# TEST REPORT

| | | |
|---|---|---|
| **Reference No.** | : | WTD15D1136592S |
| **Applicant** | : | PortaPower(HK) Limited |
| **Address** | : | Flat 1003, 10/F., Hopeful Factory Centre 10-16 Wo Shing Street, Fotan, N.T.Hong Kong |
| **Manufacturer** | : | Guangzhou Zhanhui Electronics Co., Ltd. |
| **Address** | : | Shinan Road, Guantan Village, Dongchong Town, Nansha District, Guangzhou, 511453, P. R. China |
| **Product Name** | : | Charger |
| **Model No.** | : | C060L1001, C060F1101, C060L0701, C060F0801, C060L0901 |
| **Standards** | : | Safety of household and similar electrical appliances<br>Part 2: Particular requirements for battery chargers<br>EN 60335-1:2012+A11:2014<br>EN 60335-2-29:2004+A2:2010<br>EN 62233:2008 |
| **Date of Receipt sample** | : | 2015-04-01 |
| **Date of Test** | : | 2015-04-03 to 2015-04-17 |
| **Date of Issue** | : | 2015-12-04 |
| **Test Report Form No.** | : | WSH-60335229F-03A |
| **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 (Dongguan) Co., Ltd.**
Address: 8/F, Hongyi Building, WuShiGang ZhuShan, DongCheng District, Dongguan, Guangdong, China
Tel: +86-769-22676998
Fax: +86-769-22676828


Compiled by:

Gary Liang / Project Engineer

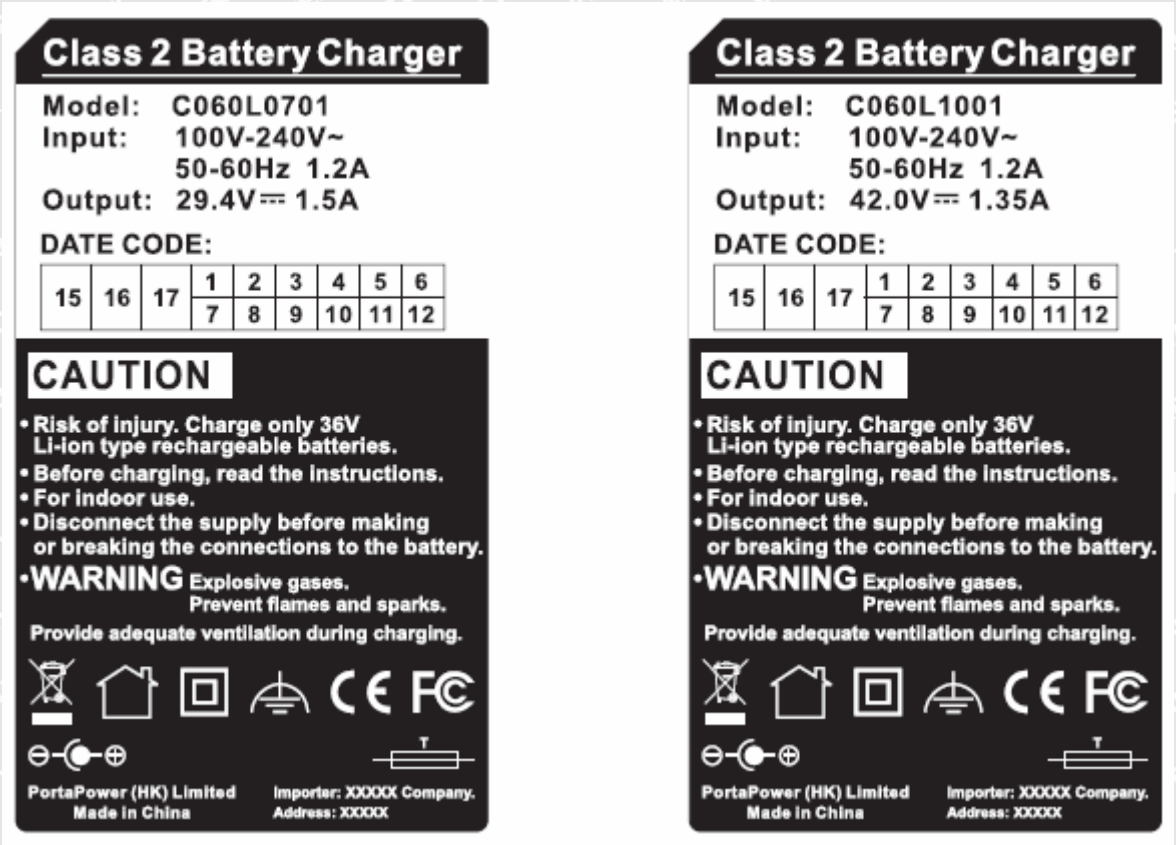
Approved by:

Billy Wang / Manager

| | |
|---|---|
| Test item description ..... | Charger |
| Trademark ..... | / |
| Model and/or type reference ..... | C060L1001, C060F1101, C060L0701, C060F0801, C060L0901 |
| Rating(s)..... | Input: 100-240 V~, 50/60 Hz, 1,2 A (Max.);<br>Output: see the general product information |

Copy of marking plate:

The artwork below may be only a draft. The use of certification marks on a product must be authorized by the respective NCBs that own these marks.




Note:

This is a representative label, the others are identical to it except for the model number and output ratings as listed in the model description.
The height dimension of CE mark should not less than 5mm, the height dimension of WEEE symbol should not less than 7mm.

Summary of testing:

1. The samples are tested and found to be complied with the requirements of standards listed on cover page.
2. The report was copied from report No. WTD14D0615641X2S of Waltek Services (Dongguan) Co., Ltd for adding a model C060L0901, it is no new test performed.

| | |
|---|---|
| Test item particulars ..... : | |
| Classification of installation and use..... : | Portable appliance and household indoor use |
| Supply Connection ..... : | Directly connected to the mains and appliance inlet used |

Possible test case verdicts:

- test case does not apply to the test object ..... : N (N/A)
- 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 comma is used as the decimal separator.

General product information:

1. The battery charger is class II appliance.
2. The appliance is for household and indoor use only.
3. It is intended to charge maximum capacity battery.
4. Model list are shown as below:

| Model | Input | Output Voltage | Output current |
|---|---|---|---|
| C060L1001 | AC 100-240V 50/60Hz 1.2A | DC42.0V | 1.35A |
| C060F1101 | AC 100-240V 50/60Hz 1.2A | DC39.6V | 1.35A |
| C060L0701 | AC 100-240V 50/60Hz 1.2A | DC29.4V | 1.50A |
| C060F0801 | AC 100-240V 50/60Hz 1.2A | DC28.8V | 1.50A |
| C060L0901 | AC 100-240V 50/60Hz 1.2A | DC37.6V | 1.35A |

Models C060F1101, C060F0801, C060L0901 are identical to models C060L1001, C060L0701 except that they have the different output and model names, all the tests were performed on models C060L1001 and C060L0701 at the worst case.

| IEC 60335-2-29 | | | |
|---|---|---|---|
| Clause | Requirement + Test | Result - Remark | Verdict |
| 5 | GENERAL CONDITIONS FOR THE TESTS | | P |
| | Tests performed according to cl. 5, e.g. nature of supply, sequence of testing, etc. | | P |
| 5.2 | If the test of 21.101 is carried out two additional battery chargers required (IEC 60335-2-29) | | P |
| 5.3 | The test of 19.14 carried out before the test of 19.11 | | P |
| 5.101 | Battery chargers tested as motor-operated appliances (IEC 60335-2-29) | | 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 | IPX0 | N |
| 7 | MARKING AND INSTRUCTIONS | | P |
| 7.1 | Rated voltage or voltage range (V) .....: | See page 2 | P |
| | Nature of supply .....: | See page 2 | P |
| | Rated frequency (Hz).....: | See page 2 | P |
| | Rated power input (W).....: | See page 2 | P |
| | Rated current (A) .....: | See page 2 | N |
| | Manufacturer's or responsible vendor's name, trademark or identification mark .....: | See page 2 | P |
| | Model or type reference.....: | See page 2 | P |
| | Symbol 5172 of IEC 60417, for Class II appliances | | N |
| | IP number, other than IPX0 .....: | IPX0 | N |
| | Symbol IEC 60417-5180, for class III appliances, unless | | N |
| | the appliance is operated by batteries only | | N |
| | Symbol IEC 60417-5036, for the enclosure of electrically-operated water valves in external hose-sets for connection of an appliance to the water mains | | N |
| | Battery chargers marked with (IEC 60335-2-29): | | P |
| | - rated d.c. output voltage (V) | | P |
| | - rated d.c. output current (A) | | P |
| | - rated current (A) of protective devices incorporated in a d.c. distribution board | | N |

| IEC 60335-2-29 | | | |
|---|---|---|---|
| Clause | Requirement + Test | Result - Remark | Verdict |
| | - polarity of the output terminals indicated by symbol IEC 60417-5005 for the positive terminal and IEC 60417-5006 for the negative terminal | Special output terminal used. | P |
| | - time-current characteristic of fuse-links of the time-lag type | | P |
| | If the output exceeds 20 VA, battery chargers marked with (IEC 60335-2-29): | | P |
| | - before charging, read the instructions | | P |
| | - for indoor use or do not expose to rain, unless appliance is at least IPX4 | indoor use | P |
| | If the output exceeds 20 VA and the battery charger is for lead-acid batteries, battery chargers marked with (IEC 60335-2-29): | | P |
| | - disconnect the supply before making or breaking the connections to the battery | | P |
| | - WARNING: Explosive gases. Prevent flames and sparks. Provide adequate ventilation during charging. | | P |
| | Battery chargers incorporating an engine cracking switch allowing the charger to supply a supplementary starting current for the engine marked with (IEC 60335-2-29): | | N |
| | - maximum “on” time | | N |
| | - minimum “off” time or maximum ratio between “on” time and “off” time | | N |
| 7.2 | Warning for stationary appliances for multiple supply | | N |
| | Warning placed in vicinity of terminal cover | | N |
| 7.3 | Range of rated values marked with the lower and upper limits separated by a hyphen | | P |
| | Different rated values marked with the values separated by an oblique stroke | | N |
| 7.4 | If the appliance can be adjusted for different rated voltages, the voltage to which the appliance is adjusted shall be 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 |
| | Output voltage clearly discernible if the battery charger can be adjusted to different rated d.c. output voltages (IEC 60335-2-29) | | N |
| 7.5 | Appliances with more than one rated voltage or one or more rated voltage ranges, marked with rated input or rated current for each rated voltage or range, unless | | N |
| | the power input is related to the arithmetic mean value of the rated voltage range | | N |

| IEC 60335-2-29 | | | |
|---|---|---|---|
| Clause | Requirement + Test | Result - Remark | Verdict |
| | Relation between marking for upper and lower limits of rated power input or rated current and voltage is clear | | N |
| 7.6 | Correct symbols used | | 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: | | P |
| | - marking of terminals exclusively for the neutral conductor (N) | | N |
| | - marking of protective earthing terminals (symbol 5019 of IEC 60417) | | P |
| | - marking not placed on removable parts | | P |
| 7.9 | Marking or placing of switches which may cause a hazard | | P |
| 7.10 | Indications of switches on stationary appliances and controls on all appliances by use of figures, letters or other visual means.....: | | N |
| | The 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 | | N |
| 7.12 | Instructions for safe use provided | | P |
| | Details concerning precautions during user maintenance | | P |
| | The instructions state that: | | P |
| | - 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 |

| IEC 60335-2-29 | | | |
|---|---|---|---|
| Clause | Requirement + Test | Result - Remark | Verdict |
| | - children being supervised not to play with the appliance | | P |
| | Instructions for safe use contains (IEC 60335-2-29): | | P |
| | - specification of types, number of cells and rated capacity of batteries that can be charged | | P |
| | - warning against recharging non-rechargeable batteries | | P |
| | - statement that during charging, batteries must be placed in the well ventilated area, only for battery chargers for lead-acid batteries | | P |
| | - statement that battery chargers must only be plugged into an earthed socket-outlet, only for portable Class I battery chargers for outdoor use | | N |
| | - explanation of automatic function stating any limitation, only for automatic battery chargers | | N |
| | Battery chargers for charging automobile batteries include substance concerning (IEC 60335-2-29): | | N |
| | - The battery terminal not connected to the chassis has to be connected first. The other connection is to be made to the chassis, remote from the battery and fuel line. The battery charger is then to be connected to the supply mains; | | P |
| | - After charging, disconnect the battery charger from the supply mains. Then remove the chassis connection and then the battery connection. | | 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 |
| | The instructions for battery chargers for installation in caravans and similar vehicles shall state that the connection to the supply mains is to be in accordance with the national wiring rules (IEC 60335-2-29). | | 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 |

| IEC 60335-2-29 | | | |
|---|---|---|---|
| Clause | Requirement + Test | Result - Remark | Verdict |
| 7.12.3 | Insulation of the fixed wiring in contact with parts exceeding 50 K during clause 11; instructions stating that the fixed wiring must be protected | | N |
| 7.12.4 | Instructions for built-in appliances: | | N |
| | - dimensions of space | | N |
| | - dimensions and position of supporting means | | N |
| | - distances between parts and surrounding structure | | N |
| | - dimensions of ventilation openings and arrangement | | N |
| | - connection to supply mains and interconnection of separate components | | N |
| | - allow disconnection of the appliance after installation, by accessible plug or a switch in the fixed wiring, unless | | N |
| | a switch complying with 24.3 | | N |
| 7.12.5 | Replacement cord instructions, type X attachment with a specially prepared cord | | N |
| | Replacement cord instructions, type Y attachment | | P |
| | Replacement cord instructions, type Z attachment | | N |
| 7.12.6 | If a non-self-resetting thermal cut-out is required in order to comply with the standard then the instructions for appliances incorporating a non-self-resetting thermal cut-out that is reset by disconnection of the supply mains shall contain the substance of the following: | | N |
| | CAUTION: In order to avoid a hazard due to inadvertent resetting of the thermal cut-out, this appliance must not be supplied through an external switching device, such as a timer, or connected to a circuit that is regularly switched on and off by the utility. | | 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 | English | P |
| 7.14 | Marking clearly legible and durable | | P |
| 7.15 | Marking on a main part | | P |

| IEC 60335-2-29 | | | |
|---|---|---|---|
| Clause | Requirement + Test | Result - Remark | Verdict |
| | 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 |
| 7.101 | D.C. distribution boards marked with (IEC 60335-2-29): | | N |
| | - maximum output current (A) for each output circuit .....: | | N |
| | - types of any additional power supply which can be connected | | 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 |
| | Insertion or removal of lamps, protection against contact with live parts of the lamp cap | | N |
| | Use of test probe B of IEC 61032: no contact with live parts | | P |
| 8.1.2 | Use of test probe 13 of IEC 61032 through openings in class 0 appliances and class II appliances/ constructions: no contact with live parts | | 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: no contact with live parts of visible glowing heating elements | | N |
| 8.1.4 | Accessible part not considered live if: | | P |

| IEC 60335-2-29 | | | |
|---|---|---|---|
| Clause | Requirement + Test | Result - Remark | Verdict |
| | - 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 | Measured max.: 42,186 V | P |
| | - or separated from live parts by protective impedance | | P |
| | 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 |
| | Only possible to touch parts separated from live parts by double or reinforced insulation | | P |
| 9 | STARTING OF MOTOR-OPERATED APPLIANCES | | N |
| | Requirements and tests are specified in part 2 when necessary | | 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 | | N |
| | Test for an appliance with one or more rated voltage ranges | | N |
| 10.2 | Current at normal operating temperature, rated voltage and normal operation not deviating from rated current by more than shown in table 2 | (see appended table 10.2) | P |
| | Test for an appliance with one or more rated voltage ranges | (see appended table 10.2) | P |

| IEC 60335-2-29 | | | |
|---|---|---|---|
| Clause | Requirement + Test | Result - Remark | Verdict |
| 10.101 | No-load d.c. output voltage does not exceed 42,2 V (IEC 60335-2-29) ..... : | (see appended table 10.101) | P |
| 10.102 | Arithmetic mean value of output current does not deviate from rated d.c. output current by more than 10 % (IEC 60335-2-29) | (see appended table 10.102) | P |
| 11 | HEATING | | P |
| 11.1 | No excessive temperatures in normal use | | P |
| 11.2 | Placing and mounting of battery chargers in the test corner as specified for heating appliances (IEC 60335-2-29) | | 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 makes it difficult to make the necessary connections | | P |
| 11.4 | Heating appliances operated under normal operation at 1,15 times rated power input .....: | | N |
| 11.5 | Battery chargers supplied only at 1,06 times rated voltage (IEC 60335-2-29) .....: | | P |
| 11.6 | Combined appliances operated under normal operation at most unfavourable voltage between 0.94 and 1,06 times rated voltage .....: | | N |
| 11.7 | Battery chargers operate until steady conditions are established (IEC 60335-2-29) | | P |
| 11.8 | Temperature rises not exceeding values in table 3 | (see appended table 11.8) | P |
| | If the temperature rise of a motor winding exceeds the value of table 3, or | | N |
| | if there is doubt with regard to classification of insulation, | | N |
| | tests of Annex C are carried out | | N |
| | Sealing compound does not flow out | | P |
| | Protective devices do not operate, except | | P |
| | components in protective electronic circuits tested for the number of cycles specified in 24.1.4 | No such parts | N |
| 13 | LEAKAGE CURRENT AND ELECTRIC STRENGTH AT OPERATING TEMPERATURE | | P |
| 13.1 | Leakage current not excessive and electric strength adequate | | P |

| IEC 60335-2-29 | | | |
|---|---|---|---|
| Clause | Requirement + Test | Result - Remark | Verdict |
| | Heating appliances operated at 1,15 times rated power input.....: | | N |
| | Motor-operated appliances and combined appliances supplied at 1,06 times rated voltage.....: | (see appended table 13.2 and 13.3) | P |
| | Protective impedance and radio interference filters disconnected before carrying out the tests | | P |
| 13.2 | Leakage current measured by means of the circuit described in figure 4 of IEC 60990 | | P |
| | Leakage current measurements | (see appended table 13.2) | P |
| 13.3 | The appliance is disconnected from the supply | | P |
| | Electric strength tests according to table 4 | (see appended table 13.3) | P |
| | No breakdown during the tests | | P |
| 14 | TRANSIENT OVERVOLTAGES | | N |
| | Appliances withstand the transient overvoltages to which they may be subjected | | N |
| | Clearances having a value less than specified in table 16 subjected to an impulse voltage test, the test voltage specified in table 6 | | N |
| | No flashover during the test, unless of functional insulation | | N |
| | In case of flashover of functional insulation, the appliance complies with clause 19 with the clearance short circuited | | N |
| 15 | MOISTURE RESISTANCE | | P |
| 15.1 | Enclosure provides the degree of moisture protection according to classification of the appliance | | N |
| | Compliance checked as specified in 15.1.1, taking into account 15.1.2, followed by the electric strength test of 16.3 | | N |
| | No trace of water on insulation which can result in a reduction of clearances and creepage distances below values specified in clause 29 | | N |
| 15.1.1 | Appliances, other than IPX0, subjected to tests as specified in IEC 60529.....: | | N |
| | Water valves in external hoses for connection of an appliance to the water mains tested as specified for IPX7 appliances | | N |
| 15.1.2 | Hand-held appliance turned continuously through the most unfavourable positions during the test | | N |

