

IEC SYSTEM FOR MUTUAL RECOGNITION OF TEST CERTIFICATES FOR ELECTRICAL EQUIPMENT
(IECEE) CB SCHEME

CB TEST CERTIFICATE

Product

LED STRIP LIGHT

Name and address of the applicant

ATC MIDDLE EAST FZCO
Jebel Ali JAFZA 18&19 BCW
Dubai, United Arab Emirates

Name and address of the manufacturer

Foshan Aidike trading CO., LTD
Floor 5th, No. 9 Nanmian Road, Junan Town, Shunde district
Foshan City, Guangdong Province, China

Name and address of the factory

Foshan Aidike trading CO., LTD
Floor 5th, No. 9 Nanmian Road, Junan Town, Shunde district
Foshan City, Guangdong Province, China

Ratings and principal characteristics

AC 220-240V; 50/60Hz; ta:45°C; Class II;
For other ratings, see the test report.

Trademark (if any)

Rafeed

Customer's Testing Facility (CTF) Stage used

N/A

Model / Type Ref.

RFE-0097A; RFE-0409; RFE-0453; RFE-0454; RFE-0098A;
RFE-0410A; RFE-0167A; RFE-0225A; RFE-0226A; RFE-0227A;
RFE-0228A; RFE-0344AAdditional information (if necessary may
also be reported on page 2)

-see also test report ref no. 50309703 001.

A sample of the product was tested and
found to be in conformity withIEC 60598-2-21:2014
IEC 60598-1:2014As shown in the Test Report Ref. No. which
forms part of this Certificate

50309703 001

This CB Test Certificate is issued by the National Certification Body



TÜV Rheinland LGA Products GmbH
Tillystraße 2 · 90431 Nürnberg, Germany
Phone + 49 221 806-1371
Fax + 49 221 806-3935
Mail: cert-validity@de.tuv.com
Web: www.tuv.com



Date:

11.12.2019

Signature:

Hongyan Yu

**Business Stream Products
Certification Department**



TÜV Rheinland LGA Products GmbH · 90431 Nürnberg

ATC MIDDLE EAST FZCO
Jebel Ali JAFZA 18&19 BCW
DUBAI
UNITED ARAB EMIRATES

Contact

Tel. +49 911 655-5225
Mail service@de.tuv.com

Date December 11, 2019

Application for : **CB-Zertifikat**
Certificate No. : DE 02026441
Device : Lighting Chain
LED STRIP LIGHT
Type : see Certificate
Test requirement : IEC 60598-2-21:2014
IEC 60598-1:2014

Dear Madame or Sir,

The submitted sample of the product has been tested and in this configuration found to be in accordance with the above mentioned requirements.
Enclosed please find the certificate No. DE 02026441.

Kind regards

Certification body


Hongyan Yu

Test sample: no, documentation available

TÜV Rheinland
LGA Products GmbH

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Nuremberg HRB 26013
VAT No.: DE 811835490



Test Report issued under the responsibility of:



**TEST REPORT
IEC 60598-2-21
Part 2: Particular requirements
Section 21: Rope Lights**

Report Number..... : 50309703 001

Date of issue : 03-12-2019

Total number of pages 41 pages

**Name of Testing Laboratory
preparing the Report** TÜV Rheinland/CCIC(Ningbo) Co., Ltd

Applicant's name : **ATC MIDDLE EAST FZCO**

Address..... : Jebel Ali JAFZA 18&19 BCW Dubai United Arab Emirates

Test specification:

Standard : IEC 60598-2-21:2014 (First Edition) used in conjunction with
IEC 60598-1:2014 (Eighth Edition)

Test procedure..... : CB Scheme

Non-standard test method..... : N/A

Test Report Form No. : IEC60598_2_21A

Test Report Form(s) Originator : DEKRA Certification B.V.

Master TRF : 2016-01

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**This report is not valid as a CB Test Report unless signed by an approved CB Testing Laboratory
and appended to a CB Test Certificate issued by an NCB in accordance with IECEE 02.**

General disclaimer:

The test results presented in this report relate only to the object tested.

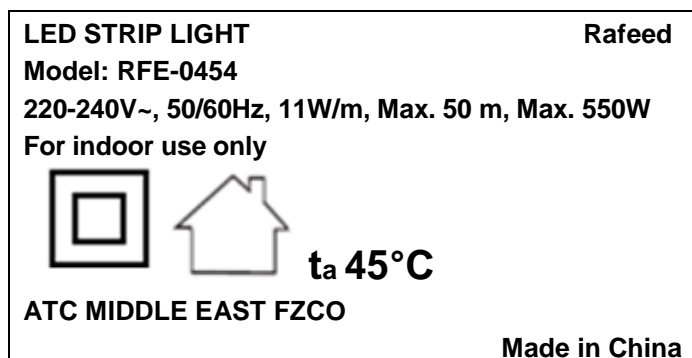
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| | | |
|---|---|---------------------------------|
| Test item description | LED STRIP LIGHT | |
| Trade Mark | Rafeed | |
| Manufacturer | Foshan Aidike trading co., LTD Floor 5th, No. 9 Nanmian Road, Junan Town, Shunde district, Foshan City, Guangdong Province, China | |
| Model/Type reference | RFE-0097A, RFE-0409, RFE-0453, RFE-0454, RFE-0098A, RFE-0410A, RFE-0167A, RFE-0225A, RFE-0226A, RFE-0227A, RFE-0228A, RFE-0344A | |
| Ratings | 220-240 V~, 50/60 Hz, Class II, ta45°C, Details see model list on page 6. | |
| Responsible Testing Laboratory (as applicable), testing procedure and testing location(s): | | |
| <input checked="" type="checkbox"/> CB Testing Laboratory: | TÜV Rheinland/CCIC(Ningbo) Co., Ltd | |
| Testing location/ address | 3F, Building C13, R&D Park, No.32 Lane 299 Guanghua Road, National Hi-Tech Zone, Ningbo 315048, China | |
| <input type="checkbox"/> Associated CB Testing Laboratory: | | |
| Testing location/ address | | |
| Tested by (name, function, signature) | Jing zheng | PE <i>Jing zheng</i> |
| Approved by (name, function, signature) .. | Chengchao Huang | Reviewer <i>Chengchao Huang</i> |
| <input type="checkbox"/> Testing procedure: CTF Stage 1: | | |
| Testing location/ address | N/A | |
| Tested by (name, function, signature) | N/A | |
| Approved by (name, function, signature) .. | N/A | |
| <input type="checkbox"/> Testing procedure: CTF Stage 2: | | |
| Testing location/ address | N/A | |
| Tested by (name + signature) | N/A | |
| Witnessed by (name, function, signature) .: | N/A | |
| Approved by (name, function, signature) .. | N/A | |
| <input type="checkbox"/> Testing procedure: CTF Stage 3: | | |
| <input type="checkbox"/> Testing procedure: CTF Stage 4: | | |
| Testing location/ address | N/A | |
| Tested by (name, function, signature) | N/A | |
| Witnessed by (name, function, signature) .: | N/A | |
| Approved by (name, function, signature) .. | N/A | |
| Supervised by (name, function, signature) : | N/A | |

| | |
|--|---|
| <p>List of Attachments (including a total number of pages in each attachment):</p> <p>Attachment 1: Tests according to IEC 62031:2018. (1 page)</p> <p>Attachment 2: Photobiological safety of lamps and lamp systems were according to standard IEC TR 62778:2014. (2 pages)</p> <p>Attachment 3: Tests according to IEC 61347-2-11:2001 used in conjunction with IEC 61347-1:2015. (21 pages)</p> <p>Attachment 4: photo document. (9 pages)</p> | |
| <p>Summary of testing:</p> | |
| <p>Tests performed (name of test and test clause):</p> <p>21.4 (0) General test requirements</p> <p>21.5 (2) Classification of luminaires</p> <p>21.6 (3) Marking</p> <p>21.7 (4) Construction</p> <p>21.8 (11) Creepage distances and Clearances</p> <p>21.11 (5) External and internal wiring</p> <p>21.12 (8) Protection against electric shock</p> <p>21.13(12) Endurance test and thermal tests</p> <p>21.14 (9) Resistance to dust and moisture</p> <p>21.15(10) Insulation resistance and electric strength</p> <p>21.16(13) Resistance to heat, fire and tracking</p> <p>All test items are applied to the model RFE-0454, and RFE-0167A which are considered representative for the series and give the most unfavourable test results. And the other model had been tested with construction check.</p> | <p>Testing location:</p> <p>TÜV Rheinland/CCIC(Ningbo) Co., Ltd 3F, Building C13, R&D Park, No.32 Lane 299 Guanghua Road, National Hi-Tech Zone, Ningbo 315048, China</p> |
| <p>Summary of compliance with National Differences (List of countries addressed):</p> <p>N/A</p> | |

Copy of marking plate:

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



On supply cable of product.

Note 1: The height of letters and numerals is 2mm;

Note 2: The height of graphical symbol is 5mm;

Note 3: The others' rating labels are only different from the model name and electrical parameter.

| | |
|---|--|
| Test item particulars: | |
| Classification of installation and use: LED-fixed luminaires, for indoor use only | |
| Supply Connection: supply cords | |
|: | |
| Possible test case verdicts: | |
| - test case does not apply to the test object..... : N/A | |
| - test object does meet the requirement..... : P (Pass) | |
| - test object does not meet the requirement..... : F (Fail) | |
| Testing: | |
| Date of receipt of test item : 25-09-2018 | |
| Date (s) of performance of tests : 25-09-2018 to 30-10-2019 | |
| | |
| General remarks: | |
| "(See Enclosure #)" refers to additional information appended to the report. "(See appended table)" refers to a table appended to the report. | |
| Throughout this report a <input checked="" type="checkbox"/> comma / <input type="checkbox"/> point is used as the decimal separator. | |
| Clause numbers between brackets refer to clauses in IEC 60598-1 | |
| Manufacturer's Declaration per sub-clause 4.2.5 of IEC 02: | |
| The application for obtaining a CB Test Certificate includes more than one factory location and a declaration from the Manufacturer stating that the sample(s) submitted for evaluation is (are) representative of the products from each factory has been provided : | <input type="checkbox"/> Yes <input checked="" type="checkbox"/> Not applicable |
| When differences exist; they shall be identified in the General product information section. | |
| Name and address of factory (ies) : Same as the manufacturer | |

General product information:

Product: LED STRIP LIGHT


Rating: AC 220-240 V, 50/60 Hz, Class II, ta45°C, Details see below model list.

1. The products under test are general purpose use luminaries, intend to use indoor only.
2. The lighting chains equipped with non-replaceable lighting source.
3. The lighting chains are class II luminaries, ta45°C, and suitable for direct mounting on normally flammable surfaces.
4. The lighting chains intend to only to be installed outside arms reach.
5. The lighting chains connect to the mains supply via the supply cords, and it shall be installed the product according to the instruction manual.
6. All models have the same construction and electronic control device, except the dimension, LED module and power parameter.
7. The lighting chains have no interconnection connecting device, do not allow interconnection each other and it can't allow exceed the maximum length indicated by manufacturer.
8. This CB report is for IECEE registration only.

Details refer to the model list.

| Model list | | | | | | | |
|------------|--------------|--------------------|------------------------|---------------------------|-----------------|---------|-------|
| Series No. | Model number | Wattage (W/m Max.) | Total Wattage (W Max.) | Electronic control device | Max. Length (m) | LED | CCT |
| 1 | RFE-0097A | 10 | 500 | Rectifier bridge | 50 | SMD5050 | RGB |
| | RFE-0409 | 10 | 500 | | | | RGB |
| | RFE-0453 | 10 | 500 | | | | RGB |
| | RFE-0454 | 11 | 550 | | | | RGB |
| 2 | RFE-0098A | 7 | 350 | | | SMD2835 | 3000K |
| | RFE-0410A | 7 | 350 | | | | 4000K |
| | RFE-0167A | 7 | 350 | | | | 6000K |
| | RFE-0225A | 6 | 300 | | | | G |
| | RFE-0226A | 6 | 300 | | | | B |
| | RFE-0227A | 6 | 300 | | | | P |
| | RFE-0228A | 6 | 300 | | | | Y |
| | RFE-0344A | 6 | 300 | | | | R |

| IEC 60598-2-21 | | | |
|-----------------|---|---|----------|
| Clause | Requirement + Test | Result - Remark | Verdict |
| 21.4 (0) | GENERAL TEST REQUIREMENTS | | P |
| 21.4 (0.1) | Information for luminaire design considered | Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> Lamp standard: IEC 62031 | — |
| 21.4 (0.3) | More sections applicable | Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> Section/s: | — |
| 21.5 (2) | CLASSIFICATION | | P |
| 21.5 (2.2) | Type of protection | Class II | P |
| 21.5 (2.3) | Degree of protection | IP20 | P |
| 21.5 (2.4) | Luminaire suitable for direct mounting on normally flammable surfaces | Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> | — |
| 21.5 (2.5) | Luminaire for normal use | Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> | — |
| | Luminaire for rough service | Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> | — |
| 21.5.2 (-) | Class II or Class III | Class II | P |
| 21.5.3 (-) | Rope lights for outdoor use shall be IP44 or higher | Only for indoor use | N/A |
| 21.6 (3) | MARKING | | P |
| 21.6 (3.2) | Mandatory markings | See "Copy of marking plate" | P |
| | Position of the marking | On supply cable of product | P |
| | Format of symbols/text | Both are used on the marking | P |
| 21.6 (3.3) | Additional information | User manual | P |
| | Language of instructions | Official language | P |
| 21.6 (3.3.1) | Combination luminaires | Not combination luminaire | N/A |
| 21.6 (3.3.2) | Nominal frequency in Hz | 50/60 Hz | P |
| 21.6 (3.3.3) | Operating temperature | | N/A |
| 21.6 (3.3.4) | Symbol or warning notice | | N/A |
| 21.6 (3.3.5) | Wiring diagram | | N/A |
| 21.6 (3.3.6) | Special conditions | | N/A |
| 21.6 (3.3.7) | Metal halide lamp luminaire – warning | Not metal halide lamp luminaire | N/A |
| 21.6 (3.3.8) | Limitation for semi-luminaires | Not semi-luminaires | N/A |
| 21.6 (3.3.9) | Power factor and supply current | | N/A |
| 21.6 (3.3.10) | Suitability for use indoors | | N/A |
| 21.6 (3.3.11) | Luminaires with remote control | No remote control | N/A |

| IEC 60598-2-21 | | | |
|-------------------|---|---|----------|
| Clause | Requirement + Test | Result - Remark | Verdict |
| 21.6 (3.3.12) | Clip-mounted luminaire – warning | No relevant device | N/A |
| 21.6 (3.3.13) | Specifications of protective shields | | N/A |
| 21.6 (3.3.14) | Symbol for nature of supply |  | P |
| 21.6 (3.3.15) | Rated current of socket outlet | No socket outlet | N/A |
| 21.6 (3.3.16) | Rough service luminaire | Not rough service luminaire | P |
| 21.6 (3.3.17) | Mounting instruction for type Y, type Z and some type X attachments | Type Z | N/A |
| 21.6 (3.3.18) | Non-ordinary luminaires with PVC cable | | N/A |
| 21.6 (3.3.19) | Protective conductor current in instruction if applicable | | P |
| 21.6 (3.3.20) | Provided with information if not intended to be mounted within arm's reach | Non-replaceable light sources | P |
| 21.6 (3.3.21) | Non replaceable and non-user replaceable light sources information provided | | P |
| | Cautionary symbol | | N/A |
| 21.6 (3.3.22) | Controllable luminaires, classification of insulation provided | | N/A |
| 21.6 (3.4) | Test with water | 15s with water, and then | P |
| | Test with hexane | 15s with petroleum hexane | P |
| | Legible after test | Legible and no curling | P |
| | Label attached | The marking is legible, and no curling | P |
| 21.6.2 (-) | Rope light marking | | P |
| | Rated voltage and wattage marked on the rope light | | P |
| | Durable non-removable label if information on the cable | | P |
| 21.6.3 (-) | Rope light and packing marking | | P |
| | Marking if only for indoor use | | P |
| 21.6.4 (-) | Marking on the packing or instructions | | P |
| | Marking a) – e) | See instruction manual | P |

| IEC 60598-2-21 | | | |
|-------------------|--|-----------------|------------|
| Clause | Requirement + Test | Result - Remark | Verdict |
| 21.7 (4) | CONSTRUCTION | | P |
| 21.7 (4.2) | Components replaceable without difficulty | | N/A |
| 21.7 (4.3) | Wireways smooth and free from sharp edges | | P |
| 21.7 (4.4) | Lampholders | | N/A |
| 21.7 (4.4.1) | Integral lampholder | No lampholder | N/A |
| 21.7 (4.4.2) | Wiring connection | | N/A |
| 21.7 (4.4.3) | Lampholder for end-to-end mounting | | N/A |
| 21.7 (4.4.4) | Positioning | | N/A |
| | - pressure test (N) | | — |
| | After test the lampholder comply with relevant standard sheets and show no damage | | N/A |
| | After test on single-capped lampholder the lampholder have not moved from its position and show no permanent deformation | | N/A |
| | - bending test (N) | | — |
| | After test the lampholder have not moved from its position and show no permanent deformation | | N/A |
| 21.7 (4.4.5) | Peak pulse voltage | | N/A |
| 21.7 (4.4.6) | Centre contact | | N/A |
| 21.7 (4.4.7) | Parts in rough service luminaires resistant to tracking | | N/A |
| 21.7 (4.4.8) | Lamp connectors | | N/A |
| 21.7 (4.4.9) | Caps and bases correctly used | | N/A |
| 21.7 (4.4.10) | Light source for lampholder or connection according IEC 60061 not connected another way | | N/A |
| 21.7 (4.5) | Starter holders | | N/A |
| | Starter holder in luminaires other than class II | | N/A |
| | Starter holder class II construction | | N/A |
| 21.7 (4.7) | Terminals and supply connections | | N/A |
| 21.7 (4.7.1) | Contact to metal parts | | N/A |
| 21.7 (4.7.2) | Test 8 mm live conductor | | N/A |
| | Test 8 mm earth conductor | | N/A |
| 21.7 (4.7.3) | Terminals for supply conductors | | N/A |
| 21.7 (4.7.3.1) | Welded method and material | | N/A |
| | - stranded or solid conductor | | N/A |
| | - spot welding | | N/A |

