

# Henan Zhonghai Environmental Protection Equipment Co., Ltd

## CE LVD REPORT

Prepared For :	Henan Zhonghai Environmental Protection Equipment Co., Ltd No. 112, 14th Floor, Unit 1, Building 1, No. 41 Jinsuo Road, High tech Industrial Development Zone, Zhengzhou City, Henan Province
Product Name:	Water Treatment Equipment
Main Test Model:	DRO-2T
Additional Model:	A1-800G, B1-1600G, B2-2000G, C1-600G, C1-1200G, F1-0.25T, F1-0.5T, DRO-1T, DRO-2T, X1-0.5T, W1-400G, W2-800G, JY-100GPD, JY-400GPD, JY-600GPD, UF-5, UF-3, WS-1T, WS-2T, WS-3T
Prepared By:	Shenzhen CTG Testing Co., LTD.  3F, Yongxing Plastic Plant, No. 11 Waihuan Road, Shiyuan street, Bao'an District, Shenzhen, China
Test Date:	May 08, 2025 To May 23, 2025
Date of Report:	May 23, 2025
Report No.:	CTG2505234933K-SR03AA



**TEST REPORT**  
**EN 60335-1**  
**Safety of household and similar electrical appliances**  
**Part 1:General requirements**

**Testing Laboratory**

Name.....: Shenzhen CTG Testing Co., LTD.  
Address.....: 3F, Yongxing Plastic Plant, No. 11 Waihuan Road,Shiyan street, Bao'an District, Shenzhen,China  
Testing location.....: Shenzhen CTG Testing Co., LTD.

**Applicant**

name.....: Henan Zhonghai Environmental Protection Equipment Co., Ltd  
Address.....: No. 112, 14th Floor, Unit 1, Building 1, No. 41 Jinsuo Road, High tech Industrial Development Zone, Zhengzhou City, Henan Province

**Test specification:**

Standard.....: EN IEC 60335-1:2023/A11:2023  
Test procedure.....: CE-LVD  
Non-standard test method.....: N/A

**Test item**

Description.....: Water Treatment Equipment  
Trade Name.....: N/A  
Model and/or type reference.....: DRO-2T  
Manufacturer .....: Henan Zhonghai Environmental Protection Equipment Co., Ltd  
Address .....: No. 112, 14th Floor, Unit 1, Building 1, No. 41 Jinsuo Road, High tech Industrial Development Zone, Zhengzhou City, Henan Province  
Rating(s).....: Input: 110V-240V~, 50/60Hz, 5500W

**Test item particulars**

Classification of installation and use : Class II  
Supply Connection.....: N/A

**Possible test case verdicts**

- test case does not apply to the test object: N(.A)  
- test object does meet the requirement: P(Pass)  
- test object does not meet the requirement: F(Fail)



General remarks

This test report shall not be reproduced except in full without the written approval of the testing laboratory. The test results presented in this report relate only to the item tested.  
"(see remark #)" refers to a remark appended to the report.  
"(see appended table)" refers to a table appended to the report.

General product information: N/A

Copy of marking plate(s):

Product Name: Water Treatment Equipment  
Model: DRO-2T  
Rating: 110V-240V~, 50/60Hz, 5500W



Henan Zhonghai Environmental Protection Equipment Co., Ltd

Prepared by :

*Jane Tao*

Engineer

Reviewer :

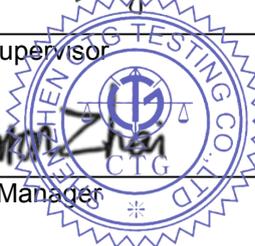
*Eric Ding*

Supervisor

Approved & Authorized Signer :

*Adam Zhan*

Manager





EN 60335-1			
Clause	Requirement + Test	Result - Remark	Verdict
5	GENERAL CONDITIONS FOR THE TESTS		--
	Tests performed according to cl. 5, e.g. nature of supply, sequence of testing, etc.		P
6	CLASSIFICATION		--
6.1	Protection against electric shock: Class I, II, III .....	Class II	P
6.2	Protection against harmful ingress of water		N
7	MARKING AND INSTRUCTIONS		--
7.1	Rated voltage or voltage range (V).....		P
	Single-phase appliances to be connected to the supply mains: 230 V covered		N
	Multi-phase appliances to be connected to the supply mains: 400 V covered		N
	Nature of supply.....		P
	Rated frequency (Hz).....	50/60Hz	P
	Rated power input (W).....		P
	Rated current (A) .....		N
	Manufacturer's or responsible vendor's name, trademark or identification mark.....		P
	Model or type reference.....	See page 1	P
	Symbol 5172 of IEC 60417, for Class II appliances		N
	IP number, other than IPX0.....		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		P
7.2	Warning for stationary appliances for multiple supply		N
	Warning placed in vicinity of terminal cover		N
7.3	Range of rated values marked with the lower and upper limits separated by a hyphen		N
	Different rated values marked with the values separated by an oblique stroke		N
7.4	Appliances adjustable for different rated voltages, the voltage setting is clearly discernible		N





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Clause	Requirement + Test	Result - Remark	Verdict
7.5	Appliances with more than one rated voltage or one or more rated voltage ranges, marked with rated input or rated current for each rated voltage or range, unless		P
	the power input is related to the mean value of the rated voltage range		P
	Relation between marking for upper and lower limits of rated power input or rated current and voltage is clear		N
7.6	Correct symbols used		P
7.7	Connection diagram fixed to appliances to be connected to more than two supply conductors and appliances for multiple supply		N
7.8	Except for type Z attachment, terminals for connection to the supply mains indicated as follows:		N
	- marking of terminals exclusively for the neutral conductor (N)		N
	- marking of protective earthing terminals (symbol 5019 of IEC 60417)		N
	- marking not placed on removable parts		N
7.9	Marking or placing of switches which may cause a hazard		N
7.10	Indications of switches on stationary appliances and controls on all appliances by use of figures, letters or other visual means..... :		N
	The figure 0 indicates only OFF position, unless no confusion with the OFF position		N
7.11	Indication for direction of adjustment of controls		N
7.12	Instructions for safe use provided		P
7.12.1	Sufficient details for installation supplied		P
7.12.2	Stationary appliances not fitted with means for disconnection from the supply mains having a contact separation in all poles that provide full disconnection under overvoltage category III, the instructions state that means for disconnection must be incorporated in the fixed wiring in accordance with the wiring rules		N
7.12.3	Insulation of the fixed wiring in contact with parts exceeding 50 K during clause 11; instructions stating that the fixed wiring must be protected		N





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Clause	Requirement + Test	Result - Remark	Verdict
7.12.4	Instructions for built-in appliances:		N
	- dimensions of space		N
	- dimensions and position of supporting means		N
	- distances between parts and surrounding structure		N
	- dimensions of ventilation openings and arrangement		N
	- connection to supply mains and interconnection of separate components		N
	- 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		N
	Replacement cord instructions, type Z attachment		N
7.12.6	Caution in the instructions for heating appliances with a non-self-resetting thermal cut-out		N
7.12.7	Instructions for fixed appliances stating how the appliance is to be fixed		P
7.12.8	Instructions for appliances connected to the water mains:		N
	- max. inlet water pressure (Pa)..... :		N
	- min. inlet water pressure, if necessary (Pa)..... :		N
	Instructions concerning new and old hose-sets for appliances connected to the water mains by detachable hose-sets		N
7.13	Instructions and other texts in an official language		P
7.14	Marking clearly legible and durable	See marking label	P
7.15	Marking on a main part		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
	For stationary appliances, name, trademark or identification mark and model or type reference visible after installation		N



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Clause	Requirement + Test	Result - Remark	Verdict
	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		N
7.16	Marking of a possible replaceable thermal link or fuse link clearly visible with regard to replacing the link		N
8	PROTECTION AGAINST ACCESS TO LIVE PARTS		--
8.1	Adequate protection against accidental contact with live parts		P
8.1.1	Requirement applies for all positions, detachable parts removed		P
	Insertion or removal of lamps, protection against contact with live parts of the lamp cap		N
	Use of test probe B of IEC 61032: no contact with live parts		P
8.1.2	Use of test probe 13 of IEC 61032 through openings in class 0 appliances and class II appliances/ constructions: no contact with live parts		N
	Test probe 13 also applied through openings in earthed metal enclosures having a non-conductive coating: no contact with live parts		N
8.1.3	For appliances other than class II, use of test probe 41 of IEC 61032: no contact with live parts of visible glowing heating elements		N
8.1.4	Accessible part not considered live if:		N
	- safety extra-low a.c. voltage: peak value not exceeding 42.4 V		N
	- safety extra-low d.c. voltage: not exceeding 42.4 V		N
	- or separated from live parts by protective impedance		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 μF		N
	- for peak values over 450 V up to and including 15 kV, discharge not exceeding 45 μC		N





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Clause	Requirement + Test	Result - Remark	Verdict
8.1.5	Live parts protected at least by basic insulation before installation or assembly:		N
	- built-in appliances		N
	- fixed appliances		N
	- appliances delivered in separate units		N
8.2	Class II appliances and constructions constructed so that there is adequate protection against accidental contact with basic insulation and metal parts separated from live parts by basic insulation only	Class II	P
	Only possible to touch parts separated from live parts by double or reinforced insulation		P
10	POWER INPUT AND CURRENT		--
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)	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)	P
11	HEATING		--
11.1	No excessive temperatures in normal use		P
11.2	Placing and mounting of appliance as described		P
11.3	Temperature rises, other than of windings, determined by thermocouples		P
	Temperature rises of windings determined by resistance method, unless		P
	the windings makes it difficult to make the necessary connections		N
11.4	Heating appliances operated under normal operation at 1.15 times rated power input .....		P
11.5	Motor-operated appliances operated under normal operation at most unfavourable voltage between 0.94 and 1.06 times rated voltage.....		N
11.6	Combined appliances operated under normal operation at most unfavourable voltage between 0.94 and 1.06 times rated voltage.....		N
11.7	Operation duration corresponding to the most unfavourable conditions of normal use		P
11.8	Temperature rises not exceeding values in table 3		P





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Clause	Requirement + Test	Result - Remark	Verdict
	Protective devices do not operate, except		P
	components in protective electronic circuits tested for the number of cycles specified in 24.1.4		N
	Sealing compound does not flow out		N
13	LEAKAGE CURRENT AND ELECTRIC STRENGTH AT OPERATING TEMPERATURE		--
13.1	Leakage current not excessive and electric strength adequate		P
	Heating appliances operated at 1.15 times rated power input.....:		P
	Motor-operated appliances and combined appliances supplied at 1.06 times rated voltage.....:		N
	Protective impedance and radio interference filters disconnected before carrying out the tests		N
13.2	Leakage current measured by means of the circuit described in figure 4 of IEC 60990		P
	Leakage current measurements		P
13.3	The appliance is disconnected from the supply		P
	Electric strength tests according to table 4		P
	No breakdown during the tests		P
15	MOISTURE RESISTANCE		--
15.1	Enclosure provides the degree of moisture protection according to classification of the appliance		N
	Compliance checked as specified in 15.1.1, taking into account 15.1.2, followed by the electric strength test of 16.3		N
	No trace of water on insulation which can result in a reduction of clearances and creepage distances below values specified in clause 29		N
15.1.1	Appliances, other than IPX0, subjected to tests as specified in IEC 60529.....:		N
	Water valves 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		P