| IEC 60335-2-29 | | | |
|---|---|---|---|
| Clause | Requirement + Test | Result - Remark | Verdict |
| | Built-in appliances installed according to the instructions | | N |
| | Appliances placed or used on the floor or table placed on a horizontal unperforated support | | N |
| | Appliances normally fixed to a wall and appliances with pins for insertion into socket-outlets are mounted on a wooden board | | N |
| | For IPX3 appliances, the base of wall mounted appliances is placed at the same level as the pivot axis of the oscillating tube | | N |
| | For IPX4 appliances, the horizontal centre line of the appliance is aligned with the pivot axis of the oscillating tube | | N |
| | However, for appliances normally used on the floor or table, the movement is limited to two times 90° for a period of 5 min, the support being placed at the level of the pivot axis of the oscillating tube | | N |
| | Appliances normally fixed to a ceiling are mounted underneath a horizontal unperforated support, the pivot axis of the oscillating tube located at the level of the underside of the support | | N |
| | For IPX4 appliances, the movement of the tube is limited to two times 90° from the vertical for a period of 5 min | | N |
| | Wall-mounted appliances, take into account the distance to the floor stated in the instructions | | N |
| | Appliances with type X attachment fitted with a flexible cord as described | | N |
| | Detachable parts tested as specified | | N |
| 15.2 | Spillage of liquid does not affect the electrical insulation | | N |
| | Appliances with type X attachment fitted with a flexible cord as described | | N |
| | Appliances incorporating an appliance inlet tested with or without an connector, whichever is most unfavourable | | N |
| | Detachable parts removed | | N |
| | Overfilling test with additional amount of water, over a period of 1 min (l).....: | | N |
| | The appliance withstands the electric strength test of 16.3 | | N |

| IEC 60335-2-29 | | | |
|---|---|---|---|
| Clause | Requirement + Test | Result - Remark | Verdict |
| | No trace of water on insulation that can result in a reduction of clearances and creepage distances below values specified in clause 29 | | N |
| 15.3 | Appliances proof against humid conditions | | P |
| | Humidity test for 48 h in a humidity cabinet | 25°C, 93 % R.H. | P |
| | 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 | | P |
| 16.2 | Single-phase appliances: test voltage 1,06 times rated voltage.....: | (see appended table 16.2) | P |
| | Three-phase appliances: test voltage 1,06 times rated voltage divided by √3.....: | | N |
| | Leakage current measurements | (see appended table 16.2) | P |
| 16.3 | Electric strength tests according to table 7 | (see appended table 16.3) | 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 17) | P |
| | Appliance supplied with 1,06 or 0,94 times rated voltage and the most unfavourable short-circuit or overload likely to occur in normal use applied .....: | (see appended table 17) | P |
| | Output terminals of battery chargers are short-circuited (IEC 60335-2-29) | The appliance did not work | P |
| | Basic insulation is not short-circuited | | N |
| | Temperature rise of insulation of the conductors of safety extra-low voltage circuits not exceeding the relevant value specified in table 3 by more than 15 K | | P |
| | 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 |

| IEC 60335-2-29 | | | |
|---|---|---|---|
| Clause | Requirement + Test | Result - Remark | Verdict |
| | Requirements and tests are specified in part 2 when necessary | | N |
| 19 | ABNORMAL OPERATION | | P |
| 19.1 | The risk of fire or mechanical damage under abnormal or careless operation obviated | | P |
| | Electronic circuits so designed and applied that a fault will not render the appliance unsafe | | P |
| | if the appliance also has a control that limit the temperature during clause 11 it is subjected to the test of 19.4, and | | N |
| | Appliances incorporating motors subjected to the tests of 19.7 to 19.10, as applicable | | N |
| | Appliances incorporating contactors or relays subjected to the test of 19.14, being carried out before the tests of 19.11 | | N |
| | Appliances incorporating contactors or relays subjected to the test of 19.14, being carried out before the tests of 19.11 | | N |
| | Appliances incorporating voltage selector switches subjected to the test of 19.15 | | N |
| 19.2 | Test of appliance with heating elements with restricted heat dissipation; test voltage (V): power input of 0,85 times rated power input .....: | | N |
| 19.3 | Test of 19.2 repeated; test voltage (V): power input of 1,24 times rated power input .....: | | N |
| 19.4 | Test conditions as in cl. 11, any control limiting the temperature during tests of cl. 11 short-circuited | | N |
| 19.5 | Test of 19.4 repeated on Class 0I and I appliances with tubular sheathed or embedded heating elements. No short-circuiting, but one end of the element connected to the elements sheath | | N |
| | The test repeated with reversed polarity and the other end of the heating element connected to the sheath | | N |
| | The test is not carried out on appliances intended to be permanently connected to fixed wiring and on appliances where an all-pole disconnection occurs during the test of 19.4 | | N |
| 19.6 | Appliances with PTC heating elements tested at rated voltage, establishing steady conditions | | N |

| IEC 60335-2-29 | | | |
|---|---|---|---|
| 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 | | N |
| 19.7 | Stalling test by locking the rotor if the locked rotor torque is smaller than the full load torque or locking moving parts of other appliances | | N |
| | Locked rotor, motor capacitors open-circuited or short-circuited, if required | | N |
| | Locked rotor, capacitors open-circuited one at a time | | N |
| | Test repeated with capacitors short-circuited one at a time, if required | | N |
| | Appliances with timer or programmer supplied with rated voltage for each of the tests, for a period equal to the maximum period allowed | | N |
| | Other appliances supplied with rated voltage for a period as specified | | N |
| | Winding temperatures not exceeding values specified in table 8 | | N |
| 19.8 | Three-phase motors operated at rated voltage with one phase disconnected | | N |
| 19.9 | Running overload test on appliances incorporating motors intended to be remotely or automatically controlled or liable to be operated continuously | | N |
| | Winding temperatures not exceeding values as specified | | N |
| 19.10 | Series motor operated at 1,3 times rated voltage for 1 min.....: | | 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 they comply with the conditions specified in 19.11.1 | | P |
| | Appliances incorporating an electronic circuit subjected to the tests of 19.11.3 and 19.11.4 | | N |
| | Appliances incorporating an electronic circuit that relies upon a programmable component to function correctly, subjected to the test of 19.11.4.8 unless | | N |
| | Restarting at any point in the operating cycle after interruption of operation due to supply voltage not result in a hazard | | N |

| IEC 60335-2-29 | | | |
|---|---|---|---|
| Clause | Requirement + Test | Result - Remark | Verdict |
| | Appliances having a device with an off position obtained by electronic disconnection, or a device placing the appliance in a stand-by mode, subjected to the tests of 19.11.4 | | N |
| 19.11.1 | Before applying the fault conditions a) to f) in 19.11.2, it is checked if circuits or parts of circuit meet both of the following conditions: | | P |
| | - 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 in other parts of the appliance does not rely on the correct functioning of the electronic circuit | | P |
| 19.11.2 | Fault conditions applied one at a time, the appliance operated under conditions specified in cl. 11, but supplied at rated voltage, the duration of the tests as specified: | | P |
| | a) short circuit of functional insulation if clearances or creepage distances are less than the values specified in 29 | (see appended table 19.11.2) | P |
| | b) open circuit at the terminals of any component | | P |
| | c) short circuit of capacitors, unless they comply with IEC 60384-14 | | P |
| | d) short circuit of any two terminals of an electronic component, other than integrated circuits. This fault condition is not applied between the two circuits of an optocoupler | | P |
| | e) failure of triacs in the diode mode | | P |
| | f) failure of an integrated circuit | | P |
| | g) failure of an electronic power switching device | | 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 f) of 19.11.2 | | N |
| | During and after each test the following is checked: | | N |
| | - the temperature rise of the windings do not exceed the values specified in table 8 | | N |
| | - the appliance complies with the conditions specified in 19.13 | | N |
| | - any current flowing through protective impedance not exceeding the limits specified in 8.1.4 | | N |
| | If a conductor of a printed board becomes open-circuited, the appliance is considered to have withstood the particular test, provided all three of the following conditions are met: | | N |

| IEC 60335-2-29 | | | |
|---|---|---|---|
| Clause | Requirement + Test | Result - Remark | Verdict |
| | - the material of the printed circuit board withstands the burning test of annex E | | N |
| | - any loosened conductor does not reduce the clearances or creepage distances between live parts and accessible metal parts below the values specified in cl. 29 | | N |
| | - the appliance withstands the tests of 19.11.2 with open-circuited conductor bridged | | N |
| 19.11.4 | Appliances having a switch with an off position obtained by electronic disconnection, or | | N |
| | a switch that can be placed in the stand-by mode, | | N |
| | subjected to the tests of 19.11.4.1 to 19.11.4.7 | | N |
| | Appliances incorporating a protective electronic circuit subjected to the tests of 19.11.4.1 to 19.11.4.7, except that | | N |
| | appliances operated for 30 s or 5 min during the test of 19.7 are not subjected to the tests for electromagnetic phenomena. | | N |
| 19.11.4.1 | The appliance is subjected to electrostatic discharges in accordance with IEC 61000-4-2, test level 4 | | N |
| 19.11.4.2 | The appliance is subjected to radiated fields in accordance with IEC 61000-4-3, test level 3 | | N |
| 19.11.4.3 | The appliance is subjected to fast transient bursts in accordance with IEC 61000-4-4, test level 3 or 4 as specified | | N |
| 19.11.4.4 | The power supply terminals of the appliance subjected to voltage surges in accordance with IEC 61000-4-5, test level 3 or 4 as specified | | N |
| | Earthed heating elements in class I appliances disconnected | | N |
| 19.11.4.5 | The appliance is subjected to injected currents in accordance with IEC 61000-4-6, test level 3 | | N |
| 19.11.4.6 | Appliances having a rated current not exceeding 16 A are subjected to the Class 3 voltage dips and interruptions in accordance with IEC 61000-4-11 | | N |
| | Appliances having a rated current exceeding 16 A are subjected to the Class 3 voltage dips and interruptions in accordance with IEC 61000-4-34 | | N |
| 19.11.4.7 | The appliance is subjected to mains signals in accordance with IEC 61000-4-13, test level class 2 | | N |

| IEC 60335-2-29 | | | |
|---|---|---|---|
| Clause | Requirement + Test | Result - Remark | Verdict |
| 19.11.4.8 | The appliance is supplied at rated voltage and operated under normal operation. After 60s the power supply is reduces to a level such that the appliance ceases to respond or a programmable component cease to operate. | | N |
| | The appliance continues to operate normally or requires a manual operation to restart | | N |
| 19.12 | If the safety of the appliance for any of the fault conditions specified in 19.11.2 depends on the operation of a miniature fuse-link complying with IEC 60127, the test is repeated, measuring the current flowing through the fuse-link; measured current (A); rated current of the fuse-link (A).....: | | P |
| 19.13 | During the tests the appliance does not emit flames, molten metal, poisonous or ignitable gas in hazardous amounts | (see appended table 19.13) | P |
| | Temperature rises not exceeding the values shown in table 9 | | P |
| | During the tests, the values of Table 8 apply (IEC 60335-2-29) | | P |
| | Compliance with clause 8 not impaired | | P |
| | No rupture of the battery | | P |
| | If the appliance can still be operated it complies with 20.2 | | P |
| | Insulation, other than of class III appliance, withstand the electric strength test of 16.3, the test voltage specified in table 4: | | P |
| | - basic insulation .....: | 1000V | P |
| | - supplementary insulation.....: | 1750V | P |
| | - reinforced insulation.....: | 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 | | P |
| | The appliance does not undergo a dangerous malfunction, and | | P |
| | no failure of protective electronic circuits, if the appliance is still operable | | N |
| | Appliances tested with an electronic switch in the off position, or in the stand-by mode: | | N |
| | - do not become operational, or | | N |
| | - if they become operational, do not result in a dangerous malfunction during or after the tests of 19.11.4 | | N |

| IEC 60335-2-29 | | | |
|---|---|---|---|
| Clause | Requirement + Test | Result - Remark | Verdict |
| | 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 shortcircuited | | N |
| | If more than one relay or contactor operates in clause 11, they are short-circuited in turn | | N |
| 19.15 | For appliances with a mains voltage selector switch, the switch is set to the lowest rated voltage position and the highest value of rated voltage is applied | | N |
| 19.101 | Battery chargers supplied at rated voltage and operated under normal operation, any control limiting the temperature during tests of clause 11 short-circuited (IEC 60335-2-29) | | N |
| 19.102 | Reverse connection of battery chargers to a fully charged battery at rated voltage (IEC 60335-2-29) | The appliance did not work | P |
| | The capacity of the battery (IEC 60335-2-29).....: | Tested | P |
| 19.103 | Battery chargers intended to be used with a d.c. distribution board supplied at rated voltage and operated under normal operation, load increased as specified until protective device operates or short-circuit conditions are established (IEC 60335-2-29) | | N |
| 20 | STABILITY AND MECHANICAL HAZARDS | | P |
| 20.1 | Adequate stability | | P |
| | Tilting test through an angle of 10° (appliance placed on an inclined plane/horizontal plane); 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 | No such parts | N |

| IEC 60335-2-29 | | | |
|---|---|---|---|
| Clause | Requirement + Test | Result - Remark | Verdict |
| | Protective enclosures, guards and similar parts are non-detachable | | N |
| | have adequate mechanical strength | | N |
| | Enclosures that can be opened by overriding an interlock are considered to be detachable parts | | N |
| | Self-resetting thermal cut-outs and overcurrent protective devices not causing a hazard, by unexpected reclosure | | N |
| | Not possible to touch dangerous moving parts with test probe | | N |
| 21 | MECHANICAL STRENGTH | | P |
| 21.1 | Appliance has adequate mechanical strength and is constructed as to withstand rough handling | | P |
| | Checked by applying blows to the appliance in accordance with test Ehb of IEC 60068-2-75, spring hammer test, impact energy 1,0 J ± 0,05 J (IEC 60335-2-29) | | P |
| | If necessary, supplementary or reinforced insulation subjected to the electric strength test of 16.3 | | N |
| | If necessary, repetition of groups of three blows on a new sample | | N |
| 21.2 | Accessible parts of solid insulation having strength to prevent penetration by sharp implements | | P |
| | The insulation is tested as specified, unless | | N |
| | the thickness of supplementary insulation is at least 1 mm and reinforced insulation is at least 2 mm | | P |
| 21.101 | Battery chargers, other than built-in battery chargers, having a mass not exceeding 5 kg, subjected to a drop test (IEC 60335-2-29) | | P |
| | Battery chargers show no damage that could impair compliance with 8.1, 15.1.1, 16.3 and cl. 29 (IEC 60335-2-29) | | P |
| 21.102 | Battery chargers for installing in caravans and similar vehicles withstand vibrations to which they may be subjected (IEC 60335-2-29) | | N |
| | Vibration test as specified in IEC 60068-2-6 (IEC 60335-2-29) | | N |
| | Battery chargers show no damage that could impair compliance with 8.1, 15.1.1, 16.3 and cl. 29 (IEC 60335-2-29) | | N |
| | Connections have not worked loose (IEC 60335-2-29) | | N |

| IEC 60335-2-29 | | | |
|---|---|---|---|
| Clause | Requirement + Test | Result - Remark | Verdict |
| 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 provide all-pole disconnection from the supply provided, the following means being available: | | N |
| | - a supply cord fitted with a plug | | N |
| | - a switch complying with 24.3 | | N |
| | - a statement in the instruction sheet that a disconnection incorporated in the fixed wiring is to be provided | | N |
| | - an appliance inlet | | N |
| | 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 rotating does not impair compliance with the standard | | N |
| 22.4 | Appliance for heating liquids and appliance causing undue vibration not provided with pins for insertion into socket-outlets | | N |
| 22.5 | No risk of electric shock when touching the pins of the plug, for appliances having a capacitor with rated capacitance exceeding 0,1μF, the appliance being disconnected from the supply at the instant of voltage peak | Not exceeding 0,1 μF | N |
| 22.6 | Electrical insulation not affected by condensing water or leaking liquid | | P |
| | Electrical insulation of Class II appliances not affected in case of a hose rupture or seal leak | | N |
| 22.7 | Adequate safeguards against the risk of excessive pressure in appliances provided with steam-producing devices | | N |

| IEC 60335-2-29 | | | |
|---|---|---|---|
| Clause | Requirement + Test | Result - Remark | Verdict |
| 22.8 | Electrical connections not subject to pulling during cleaning of compartments to which access can be gained without the aid of a tool, and that are likely to be cleaned in normal use | | N |
| 22.9 | Insulation, internal wiring, windings, commutators and slip rings not exposed to oil, grease or similar substances | | P |
| | Adequate insulating properties of oil or grease to which insulation is exposed | | N |
| 22.10 | Not possible to reset voltage-maintained non-self-resetting thermal cut-outs by the operation of an automatic switching device incorporated within the appliance | No such parts | N |
| | Non-self resetting thermal motor protectors have a trip-free action, unless | | N |
| | they are voltage maintained | | N |
| | Location or protection of reset buttons of non-self-resetting controls is so that accidental resetting is unlikely | | N |
| 22.11 | Reliable fixing of non-detachable parts that provide the necessary degree of protection against electric shock, moisture or contact with moving parts | Appliance inlet used | N |
| | Obvious locked position of snap-in devices used for fixing such parts | | N |
| | No deterioration of the fixing properties of snap-in devices used in parts that are likely to be removed during installation or servicing | | N |
| | Tests as described | | N |
| 22.12 | Handles, knobs etc. fixed in a reliable manner | | 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 operators 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 |

| IEC 60335-2-29 | | | |
|---|---|---|---|
| Clause | Requirement + Test | Result - Remark | Verdict |
| | No exposed pointed ends of self tapping screws etc., liable to be touched by the user in normal use or during user maintenance | | P |
| 22.15 | Storage hooks and the like for flexible cords smooth and well rounded | | N |
| 22.16 | Automatic cord reels cause no undue abrasion or damage to the sheath of the flexible cord, no breakage of conductors strands, no undue wear of contacts | | N |
| | Cord reel tested with 6000 operations, as specified | | N |
| | Electric strength test of 16.3, voltage of 1000 V applied | | N |
| 22.17 | Spacers not removable from the outside by hand or by means of a screwdriver or a spanner | | N |
| 22.18 | Current-carrying parts and other metal parts resistant to corrosion under normal conditions of use | | P |
| 22.19 | Driving belts not used as electrical insulation | No such parts | N |
| 22.20 | Direct contact between live parts and thermal insulation effectively prevented, unless material used is non-corrosive, non-hygroscopic and non-combustible | | P |
| | Compliance is checked by inspection and, if necessary, by appropriate test | | P |
| 22.21 | Wood, cotton, silk, ordinary paper and fibrous or hygroscopic material not used as insulation, unless impregnated | | P |
| | This requirement does not apply to magnesium oxide and mineral ceramic fibres used for the electrical insulation of heating elements | No such parts | N |
| 22.22 | Appliances not containing asbestos | | P |
| 22.23 | Oils containing polychlorinated biphenyl (PCB) not used | | P |
| 22.24 | Bare heating elements, other than those in class III appliances or class III constructions that do not contain live parts, shall be supported so that the heating conductor is unlikely to come into contact with accessible metal parts if they rupture. | | N |
| | In case of rupture, the heating conductor is unlikely to come in contact with accessible metal parts | | N |
| 22.25 | Appliances shall be constructed so that sagging heating conductors cannot come into contact with accessible metal parts. This requirement does not apply to class III appliances or class III constructions that do not contain live parts. | | N |