| IEC 60598-2-21 | | | |
|-----------------------|--|---|------------|
| Clause | Requirement + Test | Result - Remark | Verdict |
| | - welding between wires | | N/A |
| | - Type Z attachment | | N/A |
| | - mechanical test according to 15.6.2 | | N/A |
| | - electrical test according to 15.6.3 | | N/A |
| | - heat test according to 15.6.2.3 and 15.6.2.4 | | N/A |
| 21.7 (4.7.4) | Terminals other than supply connection | | N/A |
| 21.7 (4.7.5) | Heat-resistant wiring/sleeves | | N/A |
| 21.7 (4.7.6) | Multi-pole plug | | N/A |
| | - test at 30 N | | N/A |
| 21.7 (4.8) | Switches | | N/A |
| | - adequate rating | | N/A |
| | - adequate fixing | | N/A |
| | - polarized supply | | N/A |
| | - compliance with IEC 61058-1 for electronic switches | | N/A |
| 21.7 (4.9) | Insulating lining and sleeves | | N/A |
| 21.7 (4.9.1) | Retainment | | N/A |
| | Method of fixing | | N/A |
| 21.7 (4.9.2) | Insulated linings and sleeves: | | N/A |
| | Resistant to a temperature > 20 °C to the wire temperature or | | N/A |
| | a) & c) Insulation resistance and electric strength | | N/A |
| | b) Ageing test. Temperature (°C) | | N/A |
| 21.7 (4.10) | Double or reinforced insulation | | P |
| 21.7 (4.10.1) | No contact, mounting surface – accessible metal parts – wiring of basic insulation | No metal encased class II luminaries | N/A |
| | Safe installation fixed luminaires | Refer to instruction, mounting by fixed clips | P |
| | Capacitors and switches | No such capacitors and switches. | N/A |
| | Interference suppression capacitors according to IEC 60384-14 | | N/A |
| 21.7 (4.10.2) | Assembly gaps: | | N/A |
| | - not coincidental | | N/A |
| | - no straight access with test probe | | N/A |

| IEC 60598-2-21 | | | |
|--------------------|--|--|------------|
| Clause | Requirement + Test | Result - Remark | Verdict |
| 21.7 (4.10.3) | Retention of insulation: | | N/A |
| | - fixed | | N/A |
| | - unable to be replaced; luminaire inoperative | | N/A |
| | - sleeves retained in position | | N/A |
| | - lining in lampholder | | N/A |
| 21.7 (4.11) | Electrical connections and current-carrying parts | | P |
| 21.7 (4.11.1) | Contact pressure | | N/A |
| 21.7 (4.11.2) | Screws: | | N/A |
| | - self-tapping screws | | N/A |
| | - thread-cutting screws | | N/A |
| 21.7 (4.11.3) | Screw locking: | | N/A |
| | - spring washer | | N/A |
| | - rivets | | N/A |
| 21.7 (4.11.4) | Material of current-carrying parts | Alloy containing at least 50 % copper is used for current-carrying parts | P |
| 21.7 (4.11.5) | No contact to wood or mounting surface | | P |
| 21.7 (4.11.6) | Electro-mechanical contact systems | | N/A |
| 21.7 (4.12) | Screws and connections (mechanical) and glands | | N/A |
| 21.7 (4.12.1) | Screws not made of soft metal | | N/A |
| | Screws of insulating material | | N/A |
| | Torque test: torque (Nm); part..... : | | N/A |
| | Torque test: torque (Nm); part..... : | | N/A |
| | Torque test: torque (Nm); part..... : | | N/A |
| 21.7 (4.12.2) | Screws with diameter < 3 mm screwed into metal | | N/A |
| 21.7 (4.12.4) | Locked connections: | | N/A |
| | - fixed arms; torque (Nm) : | | N/A |
| | - lampholder; torque (Nm) : | | N/A |
| | - push-button switches; torque 0,8 Nm : | | N/A |

| IEC 60598-2-21 | | | |
|--------------------|---|--|----------|
| Clause | Requirement + Test | Result - Remark | Verdict |
| 21.7 (4.12.5) | Screwed glands; force (Nm)..... : | | N/A |
| 21.7 (4.13) | Mechanical strength | | P |
| 21.7 (4.13.1) | Impact tests: | | P |
| | - fragile parts; energy (Nm) : | | N/A |
| | - other parts; energy (Nm)..... : | Enclosure of electronic control device and pipes, 0,5 | P |
| | 1) live parts | After test, no live parts become accessible | P |
| | 2) linings | | N/A |
| | 3) protection | Sample can be continued to afford protection against ingress of dust, solid objects and moisture, in accordance with its classification. | P |
| | 4) covers | | P |
| 21.7 (4.13.3) | Straight test finger | | P |
| 21.7 (4.13.4) | Rough service luminaires | | N/A |
| | - IP54 or higher | Ordinary luminaries | N/A |
| | a) fixed | | N/A |
| | b) hand-held | | N/A |
| | c) delivered with a stand | | N/A |
| | d) for temporary installations and suitable for mounting on a stand | | N/A |
| 21.7 (4.13.6) | Tumbling barrel | | N/A |
| 21.7 (4.14) | Suspensions, fixings and means of adjusting | | P |
| 21.7 (4.14.1) | Mechanical load: | | P |
| | A) four times the weight | | P |
| | B) torque 2,5 Nm | | N/A |
| | C) bracket arm; bending moment (Nm)..... : | | N/A |
| | D) load track-mounted luminaires | | N/A |
| | E) clip-mounted luminaires, glass-shelve. Thickness (mm) | | N/A |
| | Metal rod. diameter (mm) | | N/A |

| IEC 60598-2-21 | | | |
|--------------------|--|--|----------|
| Clause | Requirement + Test | Result - Remark | Verdict |
| | Fixed luminaire or independent control gear without fixing devices | | N/A |
| 21.7 (4.14.2) | Load to flexible cables | | N/A |
| | Mass (kg) | The lighting chains will be suspended by other support, which will be flexible around or on the support. | — |
| | Stress in conductors (N/mm ²) | | N/A |
| | Mass (kg) of semi-luminaire | | N/A |
| | Bending moment (Nm) of semi-luminaire | | N/A |
| 21.7 (4.14.3) | Adjusting devices: | | N/A |
| | - flexing test; number of cycles..... | | N/A |
| | - strands broken | | N/A |
| | - electric strength test afterwards | | N/A |
| 21.7 (4.14.4) | Telescopic tubes: cords not fixed to tube; no strain on conductors | | N/A |
| 21.7 (4.14.5) | Guide pulleys | | N/A |
| 21.7 (4.14.6) | Strain on socket-outlets | | N/A |
| 21.7 (4.15) | Flammable materials | | P |
| | - glow-wire test 650°C | See Test Table 21.16 (13.3.2) | P |
| | - spacing ≥ 30 mm | | N/A |
| | - screen withstanding test of 13.3.1 | | N/A |
| | - screen dimensions | | N/A |
| | - no fiercely burning material | | P |
| | - thermal protection | | N/A |
| | - electronic circuits exempted | | N/A |
| 21.7 (4.15.2) | Luminaires made of thermoplastic material with lamp control gear | | N/A |
| | a) construction | | N/A |
| | b) temperature sensing control | | N/A |
| | c) surface temperature | | N/ |
| 21.7 (4.16) | Luminaires for mounting on normally flammable surfaces | | P |
| | No lamp control gear | (compliance with Section 12) | N/A |

| IEC 60598-2-21 | | | |
|--------------------|---|-------------------------------|------------|
| Clause | Requirement + Test | Result - Remark | Verdict |
| 21.7 (4.16.1) | Lamp control gear spacing: | | N/A |
| | - spacing 35 mm | | N/A |
| | - spacing 10 mm | | N/A |
| 21.7 (4.16.2) | Thermal protection: | | N/A |
| | - in lamp control gear | | N/A |
| | - external | | N/A |
| | - fixed position | | N/A |
| | - temperature marked lamp control gear | | N/A |
| 21.7 (4.16.3) | Design to satisfy the test of 12.6 | (see clause 12.6) | N/A |
| 21.7 (4.17) | Drain holes | | N/A |
| | Clearance at least 5 mm | | N/A |
| 21.7 (4.18) | Resistance to corrosion | | N/A |
| 21.7 (4.18.1) | - rust-resistance | | N/A |
| 21.7 (4.18.2) | - season cracking in copper | | N/A |
| 21.7 (4.18.3) | - corrosion of aluminium | | N/A |
| 21.7 (4.19) | Igniters compatible with ballast | | N/A |
| 21.7 (4.20) | Rough service vibration | | N/A |
| 21.7 (4.21) | Protective shield | | N/A |
| 21.7 (4.21.1) | Shield fitted if tungsten halogen lamps or metal halide lamps | | N/A |
| | Shield of glass if tungsten halogen lamps | | N/A |
| 21.7 (4.21.2) | Particles from a shattering lamp not impair safety | | N/A |
| 21.7 (4.21.3) | No direct path | | N/A |
| 21.7 (4.21.4) | Impact test on shield | | N/A |
| | Glow-wire test on lamp compartment..... : | See Test Table 21.16 (13.3.2) | N/A |
| 21.7 (4.22) | Attachments to lamps not cause overheating or damage | | N/A |
| 21.7 (4.23) | Semi-luminaires comply Class II | | N/A |
| 21.7 (4.24) | Photobiological hazards | | P |

| IEC 60598-2-21 | | | |
|--------------------|--|-----------------|------------|
| Clause | Requirement + Test | Result - Remark | Verdict |
| 21.7 (4.24.1) | No excessive UV radiation if tungsten halogen lamps and metal halide lamps (Annex P) | | N/A |
| 21.7 (4.24.2) | Retinal blue light hazard | | P |
| | Luminaires with E_{thr} : | | N/A |
| | a) Fixed luminaires | RG0 | N/A |
| | - distance x m, borderline between RG1 and RG2 ...: | | N/A |
| | - marking and instruction according 3.2.23 | | N/A |
| | b) Portable and handheld luminaires | | N/A |
| | - marking according 3.2.23 if RG1 exceeded at 200 mm according to IEC/TR 62778 | | N/A |
| | Portable luminaires for children IEC 60598-2-10 and Mains socket outlet nightlights IEC 60598-2-12 not exceed RG1 at 200 mm according to IEC/62778 | | N/A |
| 21.7 (4.25) | Mechanical hazard | | P |
| | No sharp point or edges | | P |
| 21.7 (4.26) | Short-circuit protection | | N/A |
| 21.7 (4.26.1) | Adequate means of uninsulated accessible SELV parts | | N/A |
| 21.7 (4.26.2) | Short-circuit test with test chain according 4.26.3 | | N/A |
| | Test chain not melt through | | N/A |
| | Test sample not exceed values of Table 12.1 and 12.2 | | N/A |
| 21.7 (4.27) | Terminal blocks with integrated screwless earthing contacts | | N/A |
| | Test according Annex V | | N/A |
| | Pull test of terminal fixing (20 N) | | N/A |
| | After test, resistance < 0,05 Ω | | N/A |
| | Pull test of mechanical connection (50 N) | | N/A |
| | After test, resistance < 0,05 Ω | | N/A |
| | Voltage drop test, resistance < 0,05 Ω | | N/A |
| 21.7 (4.28) | Fixing of thermal sensing control | | N/A |
| | Not plug-in or easily replaceable type | | N/A |
| | Reliably kept in position | | N/A |
| | No adhesive fixing if UV radiations from a lamp can degrade the fixing | | N/A |
| | Not outside the luminaire enclosure | | N/A |

| IEC 60598-2-21 | | | |
|--------------------|---|-----------------|------------|
| Clause | Requirement + Test | Result - Remark | Verdict |
| | Test of adhesive fixing: | | N/A |
| | Max. temperature on adhesive material (°C) : | | — |
| | 100 cycles between t min and t max | | N/A |
| | Temperature sensing control still in position | | N/A |
| 21.7 (4.29) | Luminaires with non-replaceable light source | | P |
| | Not possible to replace light source | | P |
| | Live part not accessible after parts have been opened by hand or tools | | P |
| 21.7 (4.30) | Luminaires with non-user replaceable light source | | N/A |
| | If protective cover provide protection against electric shock and marked with “caution, electric shock risk” symbol: | | N/A |
| | Minimum two fixing means | | N/A |
| 21.7 (4.31) | Insulation between circuits | | N/A |
| | Circuits insulated from LV supply fulfil requirements according 4.31.1 – 4.31.3 | | N/A |
| | Controllable luminaires requiring same level of insulation for all components, the insulation between control terminals and LV supply fulfil requirements according 4.31.1 – 4.31.3 | | N/A |
| 21.7 (4.31.1) | SELV circuits | | N/A |
| | Used SELV source | | N/A |
| | Voltage ≤ ELV | | N/A |
| | Insulating of SELV circuits from LV supply | | N/A |
| | Insulating of SELV circuits from other non SELV circuits | | N/A |
| | Insulating of SELV circuits from FELV | | N/A |
| | Insulating of SELV circuits from other SELV circuits | | N/A |
| | SELV circuits insulated from accessible parts according Table X.1 | | N/A |
| | Plugs not able to enter socket-outlets of other voltage systems | | N/A |
| | Socket outlets does not admit plugs of other voltage systems | | N/A |
| | Plugs and socket-outlets does not have protective conductor contact | | N/A |
| 21.7 (4.31.2) | FELV circuits | | N/A |

| IEC 60598-2-21 | | | |
|-----------------------|--|-------------------------------|------------|
| Clause | Requirement + Test | Result - Remark | Verdict |
| | Used FELV source | | N/A |
| | Voltage \leq ELV | | N/A |
| | Insulating of FELV circuits from LV supply | | N/A |
| | FELV circuits insulated from accessible parts according Table X.1 | | N/A |
| | Plugs not able to enter socket-outlets of other voltage systems | | N/A |
| | Socket outlets does not admit plugs of other voltage systems | | N/A |
| | Socket-outlets does not have protective conductor contact | | N/A |
| 21.7 (4.31.3) | Other circuits | | N/A |
| | Other circuits insulated from accessible parts according Table X.1 | | N/A |
| | Class II construction with equipotential bonding for protection against indirect contacts with live parts: | | N/A |
| | - conductive parts are connected together | | N/A |
| | - test according 7.2.3 | | N/A |
| | - conductive part not cause an electric shock in case of an insulation fault | | N/A |
| | - equipotential bonding in master/slave applications | | N/A |
| | - master luminaire provided with terminal for accessible conductive parts of slave luminaires | | N/A |
| | - slave luminaire constructed as class I | | N/A |
| 21.7 (4.32) | Overvoltage protective devices | | N/A |
| | Comply with IEC 61643-11 | | N/A |
| | External to controlgear and connected to earth: | | N/A |
| | - only in fixed luminaires | | N/A |
| | - only connected to protective earth | | N/A |
| 21.7.2 (-) | Terminal blocks | | N/A |
| | Clause 4.6 of IEC 60598-1 referring to terminal blocks does not apply | No terminal locks | — |
| 21.7.3 (-) | Terminals and supply connections | | P |
| | Comply with Annex A | No Interconnecting connectors | N/A |
| 21.7.4 (-) | Control units | | P |
| | Forming an integral part enclosed in non-flammable insulating material tested according 21.16 | | P |

| IEC 60598-2-21 | | | |
|----------------|--------------------|-----------------|---------|
| Clause | Requirement + Test | Result - Remark | Verdict |

| | | | |
|-------------------|---|--|------------|
| | Securely fixed to the cable | | P |
| | Electronic control device comply with IEC 61347-2-11 | | P |
| | LED driver comply with IEC 61347-2-13 | | N/A |
| 21.7.5 (-) | Mechanical strength | | P |
| | a) Rigid rope lights | | N/A |
| | 1) Pull test: force 60 N | | N/A |
| | 2) Torque test: torque 0,15 Nm | | N/A |
| | b) Flexible rope lights | | P |
| | 1) Pull test: force 60 N | | P |
| | 2) Torque test: torque 0,15 Nm | | P |
| | 3) Cylinder 150 mm @ 10 times at 25 °C ± 2 °C | | P |
| | For rope lights having an IP number over X0 Additionally: Cylinder 150 mm @ 10 times at -15 °C ± 2 °C | | N/A |
| | 4) Mandrel of between 4 and 5 times the diameter of test piece | | P |
| | c) Impact test at low temperature of -15 °C ± 5 °C | | P |

| | | | |
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| 21.8 (11) | CREEPAGE DISTANCES AND CLEARANCES | | P |
| 21.8 (11.2) | Creepage distances and clearances..... : | See Table 21.8 (11.2) | P |
| | Working voltage (V)..... : | 220-240V | — |
| | Rated pulse voltage (kV)..... : | -- | — |
| | Voltage form..... : | Sinusoidal <input checked="" type="checkbox"/> Non-sinusoidal <input type="checkbox"/> | — |
| | PTI..... : | < 600 <input checked="" type="checkbox"/> ≥ 600 <input type="checkbox"/> | — |
| | Impulse withstand category (Normal category II) (Category III Annex U) | Category II <input checked="" type="checkbox"/> Category III <input type="checkbox"/> | — |

| | | | |
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| 21.10 (14) | SCREW TERMINALS | | N/A |
| | Separately approved; component list | (see Annex 1) | N/A |
| | Part of the luminaire | (see Annex 3) | N/A |

| | | | |
|-------------------|---|---------------|------------|
| 21.10 (15) | SCREWLESS TERMINALS AND ELECTRICAL CONNECTIONS | | N/A |
| | Separately approved; component list..... : | (see Annex 1) | N/A |
| | Part of the luminaire..... : | (see Annex 4) | N/A |

