# TEST REPORT

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| **Reference No.** | : | WTZ20F04017940J |
| **Applicant** | : | V-TAC EXPORTS LTD |
| **Address** | : | 301, KAM ON BUILDING, 176 A QUEENS ROAD CENTRAL, CENTRAL, HONGKONG |
| **Manufacturer** | : | V-TAC EXPORTS LTD |
| **Address** | : | 301, KAM ON BUILDING, 176 A QUEENS ROAD CENTRAL, CENTRAL, HONGKONG |
| **Product Name** | : | UVC Germicidal lamp |
| **Model No.** | : | VT-3238,VT-3239,VT-3338 |
| **Standards** | : | Safety of household and similar electrical appliances IEC 60335-1:2010 |
| **Date of Receipt sample** | : | 2020-04-13 |
| **Date of Test** | : | 2020-04-14 to 2020-04-29 |
| **Date of Issue** | : | 2020-04-30 |
| **Test Report Form No.** | : | WSH-603351T-01A |
| **Test Result** | : | Pass |

Remarks:
The results shown in this test report refer only to the sample(s) tested, this test report cannot be reproduced, except in full, without prior written permission of the company. The report would be invalid without specific stamp of test institute and the signatures of compiler and approver.

**Prepared By:**
**Waltek Services (Foshan) Co., Ltd.**
Address: No.13-19, 2/F., 2nd Building, Sunlink International Machinery City, Chencun, Shunde District, Foshan, Guangdong, China
Tel:+86-757-23811398 Fax:+86-757-23811381 E-mail:info@waltek.com.cn

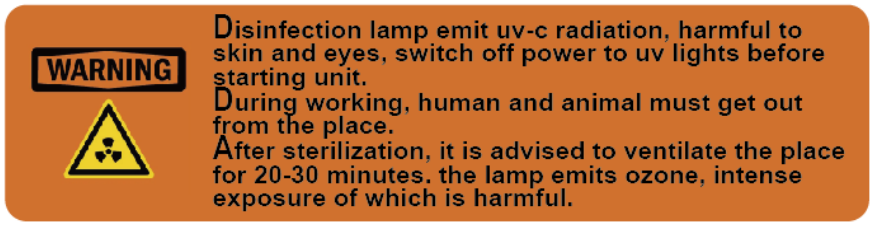
Compiled by: William He
William He / Project Engineer

Approved by:
Oren Yang / Manager

| | | |
|---|---|---|
| **Test item description** | : | Germicidal lamp |
| Trade Mark | : | See label |
| Model/Type reference | : | VT-3238,VT-3239,VT-3338 |
| Ratings | : | 220-240V~, 50/60Hz, 38W, Class II, IPX0 |

**Copy of marking plate**:




Remark: When the equipment is vended to EU, then name and address of the importer or authorized representative within the EEA shall be added on the equipment.

**National Differences:**

EU national differences were considered according to below standard:

EN 60335-1:2012+A11:2014+A13:2017

EN 62233:2008

**Summary of testing**:

1. The sample complied with the requirements of standards listed in this report.
2. Photobiological safety was assessed according to EN 62471:2008.
3. Assessment of lighting equipment related to human exposure to electromagnetic fields was evaluated and fulfilled the requirements of EN 62493:2015 and found to comply with the requirement.
4. Full tests were performed on model VT-3238.

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| **Test item particulars** ..... : | |
| Classification of installation and use..... : | Portable appliance and household indoor use |
| Supply Connection ..... : | Power cord with a non-detachable plug, type Y |
| **Possible test case verdicts**: | |
| - test case does not apply to the test object ..... : | N |
| - test object does meet the requirement..... : | P(Pass) |
| - test object does not meet the requirement..... : | F(Fail) |

**General remarks**:

"(See Enclosure #)" refers to additional information appended to the report.
"(See appended table)" refers to a table appended to the report.

Throughout this report a point is used as the decimal separator.

For the lamp part, EN 60598-1:2015+A1:2018, EN 60598-2-4:2018 were considered, please see attachment 2.

**General product information**:

1. The appliance is for household and indoor use only.

| IEC 60335-1 | | | |
|---|---|---|---|
| Clause | Requirement - Test | Result - Remark | Verdict |
| 5 | GENERAL CONDITIONS FOR THE TESTS | | P |
| | Tests performed according to clause 5, e.g. nature of supply, sequence of testing, etc. | | P |
| 6 | CLASSIFICATION | | P |
| 6.1 | Protection against electric shock:<br>Class 0, 0I, I, II, III ..... .....: | Class II | P |
| 6.2 | Protection against harmful ingress of water | | N |
| 7 | MARKING AND INSTRUCTIONS | | P |
| 7.1 | Rated voltage or voltage range (V) ..... .....: | 220-240V | P |
| | Symbol for nature of supply, or ..... .....: | ~ | P |
| | Rated frequency (Hz) ..... .....: | 50/60Hz | P |
| | Rated power input (W), or ..... .....: | 38W | P |
| | Rated current (A) ..... .....: | | N |
| | Manufacturer's or responsible vendor's name, trademark or identification mark..... .....: | See label on page 2 | P |
| | Model or type reference ..... .....: | See page 2 | P |
| | Symbol IEC 60417-5172, for class II appliances | | P |
| | IP number, other than IPX0..... .....: | IPX0 | N |
| | Symbol IEC 60417-5180, for class III appliances, unless | | N |
| | the appliance is operated by batteries only | | N |
| | Symbol IEC 60417-5036, for the enclosure of electrically-operated water valves in external hose-sets for connection of an appliance to the water mains, if the working voltage exceeds extra-low voltage | | N |
| 7.2 | Warning for stationary appliances for multiple supply | | N |
| | Warning placed in vicinity of terminal cover | | N |
| 7.3 | Range of rated values marked with the lower and upper limits separated by a hyphen | | P |
| | Different rated values marked with the values separated by an oblique stroke | | P |
| 7.4 | Appliances adjustable for different rated voltages, the voltage setting is clearly discernible | | N |
| | Requirement met if frequent changes are not required and the rated voltage to which the appliance is to be adjusted is determined from a wiring diagram | | N |

| IEC 60335-1 | | | |
|---|---|---|---|
| Clause | Requirement - Test | Result - Remark | Verdict |
| 7.5 | Appliances with more than one rated voltage or one or more rated voltage ranges, marked with rated input or rated current for each rated voltage or range, unless | | N |
| | the power input is related to the arithmetic mean value of the rated voltage range | | P |
| | Relation between marking for upper and lower limits of rated power input or rated current and voltage is clear | | N |
| 7.6 | Correct symbols used | | P |
| | Symbol for nature of supply placed next to rated voltage | | P |
| | Symbol for class II appliances placed unlikely to be confused with other marking | | P |
| | Units of physical quantities and their symbols according to international standardized system | | P |
| 7.7 | Connection diagram fixed to appliances to be connected to more than two supply conductors and appliances for multiple supply, unless | | N |
| | correct mode of connection is obvious | | N |
| 7.8 | Except for type Z attachment, terminals for connection to the supply mains indicated as follows: | | N |
| | - marking of terminals exclusively for the neutral conductor (letter N) | | N |
| | - marking of protective earthing terminals (symbol IEC 60417-5019) | | 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 ..... .....: | By use of symbol | P |
| | This applies also to switches which are part of a control | | N |
| | If figures are used, the off position indicated by the figure 0 | | 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 | | P |
| 7.12 | Instructions for safe use provided | | P |
| | Details concerning precautions during user maintenance | | P |
| | The instructions state that: | | P |

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| Clause | Requirement - Test | Result - Remark | Verdict |
| | - the appliance is not to be used by persons (including children) with reduced physical, sensory or mental capabilities, or lack of experience and knowledge, unless they have been given supervision or instruction | | P |
| | - children being supervised not to play with the appliance | | P |
| | For a part of class III construction supplied from a detachable power supply unit, the instructions state that the appliance is only to be used with the unit provided | | N |
| | Instructions for class III appliances state that it must only be supplied at SELV, unless | | N |
| | it is a battery-operated appliance, the battery being charged outside the appliance | | N |
| 7.12.1 | Sufficient details for installation supplied | | P |
| | For an appliance intended to be permanently connected to the water mains and not connected by a hose-set, this is stated | | N |
| 7.12.2 | Stationary appliances not fitted with means for disconnection from the supply mains having a contact separation in all poles that provide full disconnection under overvoltage category III, the instructions state that means for disconnection must be incorporated in the fixed wiring in accordance with the wiring rules | | N |
| 7.12.3 | Insulation of the fixed wiring in contact with parts exceeding 50 K during clause 11; instructions state that the fixed wiring must be protected | | N |
| 7.12.4 | Instructions for built-in appliances: | | N |
| | - dimensions of space | | N |
| | - dimensions and position of supporting and fixing | | N |
| | - minimum distances between parts and surrounding structure | | N |
| | - minimum dimensions of ventilating openings and arrangement | | N |
| | - connection to supply mains and interconnection of separate components | | N |
| | - allow disconnection of the appliance after installation, by accessible plug or a switch in the fixed wiring, unless | | N |
| | a switch complying with 24.3 | | N |
| 7.12.5 | Replacement cord instructions, type X attachment with a specially prepared cord | | N |

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|---|---|---|---|
| Clause | Requirement - Test | Result - Remark | Verdict |
| | Replacement cord instructions, type Y attachment | | P |
| | Replacement cord instructions, type Z attachment | | N |
| 7.12.6 | Caution in the instructions for appliances incorporating a non-self-resetting thermal cut-out that is reset by disconnection of the supply mains, if this cut-out is required to comply with the standard | | N |
| 7.12.7 | Instructions for fixed appliances stating how the appliance is to be fixed | | N |
| 7.12.8 | Instructions for appliances connected to the water mains: | | 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 | In English | P |
| 7.14 | Marking clearly legible and durable, rubbing test as specified | | P |
| 7.15 | Markings 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 |
| | For fixed appliances, name, trademark or identification mark and model or type reference visible after installation according to the instructions | | N |
| | Indications for switches and controls placed on or near the components. Marking not on parts which can be positioned or repositioned in such a way that the marking is misleading | | P |
| 7.16 | Marking of a possible replaceable thermal link or fuse link clearly visible with regard to replacing the link | | N |
| 8 | PROTECTION AGAINST ACCESS TO LIVE PARTS | | P |
| 8.1 | Adequate protection against accidental contact with live parts | | P |
| 8.1.1 | Requirement applies for all positions, detachable parts removed | | P |
| | Lamps behind a detachable cover not removed, if conditions met | | P |

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|---|---|---|---|
| Clause | Requirement - Test | Result - Remark | Verdict |
| | Insertion or removal of lamps, protection against contact with live parts of the lamp cap | | P |
| | Use of test probe B of IEC 61032, with a force not exceeding 1 N: no contact with live parts | | P |
| | Use of test probe B of IEC 61032 through openings, with a force of 20N: no contact with live parts | | P |
| 8.1.2 | Use of test probe 13 of IEC 61032, with a force not exceeding 1 N, through openings in class 0 appliances and class II appliances/constructions: no contact with live parts | | P |
| | Test probe 13 also applied through openings in earthed metal enclosures having a non-conductive coating: no contact with live parts | | N |
| 8.1.3 | For appliances other than class II, use of test probe 41 of IEC 61032, with a force not exceeding 1 N: no contact with live parts of visible glowing heating elements | | N |
| 8.1.4 | Accessible part not considered live if: | | 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 |
| | - for peak values over 15kV, the energy in the discharge not exceeding 350 mJ | | N |
| 8.1.5 | Live parts protected at least by basic insulation before installation or assembly: | | 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 | | P |

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|---|---|---|---|
| Clause | Requirement - Test | Result - Remark | Verdict |
| | Only possible to touch parts separated from live parts by double or reinforced insulation | | P |
| 9 | STARTING OF MOTOR-OPERATED APPLIANCES | | N |
| | This clause of Part 1 is not applicable | | N |
| 10 | POWER INPUT AND CURRENT | | P |
| 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 .: | | P |
| | Test carried out at upper and lower limits of the ranges for appliances with one or more rated voltage ranges, unless | | N |
| | the rated power input is related to the arithmetic mean value | | P |
| 10.2 | Current at normal operating temperature, rated voltage and normal operation not deviating from rated current by more than shown in table 2.....: | (see appended table) | N |
| | Test carried out at upper and lower limits of the ranges for appliances with one or more rated voltage ranges, unless | | N |
| | the rated current is related to the arithmetic mean value of the range | | N |
| 11 | HEATING | | P |
| 11.1 | No excessive temperatures in normal use | | P |
| 11.2 | The appliance is held, placed or fixed in position as described.....: | Placed on test corner | P |
| 11.3 | Temperature rises, other than of windings, determined by thermocouples | | P |
| | Temperature rises of windings determined by resistance method, unless | | N |
| | the windings are non-uniform or it is difficult to make the necessary connections | | N |
| 11.4 | Heating appliances operated under normal operation at 1.15 times rated power input (W) .....: | | N |
| 11.5 | Motor-operated appliances operated under normal operation at most unfavourable voltage between 0.94 and 1.06 times rated voltage (V).....: | (see appended table) | P |
| 11.6 | Combined appliances operated under normal operation at most unfavourable voltage between 0.94 and 1.06 times rated voltage (V).....: | | N |
| 11.7 | Operation duration corresponding to the most unfavourable conditions of normal use | | P |
| 11.8 | Temperature rises monitored continuously and not exceeding the values in table 3 .....: | (see appended table) | P |

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| Clause | Requirement - Test | Result - Remark | Verdict |
| | If the temperature rise of a motor winding exceeds the value of table 3, or | | N |
| | if there is doubt with regard to classification of insulation, | | N |
| | tests of Annex C are carried out | | N |
| | Sealing compound does not flow out | | N |
| | Protective devices do not operate, except | | N |
| | components in protective electronic circuits tested for the number of cycles specified in 24.1.4 | | N |
| 13 | LEAKAGE CURRENT AND ELECTRIC STRENGTH AT OPERATING TEMPERATURE | | P |
| 13.1 | Leakage current not excessive and electric strength adequate | | P |
| | Heating appliances operated at 1.15 times the rated power input (W).....: | | N |
| | Motor-operated appliances and combined appliances supplied at 1.06 times the rated voltage (V).....: | (see appended table) | P |
| | Protective impedance and radio interference filters disconnected before carrying out the tests | | N |
| 13.2 | For class 0, class II and class III appliances, leakage current measured by means of the circuit described in figure 4 of IEC 60990 | (see appended table) | P |
| | For other appliances, a low impedance ammeter may be used | | N |
| | Leakage current measurements .....: | (see appended table) | P |
| 13.3 | The appliance is disconnected from the supply | | P |
| | Electric strength tests according to table 4 .....: | (see appended table) | P |
| | No breakdown during the tests | | P |
| 14 | TRANSIENT OVERVOLTAGES | | N |
| | Appliances withstand the transient over-voltages to which they may be subjected | | N |
| | Clearances having a value less than specified in table 16 subjected to an impulse voltage test, the test voltage specified in table 6 .....: | | N |
| | No flashover during the test, unless | | N |
| | of functional insulation if the appliance complies with clause 19 with the clearance short-circuited | | N |
| 15 | MOISTURE RESISTANCE | | P |

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| Clause | Requirement - Test | Result - Remark | Verdict |
| 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 or creepage distances below values specified in clause 29 | | N |
| 15.1.1 | Appliances, other than IPX0, subjected to tests as specified in IEC 60529 .....: | IPX0 | N |
| | Water valves containing live parts in external hoses for connection of an appliance to the water mains tested as specified for IPX7 appliances | | N |
| 15.1.2 | Hand-held appliance turned continuously through the most unfavourable positions during the test | | N |
| | Built-in appliances installed according to the instructions | | N |
| | Appliances placed or used on the floor or table placed on a horizontal unperforated support | | N |
| | Appliances normally fixed to a wall and appliances with pins for insertion into socket-outlets are mounted on a wooden board | | N |
| | For IPX3 appliances, the base of wall mounted appliances is placed at the same level as the pivot axis of the oscillating tube | | N |
| | For IPX4 appliances, the horizontal centre line of the appliance is aligned with the pivot axis of the oscillating tube, and | | N |
| | for appliances normally used on the floor or table, the movement is limited to two times 90° for a period of 5 min, the support being placed at the level of the pivot axis of the oscillating tube | | N |
| | Wall-mounted appliances, take into account the distance to the floor stated in the instructions | | N |
| | Appliances normally fixed to a ceiling are mounted underneath a horizontal unperforated support, the pivot axis of the oscillating tube located at the level of the underside of the support, and | | N |
| | for IPX4 appliances, the movement of the tube is limited to two times 90° from the vertical for a period of 5 min | | N |
| | Appliances with type X attachment fitted with a flexible cord as described | | N |

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

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|---|---|---|---|
| Clause | Requirement - Test | Result - Remark | Verdict |
| | - all controls have an off position in all poles, or | | N |
| | - the appliance has no control other than a thermal cut-out, or | | N |
| | - all thermostats, temperature limiters and energy regulators do not have an off position, or | | N |
| | - the appliance has radio interference filters | | N |
| | With the radio interference filters disconnected, the leakage current do not exceed limits specified .....: | (see appended table) | N |
| 16.3 | Electric strength tests according to table 7 .....: | (see appended table) | P |
| | Test voltage applied between the supply cord and inlet bushing and cord guard and cord anchorage as specified .....: | (see appended table) | P |
| | No breakdown during the tests | | P |
| 17 | OVERLOAD PROTECTION OF TRANSFORMERS AND ASSOCIATED CIRCUITS | | P |
| | No excessive temperatures in transformer or associated circuits in event of short-circuits likely to occur in normal use.....: | (see appended table) | P |
| | Appliance supplied with 1.06 or 0.94 times rated voltage under the most unfavourable short-circuit or overload likely to occur in normal use (V) .....: | (see appended table) | P |
| | Basic insulation is not short-circuited | | P |
| | 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 | | P |
| | However, limits do not apply to fail-safe transformers complying with sub-clause 15.5 of IEC 61558-1 | | N |
| 18 | ENDURANCE | | N |
| | This clause of Part 1 is not applicable | | N |
| 19 | ABNORMAL OPERATION | | P |
| 19.1 | The risk of fire, mechanical damage or electric shock under abnormal or careless operation obviated | | P |
| | Electronic circuits so designed and applied that a fault will not render the appliance unsafe .....: | Considered | P |
| | Appliances incorporating heating elements subjected to the tests of 19.2 and 19.3, and | | N |
| | if the appliance also has a control that limit the temperature during clause 11 it is subjected to the test of 19.4, and | | N |

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| Clause | Requirement - Test | Result - Remark | Verdict |
| | if applicable, to the test of 19.5 | | N |
| | Appliances incorporating PTC heating elements are also subjected to the test of 19.6 | | N |
| | Appliances incorporating motors subjected to the tests of 19.7 to 19.10, as applicable | | N |
| | Appliances incorporating electronic circuits subjected to the tests of 19.11 and 19.12, as applicable | | P |
| | Appliances incorporating contactors or relays subjected to the test of 19.14, being carried out before the tests of 19.11 | | P |
| | Appliances incorporating voltage selector switches subjected to the test of 19.15 | | N |
| | Unless otherwise specified, the tests are continued until a non-self-resetting thermal cut-out operates, or | | N |
| | until steady conditions are established | | P |
| | If a heating element or intentionally weak part becomes open-circuited, the relevant test is repeated on a second sample | | N |
| 19.2 | Test of appliances with heating elements with restricted heat dissipation; test voltage (V), power input of 0.85 times rated power input (W) .....: | | N |
| 19.3 | Test of 19.2 repeated; test voltage (V), power input of 1.24 times rated power input (W) .....: | | N |
| 19.4 | Test conditions as in clause 11, any control limiting the temperature during tests of clause 11 short-circuited | | N |
| 19.5 | Test of 19.4 repeated on Class 0I and I appliances with tubular sheathed or embedded heating elements. No short-circuiting, but one end of the element connected to the 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 |

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| Clause | Requirement - Test | Result - Remark | Verdict |
| | The working voltage of the PTC heating element is increased by 5% and the appliance is operated until steady conditions are re-established. The voltage is then increased in similar steps until 1.5 times working voltage or until the PTC heating element ruptures (V) .....: | | N |
| 19.7 | Stalling test by locking the rotor if the locked rotor torque is smaller than the full load torque, or | | N |
| | locking moving parts of other appliances | | N |
| | Locked rotor, capacitors open-circuited one at a time | | N |
| | Test repeated with capacitors short-circuited one at a time, unless | | N |
| | capacitor is of class P2 of IEC 60252-1 | | N |
| | Appliances with timer or programmer supplied with rated voltage for each of the tests, for a period equal to the maximum period allowed .....: | | N |
| | Other appliances supplied with rated voltage for a period as specified .....: | | N |
| | Winding temperatures not exceeding values specified in table 8.....: | | N |
| 19.8 | Multi-phase motors operated at rated voltage with one phase disconnected | | N |
| 19.9 | Running overload test on appliances incorporating motors intended to be remotely or automatically controlled or liable to be operated continuously | | N |
| | Motor-operated and combined appliances for which 30.2.3 is applicable and that use overload protective devices relying on electronic circuits to protect the motor windings, are also subjected to the test | | N |
| | Winding temperatures not exceeding values as specified .....: | | N |
| 19.10 | Series motor operated at 1.3 times rated voltage for 1 min (V).....: | | N |
| | During the test, parts not being ejected from the appliance | | N |
| 19.11 | Electronic circuits, compliance checked by evaluation of the fault conditions specified in 19.11.2 for all circuits or parts of circuits, unless | | P |
| | they comply with the conditions specified in 19.11.1 | | N |
| | Appliances incorporating an electronic circuit that relies upon a programmable component to function correctly, subjected to the test of 19.11.4.8, unless | | P |

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

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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 | | P |
| | This fault condition is not applied between the two circuits of an optocoupler | | N |
| | e) failure of triacs in the diode mode | | P |
| | f) failure of microprocessors and integrated circuits | | P |
| | g) failure of an electronic power switching device | | N |
| | Each low power circuit is short-circuited by connecting the low-power point to the pole of the supply source from which the measurements were made | | N |
| 19.11.3 | If the appliance incorporates a protective electronic circuit which operates to ensure compliance with clause 19, the relevant test is repeated with a single fault simulated, as indicated in a) to g) of 19.11.2 | | N |
| 19.11.4 | Appliances having a device with an off position obtained by electronic disconnection, or | | N |
| | a device that can be placed in the stand-by mode, | | P |
| | subjected to the tests of 19.11.4.1 to 19.11.4.7, the device being set in the off position or in the stand-by mode | | P |
| | Appliances incorporating a protective electronic circuit subjected to the tests of 19.11.4.1 to 19.11.4.7, the tests being carried out after the protective electronic circuit has operated, except that | | N |
| | Appliances operated for 30 s or 5 min during the test of 19.7 are not subjected to the tests for electromagnetic phenomena. | | N |
| | Surge protective devices disconnected, unless | | N |
| | They incorporate spark gaps | | N |
| 19.11.4.1 | The appliance is subjected to electrostatic discharges in accordance with IEC 61000-4-2, test level 4 | | P |
| 19.11.4.2 | The appliance is subjected to radiated fields in accordance with IEC 61000-4-3, test level 3 | | P |
| 19.11.4.3 | The appliance is subjected to fast transient bursts in accordance with IEC 61000-4-4, test level 3 or 4 as specified | | P |
| 19.11.4.4 | The power supply terminals of the appliance subjected to voltage surges in accordance with IEC 61000-4-5, test level 3 or 4 as specified | | P |

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|---|---|---|---|
| Clause | Requirement - Test | Result - Remark | Verdict |
| | Earthed heating elements in class I appliances disconnected | | N |
| 19.11.4.5 | The appliance is subjected to injected currents in accordance with IEC 61000-4-6, test level 3 | | P |
| 19.11.4.6 | Appliances having a rated current not exceeding 16 A are subjected to the Class 3 voltage dips and interruptions in accordance with IEC 61000-4-11 | | P |
| | Appliances having a rated current exceeding 16 A are subjected to the Class 3 voltage dips and interruptions in accordance with IEC 61000-4-34 | | N |
| 19.11.4.7 | The appliance is subjected to mains signals in accordance with IEC 61000-4-13, test level class 2 | | P |
| 19.11.4.8 | The appliance is supplied at rated voltage and operated under normal operation. After 60s the power supply is reduced to a level such that the appliance ceases to respond or parts controlled by the programmable component cease to operate | | P |
| | The appliance continues to operate normally, or | | N |
| | requires a manual operation to restart | | P |
| 19.12 | If the safety of the appliance for any of the fault conditions specified in 19.11.2 depends on the operation of a miniature fuse-link complying with IEC 60127, the test is repeated, measuring the current flowing through the fuse-link; measured current (A); rated current of the fuse-link (A) .....: | | N |
| 19.13 | During the tests the appliance does not emit flames, molten metal, poisonous or ignitable gas in hazardous amounts | | P |
| | Temperature rises not exceeding the values shown in table 9.....: | (see appended table) | P |
| | Compliance with clause 8 not impaired | | P |
| | If the appliance can still be operated it complies with 20.2 | | N |
| | Insulation, other than of class III appliances or class III constructions that do not contain live parts, withstands the electric strength test of 16.3, the test voltage as specified in table 4: | | P |
| | - basic insulation (V).....: | 1000V | P |
| | - supplementary insulation (V) .....: | 1750V | P |
| | - reinforced insulation (V).....: | 3000V | P |
| | After operation or interruption of a control, clearances and creepage distances across the functional insulation withstand the electric strength test of 16.3, the test voltage being twice the working voltage | | N |

