# LVD TEST REPORT

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|---|---|
| **Report No.:** | NTEK-2016NT07217723S |
| **Product:** | LED sensor & Emergency ceiling light |
| **Model No.:** | Safeway-LL-04-12W4K-ES, Safeway-LL-04-8W65K-E, Safeway-LL-04-12W4K-E |
| **Applicant:** | LOKOLED |
| **Address:** | Kitmanstraat 14, 1812 PM Alkmaar, The Netherlands |
| **Issued by:** | NTEK Testing Technology Co., Ltd. |
| **Lab Location:** | 1/F, Building E, Fenda Science Park, Sanwei Community, Xixiang Street, Bao'an District, Shenzhen P.R. China |
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Report No. NTEK-2016NT07217723S

# TEST REPORT
## EN 60598-2-22
## Luminaires
## Part 2: Particular requirements:
## Section Twenty-two – Luminaires for emergency lighting

| | |
|---|---|
| **Report Reference No.** ..... : | NTEK-2016NT07217723S |
| Compiled by (+ signature) ..... : | Grace Gong |
| Approved by (+ signature) ..... : | CS Chan |
| Date of issue ..... : | July 25, 2016 |
| **Testing Laboratory Name** ..... : | NTEK Testing Technology Co., Ltd |
| Address ..... : | 1/F, Building E, Fenda Science Park, Sanwei Community, Xixiang Street, Bao'an District, Shenzhen P.R. China |
| **Applicant's name** ..... : | LOKOLED |
| Address ..... : | Kitmanstraat 14, 1812 PM Alkmaar, The Netherlands |
| **Test specification:** | |
| Standard ..... : | EN 60598-2-22:2014 used in conjunction with EN 60598-1:2015 EN 62493:2010 |
| Test procedure ..... : | CE-LVD |
| Non-standard test method..... : | N/A |
| **Test Report Form No.** ..... : | EN 60598_2_22C |
| Test Report Form(s) Originator ..... : | NTEK |
| Master TRF ..... : | 2016-02 |
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| **Test item description** ..... : | LED sensor & Emergency ceiling light |
| Trade Mark ..... : | LOKOLED |
| Manufacturer ..... : | LOKOLED |
| Address ..... : | 1304 Block 26A, Ya Ju Le Garden, DaLiang District, FoShan City, GuangDong Province China |
| Model/Type reference ..... : | Safeway-LL-04-12W4K-ES, Safeway-LL-04-8W65K-E, Safeway-LL-04-12W4K-E |
| Ratings ..... : | AC 100-240V, 50/60Hz, 20W |

| | |
|---|---|
| **Test item particulars** ..... : | |
| Classification of installation and use ..... : | ceiling mounting |
| Supply Connection ..... : | Terminal connection |
| **Possible test case verdicts:** | |
| - test case does not apply to the test object..... : | N (No apply) |
| - test object does meet the requirement..... : | P (Pass) |
| - test object does not meet the requirement..... : | F (Fail) |
| **Testing**..... : | |
| Date of receipt of test item ..... : | July 20, 2016 |
| Date (s) of performance of tests..... : | Sept. 30, 2014 to Oct. 28, 2014 and July 20, 2016 to July 25, 2016 |

**General remarks:**

The test results presented in this report relate only to the object tested.
This report shall not be reproduced, except in full, without the written approval of the Issuing testing laboratory.
"(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 (point) is used as the decimal separator.
Clause numbers between brackets refer to clauses in IEC 60598-1

**General product information:**

All the test data in this report (NTEK-2016NT07217723S ) is refer to the test data in initial report (*NTEK-2014NT1010589S-R1*).

This report only changed the applicant , manufactor and models name information.

1, All the models were same construction except appearance and models number, so all the test was perform on representative maximum power model SAFEWAY-LL-04-12W4K-ES

2, LED driver test with appliance according EN 61347-2-13:2006 conjunction with EN 61347-1:2008+A1:2011+A2:2013

3, LED emergency converter test with appliance according EN 61347-2-7:2012 conjunction with EN 613471:2015

4, EN 60598-2-22:2014 clause 22.17.1 to 22.17.3 did not evaluate.

**Copy of marking plate**

The height of graphical symbols shall not be less than 5 mm, the height of letters and numerals either shown separately or with or as part of symbols shall not be less than 2 mm, representative maximum power model for reference.

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LOKOLED

Product: LED sensor & Emergency ceiling light

Rated: 100-240V~ 50/60Hz 20W

Model: Safeway-LL-04-12W4K-ES

Battery-Ni-MH DC9.6V 3.2Ah, 3 hours emergency lighting power supply

Normal ligting ouput:1856lm

emergency lighting output:641lm

Manufacturer:
LOKOLED
Address: 1304 Block 26A, Ya Ju Le Garden, DaLiang District, FoShan City, GuangDong Province China

Importer:
xxx Co., Ltd.
Address: yyyy

| EN 60598-2-22 | | | |
|---|---|---|---|
| Clause | Requirement + Test | Result - Remark | Verdict |

| | | | |
|---|---|---|---|
| **22.4 (0)** | **GENERAL TEST REQUIREMENTS** | | **P** |
| 22.2 (0.1) | Information for luminaire design considered | Standard<br>Yes ☒ No ☐ | — |
| 22.2 (0.3) | More sections applicable .....: | Yes ☐ No ☒ | — |

| | | | |
|---|---|---|---|
| **22.5 (2)** | **CLASSIFICATION** | | **P** |
| 22.5 (2.2) | Type of protection (Class 0 excluded)..... : | Class I | — |
| 22.5 (2.3) | Degree of protection (Requirement: Ordinary)..... : | IP20 | — |
| 22.5 (2.4) | Luminaire suitable for direct mounting on normally flammable surfaces ..... : | Yes ☒ No ☐ | — |
| | Luminaire not suitable for direct mounting on normally flammable surfaces..... : | Yes ☐ No ☒ | — |
| 22.5 (2.5) | Luminaire for normal use ..... : | Yes ☒ No ☐ | — |
| | Luminaire for rough service ..... : | Yes ☐ No ☒ | — |
| Annex B (-) | Classification code | X 1 A 180 | — |

| | | | |
|---|---|---|---|
| **22.6 (3)** | **MARKING** | | P |
| 22.6 (3.2) | Mandatory markings | | P |
| | Position of the marking | | P |
| | Format of symbols/text | | P |
| 22.6 (3.3) | Additional information | | P |
| | Language of instructions | English | P |
| 22.6 (3.3.1) | Combination luminaires | | P |
| 22.6 (3.3.2) | Nominal frequency in Hz | 50/60Hz | P |
| 22.6 (3.3.3) | Operating temperature | | N |
| 22.6 (3.3.4) | Symbol or warning notice | | P |
| 22.6 (3.3.5) | Wiring diagram | | P |
| 22.6 (3.3.6) | Special conditions | | N |
| 22.6 (3.3.7) | Metal halide lamp luminaire – warning | | N |
| 22.6 (3.3.8) | Limitation for semi-luminaires | | N |
| 22.6 (3.3.9) | Power factor and supply current | | N |

| EN 60598-2-22 | | | |
|---|---|---|---|
| Clause | Requirement + Test | Result - Remark | Verdict |
| 22.6 (3.3.10) | Suitability for use indoors | | P |
| 22.6 (3.3.11) | Luminaires with remote control | | N |
| 22.6 (3.3.12) | Clip-mounted luminaire – warning | | N |
| 22.6 (3.3.13) | Specifications of protective shields | | N |
| 22.6 (3.3.14) | Symbol for nature of supply | ~ | P |
| 22.6 (3.3.15) | Rated current of socket outlet | | N |
| 22.6 (3.3.16) | Rough service luminaire | | N |
| 22.6 (3.3.17) | Mounting instruction for type Y, type Z and some type X attachments | | N |
| 22.6 (3.3.18) | Non-ordinary luminaires with PVC cable | | N |
| 22.6 (3.3.19) | Protective conductor current in instruction if applicable | | N |
| 22.6 (3.3.20) | Provided with information if not intended to be mounted within arms reach | | N |
| 22.6 (3.3.21) | Luminaires with non replaceable and non-user replaceable light source, the instruction sheet shall contain the substance of the following information: | | P |
| | – For non replacable lightsources:<br>"The light source of this luminaire is not replaceable; when the light source reaches its end of life the whole luminaire shall be replaced" | | N |
| | For non-user replaceable light sources:<br>"The light source contained in this luminaire shall only be replaced by the manufacturer or his service agent or a similar qualified person." | | P |
| 22.6 (3.3.22) | For controllable luminaires the classification of insulation that has been maintained. | | N |
| 22.6 (3.4) | Test with water | | P |
| | Test with hexane | | P |
| | Legible after test | | P |
| | Label attached | | P |
| 22.6.1 (-) | Supply voltage | | P |
| 22.6.2 (-) | Classification according to annex B | | P |

| EN 60598-2-22 | | | |
|---|---|---|---|
| Clause | Requirement + Test | Result - Remark | Verdict |
| 22.6.3 (-) | Correct replacement lamp | | N |
| 22.6.4 (-) | Range of ambient temperatures | | N |
| 22.6.5 (-) | Fuse ratings and/or indicator lamps | | N |
| 22.6.6 (-) | Facilities to simulate normal supply failure | | P |
| 22.6.7 (-) | Marked with correct battery replacement incl. battery type and rated voltage | | P |
| | If non-replaceable batteries a label according to 3.2.b) of IEC 60598-1 | | N |
| 22.6.8 (-) | Battery marked with date of manufacture | | P |
| | Space provided on battery label for installers marking | | P |
| 22.6.9 (-) | Correct lamp replacement for combined emergency luminaires | | N |
| | Green dot with min 5 mm diameter | | N |
| | Instruction leaflet 22.5.10 – 12 and 22.5.14 – 22.5.16 | | P |
| 22.6.10 (-) | Replacement of battery or luminaire | | P |
| 22.6.11 (-) | Details of test facilities | | P |
| 22.6.12 (-) | Details of connection leads | | P |
| 22.6.14 (-) | Details of device which changes the mode of operation | | P |
| 22.6.15 (-) | Photometric data available | | P |
| 22.6.16 (-) | Any normal preparation procedure | | P |
| 22.6.17 (-) | Position of the marking in 22.5.1 and 22.5.2 | | P |
| 22.6.18 (-) | Provided with warning if intended for external plug and socket connections | | N |
| 22.6.19 (-) | Instruction leaflet specify if lamp and/or battery is/are non-replaceable | | N |

| | | | |
|---|---|---|---|
| **22.7 (4)** | **CONSTRUCTION** | | **P** |
| 22.7 (4.2) | Components replaceable without difficulty | | N |
| 22.7 (4.3) | Wireways smooth and free from sharp edges | | P |
| 22.7 (4.4) | Lampholders | | N |
| 22.7 (4.4.1) | Integral lampholder | | N |

| EN 60598-2-22 | | | |
|---|---|---|---|
| Clause | Requirement + Test | Result - Remark | Verdict |
| 22.7 (4.4.2) | Wiring connection | | P |
| 22.7 (4.4.3) | Lampholder for end-to-end mounting | | N |
| 22.7 (4.4.4) | Positioning | | N |
| | - pressure test (N) ..... : | | N |
| | After test the lampholder comply with relevant standard sheets and show no damage | | N |
| | After test on single-capped lampholder the lampholder have not moved from its position and show no permanent deformation | | N |
| | - bending test (N) ..... : | | N |
| | After test the lampholder have not moved from its position and show no permanent deformation | | N |
| 22.7 (4.4.5) | Peak pulse voltage | | N |
| 22.7 (4.4.6) | Centre contact | | N |
| 22.7 (4.4.7) | Parts in rough service luminaires resistant to tracking | | N |
| 22.7 (4.4.8) | Lamp connectors | | N |
| 22.7 (4.4.9) | Caps and bases correctly used | | N |
| 22.7 (4.5) | Starter holders | | N |
| | Starter holder in luminaires other than class II | | N |
| | Starter holder class II construction | | N |
| 22.7 (4.6) | Terminal blocks | | P |
| | Tails | | P |
| | Unsecured blocks | | N |
| 22.7 (4.7) | Terminals and supply connections | | P |
| 22.7 (4.7.1) | Contact to metal parts | | P |
| 22.7 (4.7.2) | Test 8 mm live conductor | | P |
| | Test 8 mm earth conductor | | P |
| 22.7 (4.7.3) | Terminals for supply conductors | | P |
| 22.7 (4.7.3.1) | Welded connections: | | P |
| | - stranded or solid conductor | | P |
| | - spot welding | | N |

| EN 60598-2-22 | | | |
|---|---|---|---|
| Clause | Requirement + Test | Result - Remark | Verdict |
| | - welding between wires | | P |
| | - Type Z attachment | | N |
| | - mechanical test according to 15.8.2 | | N |
| | - electrical test according to 15.9 | | N |
| | - heat test according to 15.9.2.3 and 15.9.2.4 | | N |
| 22.7 (4.7.4) | Terminals other than supply connection | | N |
| 22.7 (4.7.5) | Heat-resistant wiring/sleeves | | N |
| 22.7 (4.7.6) | Multi-pole plug | | N |
| | - test at 30 N | | N |
| 22.7 (4.8) | Switches: | | P |
| | - adequate rating | | P |
| | - adequate fixing | | P |
| | - polarized supply | | P |
| | - compliance with 61058-1 for electronic switches | | P |
| 22.7 (4.9) | Insulating lining and sleeves | | P |
| 22.7 (4.9.1) | Retainement | | P |
| | Method of fixing ..... : | | P |
| 22.7 (4.9.2) | Insulated linings and sleeves | | N |
| | Resistant to a temperature > 20 °C to the wire temperature or | | N |
| | a) & c) Insulation resistance and electric strength | | N |
| | b) Ageing test. Temperature (°C) ..... : | | N |
| 22.7 (4.10) | Insulation of Class II luminaires | | N |
| 22.7 (4.10.1) | No contact, mounting surface – accessible metal parts – wiring of basic insulation | | N |
| | Safe installation fixed luminaires | | N |
| | Capacitors and switches | | N |
| | Interference suppression capacitors according to IEC 60384-14 | | N |
| 22.7 (4.10.2) | Assembly gaps: | | N |
| | - not coincidental | | N |

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|---|---|---|---|
| Clause | Requirement + Test | Result - Remark | Verdict |
| | - no straight access with test probe | | N |
| 22.7 (4.10.3) | Retainment of insulation: | | P |
| | - fixed | | P |
| | - unable to be replaced; luminaire inoperative | | P |
| | - sleeves retained in position | | P |
| | - lining in lampholder | | N |
| 22.7 (4.11) | Electrical connections | | P |
| 22.7 (4.11.1) | Contact pressure | | N |
| 22.7 (4.11.2) | Screws: | | P |
| | - self-tapping screws | | P |
| | - thread-cutting screws | | N |
| 22.7 (4.11.3) | Screw locking: | | N |
| | - spring washer | | N |
| | - rivets | | N |
| 22.7 (4.11.4) | Material of current-carrying parts | | P |
| 22.7 (4.11.5) | No contact to wood or mounting surface | | P |
| 22.7 (4.11.6) | Electro-mechanical contact systems | | N |
| 22.7 (4.12) | Mechanical connections and glands | | N |
| 22.7 (4.12.1) | Screws not made of soft metal | | P |
| | Screws of insulating material | | N |
| | Torque test: torque (Nm); part ..... : | 0.5 | P |
| | Torque test: torque (Nm); part ..... : | 1.2 | P |
| | Torque test: torque (Nm); part ..... : | | N |
| 22.7 (4.12.2) | Screws with diameter < 3 mm screwed into metal | | N |
| 22.7 (4.12.4) | Locked connections: | | P |
| | - fixed arms; torque (Nm) ..... : | | N |
| | - lampholder; torque (Nm) ..... : | | N |
| | - push-button switches; torque 0,8 Nm ..... : | | N |
| 22.7 (4.12.5) | Screwed glands; force (Nm) ..... : | | N |
| 22.7 (4.13) | Mechanical strength | | P |