| IEC 60598-2-21 | | | |
|--------------------|---|---------------------|----------|
| Clause | Requirement + Test | Result - Remark | Verdict |
| 21.11 (5) | EXTERNAL AND INTERNAL WIRING | | P |
| 21.11 (5.2) | Supply connection and external wiring | | P |
| 21.11 (5.2.1) | Means of connection | Supply cords | P |
| | Outdoor luminaire has not PVC insulated external wiring if not class III or SELV ≤ 25 V a.c./60 V d.c. or protected from outdoor environment | | N/A |
| 21.11 (5.2.2) | Type of cable | Replaced by 21.11.2 | — |
| | Nominal cross-sectional area (mm ²) | Replaced by 21.11.2 | — |
| | Cables equal to IEC 60227 or IEC 60245 | Replaced by 21.11.2 | — |
| 21.11 (5.2.3) | Type of attachment, X, Y or Z | Type Z | P |
| 21.11 (5.2.5) | Type Z not connected to screws | | P |
| 21.11 (5.2.6) | Cable entries: | | P |
| | - suitable for introduction | | P |
| | - adequate degree of protection | | P |
| 21.11 (5.2.7) | Cable entries through rigid material have rounded edges | | P |
| 21.11 (5.2.8) | Insulating bushings: | | N/A |
| | - suitably fixed | | N/A |
| | - material in bushings | | N/A |
| | - material not likely to deteriorate | | N/A |
| | - tubes or guards made of insulating material | | N/A |
| 21.11 (5.2.9) | Locking of screwed bushings | | N/A |
| 21.11 (5.2.10) | Cord anchorage: | | P |
| | - covering protected from abrasion | | P |
| | - clear how to be effective | | P |
| | - no mechanical or thermal stress | | P |
| | - no tying of cables into knots etc. | | P |
| | - insulating material or lining | | P |

| IEC 60598-2-21 | | | |
|---------------------|--|-----------------|---------|
| Clause | Requirement + Test | Result - Remark | Verdict |
| 21.11 (5.2.10.1) | Cord anchorage for type X attachment: | | N/A |
| | a) at least one part fixed | | N/A |
| | b) types of cable | | N/A |
| | c) no damaging of the cable | | N/A |
| | d) whole cable can be mounted | | N/A |
| | e) no touching of clamping screws | | N/A |
| | f) metal screw not directly on cable | | N/A |
| | g) replacement without special tool | | N/A |
| | Glands not used as anchorage | | N/A |
| | Labyrinth type anchorages | | N/A |
| 21.11 (5.2.10.2) | Adequate cord anchorage for type Y and type Z attachment | | N/A |
| 21.11 (5.2.10.3) | Tests: | | P |
| | - impossible to push cable; unsafe | | N/A |
| | - pull test: 25 times; pull (N) : 60 | | P |
| | - torque test: torque (Nm) : 0,15 | | P |
| | - displacement ≤ 2 mm | 0 | P |
| | - no movement of conductors | | P |
| | - no damage of cable or cord | | P |
| | - function independent of electrical connection | | P |
| 21.11 (5.2.11) | External wiring passing into luminaire | | N/A |
| 21.11 (5.2.12) | Looping-in terminals | | N/A |
| 21.11 (5.2.13) | Wire ends not tinned | | N/A |
| | Wire ends tinned: no cold flow | | P |
| 21.11 (5.2.14) | Mains plug same protection | | N/A |
| | Class III luminaire plug | | N/A |
| | No unsafe compatibility | | N/A |
| 21.11 (5.2.16) | Appliance inlets (IEC 60320) | | N/A |
| | Installation couplers (IEC 61535) | | N/A |

| IEC 60598-2-21 | | | |
|-----------------------|--|-----------------|----------|
| Clause | Requirement + Test | Result - Remark | Verdict |
| | Other appliance inlet or connector according relevant IEC standard | | N/A |
| 21.11 (5.2.17) | No standardized interconnecting cables properly assembled | | N/A |
| 21.11 (5.2.18) | Used plug in accordance with | | N/A |
| | - IEC 60083 | | N/A |
| | - other standard | | N/A |
| 21.11 (5.3) | Internal wiring | | P |
| 21.11 (5.3.1) | Internal wiring of suitable size and type | | P |
| | Through wiring | | N/A |
| | - not delivered/ mounting instruction | | N/A |
| | - factory assembled | | N/A |
| | - socket outlet loaded (A) | | N/A |
| | - temperatures | (see Annex 2) | N/A |
| | Green-yellow for earth only | | N/A |
| 21.11 (5.3.1.1) | Internal wiring connected directly to fixed wiring | | N/A |
| | Cross-sectional area (mm ²)..... | | N/A |
| | Insulation thickness | | N/A |
| | Extra insulation added where necessary | | N/A |
| 21.11 (5.3.1.2) | Internal wiring connected to fixed wiring via internal current-limiting device | | N/A |
| | Adequate cross-sectional area and insulation thickness | | N/A |
| 21.11 (5.3.1.3) | Double or reinforced insulation for class II | | P |
| 21.11 (5.3.1.4) | Conductors without insulation | | N/A |
| 21.11 (5.3.1.5) | SELV current-carrying parts | | N/A |
| 21.11 (5.3.1.6) | Insulation thickness other than PVC or rubber | | N/A |
| 21.11 (5.3.2) | Sharp edges etc. | | P |
| | No moving parts of switches etc. | | P |
| | Joints, raising/lowering devices | | N/A |

| IEC 60598-2-21 | | | |
|-----------------------|---|--|------------|
| Clause | Requirement + Test | Result - Remark | Verdict |
| | Telescopic tubes etc. | | N/A |
| | No twisting over 360° | | P |
| 21.11 (5.3.3) | Insulating bushings: | | N/A |
| | - suitable fixed | | N/A |
| | - material in bushings | | N/A |
| | - material not likely to deteriorate | | N/A |
| | - cables with protective sheath | | N/A |
| 21.11 (5.3.4) | Joints and junctions effectively insulated | | N/A |
| 21.11 (5.3.5) | Strain on internal wiring | | N/A |
| 21.11 (5.3.6) | Wire carriers | | N/A |
| 21.11 (5.3.7) | Wire ends not tinned | | N/A |
| | Wire ends tinned: no cold flow | | P |
| 21.11.2 (-) | Cables for rope lights | | P |
| | Type of cable | H05VV-F | P |
| | Cables not lighter than IEC 60227 or IEC 60245 for class II rope lights | | P |
| | Cables not lighter than insulation according to 5.3.1 of part 1 for class III rope lights | | N/A |
| | Nominal cross-sectional area (mm ²) | 2x0,75 | P |
| | Mechanical properties according 4.14.1 and 4.14.2 of part 1 | | P |
| 21.11.3 (-) | Cord anchorage test | | N/A |
| | Pull test 30 N 25 times on single-core cable | | N/A |
| 21.11.4 (-) | Plugs and cable length | | N/A |
| | Splash-proof plug or permanent connection if for outdoor use | | N/A |
| | Length of the cable between the plug and the connection to the rope light not less than 1,5 m | | N/A |
| 21.11.5 (-) | Maximum length of extendable class II rope lights | | P |
| | Maximum length 100 m for 0,5 mm ² cable | No interconnection device exist, no extendable lighting chains | N/A |
| | Maximum length 150 m for 0,75 mm ² cable | | P |

| IEC 60598-2-21 | | | |
|-----------------------|--|-----------------|----------|
| Clause | Requirement + Test | Result - Remark | Verdict |
| 21.12 (8) | PROTECTION AGAINST ELECTRIC SHOCK | | P |
| 21.12 (8.2.1) | Live parts not accessible | | P |
| | Basic insulated parts not used on the outer surface without appropriate protection | | P |
| | Basic insulated parts not accessible with standard test finger on portable, settable and adjustable luminaires | | N/A |
| | Basic insulated parts not accessible with Ø 50 mm probe from outside, other types of luminaires | | P |
| | Lamp and starterholders in portable and adjustable luminaires comply with double or reinforced insulation requirements | | N/A |
| | Basic insulation only accessible under lamp or starter replacement | | N/A |
| | Protection in any position | | P |
| | Double-ended tungsten filament lamp | | N/A |
| | Insulation lacquer not reliable | | P |
| | Double-ended high pressure discharge lamp | | N/A |
| | Relevant warning according to 3.2.18 fitted to the luminaire | | N/A |
| 21.12 (8.2.2) | Portable luminaire adjusted in most unfavourable position | | N/A |
| 21.12 (8.2.3.a) | Class II luminaire: | | P |
| | - basic insulated metal parts not accessible during starter or lamp replacement | | N/A |
| | - basic insulation not accessible other than during starter or lamp replacement | | N/A |
| | - glass protective shields not used as supplementary insulation | | N/A |
| 21.12 (8.2.3.b) | BC lampholder of metal in class I luminaires shall be earthed | | N/A |
| 21.12 (8.2.3.c) | SELV circuits with exposed current carrying parts: | | N/A |
| | Ordinary luminaire: | | N/A |
| | - touch current | | N/A |
| | - no-load voltage..... | | N/A |
| | Other than ordinary luminaire: | | N/A |
| | - nominal voltage | | N/A |

| IEC 60598-2-21 | | | |
|-------------------|--|-----------------|----------|
| Clause | Requirement + Test | Result - Remark | Verdict |
| 21.12 (8.2.4) | Portable luminaire have protection independent of supporting surface | | N/A |
| 21.12 (8.2.5) | Compliance with the standard test finger or relevant probe | | P |
| 21.12 (8.2.6) | Covers reliably secured | | P |
| 21.12 (8.2.7) | Discharging of capacitors $\geq 0,5 \mu\text{F}$ | | N/A |
| | Portable plug connected luminaire with capacitor | | N/A |
| | Other plug connected luminaire with capacitor | | N/A |
| | Discharge device on or within capacitor | | N/A |
| | Discharge device mounted separately | | N/A |
| 21.13 (12) | ENDURANCE TEST AND THERMAL TEST | | P |
| 21.13.1 (-) | If IP > IP 20 relevant test of (12.4), (12.5) and (12.6) after (9.2) before (9.3) specified in 21.14 | | P |
| 21.13 (12.3) | Endurance test: | | P |
| | - mounting-position..... : As normal use | | — |
| | - test temperature (°C) : 55 | | — |
| | - total duration (h) : 240 | | — |
| | - supply voltage: Un factor; calculated voltage (V)... : 1,1 x 240=264 | | — |
| | - lamp used..... : LED | | — |
| 21.13 (12.3.2) | After endurance test: | | P |
| | - no part unserviceable | | P |
| | - luminaire not unsafe | | P |
| | - no damage to track system | No track system | N/A |
| | - marking legible | | P |
| | - no cracks, deformation etc. | | P |
| 21.13 (12.4) | Thermal test (normal operation) | (see Annex 2) | P |
| 21.13 (12.5) | Thermal test (abnormal operation) | (see Annex 2) | N/A |
| 21.13 (12.6) | Thermal test (failed lamp control gear condition): | | N/A |
| 21.13 (12.6.1) | Through wiring or looping-in wiring loaded by a current of (A) : | | — |

| IEC 60598-2-21 | | | |
|---------------------|---|--------------------------|---------|
| Clause | Requirement + Test | Result - Remark | Verdict |
| | - case of abnormal conditions | | — |
| | - electronic lamp control gear | | N/A |
| | - measured winding temperature (°C): at 1,1 Un | | — |
| | - measured mounting surface temperature (°C) at 1,1 Un | | N/A |
| | - calculated mounting surface temperature (°C) | | N/A |
| | - track-mounted luminaires | | N/A |
| 21.13 (12.6.2) | Temperature sensing control | | N/A |
| | - case of abnormal conditions | | — |
| | - thermal link | | N/A |
| | - manual reset cut-out | | N/A |
| | - auto reset cut-out | | N/A |
| | - measured mounting surface temperature (°C) | | N/A |
| | - track-mounted luminaires | | N/A |
| 21.13 (12.7) | Thermal test (failed lamp control gear in plastic luminaires): | | N/A |
| 21.13 (12.7.1) | Luminaire without temperature sensing control | | N/A |
| 21.13 (12.7.1.1) | Luminaire with fluorescent lamp ≤ 70W | | N/A |
| | Test method 12.7.1.1 or Annex W | | — |
| | Test according to 12.7.1.1: | | N/A |
| | - case of abnormal conditions | | — |
| | - Ballast failure at supply voltage (V) | | — |
| | - Components retained in place after the test | | N/A |
| | - Test with standard test finger after the test | | N/A |
| | Test according to Annex W: | | N/A |
| | - case of abnormal conditions | | — |
| | - measured winding temperature (°C): at 1,1 Un | | — |
| | - measured temperature of fixing point/exposed part (°C): at 1,1 Un | | — |
| | - calculated temperature of fixing point/exposed part (°C) | | — |
| | Ball-pressure test | See Table 21.16 (13.2.1) | N/A |

| IEC 60598-2-21 | | | |
|---------------------|---|--|------------|
| Clause | Requirement + Test | Result - Remark | Verdict |
| 21.13 (12.7.1.2) | Luminaire with discharge lamp, fluorescent lamp > 70W, transformer > 10 VA | | N/A |
| | - case of abnormal conditions | | — |
| | - measured winding temperature (°C): at 1,1 Un | | — |
| | - measured temperature of fixing point/exposed part (°C): at 1,1 Un | | — |
| | - calculated temperature of fixing point/exposed part (°C) | | — |
| | Ball-pressure test | See Table 21.16 (13.2.1) | N/A |
| 21.13 (12.7.1.3) | Luminaire with short circuit proof transformers ≤ 10 VA | | N/A |
| | - case of abnormal conditions | | — |
| | - Components retained in place after the test | | N/A |
| | - Test with standard test finger after the test | | N/A |
| 21.13 (12.7.2) | Luminaire with temperature sensing control | | N/A |
| | - thermal link | Yes <input type="checkbox"/> No <input type="checkbox"/> | — |
| | - manual reset cut-out | Yes <input type="checkbox"/> No <input type="checkbox"/> | — |
| | - auto reset cut-out | Yes <input type="checkbox"/> No <input type="checkbox"/> | — |
| | - case of abnormal conditions | | — |
| | - highest measured temperature of fixing point/ exposed part (°C): | | — |
| | Ball-pressure test: | See Table 21.16 (13.2.1) | N/A |
| 21.13.2 (-) | Test voltage | | N/A |
| | Provision of 12.3.1 d) of part 1 and if class III rope lights 1,1 x rated voltage of transformer/convertor | | — |
| | Provision of 12.4.1 d) of part 1 and if class III rope lights 1,06 x rated voltage of transformer/convertor | | — |
| 21.13.3 (-) | Short-circuit test of rectifier | | N/A |
| | No emission of flames or molten material or production of flammable gases and no live parts accessible when short-circuit output of the rectifier | | N/A |
| 21.14 (9) | RESISTANCE TO DUST, SOLID OBJECTS AND MOISTURE | | P |
| 21.14 (-) | If IP > IP 20 the order of tests as specified in clause 21.13 | | — |
| 21.14 (9.2) | Tests for ingress of dust, solid objects and moisture: | | P |
| | - classification according to IP | IP20 | — |

| IEC 60598-2-21 | | | |
|----------------|--|-----------------|---------|
| Clause | Requirement + Test | Result - Remark | Verdict |
| | - mounting position during test | As normal use | — |
| | - fixing screws tightened; torque (Nm) | -- | — |
| | - tests according to clauses..... | Clauses 9.2.2 | — |
| | - electric strength test afterwards | Clauses 10.2.2 | P |
| | a) no deposit in dust-proof luminaire | | N/A |
| | b) no talcum in dust-tight luminaire | | N/A |
| | c) no trace of water on current-carrying parts or on insulation where it could become a hazard | | N/A |
| | d) i) For luminaires without drain holes – no water entry | | N/A |
| | d) ii) For luminaires with drain holes – no hazardous water entry | | N/A |
| | e) no water in watertight luminaire | | N/A |
| | f) no contact with live parts (IP 2X) | | P |
| | f) no entry into enclosure (IP 3X and IP 4X) | | N/A |
| | f) no contact with live parts (IP3X and IP4X) | | N/A |
| | g) no trace of water on part of lamp requiring protection from splashing water | | N/A |
| | h) no damage of protective shield or glass envelope | | N/A |
| 21.14 (9.3) | Humidity test 48 h | 25°C, 93 % R.H. | P |

| | | | |
|-------------------|---|-----------------------|----------|
| 21.15 (10) | INSULATION RESISTANCE AND ELECTRIC STRENGTH | | P |
| 21.15 (10.2.1) | Insulation resistance test | | P |
| | Cable or cord covered by metal foil or replaced by a metal rod of mm Ø | Covered by metal foil | — |
| | Insulation resistance (MΩ) | See below | — |
| | SELV | | N/A |
| | - between current-carrying parts of different polarity : | | N/A |
| | - between current-carrying parts and mounting surface..... | | N/A |
| | - between current-carrying parts and metal parts of the luminaire | | N/A |
| | - between the outer surface of a flexible cord or cable where it is clamped in a cord anchorage and accessible metal parts..... | | N/A |
| | - Insulation bushings as described in Section 5 | | N/A |

| IEC 60598-2-21 | | | |
|----------------|--|------------------------------|---------|
| Clause | Requirement + Test | Result - Remark | Verdict |
| | Other than SELV | | P |
| | - between live parts of different polarity | >100 | P |
| | - between live parts and mounting surface | >100 | P |
| | - between live parts and metal parts | | N/A |
| | - between live parts of different polarity through action of a switch | | N/A |
| | - between the outer surface of a flexible cord or cable where it is clamped in a cord anchorage and accessible metal parts | | N/A |
| | - Insulation bushings as described in Section 5 | | N/A |
| 21.15 (10.2.2) | Electric strength test | | P |
| | Dummy lamp | No ignitors and lampholders | N/A |
| | Luminaires with ignitors after 24 h test | | N/A |
| | Luminaires with manual ignitors | | N/A |
| | Test voltage (V) | See below | N/A |
| | SELV | | N/A |
| | - between current-carrying parts of different polarity : | | N/A |
| | - between current-carrying parts and mounting surface | | N/A |
| | - between current-carrying parts and metal parts of the luminaire | | N/A |
| | - between the outer surface of a flexible cord or cable where it is clamped in a cord anchorage and accessible metal parts | | N/A |
| | - Insulation bushings as described in Section 5 | | N/A |
| | Other than SELV | | P |
| | - between live parts of different polarity | 1480V | P |
| | - between live parts and mounting surface | 2960V | P |
| | - between live parts and metal parts | | N/A |
| | - between live parts of different polarity through action of a switch | | N/A |
| | - between the outer surface of a flexible cord or cable where it is clamped in a cord anchorage and accessible metal parts | | N/A |
| | - Insulation bushings as described in Section 5 | | N/A |
| 21.15 (10.3) | Touch current or protective conductor current (mA) : | Touch current: 0,015mA<0,7mA | P |