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Clause	Requirement + Test	Result - Remark	Verdict
	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		N
	However, for appliances normally used on the floor or table, the movement is limited to two times 90° for a period of 5 min, the support being placed at the level of the pivot axis of the oscillating tube		N
	Appliances normally fixed to a ceiling are mounted underneath a horizontal unperforated support, the pivot axis of the oscillating tube located at the level of the underside of the support		N
	For IPX4 appliances, the movement of the tube is limited to two times 90° from the vertical for a period of 5 min		N
	Wall-mounted appliances, take into account the distance to the floor stated in the instructions		N
	Appliances with type X attachment fitted with a flexible cord as described		N
	Detachable parts tested as specified		N
15.2	Spillage of liquid does not affect the electrical insulation		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 removed		N
	Overfilling test with additional amount of water, over a period of 1 min (I).....:		N





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Clause	Requirement + Test	Result - Remark	Verdict
	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 and creepage distances below values specified in clause 29		N
15.3	Appliances proof against humid conditions	25°C, RH93%	P
	Humidity test for 48 h in a humidity cabinet		P
	The appliance withstands the tests of clause 16		P
16	LEAKAGE CURRENT AND ELECTRIC STRENGTH		--
16.1	Leakage current not excessive and electric strength adequate		P
	Protective impedance disconnected from live parts before carrying out the tests		N
16.2	Single-phase appliances: test voltage 1.06 times rated voltage..... :		P
	Three-phase appliances: test voltage 1.06 times rated voltage divided by $\sqrt{3}$ ..... :		N
	Leakage current measurements		P
16.3	Electric strength tests according to table 7		P
	No breakdown during the tests		P
17	OVERLOAD PROTECTION OF TRANSFORMERS AND ASSOCIATED CIRCUITS		--
	No excessive temperatures in transformer or associated circuits in event of short-circuits likely to occur in normal use		N
	Appliance supplied with 1.06 or 0.94 times rated voltage and the most unfavourable short-circuit or overload likely to occur in normal use applied..... :		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
19	ABNORMAL OPERATION		--
19.1	The risk of fire or mechanical damage under abnormal or careless operation obviated		N



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Clause	Requirement + Test	Result - Remark	Verdict
	Electronic circuits so designed and applied that a fault will not render the appliance unsafe		N
19.2	Test of appliance with heating elements with restricted heat dissipation; test voltage (V): power input of 0.85 times rated power input.....:		N
19.3	Test of 19.2 repeated; test voltage (V): power input of 1.24 times rated power input.....:		N
19.4	Test conditions as in cl. 11, any control limiting the temperature during tests of cl. 11 short-circuited	No such control	N
19.5	Test of 19.4 repeated on Class 0I and I appliances with tubular sheathed or embedded heating elements. No short-circuiting, but one end of the element connected to the elements sheath		N
	The test repeated with reversed polarity and the other end of the heating element connected to the sheath		N
	The test is not carried out on appliances intended to be permanently connected to fixed wiring and on appliances where an all-pole disconnection occurs during the test of 19.4		N
19.6	Appliances with PTC heating elements tested at rated voltage, establishing steady conditions		N
	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		N
19.7	Stalling test by locking the rotor if the locked rotor torque is smaller than the full load torque or locking moving parts of other appliances		N
	Locked rotor, motor capacitors open-circuited or short-circuited, if required		N
	Locked rotor, capacitors open-circuited one at a time		N
	Test repeated with capacitors short-circuited one at a time, if required		N
	Appliances with timer or programmer supplied with rated voltage for each of the tests, for a period equal to the maximum period allowed		N
	Other appliances supplied with rated voltage for a period as specified		N





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Clause	Requirement + Test	Result - Remark	Verdict
	Winding temperatures not exceeding values specified in table 8		N
19.8	Three-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
	Winding temperatures not exceeding values as specified		N
19.10	Series motor operated at 1.3 times rated voltage for 1 min..... : 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 they comply with the conditions specified in 19.11.1		N
	Appliances incorporating a protective electronic circuit subjected to the tests of 19.11.3 and 19.11.4		N
	Appliances having a switch with an off position obtained by electronic disconnection, or a switch placing the appliance in a stand-by mode, subjected to the tests of 19.11.4		N
19.11.1	Before applying the fault conditions a) to f) in 19.11.2, it is checked if circuits or parts of circuit meet both of the following conditions: - the electronic circuit is a low-power circuit, that is, the maximum power at low-power points does not exceed 15 W according to the tests specified - the protection against electric shock, fire hazard, mechanical hazard or dangerous malfunction in other parts of the appliance does not rely on the correct functioning of the electronic circuit		N
19.11.2	Fault conditions applied one at a time, the appliance operated under conditions specified in cl. 11, but supplied at rated voltage, the duration of the tests as specified: a) short circuit of functional insulation if clearances or creepage distances are less than the values specified in 29 b) open circuit at the terminals of any component c) short circuit of capacitors, unless they comply with IEC 60384-14		P



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Clause	Requirement + Test	Result - Remark	Verdict
	d) short circuit of any two terminals of an electronic component, other than integrated circuits. This fault condition is not applied between the two circuits of an optocoupler		P
	e) failure of triacs in the diode mode		P
	f) failure of an integrated circuit		P
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 f) of 19.11.2		N
	During and after each test the following is checked:		N
	- the temperature rise of the windings do not exceed the values specified in table 8		N
	- the appliance complies with the conditions specified in 19.13		N
	- any current flowing through protective impedance not exceeding the limits specified in 8.1.4		N
	If a conductor of a printed board becomes open-circuited, the appliance is considered to have withstood the particular test, provided all three of the following conditions are met:		N
	- the material of the printed circuit board withstands the burning test of annex E		N
	- any loosened conductor does not reduce the clearances or creepage distances between live parts and accessible metal parts below the values specified in cl. 29		N
	- the appliance withstands the tests of 19.11.2 with open-circuited conductor bridged		N
19.11.4	Appliances having a switch with an off position obtained by electronic disconnection, or		N
	a switch that can be placed in the stand-by mode,		N
	subjected to the tests of 19.11.4.1 to 19.11.4.7		N
	Appliances incorporating a protective electronic circuit subjected to the tests of 19.11.4.1 to 19.11.4.7, except that		N
	appliances operated for 30 s or 5 min during the test of 19.7 are not subjected to the tests for electromagnetic phenomena.		N





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Clause	Requirement + Test	Result - Remark	Verdict
19.11.4.1	The appliance is subjected to electrostatic discharges in accordance with IEC 61000-4-2, test level 4		N
19.11.4.2	The appliance is subjected to radiated fields in accordance with IEC 61000-4-3, test level 3		N
19.11.4.3	The appliance is subjected to fast transient bursts in accordance with IEC 61000-4-4, test level 3 or 4 as specified		N
19.11.4.4	The power supply terminals of the appliance subjected to voltage surges in accordance with IEC 61000-4-5, test level 3 or 4 as specified		N
	Earthed heating elements in class I appliances disconnected		N
19.11.4.5	The appliance is subjected to injected currents in accordance with IEC 61000-4-6, test level 3		N
19.11.4.6	The appliance is subjected to voltage dips and interruptions in accordance with IEC 61000-4-11		N
19.11.4.7	The appliance is subjected to mains signals in accordance with IEC 61000-4-13, test level class 2		N
19.12	If the safety of the appliance for any of the fault conditions specified in 19.11.2 depends on the operation of a miniature fuse-link complying with IEC 60127, the test is repeated, measuring the current flowing through the fuse-link; measured current (A); rated current of the fuse-link (A)..... :		N
19.13	During the tests the appliance does not emit flames, molten metal, poisonous or ignitable gas in hazardous amounts		N
	Temperature rises not exceeding the values shown in table 9		N
	Enclosures not deformed to such an extent that compliance with cl. 8 is impaired		N
	If the appliance can still be operated it complies with 20.2		N
	Insulation, other than of class III appliance, withstand the electric strength test of 16.3, the test voltage specified in table 4:		N
	- basic insulation..... :		N
	- supplementary insulation..... :		N
	- reinforced insulation..... :		N





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Clause	Requirement + Test	Result - Remark	Verdict
	The appliance does not undergo a dangerous malfunction, and		N
	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		N
20	STABILITY AND MECHANICAL HAZARDS		P
20.1	Adequate stability		N
	Tilting test through an angle of 10° (appliance placed on an inclined plane/horizontal plane); 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		N
	Adequate mechanical strength and fixing of protective enclosures		N
	Self-resetting thermal cut-outs and overcurrent protective devices not causing a hazard, by unexpected reclosure		N
	Not possible to touch dangerous moving parts with test probe		N
21	MECHANICAL STRENGTH		--
21.1	Appliance has adequate mechanical strength and is constructed as to withstand rough handling		N
	Checked by applying blows to the appliance in accordance with test Ehb of IEC 60068-2-75, spring hammer test, impact energy 0,5 J		N
	If necessary, 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

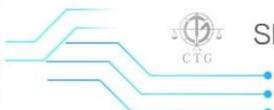




EN 60335-1			
Clause	Requirement + Test	Result - Remark	Verdict
21.2	Accessible parts of solid insulation having strength to prevent penetration by sharp implements		N
	The insulation is tested as specified, unless		N
	the thickness of supplementary insulation is at least 1 mm and reinforced insulation is at least 2 mm		N
22	CONSTRUCTION		--
22.1	Appliance marked with the first numeral of the IP system, relevant requirements of IEC 60529 are fulfilled		N
22.2	Stationary appliance: means to provide all-pole disconnection from the supply provided, the following means being available:		N
	- a supply cord fitted with a plug		N
	- a switch complying with 24.3		N
	- a statement in the instruction sheet that a disconnection incorporated in the fixed wiring is to be provided		N
	- an appliance inlet		N
	Single-pole switches and single-pole protective devices for the disconnection of heating elements in single-phase permanently connected class I appliances, connected in the phase conductor		N
22.3	Appliance provided with pins: no undue strain on socket-outlets		P
	Applied torque not exceeding 0.25 Nm		P
	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		P
	Each pin subjected to a torque of 0.4Nm; the pins are not rotating unless rotating does not impair compliance with the standard		P
22.4	Appliance for heating liquids and appliance causing undue vibration not provided with pins for insertion into socket-outlets		N
22.5	No risk of electric shock when touching the pins of the plug, the appliance being disconnected from the supply at the instant of voltage peak.		P
22.6	Electrical insulation not affected by condensing water or leaking liquid		N



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Clause	Requirement + Test	Result - Remark	Verdict
	Electrical insulation of Class II appliances not affected in case of a hose rupture or seal leak		N
22.7	Adequate safeguards against the risk of excessive pressure in appliances provided with 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		P
	Adequate insulating properties of oil or grease to which insulation is exposed		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		N
	Non-self resetting thermal motor protectors have a trip-free action, unless		N
	they are voltage maintained		N
	Location or protection of reset buttons of non-self-resetting controls is so 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		N
	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		N
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