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|---|---|---|---|
| Clause | Requirement - Test | Result - Remark | Verdict |
| | The appliance does not undergo a dangerous malfunction, and | | P |
| | no failure of protective electronic circuits, if the appliance is still operable | | N |
| | Appliances tested with an electronic switch in the off position, or in the stand-by mode: | | P |
| | - do not become operational, or | | P |
| | - if they become operational, do not result in a dangerous malfunction during or after the tests of 19.11.4 | | N |
| | If the appliance contains lids or doors that are controlled by one or more interlocks, one of the interlocks may be released provided that: | | N |
| | - the lid or door does not move automatically to an open position when the interlock is released, and | | N |
| | - the appliance does not start after the cycle in which the interlock was released | | N |
| 19.14 | Appliances operated under the conditions of clause 11, any contactor or relay contact operating under the conditions of clause 11 being short-circuited | | N |
| | For a relay or contactor with more than one contact, all contacts are short-circuited at the same time | | N |
| | A relay or contactor operating only to ensure the appliance is energized for normal use is not short-circuited | | P |
| | If more than one relay or contactor operates in clause 11, they are short-circuited in turn | | N |
| 19.15 | For appliances with a mains voltage selector switch, the switch is set to the lowest rated voltage position and the highest value of rated voltage is applied | | N |
| 20 | STABILITY AND MECHANICAL HAZARDS | | P |
| 20.1 | Appliances having adequate stability | | P |
| | Tilting test through an angle of 10°, appliance placed on an inclined plane/horizontal support, not connected to the supply mains; appliance does not overturn | | P |
| | Tilting test repeated on appliances with heating elements, angle of inclination increased to 15° | | N |
| | Possible heating test in overturned position; temperature rise does not exceed values shown in table 9 | | N |
| 20.2 | Moving parts adequately arranged or enclosed as to provide protection against personal injury | | N |

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|---|---|---|---|
| Clause | Requirement - Test | Result - Remark | Verdict |
| | Protective enclosures, guards and similar parts are non-detachable, and | | N |
| | have adequate mechanical strength | | N |
| | Enclosures that can be opened by overriding an interlock are considered to be detachable parts | | N |
| | Self-resetting thermal cut-outs and overcurrent protective devices not causing a hazard by unexpected closure | | N |
| | Not possible to touch dangerous moving parts with the test probe described | | N |
| 21 | MECHANICAL STRENGTH | | P |
| 21.1 | Appliance has adequate mechanical strength and is constructed as to withstand rough handling | Everyone must leave the scene when the appliance is in normal use. | N |
| | Checked by applying 3 blows to every point of the enclosure like to be weak, in accordance with test Ehb of IEC 60068-2-75, spring hammer test, with an impact energy of 0,5 J | | N |
| | The appliance shows no damage impairing compliance with this standard, and | | N |
| | compliance with 8.1, 15.1 and clause 29 not impaired | | N |
| | If doubt, supplementary or reinforced insulation subjected to the electric strength test of 16.3 | | N |
| | If necessary, repetition of groups of three blows on a new sample | | N |
| 21.2 | Accessible parts of solid insulation having strength to prevent penetration by sharp implements | | P |
| | Test not applicable if the thickness of supplementary insulation is at least 1 mm and reinforced insulation at least 2 mm | | P |
| | The insulation is tested as specified, and does withstand the electric strength test of 16.3 | | N |
| 22 | CONSTRUCTION | | P |
| 22.1 | Appliance marked with the first numeral of the IP system, relevant requirements of IEC 60529 are fulfilled | IPX0 | N |
| 22.2 | Stationary appliance: means to ensure all-pole disconnection from the supply being provided: | | N |
| | - a supply cord fitted with a plug, or | | N |
| | - a switch complying with 24.3, or | | N |

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|---|---|---|---|
| Clause | Requirement - Test | Result - Remark | Verdict |
| | - a statement in the instruction sheet that a disconnection incorporated in the fixed wiring is to be provided, or | | N |
| | - an appliance inlet | | N |
| | Singe-pole switches and single-pole protective devices for the disconnection of heating elements in single-phase, permanently connected class 01 and class I appliances, connected to the phase conductor | | N |
| 22.3 | Appliance provided with pins: no undue strain on socket-outlets | | N |
| | Applied torque not exceeding 0.25 Nm | | N |
| | Pull force of 50N to each pin after the appliance has being placed in the heating cabinet; when cooled to room temperature the pins are not displaced by more than 1mm | | N |
| | Each pin subjected to a torque of 0.4Nm; the pins are not rotating, unless | | N |
| | rotating does not impair compliance with this standard | | N |
| 22.4 | Appliance for heating liquids and appliance causing undue vibration not provided with pins for insertion into socket-outlets | | N |
| 22.5 | No risk of electric shock when touching the pins of the plug, for appliances having a capacitor with rated capacitance exceeding 0,1μF, the appliance being disconnected from the supply at the instant of voltage peak | | P |
| | Voltage not exceeding 34 V (V) .....: | 2V | P |
| 22.6 | Electrical insulation not affected by condensing water or leaking liquid | | P |
| | Electrical insulation of Class II appliances not affected if a hose ruptures or seal leaks | | N |
| | In case of doubt, test as described | | P |
| 22.7 | Adequate safeguards against the risk of excessive pressure in appliances containing liquid or gases or having steam-producing devices | | N |
| 22.8 | Electrical connections not subject to pulling during cleaning of compartments to which access can be gained without the aid of a tool, and that are likely to be cleaned in normal use | | P |
| 22.9 | Insulation, internal wiring, windings, commutators and slip rings not exposed to oil, grease or similar substances, unless | | P |
| | the substance has adequate insulating properties | | N |

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|---|---|---|---|
| Clause | Requirement - Test | Result - Remark | Verdict |
| 22.10 | Not possible to reset voltage-maintained non-self-resetting thermal cut-outs by the operation of an automatic switching device incorporated within the appliance, if: | | N |
| | - a non-self-resetting thermal cut-out is required by the standard, and | | N |
| | - a voltage maintained non-self-resetting thermal cut-out is used to meet it | | N |
| | Non-self-resetting thermal motor protectors have a trip-free action, unless | | N |
| | they are voltage maintained | | N |
| | Reset buttons of non-self-resetting controls so located or protected that accidental resetting is unlikely | | N |
| 22.11 | Reliable fixing of non-detachable parts that provide the necessary degree of protection against electric shock, moisture or contact with moving parts | | P |
| | Obvious locked position of snap-in devices used for fixing such parts | | N |
| | No deterioration of the fixing properties of snap-in devices used in parts that are likely to be removed during installation or servicing | | N |
| | Tests as described | | P |
| 22.12 | Handles, knobs etc. fixed in a reliable manner | | P |
| | Fixing in wrong position of handles, knobs etc. indicating position of switches or similar components not possible | | P |
| | Axial force 15 N applied to parts, the shape being so that an axial pull is unlikely to be applied | | P |
| | Axial force 30 N applied to parts, the shape being so that an axial pull is likely to be applied | | P |
| 22.13 | Unlikely that handles, when gripped as in normal use, make the operator’s hand touch parts having a temperature rise exceeding the value specified for handles which are held for short periods only | | N |
| 22.14 | No ragged or sharp edges creating a hazard for the user in normal use, or during user maintenance | | P |
| | No exposed pointed ends of self-tapping screws or other fasteners, likely to be touched by the user in normal use or during user maintenance | | P |
| 22.15 | Storage hooks and the like for flexible cords smooth and well rounded | | N |

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|---|---|---|---|
| Clause | Requirement - Test | Result - Remark | Verdict |
| 22.16 | Automatic cord reels cause no undue abrasion or damage to the sheath of the flexible cord, no breakage of conductors strands and no undue wear of contacts | | N |
| | Cord reel tested with 6000 operations, as specified | | N |
| | Electric strength test of 16.3, voltage of 1000 V applied | | N |
| 22.17 | Spacers not removable from the outside by hand or by means of a screwdriver or a spanner | | N |
| 22.18 | Current-carrying parts and other metal parts resistant to corrosion | | P |
| 22.19 | Driving belts not relied upon to provide the required level of insulation, unless | | N |
| | constructed to prevent inappropriate replacement | | N |
| 22.20 | Direct contact between live parts and thermal insulation effectively prevented, unless | | P |
| | material used is non-corrosive, non-hygroscopic and non-combustible | | N |
| 22.21 | Wood, cotton, silk, ordinary paper and fibrous or hygroscopic material not used as insulation, unless | | P |
| | impregnated | | N |
| | This requirement does not apply to magnesium oxide and mineral ceramic fibres used for the electrical insulation of heating elements | | N |
| 22.22 | Appliances not containing asbestos | | P |
| 22.23 | Oils containing polychlorinated biphenyl (PCB) not used | | P |
| 22.24 | Bare heating elements, except in class III appliances or class III constructions that do not contain live parts, adequately supported | | N |
| | In case of rupture, the heating conductor is unlikely to come in contact with accessible metal parts | | N |
| 22.25 | Sagging heating conductors, except in class III appliances or class III constructions that do not contain live parts, cannot come into contact with accessible metal parts | | N |
| 22.26 | For class III constructions the insulation between parts operating at safety extra-low voltage and other live parts complies with the requirements for double or reinforced insulation | | N |
| 22.27 | Parts connected by protective impedance separated by double or reinforced insulation | | N |

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|---|---|---|---|
| Clause | Requirement - Test | Result - Remark | Verdict |
| 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 | Neither clearances nor creepage distances over supplementary and reinforced insulation reduced below values specified in clause 29 as a result of wear | | P |
| | Neither clearances nor creepage distances between live parts and accessible parts reduced below values for supplementary insulation if wires, screws etc. become loose | | P |
| 22.32 | Supplementary and reinforced insulation constructed or protected against pollution so that clearances or creepage distances are not reduced below the values in clause 29 | | P |
| | Supplementary insulation of natural or synthetic rubber resistant to ageing, or arranged and dimensioned so that creepage distances are not reduced below values specified in 29.2 | | N |
| | Ceramic material not tightly sintered, similar materials or beads alone not used as supplementary or reinforced insulation | | N |
| | Insulating material in which heating conductors are embedded is considered to be basic insulation, not reinforced insulation | | N |
| | Oxygen bomb test at 70 °C for 96 h and 16 h at room temperature | | N |
| 22.33 | Conductive liquids that are or may become accessible in normal use and conductive liquids that are in contact with unearthed accessible metal parts are not in direct contact with live parts | | N |
| | Electrodes not used for heating liquids | | N |

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

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|---|---|---|---|
| Clause | Requirement - Test | Result - Remark | Verdict |
| 22.37 | Capacitors in Class II appliances not connected to accessible metal parts and their casings, if of metal, separated from accessible metal parts by supplementary insulation, unless | | P |
| | the capacitors comply with 22.42 | | N |
| 22.38 | Capacitors not connected between the contacts of a thermal cut-out | | P |
| 22.39 | Lamp holders used only for the connection of lamps | | P |
| 22.40 | Motor-operated appliances and combined appliances intended to be moved while in operation, or having accessible moving parts, fitted with a switch to control the motor. The actuating member of the switch being easily visible and accessible | | N |
| | If the appliance cannot operate continuously, automatically or remotely without giving rise to a hazard, appliances for remote operation being fitted with a switch for stopping the operation. The actuating member of the switch being easily visible and accessible | | N |
| 22.41 | No components, other than lamps, containing mercury | | 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 |
| | Resistors checked by the test of 14.1 a) in IEC 60065 | | N |
| | Capacitors checked by the tests for class Y capacitors in IEC 60384-14 | | N |
| 22.43 | Appliances adjustable for different voltages, accidental changing of the setting of the voltage unlikely to occur | | N |
| 22.44 | Appliances not having an enclosure that is shaped or decorated like a toy | | P |
| 22.45 | When air is used as reinforced insulation, clearances not reduced below the values specified in 29.1.3 due to deformation as a result of an external force applied to the enclosure | | N |
| 22.46 | For programmable protective electronic circuits used to ensure compliance with the standard, the software contains measures to control the fault/error conditions in table R.1 | | N |

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|---|---|---|---|
| Clause | Requirement - Test | Result - Remark | Verdict |
| | Software that contains measures to control the fault/error conditions specified in table R.2 is to be specified in parts 2 for particular constructions or to address specific hazards | | N |
| | These requirements are not applicable to software used for functional purpose or compliance with clause 11 | | N |
| 22.47 | Appliances connected to the water mains withstand the water pressure expected in normal use | | N |
| | No leakage from any part, including any inlet water hose | | N |
| 22.48 | Appliances connected to the water mains constructed to prevent backsiphonage of non-potable water | | N |
| 22.49 | For remote operation, the duration of operation is to be set before the appliance can be started, unless | | N |
| | the appliance switches off automatically or can operate continuously without hazard | | N |
| 22.50 | Controls incorporated in the appliance take priority over controls actuated by remote operation | | N |
| 22.51 | There is a control on the appliance manually adjusted to the setting for remote operation before the appliance can be operated in this mode | | N |
| | There is a visual indication showing that the appliance is adjusted for remote operation | | N |
| | These requirements not necessary on appliances that can operate as follows, without giving rise to a hazard: | | N |
| | - continuously, or | | N |
| | - automatically, or | | N |
| | - remotely | | N |
| 22.52 | Socket-outlets on appliances accessible to the user in accordance with the socket-outlet system used in the country in which the appliance is sold | | N |
| 23 | INTERNAL WIRING | | P |
| 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 | | 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 | | N |
| | 100 flexings for conductors flexed during user maintenance | | N |
| | Electric strength test of 16.3, 1000 V between live parts and accessible metal parts | | N |
| | Not more than 10% of the strands of any conductor broken, and | | N |
| | not more than 30% for wiring supplying circuits that consume no more than 15W | | N |
| 23.4 | Bare internal wiring sufficiently rigid and fixed | | N |
| 23.5 | The insulation of internal wiring subjected to the supply mains voltage withstanding the electrical stress likely to occur in normal use | | P |
| | Basic insulation electrically equivalent to the basic insulation of cords complying with IEC 60227 or IEC 60245, or | | N |
| | no breakdown when a voltage of 2000 V is applied for 15 min between the conductor and metal foil wrapped around the insulation | | P |
| 23.6 | Sleeving used as supplementary insulation on internal wiring retained in position by clamping at both ends, or | | N |
| | be such that it can only be removed by breaking or cutting | | N |
| 23.7 | The colour combination green/yellow only used for earthing conductors | | N |
| 23.8 | Aluminium wires not used for internal wiring | | P |
| 23.9 | Stranded conductors not consolidated by soldering where they are subjected to contact pressure, unless | | N |
| | the contact pressure is provided by spring terminals | | N |

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

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|---|---|---|---|
| Clause | Requirement - Test | Result - Remark | Verdict |
| | If the switch operates a relay or contactor, the complete switching system is subjected to the test | | N |
| | If the switch only operates a motor staring relay complying with IEC 60730-2-10 with the number of cycles of a least 10 000 as specified, the complete switching system need not be tested | | N |
| 24.1.4 | Automatic controls complying with IEC 60730-1 with the relevant part 2. The number of cycles of operation being at least: | | 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: 1 000 | | N |
| | - other non-self-resetting thermal cut-outs: 30 | | N |
| | - timers: 3 000 | | N |
| | - energy regulators: 10 000 | | N |
| | The number of cycles for controls operating during clause 11 need not be declared, if the appliance meets the requirements of this standard when they are short-circuited | | N |
| | Thermal motor protectors are tested in combination with their motor under the conditions specified in Annex D | | N |
| | For water valves containing live parts and that are incorporated in external hoses for connection of an appliance to the water mains, the degree of protection declared for subclause 6.5.2 of IEC 60730-2-8 is IPX7 | | N |
| 24.1.5 | Appliance couplers complying with IEC 60320-1 | | N |
| | However, for appliances classified higher than IPX0, the appliance couplers complying with IEC 60320-2-3 | | N |
| | Interconnection couplers complying with IEC 60320-2-2 | | N |
| 24.1.6 | Small lamp holders similar to E10 lampholders complying with IEC 60238, the requirements for E10 lampholders being applicable | | N |
| 24.1.7 | For remote operation of the appliance via a telecommunication network, the relevant standard for the telecommunication interface circuitry in the appliance is IEC 62151 | | N |
| 24.1.8 | The relevant standard for thermal links is IEC 60691 | | N |

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|---|---|---|---|
| Clause | Requirement - Test | Result - Remark | Verdict |
| | Thermal links not complying with IEC 60691 are considered to be an intentionally weak part for the purposes of Clause 19 | | N |
| 24.1.9 | Contactors and relays, other than motor starting relays, tested as part of the appliance | | P |
| | They are also tested in accordance with Clause 17 of IEC 60730-1, the number of cycles of operations in 24.1.4 selected according to the contactor or relay function in the appliance.....: | Approved | P |
| 24.2 | Appliances not fitted with: | | P |
| | - switches or automatic controls in flexible cords | | P |
| | - devices causing the protective device in the fixed wiring to operate in the event of a fault in the appliance | | P |
| | - thermal cut-outs that can be reset by soldering, unless | | N |
| | the solder has a melding point of at least 230 ˚C | | N |
| 24.3 | Switches intended for all-pole disconnection of stationary appliances are directly connected to the supply terminals and have a contact separation in all poles, providing full disconnection under overvoltage category III conditions | | N |
| 24.4 | Plugs and socket-outlets for extra-low voltage circuits and heating elements, not interchangeable with plugs and socket-outlets listed in IEC/TR 60083 or IEC 60906-1 or with connectors and appliance inlets complying with the standard sheets of IEC 60320-1 | | N |
| 24.5 | Capacitors in auxiliary windings of motors marked with their rated voltage and capacitance, and used accordingly | | N |
| | Voltage across capacitors in series with a motor winding does not exceed 1,1 times rated voltage, when the appliance is supplied at 1,1 times rated voltage under minimum load | | N |
| 24.6 | Working voltage of motors connected to the supply mains and having basic insulation that is inadequate for the rated voltage of the appliance, not exceeding 42 V | | N |
| | In addition, the motors comply with the requirements of Annex I | | N |
| 24.7 | Detachable hose-sets for connection of appliances to the water mains comply with IEC 61770 | | N |
| | They are supplied with the appliance | | N |

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|---|---|---|---|
| Clause | Requirement - Test | Result - Remark | Verdict |
| | Appliances intended to be permanently connected to the water mains not connected by a detachable hose-set | | N |
| 24.8 | Motor running capacitors in appliances for which 30.2.3 is applicable and that are permanently connected in series with a motor winding, not causing a hazard in event of a failure | | N |
| | One or more of the following conditions are to be met: | | N |
| | - the capacitors are of class P2 according to IEC 60252-1 | | N |
| | - the capacitors are housed within a metallic or ceramic enclosure | | N |
| | - the distance of separation of the outer surface to adjacent non-metallic parts exceeds 50 mm | | N |
| | - adjacent non-metallic parts within 50 mm withstand the needle-flame test of Annex E | | N |
| | - adjacent non-metallic parts within 50 mm classified as at least V-1 according to IEC 60695-11-10 | | N |
| 25 | SUPPLY CONNECTION AND EXTERNAL FLEXIBLE CORDS | | P |
| 25.1 | Appliance not intended for permanent connection to fixed wiring, means for connection to the supply: | | P |
| | - supply cord fitted with a plug, | | P |
| | - an appliance inlet having at least the same degree of protection against moisture as required for the appliance, or | | N |
| | - pins for insertion into socket-outlets | | N |
| 25.2 | Appliance not provided with more than one means of connection to the supply mains | | P |
| | Stationary appliance for multiple supply may be provided with more than one means of connection, provided electric strength test of 1250 V for 1 min between each means of connection causes no breakdown | | N |
| 25.3 | Appliance intended to be permanently connected to fixed wiring provided with one of the following means for connection to the supply mains: | | N |
| | - a set of terminals allowing the connection of a flexible cord | | N |
| | - a fitted supply cord | | N |
| | - a set of supply leads accommodated in a suitable compartment | | N |

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|---|---|---|---|
| Clause | Requirement - Test | Result - Remark | Verdict |
| | - a set of terminals for the connection of cables of fixed wiring, cross-sectional areas specified in 26.6, and the appliance allows the connection of the supply conductors after the appliance has been fixed to its support | | N |
| | - a set of terminals and cable entries, conduit entries, knock-outs or glands, allowing connection of appropriate types of cable or conduit, and the appliance allows the connection of the supply conductors after the appliance has been fixed to its support | | N |
| | For a fixed appliance constructed so that parts can be removed to facilitate easy installation, this requirement is met if it is possible to connect the fixed wiring without difficulty after a part of the appliance has been fixed to its support | | N |
| 25.4 | Cable and conduit entries, rated current of appliance not exceeding 16 A, dimension according to table 10 (mm) .....: | | N |
| | Introduction of conduit or cable does not reduce clearances or creepage distances below values specified in clause 29 | | N |
| 25.5 | Method for assembling the supply cord to the appliance: | | P |
| | - type X attachment | | N |
| | - type Y attachment | | P |
| | - type Z attachment | | N |
| | Type X attachment, other than those with a specially prepared cord, not used for flat twin tinsel cords | | N |
| | For multi-phase appliances supplied with a supply cord and that are intended to be permanently connected to fixed wiring, the supply cord is assembled to the appliance by type Y attachment | | N |
| 25.6 | Plugs fitted with only one flexible cord | | P |
| 25.7 | Supply cords, other than for class III appliances, being one of the following types: | | P |
| | - rubber sheathed (at least 60245 IEC 53) | | N |
| | - polychloroprene sheathed (at least 60245 IEC 57) | See table 24.1 | P |
| | - cross-linked polyvinyl chloride sheathed (at least 60245 IEC 88) | | N |
| | - Polyvinyl chloride sheathed. Not used if they are likely to touch metal parts having a temperature rise exceeding 75 K during the test of clause 11 | | N |
| | • light polyvinyl chloride sheathed cord (60227 IEC 52), for appliances not exceeding 3 kg | See table 24.1 | P |

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|---|---|---|---|
| Clause | Requirement - Test | Result - Remark | Verdict |
| | • ordinary polyvinyl chloride sheathed cord (60227 IEC 53), for other appliances | | N |
| | - Heat resistant polyvinyl chloride sheathed. Not used for type X attachment other than specially prepared cords | | N |
| | • heat-resistant light polyvinyl chloride sheathed cord (60227 IEC 56), for appliances not exceeding 3 kg | | N |
| | • heat-resistant polyvinyl chloride sheathed cord (60227 IEC 57), for other appliances | | N |
| | Supply cords for class III appliances adequately insulated | | N |
| | Test with 500 V for 2 min for supply cords of class III appliances that contain live parts | | N |
| 25.8 | Nominal cross-sectional area of supply cords not less than table 11; rated current (A); cross-sectional area ($mm^2$) .....: | Rated current: 0.28A; Cross-sectional area: 0.75$mm^2$ | P |
| 25.9 | Supply cords not in contact with sharp points or edges | | P |
| 25.10 | Supply cord of class I appliances have a green/yellow core for earthing | | N |
| 25.11 | Conductors of supply cords not consolidated by soldering where they are subject to contact pressure, unless | | P |
| | the contact pressure is provided by spring terminals | | N |
| 25.12 | Insulation of the supply cord not damaged when moulding the cord to part of the enclosure | | P |
| 25.13 | Inlet openings so constructed as to prevent damage to the supply cord | | N |
| | If the enclosure at the inlet opening is not of insulating material, a non-detachable lining or bushing complying with 29.3 for supplementary insulation provided | | N |
| | If unsheathed supply cord, a similar additional bushing or lining is required, unless the appliance is | | N |
| | class 0, or | | N |
| | a class III appliance not containing live parts | | N |
| 25.14 | Supply cords moved while in operation adequately protected against excessive flexing | | N |
| | Flexing test, as described: | | N |
| | - applied force (N) .....: | | N |
| | - number of flexings.....: | | N |

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|---|---|---|---|
| Clause | Requirement - Test | Result - Remark | Verdict |
| | The test does not result in: | | N |
| | - short-circuit between the conductors, such that the current exceeds a value of twice the rated current | | N |
| | - breakage of more than 10% of the strands of any conductor | | N |
| | - separation of the conductor from its terminal | | N |
| | - loosening of any cord guard | | N |
| | - damage to the cord or the cord guard | | N |
| | - broken strands piercing the insulation and becoming accessible | | N |
| 25.15 | For appliances with supply cord and appliances to be permanently connected to fixed wiring by a flexible cord, conductors of the supply cord relieved from strain, twisting and abrasion by use of cord anchorage | | P |
| | The cord cannot be pushed into the appliance to such an extent that the cord or internal parts of the appliance can be damaged | | P |
| | Pull and torque test of supply cord, values shown in table 12: mass (kg); pull (N); torque (not on automatic cord reel) (Nm) .....: | 30N, 0.1Nm | P |
| | Cord not damaged and max. 2 mm displacement of the cord | 1.0mm | P |
| 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 supply cord | | N |
| | - cord cannot touch the clamping screws of cord anchorage if these screws are accessible, unless | | N |
| | they are separated from accessible metal parts by supplementary insulation | | N |
| | - the cord is not clamped by a metal screw which bears directly on the cord | | N |
| | - at least one part of the cord anchorage securely fixed to the appliance, unless | | N |
| | it is part of a specially prepared cord | | N |
| | - screws which have to be operated when replacing the cord do not fix any other component, unless | | N |
| | the appliance becomes inoperative or incomplete or the parts cannot be removed without a tool | | N |