| IEC 60598-2-21 | | | |
|----------------|--------------------|-----------------|---------|
| Clause | Requirement + Test | Result - Remark | Verdict |

| 21.16 (13) | RESISTANCE TO HEAT, FIRE AND TRACKING | | P |
|----------------|--|-------------------------------|-----|
| 21.16 (13.2.1) | Ball-pressure test | See Test Table 21.16 (13.2.1) | P |
| 21.16 (13.3.1) | Needle-flame test (10 s) | See Test Table 21.16 (13.3.1) | P |
| 21.16 (13.3.2) | Glow-wire test (650°C) | See Test Table 21.16 (13.3.2) | P |
| 21.16 (13.4) | Proof tracking test (IEC 60112) | See Test Table 21.16 (13.4) | N/A |
| 20.16 (-) | Flexible pipes of rope lights in compliance with IEC 60811-508 | | P |

| IEC 60598-2-21 | | | |
|----------------|--------------------|-----------------|---------|
| Clause | Requirement + Test | Result - Remark | Verdict |

| | | | | | | | |
|--|---|-----|-----|-----|-----|------|-----|
| 21.8 (11.2) | TABLES: Creepage distances and clearances | | | | | | P |
| Table 11.1 | 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 \geq 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 | | | 3,3 | | | | |
| Required supplementary insulation PTI \geq 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 | | | 6,2 | | | | |
| Clearances | | | | | | | |
| Required basic insulation | 0,2 | 0,8 | 1,5 | 3 | 4 | 5,5 | |
| Measured | | | 3,3 | | | | |
| Required supplementary insulation | - | 0,8 | 1,5 | 3 | 4 | 5,5 | |
| Measured | | | | | | | |
| Required reinforced insulation | - | 1,6 | 3 | 6 | 8 | 11 | |
| Measured | | | 6,2 | | | | |
| Table 11.2 | Minimum distances (mm) for non-sinusoidal pulse voltages | | | | | | |
| 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 | | | | | | | |

| IEC 60598-2-21 | | | |
|----------------|--------------------|-----------------|---------|
| Clause | Requirement + Test | Result - Remark | Verdict |

| 21.16 (13.2.1) | TABLE: Ball Pressure Test of Thermoplastics | | | P |
|---|--|-----------------------|--------------------------|----------|
| Allowed impression diameter (mm) : 2 | | | | — |
| Object/ Part No./ Material | Manufacturer/ trademark | Test temperature (°C) | Impression diameter (mm) | |
| Enclosure of electronic control device | See annex 1 | 91 | 0,8 | |
| PCB of LED module | See annex 1 | 125 | 0,8 | |
| Enclosure of lighting chains | See annex 1 | 75 | 1,2 | |
| End terminal of the lighting chains | See annex 1 | 75 | 1,0 | |
| Supplementary information: | | | | |

| 21.16 (13.3.1) | TABLE: Needle-flame test (IEC 60695-11-5) | | | | P |
|----------------------------|--|---|------------------------------------|------------------------------|----------|
| Object/ Part No./ Material | Manufacturer/ trademark | Duration of application of test flame (ta); (s) | Ignition of specified layer Yes/No | Duration of burning (tb) (s) | Verdict |
| PCB of LED module | See annex 1 | 10 | No | 0 | P |
| Supplementary information: | | | | | |

| 21.16 (13.3.2) | TABLE: Glow-wire test (IEC 60695-2-11) | | | | P |
|---|---|------------------------------------|------------------------------|---------|----------|
| Glow wire temperature : 650°C | | | | — | |
| Object/ Part No./ Material | Manufacturer/ trademark | Ignition of specified layer Yes/No | Duration of burning (tb) (s) | Verdict | |
| Enclosure of electronic control device | See annex 1 | No | 0 | P | |
| Enclosure of lighting chains | See annex 1 | No | 0 | P | |
| End terminal of the lighting chains | See annex 1 | No | 0 | P | |
| Any flame or glowing of the sample extinguished within 30 s of withdrawing the glow-wire, and any burning or molten drop did not ignite the underlying parts (Yes/No) | | | | | Yes |

| IEC 60598-2-21 | | | |
|----------------|--------------------|-----------------|---------|
| Clause | Requirement + Test | Result - Remark | Verdict |

Supplementary information:

| 21.16 (13.4) | TABLE: Proof tracking test (IEC 60112) | | | N/A | |
|-------------------------------|---|---|----|------------|---------|
| Test voltage PTI | | 175 V | | — | |
| Object/ Part No./ Material | Manufacturer/ trademark | Withstand 50 drops without failure on three places or on three specimens | | | Verdict |
| -- | -- | -- | -- | -- | -- |
| -- | -- | -- | -- | -- | -- |
| -- | -- | -- | -- | -- | -- |
| Supplementary information: | | | | | |

| IEC 60598-2-21 | | | |
|----------------|--------------------|-----------------|---------|
| Clause | Requirement + Test | Result - Remark | Verdict |

| | | | |
|----------------|---|--|------------|
| ANNEX A | Requirements for interconnecting connectors for use in rope lights | | N/A |
| | This Annex A consist relevant requirements and modifications of IEC 61984 | | N/A |
| 5.2 | Classification according to protection against electric shock | | N/A |
| | Only enclosed connectors | | N/A |
| 5.3 | Classification according to the style of connector | | N/A |
| | Only free connectors | | N/A |
| 5.4 | Classification according to additional characteristics of connectors | | N/A |
| | According b), d), e), f), h), and j) | | N/A |
| 6.2.1 | Identification | | N/A |
| | According a) and b) | | N/A |
| 6.4.1 | Non accessibility of live parts | | N/A |
| | Test with test finger on class II rope lights | | N/A |
| 6.9.1 | Polarisation | | N/A |
| | Improper connection of mating parts is prevented | | N/A |
| | No unsafe compatibility between connectors for class II and class III rope lights of the same manufacturer | | N/A |
| | Male part of class III rope lights not make contact in the female contact of low voltage connectors (e.g. IEC 60320) | | N/A |
| | Manufacturer designed connectors, no unsafe compatibility with systems according IEC 60320 and IEC 60906 and national domestic plug and socket-outlet systems in the country where the rope light is placed on the market | | N/A |
| 6.9.3 | Connection of conductors | | N/A |
| | Cross sectional area of the contact making part of the interconnecting coupler not less than the corresponding conductor in the interconnected cable | | N/A |
| 6.10 | Design of a CBC | | N/A |
| | Adequate breaking capacity | | N/A |
| | Female part at the end of the rope light, other than ordinary, provided with sealing device securely fixed to the coupler | | N/A |
| 6.13 | Dielectric strength | | N/A |
| | Test according clause 21.15 of this standard | | N/A |
| 6.14.2 | Electrical endurance (CBC) | | N/A |
| | Meet the specified breaking capacity | | N/A |

| IEC 60598-2-21 | | | |
|-----------------------|--|-----------------|------------|
| Clause | Requirement + Test | Result - Remark | Verdict |
| | Number of cycles 50 | | — |
| | Test according 7.3.5 | | N/A |
| 6.14.3 | Bendings (non-rewirable connectors) | | N/A |
| | Meet the specified number of bendings | | N/A |
| | Number of cycles 1000 | | — |
| | Test according 7.3.10 | | N/A |
| 6.17 | Cable clamp | | N/A |
| | Test according clause 21.11.3 of this standard | | N/ |

| IEC 60598-2-21 | | | |
|----------------|--------------------|-----------------|---------|
| Clause | Requirement + Test | Result - Remark | Verdict |

| ANNEX 1 TABLE: Critical components information | | | | | | |
|---|------|---|------------------|--|---|-------------------------------------|
| Object / part No. | Code | Manufacturer/ trademark | Type / model | Technical data | Standard | Mark(s) of conformity ¹⁾ |
| Supply cord | B | Shangyu Jintao Electron Co., Ltd. | H05VV-F | 300/300V, 2x0,75mm ² | DIN EN 50525-2-21 | VDE 40013419 |
| Enclosure of lighting chains | C | Sumika Styron Polycarbonate Ltd | LD205(w)# | PVC, V-2, 80°C | IEC 60598-1 IEC 60598-2-21 | UL E123529 Tested with appliance |
| End cover of lighting chains | C | Sumika Styron Polycarbonate Ltd | LD205(w)# | PVC, V-2, 80°C | IEC 60598-1 IEC 60598-2-21 | UL E123529 Tested with appliance |
| Connection of the supply cord and cord anchorage | C | Sumika Styron Polycarbonate Ltd | LD205(w)# | PVC, V-2, 80°C | IEC 60598-1 IEC 60598-2-21 | UL E123529 Tested with appliance |
| Heat-shrinkable tube | C | Shengzheng Hangxuan S&T Co Ltd | XH-RSG | 600V, 125°C | IEC 60598-1 IEC 60598-2-21 | UL E361862 Tested with appliance |
| LED PCB | C | Shung Ching Electronic Technology Co Ltd | CZ-1004 | V-0, 130°C | IEC 60598-1 IEC 60598-2-20 | UL E323040 Tested with appliance |
| LED module | C | MLS | E5050SRGB05-H | Vf: 1,7-3,5VDC; If: 0-20mA CCT: 3000-6500K | IEC/TR 62778 | Tested with appliance |
| -Alternative | C | MLS | E2835UX21 | Vf: 2,8-3,8VDC; If: 60mA CCT: 3000-6500K | IEC/TR 62778 | Tested with appliance |
| Rectifier(model rectifier bridge) | C | Shenzhen Homen Technology Co., Ltd. | Rectifier bridge | 220-240V ~, 50/60Hz, Max. 550W LED loading. | IEC 60598-1 IEC 60598-2-20 | Tested with appliance |
| -Fuse of electronic control device rectifier bridge | B | Shenzhen Lanson Electronics Co Ltd | 3K | T2A, 250V~ | EN 60127-1; EN 60127-2 | VDE 40012592 |
| MOV | B | Brightking (Shenzhen) Co. Ltd. | 14D561K | Min.320 Vac./415Vdc, 85°C | IEC 61051-1; IEC 61051-2; IEC 61051-2-2 | VDE 40027827 |
| -PCB of the rectifier | C | Shen Zhen Tong Wei Xin Circuit Technological Co Ltd | TWX-01 | 130°C, V-0 | IEC 61347-1; IEC 61347-2-11 | UL E319765 Tested with appliance |

| IEC 60598-2-21 | | | | | | |
|--|--------------------|-----------------------------------|-----------------|------------------------------------|--------------------------------|-----------------------|
| Clause | Requirement + Test | | | Result - Remark | | Verdict |
| - Semiconductor DB bridge | C | Interchangeable | Interchangeable | Max.600V, 10A | IEC 61347-1; IEC 61347-2-11 | Tested with appliance |
| -Output cord of rectifier | B | Shangyu Jintao Electron Co., Ltd. | H05VV-F | 300/300V, 2x0.75mm ² | DIN EN 50525-2-21 | VDE 40013419 |
| <p>Supplementary information:</p> <p>¹⁾ Provided evidence ensures the agreed level of compliance. See OD-CB2039.</p> <p>The codes above have the following meaning:</p> <p>A - The component is replaceable with another one, also certified, with equivalent characteristics</p> <p>B - The component is replaceable if authorised by the test house</p> <p>C - Integrated component tested together with the appliance</p> <p>D - Alternative component</p> | | | | | | |

| IEC 60598-2-21 | | | |
|----------------|--------------------|-----------------|---------|
| Clause | Requirement + Test | Result - Remark | Verdict |

| ANNEX 2 | TABLE: Temperature measurements, thermal tests of Section 12 | | | | | | P |
|--|---|--|--------|--------|-------|------------------------|-------|
| | Type reference | RFE-0454 | | | | | — |
| | Lamp used..... | Integral LED module | | | | | — |
| | Lamp control gear used..... | Integral rectifier | | | | | — |
| | Mounting position of luminaire | As normal use according to the instruction | | | | | — |
| | Supply wattage (W) | 551,3 | | | | | — |
| | Supply current (A) | 2,407 | | | | | — |
| | Calculated power factor..... | 0,902 | | | | | — |
| | Table: measured temperatures corrected for ta = 45 °C: | | | | | | P |
| | - abnormal operating mode | -- | | | | | — |
| | - test 1: rated voltage..... | -- | | | | | — |
| | - test 2: 1,06 times rated voltage or 1,05 times rated wattage | 1,06 x 240V=254,4V | | | | | — |
| | - test 3: Load on wiring to socket-outlet, 1,06 times voltage or 1,05 times wattage | -- | | | | | — |
| | - test 4: 1,1 times rated voltage or 1,05 times rated wattage | -- | | | | | — |
| | Through wiring or looping-in wiring loaded by a current of A during the test | -- | | | | | — |
| Temperature measurements, (°C) | | | | | | | |
| Part | Ambient | Clause 12.4 – normal | | | | Clause 12.5 – abnormal | |
| | | test 1 | test 2 | test 3 | limit | test 4 | limit |
| Supply cord | 45 | -- | 55,6 | -- | 90 | -- | -- |
| PCB of electronic control device | 45 | -- | 69,7 | -- | Ref. | -- | -- |
| E1 | 45 | -- | 75,3 | -- | 105 | -- | -- |
| Enclosure of electronic control device | 45 | -- | 65,3 | -- | Ref. | -- | -- |
| Cable of input connection | 45 | -- | 58,3 | -- | Ref. | -- | -- |
| LED PCB | 45 | -- | 76,9 | -- | Ref. | -- | -- |
| Enclosure of pipes | 45 | -- | 64,5 | -- | Ref. | -- | -- |

| IEC 60598-2-21 | | | | | | | |
|----------------------------|--------------------|----|------|----|-----------------|----|---------|
| Clause | Requirement + Test | | | | Result - Remark | | Verdict |
| Mounting surface | 45 | -- | 49,8 | -- | 90 | -- | -- |
| Supplementary information: | | | | | | | |

| ANNEX 2 | TABLE: Temperature measurements, thermal tests of Section 12 | | | | | | P |
|--|---|--|--------|--------|-------|------------------------|-------|
| | Type reference | RFE-0167A | | | | | — |
| | Lamp used..... | Integral LED module | | | | | — |
| | Lamp control gear used..... | Integral rectifier | | | | | — |
| | Mounting position of luminaire | As normal use according to the instruction | | | | | — |
| | Supply wattage (W) | 350,7 | | | | | — |
| | Supply current (A) | 1,512A | | | | | — |
| | Calculated power factor..... | 0,912 | | | | | — |
| | Table: measured temperatures corrected for $t_a = 45\text{ }^\circ\text{C}$: | | | | | | P |
| | - abnormal operating mode | -- | | | | | — |
| | - test 1: rated voltage..... | -- | | | | | — |
| | - test 2: 1,06 times rated voltage or 1,05 times rated wattage | 1,06 x 240V=254,4V | | | | | — |
| | - test 3: Load on wiring to socket-outlet, 1,06 times voltage or 1,05 times wattage | -- | | | | | — |
| | - test 4: 1,1 times rated voltage or 1,05 times rated wattage | -- | | | | | — |
| | Through wiring or looping-in wiring loaded by a current of A during the test | -- | | | | | — |
| Temperature measurements, ($^\circ\text{C}$) | | | | | | | |
| Part | Ambient | Clause 12.4 – normal | | | | Clause 12.5 – abnormal | |
| | | test 1 | test 2 | test 3 | limit | test 4 | limit |
| Input cable of electronic control device | 45 | -- | 56,5 | -- | 90 | -- | -- |
| PCB of electronic control device | 45 | -- | 66,1 | -- | Ref. | -- | -- |
| Enclosure of electronic control device | 45 | -- | 64,5 | -- | Ref. | -- | -- |

| IEC 60598-2-21 | | | | | | | |
|----------------------------|--------------------|----|------|----|-----------------|----|---------|
| Clause | Requirement + Test | | | | Result - Remark | | Verdict |
| Cable of input connection | 45 | -- | 60,7 | -- | Ref. | -- | -- |
| LED PCB | 45 | -- | 75,3 | -- | Ref. | -- | -- |
| Enclosure of pipes | 45 | -- | 62,8 | -- | Ref. | -- | -- |
| Mounting surface | 45 | -- | 52,6 | -- | 90 | -- | -- |
| Supplementary information: | | | | | | | |

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

| IEC 60598-2-21 | | | |
|----------------|---|-----------------|---------|
| Clause | Requirement + Test | Result - Remark | Verdict |
| ANNEX 4 | Screwless terminals (part of the luminaire) | | N/A |
| (15) | SCREWLESS TERMINALS | | N/A |
| (15.2) | Type of terminal..... : | | — |
| | Rated current (A)..... : | | — |
| (15.3.1) | Material | | N/A |
| (15.3.2) | Clamping | | N/A |
| (15.3.3) | Stop | | N/A |
| (15.3.4) | Unprepared conductors | | N/A |
| (15.3.5) | Pressure on insulating material | | N/A |
| (15.3.6) | Clear connection method | | N/A |
| (15.3.7) | Clamping independently | | N/A |
| (15.3.8) | Fixed in position | | N/A |
| (15.3.10) | Conductor size | | N/A |
| | Type of conductor | | N/A |
| (15.5) | Terminals and connections for internal wiring | | N/A |
| (15.5.1) | Mechanical tests | | N/A |
| (15.5.1.1.1) | Pull test spring-type terminals (4 N, 4 samples) | | N/A |
| (15.5.1.1.2) | Pull test pin or tab terminals (4 N, 4 samples) | | N/A |
| | Insertion force not exceeding 50 N | | N/A |
| (15.5.1.2) | Permanent connections: pull-off test (20 N) | | N/A |
| (15.5.2) | Electrical tests | | N/A |
| | Voltage drop (mV) after 1 h (4 samples)..... : | | N/A |
| | Voltage drop of two inseparable joints | | N/A |
| | Number of cycles: | | — |
| | Voltage drop (mV) after 10th alt. 25th cycle (4 samples)..... : | | N/A |
| | Voltage drop (mV) after 50th alt. 100th cycle (4 samples)..... : | | N/A |
| | After ageing, voltage drop (mV) after 10th alt. 25th cycle (4 samples) | | N/A |
| | After ageing, voltage drop (mV) after 50th alt. 100th cycle (4 samples) | | N/A |
| (15.6) | Terminals and connections for external wiring | | N/A |
| (15.6.1) | Conductors | | N/A |
| | Terminal size and rating | | N/A |

| IEC 60598-2-21 | | | |
|-----------------------|--------------------|-----------------|---------|
| Clause | Requirement + Test | Result - Remark | Verdict |

| | | | |
|------------|---|--|-----|
| 15.6.2 | Mechanical tests | | N/A |
| (15.6.2.1) | Pull test spring-type terminals or welded connections (4 samples); pull (N) | | N/A |
| (15.6.2.2) | Pull test pin or tab terminals (4 samples); pull (N) | | N/A |
| (15.6.3) | Electrical tests | | N/A |
| | Tests according 15.6.3.1 + 15.6.3.2 in IEC 60598-1 | | N/A |

| | | | | | | | | | | | |
|----------------------------|--|---|---|---|---|---|---|---|---|----|-----------------------------|
| (15.6.3.1) | TABLE: Contact resistance test / Heating tests | | | | | | | | | | N/A |
| (15.6.3.2) | | | | | | | | | | | Voltage drop (mV) after 1 h |
| terminal | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | |
| voltage drop (mV) | | | | | | | | | | | |
| | Voltage drop of two inseparable joints | | | | | | | | | | |
| | Voltage drop after 10th alt. 25th cycle | | | | | | | | | | |
| | 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 | | | | | | | | | | |
| | 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 | | | | | | | | | | |
| | 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 | | | | | | | | | | |
| | Max. allowed voltage drop (mV) | | | | | | | | | | — |
| terminal | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | |
| voltage drop (mV) | | | | | | | | | | | |
| Supplementary information: | | | | | | | | | | | |

| | |
|---------------------|--|
| Attachment 1 | Tests according to IEC 62031:2018 |
|---------------------|--|

