temperature rise of winding:	R1 ( $\Omega$ )	R2 ( $\Omega$ )	$\Delta T$ (K)	Max. $\Delta T$ (K)	Insulation class	
--	--	--	--	--	--	
Supplementary information:						

**Appendix tables**

<b>13.2</b>	<b>TABLE: Leakage current</b>		P
	<b>Heating appliances: 1.15 x rated input (W)...</b>	--	—
	<b>Motor-operated and combined appliances: 1.06 x rated voltage (V).....</b>	1.06x240V	—
<b>Leakage current between:</b>		<b>I (mA)</b>	<b>Max. allowed I (mA)</b>
L/N to Metal enclosure		0.036	0.75
L/N to Non-metal enclosure		0.016	0.75
L/N to GND		0.057	0.75
Supplementary information:			

<b>13.3</b>	<b>TABLE: Dielectric strength</b>		P
<b>Test voltage applied between:</b>		<b>Test potential applied (V)</b>	<b>Breakdown / flashover (Yes/No)</b>
L/N to Non-metal enclosure		3000	No
L/N to Metal enclosure		3000	No
L/N to GND		1000	No
Supplementary information:			

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

<b>16.2</b>	<b>TABLE: Leakage current</b>		P
	<b>Single phase appliances: 1.06 x rated voltage (V).....</b>	1.06x240V	—
	<b>Three phase appliances 1.06 x rated voltage divided by <math>\sqrt{3}</math> (V).....</b>	--	—
<b>Leakage current between:</b>		<b>I (mA)</b>	<b>Max. allowed I (mA)</b>
L/N to Metal enclosure		0.062	0.75
L/N to Non-metal enclosure		0.036	0.75
L/N to GND		0.051	0.75
Supplementary information:			

Appendix tables

<b>16.3</b>	<b>TABLE: Dielectric strength</b>			P
<b>Test voltage applied between:</b>		<b>Test potential applied (V)</b>	<b>Breakdown / flashover (Yes/No)</b>	
L/N to Metal enclosure		3000	No	
L/N to Non-metal enclosure		3000	No	
L/N to GND		1250	No	
Supplementary information:				

<b>17</b>	<b>TABLE: Overload protection</b>			N
<b>Thermocouple locations:</b>		<b>Max. temperature rise measured, Δ T (K)</b>	<b>Max. temperature rise limit, Δ T (K)</b>	
--		--	--	
Supplementary information:				

<b>17</b>	<b>TABLE: Overload protection, resistance method</b>					N
<b>Test voltage (V)..... :</b>					—	
<b>Ambient, t1 (°C)..... :</b>					—	
<b>Ambient, t2 (°C)..... :</b>					—	
<b>Temperature of winding:</b>	<b>R1 (Ω)</b>	<b>R2 (Ω)</b>	<b>Δ T (K)</b>	<b>T (°C)</b>	<b>Max. T (°C)</b>	
--	--	--	--	--	--	
Supplementary information:						

<b>19</b>	<b>Abnormal operation conditions</b>						P
<b>Operational characteristics</b>		<b>YES/NO</b>	<b>Operational conditions</b>				
Are there electronic circuits to control the appliance operation?		NO					
Are there “off” or “stand-by” position?		NO					
The unintended operation of the appliance results in dangerous malfunction?		NO					
<b>Sub-clause</b>	<b>Operating conditions description</b>	<b>Test results description</b>	<b>PEC description</b>	<b>EMP 19.11.4</b>	<b>Software type required</b>	<b>19.11.3 PEC</b>	<b>Final result</b>
<b>19.2</b>	N.A	N.A	N.A	N.A	N.A	N.A	N.A
<b>19.3</b>	N.A	N.A	N.A	N.A	N.A	N.A	N.A
<b>19.4</b>	N.A	N.A	N.A	N.A	N.A	N.A	N.A
<b>19.5</b>	N.A	N.A	N.A	N.A	N.A	N.A	N.A
<b>19.6</b>	N.A	N.A	N.A	N.A	N.A	N.A	N.A

**Appendix tables**

19.7	Lock rotor	Pass	N.A	N.A	N.A	N.A	Pass
19.8	N.A	N.A	N.A	N.A	N.A	N.A	N.A
19.9	N.A	N.A	N.A	N.A	N.A	N.A	N.A
19.10	N.A	N.A	N.A	N.A	N.A	N.A	N.A
19.11.2	N.A	N.A	N.A	N.A	N.A	N.A	N.A
19.11.4.8	N.A	N.A	N.A	N.A	N.A	N.A	N.A

Supplementary information:

19.7	<b>TABLE: Abnormal operation, locked rotor/moving parts</b>					P
	Test voltage (V).....	240V~, 50Hz			—	
	Ambient, t1 (°C).....	24.1			—	
	Ambient, t2 (°C).....	24.3			—	