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Clause	Requirement + Test	Result - Remark	Verdict
	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 operators hand touch parts having a temperature rise exceeding the value specified for handles which are held for short periods only		P
22.14	No ragged or sharp edges creating a hazard for the user in normal use, or during user maintenance		P
	No exposed pointed ends of self tapping screws etc., liable to be touched by the user in normal use or during user maintenance		P
22.15	Storage hooks and the like for flexible cords smooth and well rounded		N
22.16	Automatic cord reels cause no undue abrasion or damage to the sheath of the flexible cord, no breakage of conductors strands, no undue wear of contacts		N
	Cord reel tested with 6000 operations, as specified		N
	Electric strength test of 16.3, voltage of 1000 V applied		N
22.17	Spacers not removable from the outside by hand or by means of a screwdriver or a spanner		N
22.18	Current-carrying parts and other metal parts resistant to corrosion under normal conditions of use		P
22.19	Driving belts not used as electrical insulation		N
22.20	Direct contact between live parts and thermal insulation effectively prevented, unless material used is non-corrosive, non-hygroscopic and non-combustible		N
	Compliance is checked by inspection and, if necessary, by appropriate test		N
22.21	Wood, cotton, silk, ordinary paper and fibrous or hygroscopic material not used as insulation, unless impregnated		N
22.22	Appliances not containing asbestos		P
22.23	Oils containing polychlorinated biphenyl (PCB) not used		N
22.24	Bare heating elements adequately supported		N





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Clause	Requirement + Test	Result - Remark	Verdict
	In case of rupture, the heating conductor is unlikely to come in contact with accessible metal parts		N
22.25	Sagging heating conductors cannot come into contact with accessible metal parts		N
22.26	The insulation between parts operating at safety extra-low voltage and other live parts complies with the requirements for double or reinforced insulation		N
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		P
	so constructed that they cannot be replaced in an incorrect position, and so that if they are omitted, the appliance is rendered inoperable or manifestly incomplete		P
22.31	Clearances and creepage distances over supplementary and reinforced insulation not reduced below values specified in clause 29 as a result of wear		P
	Clearances and creepage distances between live parts and accessible parts not reduced below values for supplementary insulation, if wires, screws etc. become loose		P
22.32	Supplementary and reinforced insulation designed or protected against deposition of dirt or dust		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 material or beads alone not used as supplementary or reinforced insulation		N





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Clause	Requirement + Test	Result - Remark	Verdict
	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 are not in direct contact with live parts		N
	Electrodes not used for heating liquids		N
	For class II constructions, conductive liquids that are or may become accessible in normal use, not in direct contact with basic or reinforced insulation		N
	For class II constructions, conductive liquids which are in contact with live parts, not in direct contact with reinforced insulation		N
22.34	Shafts of operating knobs, handles, levers etc. not live, unless the shaft is not accessible when the part is removed		N
22.35	Handles, levers and knobs, held or actuated in normal use, not becoming live in the event of an insulation fault		P
	Such parts being of metal, and their shafts or fixings are likely to become live in the event of an insulation fault, they are either adequately covered by insulation material, or their accessible parts are separated from their shafts or fixings by supplementary insulation		N
	This requirement does not apply to handles, levers and knobs on stationary appliances other than those of electrical components, provided they are either reliably connected to an earthing terminal or earthing contact, or separated from live parts by earthed metal		N
22.36	Handles continuously held in the hand in normal use are so constructed that when gripped as in normal use, the operators hand is not likely to touch metal parts, unless 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, unless complying with 22.42		N
	Metal casings of capacitors in Class II appliances separated from accessible metal parts by supplementary insulation, unless complying 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





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Clause	Requirement + Test	Result - Remark	Verdict
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
22.41	No components, other than lamps, containing mercury		N
22.42	Protective impedance consisting of at least two separate components		N
	Values specified in 8.1.4 not exceeded if any one of the components are short-circuited or open-circuited		N
22.43	Appliances adjustable for different voltages, accidental changing of the setting of the voltage unlikely to occur		N
22.44	Appliances are not allowed to have an enclosure that is shaped and decorated so that the appliance is likely to be treated as a toy by children		P
22.45	When air is used as reinforced insulation, clearances not reduced below the values specified in 29.1.4 due to deformation as a result of an external force applied to the enclosure		N
22.46	Software used in protective electronic circuits is software class B or C .....		N
22.47	Appliances connected to the water mains withstand the water pressure expected in normal use		N
	No leakage from any part, including any inlet water hose		N
22.48	Appliances connected to the water mains constructed to prevent backsiphonage of non-potable water		N
23	INTERNAL WIRING		--
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		N
23.2	Beads etc. on live wires cannot change their position, and are not resting on sharp edges or corners		N



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Clause	Requirement + Test	Result - Remark	Verdict
	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 100 flexings for conductors flexed during user maintenance		N
	Electric strength test, 1000 V between live parts and accessible metal parts		N
23.4	Bare internal wiring sufficiently rigid and fixed		N
23.5	The insulation of internal wiring withstanding the electrical stress likely to occur in normal use		P
	No breakdown when a voltage of 2000 V is applied for 15 min between the conductor and metal foil wrapped around the insulation		P
23.6	Sleeving used as supplementary insulation on internal wiring retained in position by positive means		P
23.7	The colour combination green/yellow used only for earthing conductors		N
23.8	Aluminium wires not used for internal wiring		N
23.9	No lead-tin soldering of stranded conductors where they are subject to contact pressure, unless		N
	clamping means so constructed that there is no risk of bad contact due to cold flow of the solder		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
24	COMPONENTS		--
24.1	Components comply with safety requirements in relevant IEC standards		P
	List of components		P



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Clause	Requirement + Test	Result - Remark	Verdict
	Components not tested and found to comply with relevant IEC standard for the number of cycles specified are tested in accordance with 24.1.1 to 24.1.6		P
	Components not tested and found to comply with relevant IEC standard, components not marked or not used in accordance with its marking, tested under the conditions occurring in the appliance		P
24.1.1	Capacitors likely to be permanently subjected to the supply voltage and used for radio interference suppression or for voltage dividing, complying with IEC 60384-14, or		P
	tested according to annex F		N
24.1.2	Safety isolating transformers complying with IEC 61558-2-6, or		N
	tested according to annex G		N
24.1.3	Switches complying with IEC 61058-1, the number of cycles of operation being at least 10 000, or		N
	tested according to annex H		N
	If the switch operates a relay or contactor, the complete switching system is subjected to the test		N
24.1.4	Automatic controls complying with IEC 60730-1 with relevant part 2. The number of cycles of operation being:		N
	- thermostats: 10 000		N
	- temperature limiters: 1 000		N
	- self-resetting thermal cut-outs: 300		N
	- voltage maintained non-self-resetting thermal cut-outs: 1000		N
	- other non-self-resetting thermal cut-outs: 30		N
	- timers: 3 000		N
	- energy regulators: 10 000		N
	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



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Clause	Requirement + Test	Result - Remark	Verdict
24.1.5	Appliance couplers complying with IEC 60320-1		N
	However, appliances classified higher than IPX0, the appliance couplers complying with IEC 60320-2-3		N
	Interconnection couplers complying with IEC 60320-2-2		N
24.1.6	Small lamp holders similar to E10 lampholders complying with IEC 60238, the requirements for E10 lampholders being applicable		N
24.2	No switches or automatic controls in flexible cords		P
	No devices causing the protective device in the fixed wiring to operate in the event of a fault in the appliance		P
	No thermal cut-outs that can be reset by soldering		P
24.3	Switches intended for all-pole disconnection of stationary appliances are directly connected to the supply terminals and having a contact separation in all poles, providing full disconnection under overvoltage category III conditions		N
24.4	Plugs and socket-outlets for extra-low voltage circuits and heating elements, not interchangeable with plugs and socket-outlets listed in IEC 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 42V.		N
	In addition, the motors are complying with the requirements of Annex I		N
24.7	Hose-sets for connection of appliances to the water mains, complying with IEC 61770 and supplied with the appliance		N
25	SUPPLY CONNECTION AND EXTERNAL FLEXIBLE CORDS		N



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Clause	Requirement + Test	Result - Remark	Verdict
25.1	Appliance not intended for permanent connection to fixed wiring, means for connection to the supply:		N
	- supply cord fitted with a plug		N
	- an appliance inlet having at least the same degree of protection against moisture as required for the appliance		N
	- pins for insertion into socket-outlets		N
25.2	Appliance not provided with more than one means of connection to the supply mains		N
	Stationary appliance for multiple supply may be provided with more than one means of connection, provided electric strength test of 1250 V for 1 min between each means of connection causes no breakdown		N
25.3	Connection of supply conductors for appliance intended to be permanently connected to fixed wiring possible after the appliance has been fixed to its support		N
	Appliance provided with a set of terminals for the connection of cables or fixed wiring, cross-sectional areas specified in 26.6		N
	Appliance provided with a set of terminals allowing the connection of a flexible cord		N
	Appliance provided with a set of supply leads accommodated in a suitable compartment		N
	Appliance provided with a set of terminals and cable entries, conduit entries, knock-outs or glands, allowing connection of appropriate type of cable or conduit		N
25.4	Cable and conduit entries, rated current of appliance not exceeding 16 A, dimensions according to table 10		N
	Introduction of conduit or cable does not reduce clearances or creepage distances below values specified in 29		N
25.5	Method for assemble supply cord with the appliance:		N
	- type X attachment		N
	- type Y attachment		N
	- type Z attachment, if allowed in part 2		N





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Clause	Requirement + Test	Result - Remark	Verdict
	Type X attachment, other than those with a specially prepared cord, not used for flat twin tinsel cords		N
25.6	Plugs fitted with only one flexible cord		N
	Supply cords of single-phase portable appliances having a rated current not exceeding 16 A, fitted with a plug complying with the following standard sheets of IEC 60083:1975:		N
	- for Class I appliances: standard sheet C2b, C3b or C4 .....		N
	- for Class II appliances: standard sheet C5 or C6. :		N
25.7	Supply cord not lighter than:		N
	- braided cord (60245 IEC 51)		N
	- ordinary tough rubber sheathed cord (60245 IEC 53)		N
	- ordinary polychloroprene sheathed flexible cord (60245 IEC 57)		N
	- flat twin tinsel cord (60227 IEC 41)		N
	- light polyvinyl chloride sheathed cord (60227 IEC 52), appliance not exceeding 3 kg		N
	- ordinary polyvinyl chloride sheathed cord (60227 IEC 53), appliance exceeding 3 kg		N
	Supply cords having high flexibility, not lighter than:		N
	- rubber insulated and sheathed cord (60245 IEC 86)		N
	- rubber insulated, crosslinked PVC sheathed cord (60245 IEC 87)		N
	- crosslinked PVC insulated and sheathed cord (60245 IEC 88)		N
	Temperature rise of external metal parts exceeding 75 K, PVC cord not used, unless		N
	appliance so constructed that the supply cord is not likely to touch external metal parts in normal use, or		N
	the supply cord is appropriate for higher temperatures, type Y or type Z attachment used		N
25.8	Nominal cross-sectional area of supply cords according to table 11; rated current (A); cross-sectional area (mm <sup>2</sup> )..... :		N
25.9	Supply cord not in contact with sharp points or edges		N
25.10	Green/yellow core for earthing purposes in Class I appliance		N



EN 60335-1			
Clause	Requirement + Test	Result - Remark	Verdict
25.11	Conductors of supply cords not consolidated by lead-tin soldering where they are subject to contact pressure, unless		N
	clamping means so constructed that there is no risk of bad contacts due to cold flow of the solder		N
25.12	Moulding the cord to part of the enclosure does not damage the insulation of the supply cord		N
25.13	Inlet opening so shaped as to prevent damage to the supply cord		N
	Unless the enclosure at the inlet opening is of insulation material, a non-detachable lining or bushing complying with 29.3 for supplementary insulation provided		N
	If unsheathed supply cord, a similar additional bushing or lining is required, unless		N
	the appliance is class 0		N
25.14	Supply cords adequately protected against excessive flexing		N
	Flexing test:		N
	- applied force (N).....:		N
	- number of flexings..... :		N
	The test does not result in:		N
	- short circuit between the conductors		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, within the meaning of the standard, to the cord or the cord guard		N
	- broken strands piercing the insulation and becoming accessible		N
25.15	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