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|---|---|---|---|
| Clause | Requirement + Test | Result - Remark | Verdict |
| 22.7 (4.13.1) | Impact tests: | | P |
| | - fragile parts; energy (Nm) ..... : | | N |
| | - other parts; energy (Nm) ..... : | 0.35 Nm, metal enclosure<br>0.35 Nm, Transparent cover | P |
| | 1) live parts | Not become accessible | P |
| | 2) linings | | P |
| | 3) protection | Not become accessible | P |
| | 4) covers | Not become accessible | P |
| 22.7 (4.13.3) | Straight test finger | Can't touch with live part with 30N | P |
| 22.7 (4.13.4) | Rough service luminaires | | N |
| | - IP54 or higher | | N |
| | a) fixed | | N |
| | b) hand-held | | N |
| | c) delivered with a stand | | N |
| | d) for temporary installations and suitable for mounting on a stand | | N |
| 22.7 (4.13.6) | Tumbling barrel | | N |
| 22.7 (4.14) | Suspensions and adjusting devices | | N |
| 22.7 (4.14.1) | Mechanical load: | | P |
| | A) four times the weight | | P |
| | B) torque 2,5 Nm | | N |
| | C) bracket arm; bending moment (Nm) ..... : | | N |
| | D) load track-mounted luminaires | | N |
| | E) clip-mounted luminaires, glass-shelve. Thickness (mm) ..... : | | N |
| | Metal rod. diameter (mm) ..... : | | N |
| | Fixed luminaire or independent control gear without fixing devices | | P |
| 22.7 (4.14.2) | Load to flexible cables | | N |
| | Mass (kg) ..... : | | N |
| | Stress in conductors (N/mm²) ..... : | | N |

| EN 60598-2-22 | | | |
|---|---|---|---|
| Clause | Requirement + Test | Result - Remark | Verdict |
| | Mass (kg) of semi-luminaire .....: | | N |
| | Bending moment (Nm) of semi-luminaire .....: | | N |
| 22.7 (4.14.3) | Adjusting devices: | | N |
| | - flexing test; number of cycles .....: | | N |
| | - strands broken | | N |
| | - electric strength test afterwards | | N |
| 22.7 (4.14.4) | Telescopic tubes: cords not fixed to tube; no strain on conductors | | N |
| 22.7 (4.14.5) | Guide pulleys | | N |
| 22.7 (4.14.6) | Strain on socket-outlets | | N |
| 22.7 (4.15) | Flammable materials: | | N |
| | - glow-wire test 650 °C | | N |
| | - spacing ≥ 30 mm | | N |
| | - screen withstanding test of 13.3.1 | | N |
| | - screen dimensions | | N |
| | - no fiercely burning material | | N |
| | - thermal protection | | N |
| | - electronic circuits exempted | | N |
| 22.7 (4.15.2) | Luminaires made of thermoplastic material with lamp control gear | | N |
| | a) construction | | N |
| | b) temperature sensing control | | N |
| | c) surface temperature | | N |
| 22.7 (4.16) | Luminaires for mounting on normally flammable surfaces | | P |
| | No lamp control gear | (compliance with Section 12) | N |
| 22.7 (4.16.1) | Lamp control gear spacing: | | N |
| | - spacing 35 mm | | N |
| | - spacing 10 mm | | N |
| 22.7 (4.16.2) | Thermal protection: | | N |
| | - in lamp control gear | | N |
| | - external | | N |

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|---|---|---|---|
| Clause | Requirement + Test | Result - Remark | Verdict |
| | - fixed position | | N |
| | - temperature marked lamp control gear | | N |
| 22.7 (4.16.3) | Design to satisfy the test of 12.6 | (see 12.6) | N |
| 22.7 (4.17) | Drain holes | | N |
| | Clearance at least 5 mm | | N |
| 22.7 (4.18) | Resistance to corrosion: | | N |
| 22.7 (4.18.1) | - rust-resistance | | N |
| 22.7 (4.18.2) | - season cracking in copper | | N |
| 22.7 (4.18.3) | - corrosion of aluminium | | N |
| 22.7 (4.19) | Ignitors compatible with ballast | | N |
| 22.7 (4.20) | Rough service vibration | | N |
| 22.7 (4.21) | Protective shield: | | N |
| 22.7 (4.21.1) | Shield fitted | | N |
| | Shield of glass if tungsten halogen lamps | | N |
| 22.7 (4.21.2) | Particles from a shattering lamp not impair safety | | N |
| 22.7 (4.21.3) | No direct path | | N |
| 22.7 (4.21.4) | Impact test on shield | | N |
| | Glow-wire test on lamp compartment | | N |
| 22.7 (4.22) | Attachments to lamps | | N |
| 22.7 (4.23) | Semi-luminaires comply Class II | | N |
| 22.7 (4.24) | UV radiation for tungsten halogen lamps and metal halide lamps (Annex P) | | N |
| 22.7 (4.25) | No sharp point or edges | | N |
| 22.7 (4.26) | Short-circuit protection: | | N |
| 22.7 (4.26.1) | Uninsulated accessible SELV parts | | N |
| 22.7 (4.26.2) | Short-circuit test | | N |
| 22.7 (4.26.3) | Test chain according to Figure 29 | | N |
| 22.7.1 (-) | No glow starters in circuit in start of or during the emergency mode | | N |
| 22.7.2 (-) | Lamp control gears | | P |
| 22.7.3 (-) | Failure of one luminaire not affect other | | N |

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|---|---|---|---|
| Clause | Requirement + Test | Result - Remark | Verdict |
| 22.7.5 (-) | Circuit separation (self-contained lum.) | | P |
| 22.7.6 (-) | Circuit separation (centrally supplied lum.) | | N |
| 22.7.7 (-) | Charging device | | P |
| | Indicator lamp and colour | | P |
| 22.7.8 (-) | Battery requirements | | P |
| 22.7.9 (-) | Safety device | | P |
| 22.7.10 (-) | No switch | | P |
| 22.7.11 (-) | Failure of lamp(s) | | P |
| 22.7.12 (-) | Current limiting device | | P |
| 22.7.13 (-) | Influence in emergency mode | | P |
| 22.7.14 (-) | Changing device | | P |
| 22.7.15 (-) | Influence on luminaire with remote inhibiting facility | | N |
| 22.7.16 (-) | Operation of remote control | | N |
| 22.7.17 (-) | Influence on luminaire with rest mode facility | | N |
| 22.7.18 (-) | Current drain | | N |
| 22.7.19 (-) | Lamp voltage | | N |

| | | | |
|---|---|---|---|
| **22.8 (11)** | **CREEPAGE DISTANCES AND CLEARANCES** | | **P** |
| | Working voltage (V) ..... : | | — |
| | Voltage form | Sinusoidal ☒<br>Non-sinusoidal ☐ | — |
| | PTI | < 600 ☒ ≥ 600 ☐ | — |
| | Impulse withstand category (Normal category II) (Category III Annex U) | Category II ☒ Category III ☐ | — |
| | Rated pulse voltage (kV) ..... : | - | — |
| | (1) Current-carrying parts of different polarity: cr (mm); cl (mm) ..... : | Cr:1.5mm<br>cl:2.5mm | P |
| | (2) Current-carrying parts and accessible parts: cr (mm); cl (mm) ..... : | Cr:1.5mm<br>cl:2.5mm | P |

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|---|---|---|---|
| Clause | Requirement + Test | Result - Remark | Verdict |
| | (3) Parts becoming live due to breakdown of basic insulation and metal parts:<br>cr (mm); cl (mm) ..... : | | N |
| | (4) Outer surface of cable where it is clamped and metal parts: cr (mm); cl (mm)..... : | | N |
| | (5) Not used | | — |
| | (6) Current-carrying parts and supporting surface:<br>cr (mm); cl (mm) ..... : | Cr:1.5mm<br>cl:2.5mm | P |
| **22.9 (7)** | **PROVISION FOR EARTHING** | | **P** |
| 22.9 (7.2.1 + 7.2.3) | Accessible metal parts | | P |
| | Metal parts in contact with supporting surface | | P |
| | Resistance < 0,5 Ω | 0.011Ω | P |
| | Self-tapping screws used | | P |
| | Thread-forming screws | | N |
| | Thread-forming screw used in a grove | | N |
| | Earth makes contact first | | N |
| 22.9 (7.2.2 + 7.2.3) | Earth continuity in joints etc. | | N |
| 22.9 (7.2.4) | Locking of clamping means | | P |
| | Compliance with 4.7.3 | | P |
| | Terminal blocks with integrated screwless earthing contacts tested according Annex V | | N |
| 22.9 (7.2.5) | Earth terminal integral part of connector socket | | N |
| 22.9 (7.2.6) | Earth terminal adjacent to mains terminals | | P |
| 22.9 (7.2.7) | Electrolytic corrosion of the earth terminal | | P |
| 22.9 (7.2.8) | Material of earth terminal | | P |
| | Contact surface bare metal | | P |
| 22.9 (7.2.10) | Class II luminaire for looping-in | | N |
| | Double or reinforced insulation to functional earth | | N |
| 22.9 (7.2.11) | Earthing core coloured green-yellow | | P |

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|---|---|---|---|
| Clause | Requirement + Test | Result - Remark | Verdict |
| | Length of earth conductor | | N |
| **22.10(14)** | **SCREW TERMINALS** | | N |
| | Separately approved; component list | (see Annex 1) | N |
| | Part of the luminaire | (see Annex 3) | N |
| **22.10(15)** | **SCREWLESS TERMINALS AND ELECTRICAL CONNECTIONS** | | **N** |
| | Separately approved; component list | (see Annex 1) | N |
| | Part of the luminaire | (see Annex 4) | N |
| **22.11 (5)** | **EXTERNAL AND INTERNAL WIRING** | | **P** |
| 22.11 (5.2) | Supply connection and external wiring | | N |
| 22.11 (5.2.1) | Means of connection.....: | Terminal block connector | P |
| 22.11 (5.2.2) | Type of cable .....: | H03VV-F | P |
| | Nominal cross-sectional area (mm²).....: | 3 x 0.75 | P |
| | Cables equal to IEC 60227 or IEC 60245 | | P |
| 22.11 (5.2.3) | Type of attachment, X, Y or Z | | N |
| 22.11 (5.2.5) | Type Z not connected to screws | | N |
| 22.11 (5.2.6) | Cable entries: | | P |
| | - suitable for introduction | | P |
| | - adequate degree of protection | | P |
| 22.11 (5.2.7) | Cable entries through rigid material have rounded edges | | N |
| 22.11 (5.2.8) | Insulating bushings: | | N |
| | - suitably fixed | | N |
| | - material in bushings | | N |
| | - material not likely to deteriorate | | N |
| | - tubes or guards made of insulating material | | N |
| 22.11 (5.2.9) | Locking of screwed bushings | | N |
| 22.11 (5.2.10) | Cord anchorage: | | N |

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|---|---|---|---|
| Clause | Requirement + Test | Result - Remark | Verdict |
| | - covering protected from abrasion | | N |
| | - clear how to be effective | | N |
| | - no mechanical or thermal stress | | N |
| | - no tying of cables into knots etc. | | N |
| | - insulating material or lining | | N |
| 22.11 (5.2.10.1) | Cord anchorage for type X attachment: | | N |
| | a) at least one part fixed | | N |
| | b) types of cable | | N |
| | c) no damaging of the cable | | N |
| | d) whole cable can be mounted | | N |
| | e) no touching of clamping screws | | N |
| | f) metal screw not directly on cable | | N |
| | g) replacement without special tool | | N |
| | Glands not used as anchorage | | N |
| | Labyrinth type anchorages | | N |
| 22.11 (5.2.10.2) | Adequate cord anchorage for type Y and type Z attachment | | N |
| 22.11 (5.2.10.3) | Tests: | | N |
| | - impossible to push cable; unsafe | | N |
| | - pull test: 25 times; pull (N) ..... : | | N |
| | - torque test: torque (Nm) ..... : | | N |
| | - displacement ≤ 2 mm | | N |
| | - no movement of conductors | | N |
| | - no damage of cable or cord | | N |
| 22.11 (5.2.11) | External wiring passing into luminaire | | N |
| 22.11 (5.2.12) | Looping-in terminals | | N |
| 22.11 (5.2.13) | Wire ends not tinned | | N |

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|---|---|---|---|
| Clause | Requirement + Test | Result - Remark | Verdict |
| | Wire ends tinned: no cold flow | | N |
| 22.11 (5.2.14) | Mains plug same protection | | N |
| | Class III luminaire plug | | N |
| 22.11 (5.2.16) | Appliance inlets (IEC 60320) | | N |
| | Appliance couplers of class II type | | N |
| 22.11 (5.2.17) | No standardized interconnecting cables properly assembled | | N |
| 1.10 (5.2.18) | Used plug in accordance with | | N |
| | - IEC 60083 | | N |
| | - other standard | | N |
| 22.11 (5.3) | Internal wiring | | P |
| 22.11 (5.3.1) | Internal wiring of suitable size and type | Suitable size and type | P |
| | Through wiring | | N |
| | - not delivered/ mounting instruction | | P |
| | - factory assembled | | P |
| | - socket outlet loaded (A)..... : | | N |
| | - temperatures ..... : | (see Annex 2) | P |
| | Green-yellow for earth only | | P |
| 22.11 (5.3.1.1) | Internal wiring connected directly to fixed wiring | | P |
| | Cross-sectional area (mm²) ..... : | 0.61mm² | P |
| | Insulation thickness | | P |
| | Extra insulation added where necessary | | N |
| 22.11 (5.3.1.2) | Internal wiring connected to fixed wiring via internal current-limiting device | | P |
| | Adequate cross-sectional area and insulation thickness | | P |
| 22.11 (5.3.1.3) | Double or reinforced insulation for class II | | N |
| 22.11 (5.3.1.4) | Conductors without insulation | | N |

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|---|---|---|---|
| Clause | Requirement + Test | Result - Remark | Verdict |
| 22.11 (5.3.1.5) | SELV current-carrying parts | | P |
| 22.11 (5.3.1.6) | Insulation thickness other than PVC or rubber | | N |
| 22.11 (5.3.2) | Sharp edges etc. | | P |
| | No moving parts of switches etc. | | N |
| | Joints, raising/lowering devices | | N |
| | Telescopic tubes etc. | | N |
| | No twisting over 360° | | P |
| 22.11 (5.3.3) | Insulating bushings: | | P |
| | - suitable fixed | | P |
| | - material in bushings | | P |
| | - material not likely to deteriorate | | P |
| | - cables with protective sheath | | P |
| 22.11 (5.3.4) | Joints and junctions effectively insulated | | N |
| 22.11 (5.3.5) | Strain on internal wiring | | N |
| 22.11 (5.3.6) | Wire carriers | | P |
| 22.11 (5.3.7) | Wire ends not tinned | | N |
| | Wire ends tinned: no cold flow | | P |
| 22.11.1 (-) | Permanently connected | | P |
| **22.12 (8)** | **PROTECTION AGAINST ELECTRIC SHOCK** | | **P** |
| 22.12 (8.2.1) | Live parts not accessible with standard test finger | | P |
| | Basic insulated parts not used on the outer surface without appropriate protection | | P |
| | Basic insulated parts not accessible with standard test finger on and adjustable luminaires | | P |
| | Basic insulated parts not accessible with Ø 50 mm probe from outside, within arms reach, on wall-mounted luminaires | | P |
| | Lamp and starterholders in and adjustable luminaires comply with double or reinforced insulation requirements | | N |

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|---|---|---|---|
| Clause | Requirement + Test | Result - Remark | Verdict |
| | Basic insulation only accessible under lamp or starter replacement | | P |
| | Protection in any position | | P |
| | Double-ended tungsten filament lamp | | N |
| | Insulation lacquer not reliable | | N |
| | Double-ended high pressure discharge lamp | | N |
| | Relevant warning according to 3.2.18 fitted to the luminaire | | N |
| 22.12 (8.2.2) | luminaire adjusted in most unfavourable position | | P |
| 22.12 (8.2.3.a) | Class II luminaire: | | N |
| | - basic insulated metal parts not accessible during starter or lamp replacement | | N |
| | - basic insulation not accessible other than during starter or lamp replacement | | N |
| | - glass protective shields not used as supplementary insulation | | N |
| 22.12 (8.2.3.b) | BC lampholder of metal in class I luminaires shall be earthed | | N |
| 22.12 (8.2.3.c) | Class III luminaires with exposed SELV parts: | | N |
| | Ordinary luminaire: | | N |
| | - touch current ..... : | | N |
| | - no-load voltage ..... : | | N |
| | Other than ordinary luminaire: | | N |
| | - nominal voltage ..... : | | N |
| 22.12 (8.2.4) | luminaire: | | N |
| | - protection independent of supporting surface | | P |
| | - terminal block completely covered | | P |
| 22.12 (8.2.5) | Compliance with the standard test finger or relevant probe | | P |
| 22.12 (8.2.6) | Covers reliably secured | | P |
| 22.12 (8.2.7) | Discharging of capacitors ≥ 0,5 μF | | P |

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|---|---|---|---|
| Clause | Requirement + Test | Result - Remark | Verdict |
| | plug connected luminaire with capacitor | | P |
| | Other plug connected luminaire with capacitor | | N |
| | Discharge device on or within capacitor | | P |
| | Discharge device mounted separately | | N |
| **22.13 (12)** | **ENDURANCE TEST AND THERMAL TEST** | | **P** |
| 22.13 (12.3) | Endurance test: | | P |
| | - mounting-position ..... : | Ceiling mounting | — |
| | - test temperature (°C) ..... : | 33-37 | — |
| | - total duration (h) ..... : | 390 | — |
| | - supply voltage: Un factor; calculated voltage (V): | 240V | — |
| | - lamp used ..... : | LED | — |
| 22.13 (12.3.2) | After endurance test: | | P |
| | - no part unserviceable | | P |
| | - luminaire not unsafe | | P |
| | - no damage to track system | | N |
| | - marking legible | | P |
| | - no cracks, deformation etc. | | P |
| 22.13 (12.4) | Thermal test (normal operation) | (see Annex 2) | P |
| 22.13 (12.5) | Thermal test (abnormal operation) | (see Annex 2) | P |
| 22.13 (12.6) | Thermal test (failed lamp control gear condition): | | N |
| 22.13 (12.6.1) | Through wiring or looping-in wiring loaded by a current of (A) ..... : | | — |
| | - case of abnormal conditions..... : | | — |
| | - electronic lamp control gear | | N |
| | - measured winding temperature (°C): at 1,1 Un . : | | — |
| | - measured mounting surface temperature (°C) at 1,1 Un ..... : | | N |
| | - calculated mounting surface temperature (°C) .. : | | N |
| | - track-mounted luminaires | | N |