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|---|---|---|---|
| Clause | Requirement - Test | Result - Remark | Verdict |
| | - if labyrinths can be bypassed the test of 25.15 is nevertheless withstood | | N |
| | - for class 0, 0I and I appliances they are of insulating material or are provided with an insulating lining, unless | | N |
| | failure of the insulation of the cord does not make accessible metal parts live | | N |
| | - for class II appliances they are of insulating material, or | | N |
| | if of metal, they are insulated from accessible metal parts by supplementary insulation | | N |
| | After the test of 25.15, under the conditions specified, the conductors have not moved by more than 1 mm in the terminals | | N |
| 25.17 | Adequate cord anchorages for type Y and Z attachment, test with the cord supplied with the appliance | | P |
| 25.18 | Cord anchorages only accessible with the aid of a tool, or | | P |
| | Constructed so that the cord can only be fitted with the aid of a tool | | P |
| 25.19 | Type X attachment, glands not used as cord anchorage in portable appliances | | N |
| | Tying the cord into a knot or tying the cord with string not used | | N |
| 25.20 | The insulated conductors of the supply cord for type Y and Z attachment additionally insulated from accessible metal parts | | P |
| 25.21 | Space for supply cord for type X attachment or for connection of fixed wiring constructed: | | N |
| | - to permit checking of conductors with respect to correct positioning and connection before fitting any cover | | N |
| | - so there is no risk of damage to the conductors or their insulation when fitting the cover | | N |
| | - for portable appliances, so that the uninsulated end of a conductor, if it becomes free from the terminal, prevented from contact with accessible metal parts | | N |
| | 2 N test to the conductor for portable appliances; no contact with accessible metal parts | | N |
| 25.22 | Appliance inlets: | | N |
| | - live parts not accessible during insertion or removal | | N |

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|---|---|---|---|
| Clause | Requirement - Test | Result - Remark | Verdict |
| | Requirement not applicable to appliance inlets complying with IEC 60320-1 | | N |
| | - connector can be inserted without difficulty | | N |
| | - the appliance is not supported by the connector | | N |
| | - Not for cold conditions if temp. rise of external metal parts exceeds 75 K during clause 11, unless | | N |
| | the supply cord is unlikely to touch such metal parts | | N |
| 25.23 | Interconnection cords comply with the requirements for the supply cord, except that: | | N |
| | - the cross-sectional area of the conductors is determined on the basis of the maximum current during clause 11 | | N |
| | - the thickness of the insulation may be reduced | | N |
| | If necessary, electric strength test of 16.3 | | N |
| 25.24 | Interconnection cords not detachable without the aid of a tool if compliance with this standard is impaired when they are disconnected | | N |
| 25.25 | Dimensions of pins that are inserted into socket-outlets compatible with the dimensions of the relevant socket-outlet. | | N |
| | Dimensions of pins and engagement face in accordance with the dimensions of the relevant plug in IEC/TR 60083 | | N |
| 26 | TERMINALS FOR EXTERNAL CONDUCTORS | | P |
| 26.1 | Appliances provided with terminals or equally effective devices for connection of external conductors | | P |
| | Terminals only accessible after removal of a non-detachable cover, except | | P |
| | for class III appliances that do not contain live parts | | N |
| | Earthing terminals may be accessible if a tool is required to make the connections and means are provided to clamp the wire independently from its connection | | N |
| 26.2 | Appliances with type X attachment and appliances for the connection of cables to fixed wiring provided with terminals in which connections are made by means of screws, nuts or similar devices, unless | | N |
| | the connections are soldered | | N |
| | Screws and nuts not used to fix any other component, except | | N |

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|---|---|---|---|
| Clause | Requirement - Test | Result - Remark | Verdict |
| | internal conductors, if so arranged that they are unlikely to be displaced when fitting the supply conductors | | N |
| | If soldered connections used, the conductor so positioned or fixed that reliance is not placed on soldering alone, unless | | N |
| | barriers provided so that neither clearances nor creepage distances between live parts and other metal parts reduced below the values for supplementary insulation if the conductor becomes free at the soldered joint | | N |
| 26.3 | Terminals for type X attachment and for connection of cables of fixed wiring so constructed that the conductor is clamped between metal surfaces with sufficient contact pressure but without damaging the conductor | | N |
| | Terminals fixed so that when the clamping means is tightened or loosened: | | N |
| | - the terminal does not become loose | | N |
| | - internal wiring is not subjected to stress | | N |
| | - neither clearances nor creepage distances are reduced below the values in clause 29 | | N |
| | Compliance checked by inspection and by the test of subclause 9.6 of IEC 60999-1, the torque applied being equal to two-thirds of the torque specified (Nm) .....: | | N |
| | No deep or sharp indentations of the conductors | | N |
| 26.4 | Terminals for type X attachment, except those having a specially prepared cord and those for the connection of cables of fixed wiring, no special preparation of conductors such as by soldering, use of cable lugs, eyelets or similar, and | | N |
| | so constructed or placed that conductors prevented from slipping out when clamping screws or nuts are tightened | | N |
| 26.5 | Terminals for type X attachment so located or shielded that if a wire of a stranded conductor escapes, no risk of accidental connection to other parts that result in a hazard | | N |
| | Stranded conductor test, 8 mm insulation removed | | N |
| | No contact between live parts and accessible metal parts and, | | N |
| | for class II constructions, between live parts and metal parts separated from accessible metal parts by supplementary insulation only | | N |

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|---|---|---|---|
| Clause | Requirement - Test | Result - Remark | Verdict |
| 26.6 | Terminals for type X attachment and for connection of cables of fixed wiring suitable for connection of conductors with cross-sectional area according to table 13; rated current (A); nominal cross-sectional area (mm²).....: | | N |
| | If a specially prepared cord is used, terminals need only be suitable for that cord | | N |
| 26.7 | Terminals for type X attachment, except in class III appliances not containing live parts, accessible after removal of a cover or part of the enclosure | | N |
| 26.8 | Terminals for the connection of fixed wiring, including the earthing terminal, located close to each other | | N |
| 26.9 | Terminals of the pillar type constructed and located as specified | | N |
| 26.10 | Terminals with screw clamping and screwless terminals not used for flat twin tinsel cords, unless | | P |
| | conductors ends fitted with means suitable for screw terminals | | N |
| | Pull test of 5 N to the connection | | P |
| 26.11 | For type Y and Z attachment, soldered, welded, crimped or similar connections may be used | | P |
| | For Class II appliances, the conductor so positioned or fixed that reliance is not placed on soldering, welding or crimping alone | | P |
| | If soldering, welding or crimping alone used, barriers provided so that clearances and creepage distances between live parts and other metal parts are not reduced below the values for supplementary insulation if the conductor becomes free | | N |
| 27 | PROVISION FOR EARTHING | | P |
| 27.1 | Accessible metal parts of Class 0I and I appliances permanently and reliably connected to an earthing terminal or earthing contact of the appliance inlet | | N |
| | Earthing terminals and earthing contacts not connected to the neutral terminal | | N |
| | Class 0, II and III appliances have no provision for earthing | Class II | P |
| | Safety extra-low voltage circuits not earthed, unless | | N |
| | protective extra-low voltage circuits | | N |
| 27.2 | Clamping means of earthing terminals adequately secured against accidental loosening | | N |

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|---|---|---|---|
| Clause | Requirement - Test | Result - Remark | Verdict |
| | Terminals for the connection of external equipotential bonding conductors allow connection of conductors of 2.5 to 6 mm², and | | N |
| | do not provide earthing continuity between different parts of the appliance, and | | N |
| | conductors cannot be loosened without the aid of a tool | | N |
| 27.3 | For a detachable part having an earth connection and being plugged into another part of the appliance, the earth connection is made before and separated after current-carrying connections when removing the part | | N |
| | For appliances with supply cords, current-carrying conductors become taut before earthing conductor, if the cord slips out of the cord anchorage | | N |
| 27.4 | No risk of corrosion resulting from contact between parts of the earthing terminal and the copper of the earthing conductor or other metal | | N |
| | Parts providing earthing continuity, other than parts of a metal frame or enclosure, have adequate resistance to corrosion | | N |
| | If of steel, these parts provided with an electroplated coating with a thickness at least 5 µm | | N |
| | Adequate protection against rusting of parts of coated or uncoated steel, only intended to provide or transmit contact pressure | | N |
| | In the body of the earthing terminal is a part of a frame or enclosure of aluminium or aluminium 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 the clearances of basic insulation are based on the rated voltage of the appliance | | N |
| | Resistance not exceeding 0,1 Ω at the specified low-resistance test (Ω ) .....: | | N |
| 27.6 | The printed conductors of printed circuit boards not used to provide earthing continuity in hand-held appliances. | | N |
| | They may be used to provide earthing continuity in other appliances if at least two tracks are used with independent soldering points and the appliance complies with 27.5 for each circuit | | N |
| 28 | SCREWS AND CONNECTIONS | | P |

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|---|---|---|---|
| Clause | Requirement - Test | Result - Remark | Verdict |
| 28.1 | Fixings, electrical connections and connections providing earthing continuity withstand mechanical stresses | | P |
| | Screws not of soft metal liable to creep, such as zinc or aluminium | | P |
| | Diameter of screws of insulating material min. 3 mm | | N |
| | Screws of insulating material not used for any electrical connections or connections providing earthing continuity | | N |
| | Screws used for electrical connections or connections providing earthing continuity screwed into metal | | N |
| | Screws not of insulating material if their replacement by a metal screw can impair supplementary or reinforced insulation | | N |
| | For type X attachment, screws to be removed for replacement of supply cord or for user maintenance, not of insulating material if their replacement by a metal screw impairs basic insulation | | N |
| | For screws and nuts; torque-test as specified in table 14.....: | (see appended table) | P |
| 28.2 | Electrical connections and connections providing earthing continuity constructed so that contact pressure is not transmitted through non-ceramic insulating material liable to shrink or distort, unless | | N |
| | there is resiliency in the metallic parts to compensate for shrinkage or distortion of the insulating material | | N |
| | This requirement does not apply to electrical connections in circuits of appliances for which: | | N |
| | • 30.2.2 is applicable and that carry a current not exceeding 0,5 A | | N |
| | • 30.2.3 is applicable and that carry a current not exceeding 0,2 A | | N |
| 28.3 | Space-threaded (sheet metal) screws only used for electrical connections if they clamp the parts together | | N |
| | Thread-cutting (self-tapping) screws and thread rolling screws only used for electrical connections if they generate a full form standard machine screw thread | | N |
| | Thread-cutting (self-tapping) screws not used if they are likely to be operated by the user or installer | | N |

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|---|---|---|---|
| Clause | Requirement - Test | Result - Remark | Verdict |
| | Thread-cutting, thread rolling and space threaded screws may be used in connections providing earthing continuity provided it is not necessary to disturb the connection: | | N |
| | - in normal use, | | N |
| | - during user maintenance, | | N |
| | - when replacing a supply cord having a type X attachment, or | | N |
| | - during installation | | N |
| | At least two screws being used for each connection providing earthing continuity, unless | | N |
| | the screw forms a thread having a length of at least half the diameter of the screw | | N |
| 28.4 | Screws and nuts that make mechanical connection secured against loosening if they also make electrical connections or connections providing earthing continuity | | N |
| | This requirement does not apply to screws in the earthing circuit if at least two screws are used, or | | N |
| | if an alternative earthing circuit is provided | | N |
| | Rivets for electrical connections or connections providing earthing continuity secured against loosening if the connections are subjected to torsion | | N |
| 29 | CLEARANCES, CREEPAGE DISTANCES AND SOLID INSULATION | | P |
| | Clearances, creepage distances and solid insulation withstand electrical stress | | P |
| | For coatings used on printed circuits boards to protect the microenvironment (Type 1) or to provide basic insulation (Type 2), Annex J applies.....: | | N |
| | The microenvironment is pollution degree 1 under type 1 protection | | N |
| | For type 2 protection, the spacing between the conductors before the protection is applied is not less than the values specified in Table 1 of IEC 60664-3 | | N |
| | These values apply to functional, basic, supplementary and reinforced insulation .....: | (see appended table) | P |
| 29.1 | Clearances not less than the values specified in table 16, taking into account the rated impulse voltage for the overvoltage categories of table 15, unless .....: | (see appended table) | P |
| | for basic insulation and functional insulation they comply with the impulse voltage test of clause 14 | | N |

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|---|---|---|---|
| Clause | Requirement - Test | Result - Remark | Verdict |
| | However, if the distances are affected by wear, distortion, movement of the parts or during assembly, the clearances for rated impulse voltages of 1500V and above are increased by 0,5 mm and the impulse voltage test is not applicable | | P |
| | Impulse voltage test is not applicable: | | N |
| | - when the microenvironment is pollution degree 3, or | | N |
| | - for basic insulation of class 0 and class 01 appliances | | N |
| | Appliances are in overvoltage category II | | P |
| | A force of 2 N is applied to bare conductors, other than heating elements | | P |
| | A force of 30 N is applied to accessible surfaces | | P |
| 29.1.1 | Clearances of basic insulation withstand the overvoltages, taking into account the rated impulse voltage | | P |
| | The values of table 16 or the impulse voltage test of clause 14 are applicable .....: | (see appended table) | P |
| | Clearance at the terminals of tubular sheathed heating elements may be reduced to 1,0 mm if the microenvironment is pollution degree 1 | | N |
| | Lacquered conductors of windings considered to be bare conductors | | P |
| 29.1.2 | Clearances of supplementary insulation not less than those specified for basic insulation in table 16 .....: | (see appended table) | P |
| 29.1.3 | Clearances of reinforced insulation not less than those specified for basic insulation in table 16, using the next higher step for rated impulse voltage .....: | (see appended table) | P |
| | For double insulation, with no intermediate conductive part between basic and supplementary insulation, clearances are measured between live parts and the accessible surface, and the insulation system is treated as reinforced insulation | | P |
| 29.1.4 | Clearances for functional insulation are the largest values determined from: | | P |
| | - table 16 based on the rated impulse voltage.....: | (see appended table) | P |
| | - table F.7a in IEC 60664-1, frequency not exceeding 30 kHz | | N |
| | - clause 4 of IEC 60664-4, frequency exceeding 30 kHz | | N |
| | If values of table 16 are largest, the impulse voltage test of clause 14 may be applied instead, unless | | P |

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|---|---|---|---|
| Clause | Requirement - Test | Result - Remark | Verdict |
| | the microenvironment is pollution degree 3, or | | P |
| | the distances can be affected by wear, distortion, movement of the parts or during assembly | | N |
| | However, clearances are not specified if the appliance complies with clause 19 with the functional insulation short-circuited | | N |
| | Lacquered conductors of windings considered to be bare conductors | | P |
| | However, clearances at crossover points are not measured | | P |
| | Clearance between surfaces of PTC heating elements may be reduced to 1mm | | N |
| 29.1.5 | Appliances having higher working voltages than rated voltage, clearances for basic insulation are the largest values determined from: | | N |
| | - table 16 based on the rated impulse voltage.....: | | N |
| | - table F.7a in IEC 60664-1, frequency not exceeding 30 kHz | | N |
| | - clause 4 of IEC 60664-4, frequency exceeding 30 kHz | | N |
| | If clearances for basic insulation are selected from Table F.7a of IEC 60664-1 or Clause 4 of IEC 60664-4, the clearances of supplementary insulation are not less than those specified for basic insulation | | N |
| | If clearances for basic insulation are selected from Table F.7a of IEC 60664-1, the clearances of reinforced insulation dimensioned as specified in Table F.7a are to withstand 160% of the withstand voltage required for basic insulation | | N |
| | If clearances for basic insulation are selected from Clause 4 of IEC 60664-4, the clearances of reinforced insulation are twice the value required for basic insulation | | N |
| | If the secondary winding of a step-down transformer is earthed, or if there is an earthed screen between the primary and secondary windings, clearances of basic insulation on the secondary side not less than those specified in table 16, but using the next lower step for rated impulse voltage | | N |
| | Circuits supplied with a voltage lower than rated voltage, clearances of functional insulation are based on the working voltage used as the rated voltage in table 15 | | N |

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|---|---|---|---|
| Clause | Requirement - Test | Result - Remark | Verdict |
| 29.2 | Creepage distances not less than those appropriate for the working voltage, taking into account the material group and the pollution degree .....: | (see appended table) | P |
| | Pollution degree 2 applies, unless | | P |
| | - precautions taken to protect the insulation; pollution degree 1 | | N |
| | - insulation subjected to conductive pollution; pollution degree 3 | | N |
| | A force of 2 N is applied to bare conductors, other than heating elements | | P |
| | A force of 30 N is applied to accessible surfaces | | P |
| | In a double insulation system, the working voltage for both the basic and supplementary insulation is taken as the working voltage across the complete double insulation system | | P |
| 29.2.1 | Creepage distances of basic insulation not less than specified in table 17 .....: | (see appended table) | P |
| | However, if the working voltage is periodic and has a frequency exceeding 30 kHz, the creepage distances are also determined from table 2 of IEC 60664-4, these values being used if exceeding the values in table 17 .....: | | N |
| | Except for pollution degree 1, corresponding creepage distance not less than the minimum specified for the clearance in table 16, if the clearance has been checked according to the test of clause 14 .....: | | N |
| 29.2.2 | Creepage distances of supplementary insulation at least those specified for basic insulation in table 17, or .....: | (see appended table) | P |
| | Table 2 of IEC 60664-4, as applicable .....: | | N |
| 29.2.3 | Creepage distances of reinforced insulation at least double those specified for basic insulation in table 17, or .....: | (see appended table) | P |
| | Table 2 of IEC 60664-4, as applicable .....: | | N |
| 29.2.4 | Creepage distances of functional insulation not less than specified in table 18 .....: | (see appended table) | P |
| | However, if the working voltage is periodic and has a frequency exceeding 30 kHz, the creepage distances are also determined from table 2 of IEC 60664-4, these values being used if exceeding the values in table 18 .....: | | N |
| | Creepage distances may be reduced if the appliance complies with clause 19 with the functional insulation short-circuited | | N |

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|---|---|---|---|
| Clause | Requirement - Test | Result - Remark | Verdict |
| 29.3 | Supplementary and reinforced insulation have adequate thickness, or a sufficient number of layers, to withstand the electrical stresses | | P |
| | Compliance checked: | | P |
| | - by measurement, in accordance with 29.3.1, or | | P |
| | - by an electric strength test in accordance with 29.3.2, or | | N |
| | - by an assessment of the thermal quality of the material combined with an electric strength test, in accordance with 29.3.3, and | | N |
| | for accessible parts of reinforced insulation consisting of a single layer, by measurement in accordance with 29.3.4, or | | N |
| | - as specified in subclause 6.3 of IEC 60664-4 for insulation that is subjected to any periodic voltage having a frequency exceeding 30 kHz | | N |
| 29.3.1 | Supplementary insulation have a thickness of at least 1 mm | | P |
| | Reinforced insulation have a thickness of at least 2 mm | | P |
| 29.3.2 | Each layer of material withstand the electric strength test of 16.3 for supplementary insulation | | N |
| | Supplementary insulation consist of at least 2 layers | | N |
| | Reinforced insulation consist of at least 3 layers | | N |
| 29.3.3 | The insulation is subjected to the dry heat test Bb of IEC 60068-2-2, followed by | | N |
| | the electric strength test of 16.3 | | N |
| | If the temperature rise during the tests of clause 19 does not exceed the value specified in table 3, the test of IEC 60068-2-2 is not carried out | | N |
| 29.3.4 | Thickness of accessible parts of reinforced insulation consisting of a single layer not less than specified in table 19 .....: | | N |
| 30 | RESISTANCE TO HEAT AND FIRE | | P |
| 30.1 | External parts of non-metallic material, | | P |
| | parts supporting live parts, and | | P |
| | parts of thermoplastic material providing supplementary or reinforced insulation | | P |
| | sufficiently resistant to heat | | P |
| | Ball-pressure test according to IEC 60695-10-2 | | P |

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|---|---|---|---|
| Clause | Requirement - Test | Result - Remark | Verdict |
| | External parts tested at 40 °C plus the maximum temperature rise determined during the test of clause 11, or at 75 °C, whichever is the higher; temperature (°C) .....: | (see appended table) | P |
| | Parts supporting live parts tested at 40°C plus the maximum temperature rise determined during the test of clause 11, or at 125 °C, whichever is the higher; temperature (°C) .....: | (see appended table) | P |
| | Parts of thermoplastic material providing supplementary or reinforced insulation tested at 25 °C plus the maximum temperature rise determined during clause 19, if higher; temperature (°C).....: | (see appended table) | N |
| 30.2 | Parts of non-metallic material resistant to ignition and spread of fire | | P |
| | This requirement does not apply to: | | N |
| | parts having a mass not exceeding 0,5 g, provided the cumulative effect is unlikely to propagate flames that originate inside the appliance by propagating flames from one part to another, or | | N |
| | decorative trims, knobs and other parts unlikely to be ignited or to propagate flames that originate inside the appliance | | N |
| | Compliance checked by the test of 30.2.1, and in addition: | | P |
| | - for attended appliances, 30.2.2 applies | | N |
| | - for unattended appliances, 30.2.3 applies | | P |
| | For appliances for remote operation, 30.2.3 applies | | N |
| | For base material of printed circuit boards, 30.2.4 applies | | P |
| 30.2.1 | Parts of non-metallic material subjected to the glow-wire test of IEC 60695-2-11 at 550 °C | | P |
| | However, test not carried out if the material is classified as having a glow-wire flammability index according to IEC 60695-2-12 of at least 550 °C, or | | N |
| | the material is classified at least HB40 according to IEC 60695-11-10 | | N |
| | Parts for which the glow-wire test cannot be carried out need to meet the requirements in ISO 9772 for material classified HBF | | N |
| 30.2.2 | Appliances operated while attended, parts of non-metallic material supporting current-carrying connections, and | | N |
| | parts of non-metallic material within a distance of 3mm of such connections, | | N |

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|---|---|---|---|
| Clause | Requirement - Test | Result - Remark | Verdict |
| | subjected to the glow-wire test of IEC 60695-2-11 | | N |
| | The test severity is: | | N |
| | - 750 °C, for connections carrying a current exceeding 0,5 A during normal operation | | N |
| | - 650 °C, for other connections | | N |
| | Glow-wire applied to an interposed shielding material, if relevant | | N |
| | The glow-wire test is not carried out on parts of material classified as having a glow-wire flammability index according to IEC 60695-2-12 of at least: | | N |
| | - 750 °C, for connections carrying a current exceeding 0,5 A during normal operation | | N |
| | - 650 °C, for other connections | | N |
| | The glow-wire test is also not carried out on small parts. These parts are to: | | N |
| | - comprise material having a glow-wire flammability index of at least 750 °C, or 650 °C as appropriate, or | | N |
| | - comply with the needle-flame test of Annex E, or | | N |
| | - comprise material classified as V-0 or V-1 according to IEC 60695-11-10 .....: | | N |
| | Glow-wire test not applicable to conditions as specified .....: | | N |
| 30.2.3 | Appliances operated while unattended, tested as specified in 30.2.3.1 and 30.2.3.2 | | P |
| | The tests are not applicable to conditions as specified .....: | | N |
| 30.2.3.1 | Parts of non-metallic material supporting connections carrying a current exceeding 0,2 A during normal operation, and | | P |
| | parts of non-metallic material, other than small parts, within a distance of 3 mm, | | P |
| | subjected to the glow-wire test of IEC 60695-2-11 with a test severity of 850 °C | | P |
| | Glow-wire applied to an interposed shielding material, if relevant | | P |
| | The glow-wire test is not carried out on parts of material classified as having a glow-wire flammability index according to IEC 60695-2-12 of at least 850 °C | | N |
| 30.2.3.2 | Parts of non-metallic material supporting connections, and | | P |
| | parts of non-metallic material within a distance of 3mm, | | P |

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|---|---|---|---|
| Clause | Requirement - Test | Result - Remark | Verdict |
| | subjected to glow-wire test of IEC 60695-2-11 | | P |
| | The test severity is: | | P |
| | - 750 °C, for connections carrying a current exceeding 0,2 A during normal operation | | P |
| | - 650 °C, for other connections | | P |
| | Glow-wire applied to an interposed shielding material, if relevant | | P |
| | However, the glow-wire test of 750 °C or 650 °C as appropriate, is not carried out on parts of material fulfilling both or either of the following classifications: | | N |
| | - a glow-wire ignition temperature according to IEC 60695-2-13 of at least: | | N |
| | • 775 °C, for connections carrying a current exceeding 0,2 A during normal operation | | N |
| | • 675 °C, for other connections | | N |
| | - a glow-wire flammability index according to IEC 60695-2-12 of at least: | | N |
| | - 750 °C, for connections carrying a current exceeding 0,2 A during normal operation | | N |
| | - 650 °C, for other connections | | N |
| | The glow-wire test is also not carried out on small parts. These parts are to: | | N |
| | - comprise material having a glow-wire ignition temperature of at least 775 °C or 675 °C as appropriate, or | | N |
| | - comprise material having a glow-wire flammability index of at least 750 °C or 650 °C as appropriate, or | | N |
| | - comply with the needle-flame test of Annex E, or | | N |
| | - comprise material classified as V-0 or V-1 according to IEC 60695-11-10 | | N |
| | The consequential needle-flame test of Annex E applied to non-metallic parts that encroach within the vertical cylinder placed above the centre of the connection zone and on top of the non-metallic parts supporting current-carrying connections, and parts of non-metallic material within a distance of 3 mm of such connections if these parts are those: | | N |
| | - parts that withstood the glow-wire test of IEC 60695-2-11 of 750 °C or 650 °C as appropriate, but produce a flame that persist longer than 2 s, or | | N |
| | - parts that comprised material having a glow-wire flammability index of at least 750 °C or 650 °C as appropriate, or | | N |