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Clause	Requirement + Test	Result - Remark	Verdict
	Pull and torque test of supply cord, values shown in table 10: pull (N); torque (not on automatic cord reel) (Nm)..... :		N
	Max. 2 mm displacement of the cord, and conductors not moved more than 1 mm in the terminals		N
	Creepage distances and clearances not reduced below values specified in 29.1		N
25.16	Cord anchorages for type X attachments constructed and located so that:		N
	- replacement of the cord is easily possible		N
	- it is clear how the relief from strain and the prevention of twisting are obtained		N
	- they are suitable for different types of cord		N
	- cord cannot touch the clamping screws of cord anchorage if these screws are accessible, unless 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 part of a specially prepared cord		N
	- screws which have to be operated when replacing the cord do not fix any other component, if applicable		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 a failure of the insulation of the cord does not make accessible metal parts live		N
	- for Class II appliances: they are of insulating material, or if of metal, they are insulated from accessible metal parts by supplementary insulation		N
25.17	Adequate cord anchorages for type Y and Z attachment		N
25.18	Cord anchorages only accessible with the aid of a tool, or		N
	so constructed that the cord can only be fitted with the aid of a tool		N



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Clause	Requirement + Test	Result - Remark	Verdict
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	Conductors of the supply cord for type Y and Z attachment adequately additionally insulated		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, no risk of damage to the conductors when fitting the cover, no contact with accessible metal parts if a conductor becomes loose, etc.		N
	For portable appliances, the uninsulated end of a conductor prevented from any contact with accessible metal parts, unless the end of the cord is such that the conductors are unlikely to slip free		N
25.22	Appliance inlet:		N
	- live parts not accessible during insertion or removal		N
	- connector can be inserted without difficulty		N
	- the appliance is not supported by the connector		N
	- is not for cold conditions if temp. rise of external metal parts exceeds 75 K, unless the supply cord is not likely to touch such metal parts		N
25.23	Interconnection cords comply with the requirements for the supply cord, except as specified		N
	If necessary, electric strength test of 16.3		N
25.24	Interconnection cords not detachable without the aid of a tool if compliance with the standard is impaired when they are disconnected		N
25.25	Dimensions of pins compatible with the dimensions of the relevant socket-outlet. Dimensions of pins and engagement face in accordance with the relevant plug in IEC 60083		N
26	TERMINALS FOR EXTERNAL CONDUCTORS		--
26.1	Appliances provided with terminals or equally effective devices for connection of external conductors		N
	Terminals only accessible after removal of a non-detachable cover		N





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Clause	Requirement + Test	Result - Remark	Verdict
	However, 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 connection to fixed wiring provided with terminals in which connections are made by means of screws, nuts or similar devices, unless the connections are soldered		N
	Screws and nuts serve only to clamp supply conductors, 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		N
	Soldering alone used, barriers provided, clearances and creepage distances satisfactory if the conductor becomes free at the soldered joint		N
26.3	Terminals for type X attachment and for connection to fixed wiring so constructed that the conductor is clamped between metal surfaces with sufficient contact pressure and without damaging the conductor		N
	Terminals for type X attachment and those for connection to fixed wiring so fixed that when tightening or loosening the clamping means:		N
	- the terminal does not loosen		N
	- internal wiring is not subjected to stress		N
	- clearances and creepage distances are not reduced below the values in 29		N
	Compliance checked by inspection and by the test of subclause 8.6 of IEC 60999-1, the torque applied being equal to two-thirds of the torque specified. Nominal diameter of thread (mm); screw category; torque (Nm).....:		N
26.4	Terminals for type X attachment, except those with a specially prepared cord, and those for connection to fixed wiring, no special preparation of conductors required, and so constructed or placed that conductors prevented from slipping out		N



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Clause	Requirement + Test	Result - Remark	Verdict
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, for class II constructions, between live parts and metal parts separated from accessible metal parts by supplementary insulation only		N
26.6	Terminals for type X attachment and for connection to fixed wiring suitable for connection of conductors with required cross-sectional area according to table 13; rated current (A); nominal cross-sectional area (mm <sup>2</sup> ):		N
	Terminals only suitable for a specially prepared cord		N
26.7	Terminals for type X attachment accessible after removal of a cover or part of the enclosure		N
26.8	Terminals for the connection to fixed wiring, including the earthing terminal, located close to each other		N
26.9	Terminals of the pillar type constructed and located as specified		N
26.10	Terminals with screw clamping and screwless terminals not used for flat twin tinsel cords, unless conductors ends fitted with a device 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 and 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
	For Class II appliances: soldering, welding or crimping alone used, barriers provided, clearances and creepage distances satisfactory if the conductor becomes free		N
27	PROVISION FOR EARTHING		N
27.1	Accessible metal parts of Class 0I and I appliances, permanently and reliably connected to an earthing terminal or contact of the appliance inlet		N
	Earthing terminals not connected to neutral terminal		N



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Clause	Requirement + Test	Result - Remark	Verdict
	Class 0, II and III appliance have no provision for earthing		N
	Safety extra-low voltage circuits not earthed, unless protective extra-low voltage circuits		N
27.2	Clamping means adequately secured against accidental loosening		N
	Terminals used for the connection of external equipotential bonding conductors allow connection of conductors of 2.5 to 6 mm <sup>2</sup> , and		N
	do not provide earthing continuity between different parts of the appliance		N
	Conductors cannot be loosened without the aid of a tool		N
27.3	For detachable parts that are plugged into another part of the appliance, and having an earth connection, the earth connection made before and separated after current-carrying connections when removing the part		N
	For appliances with supply cord, current-carrying conductors become taut before earthing conductor, if the cord slips out of the cord anchorage		N
27.4	No risk of corrosion resulting from contact between metal of earthing terminal and other metal		N
	Adequate resistance to corrosion of coated or uncoated parts providing earthing continuity, other than parts of a metal frame or enclosure		N
	Parts of steel providing earthing continuity provided at the essential areas with an electroplated coating, thickness at least 5 μm		N
	Adequate protection against rusting of parts of coated or uncoated steel, only intended to provide or transmit contact pressure		N
	In case of aluminium alloys precautions taken to avoid risk of corrosion		N
27.5	Low resistance of connection between earthing terminal and earthed metal parts		N
	This requirement does not apply to connections providing earthing continuity in the protective extra-low voltage circuit, provided that clearances of basic insulation are based on the rated voltage of the appliance		N



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Clause	Requirement + Test	Result - Remark	Verdict
	Resistance not exceeding 0,1 $\Omega$ at the specified low-resistance test		N
27.6	The printed conductors of printed circuit boards not used to provide earthing continuity in hand held appliances		N
	They may be used in other appliances if:		N
	- at least two tracks are used with independent soldering points and the appliance complies with requirements of 27.5 for each circuit		N
	- the material of the printed circuit board complies with IEC 60249-2-4 or IEC 60249-2-5		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 connection or connections providing earthing continuity		N
	Screws used for electrical connections or connections providing earthing continuity screw into metal		N
	Screws not of insulating material if their replacement by a metal screw can impair supplementary or reinforced insulation		N
	Type X attachment, screws to be removed for replacement of supply cord or for user maintenance, not of insulating material if their replacement by a metal screw can impair basic insulation		N
	For screws and nuts; test as specified	(see appended table)	P
28.2	Electrical connections and connections providing earthing continuity constructed so that contact pressure not transmitted through insulating material liable to shrink or distort, unless shrinkage or distortion compensated		P
	This requirement does not apply to electrical connections in circuits carrying a current not exceeding 0.5A		N



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Clause	Requirement + Test	Result - Remark	Verdict
28.3	Space-threaded (sheet metal) screws only used for electrical connections if they clamp the parts together		N
	Thread-cutting (self-tapping) screws only used for electrical connections if they generate a full form standard machine screw thread		N
	Such screws not used if they are likely to be operated by the user or installer unless the thread is formed by a swaging action		N
	Thread-cutting and space-threaded screws may be used in connections providing earthing continuity, provided unnecessary to disturb the connection and at least two screws are used for each connection		N
28.4	Screws and nuts that make mechanical connection secured against loosening if they also make electrical connections or connections providing earthing continuity		N
	Rivets for electrical connections or connections providing earthing continuity secured against loosening if subjected to torsion		N
29	CLEARANCES, CREEPAGE DISTANCES AND SOLID INSULATION		--
	Clearances, creepage distances and solid insulation withstand electrical stress		P
	For coatings used on printed circuits boards to protect the microenvironment (Type A) or to provide basic insulation (Type B), annex J applies..... :		N
	The microenvironment is pollution degree 1 under Type A coating		N
	No creepage distance or clearance requirements under Type B coating		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		P
	for basic insulation and functional insulation they comply with the impulse voltage test of clause 14		N
	However, if the construction is affected by wear, distortion, movement of the parts or during assembly, the clearances for rated impulse voltages of 1500V and above are increased by 0,5 mm and the impulse voltage test is not applicable		N
	Impulse voltage test not applicable:		N



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Clause	Requirement + Test	Result - Remark	Verdict
	- when the microenvironment is pollution degree 3		N
	- for basic insulation of class 0 and class 01 appliances		N
	Appliances are in overvoltage category II		P
	Clearances less than specified in table 16 not allowed for basic insulation of class 0 and class 01 appliances,		N
	or if pollution degree 3 is applicable		N
	Compliance is checked by inspection and measurements as specified		N
29.1.1	Clearances of basic insulation withstand the overvoltages, taking into account the rated impulse voltage		P
	Clearance at the terminals of tubular sheathed heating elements may be reduced to 1mm 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		N
29.1.3	Clearances of reinforced insulation not less than those specified for basic insulation in table 16, but using the next higher step for rated impulse voltage		N
29.1.4	For functional insulation, the values of table 16 are applicable, unless		N
	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 voltage than rated voltage, the voltage used for determining clearances from table 16 is the sum of the rated impulse voltage and the difference between the peak value of the working voltage and the peak value of the rated voltage		N



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Clause	Requirement + Test	Result - Remark	Verdict
	If the secondary winding of a step-down transformer is earthed, or if there is an earthed screen between the primary and secondary windings, clearances of basic insulation on the secondary side not less than those specified in table 16, but using the next lower step for rated impulse voltage		N
	Circuits supplied with a voltage lower than rated voltage, clearances of functional insulation 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		N
	Pollution degree 2 applies, unless		N
	precautions taken to protect the insulation; pollution degree 1		N
	insulation subjected to conductive pollution; pollution degree 3		N
	Compliance is checked by inspection and measurements as specified		N
29.2.1	Creepage distances of basic insulation not less than specified in table 17		N
	For pollution degree 1, creepage distance not less than the minimum specified for the clearance in table 16, if the clearance has been checked according to the test of clause 14		N
29.2.2	Creepage distances of supplementary insulation at least as specified for basic insulation in table 17		N
29.2.3	Creepage distances of reinforced insulation at least double as specified for basic insulation in table 17		N
29.2.4	Creepage distances of functional insulation not less than specified 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 having 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