| IEC 60335-2-29 | | | |
|---|---|---|---|
| Clause | Requirement + Test | Result - Remark | Verdict |
| 22.26 | Output circuit supplied through a safety isolating transformer (IEC 60335-2-29) | | P |
| | No connection between the output circuit and accessible metal parts or an earthing terminal (IEC 60335-2-29) | | P |
| | Insulation between parts operating at safety extra-low voltage and live parts complies with the requirements for double or reinforced insulation (IEC 60335-2-29) | | P |
| 22.27 | Parts connected by protective impedance separated by double or reinforced insulation | | P |
| 22.28 | Metal parts of Class II appliances conductively connected to gas pipes or in contact with water: separated from live parts by double or reinforced insulation | | N |
| 22.29 | Class II appliances permanently connected to fixed wiring so constructed that the required degree of access to live parts is maintained after installation | | N |
| 22.30 | Parts serving as supplementary or reinforced insulation fixed so that they cannot be removed without being seriously damaged, or | | P |
| | so constructed that they cannot be replaced in an incorrect position, and so that if they are omitted, the appliance is rendered inoperable or manifestly incomplete | | P |
| 22.31 | Clearances and creepage distances over supplementary and reinforced insulation not reduced below values specified in clause 29 as a result of wear | | P |
| | Clearances and creepage distances between live parts and accessible parts not reduced below values for supplementary insulation, if wires, screws etc. become loose | | P |
| 22.32 | Supplementary and reinforced insulation designed or protected against deposition of dirt or dust | | 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 | | P |
| | Ceramic material not tightly sintered, similar material or beads alone not used as supplementary or reinforced insulation | | N |
| | Oxygen bomb test at 70°C for 96 h and 16 h at room temperature | | N |

| IEC 60335-2-29 | | | |
|---|---|---|---|
| Clause | Requirement + Test | Result - Remark | Verdict |
| | Insulating material in which heating conductors are embedded is considered to be basic insulation and not reinforced insulation | | N |
| 22.33 | Conductive liquids that are or may become accessible in normal use are not in direct contact with live parts | | N |
| | Electrodes not used for heating liquids | | N |
| | For class II constructions, conductive liquids that are or may become accessible in normal use 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 the shaft is not accessible when the part is removed | | P |
| 22.35 | For other than class III constructions, handles, levers and knobs, held or actuated in normal use, not becoming live in the event of a failure of basic insulation | | N |
| | Such parts being of metal, and their shafts or fixings are likely to become live in the event of an insulation fault, they are either adequately covered by insulation material, or their accessible parts are separated from their shafts or fixings by supplementary insulation | | N |
| | This requirement does not apply to handles, levers and knobs on stationary appliances other than those of electrical components, provided they are either reliably connected to an earthing terminal or earthing contact, or separated from live parts by earthed metal | | N |
| | Insulating material covering metal handles, levers and knobs withstand the electric strength test of 16.3 for supplementary insulation | | N |

| IEC 60335-2-29 | | | |
|---|---|---|---|
| Clause | Requirement + Test | Result - Remark | Verdict |
| 22.36 | Handles continuously held in the hand in normal use are so constructed that when gripped as in normal use, the operators hand is not likely to touch metal parts, unless they are separated from live parts by double or reinforced insulation | | N |
| 22.37 | Capacitors in Class II appliances not connected to accessible metal parts, unless complying with 22.42 | No accessible metal parts | N |
| | Metal casings of capacitors in Class II appliances separated from accessible metal parts by supplementary insulation, unless complying with 22.42 | | N |
| 22.38 | Capacitors not connected between the contacts of a thermal cut-out | No thermal cut-outs | N |
| 22.39 | Lamp holders used only for the connection of lamps | | N |
| 22.40 | Motor-operated appliances and combined appliances intended to be moved while in operation, or having accessible moving parts, fitted with a switch to control the motor. The actuating member of the switch being easily visible and accessible | | N |
| | Unless the appliance can operate continuously, automatically or remotely without giving rise to a hazard, appliances for remote operation being fitted with a switch. The actuating member of the switch being easily visible and accessible | | N |
| 22.41 | No components, other than lamps, containing mercury | | P |
| 22.42 | Protective impedance consisting of at least two separate components | | P |
| | Values specified in 8.1.4 not exceeded if any one of the components are short-circuited or open-circuited | | P |
| | 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 | Approved | P |
| 22.43 | Appliances adjustable for different voltages, accidental changing of the setting of the voltage unlikely to occur | | N |
| 22.44 | Appliances shall not have 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 29.1.4 due to deformation as a result of an external force applied to the enclosure | | P |

| IEC 60335-2-29 | | | |
|---|---|---|---|
| Clause | Requirement + Test | Result - Remark | Verdict |
| 22.46 | For programmable protective electronic circuits used to ensure compliance with the standard, the software contains measures to control the fault/error conditions in table R.1 | | N |
| | Software that contains measures to control the fault/error conditions specified in table R.2 is to be specified in parts 2 for particular constructions or to address specific hazards | | N |
| | These requirements are not applicable to software used for functional purpose or compliance with clause 11 | | N |
| 22.47 | Appliances connected to the water mains withstand the water pressure expected in normal use | | 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 set before the appliance can be started, unless | | N |
| | the appliance switches off automatically or operate continuously without hazard | | N |
| 22.50 | Controls incorporated in the appliance take priority over controls actuated by remote operation | | N |
| 22.51 | A control on the appliance being manually adjusted to the setting for remote operation before the appliance operated in this mode | | N |
| | Visual indication showing that the appliance is adjusted for remote operation | | N |
| | Manual setting and visual indication not necessary on appliances that can operate as follows, without giving rise to a hazard: | | N |
| | - operate continuously, | | N |
| | - operate automatically, or | | N |
| | - be operated remotely | | N |
| 22.52 | Socket-outlets on appliances accessible to the user in accordance with the socket-outlet system used in the country in which the appliance is sold | | N |
| 22.102 | Each circuit supplied from a d.c. distribution board incorporates an overload protective device (IEC 60335-2-29) | | N |
| 22.103 | Battery chargers for installing in caravans or similar vehicles constructed so that they can be securely fixed to a support (IEC 60335-2-29) | | N |

| IEC 60335-2-29 | | | |
|---|---|---|---|
| Clause | Requirement + Test | Result - Remark | Verdict |
| 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 or corners | | N |
| | Beads inside flexible metal conduits contained within an insulating sleeve | | N |
| 23.3 | Electrical connections and internal conductors movable relatively to each other not exposed to undue stress | | N |
| | Flexible metallic tubes not causing damage to insulation of conductors | | N |
| | Open-coil springs not used | | N |
| | Adequate insulating lining provided inside a coiled spring, the turns of which touch one another | | N |
| | No damage after 10 000 flexings for conductors flexed during normal use or 100 flexings for conductors flexed during user maintenance | | N |
| | Electric strength test of 16.3, 1000 V between live parts and accessible metal parts | No 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 15 W | | N |
| 23.4 | Bare internal wiring sufficiently rigid and fixed | | P |
| 23.5 | The insulation of internal wiring 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 |

| IEC 60335-2-29 | | | |
|---|---|---|---|
| Clause | Requirement + Test | Result - Remark | Verdict |
| | be such that it can only be removed by breaking or cutting | | N |
| 23.7 | The colour combination green/yellow used only for earthing conductors | | N |
| 23.8 | Aluminium wires not used for internal wiring | No aluminium wires | P |
| 23.9 | No lead-tin soldering of stranded conductors where they are subject to contact pressure, unless | | P |
| | clamping means so constructed that there is no risk of bad contact due to cold flow of the solder | | N |
| 23.10 | The insulation and sheath of internal wiring, incorporated in external hoses for the connection of an appliance to the water mains, at least equivalent to that of light polyvinyl chloride sheathed flexible cord (60227 IEC 52) | | N |
| 24 | COMPONENTS | | P |
| 24.1 | Components comply with safety requirements in relevant IEC standards | | P |
| | List of components | (see appended table 24.1) | P |
| | Components not tested and found to comply with relevant IEC standard for the number of cycles specified are tested in accordance with 24.1.1 to 24.1.9 | | 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, components not marked or not used in accordance with its marking, tested under the conditions occurring in the appliance | | P |
| | Lampholders and starterholders not being tested and found to comply with the relevant IEC standard, tested as a part of the appliance and additionally according to the gauging and interchangeability requirements of the relevant IEC standard | | N |
| | No additional tests specified for nationally standardized plugs such as those detailed in IEC/TR 60083 or connectors complying with the standard sheets of IEC 60320-1 and IEC 60309 | | P |
| 24.1.1 | Capacitors likely to be permanently subjected to the supply voltage and used for radio interference suppression or for voltage dividing, complying with IEC 60384-14, or | Approved | P |

| IEC 60335-2-29 | | | | |
|---|---|---|---|---|
| Clause | Requirement + Test | | Result - Remark | Verdict |
| | tested according to annex F | | | N |
| 24.1.2 | Safety isolating transformers complying with IEC 61558-2-6, or | | | N |
| | tested according to annex G | | | P |
| 24.1.3 | Switches complying with IEC 61058-1, the number of cycles of operation being at least 10 000, or | | | N |
| | tested according to annex H | | | N |
| | If the switch operates a relay or contactor, the complete switching system is subjected to the test | | | N |
| | 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 relevant part 2. The number of cycles of operation being: | | | N |
| | - thermostats: | 10 000 | | N |
| | - temperature limiters: | 1 000 | | N |
| | - self-resetting thermal cut-outs: | 300 | | N |
| | - voltage maintained non-self-resetting thermal cut-outs: | 1000 | | N |
| | - other non-self-resetting thermal cut-outs: | 30 | | N |
| | - timers: | 3 000 | | N |
| | - energy regulators: | 10 000 | | N |
| | Thermal motor protectors are tested in combination with their motor under the conditions specified in Annex D | | | N |
| | For water valves containing live parts and that are incorporated in external hoses for connection of an appliance to the water mains, the degree of protection declared for subclause 6.5.2 of IEC 60730-2-8 is IPX7 | | | N |
| 24.1.5 | Appliance couplers complying with IEC 60320-1 | | Approved | P |
| | However, appliances classified higher than IPX0, the appliance couplers complying with IEC 60320-2-3 | | | N |
| | Interconnection couplers complying with IEC 60320-2-2 | | | N |
| 24.1.6 | Small lamp holders similar to E10 lampholders complying with IEC 60238, the requirements for E10 lampholders being applicable | | | N |

| IEC 60335-2-29 | | | |
|---|---|---|---|
| Clause | Requirement + Test | Result - Remark | Verdict |
| 24.1.7 | If the remote operation of the appliance is via a telecommunication network, the relevant standard for the telecommunication interface circuitry in the appliance is IEC 62151 | | N |
| 24.1.8 | The relevant standard for thermal links is IEC 60691. 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 | Relays, other than motor starting relays, tested as part of the appliance | | N |
| | They also tested in accordance with Clause 17 of IEC 60730-1, the number of operations in 24.1.4 selected according to the relay function in the appliance .....: | | N |
| 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 having a contact separation in all poles, providing full disconnection under overvoltage category III conditions | | N |
| 24.4 | Plugs and socket-outlets for extra-low voltage circuits and heating elements, not interchangeable with plugs and socket-outlets listed in IEC 60083 or IEC 60906-1 or with connectors and appliance inlets complying with the standard sheets of IEC 60320-1 | | N |
| 24.5 | Capacitors in auxiliary windings of motors marked with their rated voltage and capacitance and used accordingly | | N |
| | Voltage across capacitors in series with a motor winding does not exceed 1,1 times rated voltage, when the appliance is supplied at 1,1 times rated voltage under minimum load | | N |
| 24.6 | Working voltage of motors connected to the supply mains and having basic insulation that is inadequate for the rated voltage of the appliance, not exceeding 42V | | N |
| | In addition, the motors are complying with the requirements of Annex I | | N |

| IEC 60335-2-29 | | | |
|---|---|---|---|
| Clause | Requirement + Test | Result - Remark | Verdict |
| 24.7 | Hose-sets for connection of appliances to the water mains, complying with IEC 61770 and supplied with the appliance | | 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 | | N |
| | - an appliance inlet having at least the same degree of protection against moisture as required for the appliance | | P |
| | - pins for insertion into socket-outlets | | N |
| 25.2 | Appliance not provided with more than one means of connection to the supply mains | | P |
| | Stationary appliance for multiple supply may be provided with more than one means of connection, provided electric strength test of 1250 V for 1 min between each means of connection causes no breakdown | | N |
| 25.3 | Appliance intended to be permanently connected to fixed wiring provided with one of the following means for connection to the supply mains: | | N |
| | - a set of terminals allowing the connection of a flexible cord | | N |
| | - a fitted supply cord | | N |
| | - a set of supply leads accommodated in a suitable compartment | | N |

| IEC 60335-2-29 | | | |
|---|---|---|---|
| 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 |
| | Appliances intended to be permanently connected to fixed wiring that are provided with | | N |
| | a set of terminals allowing the connection of cables of fixed wiring having the nominal cross-sectional areas specified in 26.6, or | | N |
| | a set of terminals and cable entries, conduit entries, knock-outs or glands, which allow the connection of the appropriate types of cable or conduit, | | N |
| | shall allow the connection of the supply conductors after the appliance has been fixed to its support. | | N |
| | If a fixed appliance is constructed so that parts can be removed to facilitate easy installation, this requirement is considered to be met if it is possible to connect the fixed wiring without difficulty after a part of the appliance has been fixed to its support. In this case, removable parts are to be constructed for ease of reassembly without risk of incorrect assembly or damage to the wiring or terminals. | | N |
| 25.4 | Cable and conduit entries, rated current of appliance not exceeding 16 A, dimension according to table 10 | | N |
| | Introduction of conduit or cable does not reduce clearances or creepage distances below values specified in 29 | | N |
| 25.5 | Method for assemble supply cord with the appliance: | | N |
| | - type X attachment | | N |
| | - type Y attachment | | N |
| | - type Z attachment, if allowed in part 2 | | N |
| | Type X attachment, other than those with a specially prepared cord, not used for flat twin tinsel cords | | N |
| | For multi-phase appliances supplied with a supply cord and that are intended to be permanently connected to fixed wiring, the supply cord is assembled to the appliance by type Y attachment | | N |
| 25.6 | Plugs fitted with only one flexible cord | | N |

| IEC 60335-2-29 | | | |
|---|---|---|---|
| Clause | Requirement + Test | Result - Remark | Verdict |
| 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) | | N |
| | - cross-linked polyvinyl chloride sheathed (at least 60245 IEC 87) | | N |
| | Polyvinyl chloride sheathed:<br>Not used if they are likely to touch metal parts having a temperature rise exceeding 75K during the test of Clause 11. | | N |
| | - light polyvinyl chloride sheathed cord (at least 60227 IEC 52), appliances not exceeding 3 kg | | P |
| | - ordinary polyvinyl chloride sheathed cord (at least 60227 IEC 53), other appliances | | N |
| | Heat resistant polyvinyl chloride sheathed:<br>Not used for type X attachment other than specially prepared cords. | | N |
| | - Heat-resistant light polyvinyl chloride sheathed cord (at least 60227 IEC 56), appliances not exceeding 3 kg | | N |
| | - heat-resistant polyvinyl chloride sheathed cord (60227 IEC 57), other appliances | | N |
| | Supply cords for class III appliances adequately insulated | | N |
| | A voltage of 500 V is applied for 2 min between the conductor and metal foil wrapped around the insulation, the insulation being at the temperature measured during the test of Clause 11. There shall be no breakdown during this test. | | N |
| | Battery chargers for charging automobile batteries shall not be fitted with natural rubber sheathed supply cords (IEC 60335-2-29). | | N |
| 25.8 | Nominal cross-sectional area of supply cords according to table 11; rated current (A); cross-sectional area (mm²).....: | | N |
| 25.9 | Supply cord not in contact with sharp points or edges | | N |
| 25.10 | Green/yellow core for earthing purposes in Class I appliance | | N |
| 25.11 | Conductors of supply cords not consolidated by lead-tin soldering where they are subject to contact pressure, unless | | N |
| | clamping means so constructed that there is no risk of bad contacts due to cold flow of the solder | | N |

| IEC 60335-2-29 | | | |
|---|---|---|---|
| Clause | Requirement + Test | Result - Remark | Verdict |
| 25.12 | Moulding the cord to part of the enclosure does not damage the insulation of the supply cord | | N |
| 25.13 | Inlet opening so shaped as to prevent damage to the supply cord | | N |
| | Unless the enclosure at the inlet opening is of insulation material, a non-detachable lining or bushing complying with 29.3 for supplementary insulation provided | | N |
| | If unsheathed supply cord, a similar additional bushing or lining is required, unless | | N |
| | the appliance is class 0 | | N |
| | a class III appliance not containing live parts | | N |
| 25.14 | Supply cords adequately protected against excessive flexing | | N |
| | Flexing test: | | N |
| | - applied force (N) .....: | | N |
| | - number of flexings..... : | | N |
| | The test does not result in: | | N |
| | - short circuit between the conductors | | N |
| | - breakage of more than 10% of the strands of any conductor | | N |
| | - separation of the conductor from its terminal | | N |
| | - loosening of any cord guard | | N |
| | - damage, within the meaning of the standard, to the cord or the cord guard | | N |
| | - broken strands piercing the insulation and becoming accessible | | N |
| 25.15 | Conductors of the supply cord relieved from strain, twisting and abrasion by use of cord anchorage | | N |
| | The cord cannot be pushed into the appliance to such an extent that the cord or internal parts of the appliance can be damaged | | N |
| | Pull and torque test of supply cord, values shown in table 10: pull (N); torque (not on automatic cord reel) (Nm).....: | | N |
| | Max. 2 mm displacement of the cord, and conductors not moved more than 1 mm in the terminals | | N |
| | Creepage distances and clearances not reduced below values specified in 29.1 | | N |

| IEC 60335-2-29 | | | |
|---|---|---|---|
| Clause | Requirement + Test | Result - Remark | Verdict |
| 25.16 | Cord anchorages for type X attachments constructed and located so that: | | N |
| | - replacement of the cord is easily possible | | N |
| | - it is clear how the relief from strain and the prevention of twisting are obtained | | N |
| | - they are suitable for different types of cord | | N |
| | - cord cannot touch the clamping screws of cord anchorage if these screws are accessible, unless separated from accessible metal parts by supplementary insulation | | N |
| | - the cord is not clamped by a metal screw which bears directly on the cord | | N |
| | - at least one part of the cord anchorage securely fixed to the appliance, unless part of a specially prepared cord | | N |
| | - screws which have to be operated when replacing the cord do not fix any other component, if applicable | | N |
| | - if labyrinths can be bypassed the test of 25.15 is nevertheless withstood | | N |
| | - for Class 0, 0I and I appliances: they are of insulating material or are provided with an insulating lining, unless a failure of the insulation of the cord does not make accessible metal parts live | | N |
| | - for Class II appliances: they are of insulating material, or if of metal, they are insulated from accessible metal parts by supplementary insulation | | N |
| 25.17 | Adequate cord anchorages for type Y and Z attachment | | N |
| 25.18 | Cord anchorages only accessible with the aid of a tool, or | | N |
| | so constructed that the cord can only be fitted with the aid of a tool | | N |
| 25.19 | Type X attachment, glands not used as cord anchorage in portable appliances | | N |
| | Tying the cord into a knot or tying the cord with string not used | | N |
| 25.20 | Conductors of the supply cord for type Y and Z attachment adequately additionally insulated | | N |