Temperature of winding:	R1 (Ω)	R2 (Ω)	Δ T (K)	T (°C)	Max. T (°C)
Motor coil	--	--	78.9	103.2	175

Supplementary information:

19.9	<b>TABLE: Abnormal operation, running overload</b>					N
	Test voltage (V).....				—	
	Ambient, t1 (°C).....				—	
	Ambient, t2 (°C).....				—	

Temperature of winding:	R1 (Ω)	R2 (Ω)	Δ T (K)	T (°C)	Max. T (°C)
--	--	--	--	--	--
--	--	--	--	--	--

Supplementary information:

19.13	<b>TABLE: Abnormal operation, temperature rises</b>					P
-------	---	--	--	--	--	---

Duration: Until steady conditions

T1 (°C).....	24.1	--
T2 (°C) .....	24.2	--
Test voltage (V) .....	1.06x240V	--
<b>Thermocouple locations:</b>	<b>Max. temperature rise measured, Δ T (K)</b>	<b>Max. temperature rise limit, Δ T (K)</b>
Enclosure inside	54.9	Cl. 30
Test corner	34.3	150K

Supplementary information:

21.1	<b>TABLE: Impact resistance</b>					P
------	---------------------------------	--	--	--	--	---

**Appendix tables**

Impacts per surface	Surface tested	Impact energy (Nm)	Comments
Three times	Enclosure	1.0	No damage
Supplementary information:			



**Appendix tables**

24.1	TABLE: Critical components information					P
Object / part No.	Manufacturer/ trademark	Type / model	Technical data	Standard	Mark(s) of conformity <sup>1)</sup>	
Supply cord	Huijun	H05VV-F	3*0.75mm <sup>2</sup>	EN 60227-1	VDE	
Switch	Leqing Langzheng Electronics Co., Ltd	LZ-14	250 V~, 10 A,	IEC 61058-1	CB	
Motor	Wenzhou Jiehong Technology Co., Ltd	JHU020	100-240V~, class B	EN 60034-1 EN 60335-1	CE Tested with appliance	
PCB	Wuhan Zhiwei Medical Equipment Co., Ltd	ZW-WTCP-01-12	V-0, 130°C	UL 94	UL	
Relay	Wuhan Zhiwei Medical Equipment Co., Ltd	ZW-SRD-12VDC	250V~, 10A; 30VDC, 10A	IEC 60947-1	CB	
Internal wire	Yueqing Boyuan Electronic Wire & Cable Co., Ltd	1015	VW-1, 28-18AWG, 105°C	UL 758	UL E203561 Tested with appliance	
Plastic enclosure	Chi Mei Corporation	PA-707(+)	ABS, HB, min.thickness: 2.0mm	IEC EN 60335-1	Tested with appliance	
Supplementary information: 1) Provided evidence ensures the agreed level of compliance. See OD-CB2039.						

Appendix tables

28.1	TABLE: Threaded part torque test			P
Threaded part identification:	Diameter of thread (mm)	Column number (I, II, or III)	Applied torque (Nm)	
Fixed enclosure	3.96	II	0.6	
Supplementary information:				

29.1 TABLE: Clearances

Overvoltage category..... :		II				—
Tested pulse voltage (V):	Min. cl (mm)	Type of insulation:				Verdict / Remark
		Basic (mm)	Supplementary (mm)	Reinforced (mm)	Functional (mm)	
30	0,2* / 0,5 / 0,8**	--	--	--	--	N
100	0,2* / <u>0,5</u> / 0,8**	--	--	--	>0.5	P
300	0,2* / 0,5/ 0,8**	--	--	--	--	N
500	0,5 / 0,8** / 1,0***	--	--	--	--	N
1000	1.5/ 2.0***	<b>X</b>	<b>X</b>	—	--	P
1500	3.0/ 3.5***	--	--	--	<b>X</b>	P
2000	5,5 / 6,0***	--	--	--	--	N
2500	8,0 / 8,5***	--	--	--	--	N
3000	11,0 / 11,5***	--	--	--	--	N
Supplementary information:						
Cracks on printed circuit boards if pollution degree 1 and 2						
pollution degree 3						
The construction is affected by wear, distortion, movement of the parts or during assembly						