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Clause	Requirement + Test	Result - Remark	Verdict
	- an electric strength test in accordance with 29.3.2, or		N
	- an assessment of the thermal quality of the material combined with an electric strength test, in accordance with 29.3.3		N
29.3.1	Supplementary insulation having a thickness of at least 1 mm		N
	Reinforced insulation having a thickness of at least 2 mm		N
29.3.2	Each layer of material withstand the electric strength test of 16.3 for supplementary insulation		N
	Supplementary insulation consisting of at least 2 layers		N
	Reinforced insulation consisting 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
30	RESISTANCE TO HEAT AND FIRE		--
30.1	External parts of non-metallic material,		P
	parts supporting live parts, and		P
	thermoplastic material providing supplementary or reinforced insulation,		P
	sufficiently resistant to heat		P
	Ball-pressure test according to IEC 60695-10-2		P
	External parts: at 40 °C plus the maximum temperature rise determined during the test of clause 11, or at 75 °C, whichever is the higher; temperature (°C).....:		N
	Parts supporting live parts: at 40°C plus the maximum temperature rise determined during the test of clause 11, or at 125°C, whichever is the higher; temperature (°C).....:		P
	Parts of thermoplastic material providing supplementary or reinforced insulation, 25°C plus the maximum temperature rise determined during clause 19, if higher; temperature (°C).....:		N



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Clause	Requirement + Test	Result - Remark	Verdict
30.2	Relevant parts of non-metallic material adequately resistant to ignition and spread of fire		P
30.2.1	Glow-wire test of IEC 60695-2-11 at 550 °C, unless		P
	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 meet the requirements in ISO9772 for category HBF material		N
30.2.2	Appliances operated while attended, parts of insulating material supporting current-carrying connections and parts within a distance of 3mm subjected to the glow-wire test of IEC 60695-2-11 at a temperature of:		P
	-750°C, for connections carrying a current exceeding 0,5A during normal operation		P
	-650°C, for other connections		N
	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		N
	Test not applicable to conditions as specified		N
30.2.3.1	Parts of insulating material supporting connections carrying a current exceeding 0.2A during normal operation, and		N
	parts of insulating material within a distance of 3mm,		N
	having a glow-wire flammability index of at least 850°C according to IEC 60695-2-12		N
30.2.3.2	Parts of insulating material supporting current-carrying connections, and		N
	parts of insulating material within a distance of 3mm,		N
	subjected to glow-wire test of IEC 60695-2-11		N
	Test not carried out on material having a glow-wire ignition temperature according to IEC 60695-2-13 as specified		N
	Glow-wire test of IEC 60695-2-11, the temperature being:		--
	-750°C, for connections carrying a current exceeding 0,2A during normal operation		N
	-650°C, for other connections		N
	Parts that during the test produce a flame persisting longer than 2 s, tested as specified		N



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Clause	Requirement + Test	Result - Remark	Verdict
	If a flame persists longer than 2 s during the test, parts above the connection, as specified, subjected to the needle-flame test of annex E, unless		N
	the material is classified as V-0 or V-1 according to IEC 60695-11-10		N
30.2.4	Base material of printed circuit boards subjected to 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
32	RADIATION, TOXICITY AND SIMILAR HAZARDS		--
	Appliance does not emit harmful radiation		P
	Appliance does not present a toxic or similar hazard		P

<b>A</b>	<b>ANNEX A (INFORMATIVE) ROUTINE TESTS</b>		N/A
	Description of routine tests to be carried out by the manufacturer		N/A
<b>B</b>	<b>ANNEX B (NORMATIVE) APPLIANCES POWERED BY RECHARGEABLE BATTERIES THAT ARE RECHARGED IN THE APPLIANCE</b>		N/A
	The following modifications to this standard are applicable for appliances powered by batteries that are recharged in the appliance		N/A
	Three forms of construction covered:		N/A
	a) Appliance supplied directly from the supply mains or a renewable energy source, the battery charging circuitry and other supply unit circuitry incorporated within the appliance		N/A





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Clause	Requirement + Test	Result - Remark	Verdict
	b) The part of the appliance incorporating the battery is supplied from the supply mains or a renewable energy source, via a detachable supply unit. The battery charging circuitry is incorporated within the part of the appliance containing the battery		N/A
	c) The part of the appliance incorporating the battery is supplied from the supply mains or a renewable energy source, via a detachable supply unit. The battery charging circuitry is incorporated within the detachable supply unit		N/A
3.1.9	Appliance operated under the following conditions:		N/A
	- the appliance, supplied by its fully charged battery, operated as specified in relevant part 2		N/A
	- the battery is charged, the battery being initially discharged to such an extent that the appliance cannot operate		N/A
	-if possible, the appliance is supplied from the supply mains through its battery charger, the battery being initially discharged to such an extent that the appliance cannot operate. The appliance is operated as specified in relevant part 2		N/A
	- if the appliance incorporates inductive coupling between two parts that are detachable from each other, the appliance is supplied from the supply mains with the detachable part removed		N/A
3.6.2	Part to be removed in order to discard the battery is not considered to be detachable		N/A
5.B.101	Appliances supplied from the supply mains tested as specified for motor-operated appliances		N/A
7.1	Battery compartment for batteries intended to be replaced by the user, marked with battery voltage (V) and polarity of the terminals..... :		N/A
	The positive terminal indicated by symbol IEC 60417-5005 and the negative terminal by symbol IEC 60417-5006		N/A
	Appliances intending to be supplied from a detachable supply unit marked with symbol IEC 60417-6181 and its type reference along with symbol ISO 7000-0790 (2004-01), or		N/A
	use only with <model designation> supply unit .....		N/A
7.6	Additional symbols		N/A





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Clause	Requirement + Test	Result - Remark	Verdict
7.12	The instructions give information regarding charging		N/A
	The instructions for appliances incorporating batteries intended to be replaced by the user includes required information		N/A
	Details about how to remove batteries containing materials hazardous to the environment given		N/A
	Instructions for appliances containing non-user-replaceable batteries state the substance of the following:		N/A
	This appliance contains batteries that are only replaceable by skilled persons		N/A
	Instructions for appliances containing non-replaceable batteries shall state the substance of the following:		N/A
	This appliance contains batteries that are non-replaceable		N/A
	For appliances intending to be supplied from a detachable supply unit for the purposes of recharging the battery, the type reference of the detachable supply unit is stated along with the following:		N/A
	WARNING: For the purposes of recharging the battery, only use the detachable supply unit provided with this appliance		N/A
	If the symbol for detachable supply unit is used, its meaning is explained		N/A
7.15	Markings placed on the part of the appliance connected to the supply mains		N/A
	The type reference of the detachable supply unit is placed in close proximity to the symbol		N/A
8.2	Appliances having batteries that according to the instruction may be replaced by the user need only have basic insulation between live parts and the inner surface of the battery compartment		N/A
	If the appliance can be operated without batteries, double or reinforced insulation required		N/A
11.7	The battery is charged for the period stated in the instructions or 24 h..... :		N/A
11.8	Temperature rise of the battery surface does not exceed the limit in the battery manufacturer's specification; measured (K); limit (K)..... :		N/A
	If no limit specified, the temperature rise does not exceed 20 K; measured (K) ..... :		N/A
19.1	Appliances subjected to tests of 19.B.101, 19.B.102 and 19.B.103		N/A





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Clause	Requirement + Test	Result - Remark	Verdict
19.10	Not applicable		N/A
19.B.101	Appliances supplied at rated voltage for 168 h, the battery being continually charged		N/A
19.B.102	For appliances having batteries that can be removed without the aid of a tool, short-circuit of the terminals of the battery, the battery being fully charged,		N/A
19.B.103	Appliances having batteries replaceable by the user supplied at rated voltage under normal operation with the battery removed or in any position allowed by the construction		N/A
19.13	The battery does not rupture or ignite		N/A
21.B.101	Appliances having pins for insertion into socket-outlets have adequate mechanical strength		N/A
	Part of the appliance incorporating the pins subjected to the free fall test, procedure 2, of IEC 60068-2-31, the number of falls being:		N/A
	- 100, if the mass of the part does not exceed 250 g (g)..... :		N/A
	- 50, if the mass of the part exceeds 250 g..... :		N/A
	After the test, the requirements of 8.1, 15.1.1, 16.3 and clause 29 are met		N/A
22.3	Appliances having pins for insertion into socket-outlets tested as fully assembled as possible		N/A
25.13	An additional lining or bushing not required for interconnection cords in class III appliances or class III constructions operating at safety extra-low voltage not containing live parts		N/A
30.2	For parts of the appliance connected to the supply mains during the charging period, 30.2.3 applies		N/A
	For other parts, 30.2.2 applies		N/A
<b>C</b>	<b>ANNEX C (NORMATIVE) AGEING TEST ON MOTORS</b>		N/A
	Tests, as described, carried out when doubt with regard to the temperature classification of the insulation of a motor winding		N/A
	Test conditions as specified		N/A
<b>D</b>	<b>ANNEX D (NORMATIVE) THERMAL MOTOR PROTECTORS</b>		
	Applicable to appliances having motors that incorporate thermal motor protectors necessary for compliance with the standard		N/A



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Clause	Requirement + Test	Result - Remark	Verdict
	Test conditions as specified		N/A
<b>E</b>	<b>ANNEX E (NORMATIVE) NEEDLE-FLAME TEST</b>		N/A
	Needle-flame test carried out in accordance with IEC 60695- 11-5, with the following modifications:		N/A
7	Severities		P
	The duration of application of the test flame is 30 s ± 1 s		P
9	Test procedure		P
9.1	The specimen so arranged that the flame can be applied to a vertical or horizontal edge as shown in the examples of Figure 1		P
9.2	The first paragraph does not apply		P
	If possible, the flame is applied at least 10 mm from a corner		P
9.3	The test is carried out on one specimen		P
	If the specimen does not withstand the test, the test may be repeated on two additional specimens, both withstanding the test		N/A
11	Evaluation of test results		P
	The duration of burning not exceeding 30 s		P
	However, for printed circuit boards, the duration of burning not exceeding 15 s		N/A
<b>F</b>	<b>ANNEX F (NORMATIVE) CAPACITORS</b>		N/A
	Capacitors likely to be permanently subjected to the supply voltage, and used for radio interference suppression or voltage dividing, comply with the following clauses of IEC 60384-14, with the following modifications:		N/A
1.5	Terms and definitions		
1.5.3	Class X capacitors tested according to subclass X2		N/A
1.5.4	This subclause is applicable		N/A
1.6	Marking		N/A
	Items a) and b) are applicable		N/A
3.4	Approval testing		N/A
3.4.3.2	Table 3 is applicable as described		N/A
4.1	Visual examination and check of dimensions		N/A
	This subclause is applicable		N/A





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Clause	Requirement + Test	Result - Remark	Verdict
4.2	Electrical tests		N/A
4.2.1	This subclause is applicable		N/A
4.2.5	This subclause is applicable		N/A
4.2.5.2	Only table 11 is applicable		N/A
	Values for test A apply		N/A
	However, for capacitors in heating appliances the values for test B or C apply		N/A
4.12	Damp heat, steady state		N/A
	This subclause is applicable		N/A
	Only insulation resistance and voltage proof are checked		N/A
4.13	Impulse voltage		N/A
	This subclause is applicable		N/A
4.14	Endurance		
	Subclauses 4.14.1, 4.14.3, 4.14.4 and 4.14.7 are applicable		N/A
4.14.7	Only insulation resistance and voltage proof are checked		N/A
	No visible damage		N/A
4.17	Passive flammability test		N/A
	This subclause is applicable		N/A
4.18	Active flammability test		N/A
	This subclause is applicable		N/A
<b>G</b>	<b>ANNEX G (NORMATIVE) SAFETY ISOLATING TRANSFORMERS</b>		N/A
	The following modifications to this standard are applicable for safety isolating transformers:		N/A
7	Marking and instructions		N/A
7.1	Transformers for specific use marked with:		N/A
	-name, trademark or identification mark of the manufacturer or responsible vendor.....:		N/A
	-model or type reference..... :		N/A
17	Overload protection of transformers and associated circuits		N/A
	Fail-safe transformers comply with subclause 15.5 of IEC 61558-1		N/A
22	Construction		N/A