| IEC 60335-2-29 | | | |
|---|---|---|---|
| Clause | Requirement + Test | Result - Remark | Verdict |
| 25.21 | Space for supply cord for type X attachment or for connection of fixed wiring constructed to permit checking of conductors with respect to correct positioning and connection before fitting any cover, no risk of damage to the conductors when fitting the cover, no contact with accessible metal parts if a conductor becomes loose, etc. | | N |
| | For portable appliances, the uninsulated end of a conductor prevented from any contact with accessible metal parts, unless the end of the cord is such that the conductors are unlikely to slip free | | N |
| 25.22 | Appliance inlet: | | P |
| | - live parts not accessible during insertion or removal | | P |
| | - Requirement not applicable to appliance inlets complying with IEC 60320-1 | | P |
| | - connector can be inserted without difficulty | | P |
| | - the appliance is not supported by the connector | | P |
| | - not for cold conditions if temp. rise of external metal parts exceeds 75 K during clause 11, unless | | N |
| | - the supply cord is unlikely to touch such metal parts | | N |
| 25.23 | Interconnection cords comply with the requirements for the supply cord, except as specified | | N |
| | If necessary, electric strength test of 16.3 | | N |
| 25.24 | Interconnection cords not detachable without the aid of a tool if compliance with the standard is impaired when they are disconnected | | N |
| 25.25 | Dimensions of pins compatible with the dimensions of the relevant socket-outlet. Dimensions of pins and engagement face in accordance with the relevant plug in IEC 60083 | | N |
| 26 | TERMINALS FOR EXTERNAL CONDUCTORS | | 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 | | N |
| | for class III appliances that do not contain live parts | | N |
| | However, earthing terminals may be accessible if a tool is required to make the connections and means are provided to clamp the wire independently from its connection | | N |

| IEC 60335-2-29 | | | |
|---|---|---|---|
| Clause | Requirement + Test | Result - Remark | Verdict |
| 26.2 | Appliances with type X attachment and appliances for connection of cables of fixed wiring provided with terminals in which connections are made by means of screws, nuts or similar devices, unless the connections are soldered | | N |
| | the connections are soldered | | N |
| | Screws and nuts serve only to clamp supply conductors, except | | N |
| | internal conductors, if so arranged that they are unlikely to be displaced when fitting the supply conductors | | N |
| | If soldered connections used, the conductor so positioned or fixed that reliance is not placed on soldering alone | | N |
| | Soldering alone used, barriers provided, clearances and creepage distances satisfactory if the conductor becomes free at the soldered joint | | N |
| 26.3 | Terminals for type X attachment and for connection of cables of fixed wiring so constructed that the conductor is clamped between metal surfaces with sufficient contact pressure and without damaging the conductor | | N |
| | Terminals for type X attachment and those for connection to fixed wiring so fixed that when tightening or loosening the clamping means: | | N |
| | - the terminal does not loosen | | N |
| | - internal wiring is not subjected to stress | | N |
| | - clearances and creepage distances are not reduced below the values in 29 | | N |
| | Compliance checked by inspection and by the test of subclause 9.6 of IEC 60999-1, the torque applied being equal to two-thirds of the torque specified. Nominal diameter of thread (mm); screw category; torque (Nm)… .....…….: | | N |
| 26.4 | Terminals for type X attachment, except those with a specially prepared cord, and those for connection to fixed wiring, no special preparation of conductors required, and so constructed or placed that conductors prevented from slipping out | | N |
| 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 |

| IEC 60335-2-29 | | | |
|---|---|---|---|
| Clause | Requirement + Test | Result - Remark | Verdict |
| | No contact between live parts and accessible metal parts and, for class II constructions, between live parts and metal parts separated from accessible metal parts by supplementary insulation only | | N |
| 26.6 | Terminals for type X attachment and for connection of cables of fixed wiring suitable for connection of conductors with required cross-sectional area according to table 13; rated current (A); nominal cross-sectional area (mm²).....: | | N |
| | Terminals only suitable for a specially prepared cord | | N |
| 26.7 | Terminals for type X attachment accessible after removal of a cover or part of the enclosure | | N |
| 26.8 | Terminals for the connection to fixed wiring, including the earthing terminal, located close to each other | | N |
| 26.9 | Terminals of the pillar type constructed and located as specified | | N |
| 26.10 | Terminals with screw clamping and screwless terminals not used for flat twin tinsel cords, unless conductors ends fitted with a device suitable for screw terminals | | N |
| | Pull test of 5 N to the connection | | N |
| 26.11 | For type Y and Z attachment: soldered, welded, crimped and similar connections may be used | | N |
| | For Class II appliances: the conductor so positioned or fixed that reliance is not placed on soldering, welding or crimping alone | | N |
| | For Class II appliances: soldering, welding or crimping alone used, barriers provided, clearances and creepage distances satisfactory if the conductor becomes free | | N |
| 27 | PROVISION FOR EARTHING | | P |
| 27.1 | Accessible metal parts of Class 0I and I appliances, permanently and reliably connected to an earthing terminal or contact of the appliance inlet | | P |
| | Earthing terminals not connected to neutral terminal | | P |
| | Class 0, II and III appliance have no provision for earthing | Class II | P |
| | Safety extra-low voltage circuits not earthed, unless protective extra-low voltage circuits | | P |
| 27.2 | Clamping means adequately secured against accidental loosening | | N |

| IEC 60335-2-29 | | | |
|---|---|---|---|
| Clause | Requirement + Test | Result - Remark | Verdict |
| | Terminals used 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 | | N |
| | Conductors cannot be loosened without the aid of a tool | | N |
| 27.3 | For detachable parts that are plugged into another part of the appliance, and having an earth connection, the earth connection made before and separated after current-carrying connections when removing the part | | N |
| | For appliances with supply cord, current-carrying conductors become taut before earthing conductor, if the cord slips out of the cord anchorage | | N |
| 27.4 | No risk of corrosion resulting from contact between metal of earthing terminal and other metal | | N |
| | Adequate resistance to corrosion of coated or uncoated parts providing earthing continuity, other than parts of a metal frame or enclosure | | N |
| | Parts of steel providing earthing continuity provided at the essential areas with an electroplated coating, thickness at least 5 µm | | N |
| | Adequate protection against rusting of parts of coated or uncoated steel, only intended to provide or transmit contact pressure | | N |
| | In case of aluminium alloys precautions taken to avoid risk of corrosion | | N |
| 27.5 | Low resistance of connection between earthing terminal and earthed metal parts | | N |
| | This requirement does not apply to connections providing earthing continuity in the protective extra-low voltage circuit, provided that clearances of basic insulation are based on the rated voltage of the appliance | | N |
| | Resistance not exceeding 0,1 Ω at the specified low-resistance test | No accessible earthed parts | N |
| 27.6 | The printed conductors of printed circuit boards not used to provide earthing continuity in hand-held appliances. | Not a hand-held appliance | 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 |

| IEC 60335-2-29 | | | |
|---|---|---|---|
| Clause | Requirement + Test | Result - Remark | Verdict |
| 28 | SCREWS AND CONNECTIONS | | P |
| 28.1 | Fixings, electrical connections and connections providing earthing continuity withstand mechanical stresses | | P |
| | Screws not of soft metal liable to creep, such as zinc or aluminium | | P |
| | Diameter of screws of insulating material min. 3 mm | | N |
| | Screws of insulating material not used for any electrical connection or connections providing earthing continuity | | P |
| | Screws used for electrical connections or connections providing earthing continuity screw into metal | | N |
| | Screws not of insulating material if their replacement by a metal screw can impair supplementary or reinforced insulation | | N |
| | Type X attachment, screws to be removed for replacement of supply cord or for user maintenance, not of insulating material if their replacement by a metal screw can impair basic insulation | | N |
| | For screws and nuts; test as specified | (see appended table 28.1) | P |
| 28.2 | Electrical connections and connections providing earthing continuity constructed so that contact pressure is not transmitted through non-ceramic insulating material liable to shrink or distort, unless | | P |
| | there is resiliency in the metallic parts to compensate for shrinkage or distortion of the insulating material | | N |
| | This requirement does not apply to electrical connections in circuits of appliances for which: | | 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 |
| | 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 |

| IEC 60335-2-29 | | | |
|---|---|---|---|
| Clause | Requirement + Test | Result - Remark | Verdict |
| | - 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 |
| | Rivets for electrical connections or connections providing earthing continuity secured against loosening if 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 .....: | | N |
| 29.1 | Clearances not less than the values specified in table 16, taking into account the rated impulse voltage for the overvoltage categories of table 15, unless | (see appended table 29.1) | P |
| | for basic insulation and functional insulation they comply with the impulse voltage test of clause 14 | | N |
| | However, if the construction is affected by wear, distortion, movement of the parts or during assembly, the clearances for rated impulse voltages of 1500V and above are increased by 0,5 mm and the impulse voltage test is not applicable | | N |
| | Impulse voltage test not applicable: | | N |

| IEC 60335-2-29 | | | |
|---|---|---|---|
| Clause | Requirement + Test | Result - Remark | Verdict |
| | - when the microenvironment is pollution degree 3 | | N |
| | - for basic insulation of class 0 and class 01 appliances | | N |
| | Appliances are in overvoltage category II | | P |
| | Clearances less than specified in table 16 not allowed for basic insulation of class 0 and class 0I appliances, | | N |
| | or if pollution degree 3 is applicable | | N |
| | Compliance is checked by inspection and measurements as specified | | P |
| 29.1.1 | Clearances of basic insulation withstand the overvoltages, taking into account the rated impulse voltage | | P |
| | Clearance at the terminals of tubular sheathed heating elements may be reduced to 1mm if the microenvironment is pollution degree 1 | | N |
| | Lacquered conductors of windings considered to be bare conductors | | P |
| 29.1.2 | Clearances of supplementary insulation not less than those specified for basic insulation in table 16 | (see appended table 29.1) | P |
| 29.1.3 | Clearances of reinforced insulation not less than those specified for basic insulation in table 16, but using the next higher step for rated impulse voltage | (see appended table 29.1) | 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 29.1) | P |
| | - table F.7a in IEC 60664-1, frequency not exceeding 30 kHz | | N |
| | - clause 4 of IEC 60664-4, frequency exceeding 30 kHz | | N |
| | If values of table 16 are largest, the impulse voltage test of clause 14 may be applied instead, unless | | N |
| | the microenvironment is pollution degree 3, or | | N |
| | the distances can be affected by wear, distortion, movement of the parts or during assembly | | N |
| | However, clearances are not specified if the appliance complies with clause 19 with the functional insulation short-circuited | | P |

| IEC 60335-2-29 | | | |
|---|---|---|---|
| Clause | Requirement + Test | Result - Remark | Verdict |
| | 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: | | P |
| | - table 16 based on the rated impulse voltage.....: | (see appended table 29.1) | 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 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 based on the working voltage used as the rated voltage in table 15 | | N |
| 29.2 | Creepage distances not less than those appropriate for the working voltage, taking into account the material group and the pollution degree | (see appended table 29.2) | 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 |

| IEC 60335-2-29 | | | |
|---|---|---|---|
| Clause | Requirement + Test | Result - Remark | Verdict |
| | Compliance is checked by inspection and measurements as specified | | P |
| 29.2.1 | Creepage distances of basic insulation not less than specified in table 17 | | 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 .....: | Considered | P |
| | 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 29.2) | 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 29.2) | 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 | | 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 .....: | Considered | P |
| | Creepage distances may be reduced if the appliance complies with clause 19 with the functional insulation short-circuited | | N |
| 29.3 | Supplementary and reinforced insulation having adequate thickness, or a sufficient number of layers, to withstand the electrical stresses | | P |
| | Compliance checked by: | | P |
| | - measurement, in accordance with 29.3.1, or | | P |
| | - an electric strength test in accordance with 29.3.2, or | | P |
| | - an assessment of the thermal quality of the material combined with an electric strength test, in accordance with 29.3.3 | | N |
| | - for accessible parts of reinforced insulation consisting of a single layer, by measurement in accordance with 29.3.4, or | | N |

| IEC 60335-2-29 | | | |
|---|---|---|---|
| Clause | Requirement + Test | Result - Remark | Verdict |
| | - 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 having a thickness of at least 1 mm | | P |
| | Reinforced insulation having 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 | | P |
| | Supplementary insulation consisting of at least 2 layers | | P |
| | Reinforced insulation consisting of at least 3 layers | Insulation for transformer | P |
| 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 |
| | thermoplastic material providing supplementary or reinforced insulation, | | P |
| | sufficiently resistant to heat | | P |
| | Ball-pressure test according to IEC 60695-10-2 | | P |
| | External parts: at 40°C plus the maximum temperature rise determined during the test of clause 11, or at 75°C, whichever is the higher; temperature (°C) .....: | (see appended table 30.1) | P |
| | Parts supporting live parts: at 40°C plus the maximum temperature rise determined during the test of clause 11, or at 125°C, whichever is the higher; temperature (°C).....: | (see appended table 30.1) | P |
| | Parts of thermoplastic material providing supplementary or reinforced insulation, 25°C plus the maximum temperature rise determined during clause 19, if higher; temperature (°C) .....: | (see appended table 30.1) | P |

| IEC 60335-2-29 | | | |
|---|---|---|---|
| Clause | Requirement + Test | Result - Remark | Verdict |
| 30.2 | Parts of non-metallic material adequately resistant to ignition and spread of fire | | P |
| | This requirement does not apply to: | | P |
| | parts having a mass not exceeding 0,5 g, provided the cumulative effect is unlikely to propagate flames that originate inside the appliance by propagating flames from one part to another, or | | P |
| | 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.<br>In addition: | | P |
| | - attended appliances, 30.2.2 applies | | N |
| | - unattended appliances, 30.2.3 applies | | P |
| | Appliances for remote operation, 30.2.3 applies | | N |
| | Base material of printed circuit board, 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 | (see appended table 30.2-1) | 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 meet the requirements in ISO9772 for category HBF material | | N |
| 30.2.2 | Appliances operated while attended, parts of nonmetallic material supporting current-carrying connections, and | Not applicable for IEC 60335-2-29 | N |
| | parts of non-metallic material within a distance of 3 mm of such connections, | | N |
| | 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 0,5A during normal operation | | N |
| | -650°C, for other connections | | N |

| IEC 60335-2-29 | | | |
|---|---|---|---|
| Clause | Requirement + Test | Result - Remark | Verdict |
| | Test as specified for an interposed shielding material | | 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 | (see appended table 32.2-1) | P |
| | Tests not applicable to conditions as specified | | P |
| 30.2.3.1 | Parts of insulating material supporting connections carrying a current exceeding 0,2A during normal operation, and | | P |
| | parts of non-metallic material within a distance of 3mm, | | P |
| | subjected to the glow-wire test of IEC 60695-2-11 with a test severity of 850°C | | P |
| | Glow-wire test not carried out on parts of material classified as having a glow-wire flammability index of at least 850°C according to IEC 60695-2-12 | | N |
| | Glow-wire test not carried out on small parts that comply with the needle-flame test of Annex E or on small parts of material classified as V-0 or V-1 according to IEC 60695-11-10 | | P |
| | Test as specified for an interposed shielding material | | P |
| 30.2.3.2 | Parts of non-metallic material supporting current-carrying connections, and | | P |
| | parts of non-metallic material within a distance of 3mm, | | P |
| | subjected to glow-wire test of IEC 60695-2-11 | | P |
| | The test severity is: | | P |
| | - 750 °C, for connections carrying a current exceeding 0,2 A during normal operation | | P |
| | - 650 °C, for other connections | | N |
| | Glow-wire applied to an interposed shielding material, if relevant | | N |
| | However, the glow-wire test of 750 °C or 650 °C as appropriate, is not carried out on parts of material fulfilling both or either of the following classifications: | | N |
| | - a glow-wire ignition temperature according to IEC 60695-2-13 of at least: | | N |

| IEC 60335-2-29 | | | |
|---|---|---|---|
| Clause | Requirement + Test | Result - Remark | Verdict |
| | • 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 |
| | - 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 |

| IEC 60335-2-29 | | | |
|---|---|---|---|
| Clause | Requirement + Test | Result - Remark | Verdict |
| | - 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 needle-flame test of annex E | Approved PCB used | N |
| | Test not applicable to conditions as specified | | N |
| 31 | RESISTANCE TO RUSTING | | N |
| | Relevant ferrous parts adequately protected against rusting | | N |
| 32 | RADIATION, TOXICITY AND SIMILAR HAZARDS | | P |
| | Appliance shall not emit harmful radiation, present a toxic or similar hazard due to their operation in normal use | | P |
| | Relevant tests specified in part 2, if necessary | | N |
| A | ANNEX A (INFORMATIVE)<br>ROUTINE TESTS | | N |
| | Description of routine tests to be carried out by the manufacturer | | N |
| | Test voltage of electric strength test between the input and output circuits (IEC 60335-2-29) | | 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 |
| | -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 |

| IEC 60335-2-29 | | | |
|---|---|---|---|
| Clause | Requirement + Test | Result - Remark | Verdict |
| | -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 |
| 5.101 | 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 |
| 7.12 | 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 described | | N |
| 19.1 | Appliances subjected to tests of 19.101, 19.102 and 19.103 | | N |
| 19.B.101 | Appliances supplied at rated voltage for 168 h, the battery being continually charged | | N |
| 19.B.102 | Short-circuiting of the terminals of the battery, being fully charged, for appliances having batteries that can be removed without the aid of a tool | | 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 |

| IEC 60335-2-29 | | | |
|---|---|---|---|
| Clause | Requirement + Test | Result - Remark | Verdict |
| 21.B.101 | Appliances having pins for insertion into socket-outlets have adequate mechanical strength, checked according to procedure 2 of IEC 68-2-32 | | N |
| | Part of the appliance incorporating the pins subjected to the free fall test, procedure 2, of IEC 60068-2-32, the number of falls being: | | N |
| | - 100, the mass of part does not exceed 250 g | | N |
| | - 50, the mass of 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 operating at safety extra-low voltage | | 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 |
| D | ANNEX D (NORMATIVE)<br>THERMAL MOTOR PROTECTORS | | N |
| | Applicable to appliances having motors that incorporate thermal motor protectors | | N |
| E | ANNEX E (NORMATIVE)<br>NEEDLE-FLAME TEST | | N |
| | Needle-flame test carried out in accordance with IEC 60695-11-5, with the following modifications: | | N |
| 7 | Severities | | N |
| | The duration of application of the test flame is 30 s ± 1 s | | N |
| 9 | Test procedure | | N |
| 9.1 | The specimen so arranged that the flame can be applied to a vertical or horizontal edge as shown in the examples of figure 1 | | N |