## Appendix tables

29.2	TABLE: Creepage distances, basic, supplementary and reinforced insulation											P
Working voltage (V):	Creepage distance (mm)											
	Pollution degree											
	1	2			3			Type of insulation				
		Material group			Material group							
		I	II	IIIa/IIIb	I	II	IIIa/IIIb*	B**	S**	R**	Verdict	
≤50	0,18	0,6	0,85	1,2	1,5	1,7	1,9	>1.2	—	—	P	
≤50	0,18	0,6	0,85	1,2	1,5	1,7	1,9	—		—	N	
≤50	0,36	1,2	1,7	2,4	3,0	3,4	3,8	—	—		N	
125	0,28	0,75	1,05	1,5	1,9	2,1	2,4	X	—	—	P	
125	0,28	0,75	1,05	1,5	1,9	2,1	2,4	—		—	N	
125	0,56	1,5	2,1	3,0	3,8	4,2	4,8	—	—	X	P	
250	0,56	1,25	1,8	2,5	3,2	3,6	4,0		--	--	N	
250	0,56	1,25	1,8	2,5	3,2	3,6	4,0	--		--	N	
250	1,12	2,5	3,6	5,0	6,4	7,2	8,0	--	--		N	
400	1,0	2,0	2,8	4,0	5,0	5,6	6,3		—	—	N	
400	1,0	2,0	2,8	4,0	5,0	5,6	6,3	—		—	N	
400	2,0	4,0	5,6	8,0	10,0	11,2	12,6	—	—		N	
500	1,3	2,5	3,6	5,0	6,3	7,1	8,0		—	—	N	
500	1,3	2,5	3,6	5,0	6,3	7,1	8,0	—		—	N	
500	2,6	5,0	7,2	10,0	12,6	14,2	16,0	—	—		N	
>630 and ≤800	1,8	3,2	4,5	6,3	8,0	9,0	10,0		—	—	N	
>630 and ≤800	1,8	3,2	4,5	6,3	8,0	9,0	10,0	—		—	N	
>630 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	

**Appendix tables**

>1250 and ≤1600	8,4	12,6	18,0	25,0	32,0	36,0	40,0	—	—		N
>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

Supplementary information:

\*) Material group IIIb is allowed if the working voltage does not exceed 50 V

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

## Appendix tables

29.2		TABLE: Creepage distances, functional insulation								P
Working voltage (V):		Creepage distance (mm) Pollution degree								
		1	2			3				
		Material group			Material group					
			I	II	IIIa/IIIb	I	II	IIIa/IIIb*	Verdict / Remark	
≤10	0,08	0,4	0,4	0,4	1,0	1,0	1,0	N		
50	0,16	0,56	0,8	1,1	1,4	1,6	1,8	P		
125	0,25	0,71	1,0	1,4	1,8	2,0	2,2	N		
250	0,42	1,0	1,4	2,0	2,5	2,8	3,2	N		
400	0,75	1,6	2,2	3,2	4,0	4,5	5,0	N		
500	1,0	2,0	2,8	4,0	5,0	5,6	6,3	N		
>630 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		
Supplementary information:										
*) Material group IIIb is allowed if the working voltage does not exceed 50 V										

**Appendix tables**

<b>30.1</b>	<b>TABLE: Ball Pressure Test of Thermoplastics</b>			P
Allowed impression diameter (mm) .....				—
Object/ Part No./ Material	Manufacturer/ trademark	Test temperature (°C)	Impression diameter (mm)	
Enclosure	See table 24.1	125	1.3	
PCB	See table 24.1	125	0.8	
Supplementary information:				

<b>30.2</b>	<b>TABLE: Resistance to heat and fire – Glow wire tests</b>							P
Object/ Part No./ Material	Manufacturer / trademark	Glow wire test (GWT); (°C)						Verdict
		550	650		750		850	
			te	ti	te	ti		
Enclosure	See table 24.1	--	--	--	×	×	×	Pass
					No flame	No flame	No flame	
Object/ Part No./ Material	Manufacturer / trademark	Glow-wire flammability index (GWFI), °C				GW ignition temp. (GWIT), °C		Verdict
		550	650	750	850	675	775	
--	--	--	--	--	--	--	--	--
The test specimen passed the glow wire test (GWT) with no ignition [(te – ti) ≤ 2s] (Yes/No):								Yes
If no, then surrounding parts passed the needle-flame test of annex E (Yes/No)..... :								No
The test specimen passed the test by virtue of most of the flaming material being withdrawn with the glow-wire (Yes/No)?..... :								No
Ignition of the specified layer placed underneath the test specimen (Yes/No)..... :								No
Supplementary information:								
- 550 °C GWT not relevant (or applicable) to parts of material classified at least HB40 or if relevant HBF								
- The GWIT pre-selection option, the 850 °C GWFI pre-selection option, and the 850 °C GWT are not relevant (or applicable) for attended appliances								

<b>30.2/30.2.4</b>	<b>TABLE: Needle- flame test (NFT)</b>				N
Object/ Part No./ Material	Manufacturer/ trademark	Duration of application of test flame (ta); (s)	Ignition of specified layer Yes/No	Duration of burning (tb) (s)	Verdict
--	--	--	--	--	--
Supplementary information:					
- NFT not relevant (or applicable) for Parts of material classified as V-0 or V- 1					
- NFT not relevant (or applicable) for Base material of PCBs classified as V-0 or if relevant VTM-0					

**Product Photos**



Fig. 1



Fig. 2

**Product Photos**



Fig. 3

----- END OF REPORT -----

STE Testing