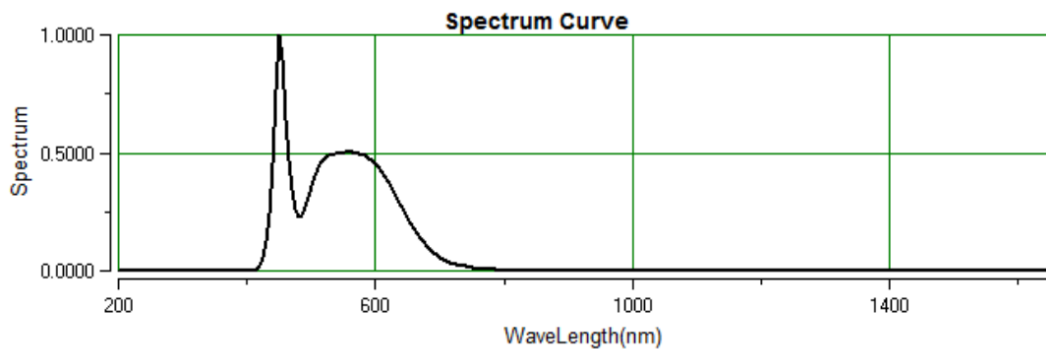
| | | |
|-------------|--|----------|
| 12.2 | Overpower condition | P |
| | Module withstands overpower condition >15 min. | P |
| | Module with automatic protective device or power limiter, test performed 15 min. at limit. | N/A |
| | No fire, smoke or flammable gas is produced | P |
| | Molten material does not ignite tissue paper, spread below the module | P |

| | | |
|-------------|---|------------|
| 22 | PHOTOBIOLOGICAL SAFETY | P |
| 22.1 | UV radiation | N/A |
| | Luminous radiation not exceed 2mW/klm | N/A |
| 22.2 | Blue light hazard | P |
| | Assessed according to IEC TR 62778 | RG0 |
| 22.3 | Infrared radiation | N/A |
| | Requirements for infrared radiation when required | N/A |

| | |
|---------------------|--|
| Attachment 2 | Photobiological safety of lamps and lamp systems were according to standard IEC TR 62778:2014 |
|---------------------|--|

| | | | |
|--------------|-----------------------------------|---|--|
| Table | Measurement performed on: | <input type="checkbox"/> LED package <input type="checkbox"/> LED module <input type="checkbox"/> Lamp <input checked="" type="checkbox"/> Luminaire | |
| | Model number | RFE-0454 | |
| | Test voltage (V) | 240 | |
| | Test current (mA) | -- | |
| | Test frequency (Hz) | 50Hz | |
| | Ambient, t (°C) | 25,0°C | |
| | Measurement distance | <input checked="" type="checkbox"/> 20 cm <input type="checkbox"/> ... cm | |
| | Source size | <input checked="" type="checkbox"/> Non-small <input type="checkbox"/> Small : mm | |
| | Field of view | <input type="checkbox"/> 100 mrad <input checked="" type="checkbox"/> 11 mrad <input type="checkbox"/> 1,7 mrad (for small sources) | |

| Item | Symbol | Units | Result | Remark |
|-------------------------------|----------------|--------------------------------------|---------------|--------|
| Correlated colour temperature | CCT | K | 6038 | -- |
| x/y colour coordinates | | -- | 0,1730/0,7116 | -- |
| Blue light hazard radiance | L _B | W/(m ² •sr ¹) | 17 | RG0 |
| Blue light hazard irradiance | E _B | W/m ² | 1,020E-002 | -- |
| Luminance | L | cd/m ² | 1,078E+004 | -- |
| Illuminance | E | lx | 90 | -- |



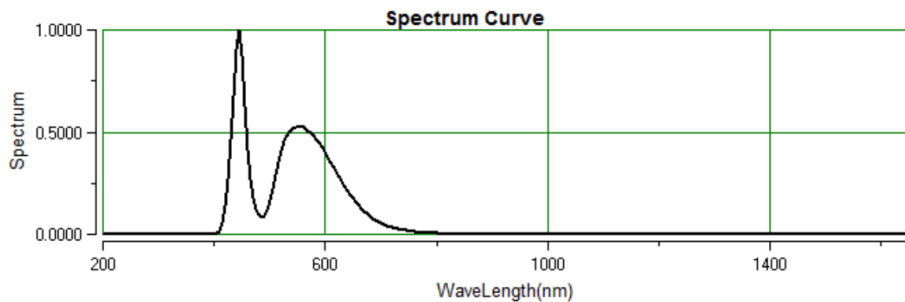
| SN | Size (mm) | field of view (mrad) | distance d (mm) | Illuminance E (lx) | Diameter D (mm) | Luminance Lv (cd/m2) | Blue light Lb (W/m2/sr) | exp. limit Tmax (s) | CCT (K) | Eb (W/m2) |
|-----|-----------|----------------------|-----------------|--------------------|-----------------|----------------------|-------------------------|---------------------|---------|------------|
| [1] | 8.9 | 11 | 200 | 90 | 2.2 | 1.078e+004 | 17 | 820930 | 6038 | 1.020e-002 |

| SN | CIE-x | CIE-y |
|-----|--------|--------|
| [1] | 0.1730 | 0.7116 |

Attachment 2 Photobiological safety of lamps and lamp systems were according to standard IEC TR 62778:2014

| | | | |
|--------------|-----------------------------------|---|-----|
| Table | Measurement performed on: | <input type="checkbox"/> LED package <input type="checkbox"/> LED module <input type="checkbox"/> Lamp <input checked="" type="checkbox"/> Luminaire | |
| | Model number | RFE-0167A | |
| | Test voltage (V) | 240 | --- |
| | Test current (mA) | -- | --- |
| | Test frequency (Hz) | 50Hz | --- |
| | Ambient, t (°C) | 25,0°C | --- |
| | Measurement distance | <input checked="" type="checkbox"/> 20 cm <input type="checkbox"/> ... cm | --- |
| | Source size | <input checked="" type="checkbox"/> Non-small <input type="checkbox"/> Small : mm | --- |
| | Field of view | <input type="checkbox"/> 100 mrad <input checked="" type="checkbox"/> 11 mrad <input type="checkbox"/> 1,7 mrad (for small sources) | --- |

| Item | Symb ol | Units | Result | Remark |
|-------------------------------|----------------|--------------------------------------|---------------|--------|
| Correlated colour temperature | CCT | K | 5898 | -- |
| x/y colour coordinates | | -- | 0,3156/0,3220 | -- |
| Blue light hazard radiance | L _B | W/(m ² •sr ¹) | 96 | RG0 |
| Blue light hazard irradiance | E _B | W/m ² | 1,024E+000 | -- |
| Luminance | L | cd/m ² | 1,015E+005 | -- |
| Illuminance | E | lx | 1084 | -- |



| SN | Size (mm) | field of view(mrad) | distance d (mm) | Illuminance E (lx) | Diameter D (mm) | Luminance Lv (cd/m2) | Blue light Lb (W/m2/sr) | exp. limit Tmax (s) | CCT (K) | Eb (W/m2) |
|-----|-----------|---------------------|-----------------|--------------------|-----------------|----------------------|-------------------------|---------------------|---------|------------|
| [1] | 12 | 11 | 200 | 1084 | 2.2 | 1.015e+005 | 96 | 10435 | 5898 | 1.024e+000 |

| SN | CIE-x | CIE-y |
|-----|--------|--------|
| [1] | 0.3156 | 0.3220 |

| IEC 61347-2-11 | | | |
|----------------|--------------------|-----------------|---------|
| Clause | Requirement + Test | Result - Remark | Verdict |

| | |
|---------------------|---|
| Attachment 3 | Tests according to IEC 61347-2-11:2001 used in conjunction with IEC 61347-1:2015 |
|---------------------|---|

| 4 (4) | GENERAL REQUIREMENTS | P |
|--------------|--|----------------------|
| - (4) | <u>Insulation materials</u> according requirements in Annex N of IEC 61347-1 | (see Annex N) N/A |
| - (4) | Compliance of <u>independent controlgear enclosure</u> with IEC 60 598-1 | N/A |
| - (4) | <u>Built-in electronic controlgear</u> with double or reinforced insulation comply with Annex O of IEC 61347-1 | (see Annex O) N/A |
| - (4) | <u>SELV controlgear</u> comply with Annex L of IEC 61347-1 | (see Annex L) N/A |

| 6 (6) | CLASSIFICATION | P |
|--------------|--|----------|
| | Built-in controlgear : Yes <input type="checkbox"/> No <input type="checkbox"/> | — |
| | Independent controlgear..... : Yes <input type="checkbox"/> No <input type="checkbox"/> | — |
| | Integral controlgear : Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> | — |

| 7 (7) | MARKING | P |
|------------------|--|----------|
| 7.1 (7.1) | Mandatory markings | N/A |
| | a) mark of origin | N/A |
| | b) model number or type reference | N/A |
| | d) correlation between interchangeable parts and controlgear marked | N/A |
| | e) rated supply voltage (V) | N/A |
| | supply frequency (Hz) | N/A |
| | supply current (A) | N/A |
| | f) earthing symbol | N/A |
| | Information if permitted to use without connection to earth | N/A |
| | k) wiring diagram | N/A |
| | l) value of tc alternative ta | N/A |
| 7.1 (-) | control terminals identified | N/A |
| | classification of insulation between live parts and control circuits | N/A |
| 7.1 (7.2) | Marking durable and legible | N/A |
| | Rubbing 15 s water, 15 s petroleum; marking legible | N/A |
| 7.2 (7.1) | Information to be provided, if applicable | N/A |

| IEC 61347-2-11 | | | |
|----------------|---|-----------------|---------|
| Clause | Requirement + Test | Result - Remark | Verdict |
| | h) declaration of protection against accidental contact | | N/A |
| | i) cross-section of conductors (mm ²) | | N/A |
| | j) number, type and wattage of lamp(s) | | N/A |
| 7.1 (7.2) | Marking durable and legible | | N/A |
| | Rubbing 15 s water, 15 s petroleum; marking legible | | N/A |

| 8 (10) | PROTECTION AGAINST ACCIDENTAL CONTACT WITH LIVE PARTS | | N/A |
|----------|---|---------------|-----|
| - (10.1) | Controlgear protected against accidental contact with live parts | | N/A |
| - (A2) | Voltage measured with 50 k Ω | (see Annex A) | N/A |
| - (A3) | Voltage > 35 V peak or > 60 V d.c. or protective impedance device | (see Annex A) | N/A |
| - (10.1) | Lacquer or enamel not used for protection or insulation | | N/A |
| | Adequate mechanical strength on parts providing protection | | N/A |
| - (10.2) | Capacitors > 0,5 μ F: voltage after 1 min (V): < 50 V | | N/A |
| - (10.3) | Controlgear providing SELV | | N/A |
| | Accessible conductive parts are insulated from live parts by double or reinforced insulation in SELV controlgear | | N/A |
| | No connection between output circuit and the body or protective earthing circuit | | N/A |
| | No possibility of connection between output circuit and the body or protective earthing circuit through other conductive parts | | N/A |
| | SELV outputs separated by at least basic insulation | | N/A |
| | ELV conductive parts insulated as live parts | | N/A |
| | Tests according Annex L of IEC 61347-1 | | N/A |
| - (10.4) | Accessible conductive parts in SELV circuits | | N/A |
| | Output voltage under load \leq 25 V r.m.s. or \leq 60 V d.c. | | N/A |
| | If output voltage > 25 V r.m.s. or > 60 V d.c.; No load output \leq 35 V peak or \leq 60 V d.c and touch current does not exceed 0,7 mA (peak) or 2 mA d.c. | | N/A |

| IEC 61347-2-11 | | | |
|----------------|--------------------|-----------------|---------|
| Clause | Requirement + Test | Result - Remark | Verdict |

| | | | |
|--|--|--|-----|
| | One conductive part is insulated if output voltage or current exceeding the values above and withstand test voltage 500 V | | N/A |
| | Double or reinforced insulation bridged by appropriate and at least two resistors or two Y2 capacitors or one Y1 capacitor | | N/A |
| | Y1 or Y2 capacitors comply with IEC 60384-14 | | N/A |
| | Resistors comply with test (a) in 14.1 of IEC 60065 | | N/A |

| | | | |
|--------------|--|---------------|------------|
| 9 (8) | TERMINALS | | N/A |
| | Screw terminals according section 14 of IEC 60598-1: | | N/A |
| | Separately approved; component list | (see Annex 1) | N/A |
| | Part of the controlgear | (see Annex 2) | N/A |
| | Screwless terminals according section 15 of IEC 60598-1: | | N/A |
| | Separately approved; component list | (see Annex 1) | N/A |
| | Part of the controlgear | (see Annex 3) | N/A |

| | | | |
|----------------|--|--|------------|
| 10 (9) | PROVISION FOR PROTECTIVE EARTHING | | N/A |
| - (9.1) | Provisions for protective earthing | | N/A |
| | Terminal complying with clause 8 | | N/A |
| | Locked against loosening and not possible to loosen by hand | | N/A |
| | Not possible to loosen clamping means unintentionally on screwless terminals | | N/A |
| | All parts of material minimizing the danger of electrolytic corrosion | | N/A |
| | Made of brass or equivalent material | | N/A |
| | Contact surface bare metal | | N/A |
| | Test according 7.2.3 of IEC 60598-1 | | N/A |
| - (9.2) | Provision for functional earthing | | N/A |
| | Comply with clause 8 and 9.1 | | N/A |
| | Functional earth insulated from live parts by double or reinforced insulation | | N/A |
| - (9.3) | Lamp controlgear with conductors for protective earthing by tracks on printed circuit board | | N/A |

| IEC 61347-2-11 | | | |
|------------------|---|-----------------|---------|
| Clause | Requirement + Test | Result - Remark | Verdict |
| | Test with a current of 25 A between earthing terminal or earthing contact and each of the accessible metal parts; measured resistance (Ω) at ≥ 10 A according 7.2.3 of IEC 60598-1: $< 0,5 \Omega$ | | N/A |
| - (9.4) | Earthing of built-in lamp controlgear | | N/A |
| | Earth by means of fixing to earthed metal of luminaire in compliance of 7.2 of IEC 60598-1 | | N/A |
| | Earthing terminal only for earthing the built-in controlgear | | N/A |
| - (9.5) | Earthing via independent controlgear | | N/A |
| - (9.5.1) | Earth connection to other equipment | | N/A |
| | Looping or through connection, conductor min. 1,5 mm ² and of copper or equivalent | | N/A |
| | Protective earthing wires in line with 5.3.1.1 and clause 7 of IEC 60598-1 | | N/A |
| - (9.5.2) | Earthing of the lamp compartments powered via the independent lamp controlgear | | N/A |
| | Test with a current of 25 A between input and output earth terminals; measured resistance (Ω) between earthing terminal or earthing contact and each of the accessible metal parts at ≥ 10 A according 7.2.3 of IEC 60598-1: $< 0,5 \Omega$ | | N/A |
| | Output earthing terminal marked as in 7.1 t) of IEC 61347-1 | | N/A |

| | | | |
|----------------|--|---------------------|----------|
| 11 (11) | MOISTURE RESISTANCE AND INSULATION | | P |
| | After storage 48 h at 91-95% relative humidity and 20-30 °C measuring of insulation resistance: | | P |
| | For basic insulation $\geq 2 \text{ M}\Omega$ | L/N:>100 M Ω | P |
| | For double or reinforced insulation $\geq 4 \text{ M}\Omega$ | | N/A |
| | Between primary and secondary circuits in controlgear providing SELV, values in Annex L in IEC 61347-1 | | N/A |

| | | | |
|----------------|--|------------|----------|
| 12 (12) | ELECTRIC STRENGTH | | P |
| | Immediately after clause 11 electric strength test for 1 min | | P |
| | Basic insulation for SELV, test voltage 500 V | | N/A |
| | Working voltage ≤ 50 V, test voltage 500 V | | N/A |
| | Working voltage $> 50 \text{ V} \leq 1000 \text{ V}$, test voltage (V): | | P |
| | Basic insulation, 2U + 1000 V | L/N: 1480V | P |

| IEC 61347-2-11 | | | |
|----------------|--|-----------------|---------|
| Clause | Requirement + Test | Result - Remark | Verdict |
| | Supplementary insulation, 2U + 1000 V | | N/A |
| | Double or reinforced insulation, 4U + 2000 V | | N/A |
| | 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 | | N/A |