| IEC 60335-2-29 | | | |
|---|---|---|---|
| Clause | Requirement + Test | Result - Remark | Verdict |
| 9.2 | The first paragraph does not apply | | N |
| | If possible, the flame is applied at least 10 mm from a corner | | N |
| 9.3 | The test is carried out on one specimen | | N |
| | If the specimen does not withstand the test, the test may be repeated on two further specimens, both withstanding the test | | N |
| 11 | Evaluation of test results | | N |
| | The duration of burning not exceeding 30 s | | N |
| | However, for printed circuit boards, the duration of burning not exceeding 15 s | | N |
| 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 | Terminology | | 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 IX is applicable | | N |
| | Values for test A apply | | N |
| | However, for capacitors in heating appliances the values for test B or C apply | | N |
| 4.12 | Damp heat, steady state | | N |
| | This subclause is applicable | | N |

| IEC 60335-2-29 | | | |
|---|---|---|---|
| Clause | Requirement + Test | Result - Remark | Verdict |
| | 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 applicable | | N |
| 4.14.7 | Only insulation resistance and voltage proof are checked | | N |
| | Visual examination, 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 | | P |
| | The following modifications to this standard are applicable for safety isolating transformers: | | P |
| 7 | Marking and instructions | | P |
| 7.1 | Transformers for specific use marked with: | | P |
| | -name, trademark or identification mark of the manufacturer or responsible vendor | | P |
| | -model or type reference | | P |
| 17 | Overload protection of transformers and associated circuits | | P |
| | Fail-safe transformers comply with subclause 15.5 of IEC 61558-1 | | N |
| 22 | Construction | | P |
| | Subclauses 19.1 and 19.1.2 of IEC 61558-2-6 are applicable | | P |
| 29 | Clearances, creepage distances and solid insulation | | P |
| 29.1, 29.2 and 29.3 | The distances specified in items 2a, 2c and 3 in table 13 of IEC 61558-1 apply | | P |
| | For insulated winding wires complying with subclause 19.12.3 of IEC 61558-1 there are no requirements for clearances or creepage distances | | P |
| | For windings providing reinforced insulation, the distance specified in item 2c of table 13 of IEC 61558-1 is not assessed | | P |

| IEC 60335-2-29 | | | |
|---|---|---|---|
| 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 | | P |
| H | ANNEX H (NORMATIVE)<br>SWITCHES | | N |
| | Switches comply with the following clauses of IEC 61058-1, as modified: | | 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, switches 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 is 10 000, unless 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 switches operated by hand that are interlocked so that they cannot be operated under load, are not subjected to the tests | | N |
| | Subclauses 17.2.2 and 17.2.5.2 not applicable | | N |
| | The ambient temperature during the test is that occurring in the appliance during the test of Clause 11 in IEC 60335-1 | | N |

| IEC 60335-2-29 | | | |
|---|---|---|---|
| Clause | Requirement + Test | Result - Remark | Verdict |
| | Temperature rise of the terminals not more than 30 K above the temperature rise measured in clause 11 of IEC 60335-1 | | 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 | Temperature rise of the body of the motor is determined instead of the temperature rise of the windings | | N |
| 11.8 | 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 not subjected to the test | | N |
| 19 | Abnormal operation | | N |
| 19.1 | The tests of 19.7 to 19.9 not carried out | | N |
| 19.101 | Appliance operated at rated voltage with each of the following fault conditions: | | N |
| | - short circuit of the terminals of the motor, including any capacitor incorporated in the motor circuit | | N |
| | - short circuit of each diode of the rectifier | | N |
| | - open circuit of the supply to the motor | | N |
| | - open circuit of any parallel resistor, the motor being in operation | | N |
| | Only one fault simulated at a time, the tests carried out consecutively | | N |
| 22 | Construction | | N |

| IEC 60335-2-29 | | | |
|---|---|---|---|
| Clause | Requirement + Test | Result - Remark | Verdict |
| 22.101 | 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 | Climatic sequence | | 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 |

| IEC 60335-2-29 | | | |
|---|---|---|---|
| Clause | Requirement + Test | Result - Remark | Verdict |
| | 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 |
| L | ANNEX L (INFORMATIVE)<br>GUIDANCE FOR THE MEASUREMENT OF CLEARANCES AND CREEPAGE DISTANCES | | P |
| | Sequences 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 microenvironment | | 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 | | N |

| IEC 60335-2-29 | | | |
|---|---|---|---|
| Clause | Requirement + Test | Result - Remark | Verdict |
| | The proof tracking test is carried out in accordance with IEC 60112 with the following modifications: | | N |
| 7 | Test apparatus | | N |
| 7.3 | Test solutions | | N |
| | Test solution A is used | | N |
| 10 | Determination of proof tracking index (PTI) | | N |
| 10.1 | Procedure | | N |
| | The proof voltage is 100V, 175V, 400V or 600V ....: | | N |
| | The last paragraph of Clause 3 applies | | N |
| | The test is carried out on five specimens | | N |
| | In case of doubt, additional test with proof voltage reduced by 25V, the number of drops increased to 100 | | N |
| 10.2 | Report | | N |
| | The report stating 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 | General conditions for the tests | | N |
| 5.7 | The ambient temperature for the tests of Clauses 11 and 13 is 40 $^{+3}/_{0}$ | | N |
| 7 | Marking and instructions | | 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 RCD having a rated residual operating current not exceeding 30 mA | | N |

| IEC 60335-2-29 | | | |
|---|---|---|---|
| Clause | Requirement + Test | Result - Remark | Verdict |
| | 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 | Heating | | N |
| 11.8 | The values of Table 3 are reduced by 15 K | | N |
| 13 | Leakage current and electric strength at operating temperature | | N |
| 13.2 | The leakage current for class I appliances not exceeding 0,5 mA | | N |
| 15 | Moisture resistance | | N |
| 15.3 | The value of t is 37 °C | | N |
| 16 | Leakage current and electric strength | | N |
| 16.2 | The leakage current for class I appliances not exceeding 0,5 mA | | N |
| 19 | Abnormal operation | | 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 | | N |
| | Description of tests for appliances incorporating electronic circuits | | N |
| 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 |

| IEC 60335-2-29 | | | |
|---|---|---|---|
| Clause | Requirement + Test | Result - Remark | Verdict |
| 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 |
| 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 |

| IEC 60335-2-29 | | | |
|---|---|---|---|
| Clause | Requirement + Test | Result - Remark | Verdict |
| 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: | | N |
| | The specification of the software safety requirements includes the descriptions listed | | N |
| R.3.2.2 | Software architecture | | N |
| R.3.2.2.1 | The specification of the software architecture includes the aspects listed<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 | | 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 |

| IEC 60335-2-29 | | | |
|---|---|---|---|
| Clause | Requirement + Test | Result - Remark | Verdict |
| | 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 | 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/A |
| 1.2 VOID | | | | | | N/A |
| 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/A |
| 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/A |

| IEC 60335-2-29 | | | |
|---|---|---|---|
| Clause | Requirement + Test | Result - Remark | Verdict |

**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 | Verdict |
|---|---|---|---|---|---|---|
| 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/A |
| 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/A |
| 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/A |
| 4.3 Addressing (relevant to variable and invariable memory) | Stuck at | Word protection with single bit redundancy including the address | H.2.19.8.2 | | | N/A |
| 5 Internal data path | Stuck at | Word protection with single bit redundancy | H.2.19.8.2 | | | N/A |
| 5.1 VOID | | | | | | N/A |
| 5.2 Addressing | Wrong address | Word protection with single bit redundancy including the address | H.2.19.8.2 | | | N/A |
| 6 External communication | Hamming distance 3 | Word protection with multi-bit redundancy, or<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/A |
| 6.1 VOID | | | | | | N/A |
| 6.2 VOID | | | | | | N/A |

| IEC 60335-2-29 | | | |
|---|---|---|---|
| Clause | Requirement + Test | Result - Remark | Verdict |

**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 | Verdict |
|---|---|---|---|---|---|---|
| 6.3 Timing | Wrong point in time | Time-slot monitoring, or | H.2.18.10.4 | | | N/A |
| | | scheduled transmission | H.2.18.18 | | | |
| | | Time-slot and logical monitoring, or | H.2.18.10.3 | | | |
| | | comparison of redundant communication channels by either: | | | | |
| | | - reciprocal comparison | H.2.18.15 | | | |
| | | - independent hardware comparator | H.2.18.3 | | | |
| | Wrong sequence | Logical monitoring, or | H.2.18.10.2 | | | |
| | | time-slot monitoring, or | H.2.18.10.4 | | | |
| | | Scheduled transmission | H.2.18.18 | | | |
| 7 Input/output periphery | Fault conditions specified in 19.11.2 | Plausibility check | H.2.18.13 | | | N/A |
| 7.1 VOID | | | | | | N/A |
| 7.2 Analog I/O | | | | | | N/A |
| 7.2.1 A/D and D/A-converter | Fault conditions specified in 19.11.2 | Plausibility check | H.2.18.13 | | | |
| 7.2.2 Analog multiplexer | Wrong addressing | Plausibility check | H.2.18.13 | | | N/A |
| 8 VOID | | | | | | N/A |
| 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/A |

NOTE A Stuck-at fault model denotes a fault model representing an open circuit or a non-varying signal level. A DC fault model denotes a stuck-at fault model incorporating short circuit between signal lines.

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

| IEC 60335-2-29 | | | |
|---|---|---|---|
| Clause | Requirement + Test | Result - Remark | Verdict |
| AA | ANNEX AA (NORMATIVE)<br>BATTERY CHARGERS FOR USE BY CHILDREN | | N |
| | The battery charger have a d.c. output at SELV not exceeding 30 V and a rated output not exceeding 50 VA | | N |
| 5.210 | Use of rechargeable batteries giving the most unfavourable conditions | | N |
| 6.1 | Protection against electric shock for battery chargers for outdoor use:<br>Class III .....: | | N |
| | Protection against electric shock for other battery chargers:<br>Class II, III .....: | | N |
| 6.2 | Protection against harmful ingress of water for battery chargers for outdoor use:<br>IPX7 .....: | | N |
| 6.201 | Protection against ingress of solid foreign objects:<br>IP3X .....: | | N |
| 7.1 | Symbol 5957 of IEC 60417 or text “For indoor use only” for battery chargers for indoor use .....: | | N |
| | IP number .....: | | N |
| | Smiling face symbol together with 8+ | | N |
| 7.6 | Correct symbols used | | N |
| 7.12 | Instructions for safe use contains: | | N |
| | - Warning to only allow children at least 8 years old to use battery charger | | N |
| | Sufficient instructions for safe use of battery charger by a child | | N |
| | Explanation that battery charger is not a toy | | N |
| | - Instruction for child not to try and recharge non-rechargeable batteries | | N |
| | - Warning to examine battery charger regularly for damage | | N |
| | Warning in case battery charger is damaged | | N |
| | Instruction for Class III battery charger to be supplied from transformer for toys | | N |
| 7.14 | Height of symbol marked on the appliance at least 10 mm | | N |
| | Height of lettering at least 3 mm | | N |

| IEC 60335-2-29 | | | |
|---|---|---|---|
| Clause | Requirement + Test | Result - Remark | Verdict |
| 8.1.1 | Use of test probe B of IEC 61032: no contact with live parts or metal parts separated from live parts by basic insulation only, even after use of a tool to remove parts of enclosure | | N |
| 10.101 | The output voltage not exceed 42,4 V peek .....: | | N |
| 11.8 | Temperature rises of parts that can be touched by test probe 18 of IEC 61032 | | N |
| 17 | Temperature rises of parts that can be touched by test probe 18 of IEC 61032 | | N |
| 19.13 | Temperature rises of parts that can be touched by test probe 18 of IEC 61032 | | N |
| 21.201 | Impact test Eha of IEC 60068-2-75, with impact energy of 2 J | | N |
| | Free fall test Ed, Procedure 1 of IEC 60068-2-32, from the height of 500 mm | | N |
| | Battery charger not damaged to such extend that compliance is impaired, live parts not accessible | | N |
| 22.201 | Battery charger with only one rated voltage or rated voltage range | | N |
| | Battery charger not incorporate means for manually adjusting output voltage | | N |
| 22.202 | Construction of battery charger prevent reverse charging | | N |
| 24.201 | Transformer for toys tested in accordance with subclauses 7.2, 20.5.1 and 20.101 and clause 15 of standard IEC 61558-2-7 | | N |
| 25.1 | Battery charger not provided with an appliance inlet | | N |
| 25.5 | Battery charger provided with type Y or type Z attachment | | N |

| 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". | | P |
| 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 |

| IEC 60335-2-29 | | | |
|---|---|---|---|
| Clause | Requirement + Test | Result - Remark | Verdict |

## ATTACHMENT TO TEST REPORT IEC 60335-1
## EUROPEAN GROUP DIFFERENCES AND NATIONAL DIFFERENCES

Household and similar electrical appliances – Safety –
Part 1: GENERAL REQUIREMENTS

| | |
|---|---|
| **Differences according to :** | EN 60335-1:2012<br>EN 62233:2008 |
| **Attachment Form No.:** | EU_GD_IEC60335_1T |
| **Attachment Originator :** | Nemko AS |
| **Master Attachment :** | 2013-02 |



| CENELEC COMMON MODIFICATIONS | | | |
|---|---|---|---|
| 6.1 | Delete “class 0” and “class 01” | | N |
| 7.1 | Single-phase appliances to be connected to the supply mains: 230 V covered | | P |
| | Multi-phase appliances to be connected to the supply mains: 400 V covered | | N |
| 7.10 | Devices used to start/stop operational functions of the appliance distinguished from other manual devices by means of shape, size, surface texture, position, etc. | | N |
| | An indication that the device has been operated is given by: | | N |
| | • a tactile feedback, or | | N |
| | • an audible and visual feedback | | N |
| 7.12 | The instructions 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 | | P |
| | - children shall not play with the appliance | | P |
| | - cleaning and user maintenance shall not be made by children without supervision | | P |
| 7.12.Z1 | The specific instructions related to the safe operation of this appliance is collated together in the front section of the user instructions | | P |
| | The height of the characters, measured on the capital letters, is at least 3 mm | | P |

| IEC 60335-2-29 | | | |
|---|---|---|---|
| Clause | Requirement + Test | Result - Remark | Verdict |
| | These instructions are also available in an alternative format, e.g. on a website | | P |
| 8.1.1 | Also test probe 18 of EN 61032 is applied | | P |
| | The appliance being in every possible position during the test | | P |
| | The force on the probe in the straight position is increased to 10 N when probe 18 is used | | P |
| | When using test probe 18 the appliance is fully assembled as in normal use without any parts removed, and | | N |
| | parts intended to be removed for user maintenance are also not removed | | N |
| 8.2 | Compliance is checked by applying the test probes of EN 61032 | | P |
| | For built-in appliances and fixed appliances, the test probe B and probe 18 of EN 61032 are applied only after installation | | N |
| 11.8 | Footnotes to “External enclosure of motor-operated appliances” to be taken into account | | P |
| 15.1.2 | Appliances with an automatic cord reel tested with the cord in the most unfavourable position so that the reeling of the wet cord may affect electrical insulation during operation, the cord not being dried before reeling | | N |
| 20.2 | When using the test probe similar to test probe B with a circular stop face, the accessories and detachable covers are removed | | N |
| | Test probe 18 applied with a force of 2,5N on the appliance fully assembled | | N |
| 24.1 | Components comply with the safety requirements specified in the relevant standards as far as they reasonably apply | | P |
| | The requirements of Clause 29 of this standard apply between live parts of components and accessible parts of the appliance. | | P |
| | The requirements of 30.2 of this standard apply to parts of non-metallic material in components including parts of non-metallic material supporting current-carrying connections inside components | | P |
| | Components that have not been previously tested or do not comply with the standard for the relevant component are tested according to the requirements of 30.2 | | P |
| | Components that have been previously tested and shown to comply with the resistance to fire requirements in the standard for the relevant component need not be retested provided that: | | P |

| IEC 60335-2-29 | | | |
|---|---|---|---|
| Clause | Requirement + Test | Result - Remark | Verdict |
| | - the severity specified in the component standard is not less than the severity specified in 30.2, and | | P |
| | - the test report for the component states whether it complied with the standard for the relevant component with or without flame, flames not exceeding 2 s during the test are ignored | | N |
| | Unless components have been previously tested and found to comply with the relevant standard for the number of cycles specified, they are tested in accordance with 24.1.1 to 24.1.9 | | P |
| | For components mentioned in 24.1.1 to 24.1.9, no additional tests specified in the relevant standard for the component are necessary other than those specified in 24.1.1 to 24.1.9 | | P |
| | Components that have not been separately tested and found to comply with the relevant standard, and | | N |
| | components that are not marked or not used in accordance with their marking, | | N |
| | are tested in accordance with the conditions occurring in the appliance, the number of samples being that required by the relevant standard | | N |
| | Lamp holders and starter holders that have not been previously tested and found to comply with the relevant standard are tested as a part of the appliance and additionally comply with the gauging and interchangeability requirements of the relevant standard under the conditions occurring in the appliance | | N |
| | Where the relevant standard specifies these gauging and interchangeability requirements at elevated temperatures, the temperatures measured during the tests of Clause 11 are used | | N |
| | Plugs and socket-outlets and other connecting devices of interconnection cords are not interchangeable with plugs and socket-outlets listed in IEC/TR 60083 or IEC 60906-1, or | | N |
| | with connectors and appliance inlets complying with the standard sheets of IEC 60320-1, | | N |
| | if direct supply to these parts from the supply mains gives rise to a hazard | | N |
| 24.1.7 | If the remote operation of the appliance is via a telecommunication network, the relevant standard for the telecommunication interface circuitry in the appliance is EN 41003 | | N |

| IEC 60335-2-29 | | | |
|---|---|---|---|
| Clause | Requirement + Test | Result - Remark | Verdict |
| | Compliance with Clause 8 of this standard is not impaired by connecting the appliance to a device covered by EN 41003 | | N |
| 24.Z1 | For motor running capacitors (IEC 60252-1 type P2) with a metallic enclosure having an overpressure fuse the flame testing of internal plastic parts supporting current carrying connections as required in 30.2.2 and 30.2.3.1 is not necessary | | N |
| 25.6 | Supply cords of single-phase portable appliances having a rated current not exceeding 16 A, fitted with a plug complying with the following standard sheets of IEC/TR 60083: | | P |
| | - for Class I appliances:<br>standard sheet C2b, C3b or C4 .....<br>.....<br>..... : | | N |
| | - for Class II appliances:<br>standard sheet C5 or C6 .....<br>.....<br>..... : | | P |
| 25.7 | Rubber sheathed cords (60245 IEC 53) are not suitable for appliances intended to be used outdoors or when they are liable to be exposed to significant amount of ultraviolet radiation | | N |
| | Halogen-free thermoplastic compound sheathed supply cords have properties at least those of: | | N |
| | • halogen-free thermoplastic compound sheathed cords (H03Z1Z1H2-F or H03Z1Z1-F), for appliances having a mass not exceeding 3 kg | | N |
| | • halogen-free thermoplastic compound sheathed cords (H05Z1Z1H2-F or H05Z1Z1-F), for other appliances | | N |
| | Cross-linked halogen-free compound sheathed supply cords have properties at least those of cross-linked halogen-free compound sheathed cords (H07ZZ-F) | | N |
| 26.11 | Conductors connected by soldering are not considered to be positioned or fixed so that reliance is not placed upon the soldering alone to maintain them in position unless they are held in place near the terminals independently of the solder | | N |
| 29.3.Z1 | Appliance constructed so that if there is a possibility of damaging the insulation during installation, the insulation withstands the scratch and penetration test of 21.2 | | N |