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Clause	Requirement + Test	Result - Remark	Verdict
	Subclauses 19.1 and 19.1.2 of IEC 61558-2-6 are applicable		N/A
29	Clearances, creepage distances and solid insulation		N/A
29.1, 29.2, 29.3	The distances specified in items 2a, 2c and 3 in table 13 of IEC 61558-1 apply		N/A
	For insulated winding wires complying with subclause 19.12.3 of IEC 61558-1 there are no requirements for clearances or creepage distances		N/A
	For windings providing reinforced insulation, the distance specified in item 2c of table 13 of IEC 61558-1 is not assessed		N/A
	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/A
<b>H</b>	<b>ANNEX H (NORMATIVE) SWITCHES</b>		N/A
	Switches comply with the following clauses of IEC 61058-1, as modified below:		N/A
	The tests of IEC 61058-1 carried out under the conditions occurring in the appliance		N/A
	Before being tested, switches are operated 20 times without load		N/A
8	Marking and documentation		N/A
	Switches are not required to be marked		N/A
	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/A
13	Mechanism		N/A
	The tests may be carried out on a separate sample		N/A
15	Insulation resistance and dielectric strength		N/A
15.1	Not applicable		N/A
15.2	Not applicable		N/A
15.3	Applicable for full disconnection and micro-disconnection		N/A
17	Endurance		N/A
	Compliance is checked on three separate appliances or switches		N/A





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Clause	Requirement + Test	Result - Remark	Verdict
	For 17.2.4.4, the number of cycles declared according to 7.1.4 is 10 000, unless		N/A
	otherwise specified in 24.1.3 of the relevant part 2 of IEC 60335..... :		N/A
	Switches for operation under no load and which can be operated only by a tool, and		N/A
	switches operated by hand that are interlocked so that they cannot be operated under load,		N/A
	are not subjected to the tests		N/A
	However, switches without this interlock are subjected to the test of 17.2.4.4 for 100 cycles of operation		N/A
	Subclauses 17.2.2 and 17.2.5.2 not applicable		N/A
	The ambient temperature during the test is that occurring in the appliance during the test of Clause 11 in IEC 60335-1		N/A
	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/A
20	Clearances, creepage distances, solid insulation and coatings of rigid printed board assemblies		N/A
	Clause 20 is applicable to clearances across full disconnection and micro-disconnection		N/A
	It is also applicable to creepage distances for functional insulation, across full disconnection and micro-disconnection, as stated in Table 24		N/A
<b>I</b>	<b>ANNEX I (NORMATIVE) MOTORS HAVING BASIC INSULATION THAT IS INADEQUATE FOR THE RATED VOLTAGE OF THE APPLIANCE</b>		N/A
	The following modifications to this standard are applicable for motors having basic insulation that is inadequate for the rated voltage of the appliance:		N/A
8	Protection against access to live parts		
8.1	Metal parts of the motor are considered to be bare live parts		N/A
11	Heating		N/A
11.3	The temperature rise of the body of the motor is determined instead of the temperature rise of the windings		N/A



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Clause	Requirement + Test	Result - Remark	Verdict
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/A
16	Leakage current and electric strength		N/A
16.3	Insulation between live parts of the motor and its other metal parts is not subjected to the test		N/A
19	Abnormal operation		N/A
19.1	The tests of 19.7 to 19.9 are not carried out		N/A
19.1.101	Appliance operated at rated voltage with each of the following fault conditions:		N/A
	- short circuit of the terminals of the motor, including any capacitor incorporated in the motor circuit		N/A
	- short circuit of each diode of the rectifier		N/A
	- open circuit of the supply to the motor		N/A
	- open circuit of any parallel resistor, the motor being in operation		N/A
	Only one fault simulated at a time, the tests carried out consecutively		N/A
22	Construction		N/A
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/A
	Compliance checked by the tests specified for double and reinforced insulation		N/A
J	ANNEX J (NORMATIVE) COATED PRINTED CIRCUIT BOARDS		N/A
	Testing of protective coatings of printed circuit boards carried out in accordance with IEC 60664-3 with the following modifications:		N/A
5.7	Conditioning of the test specimens		N/A
	When production samples are used, three samples of the printed circuit board are tested		N/A
5.7.1	Cold		N/A
	The test is carried out at -25 °C		N/A
5.7.3	Rapid change of temperature		
	Severity 1 is specified		N/A
5.9	Additional tests		N/A





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Clause	Requirement + Test	Result - Remark	Verdict
	This subclause is not applicable		N/A
<b>K</b>	<b>ANNEX K (NORMATIVE) OVERVOLTAGE CATEGORIES</b>		P
	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/A
	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/A
	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/A
	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/A
<b>L</b>	<b>ANNEX L (INFORMATIVE) GUIDANCE FOR THE MEASUREMENT OF CLEARANCES AND CREEPAGE DISTANCES</b>		P
	Information for the determination of clearances and creepage distances		P
<b>M</b>	<b>ANNEX M (NORMATIVE) POLLUTION DEGREE</b>		P
	The information on pollution degrees is extracted from IEC 60664-1		P
	Pollution		P
	The microenvironment determines the effect of pollution on the insulation, taking into account the macroenvironment		P
	Means may be provided to reduce pollution at the insulation by effective enclosures or similar		P
	Minimum clearances specified where pollution may be present in the microenvironment		P
	Degrees of pollution in the microenvironment		P



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Clause	Requirement + Test	Result - Remark	Verdict
	For evaluating creepage distances, the following degrees of pollution in the microenvironment are established:		N/A
	- pollution degree 1: no pollution or only dry, non-conductive pollution occurs. The pollution has no influence		N/A
	- 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/A
	- pollution degree 4: the pollution generates persistent conductivity caused by conductive dust or by rain or snow		N/A
<b>N</b>	<b>ANNEX N (NORMATIVE) PROOF TRACKING TEST</b>		N/A
	The proof tracking test is carried out in accordance with IEC 60112 with the following modifications:		N/A
7	Test apparatus		N/A
7.3	Test solutions		N/A
	Test solution A is used		N/A
10	Determination of proof tracking index (PTI)		N/A
10.1	Procedure		N/A
	The proof voltage is 100V, 175V, 400V or 600V...:		N/A
	The test is carried out on five specimens		N/A
	In case of doubt, additional test with proof voltage reduced by 25V, the number of drops increased to 100		N/A
10.2	Report		N/A
	The report states if the PTI value was based on a test using 100 drops with a test voltage of (PTI-25) V		N/A
<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



EN 60335-1			
Clause	Requirement + Test	Result - Remark	Verdict
<b>P</b>	<b>ANNEX P (INFORMATIVE) GUIDANCE FOR THE APPLICATION OF THIS STANDARD TO APPLIANCES USED IN TROPICAL CLIMATES</b>		N/A
	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		N/A
	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		N/A
5.7	The ambient temperature for the tests of clauses 11 and 13 is 40 +3/0 °C		N/A
7.1	The appliance marked with symbol IEC 60417-6332		N/A
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/A
	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/A
	If symbol IEC 60417-6332 is used, its meaning is explained		N/A
11.8	The values of Table 3 are reduced by 15 K		N/A
13.2	The leakage current for class I appliances not exceeding 0,5 mA		N/A
15.3	The value of t is 37 °C		N/A
16.2	The leakage current for class I appliances not exceeding 0,5 mA (mA):		N/A
19.13	The leakage current test of 16.2 is applied in addition to the electric strength test of 16.3		N/A
<b>Q</b>	<b>ANNEX Q (INFORMATIVE) SEQUENCE OF TESTS FOR THE EVALUATION OF ELECTRONIC CIRCUITS</b>		N/A
	Description of tests for appliances incorporating electronic circuits		N/A
<b>R</b>	<b>ANNEX R (NORMATIVE) SOFTWARE EVALUATION</b>		N/A
	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/A



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Clause	Requirement + Test	Result - Remark	Verdict
R.1	Programmable electronic circuits using software		N/A
	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/A
R.2	Requirements for the architecture		N/A
	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/A
R.2.1.1	Programmable electronic circuits requiring software incorporating measures to control the fault/error conditions specified in table R.2 have one of the following structures:		N/A
	- single channel with periodic self-test and monitoring		N/A
	- dual channel (homogenous) with comparison		N/A
	- dual channel (diverse) with comparison		N/A
	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/A
	- single channel with periodic self-test		N/A
	- dual channel without comparison		N/A
R.2.2	Measures to control faults/errors		
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/A
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/A



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Clause	Requirement + Test	Result - Remark	Verdict
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/A
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/A
R.2.2.5	For programmable electronic circuits with functions requiring software incorporating measures to control the fault/error conditions specified in table R.1 or R.2, detection of a fault/error occur before compliance with clause 19 is impaired		N/A
R.2.2.6	The software is referenced to relevant parts of the operating sequence and the associated hardware functions		N/A
R.2.2.7	Labels used for memory locations are unique		N/A
R.2.2.8	The software is protected from user alteration of safety-related segments and data		N/A
R.2.2.9	Software and safety-related hardware under its control is initialized and terminates before compliance with clause 19 is impaired		N/A
R.3	Measures to avoid errors		N/A
R.3.1	General		N/A
	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/A
	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/A
R.3.2	Specification		N/A
R.3.2.1	Software safety requirements:	Software Id:	N/A
	The specification of the software safety requirements includes the descriptions listed		N/A
R.3.2.2	Software architecture		N/A



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Clause	Requirement + Test	Result - Remark	Verdict
R.3.2.2.1	The specification of the software architecture includes the aspects listed <ul style="list-style-type: none"> <li>- techniques and measures to control software faults/errors (refer to R.2.2);</li> <li>- interactions between hardware and software;</li> <li>- partitioning into modules and their allocation to the specified safety functions;</li> <li>- hierarchy and call structure of the modules (control flow);</li> <li>- interrupt handling;</li> <li>- data flow and restrictions on data access;</li> <li>- architecture and storage of data;</li> <li>- time-based dependencies of sequences and data</li> </ul>	Document ref. No:	N/A
R.3.2.2.2	The architecture specification is validated against the specification of the software safety requirements by static analysis		N/A
R.3.2.3	Module design and coding		N/A
R.3.2.3.1	Based on the architecture design, software is suitably refined into modules		N/A
	Software module design and coding is implemented in a way that is traceable to the software architecture and requirements		N/A
R.3.2.3.2	Software code is structured		N/A
R.3.2.3.3	Coded software is validated against the module specification by static analysis		N/A
	The module specification is validated against the architecture specification by static analysis		N/A
R.3.3.3	Software validation		N/A
	The software is validated with reference to the requirements of the software safety requirements specification		N/A
	Compliance is checked by simulation of:		N/A
	- input signals present during normal operation		N/A
	- anticipated occurrences		N/A
	- undesired conditions requiring system action		N/A

**TABLE R.1 e – GENERAL FAULT/ERROR CONDITIONS**



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Clause	Requirement + Test	Result - Remark	Verdict