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|---|---|---|---|
| Clause | Requirement - Test | Result - Remark | Verdict |
| | - small parts, that comprised material having a glow-wire flammability index of at least 750 °C or 650 °C as appropriate, or | | N |
| | - small parts for which the needle-flame test of Annex E was applied, or | | N |
| | - small parts for which a material classification of V-0 or V-1 was applied | | N |
| | However, the consequential needle-flame test is not carried out on non-metallic parts, including small parts, within the cylinder that are: | | N |
| | - parts having a glow-wire ignition temperature of at least 775 °C or 675 °C as appropriate, or | | N |
| | - parts comprising material classified as V-0 or V-1 according to IEC 60695-11-10, or | | N |
| | - parts shielded by a flame barrier that meets the needle-flame test of Annex E or that comprises material classified as V-0 or V-1 according to IEC 60695-11-10 | | N |
| 30.2.4 | Base material of printed circuit boards subjected to the needle-flame test of Annex E | | P |
| | Test not applicable to conditions as specified.....: | | N |
| 31 | RESISTANCE TO RUSTING | | P |
| | Relevant ferrous parts adequately protected against rusting | | P |
| | Tests specified in part 2 when necessary | | N |
| 32 | RADIATION, TOXICITY AND SIMILAR HAZARDS | | P |
| | Appliance does not emit harmful radiation or present a toxic or similar hazard due to their operation in normal use | Everyone must leave the scene when the appliance is in normal use. | P |
| | Compliance is checked by the limits or tests specified in part 2, if relevant | | N |
| A | ANNEX A (INFORMATIVE)<br>ROUTINE TESTS | | N |
| | Description of routine tests to be carried out by the manufacturer | | N |
| B | ANNEX B (NORMATIVE)<br>APPLIANCES POWERED BY RECHARGEABLE BATTERIES | | N |
| | The following modifications to this standard are applicable for appliances powered by batteries that are recharged in the appliance | | N |
| | This annex does not apply to battery chargers | | N |
| 3.1.9 | Appliance operated under the following conditions: | | N |

| IEC 60335-1 | | | |
|---|---|---|---|
| Clause | Requirement - Test | Result - Remark | Verdict |
| | - the appliance, supplied by its fully charged battery, operated as specified in relevant part 2 | | N |
| | - the battery is charged, the battery being initially discharged to such an extent that the appliance cannot operate | | N |
| | -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 |
| | - if the appliance incorporates inductive coupling between two parts that are detachable from each other, the appliance is supplied from the supply mains with the detachable part removed | | N |
| 3.6.2 | Part to be removed in order to discard the battery is not considered to be detachable | | N |
| 5.B.101 | Appliances supplied from the supply mains tested as specified for motor-operated appliances | | N |
| 7.1 | Battery compartment for batteries intended to be replaced by the user, marked with battery voltage and polarity of the terminals | | N |
| | The positive terminal indicated by symbol IEC 60417-5005 and the negative terminal by symbol IEC 60417-5006 | | N |
| 7.6 | Symbols 60417-5005 and IEC 60417-5006 | | N |
| 7.12 | The instructions give information regarding charging | | N |
| | The instructions for appliances incorporating batteries intended to be replaced by the user includes required information | | N |
| | Details about how to remove batteries containing materials hazardous to the environment given | | N |
| 7.15 | Markings placed on the part of the appliance connected to the supply mains | | N |
| 8.2 | Appliances having batteries that according to the instruction may be replaced by the user need only have basic insulation between live parts and the inner surface of the battery compartment | | N |
| | If the appliance can be operated without batteries, double or reinforced insulation required | | N |
| 11.7 | The battery is charged for the period stated in the instructions or 24 h.....: | | N |
| 19.1 | Appliances subjected to tests of 19.B.101, 19.B.102 and 19.B.103 | | N |
| 19.10 | Not applicable | | N |

| IEC 60335-1 | | | |
|---|---|---|---|
| Clause | Requirement - Test | Result - Remark | Verdict |
| 19.B.101 | Appliances supplied at rated voltage for 168 h, the battery being continually charged | | N |
| 19.B.102 | For appliances having batteries that can be removed without the aid of a tool, short-circuit of the terminals of the battery, the battery being fully charged, | | N |
| 19.B.103 | Appliances having batteries replaceable by the user supplied at rated voltage under normal operation with the battery removed or in any position allowed by the construction | | N |
| 21.B.101 | Appliances having pins for insertion into socket-outlets have adequate mechanical strength | | N |
| | Part of the appliance incorporating the pins subjected to the free fall test, procedure 2, of IEC 60068-2-31, the number of falls being: | | N |
| | - 100, if the mass of the part does not exceed 250 g (g) .....: | | N |
| | - 50, if the mass of the part exceeds 250 g.....: | | N |
| | After the test, the requirements of 8.1, 15.1.1, 16.3 and clause 29 are met | | N |
| 22.3 | Appliances having pins for insertion into socket-outlets tested as fully assembled as possible | | N |
| 25.13 | An additional lining or bushing not required for interconnection cords in class III appliances or class III constructions operating at safety extra-low voltage not containing live parts | | N |
| 30.2 | For parts of the appliance connected to the supply mains during the charging period, 30.2.3 applies | | N |
| | For other parts, 30.2.2 applies | | N |
| C | ANNEX C (NORMATIVE)<br>AGEING TEST ON MOTORS | | N |
| | Tests, as described, carried out when doubt with regard to the temperature classification of the insulation of a motor winding | | N |
| | Test conditions as specified | | N |
| D | ANNEX D (NORMATIVE)<br>THERMAL MOTOR PROTECTORS | | N |
| | Applicable to appliances having motors that incorporate thermal motor protectors necessary for compliance with the standard | | N |
| | Test conditions as specified | | N |
| E | ANNEX E (NORMATIVE)<br>NEEDLE-FLAME TEST | | P |
| | Needle-flame test carried out in accordance with IEC 60695-11-5, with the following modifications: | | P |

| IEC 60335-1 | | | |
|---|---|---|---|
| Clause | Requirement - Test | Result - Remark | Verdict |
| 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 |
| 11 | Evaluation of test results | | P |
| | The duration of burning not exceeding 30 s | | N |
| | However, for printed circuit boards, the duration of burning not exceeding 15 s | | P |
| F | ANNEX F (NORMATIVE)<br>CAPACITORS | | N |
| | Capacitors likely to be permanently subjected to the supply voltage, and used for radio interference suppression or voltage dividing, comply with the following clauses of IEC 60384-14, with the following modifications: | | N |
| 1.5 | Terms and definitions | | N |
| 1.5.3 | Class X capacitors tested according to subclass X2 | | N |
| 1.5.4 | This subclause is applicable | | N |
| 1.6 | Marking | | N |
| | Items a) and b) are applicable | | N |
| 3.4 | Approval testing | | N |
| 3.4.3.2 | Table 3 is applicable as described | | N |
| 4.1 | Visual examination and check of dimensions | | N |
| | This subclause is applicable | | N |
| 4.2 | Electrical tests | | N |
| 4.2.1 | This subclause is applicable | | N |
| 4.2.5 | This subclause is applicable | | N |
| 4.2.5.2 | Only table 11 is applicable | | N |
| | Values for test A apply | | N |
| | However, for capacitors in heating appliances the values for test B or C apply | | N |

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|---|---|---|---|
| Clause | Requirement - Test | Result - Remark | Verdict |
| 4.12 | Damp heat, steady state | | N |
| | This subclause is applicable | | N |
| | Only insulation resistance and voltage proof are checked | | N |
| 4.13 | Impulse voltage | | N |
| | This subclause is applicable | | N |
| 4.14 | Endurance | | N |
| | Subclauses 4.14.1, 4.14.3, 4.14.4 and 4.14.7 are applicable | | N |
| 4.14.7 | Only insulation resistance and voltage proof are checked | | N |
| | No visible damage | | N |
| 4.17 | Passive flammability test | | N |
| | This subclause is applicable | | N |
| 4.18 | Active flammability test | | N |
| | This subclause is applicable | | N |
| G | ANNEX G (NORMATIVE)<br>SAFETY ISOLATING TRANSFORMERS | | N |
| | The following modifications to this standard are applicable for safety isolating transformers: | | N |
| 7 | Marking and instructions | | N |
| 7.1 | Transformers for specific use marked with: | | N |
| | -name, trademark or identification mark of the manufacturer or responsible vendor .....: | | N |
| | -model or type reference .....: | | N |
| 17 | Overload protection of transformers and associated circuits | | N |
| | Fail-safe transformers comply with subclause 15.5 of IEC 61558-1 | | N |
| 22 | Construction | | N |
| | Subclauses 19.1 and 19.1.2 of IEC 61558-2-6 are applicable | | N |
| 29 | Clearances, creepage distances and solid insulation | | N |
| 29.1, 29.2, 29.3 | The distances specified in items 2a, 2c and 3 in table 13 of IEC 61558-1 apply | | N |
| | For insulated winding wires complying with subclause 19.12.3 of IEC 61558-1 there are no requirements for clearances or creepage distances | | N |
| | For windings providing reinforced insulation, the distance specified in item 2c of table 13 of IEC 61558-1 is not assessed | | N |

| IEC 60335-1 | | | |
|---|---|---|---|
| Clause | Requirement - Test | Result - Remark | Verdict |
| | 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 |
| H | ANNEX H (NORMATIVE)<br>SWITCHES | | N |
| | Switches comply with the following clauses of IEC 61058-1, as modified below: | | N |
| | The tests of IEC 61058-1 carried out under the conditions occurring in the appliance | | N |
| | Before being tested, switches are operated 20 times without load | | N |
| 8 | Marking and documentation | | N |
| | Switches are not required to be marked | | N |
| | However, a switch that can be tested separately from the appliance marked with the manufacturer's name or trade mark and the type reference | | N |
| 13 | Mechanism | | N |
| | The tests may be carried out on a separate sample | | N |
| 15 | Insulation resistance and dielectric strength | | N |
| 15.1 | Not applicable | | N |
| 15.2 | Not applicable | | N |
| 15.3 | Applicable for full disconnection and micro-disconnection | | N |
| 17 | Endurance | | N |
| | Compliance is checked on three separate appliances or switches | | N |
| | For 17.2.4.4, the number of cycles declared according to 7.1.4 is 10 000, unless | | N |
| | otherwise specified in 24.1.3 of the relevant part 2 of IEC 60335 .....: | | N |
| | Switches for operation under no load and which can be operated only by a tool, and | | N |
| | switches operated by hand that are interlocked so that they cannot be operated under load, | | N |
| | are not subjected to the tests | | N |
| | However, switches without this interlock are subjected to the test of 17.2.4.4 for 100 cycles of operation | | N |
| | Subclauses 17.2.2 and 17.2.5.2 not applicable | | N |

| IEC 60335-1 | | | |
|---|---|---|---|
| Clause | Requirement - Test | Result - Remark | Verdict |
| | The ambient temperature during the test is that occurring in the appliance during the test of Clause 11 in IEC 60335-1 | | N |
| | The temperature rise of the terminals not more than 30 K above the temperature rise measured in clause 11 of IEC 60335-1 (K).....: | | N |
| 20 | Clearances, creepage distances, solid insulation and coatings of rigid printed board assemblies | | N |
| | This clause is applicable to clearances and creepage distances for functional insulation, across full disconnection and micro-disconnection, as stated in table 24 | | N |
| I | ANNEX I (NORMATIVE)<br>MOTORS HAVING BASIC INSULATION THAT IS INADEQUATE FOR THE RATED VOLTAGE OF THE APPLIANCE | | N |
| | The following modifications to this standard are applicable for motors having basic insulation that is inadequate for the rated voltage of the appliance: | | N |
| 8 | Protection against access to live parts | | N |
| 8.1 | Metal parts of the motor are considered to be bare live parts | | N |
| 11 | Heating | | N |
| 11.3 | The temperature rise of the body of the motor is determined instead of the temperature rise of the windings | | N |
| 11.8 | The temperature rise of the body of the motor, where in contact with insulating material, not exceeding values in table 3 for the relevant insulating material | | N |
| 16 | Leakage current and electric strength | | N |
| 16.3 | Insulation between live parts of the motor and its other metal parts is not subjected to the test | | N |
| 19 | Abnormal operation | | N |
| 19.1 | The tests of 19.7 to 19.9 are not carried out | | N |
| 19.I.101 | Appliance operated at rated voltage with each of the following fault conditions: | | N |
| | - short circuit of the terminals of the motor, including any capacitor incorporated in the motor circuit | | N |
| | - short circuit of each diode of the rectifier | | N |
| | - open circuit of the supply to the motor | | N |
| | - open circuit of any parallel resistor, the motor being in operation | | N |
| | Only one fault simulated at a time, the tests carried out consecutively | | N |

| IEC 60335-1 | | | |
|---|---|---|---|
| Clause | Requirement - Test | Result - Remark | Verdict |
| 22 | Construction | | N |
| 22.I.101 | For class I appliances incorporating a motor supplied by a rectifier circuit, the d.c. circuit being insulated from accessible parts of the appliance by double or reinforced insulation | | N |
| | Compliance checked by the tests specified for double and reinforced insulation | | N |
| J | ANNEX J (NORMATIVE)<br>COATED PRINTED CIRCUIT BOARDS | | N |
| | Testing of protective coatings of printed circuit boards carried out in accordance with IEC 60664-3 with the following modifications: | | N |
| 5.7 | Conditioning of the test specimens | | N |
| | When production samples are used, three samples of the printed circuit board are tested | | N |
| 5.7.1 | Cold | | N |
| | The test is carried out at -25 °C | | N |
| 5.7.3 | Rapid change of temperature | | N |
| | Severity 1 is specified | | N |
| 5.9 | Additional tests | | N |
| | This subclause is not applicable | | N |
| K | ANNEX K (NORMATIVE)<br>OVERVOLTAGE CATEGORIES | | 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 |
| | Equipment of overvoltage category III is equipment in fixed installations and for cases where the reliability and the availability of the equipment is subject to special requirements | | N |
| | Equipment of overvoltage category II is energy consuming equipment to be supplied from the fixed installation | | P |
| | If such equipment is subjected to special requirements with regard to reliability and availability, overvoltage category III applies | | N |
| | Equipment of overvoltage category I is equipment for connection to circuits in which measures are taken to limit transient overvoltages to an appropriate low level | | N |

| IEC 60335-1 | | | |
|---|---|---|---|
| Clause | Requirement - Test | Result - Remark | Verdict |
| L | ANNEX L (INFORMATIVE)<br>GUIDANCE FOR THE MEASUREMENT OF CLEARANCES AND CREEPAGE DISTANCES | | P |
| | Information for the determination of clearances and creepage distances | | P |
| M | ANNEX M (NORMATIVE)<br>POLLUTION DEGREE | | 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 |
| | For evaluating creepage distances, the following degrees of pollution in the microenvironment are established: | | P |
| | - Pollution degree 1: no pollution or only dry, non-conductive pollution occurs. The pollution has no influence | | N |
| | - pollution degree 2: only non-conductive pollution occurs, except that occasionally a temporary conductivity caused by condensation is to be expected | | P |
| | - pollution degree 3: conductive pollution occurs or dry non-conductive pollution occurs that becomes conductive due to condensation that is to be expected | | N |
| | - pollution degree 4: the pollution generates persistent conductivity caused by conductive dust or by rain or snow | | N |
| N | ANNEX N (NORMATIVE)<br>PROOF TRACKING TEST | | P |
| | The proof tracking test is carried out in accordance with IEC 60112 with the following modifications: | | P |
| 7 | Test apparatus | | P |
| 7.3 | Test solutions | | P |
| | Test solution A is used | | P |
| 10 | Determination of proof tracking index (PTI) | | P |
| 10.1 | Procedure | | P |

| IEC 60335-1 | | | |
|---|---|---|---|
| Clause | Requirement - Test | Result - Remark | Verdict |
| | The proof voltage is 100V, 175V, 400V or 600V...: | 175V | P |
| | The test is carried out on five specimens | | P |
| | In case of doubt, additional test with proof voltage reduced by 25V, the number of drops increased to 100 | | N |
| 10.2 | Report | | P |
| | The report states if the PTI value was based on a test using 100 drops with a test voltage of (PTI-25) V | | N |
| O | ANNEX O (INFORMATIVE)<br>SELECTION AND SEQUENCE OF THE TESTS OF CLAUSE 30 | | P |
| | Description of tests for determination of resistance to heat and fire | | P |
| P | ANNEX P (INFORMATIVE)<br>GUIDANCE FOR THE APPLICATION OF THIS STANDARD TO APPLIANCES USED IN WARM DAMP EQUABLE CLIMATES | | N |
| | 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 |
| | 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 |
| 5.7 | The ambient temperature for the tests of clauses 11 and 13 is 40 +3/0 °C | | N |
| 7.1 | The appliance marked with the letters WDaE | | N |
| 7.12 | The instructions state that the appliance is to be supplied through a residual current device (RCD) having a rated residual operating current not exceeding 30 mA | | N |
| | The instructions state that the appliance is considered to be suitable for use in countries having a warm damp equable climate, but may also be used in other countries | | N |
| 11.8 | The values of Table 3 are reduced by 15 K | | N |
| 13.2 | The leakage current for class I appliances not exceeding 0,5 mA | | N |
| 15.3 | The value of t is 37 °C | | N |
| 16.2 | The leakage current for class I appliances not exceeding 0,5 mA (mA): | | N |
| 19.13 | The leakage current test of 16.2 is applied in addition to the electric strength test of 16.3 | | N |
| Q | ANNEX Q (INFORMATIVE)<br>SEQUENCE OF TESTS FOR THE EVALUATION OF ELECTRONIC CIRCUITS | | P |

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

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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 |
| R.2.2.4 | For programmable electronic circuits with functions requiring software incorporating measures to control the fault/error conditions specified in table R.1 or R.2, the programmable electronic circuits incorporate measures to address the fault/errors in safety-related segments and data indicated in table R.1 and R.2 as appropriate | | N |
| R.2.2.5 | For programmable electronic circuits with functions requiring software incorporating measures to control the fault/error conditions specified in table R.1 or R.2, detection of a fault/error occur before compliance with clause 19 is impaired | | N |
| R.2.2.6 | The software is referenced to relevant parts of the operating sequence and the associated hardware functions | | N |
| R.2.2.7 | Labels used for memory locations are unique | | N |
| R.2.2.8 | The software is protected from user alteration of safety-related segments and data | | N |
| R.2.2.9 | Software and safety-related hardware under its control is initialized and terminates before compliance with clause 19 is impaired | | N |
| R.3 | Measures to avoid errors | | N |
| R.3.1 | General | | N |
| | For programmable electronic circuits with functions requiring software incorporating measures to control the fault/error conditions specified in table R.1 or R.2, the following measures to avoid systematic fault in the software are applied | | N |
| | Software that incorporates measures used to control the fault/error conditions specified in table R.2 is inherently acceptable for software required to control the fault/error conditions specified in table R.1 | | N |
| R.3.2 | Specification | | N |
| R.3.2.1 | Software safety requirements: | Software Id: | N |
| | The specification of the software safety requirements includes the descriptions listed | | N |
| R.3.2.2 | Software architecture | | N |

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

| TABLE R.1 [e] – GENERAL FAULT/ERROR CONDITIONS | | | | | | |
|---|---|---|---|---|---|---|
| Component [a] | Fault/error | Acceptable measures [b, c] | Definitions | Document reference for applied measure | Document reference for applied test | Ver-dict |

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|---|---|---|---|
| Clause | Requirement - Test | Result - Remark | Verdict |

| | | | | | | |
|---|---|---|---|---|---|---|
| 1 CPU<br>1.1 Registers | Stuck at | Functional test, or<br>periodic self-test using either:<br>- static memory test, or<br>- word protection with single bit redundancy | H.2.16.5<br>H.2.16.6<br>H.2.19.6<br>H.2.19.8.2 | | | N |
| 1.2 VOID | | | | | | N |
| 1.3 Programme counter | Stuck at | Functional test, or<br>Periodic self-test, or<br>Independent time-slot monitoring, or<br>Logical monitoring of the programme sequence | H.2.16.5<br>H.2.16.6<br>H.2.18.10.4<br>H.2.18.10.2 | | | N |
| 2 Interrupt handling and execution | No interrupt or too frequent interrupt | Functional test, or<br>time-slot monitoring | H.2.16.5<br>H.2.18.10.4 | | | N |
| 3 Clock | Wrong frequency (for quartz synchronized clock: harmonics/ sub-harmonics only) | Frequency monitoring, or<br>time slot monitoring | H.2.18.10.1<br>H.2.18.10.4 | | | N |
| 4. Memory<br>4.1 Invariable memory | All single bit faults | Periodic modified checksum, or<br>multiple checksum, or<br>word protection with single bit redundancy | H.2.19.3.1<br>H.2.19.3.2<br>H.2.19.8.2 | | | N |
| 4.2 Variable memory | DC fault | Periodic static memory test, or<br>word protection with single bit redundancy | H.2.19.6<br>H.2.19.8.2 | | | N |
| 4.3 Addressing (relevant to variable and invariable memory) | Stuck at | Word protection with single bit redundancy including the address | H.2.19.8.2 | | | N |

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|---|---|---|---|
| Clause | Requirement - Test | Result - Remark | Verdict |

| | | | | | | |
|---|---|---|---|---|---|---|
| 5 Internal data path | Stuck at | Word protection with single bit redundancy | H.2.19.8.2 | | | N |
| 5.1 VOID | | | | | | N |
| 5.2 Addressing | Wrong address | Word protection with single bit redundancy including the address | H.2.19.8.2 | | | N |
| 6 External communication | Hamming distance 3 | Word protection with multi-bit redundancy, or<br>CRC – single work, or<br>Transfer redundancy, or<br>Protocol test | H.2.19.8.1<br>H.2.19.4.1<br>H.2.18.2.2<br>H.2.18.14 | | | N |
| 6.1 VOID | | | | | | N |
| 6.2 VOID | | | | | | N |
| 6.3 Timing | Wrong point in time | Time-slot monitoring, or<br>scheduled transmission<br>Time-slot and logical monitoring, or<br>comparison of redundant communication channels by either:<br>- reciprocal comparison<br>- independent hardware comparator | H.2.18.10.4<br>H.2.18.18<br>H.2.18.10.3<br><br><br>H.2.18.15<br>H.2.18.3 | | | N |
| | Wrong sequence | Logical monitoring, or<br>time-slot monitoring, or<br>Scheduled transmission | H.2.18.10.2<br>H.2.18.10.4<br>H.2.18.18 | | | |
| 7 Input/output periphery | Fault conditions specified in 19.11.2 | Plausibility check | H.2.18.13 | | | N |
| 7.1 VOID | | | | | | N |
| 7.2 Analog I/O<br>7.2.1 A/D and D/A-converter | Fault conditions specified in 19.11.2 | Plausibility check | H.2.18.13 | | | N |
| 7.2.2 Analog multiplexer | Wrong addressing | Plausibility check | H.2.18.13 | | | N |
| 8 VOID | | | | | | N |

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|---|---|---|---|---|---|---|
| Clause | Requirement - Test | | Result - Remark | | | Verdict |
| 9 Custom chips [d] e.g. ASIC, GAL, gate array | Any output outside the static and dynamic functional specification | Periodic self-test | H.2.16.6 | | | N |
| NOTE A Stuck-at fault model denotes a fault model representing an open circuit or a non-varying signal level. A DC fault model denotes a stuck-at fault model incorporating short circuit between signal lines. | | | | | | |
| [a] For fault/error assessment, some components are divided into their sub-functions.<br>[b] For each sub-function in the table, the Table R.2 measure will cover the software fault/error.<br>[c] Where more than one measure is given for a sub-function, these are alternatives.<br>[d] To be divided as necessary by the manufacturer into sub-functions.<br>[e] Table R.1 is applied according to the requirements of R.1 to R.2.2.9 inclusive. | | | | | | |