| IEC 60335-2-29 | | | |
|---|---|---|---|
| Clause | Requirement + Test | Result - Remark | Verdict |
| 32 | Compliance regarding electromagnetic fields is checked according to EN 62233 | EN 62233 | P |
| Annex I, 19.I.101 | The appliance is supplied at rated voltage and operated under normal operation with each of the fault conditions specified | | N |
| | The duration of the test is as specified in 19.7 | | N |
| **ZA** | **ANNEX ZA** (NORMATIVE)<br>**SPECIAL NATIONAL CONDITIONS** | | — |
| | | | — |
| | **Norway** | | N |
| 19.5 | The test is also applicable to appliances intended to be permanently connected to fixed wiring | | N |
| | | | |
| | **Norway** | | N |
| 22.2 | The second paragraph of this subclause, dealing with single-phase, permanently connected class I appliances having heating elements, is not applicable due to the supply system | | N |
| | | | |
| | **All CENELEC countries** | | — |
| 25.6 and 25.25 | Information concerning National plug and socket-outlets is available from the CENELEC website. Normative national requirements concerning plug and socket-outlets are shown in the relevant National standard | | P |
| | | | |
| | **Ireland and United Kingdom** | | N |
| 25.8 | In the table, the lines for 10 A and 16 A are replaced by: | | N |
| | > 10 and ≤ 13 1,25 | | N |
| | > 13 and ≤ 16 1,5 | | N |
| **ZB** | **ANNEX ZB** (INFORMATIVE)<br>**A-DEVIATIONS** | | — |
| | | | |
| | **Ireland** | | N |
| 25.6 | These regulations apply to all plugs for domestic use at a voltage of not less than 200 V and in general allow only plugs complying with I.S. 401:1997, or equivalent, to be fitted to domestic appliances | | N |
| | | | |

| IEC 60335-2-29 | | | |
|---|---|---|---|
| Clause | Requirement + Test | Result - Remark | Verdict |
| | **United Kingdom** | | P |
| 25.6 | These regulations apply to all plugs for domestic use at a voltage of not less than 200 V and in general allow only plugs to BS 1363 to be fitted to domestic appliances. It also allows plugs to BS 4573 and EN 50075 to be fitted to shavers and toothbrushes | | P |
| **ZC** | **ANNEX ZC** (NORMATIVE)<br>**NORMATIVE REFERENCES TO INTERNATIONAL PUBLICATIONS WITH THEIR CORRESPONDING EUROPEAN PUBLICATIONS** | | — |
| | A list of referenced documents in this standard | | P |
| **ZD** | **ANNEX ZD** (INFORMATIVE)<br>**IEC and CENELEC CODE DESIGNATIONS FOR FLEXIBLE CORDS** | | — |
| | A table with IEC and CENELEC code designations for flexible cords | | P |
| | | | |
| **ZE** | **ANNEX ZE** (INFORMATIVE)<br>**SPECIFIC ADDITIONAL REQUIREMENTS FOR APPLIANCES AND MACHINES INTENDED FOR COMMERCIAL USE** | | N |
| 7.1 | Business name and full address of the manufacturer and, where applicable, his authorized representative .....: | | N |
| | Model or type reference .....: | | N |
| | Serial number, if any .....: | | N |
| | Production year | | N |
| | Designation of the appliance .....: | | N |
| 7.12 | Instructions provided with the appliance so that the appliance can be used safely | | N |
| | The instructions contain at least the following information: | | N |
| | - the business name and full address of the manufacturer and, where applicable, his authorized representative | | N |
| | - model or type reference of the appliance as marked on the appliance itself, except for the serial number | | N |
| | - the designation of the appliance together with its explanation in case it is given by a combination of letters and/or numbers | | N |
| | - the general description of the appliance, when needed due to the complexity of the appliance | | N |

| IEC 60335-2-29 | | | |
|---|---|---|---|
| Clause | Requirement + Test | Result - Remark | Verdict |
| | - specific precautions if required during installation, operation, adjusting, user maintenance, cleaning, repairing or moving | | N |
| | - when needed drawings, diagrams, descriptions and explanations necessary for the safe use and user maintenance of the appliance | | N |
| | - the possible reasonably foreseeable misuse and, whenever relevant, a warning against the effects it may have on the safe use of the appliance | | N |
| | The words “Original instructions” appear on the language version(s) verified by the manufacturer or by the authorized representative | | N |
| | When a translation of the original instructions has been provided by a person introducing the appliance on the market; the meaning of the sentence “Translation of the original instructions” appear in the relevant instructions delivered with the appliance | | N |
| | The instructions for maintenance/service to be done by specialized personnel, mandated by the manufacturer or the authorized representative may be supplied in only one Community language which the specialized personnel understand | | N |
| | The instructions indicate the type and frequency of inspections and maintenance required for safe operation including the preventive maintenance measures | | N |
| 7.12.ZE1 | If needed for specific appliances, the following information to be given: | | N |
| | • on use, transportation, assembly, dismantling when out of service, testing or foreseeable breakdowns, if these operations have consequences on stability of the appliance in order to avoid overturning, falling or uncontrolled movements of the appliance or of its component parts | | N |
| | • on how to maintain adequate mechanical stability when in use, during transportation, assembly, dismantling, scrapping and any other action involving the appliance | | N |
| | • on the protective measures to be taken by the user, including, where appropriate, the personal protective equipment to be provided | | N |
| | • on the operating method to be followed in the event of accident or breakdown; if a blockage is likely to occur the operating method to safely unblock the appliance | | N |

| IEC 60335-2-29 | | | |
|---|---|---|---|
| Clause | Requirement + Test | Result - Remark | Verdict |
| | • on the specifications on the spare parts to be used, when these affect the health and safety of the operator | | N |
| | • on airborne noise emissions, determined and declared in accordance with the relevant Part 2, which includes: | | N |
| | - the A-weighted emission sound pressure level at workstations, where this exceeds 70 dB(A) .....; | | N |
| | - where this level does not exceed 70 dB(A), this fact is indicated | | N |
| | - the peak C-weighted instantaneous sound pressure value at workstations, where this exceeds 63 Pa (130 dB in relation to 20 µPa) .....: | | N |
| | - the A-weighted sound power level emitted by the machinery, where the A-weighted emission sound pressure level at workstations exceeds 80 dB(A) .....: | | N |
| 7.12.ZE2 | The instructions includes a warning to disconnect the appliance from its power source during service and when replacing parts | | N |
| | If the removal of the plug is foreseen, it is clearly indicated that the removal of the plug has to be such that an operator can check from any of the points to which he has access that the plug remains removed | | N |
| | If this is not possible, due to the construction of the appliance or its installation, a disconnection with a locking system in the isolated position is provided | | N |
| 19.11.4.8 | The appliance continues to operate, without causing any hazard to the user, from the same point in its operating cycle at which the voltage fluctuation occurred, or | | N |
| | a manual operation is required to restart it | | N |
| 20.1 | Appliances and their components and fittings have adequate mechanical stability during transportation, assembly, dismantling and any other action involving the appliance | | N |
| 20.2 | Dangerous moving transmission parts safeguarded either by design or guards | | N |
| | When guards are used, they are fixed guards, interlocking movable guards or protective devices | | N |
| | Moving parts directly involved in the function of the appliance which cannot be made completely inaccessible fitted with: | | N |

| IEC 60335-2-29 | | | |
|---|---|---|---|
| Clause | Requirement + Test | Result - Remark | Verdict |
| | - fixed guards or interlocking movable guards preventing access to those sections of the parts that are not used in the work, and | | N |
| | - adjustable guards restricting access to those sections of the moving parts where access is necessary | | N |
| | Interlocking movable guards used where frequent access is required | | N |
| 21.1 | Appliances and their components and fittings have adequate mechanical strength and is constructed to withstand such rough handling that may be expected in normal use, during transportation, assembly, dismantling, scrapping and any other action involving the appliance | | N |
| 22.ZE.1 | For appliances provided with a seat, the seat gives adequate stability | | N |
| | The distance between the seat and the control devices capable of being adapted to the operator | | N |
| 22.ZE.2 | For appliances provided with separate devices for the start and the stop functions, the stop function is unambiguously identifiable and does always override the start function | | N |
| | For appliances provided with one device performing the start and the stop function, the stop function is unambiguously identifiable and does always override the start function | | N |
| 22.ZE.3 | Appliances designed in such a way that incorrect mounting is avoided, if this can lead to an unsafe situation | | N |
| | If this is not possible, information on the correct mounting is given directly on the part and/or the enclosure | | N |
| 22.ZE.4 | Where the weight, size or shape prevents appliances from being moved manually, they are fitted with attachments for lifting gear, or | | N |
| | so designed that they can be fitted with such attachments, or | | N |
| | be shaped in such a way that standard lifting gear can easily be used | | N |
| | Appliances to be moved manually are constructed or equipped so that they can be moved easily and safely | | N |
| 22.ZE.5 | The fixing systems of fixed guards which prevent access to dangerous moving transmission parts only removable with the use of tools | | N |

| IEC 60335-2-29 | | | |
|---|---|---|---|
| Clause | Requirement + Test | Result - Remark | Verdict |
| | If such guards have to be removed by the user for routine cleaning or maintenance their fixing systems remain attached to the fixed guards or to the machine after removal | | N |
| | Where possible, guards are incapable of remaining in place without their fixings | | N |
| | This does not apply if, after removal of the screws, or if the component is incorrectly repositioned, the appliance becomes inoperative | | N |
| | Movable guards are interlocked | | N |
| | The interlocking devices prevent the start of hazardous appliance functions until the guards are fixed in their position, and give a stop command whenever they are no longer closed | | N |
| | Where it is possible for an operator to reach the danger zone before the risk due to hazardous appliance functions has ceased, movable guards associated with a guard locking device in addition to an interlocking device that: | | N |
| | - prevents the start of hazardous appliance functions until the guard is closed and locked, and | | N |
| | - keeps the guard closed and locked until the risk of injury from the hazardous appliance functions has ceased | | N |
| | Interlocking movable guards remain attached to the appliance when open, and | | N |
| | they are designed and constructed in such a way that they can be adjusted only by means of an intentional action | | N |
| 22.ZE.6 | Interlocking movable guards designed in such a way that the absence or failure of one of their components prevents starting or stops the hazardous appliance functions | | N |
| | The guard is opened to the extent needed to cause the interlocking to operate and is then closed, the number of operations being defined in the specific Part 2.....: | | N |
| | After this test any defect that may be expected in normal use is applied to the interlock system, including interruption of the supply, only one defect being simulated at a time | | N |
| | After these tests the interlock system is fit for further use | | N |
| 22.ZE.7 | Adjustable guards restricting access to areas of the moving parts strictly necessary for the work are: | | N |
| | - adjustable manually or automatically, depending on the type of work involved, and | | N |
| | - readily adjustable without the use of tools | | N |

| IEC 60335-2-29 | | | |
|---|---|---|---|
| Clause | Requirement + Test | Result - Remark | Verdict |
| 22.ZE.8 | In case of interruption, re-establishment after an interruption or fluctuation in whatever manner of the power supply, the appliance does not restart | | N |
| | However, automatic restarting of the operation is allowed if the appliance may continue to operate, without causing any hazard to the user, from the same point in its operating cycle at which the voltage interruption or fluctuation occurred | | N |
| 22.ZE.9 | Appliances fitted with means to isolate them from all energy sources | | N |
| | Such isolators are clearly identified, and | | N |
| | they are capable of being locked if reconnection endanger persons | | N |
| | After the energy source is disconnected, it is possible to dissipate any energy remaining or stored in the circuits of the appliance without risk to persons | | 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** | | — |
| | List of standards under CENELEC/TC61 with the allocation under the LVD (Low Voltage Directive) or the MD (Machinery Directive) .....: | 2014/35/EU | P |
| **ZG** | **ANNEX ZG** (NORMATIVE)<br>**UV APPLIANCES** | | — |
| | The following modifications to this standard apply to appliances having UV emitters | | N |
| | This annex is not applicable to appliances covered by the scopes of IEC 60335-2-27, IEC 60335-2-59 or IEC 60335-2-109 | | N |
| 7.12.ZG | The instructions for appliances incorporating UVC emitters include the substance of the following: WARNING — This appliance contains a UV emitter. Do not stare at the light source | | N |
| 32 | For appliances incorporating UV emitters the manufacturer delivers a declaration providing evidence that the plastic material exposed to the radiation is UV resistant | | N |
| **ZZ** | **ANNEX ZZ** (INFORMATIVE)<br>**COVERAGE OF ESSENTIAL REQUIREMENTS OF EC DIRECTIVES** | | — |

| IEC 60335-2-29 | | | |
|---|---|---|---|
| Clause | Requirement + Test | Result - Remark | Verdict |
| | Description of the relation between this European standard and the LVD (Low Voltage Directive) and the MD (Machinery Directive) | | P |

| | | | |
|---|---|---|---|
| ANNEX | EMF | | P |
| | The test product also complies with the requirements of EN62233:2008 | | -- |
| | Limit……..100% | Measured: 1.287% Max. | P |

| IEC 60335-2-29 | | |
|---|---|---|
| Clause | Appended table | Verdict |

| 10.1 | TABLE: Power input deviation | | | | N/A |
|---|---|---|---|---|---|
| Input deviation of/at: | P rated (W) | P measured (W) | Dp | Required Dp | Remark |
| -- | -- | -- | -- | -- | -- |

| 10.2 | TABLE: Current deviation | | | | P |
|---|---|---|---|---|---|
| Input deviation of/at: | I rated (A) | I measured (A) | dI | Required dI | Remark |
| For model: C060L1001 | | | | | |
| AC100V, 50Hz | 1,2 | 1,086 | -9,5% | +20% | -- |
| AC240V, 50Hz | 1,2 | 0,419 | -65,1% | +20% | -- |
| AC100V, 60Hz | 1,2 | 1,047 | -12,8% | +20% | -- |
| AC240V, 60Hz | 1,2 | 0,499 | -58,4% | +20% | -- |
| For model: C060L0701 | | | | | |
| AC100V, 50Hz | 1,2 | 0,854 | -28,8% | +20% | -- |
| AC240V, 50Hz | 1,2 | 0,338 | -71,8% | +20% | -- |
| AC100V, 60Hz | 1,2 | 0,822 | -31,5% | +20% | -- |
| AC240V, 60Hz | 1,2 | 0,398 | -66,8% | +20% | -- |

| 10.101 | TABLE: Voltage – no load | | | P |
|---|---|---|---|---|
| Current deviation of/at: | $U_o$ rated (V) | $U_o$ measured (V) | Required $U_o$ | Remark |
| For model: C060L1001 | | | | |
| AC100V, 50Hz | 42,0 | 42,186 | 42,4V | -- |
| AC240V, 50Hz | 42,0 | 42,186 | 42,4V | -- |
| AC100V, 60Hz | 42,0 | 42,186 | 42,4V | -- |
| AC240V, 60Hz | 42,0 | 42,186 | 42,4V | -- |
| For model: C060L0701 | | | | |
| AC100V, 50Hz | 29,4 | 29,683 | 42,4V | -- |
| AC240V, 50Hz | 29,4 | 29,682 | 42,4V | -- |
| AC100V, 60Hz | 29,4 | 29,684 | 42,4V | -- |
| AC240V, 60Hz | 29,4 | 29,684 | 42,4V | -- |

| 10.102 | TABLE: Output current deviation | | | | P |
|---|---|---|---|---|---|
| Current deviation of/at: | $I_o$ rated (A) | $I_o$ measured (A) | d $I_o$ | Required d $I_o$ | Remark |
| For model: C060L1001 | | | | | |
| AC100V, 50Hz | 1,35 | 1,398 | 4,0% | +10% | -- |
| AC240V, 50Hz | 1,35 | 1,401 | 4,2% | +10% | -- |
| AC100V, 60Hz | 1,35 | 1,399 | 4,1% | +10% | -- |

| IEC 60335-2-29 | | |
|---|---|---|
| Clause | Appended table | Verdict |

| | | | | | |
|---|---|---|---|---|---|
| AC240V, 60Hz | 1,35 | 1,403 | 4,4% | +10% | -- |
| For model: C060L0701 | | | | | |
| AC100V, 50Hz | 1,5 | 1,521 | 1,4% | +10% | -- |
| AC240V, 50Hz | 1,5 | 1,522 | 1,5% | +10% | -- |
| AC100V, 60Hz | 1,5 | 1,521 | 1,4% | +10% | -- |
| AC240V, 60Hz | 1,5 | 1,523 | 1,5% | +10% | -- |

| 11.8 | TABLE: Heating test, thermocouples | | | P |
|---|---|---|---|---|
| | | Test 1 | Test 2 | -- |
| | Test voltage (V): | 0,94 x 100V =94V | 1,06 x 240V =254,4V | -- |
| | Ambient t1(°C): | -- | -- | — |
| | Ambient t2(°C): | -- | -- | — |

| Thermocouple locations: | dT (K) | | Max. dT (K) |
|---|---|---|---|
| | Test 1 | Test 2 | |
| For model: C060L1001 | | | |
| Appliance inlet | 42,5 | 33,3 | 45 |
| Thermistor (RT1) | 102,4 | 81,5 | -- |
| Varistor (VAR1) | 57,8 | 51,2 | 60 |
| X-capacitor body (CX1) | 61,7 | 45,4 | 75 |
| L2 winding | 69,8 | 52,7 | 85 |
| Y-capacitor body (CY3) | 38,2 | 28,2 | 100 |
| C2 body | 64,1 | 49,9 | 80 |
| Transformer winding | 60,0 | 59,4 | 85 |
| Transformer bobbin | 54,0 | 53,7 | -- |
| Y-capacitor body (CY1) | 58,8 | 50,9 | 100 |
| Internal lead wire | 56,6 | 45,7 | 80 |
| PCB under D1 | 55,8 | 48,0 | 105 |
| C6 body | 51,2 | 44,6 | 80 |
| Optocoupler (U3) | 48,5 | 42,2 | 75 |
| PCB under D9 | 62,6 | 48,7 | 105 |
| Output lead wire | 35,7 | 33,2 | 55 |
| Enclosure (top, inside, near T1) | 46,3 | 43,9 | For cl.30 |
| Enclosure (side, inside, near T1) | 42,6 | 35,0 | For cl.30 |
| Enclosure (top, outside, near T1) | 35,6 | 32,6 | 60 |
| Enclosure (side, outside, near T1) | 31,5 | 29,4 | 60 |