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|---|---|---|---|
| Clause | Requirement + Test | Result - Remark | Verdict |
| 22.13 (12.6.2) | Temperature sensing control | | N |
| | - case of abnormal conditions..... : | | — |
| | - thermal link | | N |
| | - manual reset cut-out | | N |
| | - auto reset cut-out | | N |
| | - measured mounting surface temperature (°C)... : | | N |
| | - track-mounted luminaires | | N |
| 22.13 (12.7) | Thermal test (failed lamp control gear in plastic luminaires): | | N |
| 22.13 (12.7.1) | Luminaire without temperature sensing control | | N |
| 22.13 (12.7.1.1) | Luminaire with fluorescent lamp ≤ 70W | | N |
| | Test method 12.7.1.1 or Annex V..... : | | — |
| | Test according to 12.7.1.1: | | N |
| | - case of abnormal conditions | | — |
| | - Ballast failure at supply voltage (V) ..... : | | — |
| | - Components retained in place after the test | | N |
| | - Test with standard test finger after the test | | N |
| | Test according to Annex V: | | N |
| | - case of abnormal conditions | | — |
| | - measured winding temperature (°C): at 1,1 Un.. : | | — |
| | - measured temperature of fixing point/exposed part (°C): at 1,1 Un..... : | | — |
| | - calculated temperature of fixing point/exposed part (°C) ..... : | | — |
| | Ball-pressure test: | | N |
| | - part tested; temperature (°C)..... : | | N |
| | - part tested; temperature (°C)..... : | | N |
| 22.13 (12.7.1.2) | Luminaire with discharge lamp, fluorescent lamp > 70W, transformer > 10 VA | | N |
| | - case of abnormal conditions | | — |

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|---|---|---|---|
| Clause | Requirement + Test | Result - Remark | Verdict |
| | - measured winding temperature (°C): at 1,1 Un.. : | | — |
| | - measured temperature of fixing point/exposed part (°C): at 1,1 Un..... : | | — |
| | - calculated temperature of fixing point/exposed part (°C) ..... : | | — |
| | Ball-pressure test: | | N |
| | - part tested; temperature (°C)..... : | | N |
| | - part tested; temperature (°C)..... : | | N |
| 22.13 (12.7.1.3) | Luminaire with short circuit proof transformers ≤ 10 VA | | N |
| | - case of abnormal conditions | | — |
| | - Components retained in place after the test | | N |
| | - Test with standard test finger after the test | | N |
| 22.13 (12.7.2) | Luminaire with temperature sensing control | | N |
| | - thermal link | Yes ☐ No ☒ | — |
| | - manual reset cut-out | Yes ☐ No ☒ | — |
| | - auto reset cut-out | Yes ☐ No ☒ | — |
| | - case of abnormal conditions | | — |
| | - highest measured temperature of fixing point/exposed part (°C):..... : | | — |
| | Ball-pressure test: | | N |
| | - part tested; temperature (°C)..... : | | N |
| | - part tested; temperature (°C)..... : | | N |
| 22.13.2 (-) | Emergency mode 22.12.3 to 22.12.5 | (see Annex 2) | P |
| 22.13.6 (-) | Additional thermal test | (see Annex 2) | P |
| 22.13.7 (-) | Rated lumen output | | P |

| | | | |
|---|---|---|---|
| **22.14 (9)** | **RESISTANCE TO DUST, SOLID OBJECTS AND MOISTURE** | | P |
| 22.14 (9.2) | Tests for ingress of dust, solid objects and moisture: | | N |
| | - classification according to IP ..... : | IP20 | — |

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|---|---|---|---|
| Clause | Requirement + Test | Result - Remark | Verdict |
| | - mounting position during test ..... : | Ceiling mounting | — |
| | - fixing screws tightened; torque (Nm)..... : | 0.8 | — |
| | - tests according to clauses ..... : | 9.2.0 | — |
| | - electric strength test afterwards | | N |
| | a) no deposit in dust-proof luminaire | | N |
| | b) no talcum in dust-tight luminaire | | N |
| | c) no trace of water on current-carrying parts or SELV parts or where it could become a hazard | | N |
| | d) i) For luminaires without drain holes – no water entry | | N |
| | d) ii) For luminaires with drain holes – no hazardous water entry | | N |
| | e) no water in watertight luminaire | | N |
| | f) no contact with live parts (IP 2X) | No contact with live parts | P |
| | f) no entry into enclosure (IP 3X and IP 4X) | | N |
| | f) no contact with live parts (IP3X and IP4X) | | N |
| | g) no trace of water on part of lamp requiring protection from splashing water | | N |
| | h) no damage of protective shield or glass envelope | | N |
| 22.14 (9.3) | Humidity test 48 h | 93%RH, 28℃ | P |

| **22.15 (10)** | **INSULATION RESISTANCE AND ELECTRIC STRENGTH** | | **P** |
|---|---|---|---|
| 22.15 (10.2.1) | Insulation resistance test | | P |
| | Cable or cord covered by metal foil or replaced by a metal rod of mm Ø ..... : | | — |
| | Insulation resistance (MΩ) | | — |
| | SELV: | | P |
| | - between current-carrying parts of different polarity ..... : | > 20 MΩ | P |
| | - between current-carrying parts and mounting surface ..... : | | N |

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|---|---|---|---|
| Clause | Requirement + Test | Result - Remark | Verdict |
| | - between current-carrying parts and metal parts of the luminaire ..... : | > 20 MΩ | P |
| | Other than SELV: | | P |
| | - between live parts of different polarity..... : | > 200 MΩ | P |
| | - between live parts and mounting surface..... : | | N |
| | - between live parts and metal parts..... : | > 200 MΩ | P |
| | - between live parts of different polarity through action of a switch ..... : | | N |
| 22.15(10.2.2) | Electric strength test | | P |
| | Dummy lamp | | N |
| | Luminaires with ignitors after 24 h test | | N |
| | Luminaires with manual ignitors | | N |
| | Test voltage (V): | | N |
| | SELV: | | P |
| | - between current-carrying parts of different polarity ..... : | 500V/1MIN | P |
| | - between current-carrying parts and mounting surface ..... : | | N |
| | - between current-carrying parts and metal parts of the luminaire ..... : | 500V/1MIN | P |
| | Other than SELV: | | P |
| | - between live parts of different polarity..... : | 1480V/1MIN | P |
| | - between live parts and mounting surface..... : | | N |
| | - between live parts and metal parts..... : | 1480V/1MIN | P |
| | - between live parts of different polarity through action of a switch ..... : | | |
| 22.15 (10.3) | Touch current (mA)..... : | Enclosure: 0.08 mA<br>Limit: 3.5 mA | P |

| **22.16 (13)** | **RESISTANCE TO HEAT, FIRE AND TRACKING** | | **P** |
|---|---|---|---|
| 22.16 (13.2.1) | Ball-pressure test: | | P |
| | - part tested; temperature (°C)..... : | Terminal block: 125℃, 0.8mm | P |

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|---|---|---|---|
| Clause | Requirement + Test | Result - Remark | Verdict |
| | - part tested; temperature (°C)..... : | Enclosure of sensor switch: 75℃, 0.7mm | P |
| | - part tested; temperature (°C)..... : | Terminal connector 125℃, 1.1mm | P |
| 22.16 (13.3.1) | Needle flame test (10 s): | | P |
| | - part tested..... : | Terminal block | P |
| | - part tested..... : | | N |
| | - part tested..... : | | N |
| 22.16 (13.3.2) | Glow-wire test (850°C): | | P |
| | - part tested..... : | Transparent cover | P |
| | - part tested..... : | | N |
| 22.16 (-) | Glow-wire test (650°C): | | N |
| | - part tested..... : | Enclosure of switch | P |
| | - part tested..... : | Terminal connector | P |
| | - part tested..... : | Insulate sheet | P |
| 22.16(13.4.1) | Tracking test: part tested ..... : | | N |

| **22.17 (-)** | **FUNCTIONAL SAFETY** | | **P** |
|---|---|---|---|
| 22.17.1 (-) | Rated lumen output | | N |
| 22.17.2 (-) | Photometric data | | N |
| 22.17.3 (-) | Photometric measurements | | N |
| 22.17.4 (-) | Colour-rendering index | Ra=84.8 | P |
| 22.17.5 (-) | Iluminance and luminance requirements | | P |

| **22.18 (-)** | **CHANGEOVER OPERATION** | | **P** |
|---|---|---|---|
| 22.18.1 (-) | Changeover test | | P |
| 22.18.2 (-) | Rated lumen output | 641lm | P |
| 22.18.3 (-) | Changeover test | | N |
| | Rated lumen output | | N |

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|---|---|---|---|
| Clause | Requirement + Test | Result - Remark | Verdict |
| **22.19 (-)** | **HIGH TEMPERATURE OPERATION** | | **P** |
| | Operation at 70°C | | P |
| | Rated lumen output | 623lm | P |
| **22.20 (-)** | **BATTERY CHARGERS FOR SELF-CONTAINED EMERGENCY LUMINAIRES** | | **P** |
| 22.20.1 (-) | Charge performance | | P |
| 22.20.2 (-) | Compliance with IEC 60742 | | P |
| **22.21 (-)** | **TEST DEVICES FOR EMERGENCY OPERATION** | | **P** |
| 22.20.1 (-) | Device for simulation failure | | P |
| 22.20.2 (-) | Influence of remote testing device | | N |
| 22.20.3 (-) | Indication colour | | P |
| | **ANNEX A: Batteries for emergency luminaires** | | **P** |
| A.1 | Type of batteries | | P |
| A.2 | Battery conform to relevant standard | | P |
| | Luminaire operate within specific tolerances | | P |
| A.3 | Battery capacity | | P |
| A.4 | Sealed nickel cadmium batteries | | N |
| A.4.1 | Battery conform to IEC 60285 | | N |
| A.4.2.a | Ambient air temperature ≤ 50 °C | | N |
| A.4.2.b | Overcharge rate ≤ 0,08 $C_5$A | | N |
| A.4.2.c | Ambient temperature of the cells ≥ 5 °C | | N |
| A.4.2.d | Discharge rates ≤ 0,6 $C_5$A for 1h and ≤ 0,25 $C_5$A for 3h | | N |
| A.5 | Valve regulated lead acid batteries | | N |
| A.5.1 | Battery conform to relevant part of IEC 60869-2 or IEC 61056-1 | | N |
| A.5.2.a | Ambient air temperature ≤ 30 °C or ≤ 25 °C | | N |
| A.5.2.b | Recharge current ≤ 0,4 $C_{20}$ | | N |

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|---|---|---|---|
| Clause | Requirement + Test | Result - Remark | Verdict |
| A.5.2.c | Discharge rates ≤ 0,4 $C_{20}$ for 1h and ≤ 0,17 $C_{20}$ for 3h | | N |
| A.5.2.d | Ripple current ≤ 0,1 $C_{20}$ | | N |
| A.5.2.e | Ambient temperature of the cells ≥ 5 °C | | N |
| A.6 | Ambient temperature of the cells measured after 48 h | | P |
| A.7 | Alternative operating parameters and evidence if operating outside limits in A.4 and A.5 | | P |
| A.8 | Battery only replaced by a competent person | | P |
| | **ANNEX B: Luminaire classification** | | **P** |
| | Classified and marked according Annex B | | P |
| | **ANNEX C: Luminance measurements** | | **P** |
| C.1 | Contrast measurements | | P |
| C.2 | On site photometric tests | | P |

## ATTACHMENT TO TEST REPORT IEC 60598-2-22
## EUROPEAN GROUP DIFFERENCES AND NATIONAL DIFFERENCES

| | | | |
|---|---|---|---|
| | **CENELEC COMMON MODIFICATIONS (EN)** | | **N/A** |
| **22.7 (3)** | **MARKING** | | **N/A** |
| 22.7 (3.3.101) | For luminaires not supplied with terminal block: Adequate warning on the package | | N/A |
| **22.7 (4)** | **CONSTRUCTION** | | **N/A** |
| 22.7 (4.11.6) | Electro-mechanical contact systems | | N/A |
| **22.11 (5)** | **EXTERNAL AND INTERNAL WIRING** | | **N/A** |
| 22.11 (5.2.1) | Connecting leads | | N/A |
| | - without a means for connection to the supply | | N/A |

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|---|---|---|---|
| Clause | Requirement + Test | Result - Remark | Verdict |
| | - terminal block specified | | N/A |
| | - relevant information provided | | N/A |
| | - compliance with 4.6, 4.7.1, 4.7.2, 4.10.1, 11.2, 12 and 13.2 of Part 1 | | N/A |
| 22.11 (5.2.2) | Cables equal to EN 50525 | | N/A |
| | Replace table 5.1 – Supply cord | | N/A |
| **22.13 (12)** | **ENDURANCE TEST AND THERMAL TEST** | | N/A |
| 22.13 (12.4.2c) | Thermal test (normal operation) see footnote c to table 12.2 relating to unsleeved fixed wiring | | N/A |
| **ZB** | **ANNEX ZB, SPECIAL NATIONAL CONDITIONS (EN)** | | N/A |
| (3.3) | DK: power supply cords of class I luminaires with label | | N/A |
| (4.5.1) | DK: socket-outlets | | N/A |
| (5.2.1) | CY, DK, FI, GB: type of plug | | N/A |
| 22.7.18 (-) 22.11.1 (-) | FR: Permanent fittings | | N/A |
| 22.7.15 (-) 22.17.1 (-) | FR: Photometric characteristics of products are only based on the “rated lumen output” | | N/A |
| **ZC** | **ANNEX ZC, NATIONAL DEVIATIONS (EN)** | | N/A |
| (4 & 5) | FR: Shuttered socket-outlets 10/16A | | N/A |
| | FR: Safety requirements for high buildings<br><br>(Arrêté du 30 décembre 2011 portant règlement de sécurité pour la construction des immeubles de grande hauteur et leur protection contre les risques d’incendie et de panique; Section VIII; Article GH 48, Eclairage)<br><br>Glow-wire test for outer parts of luminaires: | | N/A |
| | - 850°C for luminaires in stairways and horizontal travel paths | | N/A |
| | - 650°C for indoor luminaires | | N/A |

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|---|---|---|---|
| Clause | Requirement + Test | Result - Remark | Verdict |
| | GB: Requirements according to United Kingdom Building Regulation | | N/A |