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| 10.1 | TABLE: Power input deviation | | | | | P |
|---|---|---|---|---|---|---|
| Input deviation of/at: | P rated (W) | P measured (W) | dP (W, %) | Required dP (W, %) | Remark | |
| 230V | 38 | 32.6 | -14.2% | +20% | -- | |

| 10.2 | TABLE: Current deviation | | | | | N |
|---|---|---|---|---|---|---|
| Current deviation of/at: | I rated (A) | I measured (A) | dI (A, %) | Required dI (A, %) | Remark | |
| -- | -- | -- | -- | -- | -- | |

| 11.8 | TABLE: Heating test | | | P |
|---|---|---|---|---|
| | Test voltage (V) ..... | Test 1: 0.94x220V=206.8V<br>Test 2: 1.06x240V=254.4V | | — |
| | Ambient, $t_1$ (°C)..... | 23.5, 23.7 | | — |
| | Ambient, $t_2$ (°C)..... | 23.8, 24.0 | | — |

| Thermocouple locations: | Max. temperature rise measured, Δ T (K) | | Max. temperature rise limit, Δ T (K) |
|---|---|---|---|
| | Test 1 | Test 2 | |
| Power cord junction point | 3.2 | 7.8 | 50 |
| Internal wire (hottest) | 32.6 | 47.1 | T105-25=80 |
| PCB surface | 27.6 | 35.4 | Cl.30 |
| Varistor | 47.6 | 52.3 | T85-25=60 |
| X2 capacitor | 36.4 | 45.2 | T85-25=60 |
| Primary winding of transformer | 28.4 | 35.7 | Class 105, 65 |
| Secondary winding of transformer | 32.6 | 41.5 | Class 105, 65 |
| Relay | 37.4 | 44.5 | T85-25=60 |
| Ambient of lamp holder | 48.2 | 56.9 | T140-25=115 |
| Plastic enclosure (inside, hottest) | 33.5 | 46.8 | Cl.30 |
| Plastic enclosure (outside, hottest) | 27.7 | 38.2 | 75 |
| Switch button | 26.5 | 33.4 | 60 |
| Test corner | 18.5 | 28.4 | 65 |

| 13.2 | TABLE: Leakage current | | P |
|---|---|---|---|
| | Heating appliances: 1.15 x rated input (W) .....: | -- | -- |
| | Motor-operated and combined appliances: 1.06 x rated voltage (V).....: | Same as Cl.11.8 | -- |
| Leakage current between | | I (mA) | Max. allowed I (mA) |
| Live part and switch button / plastic enclosure | | 0.023 | 0.35 peak |

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| 13.3 | TABLE: Electric strength | | P |
|---|---|---|---|
| Test voltage applied between: | | Voltage (V) | Breakdown (Yes/No) |
| Live part and switch button / plastic enclosure | | 3000 | No |

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

| 16.2 | TABLE: Leakage current | | | P |
|---|---|---|---|---|
| | Single phase appliances: 1.06 x rated voltage (V) .....: | 254.4V | | -- |
| | Three phase appliances 1.06 x rated voltage divided by √3 (V) .....: | -- | | -- |
| Leakage current between | | I (mA) | Max. allowed I (mA) | |
| Live part and switch button / plastic enclosure | | 0.029 | 0.25 | |

| 16.3 | TABLE: Electric strength | | P |
|---|---|---|---|
| Test voltage applied between: | | Voltage (V) | Breakdown (Yes/No) |
| Live part and switch button / plastic enclosure | | 3000 | No |

| 17 | TABLE: Overload protection, tested at 254.4V | | P |
|---|---|---|---|
| Thermocouple locations: | | Max. temperature rise measured, Δ T (K) | Max. temperature rise limit, Δ T (K) |
| Primary winding of transformer | | 35.7 | Class 105, 150-25=125 |
| Secondary winding of transformer | | 38.9 | Class 105, 150-25=125 |

| 19.7 | TABLE: abnormal operation, temperature rise measurements | | | | | N |
|---|---|---|---|---|---|---|
| | Abnormal conditions: | Supplied at rated voltage 240V; Until steady conditions<br>1) Locking moving parts | | | | -- |
| Temperature rise dT of part/at: | | dT (K) | | Required dT (K) | | |
| -- | | -- | | -- | | |
| | Winding temperature rise measurements : | | | | | P |
| temperature rise dT of winding: | R1 (Ω) | R2 (Ω) | Temperature (°C) | Required (°C) | Insulation class | |

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|---|---|---|---|---|---|
| -- | -- | -- | -- | -- | -- |

| 19.9 | TABLE: Abnormal operation, running overload | | N |
|---|---|---|---|
| | Test voltage (V) ..... : | -- | — |
| | Ambient, t1 (°C) ..... : | -- | — |
| | Ambient, t2 (°C) ..... : | -- | — |

| Temperature of winding | R1 (Ω) | R2 (Ω) | dT (K) | T (°C) | Max. T (°C) |
|---|---|---|---|---|---|
| -- | -- | -- | -- | -- | -- |

| 19.13 | TABLE: Abnormal operation, temperature rises | P |
|---|---|---|
| Thermocouple locations: | Max. temperature rise measured, Δ T (K) | Max. temperature rise limit, Δ T (K) |
| Plastic enclosure (inside, hottest) | 38.4 | Cl.30 |
| Test corner | 34.2 | 150 |

| 24.1 | TABLE: Components information | | | | P |
|---|---|---|---|---|---|
| Object / part No. | Manufacturer/ trademark | Type / model | Technical data | Standard | Mark(s) of conformity1) |
| Plug(for EU market) | Zhongshan Guzhen Hongli Cable & Appliance Factory | HL-6 | 250V~, 2.5A | VDE 0620 | VDE |
| Alternative | Various | Various | 250V~, 2.5A | VDE 0620 | VDE approved |
| Power cord(for EU market) | Zhongshan Guzhen Hongli Cable & Appliance Factory | H03VVH2-F | 2x0.75mm$^2$ | EN 50525-2-11 | VDE |
| Alternative | Various | H03VVH2-F | 2x0.75mm$^2$ | EN 50525-2-11 | VDE approved |
| Alternative | Zhongshan Guzhen Hongli Cable & Appliance Factory | H05RN-F | 2x0.75mm$^2$ | EN 50525-2-21 | VDE |
| Alternative | Various | H05RN-F | 2x0.75mm$^2$ | EN 50525-2-21 | VDE approved |
| Internal wire | ZHONGSHAN CITY BOYU WIRE CO LTD | 1015 | 20AWG, 600V, 105℃ | -- | UL |
| Alternative | Various | 1015 | 20AWG, 600V, 105℃ | -- | UL approved |

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| | | | | | |
|---|---|---|---|---|---|
| Ballast | ZhongShan Eagle Electrical Co., Ltd. | -- | Input: 220-240~, 50/60Hz, 0.3A; Output: 43V~; Built-in; ta: 25C; tc: 70℃ | IEC/EN 61347-1 IEC/EN 61347-2-13 | CE |
| Lamp holder | Ningbo Economic & Technical Development Zone Hengda | 2G11-F446 | 500V~, 2A, T140, 2G11 | IEC/EN 60400 | TUVR |
| Plastic enclosure | QIMEI | FR500 | ABS | IEC/EN 60335-1 | Tested with appliance |

| **28.1** | **TABLE: Threaded part torque test** | P |
|---|---|---|

| Threaded part identification | Diameter of thread (mm) | Column number (I, II, or III) | Applied torque (Nm) |
|---|---|---|---|
| Screw for fixing enclosure | 3.0 | II | 0.5 |

| **29.1** | **TABLE: Clearances** | P |
|---|---|---|
| | Overvoltage category ..... ..... ... : | II — |

| | | 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 | N | N | N | N |
| 500 | 0,2* / 0,5 / 0,8** | N | N | N | N | N |
| 800 | 0,2* / 0,5 / 0,8** | N | N | N | N | N |
| 1 500 | 0,5 / 0,8** / 1,0*** | N | N | N | N | N |
| 2 500 | **1,5 / 2,0*** ** | >2.0 | >2.0 | N | >2.0 | P |
| 4 000 | **3,0 / 3,5*** ** | N | N | > 3.5 | N | P |
| 6 000 | 5,5 / 6,0*** | N | N | N | N | N |
| 8 000 | 8,0 / 8,5*** | N | N | N | N | N |
| 10 000 | 11,0 / 11,5*** | N | N | N | N | N |

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 | | | |
| | 1 | **2** | 3 | Type of insulation |

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| | | 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 |
| ≤50 | 0,18 | 0,6 | 0,85 | 1,2 | 1,5 | 1,7 | 1,9 | — | | — | N |
| ≤50 | 0,36 | 1,2 | 1,7 | 2,4 | 3,0 | 3,4 | 3,8 | — | — | | N |
| 125 | 0,28 | 0,75 | 1,05 | 1,5 | 1,9 | 2,1 | 2,4 | | — | — | N |
| 125 | 0,28 | 0,75 | 1,05 | 1,5 | 1,9 | 2,1 | 2,4 | — | | — | N |
| 125 | 0,56 | 1,5 | 2,1 | 3,0 | 3,8 | 4,2 | 4,8 | — | — | | N |
| 250 | 0,56 | 1,25 | 1,8 | **2,5** | 3,2 | 3,6 | 4,0 | > 2.5 | — | — | P |
| 250 | 0,56 | 1,25 | 1,8 | **2,5** | 3,2 | 3,6 | 4,0 | — | > 2.5 | — | P |
| 250 | 1,12 | 2,5 | 3,6 | **5,0** | 6,4 | 7,2 | 8,0 | — | — | > 5.0 | P |
| 400 | 1,0 | 2,0 | 2,8 | 4,0 | 5,0 | 5,6 | 6,3 | | — | — | N |
| 400 | 1,0 | 2,0 | 2,8 | 4,0 | 5,0 | 5,6 | 6,3 | — | | — | N |
| 400 | 2,0 | 4,0 | 5,6 | 8,0 | 10,0 | 11,2 | 12,6 | — | — | | N |
| 500 | 1,3 | 2,5 | 3,6 | 5,0 | 6,3 | 7,1 | 8,0 | | — | — | N |
| 500 | 1,3 | 2,5 | 3,6 | 5,0 | 6,3 | 7,1 | 8,0 | — | | — | N |
| 500 | 2,6 | 5,0 | 7,2 | 10,0 | 12,6 | 14,2 | 16,0 | — | — | | N |
| >630 and ≤800 | 1,8 | 3,2 | 4,5 | 6,3 | 8,0 | 9,0 | 10,0 | | — | — | N |
| >630 and ≤800 | 1,8 | 3,2 | 4,5 | 6,3 | 8,0 | 9,0 | 10,0 | — | | — | N |
| >630 and ≤800 | 3,6 | 6,4 | 9,0 | 12,6 | 16,0 | 18,0 | 20,0 | — | — | | N |
| >800 and ≤1000 | 2,4 | 4,0 | 5,6 | 8,0 | 10,0 | 11,0 | 12,5 | | — | — | N |
| >800 and ≤1000 | 2,4 | 4,0 | 5,6 | 8,0 | 10,0 | 11,0 | 12,5 | — | | — | N |
| >800 and ≤1000 | 4,8 | 8,0 | 11,2 | 16,0 | 20,0 | 22,0 | 25,0 | — | — | | N |
| >1000 and ≤1250 | 3,2 | 5,0 | 7,1 | 10,0 | 12,5 | 14,0 | 16,0 | | — | — | N |
| >1000 and ≤1250 | 3,2 | 5,0 | 7,1 | 10,0 | 12,5 | 14,0 | 16,0 | — | | — | N |
| >1000 and ≤1250 | 6,4 | 10,0 | 14,2 | 20,0 | 25,0 | 28,0 | 32,0 | — | — | | N |
| >1250 and ≤1600 | 4,2 | 6,3 | 9,0 | 12,5 | 16,0 | 18,0 | 20,0 | | — | — | N |
| >1250 and ≤1600 | 4,2 | 6,3 | 9,0 | 12,5 | 16,0 | 18,0 | 20,0 | — | | — | N |
| >1250 and ≤1600 | 8,4 | 12,6 | 18,0 | 25,0 | 32,0 | 36,0 | 40,0 | — | — | | N |
| >1600 and ≤2000 | 5,6 | 8,0 | 11,0 | 16,0 | 20,0 | 22,0 | 25,0 | | — | — | N |
| >1600 and ≤2000 | 5,6 | 8,0 | 11,0 | 16,0 | 20,0 | 22,0 | 25,0 | — | | — | N |
| >1600 and ≤2000 | 11,2 | 16,0 | 22,0 | 32,0 | 40,0 | 44,0 | 50,0 | — | — | | N |
| >2000 and ≤2500 | 7,5 | 10,0 | 14,0 | 20,0 | 25,0 | 28,0 | 32,0 | | — | — | N |
| >2000 and ≤2500 | 7,5 | 10,0 | 14,0 | 20,0 | 25,0 | 28,0 | 32,0 | — | | — | N |

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

Supplementary information:

*) Material group IIIb is allowed if the working voltage does not exceed 50 V
**) B = Basic insulation, S = Supplementary insulation, R = Reinforced insulation

| **29.2** | **TABLE: Creepage distances, functional insulation** | | | | | | | P |
|---|---|---|---|---|---|---|---|---|
| Working voltage (V) | Creepage distance (mm) Pollution degree | | | | | | | |
| | 1 | **2** | | | 3 | | | |
| | | Material group | | | Material group | | | |
| | | I | II | IIIa/IIIb | I | II | IIIa/IIIb*) | Verdict / Remark |
| ≤10 | 0,08 | 0,4 | 0,4 | 0,4 | 1,0 | 1,0 | 1,0 | N |
| 50 | 0,16 | 0,56 | 0,8 | 1,0 | 1,4 | 1,6 | 1,8 | N |
| 125 | 0,25 | 0,71 | 1,0 | 1,4 | 1,8 | 2,0 | 2,2 | N |

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| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 250 | 0,42 | 1,0 | 1,4 | **2,0** | 2,5 | 2,8 | 3,2 | P |
| 400 | 0,75 | 1,6 | 2,2 | 3,2 | 4,0 | 4,5 | 5,0 | N |
| 500 | 1,0 | 2,0 | 2,8 | 4,0 | 5,0 | 5,6 | 6,3 | N |
| >630 and ≤800 | 1,8 | 3,2 | 4,5 | 6,3 | 8,0 | 9,0 | 10,0 | N |
| >800 and ≤1000 | 2,4 | 4,0 | 5,6 | 8,0 | 10,0 | 11,0 | 12,5 | N |
| >1000 and ≤1250 | 3,2 | 5,0 | 7,1 | 10,0 | 12,5 | 14,0 | 16,0 | N |
| >1250 and ≤1600 | 4,2 | 6,3 | 9,0 | 12,5 | 16,0 | 18,0 | 20,0 | N |
| >1600 and ≤2000 | 5,6 | 8,0 | 11,0 | 16,0 | 20,0 | 22,0 | 25,0 | N |
| >2000 and ≤2500 | 7,5 | 10,0 | 14,0 | 20,0 | 25,0 | 28,0 | 32,0 | N |
| >2500 and ≤3200 | 10,0 | 12,5 | 18,0 | 25,0 | 32,0 | 36,0 | 40,0 | N |
| >3200 and ≤4000 | 12,5 | 16,0 | 22,0 | 32,0 | 40,0 | 45,0 | 50,0 | N |
| >4000 and ≤5000 | 16,0 | 20,0 | 28,0 | 40,0 | 50,0 | 56,0 | 63,0 | N |
| >5000 and ≤6300 | 20,0 | 25,0 | 36,0 | 50,0 | 63,0 | 71,0 | 80,0 | N |
| >6300 and ≤8000 | 25,0 | 32,0 | 45,0 | 63,0 | 80,0 | 90,0 | 100,0 | N |
| >8000 and ≤10000 | 32,0 | 40,0 | 56,0 | 80,0 | 100,0 | 110,0 | 125,0 | N |
| >10000 and ≤12500 | 40,0 | 50,0 | 71,0 | 100,0 | 125,0 | 140,0 | 160,0 | N |

Supplementary information:

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

| **30.1** | **TABLE: Ball pressure** | | | P |
|---|---|---|---|---|
| Part | Test temperature (°C) | Impression diameter (mm) | Allowed impression diameter (mm) | |
| PCB material | 125 | 1.0 | 2.0 | |
| Plastic enclosure | 87 | 1.1 | 2.0 | |
| Transformer bobbin | 125 | 1.3 | 2.0 | |

| **30.2** | **TABLE: Glow-wire test** | | | | | | | P |
|---|---|---|---|---|---|---|---|---|
| Part | 550 | 650 | | 750 | | 850 | Needle-flame test (NFT) | verdict |
| | | **te**(s) | **ti**(s) | **te**(s) | **ti**(s) | | | |
| Plastic enclosure | x | -- | -- | -- | -- | -- | -- | P |
| PCB material | -- | -- | -- | 0 | 0 | x | x | P |
| Transformer bobbin | -- | -- | -- | 0 | 0 | x | -- | P |
| Relay | -- | -- | -- | 0 | 0 | x | -- | P |
| Lamp holder | -- | -- | -- | 0 | 0 | x | -- | P |
| X2 capacitor | -- | 0 | 0 | -- | -- | -- | -- | P |

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|---|

| Remark: Ti = the time between glow wire touched the material and the material ignite<br>Te = the time between glow wire touched the material and the flame extinguished; |
|---|

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

| IEC 60335-1 – Attachment 1 | | | |
|---|---|---|---|
| Clause | Requirement + Test | Result - Remark | Verdict |

| **ATTACHMENT TO TEST REPORT IEC 60335-1<br>EUROPEAN GROUP DIFFERENCES AND NATIONAL DIFFERENCES** | | |
|---|---|---|
| **Differences according to** | : | EN 60335-1:2012+A11:2014+A13:2017<br>EN 62233:2008 |

| **Group/CENELEC Common Differences to IEC 60335-1:2010 (5th Edition)** | | | |
|---|---|---|---|
| 6.1 | Delete “class 0” and “class 01” | | N |
| 7.10 | Add: | | N |
| | Devices used to start/stop operational functions of the appliance, if any, shall be distinguished from other manual devices by means of shape, or size, or surface texture, or position, etc. | | P |
| | A tactile feedback or | | P |
| | An audible and visual feedback | | P |
| | NOTE Z1 The sound of the motor or sound of an actuator switching ON/OFF is regarded as audible feedback. The stopping of the typical function (e.g.stopping of the vibration on the body of the appliance or of a part of it) is regarded as tactile means. | | P |
| | NOTE Z2 Devices used to start/stop operational functions mean devices that are operated by the user to start/stop the intended function of the appliance. | | P |
| | A selector switch with an off-position clearly identifiable is allowed. | | N |
| | An ON/OFF switch, if any, is considered a suitable device to stop operational functions. A plug is not considered a suitable device to stop operational functions, as it can be difficult to be reached by vulnerable persons. | | P |
| 7.12 | The instructions shall include the substance of the following: | | P |
| | This appliance can be used by children aged from 8 years and above and persons with reduced physical, sensory or mental capabilities or lack of experience and knowledge if they have been given supervision or instruction concerning use of the appliance in a safe way and understand the hazards involved. Children shall not play with the appliance. Cleaning and user maintenance shall not be made by children without supervision. | | P |

| IEC 60335-1 – Attachment 1 | | | |
|---|---|---|---|
| Clause | Requirement + Test | Result - Remark | Verdict |
| 7.12.Z1 | The specific instructions related to the safe operation of this appliance (as given in 7.12 of this standard) shall be collated together in the front section of the user instructions. The height of the characters, measured on the capital letters, shall be at least 3mm | | P |
| | These instructions shall also be available in an alternative format, e.g. on a website | | P |
| 7.14 | Added: | | P |
| | For the evaluation of legibility and clarity of safety warnings guidance can be found in IEC 62079 | | P |
| 8.1.1 | Replace the 3rd paragraph by the following: | | P |
| | Test probe B and probe 18 of EN 61032 are applied with a force not exceeding 1N,the appliance being in every possible position…… | | P |
| 8.2 | Replace “test probe B of EN 61032” by “test probe of EN 61032” | | P |
| | Replace “test probe B of EN 61032” by “test probe B and probe 18 of EN 61032 are” | | P |
| 11.8 | Delete the sentence ”The temperature rise of the…… “ of the first paragraph. | | P |
| 15.1.2 | Appliances with an automatic cord reel are tested with the cord in the most unfavourable position in such a way that the reeling of the wet cord may affect electrical insulation during operation. The cord shall not be dried before reeling | | N |
| 20 | Replace Note 1 by the following requirement:<br>For appliances having dangerous movable parts, due to their main function, e.g. the needle of a sewing machine, tools of kitchen machines of the blade of an electrical knife, full protection is not possible for performing their intended use. | | N |
| 20.2 | Replaced the 1st paragraph of compliance by:<br>-a test probe that is similar to test probe B of EN 61032 but having a circular stop face with a diameter of 50 mm, instead of the non-circular face, applied with a force of 5N with the accessories and detachable cover removed and<br>- test probe 18 of EN 61032, applied with a force of 2.5N on the appliance in a fully assembled situation. | | N |

| IEC 60335-1 – Attachment 1 | | | |
|---|---|---|---|
| Clause | Requirement + Test | Result - Remark | Verdict |
| 24.1 | Plugs and socket-outlets and other connecting devices of interconnection cords shall not be interchangeable with plugs and socket-outlets listed in IEC/TR 60083 or IEC 6906-1 or with connectors and appliance inlets complying with the standard sheets of IEC 60320-1, if direct supply to these parts from the supply mains could give rise to a hazard | | P |
| 24.1.3 | Add NOTE Z1 For this test a thermostat or timer that is operating the relay or contactor is considered to be a switch | | N |
| 24.1.7 | If the remote operation of the appliance is via a telecommunication network, the relevant standard for the telecommunication interface circuitry in the appliance is EN 41003. | | N |
| 24.Z1 | For motor running capacitors (IEC 60252-1 type P2) with a metallic enclosure having an overpressure fuse the flame testing of internal plastic parts supporting current carrying connections as required in 30.2.2 and 30.2.3.1 is not necessary. | | N |
| 25.6 | Add<br>Supply cords of single-phase portable appliances having a rated current not exceeding 16A shall be fitted with a plug complying with the following standard sheets of IEC/TR60083 | | P |
| 26 | Add after the second sentence in the first paragraph: | | P |
| | Conductors connected by soldering are not considered to be positioned or fixed so that reliance is not placed upon the soldering alone to maintain them in position unless they are held in place near the terminals independently of the solder. | | P |
| 29 | Modification:<br>Replace NOTE 5 by:<br>Attention is drawn on the fact that for appliances intended for use at altitudes exceeding 2000 m, the altitude correction factors, relevant to the intended altitude, for clearances specified in Table A.2 of EN 60664-1:2007 may need to be taken into account. | | N |
| 29.3.Z1 | Appliance shall be constructed so that if there is a possibility of damaging the insulation during installation, the insulation shall withstand the scratch and penetration test of 21.2. | | N |
| Annex ZB | Deleted 7.1 and 29.3 | | N |
| Annex ZF | Table ZF.1 add EN 60335-2-97, drives for rolling shutters, awnings, blinds and similar equipment | | N |
| Annex ZG | Add the following: | | P |

| IEC 60335-1 – Attachment 1 | | | |
|---|---|---|---|
| Clause | Requirement + Test | Result - Remark | Verdict |
| 7.12.ZG | The instructions for appliances incorporating UVC emitters shall include the substance of the following: | | P |
| | WARNING-This appliance contains a UV emitter. Do not stare at the light source. | | P |
| 32 | Add the following: | | P |
| | For appliances incorporating UV emitters the manufacturer's shall deliver a declaration providing evidence that the plastic material exposed to the radiation is UV resistant | | P |
| | NOTE Examples of appliances that may incorporate UVC emitters are range hoods, air cleaners and finger nail hardeners | | P |

| **EN 60335-1: 2012/A11: 2014** | | | |
|---|---|---|---|
| 7 | MARKING AND INSTRUCTIONS (EN 60335-1/A11) | | P |
| 7.1 | (Replacement:)<br>In NOTE Z1, replace "IEC 82079-1" by "EN 82079-1". | | N |
| ZF | ANNEX ZF (INFORMATIVE)<br>CRITERIA APPLIED FOR THE ALLOCATION OF PRODUCTS COVERED BY STANDARDS IN THE EN 60335 SERIES UNDER LVD OR MD(EN 60335-1/A11) | | N |
| | (Replacement:)<br>In Table ZF.1 – List of standards under CLC/TC 61, replace line of EN 60335-2-38 | | N |

| **EN 60335-1:2012/A13:2017** | | |
|---|---|---|
| Annex ZC | Normative references to international publications with their corresponding European publications | P |
| Annex ZZA | Relationship between this European Standard and the safety objectives of Directive 2014/35/EU [2014 OJ L96] aimed to be covered | P |
| Annex ZZB | Relationship between this European Standard and the essential requirements of Directive 2006/42/EC aimed to be covered | N |

| | | | |
|---|---|---|---|
| ANNEX | EMF | | P |
| | The test product also complies with the requirements of EN62233:2008 | | -- |
| | Limit……..100% | Measured Max: 23.487% | P |