Component <sup>a</sup>	Fault/error	Acceptable measures <sup>b, c</sup>	Definitions	Document reference for applied measure	Document reference for applied test	Verdict
1 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/A
1.2 VOID						N/A
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/A
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/A
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/A
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/A
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/A





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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/A
5 Internal data path	Stuck at	Word protection with single bit redundancy	H.2.19.8.2			N/A
5.1 VOID						N/A
5.2 Addressing	Wrong address	Word protection with single bit redundancy including the address	H.2.19.8.2			N/A
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/A
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/A
7 Input/output periphery	Fault conditions specified in 19.11.2	Plausibility check	H.2.18.13			N/A
7.1 VOID						N/A
7.2 Analog I/O						N/A
7.2.1 A/D and D/A-converter	Fault conditions specified in 19.11.2	Plausibility check	H.2.18.13			N/A



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Clause	Requirement + Test		Result - Remark			Verdict
7.2.2 Analog multiplexer	Wrong addressing	Plausibility check	H.2.18.13			N/A
8 VOID						N/A
9 Custom chips <sup>d</sup> e.g. ASIC, GAL, gate array	Any output outside the static and dynamic functional specification	Periodic self-test	H.2.16.6			N/A
<p>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.</p> <p>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.</p>						





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Clause	Requirement + Test	Result - Remark	Verdict

<b>S</b>	<b>ANNEX S (NORMATIVE) BATTERY OPERATED APPLIANCES POWERED BY BATTERIES THAT ARE NON-RECHARGEABLE OR NOT RECHARGED IN THE APPLIANCE</b>		N/A
	The following modifications to this standard are applicable for battery-operated appliances where the batteries are either non-rechargeable (primary batteries), or		N/A
	rechargeable batteries (secondary batteries) that are not recharged in the appliance		N/A
5.8.1	If the supply terminals for the connection of the battery have no indication of polarity, the more unfavourable polarity is applied		N/A
5.S.101	Appliances intended for use with a battery box are tested with the battery box supplied with the appliance or with the battery box recommended in the instructions		N/A
5.S.102	Appliances are tested as motor-operated appliances.		N/A
7.1	Appliances marked with the battery voltage (V) and the polarity of the terminals, unless.....:		N/A
	the polarity is irrelevant		N/A
	Appliances also marked with:		
	– name, trade mark or identification mark of the manufacturer or responsible vendor.....:		N/A
	– model or type reference.....:		N/A
	– IP number according to degree of protection against ingress of water, other than IPX0.....:		N/A
	– type reference of battery or batteries.....:		N/A
	If relevant, the positive terminal is indicated by the symbol IEC 60417-5005 and the negative terminal by the symbol IEC 60417-5006		N/A
	If appliances use more than one battery, they are marked to indicate correct polarity connection of the batteries		N/A
7.6	Additional symbols		N/A
7.12	The instructions contain the following, as applicable:		
	– the types of batteries that may be used.....:		N/A
	– how to remove and insert the batteries		N/A
	– non-rechargeable batteries are not to be recharged		N/A



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Clause	Requirement + Test	Result - Remark	Verdict
	– rechargeable batteries are to be removed from the appliance before being charged		N/A
	– different types of batteries or new and used batteries are not to be mixed		N/A
	– batteries are to be inserted with the correct polarity		N/A
	– exhausted batteries are to be removed from the appliance and safely disposed of		N/A
	– if the appliance is to be stored unused for a long period, the batteries are removed		N/A
	– the supply terminals are not to be short-circuited		N/A
11.5	Appliances are supplied with the most unfavourable supply voltage between		
	– 0,55 and 1,0 times the battery voltage, if the appliance can be used with non-rechargeable batteries		N/A
	– 0,75 and 1,0 times battery voltage, if the appliance is designed for use with rechargeable batteries only		N/A
	The values specified in Table S.101 for the internal resistance per cell of the battery is taken into account		N/A
19.1	The tests are carried out with the battery fully charged unless otherwise specified		N/A
19.13	The battery does not rupture or ignite		N/A
19.S.101	Appliances are supplied with the voltage specified in 11.5. The supply terminals having an indication of polarity are connected to the opposite polarity, unless		N/A
	such a connection is unlikely to occur due to the construction of the appliance		N/A
19.S.102	For appliances with provision for multiple batteries, one or more of the batteries are reversed and the appliance is operated, if reversal of batteries is allowed by the construction		N/A
25.5	The flexible leads or flexible cord used to connect an external battery or battery box in is connected to the appliance by a type X attachment		N/A
25.13	This requirement is not applicable to the flexible leads or flexible cord connecting external batteries or a battery box with an appliance		N/A



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Clause	Requirement + Test	Result - Remark	Verdict
25.S.101	Appliances have suitable means for connection of the battery. If the type of battery is marked on the appliance, the means of connection is suitable for this type of battery		N/A
26.5	Terminal devices in an appliance for the connection of the flexible leads or flexible cord connecting an external battery or battery box are so located or shielded that there is no risk of accidental connection between supply terminals		N/A
30.2.3.2	There is no battery in the area of the vertical cylinder used for the consequential needle flame test, unless		N/A
	the battery is shielded by a barrier that meets the needle flame test of Annex E, or		N/A
	that comprises material classified as V-0 or V-1 according to IEC 60695-11-10		N/A
<b>T</b>	<b>ANNEX T (NORMATIVE) UV-C RADIATION EFFECT ON NON-METALLIC MATERIALS</b>		N/A
	Requirements for non-metallic materials subject to direct or reflected UV-C radiation exposure and whose mechanical and electrical properties are relied upon for compliance with the		N/A
	Does not apply to glass, ceramic and similar materials		N/A
	Tested as specified in ISO 4892-1 and ISO 4892-2, with the following modifications:		N/A
	Modifications to ISO 4892-1:		N/A
5.1.6	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/A
	Subclause 5.1.6.1 and Table 1 are not applicable		N/A
5.2.4	The black-panel temperature shall be 63 °C +/- 3 °C		N/A
5.3.1	Humidification of the chamber air is specified in part 2 when necessary		N/A
9	This clause is not applicable		N/A
	Modifications to ISO 4892-2:		N/A
7.1	At least three test specimens are tested		N/A
	Ten samples of internal wiring is tested		N/A
7.2	The specimens are attached to the specimen holders such that they are not subject to any stress		N/A





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Clause	Requirement + Test	Result - Remark	Verdict
7.3	Apparatus prepared as specified		N/A
	The test specimens and, if used, the irradiance-measuring instrument are exposed for 1 000 h		N/A
7.4	If used, a radiometer is mounted and calibrated such that it measures the irradiance at the exposed surface of the test specimen		N/A
7.5	Material properties and test methods for parts providing mechanical support or impact resistance as specified in Table T.1		N/A
	Material properties and test method for electrical insulation of internal wiring as specified in Table T.2		N/A
8	This clause is not applicable		N/A



<b>10.1</b>	<b>TABLE: Power Input Deviation</b>					N/A
<b>Input deviation of/at:</b>	<b>P rated (W)</b>	<b>P measured (W)</b>	<b>Δ P</b>	<b>Required Δ P</b>	<b>Remark</b>	
Supplementary information:						

<b>10.2</b>	<b>TABLE: Current deviation</b>					N/A
<b>Current deviation of/at:</b>	<b>I rated (A)</b>	<b>I measured (A)</b>	<b>Δ I</b>	<b>Required Δ I</b>	<b>Remark</b>	
Supplementary information:						

<b>11.8a</b>	<b>TABLE: Heating Test</b>			<b>P</b>
	<b>Test voltage (V)..... :</b>	240V (1,15*Pn)		—
	<b>Ambient (°C)..... :</b>	23,1		—
	<b>Thermocouple Locations</b>	<b>Max. temperature rise measured, Δ T (K)</b>	<b>Max. temperature rise limit, Δ T (K)</b>	
	Electrical box	16.4	60	
	Enclosure inside	17.1	85	
	Enclosure outside	16.1	60	
Supplementary information: N/A				

<b>11.8a</b>	<b>TABLE: Heating test, resistance method</b>					N/A
	<b>Test voltage (V)..... :</b>					—
	<b>Ambient, t<sub>1</sub> (°C)..... :</b>					—
	<b>Ambient, t<sub>2</sub> (°C)..... :</b>					—
	<b>Temperature rise of winding</b>	<b>R<sub>1</sub> (Ω)</b>	<b>R<sub>2</sub> (Ω)</b>	<b>ΔT (K)</b>	<b>Max. dT (K)</b>	<b>Insulation class</b>
Supplementary information:N/A						

<b>13.2</b>	<b>TABLE: Leakage current</b>			<b>P</b>
	<b>Heating appliances: 1.15 x rated input (W)...</b>	--		—



	<b>Motor-operated and combined appliances: 1.06 x rated voltage (V).....:</b>	240V*1.06=254.4V	—
<b>Leakage current between:</b>		<b>I (mA)</b>	<b>Max. allowed I (mA)</b>
L/N – accessible metal enclosure		Max. 0,142	0,75
Supplementary information:			

<b>13.3</b>	<b>TABLE: Dielectric Strength</b>		<b>P</b>
<b>Test voltage applied between:</b>		<b>Test potential applied (V)</b>	<b>Breakdown / flashover (Yes/No)</b>
L/N – accessible enclosure		1480	No
L/N – accessible switch knob / Electrical box		3000	No
Supplementary information:			

<b>14</b>	<b>TABLE: Transient overvoltages</b>					<b>N/A</b>
<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>		<b>P</b>
	<b>Single phase appliances: 1.06 x rated voltage (V).....:</b>	240V*1.06=254.4V	—
	<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 – accessible metal enclosure		Max. 0,142	0,75
Supplementary information:			

<b>16.3</b>	<b>TABLE: Dielectric strength</b>		<b>P</b>
<b>Test voltage applied between:</b>		<b>Test potential applied (V)</b>	<b>Breakdown / flashover (Yes/No)</b>
L/N – accessible enclosure		1480	No
L/N – accessible switch knob / Electrical box		3000	No
Supplementary information:			

<b>17</b>	<b>TABLE: Overload protection</b>		<b>N/A</b>
<b>Thermocouple locations:</b>		<b>Max. temperature rise measured, <math>\Delta T</math> (K)</b>	<b>Max. temperature rise limit, <math>\Delta T</math> (K)</b>



Supplementary information:		

<b>17</b>	<b>TABLE: Overload protection, resistance method</b>					N/A
	Test voltage (V)..... :					—
	Ambient, t1 (°C)..... :					—
	Ambient, t2 (°C)..... :					—
<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>						<b>P</b>
<b>Operational characteristics</b>			<b>YES/NO</b>	<b>Operational conditions</b>			
Are there electronic circuits to control the appliance operation?			Yes				
Are there “off” or “stand-by” position?			Yes				
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>
19.2	-	-	-	N.A	-	-	N/A
19.3	-	-	-	-	-	-	N/A
19.4	-	-	-	-	-	-	N/A
19.5	-	-	-	-	-	-	N/A
19.6	-	-	-	N.A	-	-	N/A
19.7	-	-	-	-	-	-	N/A
19.8	-	-	-	-	-	-	N/A
19.9	-	-	-	-	-	-	N/A
19.10	-	-	-	-	-	-	N/A
19.11.2	-	No hazard	-	-	-	-	P
19.11.4.8	-	No hazard	-	-	-	-	P
19.101	-	No hazard	-	-	-	-	P
Supplementary information:							

<b>19.7</b>	<b>TABLE: Abnormal operation, locked rotor/moving parts</b>					N/A
-------------	---	--	--	--	--	-----