| | | | |
|----------------|---|----------------------|----------|
| 14 (14) | FAULT CONDITIONS | | P |
| - (14.1) | 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 | | N/A |
| | Fault conditions: capacitors, resistors or inductors without proof of compliance with relevant specifications have been short-circuited or disconnected | (see appended table) | N/A |
| - (14.2) | Short-circuit of creepage distances and clearances if less than specified in clause 16 in Part 1 (after any reduction in 14.2 - 14.5) | (see appended table) | N/A |
| - (14.3) | Short-circuit or interruption of semiconductor devices | (see appended table) | N/A |
| - (14.4) | Short-circuit across insulation consisting of lacquer, enamel or textile | (see appended table) | N/A |
| - (14.5) | Short-circuit across electrolytic capacitors | (see appended table) | N/A |
| - (14.6) | After the tests has been carried out on three samples: | | P |
| | The insulation resistance $\geq 1 \text{ M}\Omega$ | >100 M Ω | 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 |
| - (14.7) | Relevant fault condition tests with high-power a.c. supply | | — |

| | | | |
|----------------|---|--|----------|
| 15 (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 |

| IEC 61347-2-11 | | | |
|----------------|---|-----------------|------------|
| Clause | Requirement + Test | Result - Remark | Verdict |
| - (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/A |
| | 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/A |
| | Plugs and socket-outlets for SELV comply with IEC 60906-3 and IEC 60884-2-4 | | N/A |
| | Plugs and socket-outlets for SELV $\leq 3 \text{ A}$, $\leq 25 \text{ V r.m.s.}$ or $\leq 60 \text{ V d.c.}$ and $\leq 72 \text{ W}$ comply with IEC 60906-3 and IEC 60884-2-4 or: | | N/A |
| | - plugs not able to enter socket-outlets of other standardised system | | N/A |
| | - socket-outlets not admit plugs of other standardised system | | N/A |
| | - socket-outlets without protective earth | | N/A |
| - (15.4) | Insulation between circuits and accessible parts | | N/A |
| - (15.4.2) | SELV circuits | | N/A |
| | Source used to supply SELV circuits: | | N/A |
| | - safety isolating transformer in accordance with relevant part 2 of IEC 61558 | | N/A |
| | - controlgear providing SELV in accordance with relevant part 2 of IEC 61347 | | N/A |
| | - another source | | N/A |
| | Voltage in the circuit not higher than ELV | | N/A |
| | SELV circuits insulated from LV by double or reinforced insulation | | N/A |
| | SELV circuits insulated from non SELV circuits by double or reinforced insulation | | N/A |
| | SELV circuits insulated from FELV circuits by supplementary insulation | | N/A |
| | SELV circuits insulated from other SELV circuits by basic insulation | | N/A |
| | SELV circuits insulated from accessible conductive parts according Table 6 in 15.4.5 | | N/A |
| - (15.4.3) | FELV circuits | | N/A |
| | Source used to supply FELV circuits: | | N/A |
| | - separating transformer in accordance with relevant part 2 of IEC 61558 | | N/A |

| IEC 61347-2-11 | | | |
|----------------|---|-----------------|---------|
| Clause | Requirement + Test | Result - Remark | Verdict |
| | - separating controlgear providing basic insulation between input and output circuits in accordance with relevant part 2 of IEC 61347 | | N/A |
| | - another source | | N/A |
| | - source in circuits separated by the LV supply by basic insulation | | N/A |
| | Voltage in the circuit not higher than ELV | | N/A |
| | FELV circuits insulated from LV supply by at least basic insulation | | N/A |
| | FELV circuits insulated from other FELV circuits if functional purpose | | N/A |
| | FELV circuits insulated from accessible conductive parts according Table 6 in 15.4.5 | | N/A |
| | Plugs and socket-outlets for FELV system comply with: | | N/A |
| | - plugs not able to enter socket-outlets of other voltage systems | | N/A |
| | - socket-outlets not admit plugs of other voltage systems | | N/A |
| | - socket-outlets have a protective conductor contact | | N/A |
| - (15.4.4) | Other circuits | | N/A |
| | Insulation between circuits other than SELV or FELV and accessible conductive parts in according Table 6 in 15.4.5. | | N/A |
| - (15.4.5) | Insulation between circuits and accessible conductive parts | | N/A |
| | Accessible conductive parts insulated from active parts of electric circuits by insulating according Table 6 | | N/A |
| | Requirements for Class II construction with equipotential bonding for protection against indirect contact with live parts: | | N/A |
| | - all conductive parts are connected together | | N/A |
| | - conductive parts are reliably connected together according test of IEC 60598-1 cl. 7.2.3 | | N/A |
| | - conductive parts comply with requirements of Annex A in case of insulation fault | | N/A |

| | | | |
|----------------|--|--|----------|
| 16 (16) | CREEPAGE DISTANCES AND CLEARANCES | | P |
| - (16) | Creepage distances and clearances according to 16.2 and 16.3 | | P |
| | Controlgears providing SELV comply with additional requirements in Annex L | | N/A |
| | Insulating lining of metallic enclosures | | N/A |

| IEC 61347-2-11 | | | |
|-----------------|--|----------------------|---------|
| Clause | Requirement + Test | Result - Remark | Verdict |
| | Controlgear protected against pollution comply with Annex P | | N/A |
| - (16.2) | Creepage distances | | P |
| - (16.2.2) | Minimum creepage distances for working voltages | | P |
| | Creepage distances according to Table 7 | (see appended table) | P |
| - (16.2.3) | Creepage distances for working voltages with frequencies above 30 kHz | | N/A |
| | Creepage distances according to Table 8 | (see appended table) | N/A |
| - (16.3) | Clearances | | P |
| - (16.3.2) | Clearances for working voltages | | P |
| | Clearances distances according to Table 9 | (see appended table) | P |
| - (16.3.3) | Clearances for ignition voltages and working voltages with higher frequencies | | N/A |
| | Clearances distances for basic or supplementary insulation according to Table 10 | (see appended table) | N/A |
| | Clearances distances for reinforced insulation according to Table 11 | (see appended table) | N/A |

| | | | |
|----------------|---|--|-----|
| 17 (17) | SCREWS, CURRENT-CARRYING PARTS AND CONNECTIONS | | N/A |
| | Screws, current-carrying parts and connections in compliance with IEC 60598-1 (clause numbers between parentheses refer to IEC 60598-1) | | N/A |
| (4.11) | Electrical connections | | N/A |
| (4.11.1) | Contact pressure | | N/A |
| (4.11.2) | Screws: | | N/A |
| | - self-tapping screws | | N/A |
| | - thread-cutting screws | | N/A |
| (4.11.3) | Screw locking: | | N/A |
| | - spring washer | | N/A |
| | - rivets | | N/A |
| (4.11.4) | Material of current-carrying parts | | N/A |
| (4.11.5) | No contact to wood or mounting surface | | N/A |
| (4.11.6) | Electro-mechanical contact systems | | N/A |
| (4.12) | Mechanical connections and glands | | N/A |
| (4.12.1) | Screws not made of soft metal | | N/A |
| | Screws of insulating material | | N/A |
| | Torque test: torque (Nm); part..... : | | N/A |
| | Torque test: torque (Nm); part..... : | | N/A |
| | Torque test: torque (Nm); part..... : | | N/A |
| (4.12.2) | Screws with diameter < 3 mm screwed into metal | | N/A |

| IEC 61347-2-11 | | | |
|----------------|--|-----------------|---------|
| Clause | Requirement + Test | Result - Remark | Verdict |
| (4.12.4) | Locked connections: | | N/A |
| | - fixed arms; torque (Nm)..... : | | N/A |
| | - lampholder; torque (Nm) : | | N/A |
| | - push-button switches; torque 0,8 Nm..... : | | N/A |
| (4.12.5) | Screwed glands; force (Nm)..... : | | N/A |

| 18 (18) | RESISTANCE TO HEAT, FIRE AND TRACKING | | P |
|----------------|--|-----------------------|----------|
| - (18.1) | Ball-pressure test: | | P |
| | - part tested; temperature (°C)..... : | PCB, 0,8mm;125 | P |
| | - part tested; temperature (°C)..... : | Enclosure, 0,8 mm; 91 | P |
| - (18.2) | Test of printed boards: | | P |
| | - part tested..... : | See below | P |
| | - part tested..... : | | N/A |
| - (18.3) | Glow-wire test (650°C): | | P |
| | - part tested..... : | Enclosure, no burning | P |
| | - part tested..... : | | N/A |
| - (18.4) | Needle flame test (10 s): | | P |
| | - part tested..... : | PCB, no burning | P |
| | - part tested..... : | | N/A |
| - (18.5) | Tracking test: | | N/A |
| | - part tested..... : | | N/A |
| | - part tested..... : | | N/A |

| 19 (19) | RESISTANCE TO CORROSION | | N/A |
|----------------|---|--|------------|
| | - test according 4.18.1 of IEC 60598-1 | | N/A |
| | - adequate varnish on the outer surface | | N/A |

| 20 (-) | ANNEXES | | N/A |
|---------------|--|---------------|------------|
| | Comply with appropriate annexes of IEC 61347-1 | (see Annexes) | N/A |

| 14 | TABLE: tests of fault conditions | | P |
|-----------|--|--|----------|
| Part | Simulated fault | | Hazard |
| DB1 | Test voltage: 240V Short-circuit, Fuse open, shut down, unrecoverable | | NO |
| Q1 | Test voltage: 240V Short-circuit, Fuse open, shut down, unrecoverable | | NO |

| IEC 61347-2-11 | | | |
|---|--|-----------------|---------|
| Clause | Requirement + Test | Result - Remark | Verdict |
| E1 | Test voltage: 240V Short-circuit, Fuse open, shut down, unrecoverable | | NO |
| Output | Test voltage: 240V Short-circuit, Fuse open, shut down, unrecoverable | | NO |
| Supplementary information: *indicated that the fusing resistor opened and relevant test repeat 10 times, each test have the same testing result. | | | |

| IEC 61347-2-11 | | | |
|----------------|--------------------|-----------------|---------|
| Clause | Requirement + Test | Result - Remark | Verdict |

| | | |
|----------------|---|----------|
| 16 (16) | TABLES: Creepage distances and clearances (mm) | P |
|----------------|---|----------|

| Table 7 | Minimum creepage distances for working voltages | | | | | | P |
|--|--|-----|-----|-----|-----|------|----------|
| RMS working voltage (V) not exceeding | 50 | 150 | 250 | 500 | 750 | 1000 | |
| Required basic or supplementary insulation, PTI \geq 600 | 0,6 | 0,8 | 1,3 | 2,5 | 3,8 | 5,0 | |
| Measured | -- | -- | -- | -- | -- | -- | |
| Supplementary information | -- | -- | -- | -- | -- | -- | |
| Required basic or supplementary insulation, PTI < 600 | 1,2 | 1,6 | 2,5 | 5 | 7,6 | 10 | |
| Measured | -- | -- | 3,0 | -- | -- | -- | |
| Supplementary information: - Between L/N (before fuse) | | | | | | | |
| Required reinforced insulation, PTI \geq 600 | -- | 1,6 | 2,6 | 5 | 7,6 | 10 | |
| Measured | -- | -- | -- | -- | -- | -- | |
| Supplementary information | -- | -- | -- | -- | -- | -- | |
| Required reinforced insulation, PTI < 600 | -- | 3,2 | 5 | 10 | 16 | 20 | |
| Measured | -- | -- | -- | -- | -- | -- | |
| Supplementary information: - | | | | | | | |

| Table 8 | Minimum creepage distances for sinusoidal or non-sinusoidal working voltages at different frequency range; basic or supplementary insulation | N/A |
|--|---|------------|
| Peak value of the working voltage \hat{U}_{out} kV | | — |
| Frequency | | — |
| Required distance..... | | — |
| Measured | | |
| Supplementary information | | — |

| Table 9 | Minimum clearances distances for working voltages | | | | | | P |
|---|--|-----|-----|-----|-----|------|----------|
| RMS working voltage (V) not exceeding | 50 | 150 | 250 | 500 | 750 | 1000 | |
| Clearances with mains supply transients according impulse withstand category II | | | | | | | |

| IEC 61347-2-11 | | | | | | | |
|---|--------------------|-----------------|-----|-----|-----|-----|---------|
| Clause | Requirement + Test | Result - Remark | | | | | Verdict |
| - Required basic or supplementary insulation | | 0,2 | 0,5 | 1,5 | 3 | 5,5 | 5,5 |
| - Measured | | -- | -- | 3,0 | -- | -- | -- |
| Supplementary information: - Between L/N (before fuse) | | | | | | | |
| - Required reinforced insulation | | 0,4 | 1,6 | 3 | 5,5 | 8 | 8 |
| - Measured | | -- | -- | -- | -- | -- | -- |
| Supplementary information: -- | | | | | | | |
| Clearances without mains supply transients | | | | | | | |
| - Required basic or supplementary insulation | | 0,2 | 0,2 | 0,2 | 0,2 | 0,3 | 0,7 |
| - Measured | | -- | -- | -- | -- | -- | -- |
| Supplementary information:-- | | | | | | | |
| - Required reinforced insulation | | 0,2 | 0,2 | 0,2 | 0,4 | 1,0 | 1,6 |
| - Measured | | -- | -- | -- | -- | -- | -- |
| Supplementary information:-- | | | | | | | |

| Table 10 | Minimum distances of clearances for sinusoidal or non-sinusoidal voltages; inhomogeneous field conditions; basic or supplementary insulation | N/A |
|--------------------------------------|---|-----|
| Voltage \hat{U}_{out} kV | : | — |
| Frequency..... | : | — |
| Transients or ignition pulse voltage | | |
| Required distance..... | : | — |
| Measured..... | : | |
| Supplementary information | | — |
| Ignition voltage or working voltage | | |
| Required distance..... | : | — |
| Measured..... | : | |
| Supplementary information | | — |

| IEC 61347-2-11 | | | |
|----------------|--------------------|-----------------|---------|
| Clause | Requirement + Test | Result - Remark | Verdict |

| Table 11 | Minimum distances of clearances for sinusoidal or non-sinusoidal voltages; inhomogeneous field conditions; reinforced insulation | N/A |
|--------------------------------------|--|-----|
| Voltage \hat{U}_{out} kV | : | — |
| Frequency..... | : | — |
| Transients or ignition pulse voltage | | |
| Required clearance | : | — |
| Measured..... | : | |
| Supplementary information | | — |
| Ignition voltage or working voltage | | |
| Required clearance | : | — |
| Measured..... | : | |
| Supplementary information | | — |

| IEC 61347-2-11 | | | |
|----------------|--------------------|-----------------|---------|
| Clause | Requirement + Test | Result - Remark | Verdict |

| | | | |
|------------|---|--|-----|
| (A) | ANNEX A - TEST TO ESTABLISH WHETHER A CONDUCTIVE PART IS A LIVE PART WHICH MAY CAUSE AN ELECTRIC SHOCK | | N/A |
| (A.1) | Comply with A.2 or A.3 | | N/A |
| (A.2) | Voltage ≤ 35 V peak or ≤ 60 V d.c | | N/A |
| (A.3) | If voltage measured according Clause A.2 exceeds the limit value; touch current does not exceed 0,7 mA (peak) or 2 mA d.c. | | N/A |
| | Comply with Annex G.2 of IEC 60598-1 | | N/A |

| | | | |
|---------------|---|--|-----|
| (C) | ANNEX C – PARTICULAR REQUIREMENTS FOR ELECTRONIC LAMP CONTROLGEAR WITH MEANS OF PROTECTION AGAINST OVERHEATING | | N/A |
| (C3) | GENERAL REQUIREMENTS | | N/A |
| (C3.1) | Thermal protection means integral with the convertor, protected against mechanical damage | | N/A |
| | Renewable only by means of a tool | | N/A |
| | If function depending on polarity, for cord-connected equipment protection means in both leads | | N/A |
| | Thermal links comply with IEC 60691 | | N/A |
| | Electrical controls comply with IEC 60730-2-3 | | N/A |
| (C3.2) | No risk of fire by breaking (clause C7) | | N/A |
| (C5) | CLASSIFICATION | | N/A |
| | 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/A |
| (C6.1) | Symbol for temperature declared thermally protected ballasts | | N/A |
| (C6.2) | Declaration of the type of protection provided | | N/A |
| (C7) | LIMITATION OF HEATING | | N/A |
| (C7.1) | Preselection test: | | N/A |
| | Test sample placed for at least 12 h in an oven having temperature ($t_c - 5$) K | | N/A |
| | No operation of the protection device | | N/A |
| (C7.2) | Functioning of protection means: | | N/A |

| IEC 61347-2-11 | | | |
|----------------|--------------------|-----------------|---------|
| Clause | Requirement + Test | Result - Remark | Verdict |

| | | | |
|--|--|--|-----|
| | 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/A |
| | No operation of the protection device | | N/A |
| | Introducing of the most onerous test condition determined during test of clause 14.2 to 14.5 | | N/A |
| | Output of windings connected to the mains supply short-circuited, and other part of the controlgear operated under normal conditions | | N/A |
| | Increasing of the current through the windings continuously until operation of the protection means | | N/A |
| | Continuous measuring of the highest surface temperature | | N/A |
| | Ballasts according to C5 a) or C5 e) operated until stable conditions are achieved | | N/A |
| | Automatic-resetting thermal protectors working 3 times | | N/A |
| | Ballasts according to C5 b) working 6 times | | N/A |
| | Ballasts according to C5 c) and C5) d) working once | | N/A |
| | Highest temperature does not exceed the marked value | | N/A |
| | Any overshoot of 10% over the marked value within 15 min | | N/A |
| | After 15 min value not exceed marked value | | N/A |

| | | | |
|------------|---|--|-----|
| (D) | ANNEX D – REQUIREMENTS FOR CARRY OUT THE HEATING TESTS OF THERMALLY PROTECTED LAMP CONTROLGEAR | | N/A |
| | Tests in C7 performed in accordance with Annex D, if applicable | | N/A |

| | | | |
|------------|--|--|-----|
| (F) | ANNEX F - DRAUGHT-PROOF ENCLOSURE | | N/A |
| | Draught-proof enclosure in accordance with the description | | N/A |
| | Dimensions of the enclosure | | N/A |
| | Other design; description | | N/A |

| | | | |
|------------|---|--|-----|
| (H) | ANNEX H - TESTS | | N/A |
| | All tests performed in accordance with the advice given in Annex H, if applicable | | N/A |