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

| | **ANNEX1: Components** | | | | **P** |
|---|---|---|---|---|---|
| Object / part No. | Manufacturer/ trademark | Type / model | Technical data | Standard | Mark(s) of conformity |
| Terminal block | King Zing | KZ8 | 450V,110°C, 10A | 60998-2-1 | VDE |
| | DEGSON | DG801 | 400V,110°C, 15A | 60998-2-1 | VDE |
| Sensor switch | Sun-Near | - | 0.5A,36V, 85°C | EN 61058-1 | VDE |
| | Bodo Ehmann GmbH | EF700DC | AC 230 V, 50 Hz, 20W-30W | EN 61058-1 | VDE 127068 |
| Fiberglass sleeves | - SHENZHEN UNITED POWER ELECTRONIC CO LTD | FSG-2 | 220°C, 2000V | UL1441 | UL E238355 |
| | NAN TAI HARDWARE & CHEMICAL CO LTD | GS30-2E | 220°C, 2000V | UL1441 | UL E173547 |
| Insulation paper | MIANYANG LONGHUA FILM CO LTD | PC-870, PC-770 | PC, 80°C, V-0, min. thickness 0.4mm | UL 94 | UL E254551 |
| LED Aluminum substrate | INTERNATIONAL LAMINATE MATERIAL LTD | YXD1 | V-0, 130°C | UL94 | UL E352507 |
| | DONGGUAN SUNTOP CIRCUIT TECHNOLOGY CO LTD | SZ-01 | V-0, 130°C | UL94 | UL E355939 |
| LED | SHENZHEN JUFEI OPTOELECTRONICS CO LTD | 2835 WIHTE LED | IF=10-20mA; VF=2.9V-3.2V; CCT=2700K-6500K | EN 60598-2-22 | Test with appliance |
| | Everlight Electronics Co., Ltd. | 2835 WIHTE LED | IF=10-240mA; VF=2.9V-3.2V; CCT=2700K-6500K | EN 60598-2-22 | Test with appliance |

| EN 60598-2-22 | | | |
|---|---|---|---|
| Clause | Requirement + Test | Result - Remark | Verdict |

| | | | | | |
|---|---|---|---|---|---|
| | Philips Lumileds Lighting Company. | 3535L LEDs | IF=10-100mA; VF=3.0V-3.3V; CCT=2700K-6500K | EN 60598-2-22 | Test with appliance |
| Transparent cover | AVERY (CHINA) CO LTD | ADFR | V-0, 130°C | UL 746C | UL E352533 |
| | BAIFU PLASTICS TECHNOLOGY (DONGGUAN) CO LTD | PPS BF-1130 | V-0, 130°C | UL 746C | UL E355914 |
| Internal wire | HANSTAR FOLUO-PLASTIC INSULATED ELECTRIC WIERS | 1015 | 600V; 18AWG; 105°C | UL 758 | UL E159007 |
| | 3E | (N)6YAF | 300/500 V, 180℃ VDE Reg-No.7612 | IEC 60227 | VDE 132269 |
| | Feng Tai | FT-PFA-102 | 300/500 V, 180℃ VDE Reg-No.7998 | IEC 60227 | VDE 40013284 |
| output wire | SHENZHEN LONGSHENGDA WURE&CABLE CO LTD | 3239 | DC 3000V; 20AWG; 200°C | UL 758 | UL E364555 |
| | NIZING ELECTRIC CO LTD | 3239 | DC 3000V; 20AWG; 200°C | UL 758 | UL E215834 |
| Earthing wire | HANSTAR FLUORO-PLASTIC INSULATED ELECTRIC WIRES | 1015 | 18AWG,105°C, 600V | UL 758 | UL E159007 |
| | 3E | 1015 | 18AWG,105°C, 600V | UL 758 | UL E176010 |
| Test switch | sing fai electric co | SS158-B41S | 2A, 250VAC 50/60Hz,6K, 80℃ | UL 61058-1 | UL E111395 |
| LED driver | LOKOLED | GDY-DRV2001D | Input:AC100-240V,50/60Hz, 23W,Output:DC42 V, 500Ma, 20W | 61347-2-13 | Test with appliance report 2014NT1015591S |
| Ni-MH Battery pack | BPI | BA2-1303(H) | 3.2Ah,DC9.6V, 8PCS | IEC 62133:2012 | SGS SZES1406 00138301 |

| EN 60598-2-22 | | | | | |
|---|---|---|---|---|---|
| Clause | Requirement + Test | | Result - Remark | | Verdict |

| | | | | | |
|---|---|---|---|---|---|
| | SHENZHEN LTT ELECTRONIC CO LTD | Variety | 3.2Ah,DC9.6V, 8PCS | IEC 62133:2012 | MH46375 |
| | SHENZHEN BETTERPOWER BATTERY CO LTD | Variety | 3.2Ah,DC9.6V, 8PCS | IEC 62133:2012 | MH10329 |
| | | | | | |
| LED emergency converter | LOKOLED | GDY-CV2001 | Input:AC100-240V,50/60Hz,65 mA, Output: DC12V,260mA | 61347-2-7 | Test with appliance |
| Plastic enclosure | Bayer Materialscience AG | FR3020 + (z) | V-0; 80°C; min. thickness: 1.6mm | UL 746C | UL E41613 |
| | Sabic Innovative Plastics US L L C | C2950(GG) | V-0; 60°C; min. thickness: 1.6mm | UL 746C | UL E121562 |
| | Sabic Innovative Plastics B V | EXCY0100 (GG)(f2); CX7240 (GG)(f2) | V-0; 90°C; min. thickness: 1.6mm | UL 746C | UL E45329 |
| Fuse(F1) | Cooper Bussmann LLC | SS-5 | T3.15A, 250Vac | IEC/EN 60127-1 IEC/EN 60127-3 | VDE 40015513 |
| | Conquer Electronics Co., Ltd. | PTU | T3.15A, 250Vac | IEC/EN 60127-1 IEC/EN 60127-3 | VDE 40001462 |
| Fuse(F2) | XC ELECTRONICS (SHENZHEN) CROP.LTD. | T3 Series | 5A, 250V | IEC/EN 60127-1 IEC/EN 60127-3 | VDE 40019636 |
| Filte (L1) | DONGGUAN XINLEINENG Electronic Co., Ltd. | UU9.8 | 120mH | EN 61347-2-7 | Test with appliance |
| Bobbin (L1) | WUXI JUFENG Co., Ltd. | 2UEW | THERMAL RATING:130°C | UL 94 | UL E206882 |
| winding (L1) | HENGYI Co., Ltd. | TEX-E | THERMAL RATING:130°C | UL 1446 | UL E344055 |
| X2 capacitance | Shantou High-New Technology Developmnt Zone Songtian Enterprise Co., Ltd. | MPX | 0.1uF; 275VAC; 40/100/21 | UL 60384-14 | VDE 40034679 |

| EN 60598-2-22 | | | |
|---|---|---|---|
| Clause | Requirement + Test | Result - Remark | Verdict |

| | | | | | |
|---|---|---|---|---|---|
| C12 Electrolytic capacitor | Variety | Variety | 400V,10uF,105°C | EN 61347-2-7 | Test with appliance |
| C3 Electrolytic capacitor | Variety | Variety | 25V,470uF,105°C | EN 61347-2-7 | Test with appliance |
| Y1 capacitor | Shantou High-New Technology Dev. Zone Songtian Enterprise Co., Ltd. | CD | 1000pf, 2KV, Y1, 125°C | IEC 60384-14 | VDE 40025754 |
| | Shantou High-New Technology Developmnt Zone Songtian Enterprise Co., Ltd. | Y5P, Y5U, Y5V | 2200PF; 400VAC; 125°C | IEC 60384-14 | VDE 40025754 |
| PCB | Viafine Pcb Technology Ltd. | VF-M | V-0; 130°C; min. thickness: 1.6mm | UL 94 | UL E466925 |
| | Huizhou BOYU Technology Co., Ltd. | IM | V-0; 130°C; min. thickness: 1.6mm | UL 94 | UL E33613 |
| | Shenzhen Kerui Electric Industry Co., Ltd. | KRP | V-0; 130°C; min. thickness: 1,6mm | UL 94 | UL E320953 |
| | | | | | |
| Transformer | DONGGUAN XINLEINENG Electronic Co., Ltd. | EE19 | 2.0mH | EN 61347-2-7 | Test with appliance |
| T1 Bobbin | CHANG CHUN PLASTICS CO LTD | T375J | Phenolic, 94V-0, 150°C | UL 94 | UL E59481 |
| T1 Secondary winding | Totoku Electric Co. Ltd. | TIW-2 | Reinforced insulation, Class B | - | VDE 40005152 |
| T1 Primary winding | SHENZHEN CHENGWEI INDUSTRY CO LTD | MW 75-C | 130°C | UL 1446 | UL E227475 |
| | HENGYI Co., Ltd. | TEX-E | THERMAL RATING:130°C | -- | UL E344055 |
| T1 Tube | SHENZHEN WOER HEAT-SHRINKABLE MATERIAL CO LTD | WF | 600V, 200°C, VW-1 | UL 224 | UL E203950 |
| T1 insulation Tape | Jingjiang Yahua Pressure | PZ, CT | 130°C | UL 510 | UL E165111 |

| EN 60598-2-22 | | | |
|---|---|---|---|
| Clause | Requirement + Test | Result - Remark | Verdict |

| | | | | | |
|---|---|---|---|---|---|
| | JINGJIANG JINGYI Co., Ltd. | SN | 130°C | UL 510 | UL E246950 |
| insulating oil (T1) | Shenzhen xingshida Co., Ltd. | MW28 | 130°C | -- | UL E327170 |
| 1) An asterisk indicates a mark which assures the agreed level of surveillance | | | | | |

| | | | |
|---|---|---|---|
| | **ANNEX 2: temperature measurements, thermal tests of Section 12** | | P |
| | Type reference ..... : | GL2001ESA | — |
| | Lamp used ..... : | LED | — |
| | Lamp control gear used ..... : | LED emergency converter and LED driver | — |
| | Mounting position of luminaire ..... : | Ceiling mounting, most unfavourable position | — |
| | Table: measured temperatures corrected for ta = 25 °C: | | P |
| | - abnormal operating mode ..... : | | — |
| | - test 1: rated voltage ..... : | Emergency lighting mode | — |
| | - test 2: 1,06 times rated voltage or 1,05 times rated wattage ..... : | 1.06×240V=254.4V | — |
| | - test 3: Load on wiring to socket-outlet, 1,06 times voltage or 1,05 times wattage ..... : | 1.1×240V=264V<br>short circuit 20% LED | — |
| | - test 4: 1,1 times rated voltage or 1,05 times rated wattage ..... : | 1.1×240V=264V<br>Double loading unit shut down | — |
| | Through wiring or lopping-in wiring loaded by a current of (A) during the tests ..... : | | — |

| temperature (°C) of part | clause 12.4 - normal | | | clause 12.5 - abnormal | | |
|---|---|---|---|---|---|---|
| | test 1 | test 2 | limits | test 3 | test 4 | limit |
| F1 fuse | 25.9 | 37.5 | 90 | - | - | - |
| F2 fuse | 39.9 | 40.3 | 90 | - | - | - |
| L1 winding | 26.7 | 40.8 | 120 | 38.1 | 27.2 | 175 |
| T2 coil | 41.7 | 63.5 | 120 | 60.2 | 32.1 | 175 |
| T2 core | 40.1 | 60.6 | 120 | 58.3 | 30.1 | 175 |
| PCB near T2 | 28.3 | 40.7 | 130 | - | - | - |
| PCB near Q8 | 34.3 | 42.1 | 130 | - | - | - |
| CY1 | 27.1 | 41.4 | 125 | - | - | - |

| EN 60598-2-22 | | | |
|---|---|---|---|
| Clause | Requirement + Test | Result - Remark | Verdict |

| | | | | | | |
|---|---|---|---|---|---|---|
| Tc of LED driver | 26.1 | 50.1 | 60 | 45.5 | 25.6 | 70 |
| C12 | 26.4 | 52.9 | 105 | 36.8 | 28.5 | 115 |
| enclosure inside near Q1 | 29.9 | 50.5 | 60 | - | - | - |
| PCB near U3 | 38.2 | 58.5 | 130 | - | - | - |
| Lead wire near LED | 26.3 | 41.9 | 200 | - | - | - |
| Mounting surface | 25.2 | 31.6 | 90 | 28.2 | 25.3 | 130 |
| C3 | 37.9 | 40.5 | 105 | 36.6 | 27.5 | 115 |
| C1 | 25.9 | 37.6 | 110 | - | - | - |
| Battery | 27.9 | 35.4 | 50 | 33.2 | 27.1 | 60 |
| Transparent cover | 24.6 | 35.8 | 130 | - | - | - |
| LED PCB | 27.0 | 43.8 | 130 | - | - | - |
| Sensor switch | 25.6 | 38.1 | 55 | - | - | - |
| PCB near sensor IC | 26.8 | 40.6 | 130 | - | - | - |
| Terminal block | 25.8 | 38.5 | 110 | - | - | - |

| EN 60598-2-22 | | | |
|---|---|---|---|
| Clause | Requirement + Test | Result - Remark | Verdict |
| | **ANNEX 3: screw terminals (part of the luminaire)** | | N |
| **(14)** | **SCREW TERMINALS** | | N |
| (14.2) | Type of terminal..... : | | — |
| | Rated current (A)..... : | | — |
| (14.3.2.1) | One or more conductors | | N |
| (14.3.2.2) | Special preparation | | N |
| (14.3.2.3) | Terminal size | | N |
| | Cross-sectional area ($mm^2$)..... : | | N |
| (14.3.3) | Conductor space (mm)..... : | | N |
| (14.4) | Mechanical tests | | N |
| (14.4.1) | Minimum distance | | N |
| (14.4.2) | Cannot slip out | | N |
| (14.4.3) | Special preparation | | N |
| (14.4.4) | Nominal diameter of thread (metric ISO thread) . : | | N |
| | External wiring | | N |
| | No soft metal | | N |
| (14.4.5) | Corrosion | | N |
| (14.4.6) | Nominal diameter of thread (mm)..... : | | N |
| | Torque (Nm)..... : | | N |
| (14.4.7) | Between metal surfaces | | N |
| | Lug terminal | | N |
| | Mantle terminal | | N |
| | Pull test; pull (N)..... : | | N |
| (14.4.8) | Without undue damage | | N |

| EN 60598-2-22 | | | |
|---|---|---|---|
| Clause | Requirement + Test | Result - Remark | Verdict |
| | **ANNEX 4: screwless terminals (part of the luminaire)** | | N |
| **(15)** | **SCREWLESS TERMINALS** | | N |
| (15.2) | Type of terminal.....: | | — |
| | Rated current (A).....: | | — |
| (15.3.1) | Material | | N |
| (15.3.2) | Clamping | | N |
| (15.3.3) | Stop | | N |
| (15.3.4) | Unprepared conductors | | N |
| (15.3.5) | Pressure on insulating material | | N |
| (15.3.6) | Clear connection method | | N |
| (15.3.7) | Clamping independently | | N |
| (15.3.8) | Fixed in position | | N |
| (15.3.10) | Conductor size | | N |
| | Type of conductor | | N |
| (15.5.1) | Terminals internal wiring | | N |
| (15.5.1.1) | Pull test spring-type terminals (4 N, 4 samples)….: | | N |
| (15.5.1.2) | Pull test pin or tab terminals (4 N, 4 samples)……: | | N |
| | Insertion force not exceeding 50 N | | N |
| (15.5.2) | Permanent connections: pull-off test (20 N) | | N |
| (15.6) | Electrical tests | | N |
| | Voltage drop (mV) after 1 h (4 samples).....: | | N |
| | Voltage drop of two inseparable joints | | N |
| | Number of cycles.....: | | — |
| | Voltage drop (mV) after 10th alt. 25th cycle (4 samples).....: | | N |
| | Voltage drop (mV) after 50th alt. 100th cycle (4 samples).....: | | N |

| EN 60598-2-22 | | | |
|---|---|---|---|
| Clause | Requirement + Test | Result - Remark | Verdict |
| | After ageing, voltage drop (mV) after 10th alt. 25th cycle (4 samples) .....: | | N |
| | After ageing, voltage drop (mV) after 50th alt. 100th cycle (4 samples) .....: | | N |
| (15.7) | Terminals external wiring | | 'N |
| | Terminal size and rating | | N |
| (15.8.1) | Pull test spring-type terminals or welded connections (4 samples); pull (N) .....: | | N |
| | Pull test pin or tab terminals (4 samples); pull (N) .....: | | N |
| (15.9) | Contact resistance test | | N |
| | Voltage drop (mV) after 1 h | | N |

| terminal | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
|---|---|---|---|---|---|---|---|---|---|---|
| voltage drop (mV) | | | | | | | | | | |

| | | | |
|---|---|---|---|
| | Voltage drop of two inseparable joints | | N |
| | Voltage drop after 10th alt. 25th cycle | | N |
| | Max. allowed voltage drop (mV) ..... : | 22.5 | — |

| terminal | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
|---|---|---|---|---|---|---|---|---|---|---|
| voltage drop (mV) | | | | | | | | | | |

| | | | |
|---|---|---|---|
| | Voltage drop after 50th alt. 100th cycle | | N |
| | Max. allowed voltage drop (mV) ..... : | | — |

| terminal | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
|---|---|---|---|---|---|---|---|---|---|---|
| voltage drop (mV) | | | | | | | | | | |

| | | | |
|---|---|---|---|
| | Continued ageing: voltage drop after 10th alt. 25th cycle | | N |
| | Max. allowed voltage drop (mV) ..... : | 22.5 | — |

| terminal | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
|---|---|---|---|---|---|---|---|---|---|---|
| voltage drop (mV) | | | | | | | | | | |

| | | | |
|---|---|---|---|
| | Continued ageing: voltage drop after 50th alt. 100th cycle | | N |
| | Max. allowed voltage drop (mV) ..... : | | — |