====== End of Attachment 1 ======

| EN 60598-2-4 -- Attachment 2 | | | |
|---|---|---|---|
| Clause | Requirement + Test | Result - Remark | Verdict |
| **4.4 (0)** | **GENERAL TEST REQUIREMENTS** | | P |
| 4.4 (0.3) | More sections applicable ..... | Yes ☐ No ☒ | — |
| 4.4 (0.5) | Components | (see Annex 1) | — |
| **4.4 (0.7)** | **Information for luminaire design in light sources standards** | | — |
| 4.4 (0.7.2) | Light source safety standard ..... | EN 61199 | — |
| | Luminaire design in the light source safety standard | | P |
| **4.5 (2)** | **CLASSIFICATION** | | P |
| 4.5 (2.2) | Type of protection ..... | Class II | — |
| 4.5 (2.3) | Degree of protection..... | IP20 | — |
| 4.5 (2.5) | Luminaire for normal use ..... | Yes ☒ No ☐ | — |
| | Luminaire for rough service ..... | Yes ☐ No ☒ | — |
| 4.5.1 (-) | Ordinary luminaire..... | Yes ☒ No ☐ | — |
| 4.5.2 (-) | Portable luminaire for outdoor use..... | Yes ☐ No ☒ | — |
| | Classified IPX4 or higher | | N |
| 4.5.3 (2.4) | Luminaire suitable for direct mounting on normally flammable surfaces ..... | Yes ☒ No ☐ | — |
| **4.6 (3)** | **MARKING** | | P |
| 4.6 (3.2) | Mandatory markings | See copy of marking plate | P |
| | Position of the marking | | P |
| | Format of symbols/text | | P |
| 4.6 (3.3) | Additional information | | P |
| | Language of instructions | In English | P |
| 4.6 (3.3.1) | Combination luminaires | | N |
| 4.6 (3.3.2) | Nominal frequency in Hz | 50/60Hz | P |
| 4.6 (3.3.3) | Operating temperature | | N |
| 4.6 (3.3.4) | Symbol or warning notice | | N |
| 4.6 (3.3.5) | Wiring diagram | | N |
| 4.6 (3.3.6) | Special conditions | | N |
| 4.6 (3.3.7) | Metal halide lamp luminaire – warning | | N |
| 4.6 (3.3.8) | Limitation for semi-luminaires | | N |
| 4.6 (3.3.9) | Power factor and supply current | | N |
| 4.6 (3.3.10) | Suitability for use indoors | | N |
| 4.6 (3.3.11) | Luminaires with remote control | | P |

| EN 60598-2-4 -- Attachment 2 | | | |
|---|---|---|---|
| Clause | Requirement + Test | Result - Remark | Verdict |
| 4.6 (3.3.12) | Clip-mounted luminaire – warning | | N |
| 4.6 (3.3.13) | Specifications of protective shields | | N |
| 4.6 (3.3.14) | Symbol for nature of supply | ~ | P |
| 4.6 (3.3.15) | Rated current of socket outlet | | N |
| 4.6 (3.3.16) | Rough service luminaire | | N |
| 4.6 (3.3.17) | Mounting instruction for type Y, type Z and some type X attachments | Type Y | P |
| 4.6 (3.3.18) | Non-ordinary luminaires with PVC cable | | N |
| 4.6 (3.3.19) | Protective conductor current in instruction if applicable | | N |
| 4.6 (3.3.20) | Provided with information if not intended to be mounted within arm's reach | | N |
| 4.6 (3.3.21) | Non replaceable and non-user replaceable light sources information provided | | N |
| | Cautionary symbol | | N |
| 4.6 (3.3.22) | Controllable luminaires, insulation | | N |
| 4.6 (3.3.23) | Luminaire without controlgear provided with necessary information for selection of appropriate component | | N |
| 4.6 (3.3.24) | If not supplied with terminal block, information on the packaging | | N |
| 4.6 (3.4) | Test with water | | P |
| | Test with hexane | | P |
| | Legible after test | | P |
| | Label attached | | P |
| 4.6.1 (-) | Luminaire not suitable for outdoor application | | N |
| | Required symbol | See copy of user manual | N |
| | Information in the instructions | | N |
| 4.6.2 (-) | Outdoor use, socket outlet incorporated in the luminaire | | N |
| | Maximum power rating marked | | N |
| | Position of the marking | | N |
| **4.7 (4)** | **CONSTRUCTION** | | P |
| 4.7 (4.2) | Components replaceable without difficulty | | P |
| 4.7 (4.3) | Wireways smooth and free from sharp edges | | P |
| 4.7 (4.4) | Lampholders | | P |
| 4.7 (4.4.1) | Integral lampholder | | P |
| 4.7 (4.4.2) | Wiring connection | | P |

| EN 60598-2-4 -- Attachment 2 | | | |
|---|---|---|---|
| Clause | Requirement + Test | Result - Remark | Verdict |
| 4.7 (4.4.3) | Lampholder for end-to-end mounting | | P |
| 4.7 (4.4.4) | Positioning | | P |
| | - pressure test (N) ..... | 30N | — |
| | After test the lampholder comply with relevant standard sheets and show no damage | | P |
| | After test on single-capped lampholder the lampholder have not moved from its position and show no permanent deformation | | P |
| | - bending test (N) ..... | -- | — |
| | After test the lampholder have not moved from its position and show no permanent deformation | | N |
| 4.7 (4.4.5) | Peak pulse voltage | | N |
| 4.7 (4.4.6) | Centre contact | | N |
| 4.7 (4.4.7) | Parts in rough service luminaires resistant to tracking | | N |
| 4.7 (4.4.8) | Lamp connectors | | P |
| 4.7 (4.4.9) | Caps and bases correctly used | | N |
| 4.7 (4.4.10) | Light source for lampholder or connection according IEC 60061 not connected another way | | N |
| 4.7 (4.5) | Starter holders | | N |
| | Starter holder in luminaires other than class II | | N |
| | Starter holder class II construction | | N |
| 4.7 (4.6) | Terminal blocks | | N |
| | Tails | | N |
| | Unsecured blocks | | N |
| 4.7 (4.7) | Terminals and supply connections | | P |
| 4.7 (4.7.1) | Contact to metal parts | | P |
| 4.7 (4.7.2) | Test 8 mm live conductor | | N |
| | Test 8 mm earth conductor | | N |
| 4.7 (4.7.3) | Terminals for supply conductors | | N |
| 4.7 (4.7.3.1) | Welded connections: | | N |
| | - stranded or solid conductor | | N |
| | - spot welding | | N |
| | - welding between wires | | N |
| | - Type Z attachment | | N |
| | - mechanical test according to 15.8.2 | | N |
| | - electrical test according to 15.9 | | N |
| | - heat test according to 15.9.2.3 and 15.9.2.4 | | N |

| EN 60598-2-4 -- Attachment 2 | | | |
|---|---|---|---|
| Clause | Requirement + Test | Result - Remark | Verdict |
| 4.7 (4.7.4) | Terminals other than supply connection | | N |
| 4.7 (4.7.5) | Heat-resistant wiring/sleeves | | N |
| 4.7 (4.7.6) | Multi-pole plug | | N |
| | - test at 30 N | | N |
| 4.7 (4.8) | Switches: | | P |
| | - adequate rating | | P |
| | - adequate fixing | | P |
| | - polarized supply | | N |
| | - compliance with IEC 61058-1 for electronic switches | | P |
| 4.7 (4.9) | Insulating lining and sleeves | | N |
| 4.7 (4.9.1) | Retainment | | N |
| | Method of fixing ..... | -- | — |
| 4.7 (4.9.2) | Insulated linings and sleeves | | N |
| | Resistant to a temperature > 20 °C to the wire temperature or | | N |
| | a) & c) Insulation resistance and electric strength | | N |
| | b) Ageing test. Temperature (°C) ..... | -- | N |
| 4.7 (4.10) | Double or reinforced insulation | | P |
| 4.7 (4.10.1) | No contact, mounting surface – accessible metal parts – wiring of basic insulation | | P |
| | Safe installation fixed luminaires | | N |
| | Capacitors and switches | | P |
| | Interference suppression capacitors according to IEC 60384-14 | | P |
| 4.7 (4.10.2) | Assembly gaps: | | N |
| | - not coincidental | | N |
| | - no straight access with test probe | | N |
| 4.7 (4.10.3) | Retainment of insulation: | | P |
| | - fixed | | P |
| | - unable to be replaced; luminaire inoperative | | P |
| | - sleeves retained in position | | P |
| | - lining in lampholder | | N |
| 4.7 (4.10.4) | Protective impedance device | | N |
| | Double or reinforced insulation bridged by appropriate and at least two resistors or two Y2 capacitors or one Y1 capacitor | | N |
| | Y1 or Y2 capacitors comply with IEC 60384-14 | | N |

| EN 60598-2-4 -- Attachment 2 | | | |
|---|---|---|---|
| Clause | Requirement + Test | Result - Remark | Verdict |
| | Resistors comply with test (a) in 14.1 of IEC 60065 | | N |
| 4.7 (4.11) | Electrical connections and current-carrying parts | | P |
| 4.7 (4.11.1) | Contact pressure | | P |
| 4.7 (4.11.2) | Screws: | | N |
| | - self-tapping screws | | N |
| | - thread-cutting screws | | N |
| 4.7 (4.11.3) | Screw locking: | | N |
| | - spring washer | | N |
| | - rivets | | N |
| 4.7 (4.11.4) | Material of current-carrying parts | | P |
| 4.7 (4.11.5) | No contact to wood or mounting surface | | P |
| 4.7 (4.11.6) | Electro-mechanical contact systems | | N |
| 4.7 (4.12) | Screws and connections (mechanical) and glands | | P |
| 4.7 (4.12.1) | Screws not made of soft metal | | P |
| | Screws of insulating material | | P |
| | Torque test: torque (Nm); part..... | Screws used for fixing bottom cover: 1.2Nm | P |
| | Torque test: torque (Nm); part..... | Screws used for fixing PCB: 0.8Nm | P |
| 4.7 (4.12.2) | Screws with diameter < 3 mm screwed into metal | | N |
| 4.7 (4.12.4) | Locked connections: | | N |
| | - fixed arms; torque (Nm) ..... | -- | N |
| | - lampholder; torque (Nm) ..... | -- | N |
| | - push-button switches; torque 0,8 Nm ..... | -- | N |
| 4.7 (4.12.5) | Screwed glands; force (Nm)..... | -- | N |
| 4.7 (4.13) | Mechanical strength | | P |
| 4.7 (4.13.1) | Impact tests: | | P |
| | - fragile parts; energy (Nm) ..... | -- | N |
| | - other parts; energy (Nm)..... | All enclosure: 0.5 Nm | P |
| | 1) live parts | | P |
| | 2) linings | | N |
| | 3) protection | | P |
| | 4) covers | | P |
| 4.7 (4.13.3) | Straight test finger | All enclosure: 30 N | P |
| 4.7 (4.13.4) | Rough service luminaires | | N |
| | - IP54 or higher | | N |

| EN 60598-2-4 -- Attachment 2 | | | |
|---|---|---|---|
| Clause | Requirement + Test | Result - Remark | Verdict |
| | a) fixed | | N |
| | b) hand-held | | N |
| | c) delivered with a stand | | N |
| | d) for temporary installations and suitable for mounting on a stand | | N |
| 4.7 (4.13.6) | Tumbling barrel | | N |
| 4.7 (4.14) | Suspensions, fixings and means of adjusting | | N |
| 4.7 (4.14.1) | Mechanical load: | | N |
| | A) four times the weight | | N |
| | B) torque 2,5 Nm | | N |
| | C) bracket arm; bending moment (Nm) ..... | -- | N |
| | D) load track-mounted luminaires | | N |
| | E) clip-mounted luminaires, glass-shelve. Thickness (mm) ..... | -- | N |
| | Metal rod. diameter (mm) ..... | -- | N |
| | Fixed luminaire or independent control gear without fixing devices | | N |
| 4.7 (4.14.2) | Load to flexible cables | | N |
| | Mass (kg) ..... | -- | — |
| | Stress in conductors (N/mm²) ..... | -- | N |
| | Mass (kg) of semi-luminaire ..... | -- | — |
| | Bending moment (Nm) of semi-luminaire ..... | -- | N |
| 4.7 (4.14.3) | Adjusting devices: | | N |
| | - flexing test; number of cycles..... | -- | N |
| | - strands broken ..... | -- | N |
| | - electric strength test afterwards | | N |
| 4.7 (4.14.4) | Telescopic tubes: cords not fixed to tube; no strain on conductors | | N |
| 4.7 (4.14.5) | Guide pulleys | | N |
| 4.7 (4.14.6) | Strain on socket-outlets | | N |
| 4.7 (4.15) | Flammable materials: | | P |
| | - glow-wire test 650°C ..... | -- | N |
| | - spacing ≥30 mm | | N |
| | - screen withstanding test of 13.3.1 | | N |
| | - screen dimensions | | N |
| | - no fiercely burning material | | N |
| | - thermal protection | | N |

| EN 60598-2-4 -- Attachment 2 | | | |
|---|---|---|---|
| Clause | Requirement + Test | Result - Remark | Verdict |
| | - electronic circuits exempted | | N |
| 4.7 (4.15.2) | Luminaires made of thermoplastic material with lamp control gear | | P |
| | a) construction | | P |
| | b) temperature sensing control | | N |
| | c) surface temperature | | P |
| 4.7 (4.16) | Luminaires for mounting on normally flammable surfaces | | P |
| | No lamp control gear ..... | (compliance with Section 12) | N |
| 4.7 (4.16.1) | Lamp control gear spacing: | | P |
| | - spacing 35 mm | | N |
| | - spacing 10 mm | | P |
| 4.7 (4.16.2) | Thermal protection: | | N |
| | - in lamp control gear | | N |
| | - external | | N |
| | - fixed position | | N |
| | - temperature marked lamp control gear | | N |
| 4.7 (4.16.3) | Design to satisfy the test of 12.6 | (see clause 12.6) | N |
| 4.7 (4.17) | Drain holes | | N |
| | Clearance at least 5 mm | | N |
| 4.7 (4.18) | Resistance to corrosion: | | P |
| 4.7 (4.18.1) | - rust-resistance | | N |
| 4.7 (4.18.2) | - season cracking in copper | | P |
| 4.7 (4.18.3) | - corrosion of aluminium | | N |
| 4.7 (4.19) | Igniters compatible with ballast | | N |
| 4.7 (4.20) | Rough service vibration | | N |
| 4.7 (4.21) | Protective shield | | N |
| 4.7 (4.21.1) | Shield fitted if tungsten halogen lamps or metal halide lamps | | N |
| | Shield of glass if tungsten halogen lamps | | N |
| 4.7 (4.21.2) | Particles from a shattering lamp not impair safety | | N |
| 4.7 (4.21.3) | No direct path | | N |
| 4.7 (4.21.4) | Impact test on shield | | N |
| | Glow-wire test on lamp compartment ..... | See Test Table 4.15 (13.3.2) | N |
| 4.7 (4.22) | Attachments to lamps not cause overheating or damage | | N |
| 4.7 (4.23) | Semi-luminaires comply Class II | | N |
| 4.7 (4.24) | Photobiological hazards | | P |

| EN 60598-2-4 -- Attachment 2 | | | |
|---|---|---|---|
| Clause | Requirement + Test | Result - Remark | Verdict |
| 4.7 (4.24.1) | No excessive UV radiation if tungsten halogen lamps and metal halide lamps (Annex P) | | P |
| 4.7 (4.24.2) | Retinal blue light hazard | | N |
| | Class of risk group assessed according to IEC/TR 62778 ..... | -- | — |
| | Luminaires with $E_{thr}$ : | | N |
| | a) Fixed luminaires | | N |
| | - distance x m, borderline between RG1 and RG2 . | | N |
| | - marking and instruction according 3.2.23 | | N |
| | b) Portable and handheld luminaires | | N |
| | - marking according 3.2.23 if RG1 exceeded at 200 mm according to IEC/TR 62778 | | N |
| | Portable luminaires for children IEC 60598-2-10 and Mains socket outlet nightlights IEC 60598-2-12 not exceed RG1 at 200 mm according to IEC/62778 | | N |
| 4.7 (4.25) | Mechanical hazard | | P |
| | No sharp point or edges | | P |
| 4.7 (4.26) | Short-circuit protection: | | N |
| 4.7 (4.26.1) | Adequate means of uninsulated accessible SELV parts | | N |
| 4.7 (4.26.2) | Short-circuit test with test chain according 4.26.3 | | N |
| | Test chain not melt through | | N |
| | Test sample not exceed values of Table 12.1 and 12.2 | | N |
| 4.7 (4.27) | Terminal blocks with integrated screwless earthing contacts | | N |
| | Test according Annex V | | N |
| | Pull test of terminal fixing (20 N) | | N |
| | After test, resistance < 0,05 Ω | | N |
| | Pull test of mechanical connection (50 N) | | N |
| | After test, resistance < 0,05 Ω | | N |
| | Voltage drop test, resistance < 0,05 Ω | | N |
| 4.7 (4.28) | Fixing of thermal sensing control | | N |
| | Not plug-in or easily replaceable type | | N |
| | Reliably kept in position | | N |
| | No adhesive fixing if UV radiations from a lamp can degrade the fixing | | N |
| | Not outside the luminaire enclosure | | N |
| | Test of adhesive fixing: | | N |

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|---|---|---|---|
| Clause | Requirement + Test | Result - Remark | Verdict |
| | Max. temperature on adhesive material (°C) ..... | -- | — |
| | 100 cycles between t min and t max | | N |
| | Temperature sensing control still in position | | N |
| 4.7 (4.29) | Luminaires with non-replaceable light source | | N |
| | Not possible to replace light source | | N |
| | Live part not accessible after parts have been opened by hand or tools | | N |
| 4.7 (4.30) | Luminaires with non-user replaceable light source | | N |
| | If protective cover provide protection against electric shock and marked with “caution, electric shock risk” symbol: | | N |
| | Minimum two fixing means | | N |
| 4.7 (4.31) | Insulation between circuits | | P |
| | Circuits insulated from LV supply fulfil requirements according 4.31.1 – 4.31.3 | | P |
| | Controllable luminaires requiring same level of insulation for all components, the insulation between control terminals and LV supply fulfil requirements according 4.31.1 – 4.31.3 | | N |
| 4.7 (4.31.1) | SELV circuits | | N |
| | Used SELV source | | N |
| | Voltage ≤ ELV | | N |
| | Insulating of SELV circuits from LV supply | | N |
| | Insulating of SELV circuits from other non SELV circuits | | N |
| | Insulating of SELV circuits from FELV | | N |
| | Insulating of SELV circuits from other SELV circuits | | N |
| | SELV circuits insulated from accessible parts according Table X.1 | | N |
| | Plugs not able to enter socket-outlets of other voltage systems | | N |
| | Socket outlets does not admit plugs of other voltage systems | | N |
| | Plugs and socket-outlets does not have protective conductor contact | | N |
| 4.7 (4.31.2) | FELV circuits | | N |
| | Used FELV source | | N |
| | Voltage ≤ ELV | | N |
| | Insulating of FELV circuits from LV supply | | N |

| EN 60598-2-4 -- Attachment 2 | | | |
|---|---|---|---|
| Clause | Requirement + Test | Result - Remark | Verdict |
| | FELV circuits insulated from accessible parts according Table X.1 | | N |
| | Plugs not able to enter socket-outlets of other voltage systems | | N |
| | Socket outlets does not admit plugs of other voltage systems | | N |
| | Socket-outlets does not have protective conductor contact | | N |
| 4.7 (4.31.3) | Other circuits | | P |
| | Other circuits insulated from accessible parts according Table X.1 | | P |
| | Class II construction with equipotential bonding for protection against indirect contacts with live parts: | | N |
| | - conductive parts are connected together | | N |
| | - test according 7.2.3 | | N |
| | - conductive part not cause an electric shock in case of an insulation fault | | N |
| | - equipotential bonding in master/slave applications | | N |
| | - master luminaire provided with terminal for accessible conductive parts of slave luminaires | | N |
| | - slave luminaire constructed as class I | | N |
| 4.7 (4.32) | Overvoltage protective devices | | N |
| | Comply with IEC 61643-11 | | N |
| | Fixed luminaires connected to a protective earth | | N |
| | External to controlgear and connected to earth: | | N |
| | - only in fixed luminaires | | N |
| | - only connected to protective earth | | N |
| 4.7.1 (-) | Insulation not damaged when placing on support | | P |
| 4.7.2 (-) | Wiring fixed, to avoid rubbing | | P |
| 4.7.3 (-) | Luminaire not overturn at angle 6° | | P |
| 4.7.4 (-) | Candlestick luminaires with E5 or E10 lampholders provided with a switch | | N |
| | Switch part of the luminaire or within 300 mm of the luminaire if with cord | | N |
| 4.7.5 (-) | Voltage not exceed 25 V for E5 lampholders | | N |
| | Voltage not exceed 60 or 250 V for E10 lampholders | | N |
| | Maximum rated wattage not exceed 100 W | | N |

| EN 60598-2-4 -- Attachment 2 | | | |
|---|---|---|---|
| Clause | Requirement + Test | Result - Remark | Verdict |
| 4.7.6 (-) | Portable luminaires for outdoor use tails not provided | | N |
| 4.7.7 (-) | Portable luminaires for outdoor use, cable entries | | N |
| 4.7.8 (-) | Portable luminaires for outdoor use, socket-outlet degree of protection at least same as the luminaire but not less than IPX4. | | N |
| | Degree of protection maintained with or without a plug inserted into the socket-outlet. | | N |
| | Class II luminaires, mains socket-outlets comply with the standard and only allow connection to Class II luminaires | | N |
| | Class I luminaires, mains socket-outlets comply with the standard and only allow connection to Class I or Class II luminaires | | N |
| 4.7.9 (-) | Portable luminaires for outdoor use, lampholders and plugs are of material resistant to tracking | | N |
| | Compliance to clause 13.4 | | N |
| **4.8 (11)** | **CREEPAGE DISTANCES AND CLEARANCES** | | **P** |
| 4.8 (11.2.1) | Impulse withstand category (Normal category II) | Category II ☒ Category III ☐ | — |
| | Category III according Annex U | | N |
| | Protected against pollution, reduced creepage and clearance according Annex P of IEC 61347-1 | | N |
| 4.7 (11.2.2) | Creepage distances for frequency up to 30 kHz | See Test Table 4.7 (11.2) I | P |
| | Creepage distances for frequency over 30 kHz: | | N |
| | - Controlgear marked with $\hat{U}_{OUT}$ and $f_{UOUT}$ according IEC 61347-1, clause 7.1, item w | See Test Table 4.7 (11.2) II | N |
| | - Requirements according IEC 60664-4 for controlgear not covered by IEC 61347 | See Test Table 4.7 (11.2) II | N |
| 4.7 (11.2.3) | Clearances for frequency up to 30 kHz | See Test Table 4.7 (11.2) I | P |
| | Clearances distances for frequency over 30 kHz: | | N |
| | - Controlgear marked with $U_P$ | See Test Table 4.7 (11.2) II | N |
| | - Requirements according IEC 60664-4 for controlgear not covered by IEC 61347 | See Test Table 4.7 (11.2) II | N |
| **4.9 (7)** | **PROVISION FOR EARTHING** | | **N** |
| 4.9 (7.2.1 + 7.2.3) | Accessible metal parts | | N |
| | Metal parts in contact with supporting surface | | N |
| | Resistance < 0,5 Ω..... | -- | N |
| | Self-tapping screws used | | N |

| EN 60598-2-4 -- Attachment 2 | | | |
|---|---|---|---|
| Clause | Requirement + Test | Result - Remark | Verdict |
| | Thread-forming screws | | N |
| | Thread-forming screw used in a grove | | N |
| | Earth makes contact first | -- | N |
| | Terminal blocks with integrated screwless earthing contacts tested according Annex V | | N |
| | Protective earthing of the luminaire not via built-in control gear | | N |
| 4.8 (7.2.2 + 7.2.3) | Earth continuity in joints, etc. | | N |
| 4.9 (7.2.4) | Locking of clamping means | | N |
| | Compliance with 4.7.3 | | N |
| | Terminal blocks with integrated screwless earthing contacts tested according Annex V | | N |
| 4.9 (7.2.5) | Earth terminal integral part of connector socket | | N |
| 4.9 (7.2.6) | Earth terminal adjacent to mains terminals | | N |
| 4.9 (7.2.7) | Electrolytic corrosion of the earth terminal | | N |
| 4.9 (7.2.8) | Material of earth terminal | | N |
| | Contact surface bare metal | | N |
| 4.9 (7.2.10) | Class II luminaire for looping-in | | N |
| | Double or reinforced insulation to functional earth | | N |
| 4.9 (7.2.11) | Earthing core coloured green-yellow | | N |
| | Length of earth conductor | | N |
| **4.10 (14)** | **SCREW TERMINALS** | | **N** |
| | Separately approved; component list..... | (see Annex 1) | N |
| | Part of the luminaire ..... | (see Annex 3) | N |
| **4.10 (15)** | **SCREWLESS TERMINALS AND ELECTRICAL CONNECTIONS** | | **N** |
| | Separately approved; component list..... | (see Annex 1) | N |
| | Part of the luminaire ..... | (see Annex 4) | N |
| **4.11 (5)** | **EXTERNAL AND INTERNAL WIRING** | | P |
| 4.11 (5.2) | Supply connection and external wiring | | P |
| 4.11 (5.2.1) | Means of connection ..... | Power cord | P |
| | Outdoor luminaire has not PVC insulated external wiring if not class III or SELV ≤ 25 V a.c./60 V d.c. or protected from outdoor environment | | N |
| 4.11 (5.2.2) | Type of cable..... | (see Annex 1) | P |

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|---|---|---|---|
| Clause | Requirement + Test | Result - Remark | Verdict |
| | Nominal cross-sectional area (mm²) ..... | (see Annex 1) | P |
| | Cables equal to IEC 60227 or IEC 60245 | | P |
| 4.11 (5.2.3) | Type of attachment, X, Y or Z | Type Y | P |
| 4.11 (5.2.5) | Type Z not connected to screws | | N |
| 4.11 (5.2.6) | Cable entries: | | P |
| | - suitable for introduction | | P |
| | - adequate degree of protection | | P |
| 4.11 (5.2.7) | Cable entries through rigid material have rounded edges | | N |
| 4.11 (5.2.8) | Insulating bushings: | | P |
| | - suitably fixed | | P |
| | - material in bushings | | P |
| | - material not likely to deteriorate | | P |
| | - tubes or guards made of insulating material | | P |
| 4.11 (5.2.9) | Locking of screwed bushings | | N |
| 4.11 (5.2.10) | Cord anchorage: | | P |
| | - covering protected from abrasion | | P |
| | - clear how to be effective | | P |
| | - no mechanical or thermal stress | | P |
| | - no tying of cables into knots etc. | | P |
| | - insulating material or lining | | P |
| 4.11 (5.2.10.1) | Cord anchorage for type X attachment: | | N |
| | a) at least one part fixed | | N |
| | b) types of cable | | N |
| | c) no damaging of the cable | | N |
| | d) whole cable can be mounted | | N |
| | e) no touching of clamping screws | | N |
| | f) metal screw not directly on cable | | N |
| | g) replacement without special tool | | N |
| | Glands not used as anchorage | | N |
| | Labyrinth type anchorages | | N |
| 4.11 (5.2.10.2) | Adequate cord anchorage for type Y and type Z attachment | Type Y | P |
| 4.11 (5.2.10.3) | Tests: | | P |
| | - impossible to push cable; unsafe | | P |