| IEC 61347-2-11 | | | |
|----------------|---|--|---------|
| Clause | Requirement + Test | Result - Remark | Verdict |
| (L) | ANNEX L: PARTICULAR ADDITIONAL REQUIREMENTS FOR CONTROLGEARS PROVIDING SELV | | N/A |
| (L.3) | Classification | | N/A |
| | Class I | Yes <input type="checkbox"/> No <input type="checkbox"/> | — |
| | Class II | Yes <input type="checkbox"/> No <input type="checkbox"/> | — |
| | Class III | Yes <input type="checkbox"/> No <input type="checkbox"/> | — |
| | non-inherently short circuit proof controlgear | Yes <input type="checkbox"/> No <input type="checkbox"/> | — |
| | inherently short circuit proof controlgear | Yes <input type="checkbox"/> No <input type="checkbox"/> | — |
| | fail safe controlgear | Yes <input type="checkbox"/> No <input type="checkbox"/> | — |
| | non-short-circuit proof controlgear | Yes <input type="checkbox"/> No <input type="checkbox"/> | — |
| (L.4) | Marking | | N/A |
| | Adequate symbols are used | | N/A |
| (L.5) | Protection against electric shock | | N/A |
| | Comply with clause 9.2 of IEC 61558-1 | | N/A |
| (L.6) | Heating | | N/A |
| | No excessive temperatures in normal use | | N/A |
| | Value if capacitor t_c marked | | — |
| | Winding insulation classified as Class | | — |
| | Comply with tests of clause 14 of IEC 61558-1 with adjustments | | N/A |
| (L.7) | Short-circuit and overload protection | | N/A |
| | Comply with tests of clause 15 of IEC 61558-1 with adjustments | | N/A |
| (L.8) | Insulation resistance and electric strength | | N/A |
| (L.8.1) | Conditioned 48 h between 91 % and 95 % | | N/A |
| (L.8.2) | Insulation resistance | | N/A |
| | Between input- and output circuits not less than 5 M Ω | | N/A |
| | Between metal parts of class II convertors which are separated from live parts by basic insulation only and the body not less than 5 M Ω | | N/A |
| | Between metal foil in contact with the inner and outer surfaces of enclosures of insulating material not less than 2 M Ω | | N/A |
| (L.8.3) | Electric strength | | N/A |
| | 1) Between live parts of input circuits and live parts of output circuits | | N/A |
| | 2) Over basic or supplementary insulation between: | | N/A |

| IEC 61347-2-11 | | | |
|----------------|--|-----------------|---------|
| Clause | Requirement + Test | Result - Remark | Verdict |
| | a) live parts having different polarity | | N/A |
| | b) live parts and body if intended to be connected to protective earth | | N/A |
| | c) accessible metal parts and a metal rod of the same diameter as the flexible cable or cord | | N/A |
| | d) live parts and an intermediate metal part | | N/A |
| | e) intermediate metal parts and the body | | N/A |
| | f) each input circuit and all other input circuits | | N/A |
| | 3) Over reinforced insulation between the body and live parts | | N/A |
| (L.9) | Construction | | N/A |
| (L.9.1) | Transformer comply with 19.12 of IEC 61558-1 and 19 of IEC 61558-2-6 | | N/A |
| | HF transformer comply with 19 of IEC 61558-2-16 | | N/A |
| (L.10) | Components | | N/A |
| | Protective devices comply with 20.6 – 20.11 of IEC 61558-1 | | N/A |
| (L.11) | Creepage distances, clearances and distances through insulation | | N/A |
| | Creepage distances and clearances not less than in Clause 16 | | N/A |
| | Distance through insulation according Table L.5 in IEC 61347-1 | | N/A |
| | 1) Basic distance through insulation | | N/A |
| | Required distance (mm) | | — |
| | Measured (mm) | | N/A |
| | Supplementary information | | — |
| | 2) Supplementary distance through insulation | | N/A |
| | Required distance (mm) | | — |
| | Measured (mm) | | N/A |
| | Supplementary information | | — |
| | 3) Reinforced distance through insulation | | N/A |
| | Required distance (mm) | | — |
| | Measured (mm) | | N/A |
| | Supplementary information | | — |
| (N) | ANNEX N: REQUIREMENTS FOR INSULATION MATERIALS USED FOR DOUBLE OR REINFORCED INSULATION | | N/A |
| (N.4) | General requirements | | N/A |

| IEC 61347-2-11 | | | |
|----------------|--|-----------------|---------|
| Clause | Requirement + Test | Result - Remark | Verdict |
| (N.4.1) | Material comply with IEC 60085 and IEC 60216 series | | N/A |
| (N.4.2) | Solid insulation | | N/A |
| | Electric strength test at least 5 kV or 1,35 x test voltage in Table N.1 | | N/A |
| | 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/A |
| (N.4.3) | Thin sheet insulation | | N/A |
| (N.4.3.1) | Thickness and composition of thin sheet insulation | | N/A |
| | - Inside the ballast and not subjected to handling or abrasion during the production and during maintenance | | N/A |
| | - Non-separated layers: Min. 3 layers and fulfil mandrel test of 150N | | N/A |
| | - Separated layers: Min. 2 layers and each layer fulfil mandrel test of 50N | | N/A |
| | - Separated layers (alternative): Min. 3 layers and 2/3 of the layers fulfil mandrel test of 100N | | N/A |
| (N.4.3.2) | Mandrel test (electric strength test during mechanical stress) | | N/A |
| | Electric strength test after mandrel test: | | N/A |
| | - Non-separated layers: min. 5 kV or 1,35 x test voltage in Table N.1 | | N/A |
| | - 2/3 of min. 3 separated layers: min. 5 kV or 1,25 x test voltage in Table N.1 | | N/A |
| | - one of 2 separated layers: min. 5 kV or 1,25 x test voltage in Table N.1 | | N/A |
| | No flashover or breakdown occurred | | N/A |
| (O) | ANNEX O: ADDITIONAL REQUIREMENTS FOR BUILT-IN ELECTRONIC CONTROLGEAR WITH DOUBLE OR REINFORCED INSULATION | | N/A |
| (O.6) | Marking | | N/A |
| | Marking according clause 7 (7) | See clause 7 | N/A |
| | Special symbol | | N/A |
| | Meaning of the special symbol explained in catalogue | | N/A |
| (O.7) | Protection against accidental contact with live parts | | N/A |
| | Requirements of clause 8 (10) | See clause 8 | N/A |
| | Test finger not possible to make contact with basic insulated metal parts | | N/A |
| (O.8) | Terminals | | N/A |

| IEC 61347-2-11 | | | |
|----------------|--|-----------------|---------|
| Clause | Requirement + Test | Result - Remark | Verdict |
| | Clause 9 (8) | See clause 9 | N/A |
| (O.9) | Provision for earthing | | N/A |
| | Functional earthing terminals comply with clause 9 of part 1 | | N/A |
| | No protective earthing terminal | | N/A |
| (O.10) | Moisture resistance and insulation | | N/A |
| | Clause 11 (11) | See clause 11 | N/A |
| (O.11) | Electric strength | | N/A |
| | Clause 12 (12) | See clause 12 | N/A |
| (O.13) | Fault conditions | | N/A |
| | Clause 14 (14) | See clause 14 | N/A |
| | 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 | | N/A |
| | 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 | | N/A |
| (O.14) | Construction | | N/A |
| | Clause 17 (15) | See clause 17 | N/A |
| | Accessible metal parts insulated from live parts by double or reinforced insulation | | N/A |
| | Live part insulated from supporting surface in contact with external faces by double or reinforced insulation | | N/A |
| (O.15) | Creepage distances and clearances | | N/A |
| | Clause 18 (16) | See clause 18 | N/A |
| | Comply with corresponding values for luminaries in IEC 60598-1 | | N/A |
| (O.16) | Screws, current-carrying parts and connections | | N/A |
| | Clause 19 (17) | See clause 19 | N/A |
| (O.17) | Resistance to heat and fire | | N/A |
| | Clause 20 (18) | See clause 20 | N/A |
| (O.18) | Resistance to corrosion | | N/A |
| | Clause 21 (19) | See clause 21 | N/A |

| IEC 61347-2-11 | | | |
|--------------------|---|-----------------|---------|
| Clause | Requirement + Test | Result - Remark | Verdict |
| (P) | Creepage distances and clearances and distance through isolation (DTI) for lamp controlgear which are protected against pollution by the use of coating or potting | | N/A |
| (P.1) | General | | N/A |
| | P.2 applies if creepage distances less than the minimum in Table 7 and 8 | | N/A |
| | P.3 applies if clearance less than the minimum in Table 9, 10 and 11 | | N/A |
| (P.2) | Creepage distances | | N/A |
| (P.2.2) | Minimum creepage distances for working voltages and rated voltages with frequencies up to 30 kHz (Table P.1) | | N/A |
| | Basic or supplementary insulation: | | N/A |
| | Required creepage | | — |
| | Measured | | N/A |
| | Supplementary information | | — |
| | Reinforced insulation: | | N/A |
| | Required creepage | | — |
| | Measured | | N/A |
| | Supplementary information | | — |
| (P.2.3) | Creepage distances for working voltages with frequencies above 30 kHz (Table P.2) | | N/A |
| | Voltage \hat{U}_{out} kV | | — |
| | Frequency | | — |
| | Required distance | | — |
| | Measured | | N/A |
| | Supplementary information | | — |
| (P.2.4) | Compliance with the required creepage distances | | N/A |
| (P.2.4.1) | Compliance in accordance with 16.3.3 and test according P.2.4.2 | | N/A |
| (P.2.4.3) | Electrical tests after conditioning | | N/A |
| (P.2.4.3.1) | Insulation resistance and electric strength according Clause 11 and 12 | | N/A |
| (P.3) | Distance through isolation | | N/A |
| (P.3.4) | Electrical tests after conditioning | | N/A |
| (P.3.4.1) | Insulation resistance and electric strength according Clause 11 and 12 | | N/A |
| (P.3.4.2) | Impulse voltage dielectrical test | | N/A |
| | Basic or supplementary insulation: | | N/A |

| IEC 61347-2-11 | | | |
|----------------|--------------------|-----------------|---------|
| Clause | Requirement + Test | Result - Remark | Verdict |

| | | | |
|--|-----------------------------|--|-----|
| | Working/rated voltage | | — |
| | Impulse voltage..... | | N/A |
| | Supplementary information | | — |
| | Reinforced insulation: | | N/A |
| | Working/rated voltage | | — |
| | Impulse voltage..... | | N/A |
| | Supplementary information | | — |

Attachment 4 | Photo document.

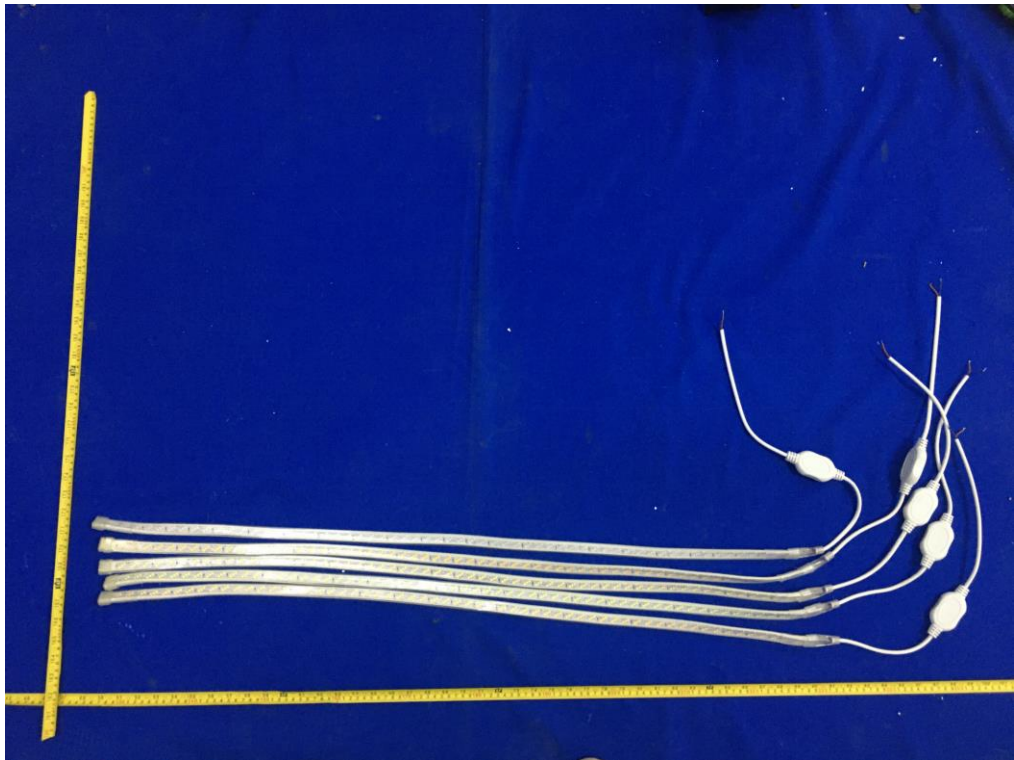


Figure 1 Overview of sample model for SMD 2835



Figure 2 LED view for SMD 2835

Attachment 4 | Photo document.

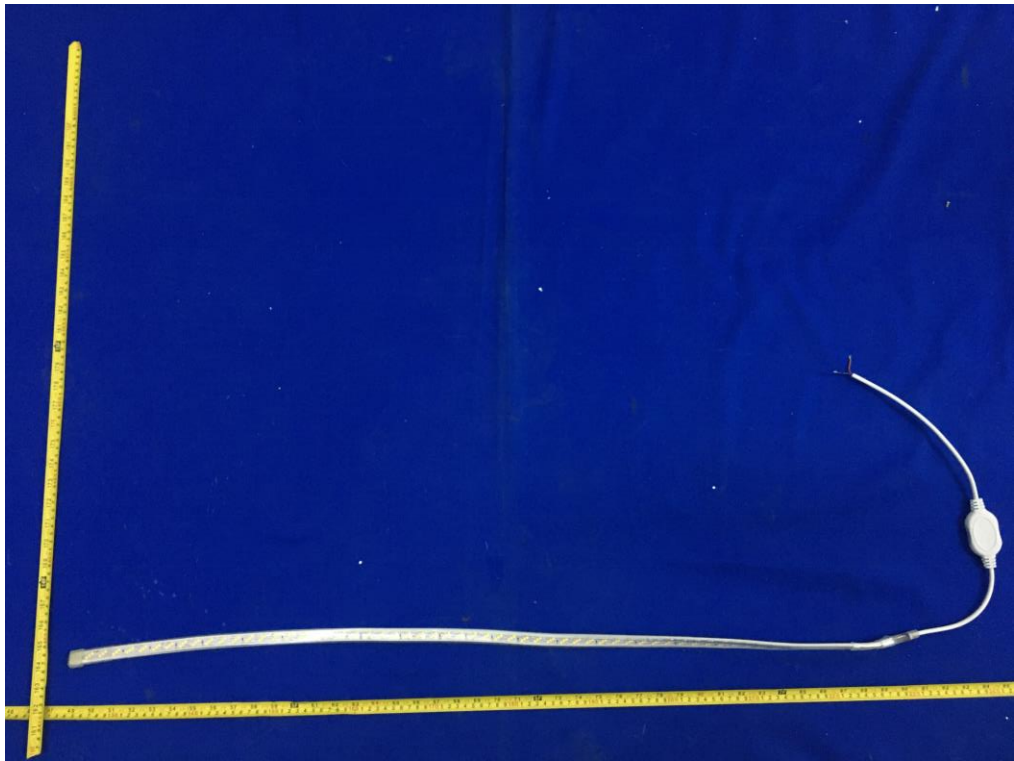


Figure 3 Overview of RFE-0167A

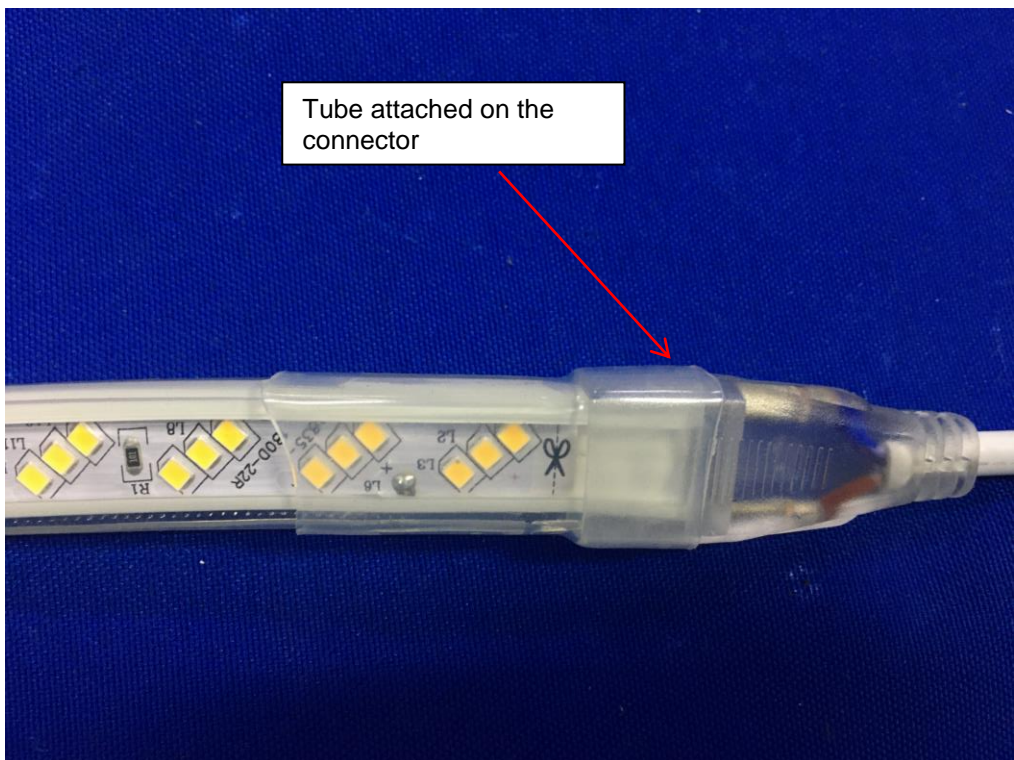


Figure 4 Overview of connection of input cable and pipes for all model

Attachment 4 | Photo document.