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

| EN 62493 | | | |
|---|---|---|---|
| Clause | Requirement + Test | Result - Remark | Verdict |
| **4.2** | **APPLICATION OF LIMITS(TEST SUMMARY)** | | -- |
| | **Specific absorption rate (SAR)** | | -- |
| a) | CISPR 15 clause 4.3.1<br>Disturbance voltage mains terminals<br>20 kHz-30 MHz | *) | P |
| b) | CISPR 15 clause 4.4<br>Radiated electromagnetic disturbances<br>100 kHz-30 MHz | *) | P |
| c) | CISPR 15 clause 4.4.2<br>Radiated electromagnetic disturbances<br>30 MHz -300 MHz | *) | P |
| *) | ☒See separate Test Report for measurements of a), b), and c) above<br>☐Only measurement of d) below. See measurement results below.<br>In this case this test report does not show compliance with IEC 62493. | | - |
| | **Induced current density** | | P |
| d) | Induced current density<br>20 kHz-10 MHz | See measurement results below | P |

| | | | |
|---|---|---|---|
| **4.2.d** | **INDUCED CURRENT DENSITY** | | **--** |

| | | | |
|---|---|---|---|
| | Power supply system utilized: | | -- |
| | Volt-age……..: | 100-240V | -- |
| | Fre-quency……..: | | -- |
| | Environmental conditions: | | -- |
| | Temperature……: | 25℃ | -- |
| | Humid-ity……: | 53% | -- |
| | EuT operation mode: | | -- |

| EN 62493 | | | |
|---|---|---|---|
| Clause | Requirement + Test | Result - Remark | Verdict |
| | ☒Normal operation | | -- |
| | ☐Other operation | | -- |

| 4.2.d | EQUIPMENT USED DURING TEST | | |
|---|---|---|---|
| Equipment | Manufacture | Type | Id. No. |
| “Van der Hoofden” test head | AFJ | VDH30 | NTEK |
| Measurement receiver | Agilent | E7405A | NTEK |
| Coaxial cable | DRAKA COMTEQ | M17/75-RG213 | NTEK |

| EN 62493 | | | | |
|---|---|---|---|---|
| Clause | Requirement + Test | | Result - Remark | Verdict |
| **4.3.d** | **MEASUREMENT RESULTS** | | | -- |
| | Measuring with “Van der Hoofden” test head | | | -- |
| Location of EuT | Measuring distance | Result (F) | Limit (F) | Verdict |
| Front of EuT | 30cm | 0.28 | 0.85 | P |
| Rear of EuT | 30cm | 0.19 | 0.85 | P |
| Side of EuT | 30cm | 0.25 | 0.85 | P |

| EN 61347-2-7 | | | |
|---|---|---|---|
| Clause | Requirement – Test | Result - Remark | Verdict |
| **4 (4)** | **GENERAL REQUIREMENTS** | | **P** |
| - (4) | Insulation materials for double or reinforced insulation according requirements in Annex N of IEC 61347-1 | (see Annex N) | P |
| - (4) | Compliance of independent controlgear enclosure with IEC 60 598-1 | | N |
| - (4) | Built-in magnetic ballast with double or reinforced insulation comply with Annex I of IEC 61347-1 | | N |
| - (4) | Built-in electronic controlgear with double or reinforced insulation comply with Annex O of IEC 61347-1 | (see Annex O) | P |
| - (4) | SELV controlgear comply with Annex L of IEC 61347-1 | (see Annex L) | P |
| 4 (-) | Each lamp type tested according clause 15 – 20, 22 and 34 and lamp with highest rated power in other tests | | — |
| 4 (-) | Controlgear with automatic test function tested according Annex K | (see Annex K) | N |
| **6 (6)** | **CLASSIFICATION** | | |
| | Built-in controlgear ..... : | Yes ☒ No ☐ | — |
| | Independent controlgear ..... : | Yes ☐ No ☒ | — |
| | Integral controlgear ..... : | Yes ☐ No ☒ | — |
| | With automatic test function ..... : | Yes ☐ No ☒ | — |
| **7 (7)** | **MARKING** | | P |
| 7.1 (7.1) | Mandatory markings | | P |
| | a) mark of origin | | P |
| | b) model number or type reference | | P |
| | c) symbol for independent controlgear, if applicable | | N |
| | d) correlation between interchangeable parts and controlgear marked | | N |
| | e) rated supply voltage (V) | 100-240V~ | P |

| EN 61347-2-7 | | | |
|---|---|---|---|
| Clause | Requirement – Test | Result - Remark | Verdict |
| | supply frequency (Hz) | 50/60Hz | P |
| | supply current (A) | 65mA | P |
| | f) earthing symbol | | P |
| | k) wiring diagram | | P |
| | l) value of $t_c$ | | N |
| 7.1 (-) | - open circuit voltage (V) | DC13V | P |
| | - controlgear without enclosure marked with a) and b) above | | P |
| | - type and current rating of fuse, if applicable | | P |
| | - symbol if the controlgear comply with this part 2 | | P |
| | - symbol if the controlgear is provided with automatic test function | | N |
| | - maximum working voltage between output terminals (V) | DC12V | P |
| | - maximum working voltage between any output terminal and earth, if applicable (V) | | N |
| 7.1 (7.2) | Marking durable and legible | | P |
| | Rubbing 15 s water, 15 s petroleum; marking legible | | P |
| 7.2 (7.1) | Information to be provided, if applicable: | | P |
| | h) declaration on protection against accidental contact | | P |
| | i) cross-section of conductors ($mm^2$) | 0.5-1.0 | P |
| | j) number, type and wattage of lamp(s) | LED 20W | P |
| | n) additional heat sink | | N |
| 7.2 (-) | - suitable for use only on battery supply not having a trickle or intermittent re-charging circuits | | P |
| | - rated duration of operation (hr) | 3hours | P |
| | - for use in luminaries for high-risk task area lighting | | N |
| | - proof against supply voltage polarity reversal | | P |
| | - emergency ballast lumen factor (EBLF) | 0.85 | P |

| EN 61347-2-7 | | | |
|---|---|---|---|
| Clause | Requirement – Test | Result - Remark | Verdict |
| | - limits of ambient temperature range within which the ballast will start and operate | 25℃ | P |
| | - type of insulation between the supply and the battery circuit (non, basic or double/reinforced) | Double insulation | P |
| | - recharge the battery normally after the test of 22.3 | | P |
| | - supply current for each lamp | 460mA | P |
| | Information for correct battery selection: | | P |
| | - technology of the battery | | P |
| | - type designation | Ni-MH Battery pack | P |
| | - capacity | 3.2Ah | |
| | - voltage | DC9.6V, | P |
| | - maximum charge current | 260mA | P |
| | - minimum charge current | 230mA | P |
| | - charge voltage limits | DC12V | P |
| | - maximum discharge current | 460 mA | P |
| | - minimum discharge current | 420 mA | P |
| | - discharge voltage limits | DC10.6V | P |
| | - temperature rating | -10℃-50℃ | P |
| | - type and manufacturer | | P |
| | - information regarding the installation, commissioning and use if with automatic test function | | N |
| **8 (10)** | **PROTECTION AGAINST ACCIDENTAL CONTACT WITH LIVE PARTS** | | **P** |
| - (10.1) | Controlgear protected against accidental contact with live parts | | P |
| - (A2) | Voltage measured with 50 kΩ | (see Annex A) | P |
| - (A3) | Voltage > 35 V peak or > 60 V d.c. or protective impendence device | (see Annex A) | N |
| - (10.1) | Lacquer or enamel not used for protection or insulation | | P |

| EN 61347-2-7 | | | |
|---|---|---|---|
| Clause | Requirement – Test | Result - Remark | Verdict |
| | Adequate mechanical strength on parts providing protection | | P |
| - (10.2) | Capacitors > 0,5 μF: voltage after 1 min (V):<br>< 50 V .....: | | P |
| - (10.3) | Controlgear providing SELV | | P |
| | Accessible conductive parts are insulated from live parts by double or reinforced insulation in SELV controlgear | | P |
| | No connection between output circuit and the body or protective earthing circuit | | N |
| | No possibility of connection between output circuit and the body or protective earthing circuit through other conductive parts | | N |
| | SELV outputs separated by at least basic insulation | | P |
| | ELV conductive parts insulated as live parts | | N |
| | Tests according Annex L of IEC 61347-1 | | P |
| - (10.4) | Accessible conductive parts in SELV circuits | | N |
| | Output voltage under load ≤ 25 V r.m.s. or ≤ 60 V d.c. | | P |
| | If output voltage > 25 V r.m.s. or > 60 V d.c.;<br>No load output ≤ 35 V peak or ≤ 60 V d.c and touch current does not exceed 0,7 mA (peak) or 2 mA d.c. .....: | | N |
| | One conductive part is insulated if output voltage or current exceeding the values above and withstand test voltage 500 V | | N |
| | Double or reinforced insulation bridged by appropriate and at least two resistors or two Y2 capacitors or one Y1 capacitor | | P |
| | Y1 or Y2 capacitors comply with IEC 60384-14 | | P |
| | Resistors comply with test (a) in 14.1 of IEC 60065 | | N |

| EN 61347-2-7 | | | |
|---|---|---|---|
| Clause | Requirement – Test | Result - Remark | Verdict |

| | | | |
|---|---|---|---|
| **9 (8)** | **TERMINALS** | | **P** |
| - (8) | Screw terminals according section 14 of IEC 60598-1: | | **N** |
| | Separately approved; component list | (see Annex 1) | N |
| | Part of the controlgear | (see Annex 2) | N |
| | Screwless terminals according section 15 of IEC 60598-1: | | **P** |
| | Separately approved; component list | (see Annex 1) | P |
| | Part of the controlgear | (see Annex 3) | N |
| **10 (9)** | **PROVISION FOR PROTECTIVE EARTHING** | | **P** |
| - (9.1) | Provisions for protective earthing | | N |
| | Terminal complying with clause 9 | | N |
| | Locked against loosening and not possible to loosen by hand | | N |
| | Not possible to loosen clamping means unintentionally on screwless terminals | | N |
| | Earthing via means of fixing | | N |
| | Earthing terminal only used for the earthing of the control gear | | N |
| | All parts of material minimizing the danger of electrolytic corrosion | | N |
| | Made of brass or equivalent material | | N |
| | Contact surface bare metal | | N |
| - (9.2) | Provision for functional earthing | | P |
| | Comply with clause 8 and 9.1 | | P |
| - (9.3) | Earth contact via the track on the printed board | | P |
| | Test with a current of 25 A between earthing terminal and each of the accessible metal parts; measured resistance (Ω) at ≥ 10 A according 7.2.3 of IEC 60598-1: < 0,5 Ω ..... : | 0.011Ω | P |
| - (9.4) | Earthing of built-in lamp controlgear | | P |
| | Earth by means of fixing to earthed metal of luminaire in compliance of 7.2 of IEC 60598-1 | | P |
| | Earthing terminal only for earthing the built-in controlgear | | P |

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|---|---|---|---|
| Clause | Requirement – Test | Result - Remark | Verdict |
| - (9.5) | Earthing via independent controlgear | | N |
| - (9.5.1) | Earth connection to other equipment | | N |
| | Looping or through connection, conductor min. 1,5 mm² and of copper or equivalent | | N |
| | Protective earthing wires in line with 5.3.1.1 and clause 7 | | N |
| - (9.5.2) | Earthing of the lamp compartments powered via the independent lamp controlgear | | N |
| | Test with a current of 25 A between input and output earth terminals; measured resistance (Ω) between earthing terminal and each of the accessible metal parts at ≥ 10 A according 7.2.3 of IEC 60598-1: < 0,5 Ω ..... : | | N |
| | Output earthing terminal marked as in 7.1 t) of IEC 61347-1 | | N |
| **11 (11)** | **MOISTURE RESISTANCE AND INSULATION** | | **P** |
| | After storage 48 h at 91-95% relative humidity and 20-30 °C measuring of insulation resistance with d.c. 500 V (MΩ): | | P |
| | For basic insulation ≥ 2 MΩ ..... : | >100 MΩ | N |
| | For double or reinforced insulation ≥ 4 MΩ ..... : | >200 MΩ | P |
| | Between primary and secondary circuits in controlgear providing SELV, values in Annex L in IEC 61347-1 | >200 MΩ | P |
| **12 (12)** | **ELECTRIC STRENGTH** | | **P** |
| - (12) | Immediately after clause 11 electric strength test for 1 min | | P |
| | Basic insulation for SELV, test voltage 500 V | | N |
| | Working voltage ≤ 50 V, test voltage 500 V | | N |
| | Working voltage > 50 V ≤ 1000 V, test voltage (V): | | P |
| | Basic insulation, 2U + 1000 V | 1480V/1MIN | P |
| | Supplementary insulation, 2U + 1000 V | | N |
| | Double or reinforced insulation, 4U + 2000 V | 3000V/1MIN | P |

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|---|---|---|---|
| Clause | Requirement – Test | Result - Remark | Verdict |
| | No flashover or breakdown | | P |
| | Solid or thin sheet insulation for double or reinforced insulation fulfil the requirements in Annex N in IEC 61347-1 | 5625V/1MIN | P |
| **15 (-)** | **STARTING CONDITIONS** | | **P** |
| | - after the switching test the ballast operate the lamps at rated operating voltage | | P |
| | - the lamps start and operate from the appropriate mains operation reference ballast/circuit | | P |
| **16 (-)** | **LAMP CURRENT** (only for fluorescent lamps) | | **N** |
| | Lamp current not exceeding 125 % of that delivered to the same lamp when operated with a reference controlgear | | N |
| **17 (-)** | **SUPPLY CURRENT** | | **P** |
| | At the rated operating voltage, the supply current from the battery differ not more than ± 15 % from the marked value when operated with reference lamp | | P |
| **18 (-)** | **MAXIMUM CURRENT IN ANY LEAD (WITH CATHODE PREHEATING)** | | **N** |
| | If fluorescent lamp, the current flowing in any cathode termination not exceed the value given in lamp data sheet of IEC 60081 and IEC 60901 | (see appended table) | N |
| **19 (-)** | **LAMP OPERATING CURRENT WAVEFORMS** (only for fluorescent lamps) | | **N** |
| | The peak current does not exceed 1,7 times the rated lamp current specified on lamp data sheets of IEC 60081 and IEC 60901 ..... : | | N |
| | The peak current does not exceed 3 times the measured r.m.s. lamp current ..... : | | N |

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|---|---|---|---|
| Clause | Requirement – Test | Result - Remark | Verdict |
| **20 (-)** | **FUNCTIONAL SAFETY (EBLF)** (only for fluorescent lamps) | | **N** |
| | The controlgear provide the necessary light output after change over to the emergency mode | | N |
| | - lowest value measured at 60 s and $V_1$ or in steady conditions at $V_{min}$ be retained and at least the declared EBLF ..... : | | N |
| | - value measured at 5 s and $V_1$ reach at least 50 % of declared EBLF ..... : | | N |
| **21 (-)** | **CHANGE-OVER OPERATION** | | **P** |
| | Change over from normal to emergency mode at not less than 0,6 times and not greater than 0,85 times rated supply voltage | | P |
| | Change over voltage (V) ..... : | 150V | P |
| | Supply reduced within 0,5 s to 0,6 times rated voltage, emergency lamps operated | | P |
| | Switching of supply at 0,85 times rated voltage for 500 cycles 2 s ″off″ and 2 s ″on″. After these cycles, supply reduced to 0,6 times rated voltage. Emergency lamps operated during emergency mode and after the test. | | P |
| | Controlgear with rest mode: automatic change-over from rest mode to normal mode at not greater than 0.9 times rated supply voltage | | P |
| **22 (-)** | **RECHARGING DEVICE** | | **P** |
| | Recharging device provide the rated charge performance specified by the battery manufac-turer to charge the battery within 24 h | | P |
| | Transformers in the recharging device comply with relevant parts of IEC 61558-2-1, IEC 61558-2-6 and IEC 61558-2-16 | | P |
| 22.1 (-) | Low temperature operation | | P |
| | Charged battery for 48 h and then discharged until voltage indicated in table 2 is achieved at 20 $^{o}$C ± 5 $^{o}$C | | P |
| | Charged battery at 0,9 times rated supply voltage at minimum ambient temperature for 24 h | | P |

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|---|---|---|---|
| Clause | Requirement – Test | Result - Remark | Verdict |
| | Simulating supply failure, lamp operated for rated duration of operation and at the end the battery voltage is at least $V_{min}$ according clause 20 | | P |
| 22.2 (-) | High temperature operation | | P |
| | Charged battery for 48 h and then discharged until voltage indicated in table 2 is achieved at 20 $^{o}$C ± 5 $^{o}$C | | P |
| | Charged at 0,9 times rated supply voltage at maximum ambient temperature for 24 h | | P |
| | Simulating supply failure, lamp operated for rated duration of operation and at the end the battery voltage is at least $V_{min}$ according clause 20 | | P |
| 22.3 (-) | Abnormal operating condition | | P |
| | Recharging device operated at 1,1 times rated supply voltage and maximum marked ambient temperature with battery disconnected and output short-circuited | | P |
| | - no flames, molten material or flammable gases | | P |
| | After the test period and short-circuit removed | | P |
| | - the recharging device is safe | | P |
| | - normal recharge if self-resetting or user-replaceable protective devices | | P |
| 22.4 (-) | Maximum output voltage | | P |
| | Output voltage of recharging device ≤ DC50V at 1,1 times rated supply voltage with or without batteries connected (V) ..... : | | P |
| 22.5 (-) | Battery charge and discharge characteristics | | P |
| | Charged battery for 48 h and then discharged until voltage indicated in table 2 is achieved at 20 $^{o}$C ± 5 $^{o}$C | | P |
| | Charged at 0,9 and 1,1 times rated supply voltage at 25 $^{o}$C ± 2 $^{o}$C for 24 h | | P |
| | Current and voltage characteristics within those declared by controlgear manufacturer | | P |
| 22.7 (-) | Lamp failure | | P |