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|---|---|---|---|
| Clause | Requirement + Test | Result - Remark | Verdict |
| | - pull test: 25 times; pull (N) ..... | 60 N | P |
| | - torque test: torque (Nm) ..... | 0.15 Nm | P |
| | - displacement ≤ 2 mm | | P |
| | - no movement of conductors | | P |
| | - no damage of cable or cord | | P |
| 4.11 (5.2.11) | External wiring passing into luminaire | | P |
| 4.11 (5.2.12) | Looping-in terminals | | N |
| 4.11 (5.2.13) | Wire ends not tinned | | N |
| | Wire ends tinned: no cold flow | | N |
| 4.11 (5.2.14) | Mains plug same protection | | P |
| | Class III luminaire plug | | N |
| | No unsafe compatibility | | P |
| 4.11 (5.2.16) | Appliance inlets (IEC 60320) | | N |
| | Installation couplers (IEC 61535) | | N |
| | Other appliance inlet or connector according relevant IEC standard | | N |
| 4.11 (5.2.17) | No standardized interconnecting cables properly assembled | | N |
| 4.11 (5.2.18) | Used plug in accordance with | | P |
| | - IEC 60083 | | N |
| | - other standard | | P |
| 4.11 (5.3) | Internal wiring | | P |
| 4.11 (5.3.1) | Internal wiring of suitable size and type | | P |
| | Through wiring | | N |
| | - not delivered/ mounting instruction | | N |
| | - factory assembled | | N |
| | - socket outlet loaded (A) ..... | -- | N |
| | - temperatures ..... | (see Annex 2) | N |
| | Green-yellow for earth only | | N |
| 4.11 (5.3.1.1) | Internal wiring connected directly to fixed wiring | | P |
| | Cross-sectional area (mm²) ..... | (see Annex 1) | P |
| | Insulation thickness | | P |
| | Extra insulation added where necessary | | N |
| 4.11 (5.3.1.2) | Internal wiring connected to fixed wiring via internal current-limiting device | | P |
| | Adequate cross-sectional area and insulation thickness | | P |
| 4.11 (5.3.1.3) | Double or reinforced insulation for class II | | P |

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|---|---|---|---|
| Clause | Requirement + Test | Result - Remark | Verdict |
| 4.11 (5.3.1.4) | Conductors without insulation | | N |
| 4.11 (5.3.1.5) | SELV current-carrying parts | | N |
| 4.11 (5.3.1.6) | Insulation thickness other than PVC or rubber | | N |
| 4.11 (5.3.2) | Sharp edges etc. | | P |
| | No moving parts of switches etc. | | N |
| | Joints, raising/lowering devices | | N |
| | Telescopic tubes etc. | | N |
| | No twisting over 360° | | P |
| 4.11 (5.3.3) | Insulating bushings: | | N |
| | - suitable fixed | | N |
| | - material in bushings | | N |
| | - material not likely to deteriorate | | N |
| | - cables with protective sheath | | N |
| 4.11 (5.3.4) | Joints and junctions effectively insulated | | N |
| 4.11 (5.3.5) | Strain on internal wiring | | N |
| 4.11 (5.3.6) | Wire carriers | | N |
| 4.11 (5.3.7) | Wire ends not tinned | | P |
| | Wire ends tinned: no cold flow | | N |
| 4.10 (5.4) | Test to determine suitability of conductors having a reduced cross-sectional area | | N |
| | Under test the temperature of the luminaire wiring insulation not exceed the limits stated in Table 12.2 | (see Annex 2) | N |
| | No damage to luminaire wiring after test | | N |
| 4.11.1 (-) | Indoor use luminaire<br>The requirement of one part of cord anchorage to be fixed to the luminaire not applied for table lamps of glass or ceramic | | — |
| 4.11.2 (-) | Class I and class II indoor use<br>Luminaire with a mass less than 1 kg the current ≤ 2,5 A and cable ≤ 2 m and conductor ≥ 0,5 mm² | | N |
| 4.11.3 (-) | Terminals, a cord anchorage and an inlet opening for the proper connection of the flexible cable or cord if for outdoor use and delivered without a flexible cable or cord and a plug. | | N |
| 4.11.4 (-) | Portable luminaires for outdoor use<br>Insulation class I and class II, non-detachable flexible cables or cords at least type 245 IEC 57. | | N |

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|---|---|---|---|
| Clause | Requirement + Test | Result - Remark | Verdict |
| **4.12 (8)** | **PROTECTION AGAINST ELECTRIC SHOCK** | | P |
| 4.12 (8.2.1) | Live parts not accessible | | P |
| | Basic insulated parts not used on the outer surface without appropriate protection | | P |
| | Basic insulated parts not accessible with standard test finger on portable, settable and adjustable luminaires | | P |
| | Basic insulated parts not accessible with Ø 50 mm probe from outside, other types of luminaires | | N |
| | Lamp and starterholders in portable and adjustable luminaires comply with double or reinforced insulation requirements | | N |
| | Basic insulation only accessible under lamp or starter replacement | | P |
| | Protection in any position | | P |
| | Double-ended tungsten filament lamp | | N |
| | Insulation lacquer not reliable | | N |
| | Double-ended high pressure discharge lamp | | N |
| | Relevant warning according to 3.2.18 fitted to the luminaire | | N |
| 4.12 (8.2.2) | Portable luminaire adjusted in most unfavourable position | | P |
| 4.12 (8.2.3.a) | Class II luminaire: | | P |
| | - basic insulated metal parts not accessible during starter or lamp replacement | | P |
| | - basic insulation not accessible other than during starter or lamp replacement | | P |
| | - glass protective shields not used as supplementary insulation | | N |
| 4.12 (8.2.3.b) | BC lampholder of metal in class I luminaires shall be earthed | | N |
| 4.12 (8.2.3.c) | SELV circuits with exposed current carrying parts: | | N |
| | Ordinary luminaire: | | N |
| | - voltage under load (V)..... | -- | N |
| | - no-load voltage (V)..... | -- | N |
| | - touch current if applicable (mA) ..... | -- | N |
| | One conductive part insulated if required | | N |
| | Other than ordinary luminaire: | | N |
| | - nominal voltage (V) ..... | -- | N |
| | Class III luminaire only for connection to SELV | | N |

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|---|---|---|---|
| Clause | Requirement + Test | Result - Remark | Verdict |
| | Class III luminaire not provided with means for protective earthing | | N |
| 4.12 (8.2.4) | Portable luminaire have protection independent of supporting surface | | P |
| 4.12 (8.2.5) | Compliance with the standard test finger or relevant probe | | P |
| 4.12 (8.2.6) | Covers reliably secured | | P |
| 4.12 (8.2.7) | Luminaire other than below with capacitor > 0,5 μF not exceed 50 V 1 min after disconnection | | N |
| | Portable luminaire with capacitor > 0,1 μF (0.25) not exceed 34 V 1 s after disconnection | | P |
| | Other luminaires with capacitor > 0,1 μF (0.25) with plug and track adaptors not exceed 60 V 5 s after disconnection | | N |
| 4.12.1 (-) | Class I luminaire with bayonet lampholder: | | N |
| | 1) cap not accessible with test finger | | N |
| | 2) metal lampholder is earthed | | N |
| **4.13 (12)** | **ENDURANCE TEST AND THERMAL TEST** | | P |
| 4.13 (-) | If IP > IP 20 relevant test of (12.4), (12.5) and (12.6) after (9.2) before (9.3) specified in 4.13 | | — |
| **4.13 (12.2)** | **Selection of lamps and ballasts** | | — |
| | Lamp used according Annex B ..... | UV tube | — |
| | Controlgear if separate and not supplied ..... | -- | — |
| 4.13 (12.3) | Endurance test: | | P |
| | a) mounting-position..... | Acc. to user manual | — |
| | b) test temperature (°C) ..... | 35 °C | — |
| | c) total duration (h) ..... | 168 h | — |
| | d) if not equipped with controlgear, constant voltage/current (V) or (A) ..... | 1.1 $U_n$ | — |
| | e) luminaire ceases to operate | | — |
| 4.13 (12.3.2) | After endurance test: | | P |
| | - no part unserviceable | | P |
| | - luminaire not unsafe | | P |
| | - no damage to track system | | N |
| | - marking legible | | P |
| | - no cracks, deformation etc. | | P |
| 4.13 (12.4) | Thermal test (normal operation) | (see Annex 2) | P |

| EN 60598-2-4 -- Attachment 2 | | | |
|---|---|---|---|
| Clause | Requirement + Test | Result - Remark | Verdict |
| 4.13 (12.5) | Thermal test (abnormal operation) | (see Annex 2) | N |
| 4.13 (12.6) | Thermal test (failed lamp control gear condition): | | N |
| 4.13 (12.6.1) | Through wiring or looping-in wiring loaded by a current of (A) ..... | -- | — |
| | - case of abnormal conditions ..... | -- | — |
| | - electronic lamp control gear | | N |
| | - measured winding temperature (°C): at 1,1 Un ... | -- | — |
| | - measured mounting surface temperature (°C) at 1,1 Un..... | -- | N |
| | - calculated mounting surface temperature (°C) .... | -- | N |
| | - track-mounted luminaires | | N |
| 4.13 (12.6.2) | Temperature sensing control | | N |
| | - case of abnormal conditions ..... | -- | — |
| | - thermal link | | N |
| | - manual reset cut-out | | N |
| | - auto reset cut-out | | N |
| | - measured mounting surface temperature (°C) ..... | -- | N |
| | - track-mounted luminaires | | N |
| 4.13 (12.7) | Thermal test (failed lamp control gear in plastic luminaires): | | P |
| 4.13 (12.7.1) | Luminaire without temperature sensing control | | P |
| 4.13 (12.7.1.1) | Luminaire with fluorescent lamp ≤ 70W | | N |
| | Test method 12.7.1.1 or Annex W ..... | -- | — |
| | Test according to 12.7.1.1: | | N |
| | - case of abnormal conditions ..... | -- | — |
| | - Ballast failure at supply voltage (V) ..... | -- | — |
| | - Components retained in place after the test | | N |
| | - Test with standard test finger after the test | | N |
| | Test according to Annex W: | | N |
| | - case of abnormal conditions ..... | -- | — |
| | - measured winding temperature (°C): at 1,1 Un .... | -- | — |
| | - measured temperature of fixing point/exposed part (°C): at 1,1 Un ..... | -- | — |
| | - calculated temperature of fixing point/exposed part (°C)..... | -- | — |
| | Ball-pressure test .....: | See Table 4.15 (13.2.1) | N |

| EN 60598-2-4 -- Attachment 2 | | | |
|---|---|---|---|
| Clause | Requirement + Test | Result - Remark | Verdict |
| 4.13 (12.7.1.2) | Luminaire with discharge lamp, fluorescent lamp > 70W, transformer > 10 VA | | N |
| | - case of abnormal conditions ..... | -- | — |
| | - measured winding temperature (°C): at 1,1 Un .... | -- | — |
| | - measured temperature of fixing point/exposed part (°C): at 1,1 Un ..... | -- | — |
| | - calculated temperature of fixing point/exposed part (°C)..... | -- | — |
| | Ball-pressure test ..... | See Table 4.15 (13.2.1) | N |
| 4.13 (12.7.1.3) | Luminaire with short circuit proof transformers ≤ 10 VA | | N |
| | - case of abnormal conditions ..... | -- | — |
| | - Components retained in place after the test | | N |
| | - Test with standard test finger after the test | | N |
| 4.13 (12.7.2) | Luminaire with temperature sensing control | | N |
| | - thermal link..... | Yes ☐ No ☐ | — |
| | - manual reset cut-out ..... | Yes ☐ No ☐ | — |
| | - auto reset cut-out..... | Yes ☐ No ☐ | — |
| | - case of abnormal conditions ..... | -- | — |
| | - highest measured temperature of fixing point/ exposed part (°C): ..... | -- | — |
| | Ball-pressure test: ..... | See Table 4.15 (13.2.1) | N |
| 4.13 (-) | Indoor use luminaire, Test overturned position (overturns < 15 ) | 15 degree was overturned | P |

| | | | |
|---|---|---|---|
| **4.14 (9)** | **RESISTANCE TO DUST, SOLID OBJECTS AND MOISTURE** | | P |
| 4.14 (-) | If IP > IP 20 the order of tests as specified in clause 4.12 | | P |
| 4.14 (9.2) | Tests for ingress of dust, solid objects and moisture: | | — |
| | - classification according to IP..... | IP20 | — |
| | - mounting position during test..... | Acc. to user manual | — |
| | - fixing screws tightened; torque (Nm) ..... | -- | — |
| | - tests according to clauses..... | 9.2.0 | — |
| | - electric strength test afterwards | | P |
| | a) no deposit in dust-proof luminaire | | N |
| | b) no talcum in dust-tight luminaire | | N |
| | c) no trace of water on current-carrying parts or SELV parts or where it could become a hazard | | N |

| EN 60598-2-4 -- Attachment 2 | | | |
|---|---|---|---|
| Clause | Requirement + Test | Result - Remark | Verdict |
| | d) i) For luminaires without drain holes – no water entry | | N |
| | d) ii) For luminaires with drain holes – no hazardous water entry | | N |
| | e) no water in watertight luminaire | | N |
| | f) no contact with live parts (IP 2X) | | P |
| | f) no entry into enclosure (IP 3X and IP 4X) | | N |
| | f) no contact with live parts (IP3X and IP4X) | | N |
| | g) no trace of water on part of lamp requiring protection from splashing water | | N |
| | h) no damage of protective shield or glass envelope | | N |
| 4.14 (9.3) | Humidity test 48 h | 25 °C, 93%RH | P |
| 4.14 (-) | Portable luminaire for outdoor use tested in the most unfavourable of the overturned positions likely to occur | | N |
| **4.15 (10)** | **INSULATION RESISTANCE AND ELECTRIC STRENGTH** | | P |
| 4.15 (10.2.1) | Insulation resistance test | | P |
| | Cable or cord covered by metal foil or replaced by a metal rod of mm Ø ..... | -- | — |
| | Insulation resistance (MΩ) ..... | | — |
| | SELV | | N |
| | - between current-carrying parts of different polarity..... | -- | N |
| | - between current-carrying parts and mounting surface..... | -- | N |
| | - between current-carrying parts and metal parts of the luminaire..... | -- | N |
| | - between the outer surface of a flexible cord or cable where it is clamped in a cord anchorage and accessible metal parts..... | -- | N |
| | - Insulation bushings as described in Section 5 ..... | -- | N |
| | Other than SELV | | P |
| | - between live parts of different polarity ..... | 100 MΩ | P |
| | - between live parts and mounting surface ..... | 100 MΩ | P |
| | - between live parts and metal parts ..... | 100 MΩ | P |
| | - between live parts of different polarity through action of a switch..... | -- | N |

| EN 60598-2-4 -- Attachment 2 | | | |
|---|---|---|---|
| Clause | Requirement + Test | Result - Remark | Verdict |
| | - between the outer surface of a flexible cord or cable where it is clamped in a cord anchorage and accessible metal parts..... | -- | N |
| | - Insulation bushings as described in Section 5 ..... | -- | N |
| 4.15 (10.2.2) | Electric strength test | | P |
| | Dummy lamp | | N |
| | Luminaires with ignitors after 24 h test | | N |
| | Luminaires with manual ignitors | | N |
| | Test voltage (V)..... | | P |
| | SELV | | N |
| | - between current-carrying parts of different polarity..... | -- | N |
| | - between current-carrying parts and mounting surface..... | -- | N |
| | - between current-carrying parts and metal parts of the luminaire..... | -- | N |
| | - between the outer surface of a flexible cord or cable where it is clamped in a cord anchorage and accessible metal parts..... | -- | N |
| | - Insulation bushings as described in Section 5 ..... | -- | N |
| | Other than SELV | | P |
| | - between live parts of different polarity ..... | 1480 V | P |
| | - between live parts and mounting surface ..... | 2960 V | P |
| | - between live parts and metal parts ..... | 2960 V | P |
| | - between live parts of different polarity through action of a switch..... | -- | N |
| | - between the outer surface of a flexible cord or cable where it is clamped in a cord anchorage and accessible metal parts..... | -- | N |
| | - Insulation bushings as described in Section 5 ..... | -- | N |
| 4.15 (10.3) | Touch current or protective conductor current (mA)..... | Touch current: 0.050mA | P |

| | | | |
|---|---|---|---|
| **4.16 (13)** | **RESISTANCE TO HEAT, FIRE AND TRACKING** | | P |
| 4.16 (13.2.1) | Ball-pressure test ..... | See Test Table 4.15 (13.2.1) | P |
| 4.16 (13.3.1) | Needle-flame test (10 s)..... | See Test Table 4.15 (13.3.1) | N |
| 4.16 (13.3.2) | Glow-wire test (650°C)..... | See Test Table 4.15 (13.3.2) | P |
| 4.16 (13.4) | Proof tracking test (IEC 60112)..... | See Test Table 4.15 (13.4) | N |

| EN 60598-2-4 -- Attachment 2 | | | |
|---|---|---|---|
| Clause | Requirement + Test | Result - Remark | Verdict |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **4.7 (11.2)** | **TABLE: Creepage distances and clearances** | | | | | | | **P** |
| | **Minimum distances (mm) for a.c. (50/60 Hz) sinusoidal voltages** | | | | | | | **P** |
| | **Applicable part of IEC 60598-1 Table 11.1* and 11.2*** | | | | | | | **P** |
| | **Insulation type **** | **Measured clearance** | **Required** | | **Measured creepage** | **Required** | | |
| | | | **clearance** | ***Table** | | **creepage** | ***Table** | |
| Distance 1: | B | 2.6 | 1.5 | 11.1 | 2.6 | 2.5 | 11.1 | |
| Working voltage (V) ..... : | | | | | Max.240V~ | | | — |
| PTI ..... : | | | | | < 600 ☒ | ≥ 600 ☐ | | — |
| Pulse voltage if applicable (kV) ..... : | | | | | -- | | | — |
| Supplementary information: Current-carrying parts of different polarity | | | | | | | | |
| Distance 2: | R | 5.3 | 3.0 | 11.1 | 5.3 | 5.0 | 11.1 | |
| Working voltage (V) ..... : | | | | | Max.240V~ | | | — |
| PTI ..... : | | | | | < 600 ☒ | ≥ 600 ☐ | | — |
| Pulse voltage if applicable (kV) ..... : | | | | | -- | | | — |
| Supplementary information: Current-carrying parts and accessible parts | | | | | | | | |
| Distance 3: | R | 5.3 | 3.0 | 11.1 | 5.3 | 5.0 | 11.1 | |
| Working voltage (V) ..... : | | | | | Max.240V~ | | | — |
| PTI ..... : | | | | | < 600 ☒ | ≥ 600 ☐ | | — |
| Pulse voltage if applicable (kV) ..... : | | | | | -- | | | — |
| Supplementary information: Current-carrying parts and supporting surface | | | | | | | | |

** Insulation type: B – Basic; S – Supplementary; R – Reinforced. See also IEC 60598-1 Annex M.

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **1.7 (11.2)** | **TABLE II: Creepage distances and clearances** | | | | | | | **N** |
| **Minimum distances (mm) for a.c. higher than 30 kHz sinusoidal voltages** | | | | | | | | |
| **Applicable part of IEC 61347-1 Table 7 and 8* or IEC 60664-4 Table 1 and 2** | | | | | | | | |
| **Distances** | **Insulation type **** | **Measured clearance** | **Required** | | **Measured creepage** | **Required** | | |
| | | | **clearance** | ***Table** | | **creepage** | ***Table** | |
| Distance 1: | | | | | | | | |
| Working voltage (V) ..... : | | | | | | | | — |
| Frequency if applicable (kHz) ..... : | | | | | | | | — |
| PTI ..... : | | | | | < 600 ☐ | ≥ 600 ☐ | | — |
| Peak value of the working voltage $\hat{U}_{out}$ if applicable (kV) ..... : | | | | | | | | — |
| Supplementary information: | | | | | | | | |
| Distance 2: | | | | | | | | |
| Working voltage (V) ..... : | | | | | | | | — |

| EN 60598-2-4 -- Attachment 2 | | | |
|---|---|---|---|
| Clause | Requirement + Test | Result - Remark | Verdict |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Frequency if applicable (kHz) ..... : | | | | | | | — |
| PTI ..... : | | | | | < 600 ☐ | ≥ 600 ☐ | — |
| Peak value of the working voltage $\hat{U}_{out}$ if applicable (kV) ..... : | | | | | | | — |
| Supplementary information: | | | | | | | |
| Distance 3: | | | | | | | |
| Working voltage (V) ..... : | | | | | | | — |
| Frequency if applicable (kHz) ..... : | | | | | | | — |
| PTI ..... : | | | | | < 600 ☐ | ≥ 600 ☐ | — |
| Peak value of the working voltage $\hat{U}_{out}$ if applicable (kV) ..... : | | | | | | | — |
| Supplementary information: | | | | | | | |

** Insulation type: B – Basic; S – Supplementary; R – Reinforced.

| EN 60598-2-4 | | | |
|---|---|---|---|
| Clause | Requirement + Test | Result - Remark | Verdict |

| 4.15a (13.2.1) | **TABLE: Ball Pressure Test of Thermoplastics** | | | P |
|---|---|---|---|---|
| **Allowed impression diameter (mm) .....** | | ≤2.0 | | — |
| Object/ Part No./ Material | Manufacturer/ trademark | Test temperature (°C) | Impression diameter (mm) | |
| Bottom cover & plastic enclosure | See Annex 1 | 96.8 | 1.741 | |
| Supplementary information: | | | | |

| 4.15b (13.3.1) | **TABLE: Needle-flame test (IEC 60695-11-5)** | | | | N |
|---|---|---|---|---|---|
| Object/ Part No./ Material | Manufacturer/ trademark | Duration of application of test flame (ta); (s) | Ignition of specified layer Yes/No | Duration of burning (tb) (s) | Verdict |
| -- | -- | -- | -- | -- | -- |
| Supplementary information: | | | | | |

| 4.15c (13.3.2) | **TABLE: Glow-wire test (IEC 60695-2-11)** | | | | P |
|---|---|---|---|---|---|
| **Glow wire temperature .....** | | 650°C | | | — |
| 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 |
| Bottom cover & plastic enclosure | See Annex 1 | 30 | N | 0 | P |
| Any flame or glowing of the sample extinguished within 30 s of withdrawing the glow-wire, and any burning or molten drop did not ignite the underlying parts (Yes/No) ..... | | | | | Yes |
| Supplementary information: | | | | | |

| **4.15d (13.4)** | **TABLE: Proof tracking test (IEC 60112)** | | | | **N** |
|---|---|---|---|---|---|
| **Test voltage PTI .....:** | | -- | | | — |
| Object/ Part No./ Material | Manufacturer/ trademark | Withstand 50 drops without failure on three places or on three specimens | | | Verdict |
| **--** | **--** | -- | -- | -- | -- |
| Supplementary information: | | | | | |

| EN 60598-2-4 | | | |
|---|---|---|---|
| Clause | Requirement + Test | Result - Remark | Verdict |

| ANNEX 1 | TABLE: Critical components information | P |
|---|---|---|
| See table 24.1 in IEC 60335 | | |

The codes above have the following meaning:
A - The component is replaceable with another one, also certified, with equivalent characteristics
B - The component is replaceable if authorised by the test house
C - Integrated component tested together with the appliance
D - Alternative component

| ANNEX 2 | TABLE: Temperature measurements, thermal tests of Section 12 | P |
|---|---|---|

| | | | |
|---|---|---|---|
| | Type reference..... : | VT-3238 | — |
| | Lamp used..... : | UV tube | — |
| | Lamp control gear used..... : | -- | — |
| | Mounting position of luminaire..... : | Acc. to user manual | — |
| | Supply wattage (W) ..... : | -- | — |
| | Supply current (A)..... : | -- | — |
| | Calculated power factor..... : | -- | — |
| | Table: measured temperatures corrected for ta = 25 °C: | | P |
| | - abnormal operating mode ..... : | 15 degree was overturned | — |
| 4.12 (12.4) | - test 1: rated voltage..... : | -- | — |
| | - test 2: 1,06 times rated voltage or 1,05 times rated wattage..... : | 1.06 times rated voltage | — |
| | - test 3: Load on wiring to socket-outlet, 1,06 times voltage or 1,05 times wattage..... : | -- | — |
| | - test 4: 1,1 times rated voltage or 1,05 times rated wattage ..... : | 1.1 times rated voltage | — |
| 4.12 (12.5) | Through wiring or looping-in wiring loaded by a current of A during the test ..... : | -- | — |