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:						

<b>19.9</b>	<b>TABLE: Abnormal operation, running overload</b>					N/A
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:						

<b>19.13</b>	<b>TABLE: Abnormal operation, temperature rises</b>			P
Thermocouple locations:		Max. temperature rise measured, Δ T (K)	Max. temperature rise limit, Δ T (K)	
Power cord		43.5	150	
Supplementary information:				

<b>21.1</b>	<b>TABLE: Impact Resistance</b>			P
Impacts per surface	Surface tested	Impact energy (Nm)	Comments	
3 times	Electrical box	0,5	No damage	
Supplementary information:				

<b>28.1</b>	<b>TABLE: Threaded part torque test</b>			P
Threaded part identification:	Diameter of thread (mm)	Column number (I, II, or III)	Applied torque (Nm)	
Screw for fixing enclosure	3,9	II	1,2	
Supplementary information:				

<b>29.1</b>	<b>TABLE: Clearances</b>				P
Overvoltage category..... :					—
Type of insulation:					



Rated impulse voltage (V):	Min. cl (mm)	Basic (mm)	Supplementary (mm)	Reinforced (mm)	Functional (mm)	Verdict / Remark
330	0,2* / 0,5 / 0,8**	-	-	-	-	N/A
500	0,2* / 0,5 / 0,8**	-	-	-	-	N/A
800	0,2* / 0,5 / 0,8**	-	-	-	-	N/A
1 500	0,5 / 0,8** / 1,0***	-	-	-	-	N/A
<b>2 500</b>	<b><u>1,5</u> / 2,0***</b>	☒	☒	-	☒	<b>P</b>
<b>4 000</b>	<b><u>3,0</u> / 3,5***</b>	-	-	☒	-	<b>P</b>
6 000	5,5 / 6,0***	-	-	-	-	N/A
8 000	8,0 / 8,5***	-	-	-	-	N/A
10 000	11,0 / 11,5***	-	-	-	-	N/A

Supplementary information:

\*) For tracks on printed circuit boards if pollution degree 1 and 2

\*\*\*) For pollution degree 3

\*\*\*\*) If the construction is affected by wear, distortion, movement of the parts or during assembly

29.2	TABLE: Creepage distances, basic, supplementary and reinforced insulation										P
Working voltage (V):	Creepage distance(mm) Pollution degree							Type of insulation			
	1	2			3						
	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		—	—	N/A
≤50	0,18	0,6	0,85	1,2	1,5	1,7	1,9	—		—	N/A



≤50	0,36	1,2	1,7	2,4	3,0	3,4	3,8	—	—		N/A
125	0,28	0,75	1,05	1,5	1,9	2,1	2,4		—	—	N/A
125	0,28	0,75	1,05	1,5	1,9	2,1	2,4	—		—	N/A
125	0,56	1,5	2,1	3,0	3,8	4,2	4,8	—	—		N/A
<b>250</b>	0,56	1,25	1,8	<b>2,5</b>	3,2	3,6	4,0	☒	—	—	P
<b>250</b>	0,56	1,25	1,8	<b>2,5</b>	3,2	3,6	4,0	—	☒	—	P
<b>250</b>	1,12	2,5	3,6	<b>5,0</b>	6,4	7,2	8,0	—	—	☒	P
400	1,0	2,0	2,8	4,0	5,0	5,6	6,3		—	—	N/A
400	1,0	2,0	2,8	4,0	5,0	5,6	6,3	—		—	N/A
400	2,0	4,0	5,6	8,0	10,0	11,2	12,6	—	—		N/A
500	1,3	2,5	3,6	5,0	6,3	7,1	8,0		—	—	N/A
500	1,3	2,5	3,6	5,0	6,3	7,1	8,0	—		—	N/A
500	2,6	5,0	7,2	10,0	12,6	14,2	16,0	—	—		N/A
>630 and ≤800	1,8	3,2	4,5	6,3	8,0	9,0	10,0		—	—	N/A
>630 and ≤800	1,8	3,2	4,5	6,3	8,0	9,0	10,0	—		—	N/A
>630 and ≤800	3,6	6,4	9,0	12,6	16,0	18,0	20,0	—	—		N/A
>800 and ≤1000	2,4	4,0	5,6	8,0	10,0	11,0	12,5		—	—	N/A
>800 and ≤1000	2,4	4,0	5,6	8,0	10,0	11,0	12,5	—		—	N/A
>800 and ≤1000	4,8	8,0	11,2	16,0	20,0	22,0	25,0	—	—		N/A
>1000 and ≤1250	3,2	5,0	7,1	10,0	12,5	14,0	16,0		—	—	N/A
>1000 and ≤1250	3,2	5,0	7,1	10,0	12,5	14,0	16,0	—		—	N/A
>1000 and ≤1250	6,4	10,0	14,2	20,0	25,0	28,0	32,0	—	—		N/A
>1250 and ≤1600	4,2	6,3	9,0	12,5	16,0	18,0	20,0		—	—	N/A
>1250 and ≤1600	4,2	6,3	9,0	12,5	16,0	18,0	20,0	—		—	N/A
>1250 and ≤1600	8,4	12,6	18,0	25,0	32,0	36,0	40,0	—	—		N/A
>1600 and ≤2000	5,6	8,0	11,0	16,0	20,0	22,0	25,0		—	—	N/A
>1600 and ≤2000	5,6	8,0	11,0	16,0	20,0	22,0	25,0	—		—	N/A
>1600 and ≤2000	11,2	16,0	22,0	32,0	40,0	44,0	50,0	—	—		N/A
>2000 and ≤2500	7,5	10,0	14,0	20,0	25,0	28,0	32,0		—	—	N/A
>2000 and ≤2500	7,5	10,0	14,0	20,0	25,0	28,0	32,0	—		—	N/A
>2000 and ≤2500	15,0	20,0	28,0	40,0	50,0	56,0	64,0	—	—		N/A
>2500 and ≤3200	10,0	12,5	18,0	25,0	32,0	36,0	40,0		—	—	N/A
>2500 and ≤3200	10,0	12,5	18,0	25,0	32,0	36,0	40,0	—		—	N/A



>2500 and ≤3200	20,0	25,0	36,0	50,0	64,0	72,0	80,0	—	—		N/A
>3200 and ≤4000	12,5	16,0	22,0	32,0	40,0	45,0	50,0		—	—	N/A
>3200 and ≤4000	12,5	16,0	22,0	32,0	40,0	45,0	50,0	—		—	N/A
>3200 and ≤4000	25,0	32,0	44,0	64,0	80,0	90,0	100,0	—	—		N/A
>4000 and ≤5000	16,0	20,0	28,0	40,0	50,0	56,0	63,0		—	—	N/A
>4000 and ≤5000	16,0	20,0	28,0	40,0	50,0	56,0	63,0	—		—	N/A
>4000 and ≤5000	32,0	40,0	56,0	80,0	100,0	112,0	126,0	—	—		N/A
>5000 and ≤6300	20,0	25,0	36,0	50,0	63,0	71,0	80,0		—	—	N/A
>5000 and ≤6300	20,0	25,0	36,0	50,0	63,0	71,0	80,0	—		—	N/A
>5000 and ≤6300	40,0	50,0	72,0	100,0	126,0	142,0	160,0	—	—		N/A
>6300 and ≤8000	25,0	32,0	45,0	63,0	80,0	90,0	100,0		—	—	N/A
>6300 and ≤8000	25,0	32,0	45,0	63,0	80,0	90,0	100,0	—		—	N/A
>6300 and ≤8000	50,0	64,0	90,0	126,0	160,0	180,0	200,0	—	—		N/A
>8000 and ≤10000	32,0	40,0	56,0	80,0	100,0	110,0	125,0		—	—	N/A
>8000 and ≤10000	32,0	40,0	56,0	80,0	100,0	110,0	125,0	—		—	N/A
>8000 and ≤10000	64,0	80,0	112,0	160,0	200,0	220,0	250,0	—	—		N/A
>10000 and ≤12500	40,0	50,0	71,0	100,0	125,0	140,0	160,0		—	—	N/A
>10000 and ≤12500	40,0	50,0	71,0	100,0	125,0	140,0	160,0	—		—	N/A
>10000 and ≤12500	80,0	100,0	142,0	200,0	250,0	280,0	320,0	—	—		N/A

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

29.2	TABLE: Creepage distances, functional insulation								P
Working voltage (V):	Creepage distance(mm) Pollution degree							Verdict / Remark	
	1	2			3				
	Material group				Material group				
	I	II	IIIa/IIIb	I	II	IIIa/IIIb*			
≤10	0,08	0,4	0,4	0,4	1,0	1,0	1,0	N/A	
50	0,16	0,56	0,8	1,1	1,4	1,6	1,8	N/A	
125	0,25	0,71	1,0	1,4	1,8	2,0	2,2	N/A	
<b>250</b>	0,42	1,0	1,4	<b>2,0</b>	2,5	2,8	3,2	P	
400	0,75	1,6	2,2	3,2	4,0	4,5	5,0	N/A	
500	1,0	2,0	2,8	4,0	5,0	5,6	6,3	N/A	
>630 and ≤800	1,8	3,2	4,5	6,3	8,0	9,0	10,0	N/A	



>800 and ≤1000	2,4	4,0	5,6	8,0	10,0	11,0	12,5	N/A
>1000 and ≤1250	3,2	5,0	7,1	10,0	12,5	14,0	16,0	N/A
>1250 and ≤1600	4,2	6,3	9,0	12,5	16,0	18,0	20,0	N/A
>1600 and ≤2000	5,6	8,0	11,0	16,0	20,0	22,0	25,0	N/A
>2000 and ≤2500	7,5	10,0	14,0	20,0	25,0	28,0	32,0	N/A
>2500 and ≤3200	10,0	12,5	18,0	25,0	32,0	36,0	40,0	N/A
>3200 and ≤4000	12,5	16,0	22,0	32,0	40,0	45,0	50,0	N/A
>4000 and ≤5000	16,0	20,0	28,0	40,0	50,0	56,0	63,0	N/A
>5000 and ≤6300	20,0	25,0	36,0	50,0	63,0	71,0	80,0	N/A
>6300 and ≤8000	25,0	32,0	45,0	63,0	80,0	90,0	100,0	N/A
>8000 and ≤10000	32,0	40,0	56,0	80,0	100,0	110,0	125,0	N/A
>10000 and ≤12500	40,0	50,0	71,0	100,0	125,0	140,0	160,0	N/A

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



<b>30.1</b>	<b>TABLE: Ball Pressure Test of Thermoplastics</b>			<b>P</b>
<b>Allowed impression diameter (mm) .....</b>				2,0
<b>Object/ Part No./ Material</b>		<b>Manufacturer/ trademark</b>	<b>Test temperature (°C)</b>	<b>Impression diameter (mm)</b>
Contact plastic with charged body		--	75	1.2
Supplementary information:				

<b>30.2</b>	<b>TABLE: Resistance to heat and fire - Glow wire tests</b>						<b>P</b>	
Object/ Part No./ Material	Manufactur er/ trademark	Glow wire test (GWT); (°C)						Verdict
		550	650		750		850	
			te	ti	te	ti		
Contact plastic with charged body	--		0s					P
Object/ Part No./ Material	Manufactur er/ 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):							No	
If no, then surrounding parts passed the needle-flame test of annex E (Yes/No)..... :							Yes	
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>				<b>N/A</b>
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					

\*\*\*\*\*END\*\*\*\*\*