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|---|---|---|---|
| Clause | Requirement – Test | Result - Remark | Verdict |
| | Lamp failure do not interrupt charging current to battery and not impair the operation of the battery | | P |
| **23 (-)** | **PROTECTION AGAINST EXCESSIVE DISCHARGE** | | **P** |
| | Protection against polarity reversal of individual cells, limits the discharge current when the battery voltage has fallen to $V_{low}$ according a) to c) | | P |
| | - Discharge current (A) ..... : | 0.27 | P |
| | Protection system prevents any further discharge until the normal supply has been restored. Battery voltage not below $V_{low}$ and discharge current not exceed a) to c) | | P |
| | - Battery voltage (V) ..... : | 3.5 | P |
| | - Discharge current (A) ..... : | $1.1 \times 10^{-4}$ C5A | P |
| **24 (-)** | **INDICATOR** | | **P** |
| | Compliance with 22.7.7 of IEC 60598-2-22 | | P |
| **25 (-)** | **REMOTE CONTROL, REST MODE, INHIBITION MODE** | | **P** |
| 25.1 (-) | No other changeover device than the switch between the battery and emergency lighting lamps | | P |
| | Not contain manual or non-self-resetting switch isolating the emergency circuit from main supply | | P |
| 25.2 (-) | If rest mode facility, operation automatically revert to normal mode if restoration of normal supply | | P |
| | If remote inhibiting facilities, provided with a means of connection to the remote inhibiting circuit | | N |
| 25.3 (-) | If for remote inhibiting facilities, in the emergency mode, not influenced by short circuit or contact to earth in the wiring to the remote control | | N |
| | - Simulation of above faults in conjunction with tests of 28.2 | | N |
| 25.4 (-) | Operation of remote control independent of the battery and mains supply | | N |
| 25.5 (-) | If rest mode facility in the emergency mode , not influenced by short circuit, contact to earth or interruption in the wiring to the remote control changeover device | | P |

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|---|---|---|---|
| Clause | Requirement – Test | Result - Remark | Verdict |
| | - Simulation of above faults in conjunction with tests of 28.2 | | P |
| 25.6 (-) | If rest mode or inhibiting facilities, in rest mode, current drain from batteries not exceed the values in 25.6 | | P |
| | - Discharge current (A) ..... : | 1.2 x $10^{-4}$ x C5A | P |
| **26 (-)** | **TEMPERATURE CYCLING TEST AND ENDURANCE TEST** | | **P** |
| 26.a (-) | Temperature cycling test: 5 cycles; | | P |
| | - 1 h at minimum ambient temperature ($^{o}$C) ..... : | -10℃ | P |
| | - 1 h at maximum ambient temperature ($^{o}$C) ..... : | 50℃ | P |
| 26.b (-) | Endurance test 50 h at an ambient that produces tc; ambient temperature ($^{o}$C) ..... : | 50℃ | P |
| | After test, controlgear restart and operate lamps at rated operating voltage | | P |
| **27 (-)** | **POLARITY REVERSAL** | | **P** |
| | If declared to be proof against polarity reversal, operating with reverse supply voltage for 1 h at maximum rated voltage | | P |
| | After test, supply connected correctly, start and operate lamps normally | | P |
| **28 (14)** | **FAULT CONDITIONS** | | **P** |
| 28.1 (14) | When operated under fault conditions the controlgear: | | P |
| | - does not emit flames or molten material | | P |
| | - does not produce flammable gases | | P |
| | - protection against accidental contact not impaired | | P |
| | Thermally protected controlgear does not exceed the marked temperature value | | P |

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|---|---|---|---|
| Clause | Requirement – Test | Result - Remark | Verdict |
| | Fault conditions: capacitors, resistors or inductors without proof of compliance with relevant specifications have been short-circuited or disconnected | (see appended table) | P |
| - (14.1) | Short-circuit of creepage distances and clearances if less than specified in clause 16 in Part 1 (except between live parts and accessible metal parts) | (see appended table) | P |
| | Creepage distances on printed boards less than specified in clause 16 in Part 1 provided with coating according to IEC 60664-3 | | P |
| - (14.2) | Short-circuit or interruption of semiconductor devices | (see appended table) | P |
| - (14.3) | Short-circuit across insulation consisting of lacquer, enamel or textile | (see appended table) | P |
| - (14.4) | Short-circuit across electrolytic capacitors | (see appended table) | P |
| - (14.5) | After the tests has been carried out on three samples: | | P |
| | The insulation resistance ≥ 1 MΩ ..... : | >200 MΩ | P |
| | No flammable gases | | P |
| | No accessible parts have become live | | P |
| | During the tests, a five-layer tissue paper, where the test specimen is wrapped, does not ignite | | P |
| - (14.6) | Relevant fault condition tests with high-power supply | | — |
| 28.2 (-) | Short circuit, contact to earth or interruption in the wiring of the normal supply not influenced the emergency mode | | P |

| | | | |
|---|---|---|---|
| **29 (15)** | **CONSTRUCTION** | | **P** |
| - (15.1) | Wood, cotton, silk, paper and similar fibrous material | | P |
| | Wood, cotton, silk, paper and similar fibrous material not used as insulation | | P |
| - (15.2) | Printed circuits | | P |
| | Printed circuits used as internal connections complies with clause 14 | | P |
| - (15.3) | Plugs and socket-outlets used in SELV or ELV circuits | | N |

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|---|---|---|---|
| Clause | Requirement – Test | Result - Remark | Verdict |
| | No dangerous compatibility between output socket-outlet and a plug for socket-outlets for input circuit in relation to installation rules, voltages and frequencies | | N |
| | Plugs and socket-outlets for SELV comply with IEC 60906-3 and IEC 60884-2-4 | | N |
| | Plugs and socket-outlets for SELV ≤ 3 A, ≤ 25 V r.m.s. or ≤ 60 V d.c. and ≤ 72 W comply with IEC 60906-3 and IEC 60884-2-4 or: | | N |
| | - plugs not able to enter socket-outlets of other standardised system | | N |
| | - socket-outlets not admit plugs of other standardised system | | N |
| | - socket-outlets without protective earth | | N |
| 29.1.1 (-) | Compliance with 22.7.1, 22.7.7, 22.7.9, 22.7.11, 22.7.19 and 22.20 of IEC 60598-2-22 if applicable | | P |
| 29.1.2 (-) | Battery comply with Annex I | | P |
| | Battery designed for at least 4 years of operation | | P |
| | Battery only use for emergency functions | | P |
| **30 (16)** | **CREEPAGE DISTANCES AND CLEARANCES** | | **P** |
| - (16) | Creepage distances and clearances according to Table 3 and 4, as appropriate | (see appended table) | P |
| | Controlgears providing SELV comply with L.1 in Annex L | | P |
| | Insulating lining of metallic enclosures | | N |
| | Basic insulation on printed boards tested according to clause 14 | | P |
| | Distances subjected to both sinusoidal voltage as non-sinusoidal pulses not less than value in either Table 3 or 4 | | P |
| | Creepage distances not less than minimum clearance | | P |
| **31 (17)** | **SCREWS, CURRENT-CARRYING PARTS AND CONNECTIONS** | | **P** |

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|---|---|---|---|
| Clause | Requirement – Test | Result - Remark | Verdict |
| | Screws, current-carrying parts and connections in compliance with IEC 60598-1 (clause numbers between parentheses refer to IEC 60598-1) | | P |
| (4.11) | Electrical connections | | P |
| (4.11.1) | Contact pressure | | N |
| (4.11.2) | Screws: | | N |
| | - self-tapping screws | | N |
| | - thread-cutting screws | | N |
| (4.11.3) | Screw locking: | | N |
| | - spring washer | | N |
| | - rivets | | N |
| (4.11.4) | Material of current-carrying parts | | P |
| (4.11.5) | No contact to wood or mounting surface | | P |
| (4.11.6) | Electro-mechanical contact systems | | N |
| (4.12) | Mechanical connections and glands | | N |
| (4.12.1) | Screws not made of soft metal | | N |
| | Screws of insulating material | | N |
| | Torque test: torque (Nm); part..... : | | N |
| | Torque test: torque (Nm); part..... : | | N |
| | Torque test: torque (Nm); part..... : | | N |
| (4.12.2) | Screws with diameter < 3 mm screwed into metal | | N |
| (4.12.4) | Locked connections: | | N |
| | - fixed arms; torque (Nm) ..... : | | N |
| | - lampholder; torque (Nm) ..... : | | N |
| | - push-button switches; torque 0,8 Nm..... : | | N |
| (4.12.5) | Screwed glands; force (Nm)..... : | | N |

| | | | |
|---|---|---|---|
| **32 (18)** | **RESISTANCE TO HEAT, FIRE AND TRACKING** | | **P** |
| - (18.1) | Ball-pressure test: | | P |
| | - part tested; temperature (°C)..... : | Enclosure: 75°C, measured: 0.9mm<2mm | P |

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|---|---|---|---|
| Clause | Requirement – Test | Result - Remark | Verdict |
| | - part tested; temperature (°C)..... : | Bobbin : 125°C, measured: 1.1mm<2mm | P |
| | - part tested; temperature (°C)..... : | Terminal block: 125°C, measured: 0.8mm<2mm | P |
| - (18.2) | Test of printed boards: | | N |
| | - part tested..... : | | N |
| | - part tested..... : | | N |
| - (18.3) | Glow-wire test (650°C): | | P |
| | - part tested..... : | Enclosure, no flame | P |
| | - part tested..... : | Connector cover, no flame | P |
| - (18.4) | Needle flame test (10 s): | | P |
| | - part tested..... : | Bobbin | P |
| | - part tested..... : | Terminal block | P |
| - (18.5) | Tracking test: | | N |
| | - part tested..... : | | N |
| | - part tested..... : | | N |
| **33 (19)** | **RESISTANCE TO CORROSION** | | **N** |
| | - test according 4.18.1 of IEC 60598-1 | | N |
| | - adequate varnish on the outer surface | | N |

| | | | |
|---|---|---|---|
| **34** | **Abnormal lamp conditions** | | **P** |
| 34.1 | Controlgear not impair safety operated under abnormal conditions | | P |
| 34.2 | Abnormal conditions for controlgear for fluorescent lamps | | N |
| | a) lamp not inserted | | N |
| | b) lamp does not start because cathode is broken | | N |
| | c) de-active lamp | | N |
| | d) lamp operates with rectifying effect | | N |
| 34.3 | Abnormal conditions for d.c. supplied electronic step-down convertors for filament lamps | | N |

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|---|---|---|---|
| Clause | Requirement – Test | Result - Remark | Verdict |
| | Output voltage of the convertor not exceed 115% of rated output voltage under abnormal conditions | | N |
| | a) lamp not inserted | | N |
| | b) twice the number of lamps | | N |
| | c) output terminals short-circuited | | N |
| 34.4 | Abnormal conditions for controlgear for d.c. supplied electronic controlgear for LED modules | | P |
| 34.4.1 | Length of output cable 20 cm and 200 cm in 34.4.2 or 34.4.3 | | P |
| 34.4.2 | Controlgear of constant voltage type | | N |
| | a) no LED module inserted | | N |
| | b) double LED modules in parallel | | N |
| | c) output terminals short-circuited | | N |
| 34.4.3 | Controlgear of constant current type | | P |
| | a) no LED module inserted (and all at same time) | | P |
| | b) double LED modules in series | | P |
| | c) output terminals short-circuited | | P |
| 34.5 | Abnormal conditions for ballast for d.c. supplied electronic controlgear for discharge lamps | | N |
| | a) lamp not inserted or does not ignite | | N |
| | b) burner leaks | | N |
| | c) lamp operates, but rectifies | | N |
| 34.6 | Compliance | | P |
| | - does not emit flames or molten material | | P |
| | - does not produce flammable gases | | P |
| | - protection against accidental contact according 10.1 of IEC 61347-1 not impaired | | P |
| | - insulation resistance ≥ 1 MΩ .....: | > 200 MΩ | P |
| **35** | **Protection of associated components** | | **N** |
| 35.1 | Peak voltage limits | | N |

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|---|---|---|---|
| Clause | Requirement – Test | Result - Remark | Verdict |
| | Voltage at output terminals not exceed maximum permitted peak value in Table 2 (V) ..... : | | N |
| 35.2 | Working voltage limits | | N |
| | Voltage at output terminals not exceed declared maximum working voltage under normal operating, and from 5 s after start (V) ..... : | | N |
| 35.3 | Compliance | | N |
| | Voltage in 35.1 and 35.2 in compliance with the limits, measured between output terminal and earth | | N |
| | Voltage in 35.1 and 35.2 in compliance with the limits, measured between output terminals if the voltage present across insulation barriers within associated components | | N |

| **18** | **TABLE: maximum current in any lead** | | | | | | **N** |
|---|---|---|---|---|---|---|---|
| | Test voltage (V): | | | | | | N |
| I 1 (mA) | I 2 (mA) | I 3 (mA) | I 4 (mA) | I 5 (mA) | I 6 (mA) | I 7 (mA) | I 8 (mA) |
| | | | | | | | |

| **14** | **TABLE: tests of fault conditions** | **P** |
|---|---|---|
| Part | Simulated fault | Hazard |
| C6 | s-c, unit shut down, no hazard occur | NO |
| C12 | s-c, unit shut down, no hazard occur | NO |
| D1 | s-c, unit shut down, no hazard occur | NO |
| BD1 | s-c, fuse broken, no hazard occur | NO |
| Q1 | s-c, fuse broken, no hazard occur | NO |
| L1 | s-c, fuse broken, no hazard occur | NO |
| C7 | s-c, fuse broken, no hazard occur | NO |
| Output | s-c, unit shut down, no hazard occur | NO |

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

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **30 (16)** | **TABLES: Creepage distances and clearances** | | | | | | **P** |
| **Table 3** | **Minimum distances (mm) for a.c. (50/60 Hz) sinusoidal voltages** | | | | | | **P** |
| RMS working voltage (V) not exceeding | | 50 | 150 | 250 | 500 | 750 | 1000 |
| **Creepage distances** | | | | | | | |
| Required basic insulation, PTI ≥ 600 | | 0,6 | 0,8 | 1,5 | 3 | 4 | 5,5 |
| Measured | | | | - | | | |
| Required basic insulation, PTI < 600 | | 1,2 | 1,6 | 2,5 | 5 | 8 | 10 |
| Measured | | | | >4.7 | | | |
| Required supplementary insulation PTI ≥ 600 | | - | 0,8 | 1,5 | 3 | 4 | 5,5 |
| Measured | | | | - | | | |
| Required supplementary insulation PTI < 600 | | - | 1,6 | 2,5 | 5 | 8 | 10 |
| Measured | | | | - | | | |
| Required reinforced insulation | | - | 3,2 | 5 | 6 | 8 | 11 |
| Measured | | | | >7 | | | |
| **Clearances** | | | | | | | |
| Required basic insulation | | 0,2 | 0,8 | 1,5 | 3 | 4 | 5,5 |
| Measured | | | | >4.7 | | | |
| Required supplementary insulation | | - | 0,8 | 1,5 | 3 | 4 | 5,5 |
| Measured | | | | - | | | |
| Required reinforced insulation | | - | 1,6 | 3 | 6 | 8 | 11 |
| Measured | | | | >7 | | | |
| **Table 4** | **Minimum distances (mm) for non-sinusoidal pulse voltages** | | | | | | **N** |

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

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Rated pulse voltage (peak kV) | 2,0 | 2,5 | 3,0 | 4,0 | 5,0 | 6,0 | 8,0 |
| Required clearances | 1,0 | 1,5 | 2 | 3 | 4 | 5,5 | 8 |
| Measured | | | | | | | |
| Rated pulse voltage (peak kV) | 10 | 12 | 15 | 20 | 25 | 30 | 40 |
| Required clearances | 11 | 14 | 18 | 25 | 33 | 40 | 60 |
| Measured | | | | | | | |
| Rated pulse voltage (peak kV) | 50 | 60 | 80 | 100 | - | - | - |
| Required clearances | 75 | 90 | 130 | 170 | - | - | - |
| Measured | | | | | | | |

| | | | |
|---|---|---|---|
| **A** | **ANNEX A IN PART 1: TEST TO ESTABLISH WHETHER A CONDUCTIVE PART IS A LIVE PART WHICH MAY CAUSE AN ELECTRIC SHOCK** | | P |
| A.1 | Comply with A.2 or A.3 | | P |
| A.2 | Voltage ≤ 35 V peak or ≤ 60 V d.c ..... : | | P |
| A.3 | If voltage > 35 V peak or > 60 V d.c. or protective impendence device;<br>touch current does not exceed 0,7 mA (peak) or 2 mA d.c. ..... : | | N |
| | Comply with Annex G of IEC 60598-1 | | P |

| | | | |
|---|---|---|---|
| **C** | **ANNEX C IN PART 1: PARTICULAR REQUIREMENTS FOR ELECTRONIC LAMP CONTROLGEAR WITH MEANS OF PROTECTION AGAINST OVERHEATING** | | N |
| **C3** | **GENERAL REQUIREMENTS** | | **N** |
| C3.1 | Thermal protection means integral with the controlgear, protected against mechanical damage | | N |
| | Renewable only by means of a tool | | N |
| | If function depending on polarity, for cord-connected equipment protection means in both leads | | N |
| | Thermal links comply with IEC 60691 | | N |
| | Electrical controls comply with IEC 60730-2-3 | | N |