| IEC 60335-2-29 | | |
|---|---|---|
| Clause | Appended table | Verdict |

| | | | |
|---|---|---|---|
| Test floor | 25,6 | 20,8 | 65 |
| Ambient (°C) | 24,3 | 24,6 | -- |
| For model: C060L0701 | | | |
| Appliance inlet | 22,7 | 18,2 | 45 |
| Thermistor (RT1) | 92,4 | 73,1 | -- |
| Varistor (VAR1) | 56,6 | 41,6 | 60 |
| X-capacitor body (CX1) | 50,2 | 36,0 | 75 |
| L2 winding | 70,5 | 51,3 | 85 |
| Y-capacitor body (CY3) | 34,2 | 24,5 | 100 |
| C2 body | 58,2 | 43,8 | 80 |
| Transformer winding | 55,2 | 52,0 | 85 |
| Transformer bobbin | 48,9 | 46,2 | -- |
| Y-capacitor body (CY1) | 56,1 | 46,8 | 100 |
| Internal lead wire | 47,8 | 36,8 | 80 |
| PCB under D1 | 56,0 | 47,1 | 105 |
| C6 body | 55,7 | 48,9 | 80 |
| Optocoupler (U3) | 43,8 | 38,1 | 75 |
| PCB under D9 | 53,8 | 40,5 | 105 |
| Output lead wire | 38,5 | 34,4 | 55 |
| Enclosure (top, inside, near T1) | 43,8 | 43,4 | For cl.30 |
| Enclosure (side, inside, near T1) | 41,4 | 37,1 | For cl.30 |
| Enclosure (top, outside, near T1) | 38,3 | 37,6 | 60 |
| Enclosure (side, outside, near T1) | 28,7 | 22,9 | 60 |
| Test floor | 20,5 | 18,6 | 65 |
| Ambient (°C) | 24,3 | 24,7 | -- |

| | | | |
|---|---|---|---|
| 13.2 | TABLE: Leakage current | | P |
| | Heating appliances: 1,15 x rated input.....: | -- | — |
| | Motor-operated and combined appliances: 1,06 x rated voltage.....: | 1,06x240V=254,4V | — |

| Leakage current between | I (mA) | Max. allowed I (mA) |
|---|---|---|
| Live/Neutral – Plastic enclosure | 0,02 | 0,35 peak |
| Live/Neutral – output terminals | 0,12 | 0,35 peak |

| | | |
|---|---|---|
| 13.3 | TABLE: Electric strength | P |

| IEC 60335-2-29 | | |
|---|---|---|
| Clause | Appended table | Verdict |

| Test voltage applied between: | Voltage (V) | Breakdown (Yes/No) |
|---|---|---|
| Differnet polarity (fuse link opened) | 1000 | No |
| Live/Neutral – plastic part | 3000 | No |
| Live/Neutral – output terminals | 3000 | No |
| Primary to secondary of transformer | 3000 | No |
| Core to secondary of transformer | 3000 | No |
| One layer insulation tape | 3000 | No |

| 14 | TABLE: Transient overvoltages | | | | N/A |
|---|---|---|---|---|---|
| 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.....: | 1,06x240V=254,4V | -- |
| | Three phase appliances 1,06 x rated voltage divided by √3: .....: | -- | -- |
| Leakage current between | | I (mA) | Max. allowed I (mA) |
| Live/Neutral – Plastic enclosure | | 0,02 | 0,25 rms |
| Live/Neutral – output terminals | | 0,12 | 0,25 rms |

| 16.3 | TABLE: Electric strength | | P |
|---|---|---|---|
| Test voltage applied between: | | Voltage (V) | Breakdown (Yes/No) |
| Differnet polarity (fuse link opened) | | 1250 | No |
| Live/Neutral – plastic part | | 3000 | No |
| Live/Neutral – output terminals | | 3000 | No |
| Primary to secondary of transformer | | 3000 | No |
| Core to secondary of transformer | | 3000 | No |
| One layer insulation tape | | 3000 | No |

| 17 | TABLE: Overload protection, temperature rise | P |
|---|---|---|
| | Test condition: | Overload or Short circuit the secondary winding of transformer |
| | Test duration: | Until steady conditions |
| | Test voltage (V): | 94V/254,4V |
| | Ambient t1 (°C): | -- |

| IEC 60335-2-29 | | |
|---|---|---|
| Clause | Appended table | Verdict |

| | Ambient t2 (°C): | -- | | |
|---|---|---|---|---|
| Thermocouple locations | | dT (K) | | Max. dT (K) |
| | | 94V | 254,4V | |
| For model: C060L1001 | | | | |
| Winding of transformer | | 90,9 | 110,7 | 150 |
| Enclosure (top, inside, near T1) | | 73,5 | 84,6 | For cl.30 |
| Enclosure (side, inside, near T1) | | 69,2 | 75,2 | For cl.30 |
| Output lead wire | | 43,8 | 49,7 | 70 |
| Test corner | | 26,6 | 30,8 | 65 |
| Ambient (°C) | | 24,5 | 24,2 | -- |
| For model: C060L0701 | | | | |
| Winding of transformer | | 87,6 | 104,8 | 150 |
| Enclosure (top, inside, near T1) | | 72,6 | 80,4 | For cl.30 |
| Enclosure (side, inside, near T1) | | 68,8 | 72,6 | For cl.30 |
| Output lead wire | | 42,9 | 45,7 | 70 |
| Test corner | | 24,8 | 28,1 | 65 |
| Ambient (°C) | | 24,3 | 24,5 | -- |
| After the output terminals of the battery charger were short-circuited, the unit was protected and recoverable when the fault was removed, no hazards. | | | | |

| 19.11.2 | TABLE: fault conditions of electronic circuit | | | | | | P |
|---|---|---|---|---|---|---|---|
| the appliance is operated under the conditions specified in clause 11 but supplied at rated voltage. In each case, the test is ended if a non-self-resetting interruption of the supply occurs within the appliance. | | | | | | | -- |
| | Test voltage (V) : | | See below | | | | — |
| Test component | Fault condition SC or OC | Test voltage (V) | Measured current (A) | Value A or B flowing through protective impedance (mA) | Duration | Observation | |
| For model: C060L1001 | | | | | | | |
| BD1 | SC | 240 | 9,1 | -- | 1s | Fuse link opened immediately, no hazards. | |
| C2 | SC | 240 | 9,1 | -- | 1s | Fuse link opened immediately, no hazards. | |
| T1 (1-3) | SC | 240 | 0,151 | -- | 10min. | Appliance was protected immediately. When the fault was removed, the unit can be recoverable, no hazards. | |
| T1 (4-5) | SC | 240 | 0,201 | -- | 10min. | Appliance was protected immediately. When the fault was removed, the unit can be recoverable, no hazards. | |

| IEC 60335-2-29 | | |
|---|---|---|
| Clause | Appended table | Verdict |

| | | | | | | |
|---|---|---|---|---|---|---|
| T1 (8-11) | SC | 240 | 0,084 | -- | 10min. | Appliance was protected immediately. When the fault was removed, the unit can be recoverable, no hazards. |
| Q2(S-G) | SC | 240 | 9,1 | -- | 1s. | Fuse link opened immediately, no hazards. |
| Q2(S-D) | SC | 240 | 9,1 | -- | 1s. | Fuse link opened immediately, no hazards. |
| C6 | SC | 240 | 0,189 | -- | 10min. | Appliance was protected immediately. When the fault was removed, the unit can be recoverable, no hazards. |
| Output terminals | SC | 240 | 0,144 | -- | 10min. | Appliance was protected immediately. When the fault was removed, the unit can be recoverable, no hazards. |
| Optocoupler primary | SC | 240 | 0,626 | -- | 2h. | T1 winding: 69,9K, enclosure inside: 49,3K, test floor: 19,5K, no damage, no hazard. |
| Optocoupler secondary | SC | 240 | 0,025 | -- | 10min. | Appliance was protected immediately. When the fault was removed, the unit can be recoverable, no hazards. |
| For model: C060L0701 | | | | | | |
| T1 (1-3) | SC | 240 | 0,104 | -- | 10min. | Appliance was protected immediately. When the fault was removed, the unit can be recoverable, no hazards. |
| T1 (4-5) | SC | 240 | 0,092 | -- | 10min. | Appliance was protected immediately. When the fault was removed, the unit can be recoverable, no hazards. |
| T1 (8-11) | SC | 240 | 0,074 | -- | 10min. | Appliance was protected immediately. When the fault was removed, the unit can be recoverable, no hazards. |
| C6 | SC | 240 | 0,137 | -- | 10min. | Appliance was protected immediately. When the fault was removed, the unit can be recoverable, no hazards. |
| Output terminals | SC | 240 | 0,109 | -- | 10min. | Appliance was protected immediately. When the fault was removed, the unit can be recoverable, no hazards. |
| Optocoupler primary | SC | 240 | 0,443 | -- | 2h. | T1 winding: 65,9K, enclosure inside: 44,3K, test floor: 18,5K, no damage, no hazard. |
| Optocoupler secondary | SC | 240 | 0,025 | -- | 10min. | Appliance was protected immediately. When the fault was removed, the unit can be recoverable, no hazards. |

| | | |
|---|---|---|
| 19.13 | TABLE: Abnormal operation, temperature rises | P |

| IEC 60335-2-29 | | |
|---|---|---|
| Clause | Appended table | Verdict |

| | | | | |
|---|---|---|---|---|
| Abnormal conditions:<br>Unless otherwise specified, the tests are continued until a non-self-resetting thermal cut-out operates or until steady conditions are established.<br>There shall # be no rupture of the battery.<br>1). Cl. 19.101 Battery chargers are supplied at rated voltage and operated under normal operation, any control that operates during the test of Clause 11 being short-circuited.<br>2). Cl. 19.102 The battery charger is connected to a fully charged battery, the connections being in reverse to normal use. The battery is to have the largest capacity of the types specified in the instructions, the capacity of a Lipo battery, however, being 70 Ah. The battery charger is operated while supplied at rated voltage. | | | | — |
| -- | Test voltage (V): | 240 | 240 | -- |
| | Test conditons: | Battery used: 70Ah | | |
| -- | T1(℃) | -- | -- | -- |
| -- | T2(℃) | -- | -- | -- |
| Thermocouple locations | | 1). dT (K) | 2). dT (K) | Max. dT (K) |
| -- | | -- | -- | -- |
| -- | | -- | -- | -- |

| **Result:** | **Condition 1)** | **Condition 2)** |
|---|---|---|
| Protective device operated? | -- | -- |
| If yes, what was the protective device? | -- | -- |
| How long was the operation until protective device operated? | -- | -- |
| Deformation of enclosure, which affect the compliance of cl.8? | -- | -- |
| Poisonous or ignitable gas? | -- | -- |
| Emit flames? | -- | -- |
| Molten metal? | -- | -- |

| test voltage applied between: | Test voltage (V) | Breakdown | |
|---|---|---|---|
| -- | -- | -- | -- |
| -- | -- | -- | -- |

After the connection to battery reversed, the unit was protected, when the fault was removed, the unit can be revoerable, no hazards.

| 24.1 | TABLE: Components | | | | P |
|---|---|---|---|---|---|
| object/part No. | manufacturer/ trademark | type/model | technical data | Standard (Edition/year) | mark(s) of conformity[1]) |
| Appliance inlet | Steady Electronics Corporation | 2124 | 2,5A, 250V | EN 60320-1 | VDE 40036028 |

| IEC 60335-2-29 | | |
|---|---|---|
| Clause | Appended table | Verdict |

| | | | | | |
|---|---|---|---|---|---|
| | Various | Various | 2,5A, 250V | EN 60320-1 | VDE |
| Plastic enclosure | SAMSUNG SDI CO LTD | NH-1015(++) | V-0, 85°C | EN 60335-1<br>EN 60335-2-29 | UL / Tested with appliance |
| | Various | Various | V-0, 85°C | EN 60335-1<br>EN 60335-2-29 | UL / Tested with appliance |
| Internal earthed wire | DONGGUANSHI HONGYING WIRE CABLE CO LTD | 1015 | 600V, 105ºC, VW-1 | EN 60335-1<br>EN 60335-2-29 | UL / Tested with appliance |
| Fuse (F1) | Shenzhen Lanson Electronics Co. Ltd. | 3K T1A250V | T1AL250VAC | EN 60127-1<br>EN 60127-3 | VDE 40010682 |
| | Various | Various | T1AL250VAC | EN 60127-1<br>EN 60127-3 | VDE |
| Varistor (VAR1) | Lien Shun Electronics Co., Ltd. | 07D471K | 470V, T85 | EN 61051-1<br>EN 61051-2 | VDE 40005858 |
| | Various | Various | 470V, T85 | EN 61051-1<br>EN 61051-2 | VDE |
| Heating shrinkable tube | GUANGZHOU KAIHENG ENTERPRISE GROUP | K-2 (+) | 600V, 125ºC | EN 60335-1<br>EN 60335-2-29 | UL / Tested with appliance |
| | Various | Various | 600V, 125ºC | EN 60335-1<br>EN 60335-2-29 | UL / Tested with appliance |
| PCB | SUN TAT INDUSTRIAL LTD | ST01 | V-0, 130°C | EN 60335-1<br>EN 60335-2-29 | UL / Tested with appliance |
| X-Capacitor (CX1) | Hsuan Tai Electronic Co. Ltd. | MCY | 0,1uF, 275V~, 100°C | EN 60384-14 | VDE 125205 |
| | Various | Various | 0,1uF, 280V~, 100°C | EN 60384-14 | VDE |
| Y-capacitor (CY1, CY2, CY3, CY4) | Jyh Chung Electronic Co., Ltd. | LTD | 400V~, 3300pF, T125, Y1 | EN 60384-14 | VDE 137027 |
| | Various | Various | 400V~, 3300pF, T125, Y1 | EN 60384-14 | VDE |
| Optocoupler (U3) | Sharp Corporation Electronic Components and Devices Group | PC817 | Int. cr: >7,6mm, Ext. cr: >7,6mm, Dti: >0,4mm, T110 | EN 60747-5-2 | VDE 40008087 |
| | Various | Various | Int. cr: >7,6mm, Ext. cr: >7,6mm, Dti: >0,4mm, T110 | EN 60747-5-2 | VDE |

| IEC 60335-2-29 | | |
|---|---|---|
| Clause | Appended table | Verdict |

| | | | | | |
|---|---|---|---|---|---|
| Output lead wire | YONG HAO ELECTRICAL INDUSTRY CO LTD | 1185 | 300V, 80ºC, VW-1, 16AWG | EN 60335-1 EN 60335-2-29 | UL / Tested with appliance |
| | WONDERFUL HI-TECH CO LTD | 1185 | 300V, 80ºC, VW-1, 16AWG | EN 60335-1 EN 60335-2-29 | UL / Tested with appliance |
| | Various | Various | 300V, 80ºC, VW-1, 16AWG | EN 60335-1 EN 60335-2-29 | UL / Tested with appliance |
| Line filter (L2) | SHENZHEN RUICHUANGYI ELECTRONICS CO., LTD | RCY-1005047 | Class B | EN 60335-1 EN 60335-2-29 | Tested with appliance |
| Line filter (L4) | SHENZHEN RUICHUANGYI ELECTRONICS CO., LTD | RCY-1003005 | Class B | EN 60335-1 EN 60335-2-29 | Tested with appliance |
| Winding of L2 and L4 | SHANTOU SHENGANG ELECTRICAL INDUSTRIAL CO LTD | UEW | 130°C | EN 60335-1 EN 60335-2-29 | UL / Tested with appliance |
| | Various | Various | 130°C | EN 60335-1 EN 60335-2-29 | UL / Tested with appliance |
| Bobbin of L2 and L4 | CHANG CHUN PLASTICS CO LTD | T375J | V-0, 150°C | EN 60335-1 EN 60335-2-29 | UL / Tested with appliance |
| Varnish of L2 | ELANTAS | V1630 | 155°C | EN 60335-1 EN 60335-2-29 | UL / Tested with appliance |
| | Various | Various | 155°C | EN 60335-1 EN 60335-2-29 | UL / Tested with appliance |
| Triple insulation wire of L4 | YOUNG CHANG SILICONE CO LTD | STLZW-B | 130°C, Class B | EN 60950-1 | VDE |
| | FURUKAWA ELECTRIC CO LTD | TEX-E | 130°C, Class B | EN 60950-1 | VDE |
| Transformer (T1) | SHENZHEN RUICHUANGYI ELECTRONICS CO., LTD | PQ3220-360uH(for model C060L0701); PQ3220-380uH(for model C060L1001) | Class B | EN 60335-1 EN 60335-2-29 | Tested with appliance |
| Bobbin of T1 | CHANGCHUN PLASTICS CO., LTD | T375J | V-0, 150°C | EN 60335-1 EN 60335-2-29 | UL / Tested with appliance |
| Magnet wire of T1 | SHANTOU SHENGANG ELECTRICAL INDUSTRIAL CO LTD | UEW | 130°C | EN 60335-1 EN 60335-2-29 | UL / Tested with appliance |
| | Various | Various | 130°C | EN 60335-1 EN 60335-2-29 | UL / Tested with appliance |

| IEC 60335-2-29 | | |
|---|---|---|
| Clause | Appended table | Verdict |

| | | | | | |
|---|---|---|---|---|---|
| Triple insulation wire of T1 | YOUNG CHANG SILICONE CO LTD | STLZW-B | 130°C | EN 60950-1 | VDE |
| | Various | Various | 130°C | EN 60950-1 | VDE |
| Varnish of T1 | Various | Various | 155°C | EN 60335-1 EN 60335-2-29 | UL / Tested with appliance |
| Insulation tape of T1 | SUZHOU MAILADUONA ELECTRIC MATERIAL CO LTD | JY312 | 130°C | EN 60335-1 EN 60335-2-29 | UL / Tested with appliance |
| | Various | Various | 130°C | EN 60335-1 EN 60335-2-29 | UL / Tested with appliance |
| Tube of T1 | CHANGYUAN ELECTRONICS GROUP CO LTD | CB-TT-T | 300V, 200°C | EN 60335-1 EN 60335-2-29 | UL / Tested with appliance |
| | Various | Various | 300V, 200°C | EN 60335-1 EN 60335-2-29 | UL / Tested with appliance |
| [1]) An asterisk indicates a mark which assures the agreed level of surveillance. | | | | | |

| 28.1 | TABLE: Threaded part torque test | | P |
|---|---|---|---|
| Threaded part identification | Diameter of thread (mm) | Column number (I, II, or III) | Applied torque ( Nm ) |
| For 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 | Functional | Supplementary | Reinforced | Verdict / Remark |
| | 0,2* / 0,5 / 0,8** | – | – | – | – | N |
| | 0,2* / 0,5 / 0,8** | – | – | – | – | N |
| | 0,2* / 0,5 / 0,8** | – | – | – | – | N |
| | 0,5 / 0,8** / 1,0*** | – | – | – | – | N |
| | 1,5 / 2,0*** | **>1,5** | **>1,5** | **>1,5** | – | P |
| | 3,0 / 3,5*** | – | – | – | **>3,0** | P |
| | 5,5 / 6,0*** | – | – | – | – | N |
| | 8,0 / 8,5*** | – | – | – | – | N |
| | 11,0 / 11,5*** | – | – | – | – | N |