**Temperature measurements, (°C)**

| Part | Ambient | Clause 12.4 – normal | | | | Clause 12.5 – abnormal | |
|---|---|---|---|---|---|---|---|
| | | test 1 | test 2 | test 3 | limit | test 4 | limit |

| EN 60598-2-4 | | | |
|---|---|---|---|
| Clause | Requirement + Test | Result - Remark | Verdict |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Power cord | 25.0 | -- | 32.9 | -- | 90 | -- | -- |
| Switch | 25.0 | -- | 64.3 | -- | 65 | -- | -- |
| Switch ambient | 25.0 | -- | 64.3 | -- | 65 | -- | -- |
| Input wire of ballast | 25.0 | -- | 66.6 | -- | 90 | | |
| Output wire of ballast | 25.0 | -- | 66.3 | -- | 105 | -- | -- |
| Tc of ballast | 25.0 | -- | 99.7 | -- | 100 | -- | -- |
| Lead wire of lampholder | 25.0 | -- | 72.1 | -- | 105 | -- | -- |
| Lampholder contact | 25.0 | -- | 81.9 | -- | 140 | -- | -- |
| Bottom cover & plastic enclosure | 25.0 | -- | 71.8 | -- | Cl.13 | -- | -- |
| Mounting surface | 25.0 | -- | 61.0 | -- | 90 | 63.8 | 130 |
| Illuminated surface (0.1m) | 25.0 | -- | 35.1 | -- | 90 | 36.6 | 175 |

| EN 60598-2-4 | | | |
|---|---|---|---|
| Clause | Requirement + Test | Result - Remark | Verdict |
| **ANNEX 3** | **Screw terminals (part of the luminaire)** | | **N** |
| **(14)** | **SCREW TERMINALS** | | N |
| (14.2) | Type of terminal..... | | — |
| | Rated current (A)..... | | — |
| (14.3.2.1) | One or more conductors | | N |
| (14.3.2.2) | Special preparation | | N |
| (14.3.2.3) | Terminal size | | N |
| | Cross-sectional area ($mm^2$)..... | | — |
| (14.3.3) | Conductor space (mm)..... | | N |
| (14.4) | Mechanical tests | | N |
| (14.4.1) | Minimum distance | | N |
| (14.4.2) | Cannot slip out | | N |
| (14.4.3) | Special preparation | | N |
| (14.4.4) | Nominal diameter of thread (metric ISO thread).... | | N |
| | External wiring | | N |
| | No soft metal | | N |
| (14.4.5) | Corrosion | | N |
| (14.4.6) | Nominal diameter of thread (mm) ..... | | N |
| | Torque (Nm)..... | | N |
| (14.4.7) | Between metal surfaces | | N |
| | Lug terminal | | N |
| | Mantle terminal | | N |
| | Pull test; pull (N)..... | | N |
| (14.4.8) | Without undue damage | | N |

| EN 60598-2-4 | | | |
|---|---|---|---|
| Clause | Requirement + Test | Result - Remark | Verdict |
| **ANNEX 4** | **Screwless terminals (part of the luminaire)** | | **N** |
| **(15)** | **SCREWLESS TERMINALS** | | **N** |
| (15.2) | Type of terminal ..... | | — |
| | Rated current (A) ..... | | — |
| (15.3.1) | Material | | N |
| (15.3.2) | Clamping | | N |
| (15.3.3) | Stop | | N |
| (15.3.4) | Unprepared conductors | | N |
| (15.3.5) | Pressure on insulating material | | N |
| (15.3.6) | Clear connection method | | N |
| (15.3.7) | Clamping independently | | N |
| (15.3.8) | Fixed in position | | N |
| (15.3.10) | Conductor size | | N |
| | Type of conductor | | N |
| (15.5.1) | Terminals internal wiring | | N |
| (15.5.1.1) | Pull test spring-type terminals (4 N, 4 samples)..... | | N |
| (15.5.1.2) | Pull test pin or tab terminals (4 N, 4 samples)..... | | N |
| | Insertion force not exceeding 50 N | | N |
| (15.5.1.2) | Permanent connections: pull-off test (20 N) | | N |
| (15.5.2) | Electrical tests | | N |
| | Voltage drop (mV) after 1 h (4 samples) ..... | | N |
| | Voltage drop of two inseparable joints | | N |
| | Number of cycles: | | — |
| | Voltage drop (mV) after 10th alt. 25th cycle (4 samples) ..... | | N |
| | Voltage drop (mV) after 50th alt. 100th cycle (4 samples) ..... | | N |
| | After ageing, voltage drop (mV) after 10th alt. 25th cycle (4 samples)..... | | N |
| | After ageing, voltage drop (mV) after 50th alt. 100th cycle (4 samples)..... | | N |
| (15.6) | Terminals external wiring | | N |
| | Terminal size and rating | | N |
| (15.6.2.1) | Pull test spring-type terminals or welded connections (4 samples); pull (N) ..... | | N |
| (15.6.2.2) | Pull test pin or tab terminals (4 samples); pull (N) ..... | -- | N |

| EN 60598-2-4 | | | |
|---|---|---|---|
| Clause | Requirement + Test | Result - Remark | Verdict |
| (15.6.3) | Electrical tests | | N |
| | Tests according 15.6.3.1 + 15.6.3.2 in IEC 60598-1 | | N |

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| **(15.6.3.1)** | **TABLE: Contact resistance test** | | | | | | | | | N |
| | Voltage drop (mV) after 1 h | | | | | | | | | — |
| terminal | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| voltage drop (mV) | | | | | | | | | | |
| | Voltage drop of two inseparable joints | | | | | | | | | N |
| | Voltage drop after 10th alt. 25th cycle | | | | | | | | | N |
| | Max. allowed voltage drop (mV).....: | | | | | | | | | — |
| terminal | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| voltage drop (mV) | | | | | | | | | | |
| | Voltage drop after 50th alt. 100th cycle | | | | | | | | | N |
| | Max. allowed voltage drop (mV).....: | | | | | | | | | — |
| terminal | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| voltage drop (mV) | | | | | | | | | | |
| | Continued ageing: voltage drop after 10th alt. 25th cycle | | | | | | | | | N |
| | Max. allowed voltage drop (mV).....: | | | | | | | | | — |
| terminal | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| voltage drop (mV) | | | | | | | | | | |
| | Continued ageing: voltage drop after 50th alt. 100th cycle | | | | | | | | | N |
| | Max. allowed voltage drop (mV).....: | | | | | | | | | — |
| terminal | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| voltage drop (mV) | | | | | | | | | | |
| | | | | | | | | | | |
| Supplementary information: | | | | | | | | | | |

| EN 60598-2-4 | | | |
|---|---|---|---|
| Clause | Requirement + Test | Result - Remark | Verdict |

| | | |
|---|---|---|
| **ANNEX 5** | **National Differences for (country name) or Group Differences** | **P** |
| | | |
| | **CENELEC COMMON MODIFICATIONS (EN)** | P |

**ATTACHMENT TO TEST REPORT IEC 60598-2-4**
**EUROPEAN GROUP DIFFERENCES AND NATIONAL DIFFERENCES**
Luminaires
Part 2: Particular Requirements:
SECTION 4: PORTABLE GENERAL PURPOSE LUMINAIRES

**Differences according to**.....: EN 60598-2-4:2018 used in conjunction with EN 60598-1:2015+A1:2018

**Annex Form No.....:** --

**Annex Form Originator.....:** --

**Master Annex Form.....:** --



| | | | |
|---|---|---|---|
| **ZB** | **ANNEX ZB, SPECIAL NATIONAL CONDITIONS (EN)** | | **N** |
| (3.3) | DK: power supply cords of class I luminaires with label | | N |
| (4.5.1) | DK: socket-outlets | | N |
| (5.2.1) | CY, DK, FI, GB: type of plug | | N |

| | | | |
|---|---|---|---|
| **ZC** | **ANNEX ZC, NATIONAL DEVIATIONS (EN)** | | **N** |
| (4 & 5) | FR: Shuttered socket-outlets 10/16A | | N |
| | FR: Safety requirements for high buildings<br><br>(Arrêté du 30 décembre 2011 portantrèglement de sécurité pour la construction des immeubles de grande hauteur et leur protection contre les risquesd'incendie et de panique; Section VIII; Article GH 48, Eclairage)<br><br>Glow-wire test for outer parts of luminaires: | | N |
| | - 850°C for luminaires in stairways and horizontal travel paths | | N |
| | - 650°C for indoor luminaires | | N |
| (13.3) | GB: Requirements according to United Kingdom Building Regulation | | N |

| EN 62493 | | | |
|---|---|---|---|
| Clause | Requirement + Test | Result - Remark | Verdict |

| | | |
|---|---|---|
| **ANNEX 6** | **Assessment Of Lighting Equipment Related To Human Exposure To Electromagnetic Fields according to standard EN 62493:2015** | **P** |

| | | | |
|---|---|---|---|
| **4** | **LIMITS** | | **P** |
| **4.1** | **General** | | **P** |
| | Comply with Van der Hoofden test limit in 4.2.3 or inherently compliant in 4.2.2 and pass assessment procedure for intentional radiators in 4.3 | | P |
| **4.2** | **Unintentional radiating part of lighting equipment** | | **P** |
| 4.2.2 | Lighting equipment deemed to comply with the Van der Hoofden test without testing | | P |
| | 1) electronic controlgear | Yes ☐ No ☐ | — |
| | 2) incandescent-lamp technology | Yes ☐ No ☐ | — |
| | 3) LED-light-source technology | Yes ☐ No ☐ | — |
| | 4) OLED-light-source technology | Yes ☐ No ☐ | — |
| | 5) high-pressure discharge lamp LED-light-source technologies | Yes ☐ No ☐ | — |
| | 6) low-pressure discharge lamp technologies with exposure distance ⩾ 50 cm | Yes ☒ No ☐ | — |
| | 7) independent auxiliary | Yes ☐ No ☐ | — |
| | Not fulfil any of 1-7 above subject to 4.2.3 | | — |
| 4.2.3 | Applications of limits | | N |
| | Not fulfil any of 1-7 in 4.2.2 but the compliance factor $F$ is ⩽ 1 | | N |
| **4.3** | **Intentional radiating part of lighting equipment** | | **N** |
| | Comply with one of methods in Clause 7 if intentional radiator | | N |

| | | | |
|---|---|---|---|
| **6** | **MEASUREMENT PROCEDURE FOR THE VAN DER HOOFDEN TEST** | | **N** |
| **6.1** | **General** | | **N** |
| | Measurements carried out under conditions according Clause 6.1 – 6.6 | See Table 6 | N |

| | | | |
|---|---|---|---|
| **7** | **ASSESSMENT PROCEDURE INTENTIONAL RADIATORS** | | **N** |
| **7.2** | **Low-power exclusion method** | | **N** |
| 7.2.1 | Input $P_{int,rad}$ ..... | | — |
| | Exclusion level $P_{max}$..... | | — |
| | Input power $P_{int,rad}$ < exclusion level $P_{max}$ | | N |
| **7.3** | **Application of the EMF product standard for body worn-equipment** | | **N** |

| EN 62493 | | | |
|---|---|---|---|
| Clause | Requirement + Test | Result - Remark | Verdict |

| | | | |
|---|---|---|---|
| | If not Clause 7.2 is met and expose distance ⩽ 0.05 m, comply with IEC 62209-2 | | N |
| **7.4** | **Application of the EMF product standard for base stations** | | **N** |
| | If not Clause 7.2 is met and if intentional radiator is base station, comply with IEC 62232 | | N |
| **7.5** | **Application of another EMF standard** | | **N** |
| | If not Clause 7.2 is met and if intentional radiator cannot be considered as in Clause 7.3 or 7.4, comply with IEC 62311 | | N |

| **6** | **TABLE: Measurement results with Van der Hoofden test head** | | | | **N** |
|---|---|---|---|---|---|
| Location of EUT | Test model | Measuring distance | Result(F) | Limit(F) | Verdict |
| Reference Annex B of EN 62493:2015 | -- | -- | -- | ⩽1.0 | N |

====== End of Attachment 2 ======

# Photo Documentation

## Model: VT-3238

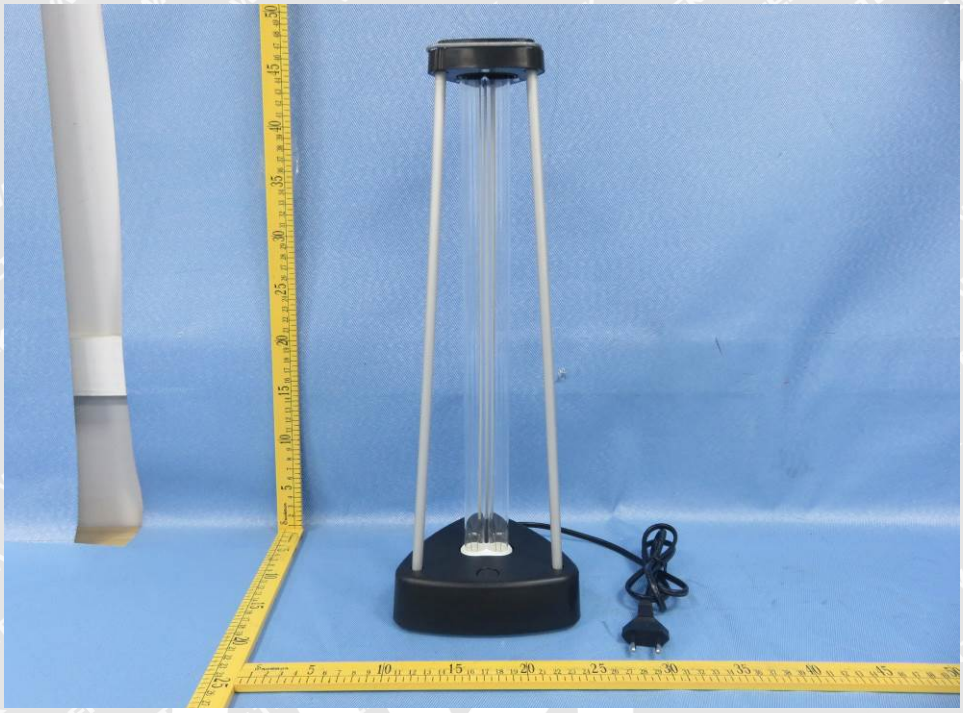

Photo 1

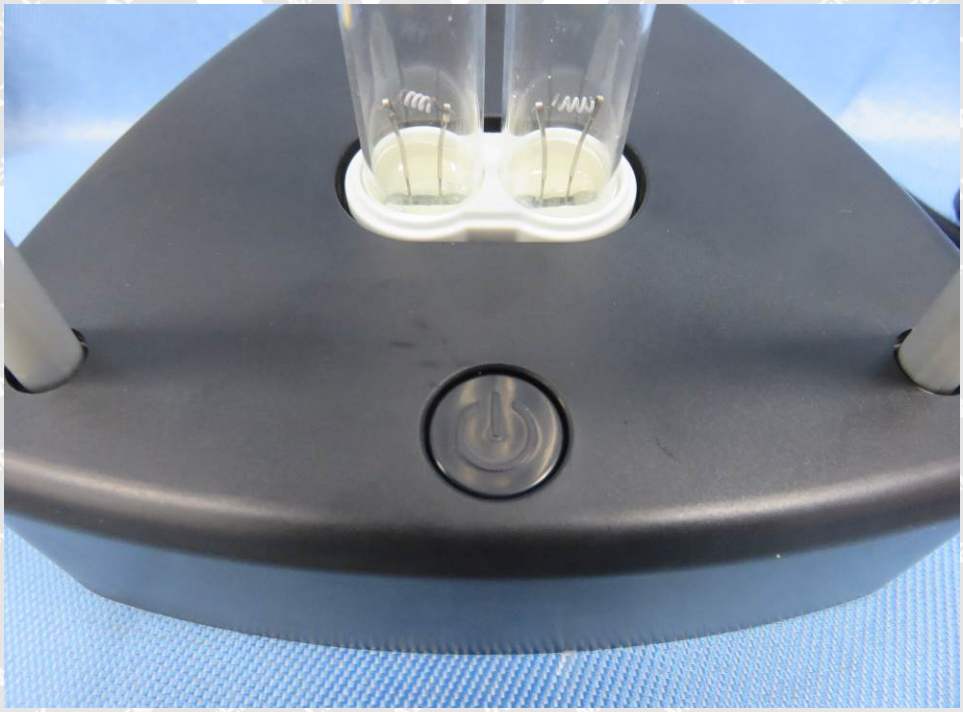

Photo 2

## Photo Documentation

Photo 3

Photo 4

## Photo Documentation

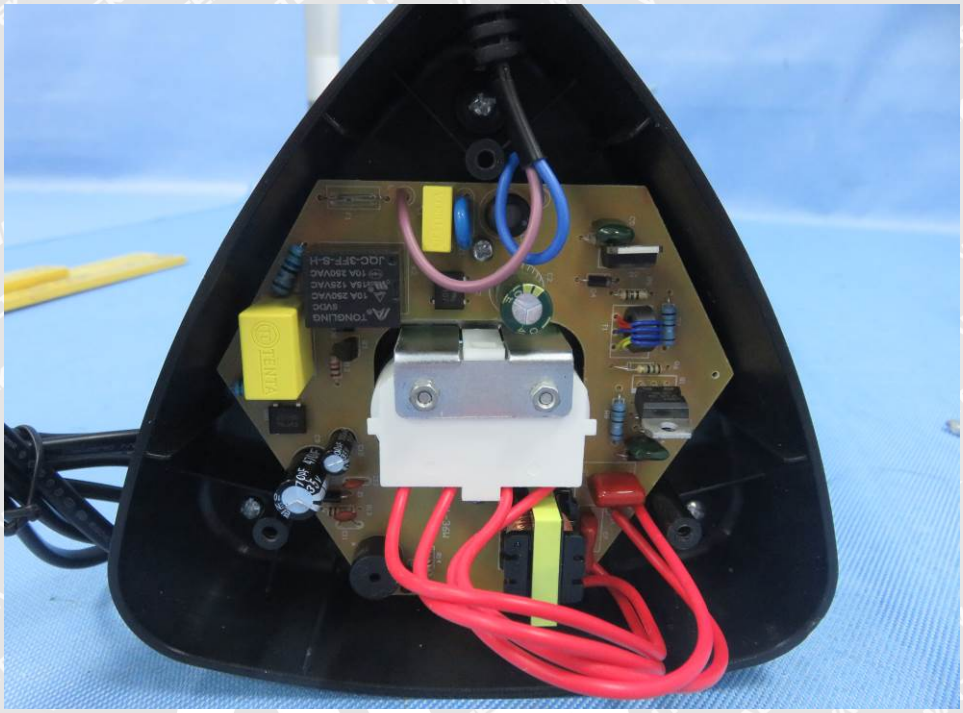

Photo 5

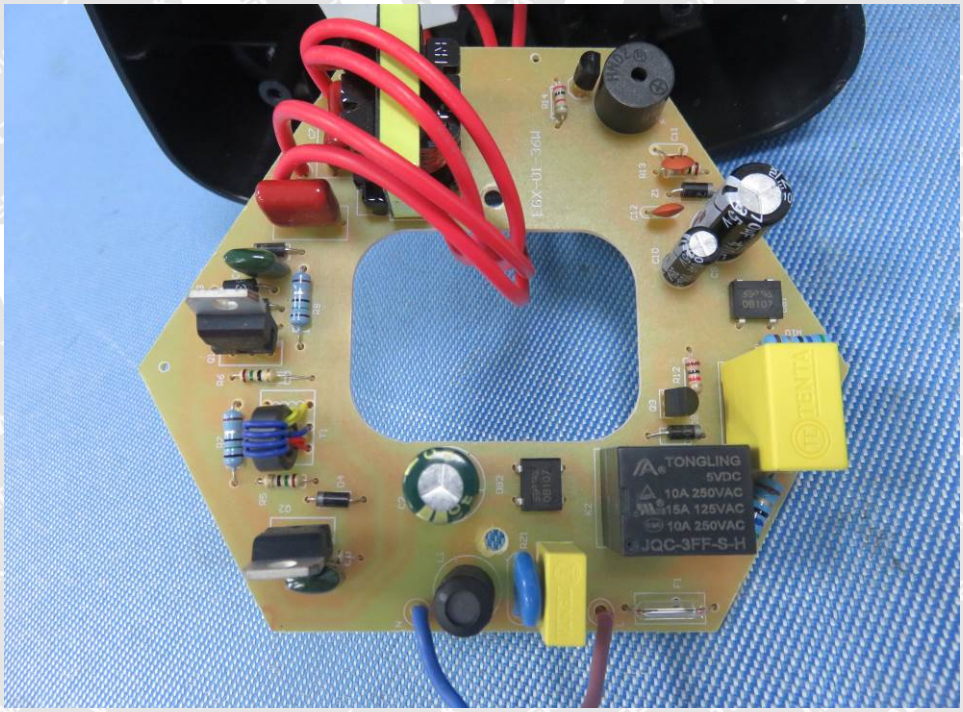


Photo 6

## Photo Documentation

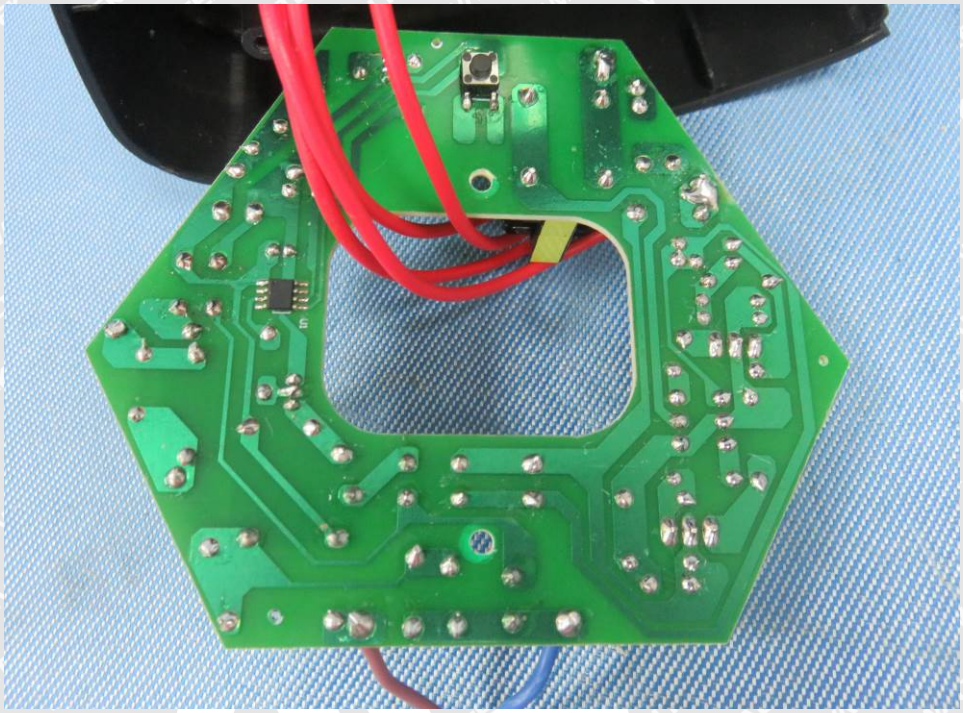

Photo 7

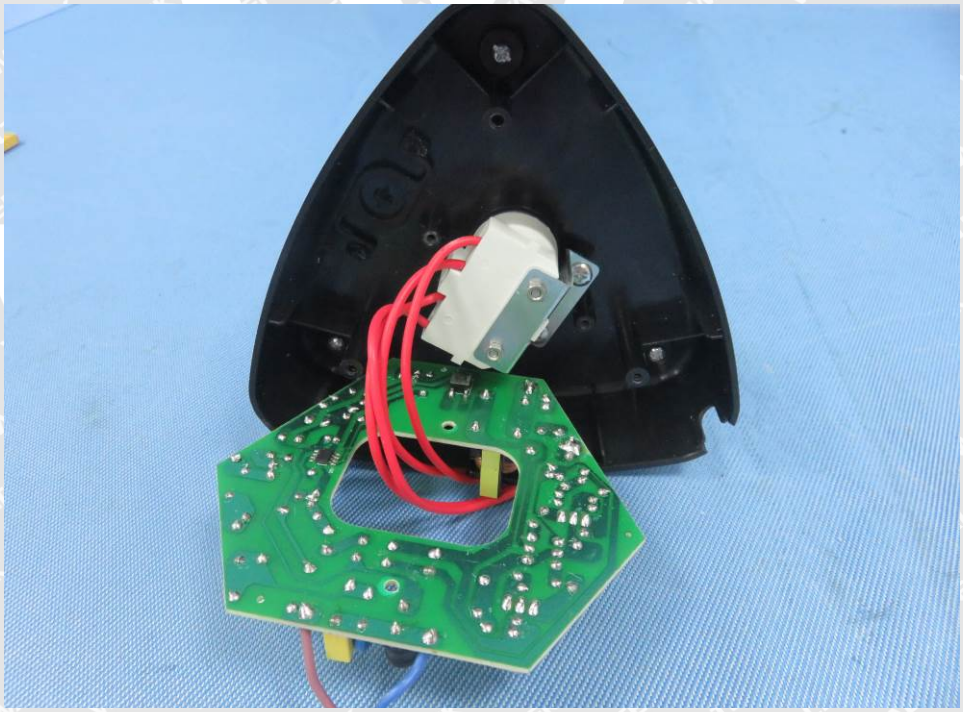

Photo 8

====== End of Photo ======