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|---|---|---|---|
| Clause | Requirement – Test | Result - Remark | Verdict |
| C3.2 | No risk of fire by breaking (clause C7) | | N |
| **C5** | **CLASSIFICATION** | | **N** |
| | a) automatic resetting type | | — |
| | b) manual resetting type | | — |
| | c) non-renewable, non-resetting type | | — |
| | d) renewable, non-resetting type | | — |
| | e) other type of thermal protection; description .. : | | — |
| **C6** | **MARKING** | | **N** |
| C6.1 | Symbol for temperature declared thermally protected controlgear | | N |
| C6.2 | Declaration of the type of protection provided | | N |
| **C7** | **LIMITATION OF HEATING** | | **N** |
| C7.1 | Preselection test: | | N |
| | Test sample placed for at least 12 h in an oven having temperature ($t_c$ - 5) K | | N |
| | No operation of the protection device | | N |
| C7.2 | Functioning of protection means: | | N |
| | Normal operation of the sample in a test enclosure according to Annex D at an ambient temperature such that ($t_c$ +0; -5) °C is obtained | | N |
| | No operation of the protection device | | N |
| | Introducing of the most onerous test condition determined during test of clause 14 | | N |
| | Output of windings connected to the mains supply short-circuited, and other part of the controlgear operated under normal conditions | | N |
| | Increasing of the current through the windings continuously until operation of the protection means | | N |
| | Continuous measuring of the highest surface temperature | | N |
| | Controlgear according to C5 a) or C5 e) operated until stable conditions are achieved | | N |

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|---|---|---|---|
| Clause | Requirement – Test | Result - Remark | Verdict |
| | Automatic-resetting thermal protectors working 3 times | | N |
| | Controlgear according to C5 b) working 6 times | | N |
| | Controlgear according to C5 c) and C5) d) working once | | N |
| | Highest temperature does not exceed the marked value | | N |
| | Any overshoot of 10% over the marked value within 15 min | | N |
| **D** | **ANNEX D IN PART 1: REQUIREMENTS FOR CARRY OUT THE HEATING TESTS OF THERMALLY PROTECTED LAMP CONTROLGEAR** | | N |
| | Tests in C7 performed in accordance with Annex D, if applicable | | N |
| **F** | **ANNEX F IN PART 1: DRAUGHT-PROOF ENCLOSURE** | | **P** |
| | Draught-proof enclosure in accordance with the description | | P |
| | Dimensions of the enclosure | | P |
| | Other design; description | | P |
| **H** | **ANNEX H IN PART 1: TESTS** | | P |
| | All tests performed in accordance with the advice given in Annex H, if applicable | | P |
| **I (-)** | **ANNEX I IN THIS PART 2: BATTERIES FOR EMERGENCY LUMINAIRES** (Annex numbers between parentheses refer to IEC 60598-2-22) | | P |
| (A.1) | Type of batteries | | P |
| (A.2) | Conform to relevant standard | | P |
| | Operate within specific tolerance | | P |
| (A.3) | Battery capacity for rated duration up to time of replacement | | P |
| (A.4) | Sealed nickel cadmium batteries | | N |

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|---|---|---|---|
| Clause | Requirement – Test | Result - Remark | Verdict |
| (A.4.1) | Conform to IEC 60285 | | N |
| (A.4.2.a) | Maximum ambient air temperature 50 °C | | N |
| (A.4.2.b) | Maximum overcharge rate 0,08 $C_5$A | | N |
| (A.4.2.c) | Minimum ambient temperature 5 °C | | N |
| (A.4.2.d) | Maximum discharge rates for 1 h: 0,6 $C_5$A and 3 h: 0,25 $C_5$A | | N |
| (A.5) | Valve regulated lead acid batteries | | N |
| (A.5.1) | Conform to IEC 60869-2 or IEC 61056-1 | | N |
| (A.5.2.a) | Maximum ambient air temperature 30 °C with temperature compensation or 25 °C without temperature compensation | | N |
| (A.5.2.b) | Minimum recharge current 0,4 $C_{20}$ | | N |
| (A.5.2.c) | Maximum discharge rates for 1 h: 0,4 $C_{20}$ and 3 h: 0,17 $C_{20}$ | | N |
| (A.5.2.d) | Maximum r.m.s. ripple current 0,1 $C_{20}$ | | N |
| (A.5.2.e) | Minimum ambient temperature 5 °C | | N |
| (A.6) | Ambient temperature of cells measured after 48 h | | P |
| (A.7) | Evidence of alternative operating parameters | | P |
| **J (D)** | **ANNEX J: REST MODE AND INHIBITION MODE FACILITIES** (ANNEX D IN IEC 60598-2-22) | | P |
| | Rest mode: | | P |
| | a) only operate when normal supply has failed | | P |
| | b) remote control wiring is fail-safe | | P |
| | c) normal mode at restoration of normal supply | | P |
| | Inhibition mode: | | N |
| | a) supply failure or disconnection not cause an unwanted discharge | | N |
| | b) protection against interruption of remote control wiring | | N |
| | 1) safety circuits independent of other circuits | | P |
| | 2) safety circuits not pass through locations exposed to fire risk or explosion risk | | P |

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|---|---|---|---|
| Clause | Requirement – Test | Result - Remark | Verdict |
| | 3) protection against overload may be omitted | | — |
| | 4) overcurrent in one circuit not impair circuits of safety services | | P |
| | 5) switchgear and controlgear clearly identified and in locations accessible only to competent persons | | P |
| | 6) Alarm devices clearly identified | | P |
| **K** | **ANNEX K IN PART 1: BALLASTS INCORPORATING AN AUTOMATIC TESTING FUNCTION FOR EMERGENCY LIGHTING OPERATION** | | **N** |
| | Fulfil relevant requirements of Table K.1 | | N |
| **L** | **ANNEX L IN PART 1: PARTICULAR ADDITIONAL REQUIREMENTS FOR CONTROLGEAR PROVIDING SELV** | | P |
| **L.3** | **Classification** | | |
| | Class I | Yes ☒ No ☐ | — |
| | Class II | Yes ☐ No ☒ | — |
| | Class III | Yes ☐ No ☒ | — |
| | non-inherently short circuit proof controlgear | Yes ☐ No ☒ | — |
| | inherently short circuit proof controlgear | Yes ☒ No ☐ | — |
| | fail safe controlgear | Yes ☒ No ☐ | — |
| | non-short-circuit proof controlgear | Yes ☐ No ☒ | — |
| **L.4** | **Marking** | | **P** |
| | Adequate symbols are used | | P |
| **L.5** | **Protection against electric shock** | | **P** |
| | Comply with 9.2 of IEC 61558-1 | | P |
| **L.6** | **Heating** | | **P** |
| | No excessive temperatures in normal use | | P |
| | Value if capacitor $t_c$ marked .....: | - | — |
| | Winding insulation classified as Class .....: | Class B | — |

| EN 61347-2-7 | | | |
|---|---|---|---|
| Clause | Requirement – Test | Result - Remark | Verdict |
| | Comply with tests of clause 14 of IEC 61558-1 with adjustments | | P |
| **L.7** | **Short-circuit and overload protection** | | **P** |
| | Comply with tests of clause 15 of IEC 61558-1 with adjustments | | P |
| **L.8** | **Insulation resistance and electric strength** | | **P** |
| L.8.1 | Conditioned 48 h between 91 % and 95 % | | P |
| L.8.2 | Insulation resistance | | P |
| | Between input- and output circuits not less than 5 _MΩ ..... : | 215 MΩ | P |
| | Between metal parts of class II convertors which are separated from live parts by basic insulation only and the body not less than 5 MΩ ..... : | 207 MΩ | P |
| | Between metal foil in contact with the inner and outer surfaces of enclosures of insulating material not less than 2 MΩ ..... : | 115 MΩ | P |
| L.8.3 | Electric strength | | P |
| | 1) Between live parts of input circuits and live parts of output circuits ..... : | 3000V | P |
| | 2) Over basic or supplementary insulation between: | | N |
| | a) live parts having different polarity ..... : | | N |
| | b) live parts and body if intended to be connected to protective earth ..... : | | N |
| | c) accessible metal parts and a metal rod of the same diameter as the flexible cable or cord ..... : | | N |
| | d) live parts and an intermediate metal part ..... : | | N |
| | e) intermediate metal parts and the body ..... : | | N |
| | f) each input circuit and all other input circuits ... : | | N |
| | 3) Over reinforced insulation between the body and live parts ..... : | 3000V | P |
| **L.9** | **Construction** | | **P** |
| L.9.1 | Transformer comply with 19.12 of IEC 61558-1 and 19 of IEC 61558-2-6 | | P |
| | HF transformer comply with 19 of IEC 61558-2-16 | | N |

| EN 61347-2-7 | | | |
|---|---|---|---|
| Clause | Requirement – Test | Result - Remark | Verdict |
| **L.10** | **Components** | | **P** |
| | Protective devices comply with 20.6 – 20.11 of IEC 61558-1 | | P |
| **L.11** | **Creepage distances and clearances** | | **P** |
| | 1. Insulation between input and output circuits, basic insulation: | | P |
| | a) measured values ≥ specified values (mm) ..... : | | N |
| | b) measured values ≥ specified values (mm) ..... : | | N |
| | c) measured values ≥ specified values (mm) ..... : | | N |
| | 2. Insulation between input and output circuits, double or reinforced insulation: | | P |
| | a) measured values ≥ specified values (mm) ..... : | cl>4.7mm<br>cr>5.0mm | P |
| | b) measured values ≥ specified values (mm) ..... : | | N |
| | c) measured values ≥ specified values (mm) ..... : | | N |
| | 3. Insulation between adjacent input circuits | | P |
| | - measured values ≥ specified values (mm) ..... : | cl>0.4mm<br>cr>2.6mm | P |
| | 3. Insulation between adjacent output circuits | | P |
| | - measured values ≥ specified values (mm) ..... : | cl>0.2mm<br>cr>1.2mm | P |
| | 4. Insulation between terminals for external connection: | | N |
| | - measured values ≥ specified values (mm) ..... : | | N |
| | 5. Basic or supplementary insulation: | | P |
| | a) measured values ≥ specified values (mm) ..... : | cl>2.5mm<br>cr>2.6mm | P |
| | b) measured values ≥ specified values (mm) ..... : | | N |
| | c) measured values ≥ specified values (mm) ..... : | | N |
| | d) measured values ≥ specified values (mm) ..... : | | N |
| | e) measured values ≥ specified values (mm) ..... : | | N |
| | 6. Reinforced insulation or insulation: | | P |
| | Between body and output circuit: measured values ≥ specified values (mm) ..... : | cl>5.0mm<br>cr>4.7mm | P |

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|---|---|---|---|
| Clause | Requirement – Test | Result - Remark | Verdict |
| | Between body and output circuit if provision against transient voltages: measured values ≥ specified values (mm) ..... : | | N |
| | 7. Distance through insulation: | | P |
| | a) measured values ≥ specified values (mm) ..... : | >0.9mm | P |
| | b) measured values ≥ specified values (mm) ..... : | | N |
| | c) measured values ≥ specified values (mm) ..... : | | N |
| **N** | **ANNEX N IN PART 1: REQUIREMENTS FOR INSULATION MATERIALS USED FOR DOUBLE OR REINFORCED INSULATION** | | N |
| **N.4** | **General requirements** | | **N** |
| N.4.1 | Material comply with IEC 60085 and IEC 60216 series | | N |
| N.4.2 | Solid insulation | | N |
| | Electric strength test at least 5 kV or 1,35 x test voltage in Table N.1 | | N |
| | If not classified according IEC 60085 and IEC 60216 series: Electric strength test increased 10 % of 5,5 kV or 1,5 x test voltage in Table N.1 | | N |
| N.4.3 | Thin sheet insulation | | N |
| N.4.3.1 | Thickness and composition of thin sheet insulation | | N |
| | - Inside the ballast and not subjected to handling or abrasion during the production and during maintenance | | N |
| | - Non-separated layers: Min. 3 layers and fulfil mandrel test of 150N | | N |
| | - Separated layers: Min. 2 layers and each layer fulfil mandrel test of 50N | | N |
| | - Separated layers (alternative): Min. 3 layers and 2/3 of the layers fulfil mandrel test of 100N | | N |
| N.4.3.2 | Mandrel test (electric strength test during mechanical stress) | | N |
| | Electric strength test after mandrel test: | | N |
| | - Non-separated layers: min. 5 kV or 1,35 x test voltage in Table N.1 | | N |

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|---|---|---|---|
| Clause | Requirement – Test | Result - Remark | Verdict |
| | - 2/3 of min. 3 separated layers: min. 5 kV or 1,25 x test voltage in Table N.1 | | N |
| | - one of 2 separated layers: min. 5 kV or 1,25 x test voltage in Table N.1 | | N |
| | No flashover or breakdown occurred | | N |
| **O** | **ANNEX O: ADDITIONAL REQUIREMENTS FOR BUILT-IN ELECTRONIC CONTROLGEAR WITH DOUBLE OR REINFORCED INSULATION** (IEC 61347-1) | | P |
| **O.6** | **Marking** | | **P** |
| | Marking according clause 7 (7) | See clause 7 | P |
| | Special symbol | | P |
| | Meaning of the special symbol explained in catalogue | | P |
| **O.7** | **Protection against accidental contact with live parts** | | **P** |
| | Requirements of clause 8 (10) | See clause 8 | P |
| | Test finger not possible to make contact with basic insulated metal parts | | P |
| **O.8** | **Terminals** | | **N** |
| | Clause 9 (8) | See clause 9 | N |
| **O.9** | **Provision for earthing** | | **N** |
| | Functional earthing terminals comply with clause 9 of part 1 | | N |
| | No protective earthing terminal | | N |
| **O.10** | **Moisture resistance and insulation** | | **P** |
| | Clause 11 (11) | See clause 11 | P |
| **O.11** | **Electric strength** | | **P** |
| | Clause 12 (12) | See clause 12 | P |
| **O.13** | **Fault conditions** | | **P** |
| | Clause 14 (14) | See clause 14 | P |

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|---|---|---|---|
| Clause | Requirement – Test | Result - Remark | Verdict |
| | End of test, between live part and accessible metal parts or external parts of insulating material in contact with the supporting surface comply with dielectric strength test reduced to 35 % of values according Table 1 in part 1 | | P |
| | Insulation resistance according to O.10 between live part and accessible metal parts or external parts of insulating material in contact with the supporting surface not less than 4 MΩ | | P |
| **O.14** | **Construction** | | **P** |
| | Clause 17 (15) | See clause 17 | P |
| | Accessible metal parts insulated from live parts by double or reinforced insulation | | P |
| | Live part insulated from supporting surface in contact with external faces by double or reinforced insulation | | P |
| **O.15** | **Creepage distances and clearances** | | **P** |
| | Clause 18 (16) | See clause 18 | P |
| | Comply with corresponding values for luminaries in IEC 60598-1 | | P |
| **O.16** | **Screws, current-carrying parts and connections** | | **P** |
| | Clause 19 (17) | See clause 19 | P |
| **O.17** | **Resistance to heat and fire** | | **P** |
| | Clause 20 (18) | See clause 20 | P |
| **O.18** | **Resistance to corrosion** | | **P** |
| | Clause 21 (19) | See clause 21 | P |

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|---|---|---|---|
| Clause | Requirement – Test | Result - Remark | Verdict |
| | **ANNEX 1: screw terminals (part of the controlgear)** | | N |
| (14) | **SCREW TERMINALS** | | N |
| (14.2) | Type of terminal ..... : | | — |
| | Rated current (A) ..... : | | — |
| (14.3.2.1) | One or more conductors | | N |
| (14.3.2.2) | Special preparation | | N |
| (14.3.2.3) | Terminal size | | N |
| | Cross-sectional area (mm²) ..... : | | N |
| (14.3.3) | Conductor space (mm) ..... : | | N |
| (14.4) | Mechanical tests | | N |
| (14.4.1) | Minimum distance | | N |
| (14.4.2) | Cannot slip out | | N |
| (14.4.3) | Special preparation | | N |
| (14.4.4) | Nominal diameter of thread (metric ISO thread) . : | M | N |
| | External wiring | | N |
| | No soft metal | | N |
| (14.4.5) | Corrosion | | N |
| (14.4.6) | Nominal diameter of thread (mm)..... : | | N |
| | Torque (Nm) ..... : | | N |
| (14.4.7) | Between metal surfaces | | N |
| | Lug terminal | | N |
| | Mantle terminal | | N |
| | Pull test; pull (N) ..... : | | N |
| (14.4.8) | Without undue damage | | N |
| | **ANNEX 2: screwless terminals (part of the controlgear)** | | N |
| (15) | **SCREWLESS TERMINALS (IEC 60598-1)** | | N |
| (15.2) | Type of terminal ..... : | | — |
| | Rated current (A) ..... : | | — |