| IEC 60335-2-29 | | |
|---|---|---|
| Clause | Appended table | Verdict |

*) 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 | | | |
| | | Material group | | | Material group | | | | | | |
| | | I | II | IIIa/IIIb | I | II | IIIa/IIIb | B*) | S*) | R*) | Verdict |
| ≤50 | 0,2 | 0,6 | 0,9 | 1,2 | 1,5 | 1,7 | 1,9 | | — | — | N |
| ≤50 | 0,2 | 0,6 | 0,9 | 1,2 | 1,5 | 1,7 | 1,9 | — | | — | N |
| ≤50 | 0,4 | 1,2 | 1,8 | 2,4 | 3,0 | 3,4 | 3,8 | — | — | | N |
| >50 and ≤125 | 0,3 | 0,8 | 1,1 | 1,5 | 1,9 | 2,1 | 2,4 | | — | — | N |
| >50 and ≤125 | 0,3 | 0,8 | 1,1 | 1,5 | 1,9 | 2,1 | 2,4 | — | | — | N |
| >50 and ≤125 | 0,6 | 1,6 | 2,2 | 3,0 | 3,8 | 4,2 | 4,8 | — | — | | N |
| >125 and ≤250 | 0,6 | 1,3 | 1,8 | **2,5** | 3,2 | 3,6 | 4,0 | >2,5 | — | — | P |
| >125 and ≤250 | 0,6 | 1,3 | 1,8 | **2,5** | 3,2 | 3,6 | 4,0 | — | >2,5 | — | P |
| >125 and ≤250 | 1,2 | 2,6 | 3,6 | **5,0** | 6,4 | 7,2 | 8,0 | — | — | >5,0 | P |
| >250 and ≤400 | 1,0 | 2,0 | 2,8 | 4,0 | 5,0 | 5,6 | 6,3 | | — | — | N |
| >250 and ≤400 | 1,0 | 2,0 | 2,8 | 4,0 | 5,0 | 5,6 | 6,3 | — | | — | N |
| >250 and ≤400 | 2,0 | 4,0 | 5,6 | 8,0 | 10,0 | 11,2 | 12,6 | — | — | | N |
| >400 and ≤500 | 1,3 | 2,5 | 3,6 | 5,0 | 6,3 | 7,1 | 8,0 | | — | — | N |
| >400 and ≤500 | 1,3 | 2,5 | 3,6 | 5,0 | 6,3 | 7,1 | 8,0 | — | | — | N |
| >400 and ≤500 | 2,6 | 5,0 | 7,2 | 10,0 | 12,6 | 14,2 | 16,0 | — | — | | N |
| >500 and ≤800 | 1,8 | 3,2 | 4,5 | 6,3 | 8,0 | 9,0 | 10,0 | | — | — | N |
| >500 and ≤800 | 1,8 | 3,2 | 4,5 | 6,3 | 8,0 | 9,0 | 10,0 | — | | — | N |
| >500 and ≤800 | 3,6 | 6,4 | 9,0 | 12,6 | 16,0 | 18,0 | 20,0 | — | — | | N |
| >800 and ≤1000 | 2,4 | 4,0 | 5,6 | 8,0 | 10,0 | 11,0 | 12,5 | | — | — | N |
| >800 and ≤1000 | 2,4 | 4,0 | 5,6 | 8,0 | 10,0 | 11,0 | 12,5 | — | | — | N |
| >800 and ≤1000 | 4,8 | 8,0 | 11,2 | 16,0 | 20,0 | 22,0 | 25,0 | — | — | | N |
| >1000 and ≤1250 | 3,2 | 5,0 | 7,1 | 10,0 | 12,5 | 14,0 | 16,0 | | — | — | N |
| >1000 and ≤1250 | 3,2 | 5,0 | 7,1 | 10,0 | 12,5 | 14,0 | 16,0 | — | | — | N |
| >1000 and ≤1250 | 6,4 | 10,0 | 14,2 | 20,0 | 25,0 | 28,0 | 32,0 | — | — | | N |

| IEC 60335-2-29 | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Clause | Appended table | | | | | | | | | | Verdict |
| >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 |
| >2000 and ≤2500 | 15,0 | 20,0 | 28,0 | 40,0 | 50,0 | 56,0 | 64,0 | — | — | | N |
| >2500 and ≤3200 | 10,0 | 12,5 | 18,0 | 25,0 | 32,0 | 36,0 | 40,0 | | — | — | N |
| >2500 and ≤3200 | 10,0 | 12,5 | 18,0 | 25,0 | 32,0 | 36,0 | 40,0 | — | | — | N |
| >2500 and ≤3200 | 20,0 | 25,0 | 36,0 | 50,0 | 64,0 | 72,0 | 80,0 | — | — | | N |
| >3200 and ≤4000 | 12,5 | 16,0 | 22,0 | 32,0 | 40,0 | 45,0 | 50,0 | | — | — | N |
| >3200 and ≤4000 | 12,5 | 16,0 | 22,0 | 32,0 | 40,0 | 45,0 | 50,0 | — | | — | N |
| >3200 and ≤4000 | 25,0 | 32,0 | 44,0 | 64,0 | 80,0 | 90,0 | 100,0 | — | — | | N |
| >4000 and ≤5000 | 16,0 | 20,0 | 28,0 | 40,0 | 50,0 | 56,0 | 63,0 | | — | — | N |
| >4000 and ≤5000 | 16,0 | 20,0 | 28,0 | 40,0 | 50,0 | 56,0 | 63,0 | — | | — | N |
| >4000 and ≤5000 | 32,0 | 40,0 | 56,0 | 80,0 | 100,0 | 112,0 | 126,0 | — | — | | N |
| >5000 and ≤6300 | 20,0 | 25,0 | 36,0 | 50,0 | 63,0 | 71,0 | 80,0 | | — | — | N |
| >5000 and ≤6300 | 20,0 | 25,0 | 36,0 | 50,0 | 63,0 | 71,0 | 80,0 | — | | — | N |
| >5000 and ≤6300 | 40,0 | 50,0 | 72,0 | 100,0 | 126,0 | 142,0 | 160,0 | — | — | | N |
| >6300 and ≤8000 | 25,0 | 32,0 | 45,0 | 63,0 | 80,0 | 90,0 | 100,0 | | — | — | N |
| >6300 and ≤8000 | 25,0 | 32,0 | 45,0 | 63,0 | 80,0 | 90,0 | 100,0 | — | | — | N |
| >6300 and ≤8000 | 50,0 | 64,0 | 90,0 | 126,0 | 160,0 | 180,0 | 200,0 | — | — | | N |
| >8000 and ≤10000 | 32,0 | 40,0 | 56,0 | 80,0 | 100,0 | 110,0 | 125,0 | | — | — | N |
| >8000 and ≤10000 | 32,0 | 40,0 | 56,0 | 80,0 | 100,0 | 110,0 | 125,0 | — | | — | N |
| >8000 and ≤10000 | 64,0 | 80,0 | 112,0 | 160,0 | 200,0 | 220,0 | 250,0 | — | — | | N |
| >10000 and ≤12500 | 40,0 | 50,0 | 71,0 | 100,0 | 125,0 | 140,0 | 160,0 | | — | — | N |
| >10000 and ≤12500 | 40,0 | 50,0 | 71,0 | 100,0 | 125,0 | 140,0 | 160,0 | — | | — | N |
| >10000 and ≤12500 | 80,0 | 100,0 | 142,0 | 200,0 | 250,0 | 280,0 | 320,0 | — | — | | N |
| *), B=Basic, S=Supplementary and R=Reinforced | | | | | | | | | | | |

| | | |
|---|---|---|
| 29.2 | TABLE: Creepage distances, functional insulation | P |

| IEC 60335-2-29 | | |
|---|---|---|
| Clause | Appended table | Verdict |

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

| 30.1 | TABLE: Ball pressure | | | P |
|---|---|---|---|---|
| Part | Test temperature (°C) | | Impression diameter (mm) | Allowed impression diameter (mm) |
| Plastic enclosure | 110 | | 0,4 | ≤2,0 |
| PCB material | 125 | | 1,0 | ≤2,0 |
| Transformer bobbin | 125 | | 0,9 | ≤2,0 |

| IEC 60335-2-29 | | |
|---|---|---|
| Clause | Appended table | Verdict |

| 30.2-1 | TABLE: resistance to heat, fire and tracking, glow-wire test | | | | | | P |
|---|---|---|---|---|---|---|---|
| Part | Test temperature (550 / 650 / 750 / 850 / 960) | Ignition of test sample (Y/N) | Ignition of tissue paper (Y/N) | Ti (s) | te (s) | $h_f$ (mm) | Result |
| Plastic enclosure | 550 | N | N | -- | -- | -- | P |
| Transformer bobbin | 850 | N | N | -- | -- | -- | P |
| | 750 | N | N | -- | -- | -- | P |
| Remark: Ti = the time between glow wire touched the material and the material ignited;<br>Te= the time between glow wire touched the material and the flame extinguished. | | | | | | | |

| 30.2-2 | TABLE: resistance to heat, fire and tracking, needle-flame test | | | | N/A |
|---|---|---|---|---|---|
| Part | Application time | Ignition of sample Yes / No | $t_b$ | Ignition of wrapping tissue Yes / No | Result |
| -- | -- | -- | -- | -- | -- |
| Remark: tb – Duration of burning.<br>The duration of burning (tb) shall not exceed 30 s. However, for printed circuit boards, it shall not exceed 15 s. | | | | | |

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

# Photo Documentation

Reference No.: WTD15D1136592S

**Model: C060L1001, C060L0701**

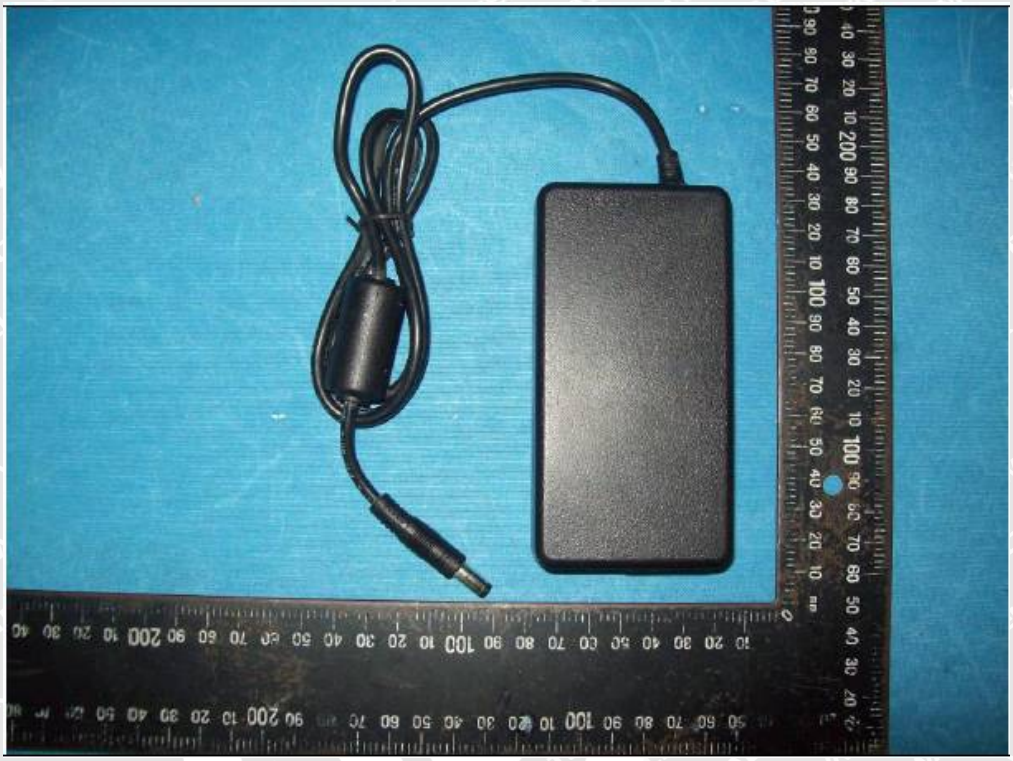


Photo 1 overall view

Photo 2 overall view

## Photo Documentation

Reference No.: WTD15D1136592S

Photo 3 internal view

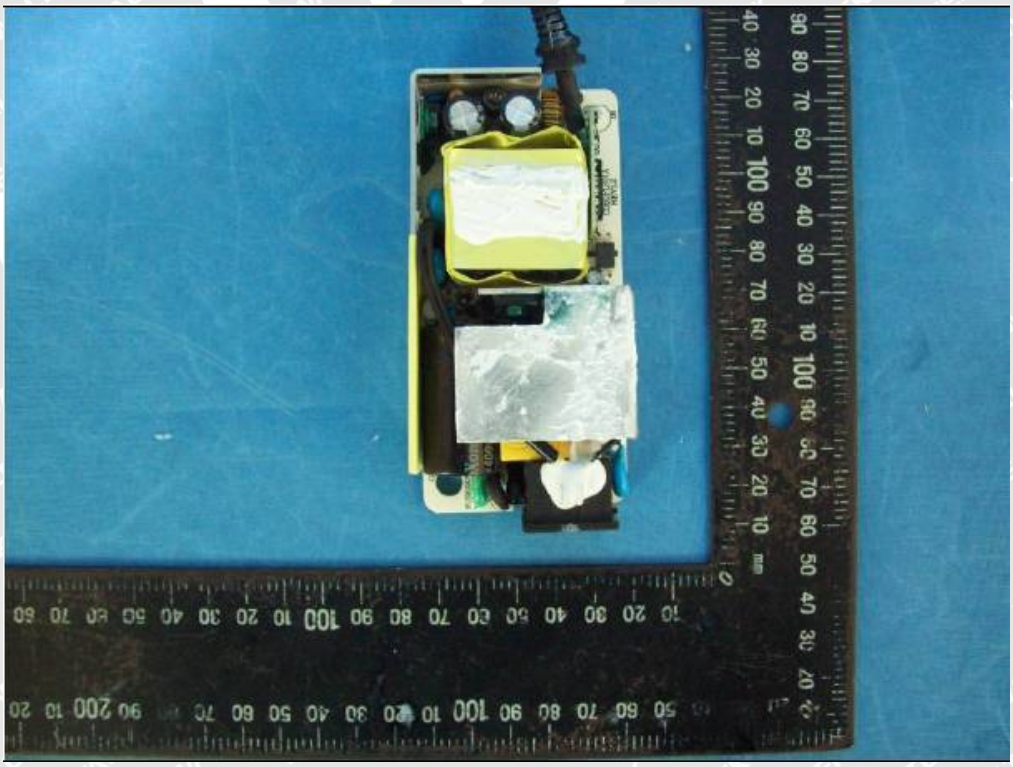


Photo 4 internal PCB top view

## Photo Documentation

Reference No.: WTD15D1136592S

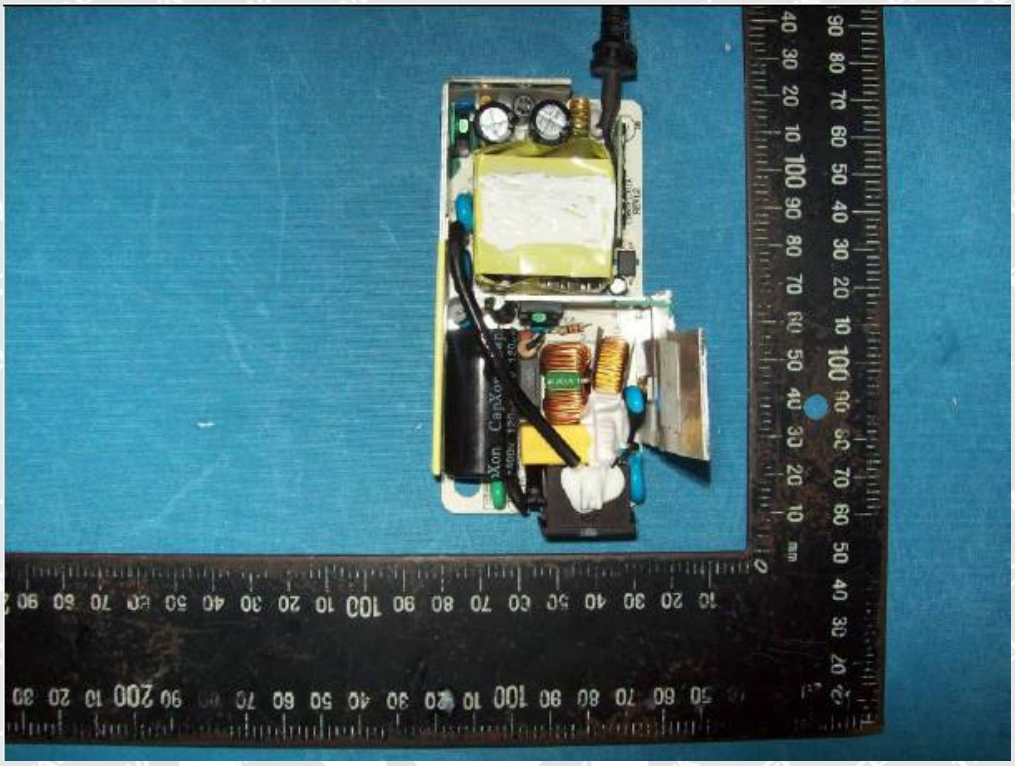


Photo 5 internal PCB top view

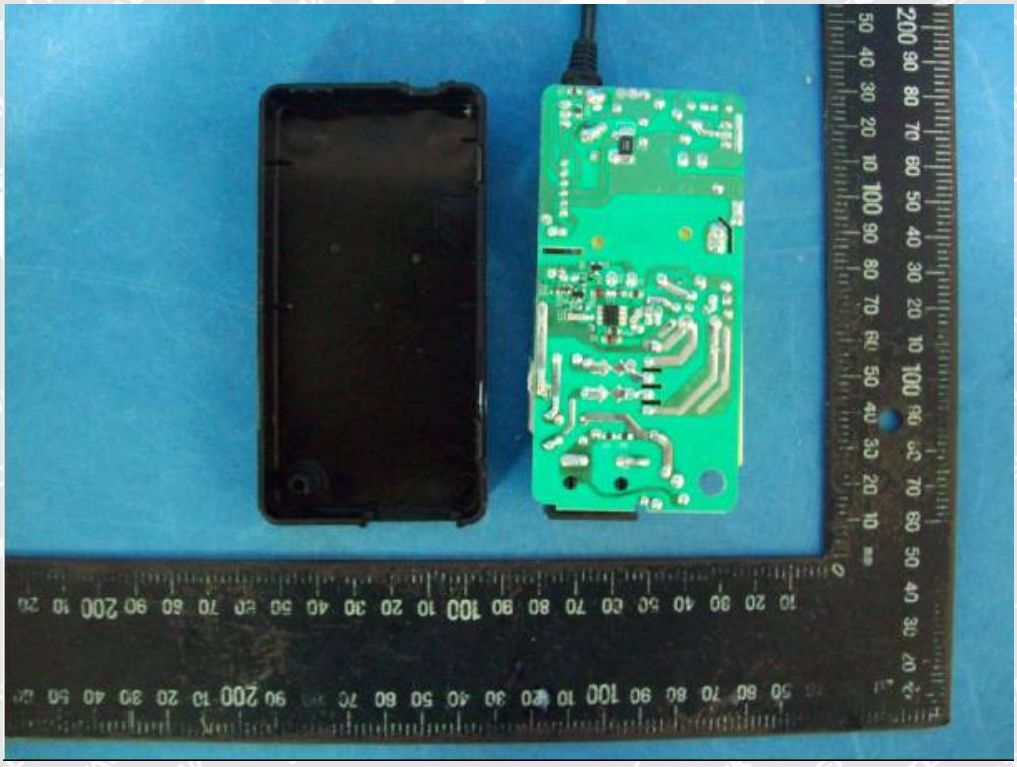


Photo 6 internal PCB bottom view