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|---|---|---|---|
| Clause | Requirement – Test | Result - Remark | Verdict |
| (15.3.1) | Material | | N |
| (15.3.2) | Clamping | | N |
| (15.3.3) | Stop | | N |
| (15.3.4) | Unprepared conductors | | N |
| (15.3.5) | Pressure on insulating material | | N |
| (15.3.6) | Clear connection method | | N |
| (15.3.7) | Clamping independently | | N |
| (15.3.8) | Fixed in position | | N |
| (15.3.10) | Conductor size | | N |
| | Type of conductor | | N |
| (15.5) | Terminals and connections for internal wiring | | N |
| (15.5.1) | Mechanical tests | | N |
| (15.5.1.1.1) | Pull test spring-type terminals (4 N, 4 samples)….: | | N |
| (15.5.1.1.2) | Pull test pin or tab terminals (4 N, 4 samples)……: | | N |
| | Insertion force not exceeding 50 N | | N |
| (15.5.1.2) | Permanent connections: pull-off test (20 N) | | N |
| (15.6) | Electrical tests | | N |
| | Voltage drop (mV) after 1 h (4 samples) ..... : | | N |
| | Voltage drop of two inseparable joints | | N |
| | Number of cycles ..... : | | — |
| | Voltage drop (mV) after 10th alt. 25th cycle (4 samples) ..... : | | N |
| | Voltage drop (mV) after 50th alt. 100th cycle (4 samples) ..... : | | N |
| | After ageing, voltage drop (mV) after 10th alt. 25th cycle (4 samples)..... : | | N |
| | After ageing, voltage drop (mV) after 50th alt. 100th cycle (4 samples)..... : | | N |
| (15.7) | Terminals external wiring | | N |
| | Terminal size and rating | | N |

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

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| (15.8.1) | Pull test spring-type terminals or welded connections (4 samples); pull (N) ..... : | | | | | | | | | | N |
| | Pull test pin or tab terminals (4 samples); pull (N) ..... : | | | | | | | | | | N |
| (15.9) | Contact resistance test | | | | | | | | | | N |
| | Voltage drop (mV) after 1 h | | | | | | | | | | N |
| terminal | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| voltage drop (mV) | | | | | | | | | | | |
| | Voltage drop of two inseparable joints | | | | | | | | | | N |
| | Voltage drop after 10th alt. 25th cycle | | | | | | | | | | N |
| | Max. allowed voltage drop (mV) ..... : | | | | | | | | | | — |
| terminal | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| voltage drop (mV) | | | | | | | | | | | |
| | Voltage drop after 50th alt. 100th cycle | | | | | | | | | | N |
| | Max. allowed voltage drop (mV) ..... : | | | | | | | | | | — |
| terminal | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| voltage drop (mV) | | | | | | | | | | | |
| | Continued ageing: voltage drop after 10th alt. 25th cycle | | | | | | | | | | N |
| | Max. allowed voltage drop (mV) ..... : | | | | | | | | | | — |
| terminal | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| voltage drop (mV) | | | | | | | | | | | |
| | Continued ageing: voltage drop after 50th alt. 100th cycle | | | | | | | | | | N |
| | Max. allowed voltage drop (mV) ..... : | | | | | | | | | | — |
| terminal | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| voltage drop (mV) | | | | | | | | | | | |

## Attachment photos

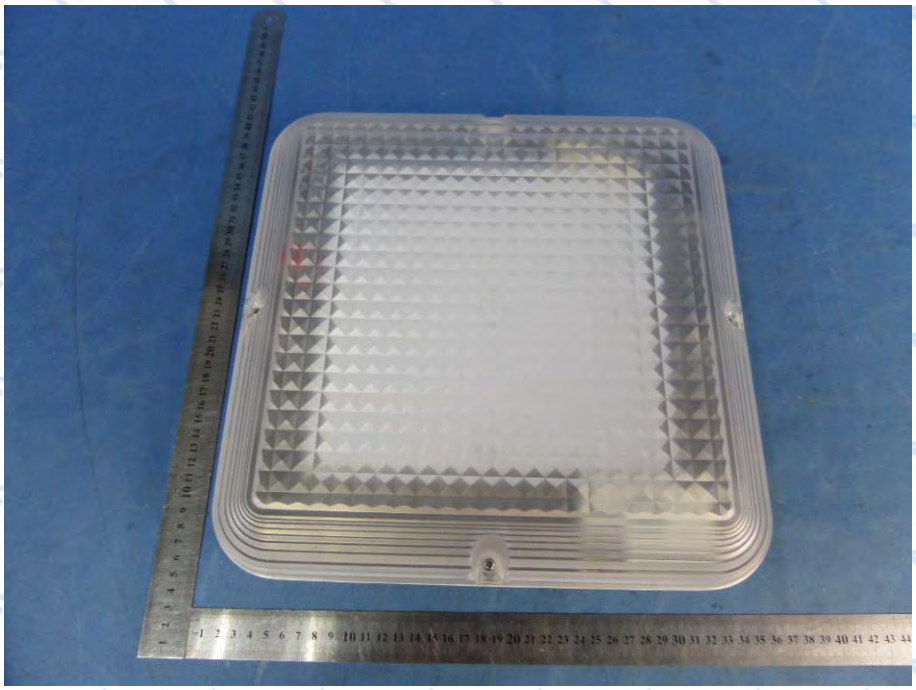

**Figure 1**

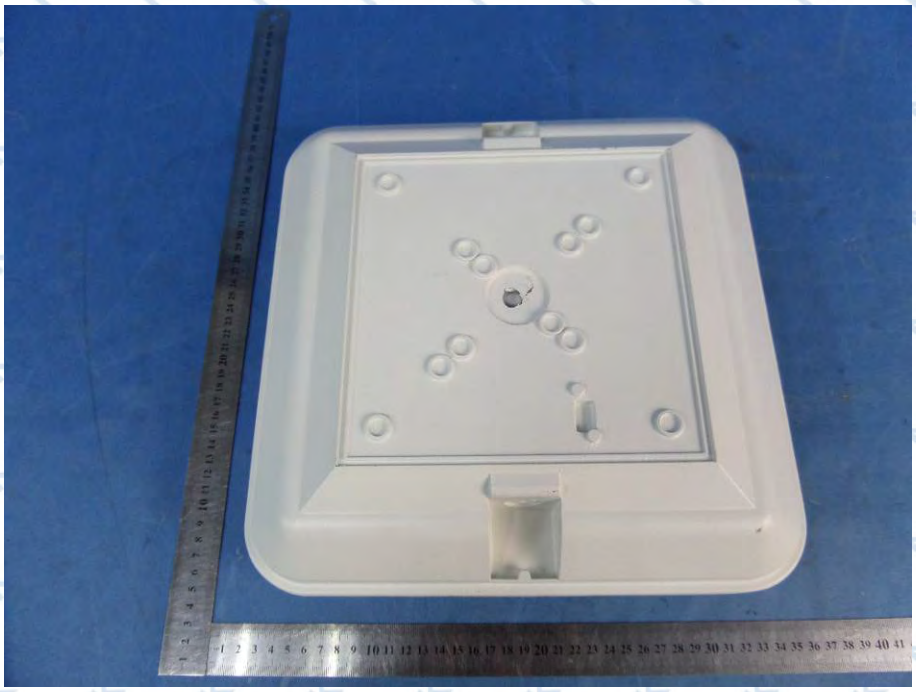

**Figure 2**

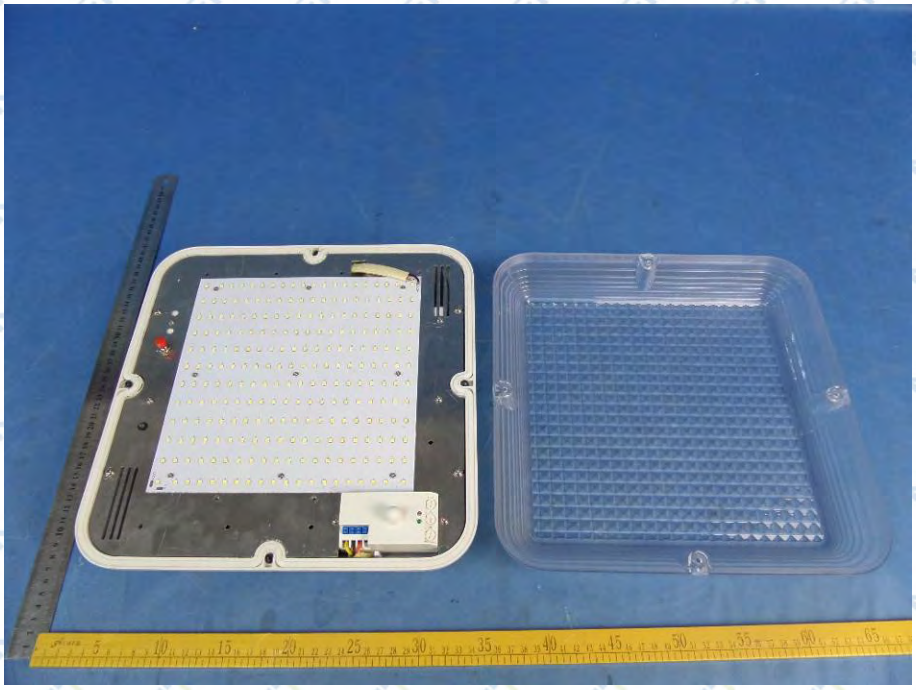

**Figure 3**

**Figure 4**

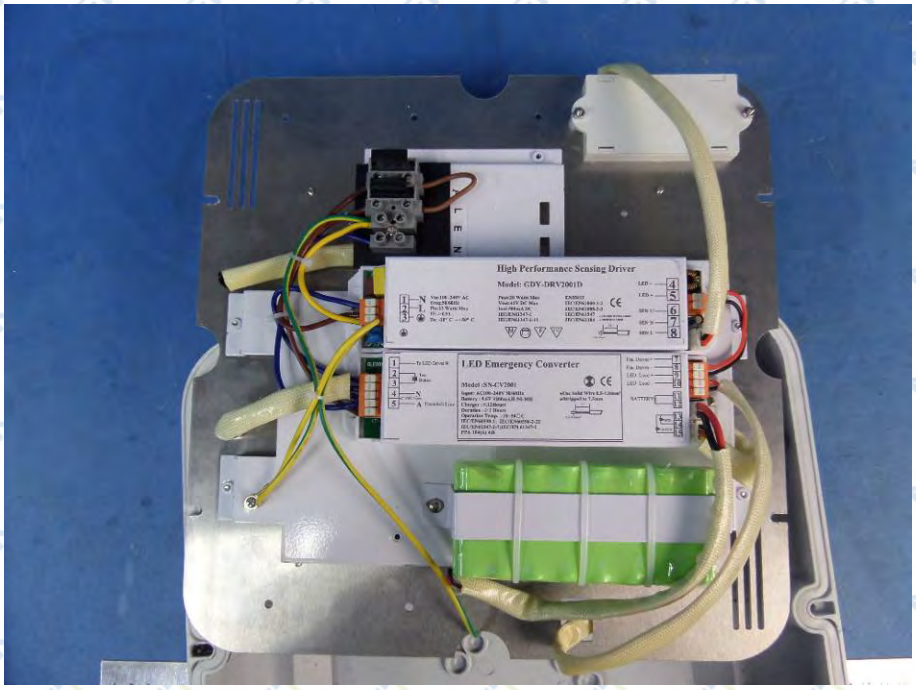


**Figure 5**


**Figure 6 LED emergency convert**

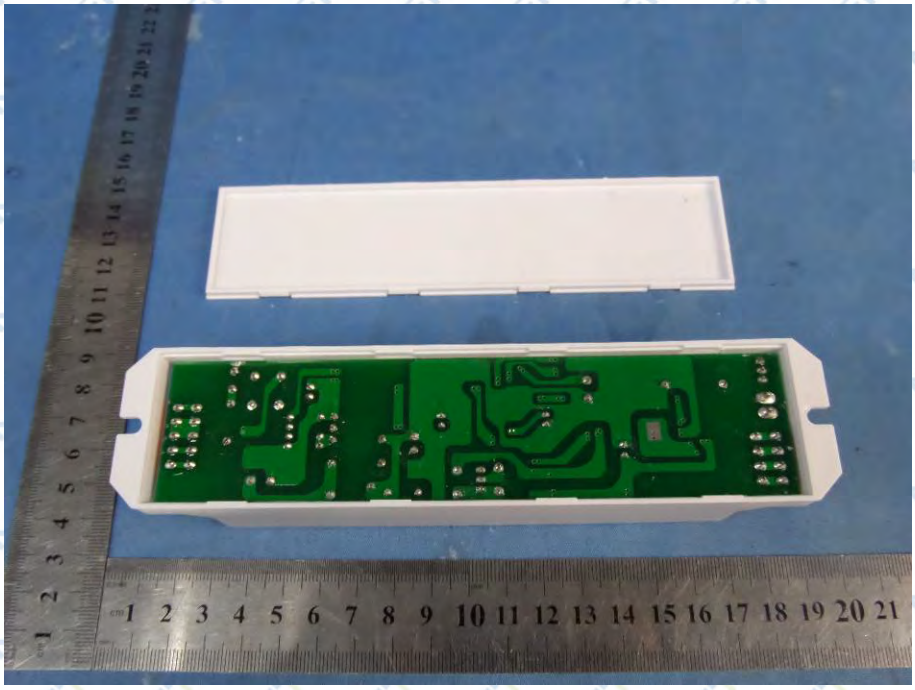

**Figure 7 LED emergency convert**

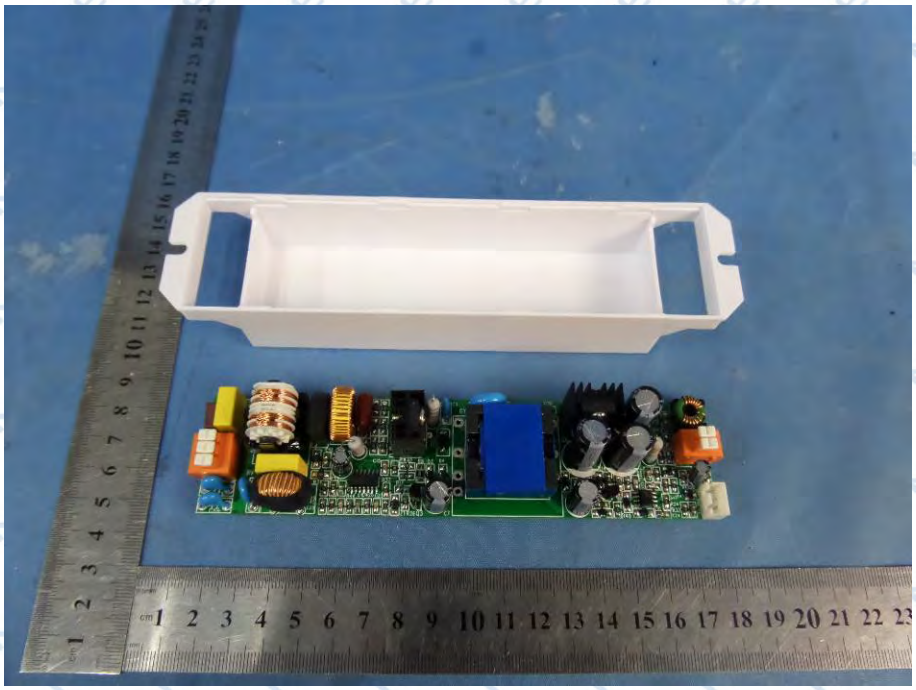

**Figure 7 LED driver**

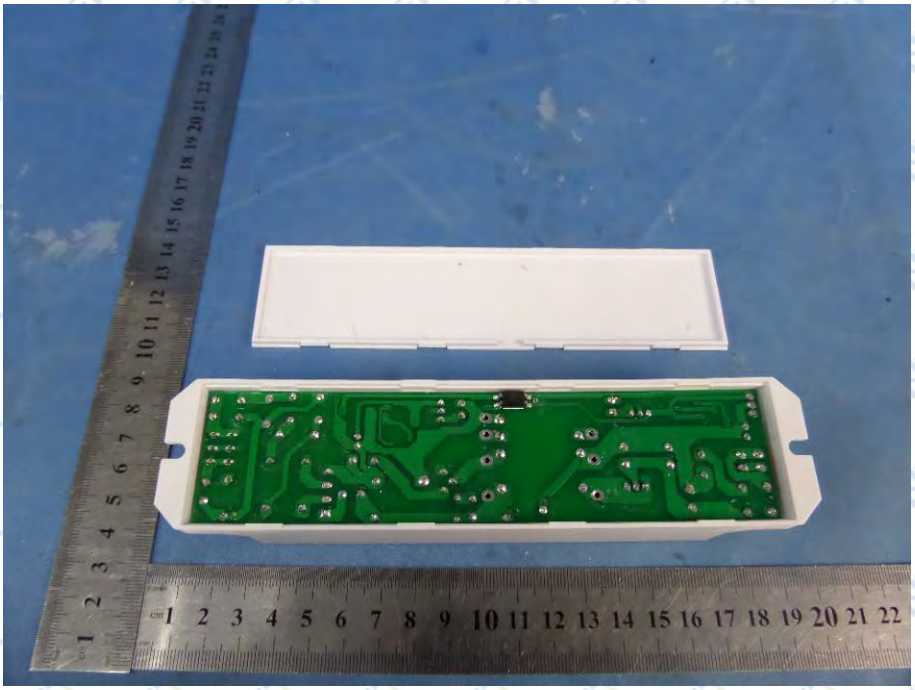

**Figure 9 LED driver**

**Figure 9 series model**

**Figure 10 series model**

※※※※※**END OF REPORT**※※※※※