Figure 5 Overview of connection of input cable and pipes for all model

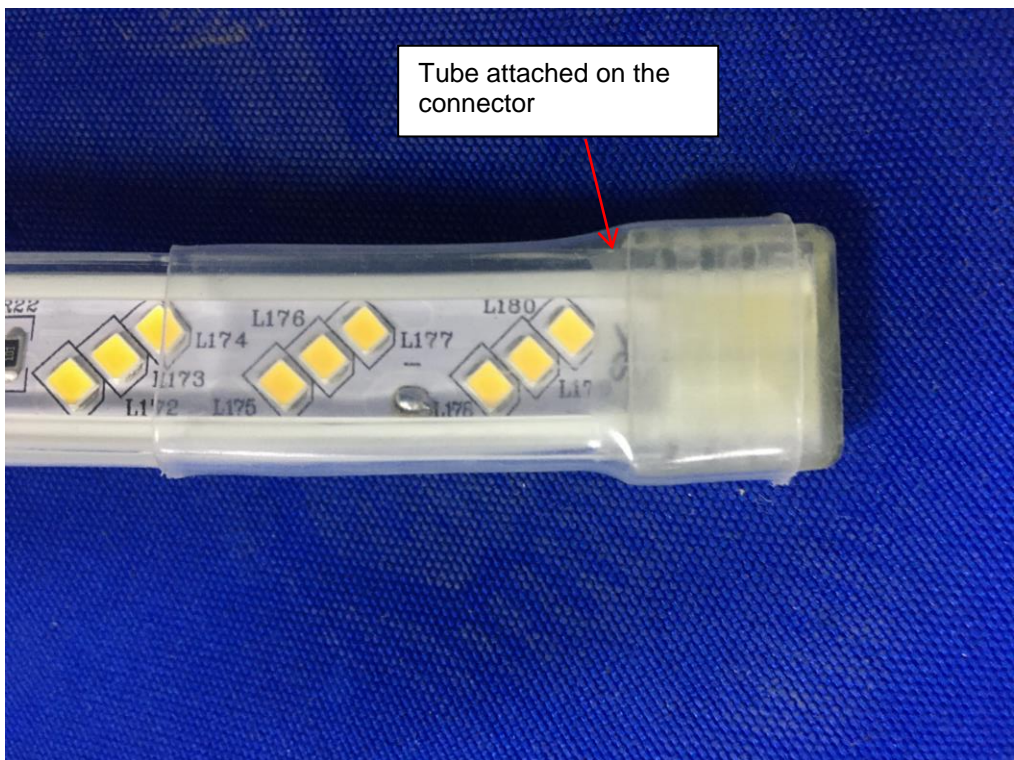


Figure 6 Overview of end cover fixed by glue for all model

Attachment 4 | Photo document.

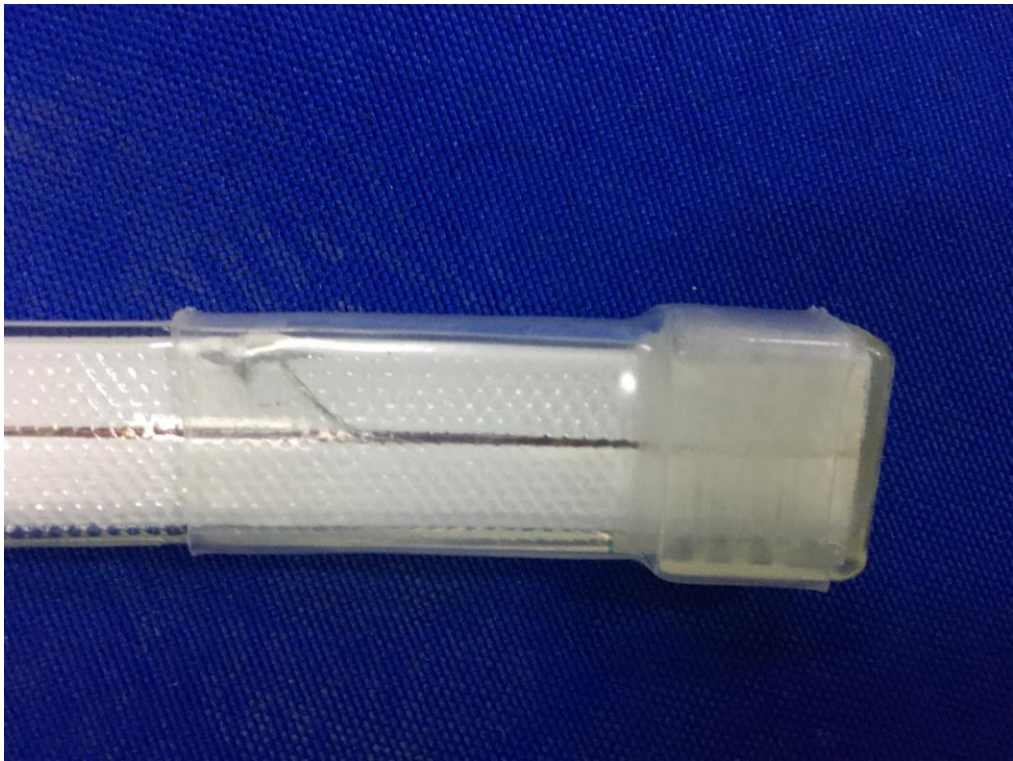


Figure 7 Overview of end cover



Figure 8 Over view of rectifier bridge

Attachment 4 | Photo document.

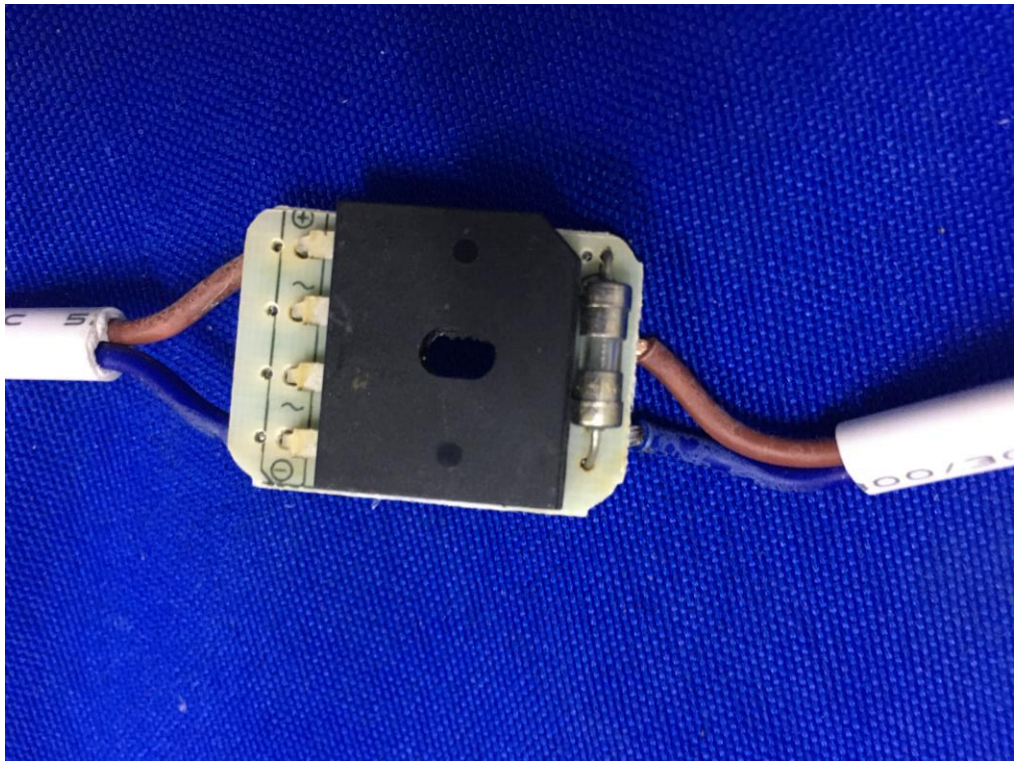


Figure 9 PCB view of rectifier bridge

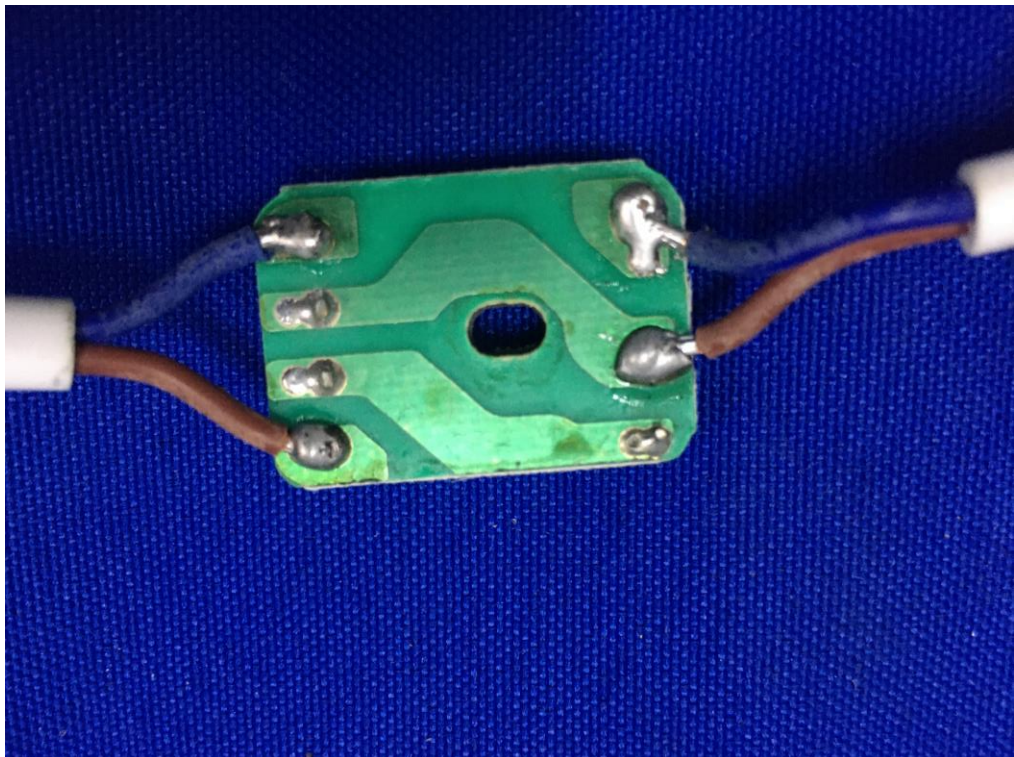


Figure 10 PCB view of rectifier bridge

Attachment 4 Photo document.

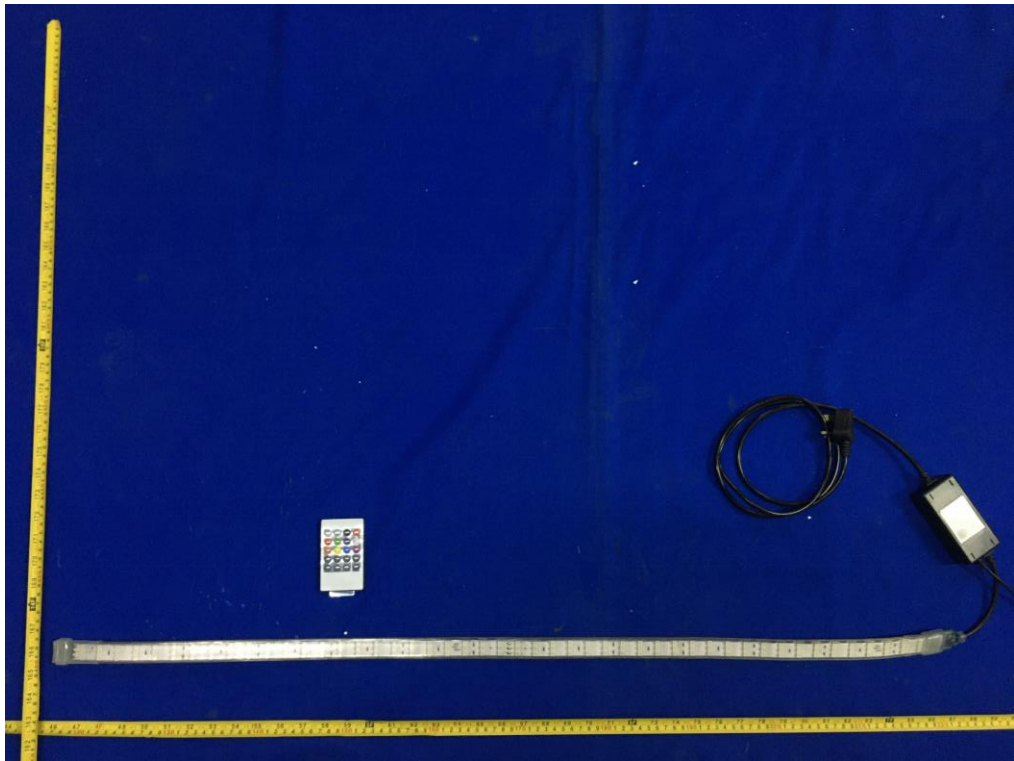


Figure 11 Over view of RFE-0454 for RGB

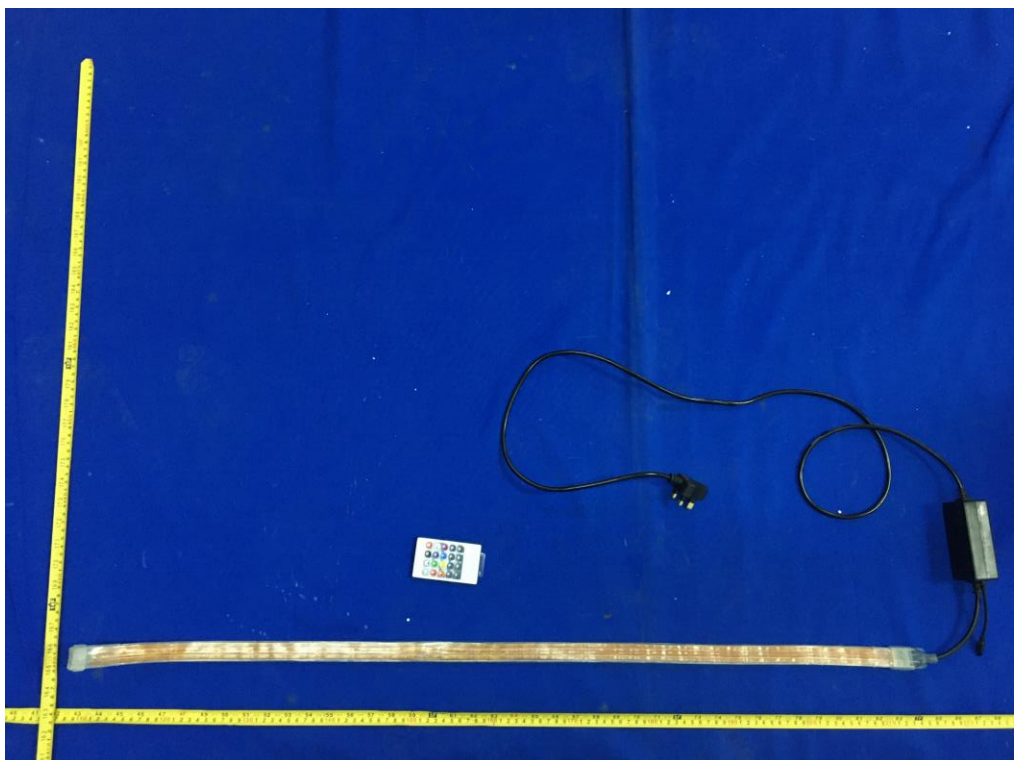


Figure 12 Over view of RFE-0454 for RGB

Attachment 4 | Photo document.



Figure 13 LED view for SMD 5050



Figure 14 Over view of rectifier bridge for RGB

Attachment 4 | Photo document.

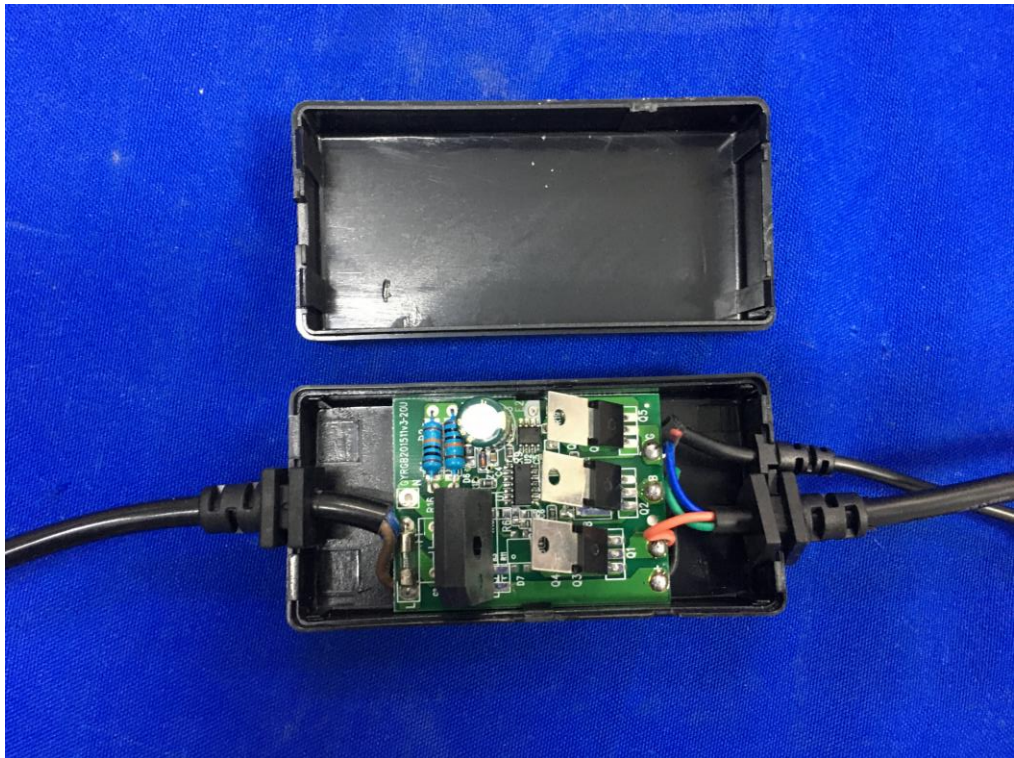


Figure 15 Internal view of rectifier bridge for RGB



Figure 16 PCB view of rectifier bridge for RGB

Attachment 4 | Photo document.

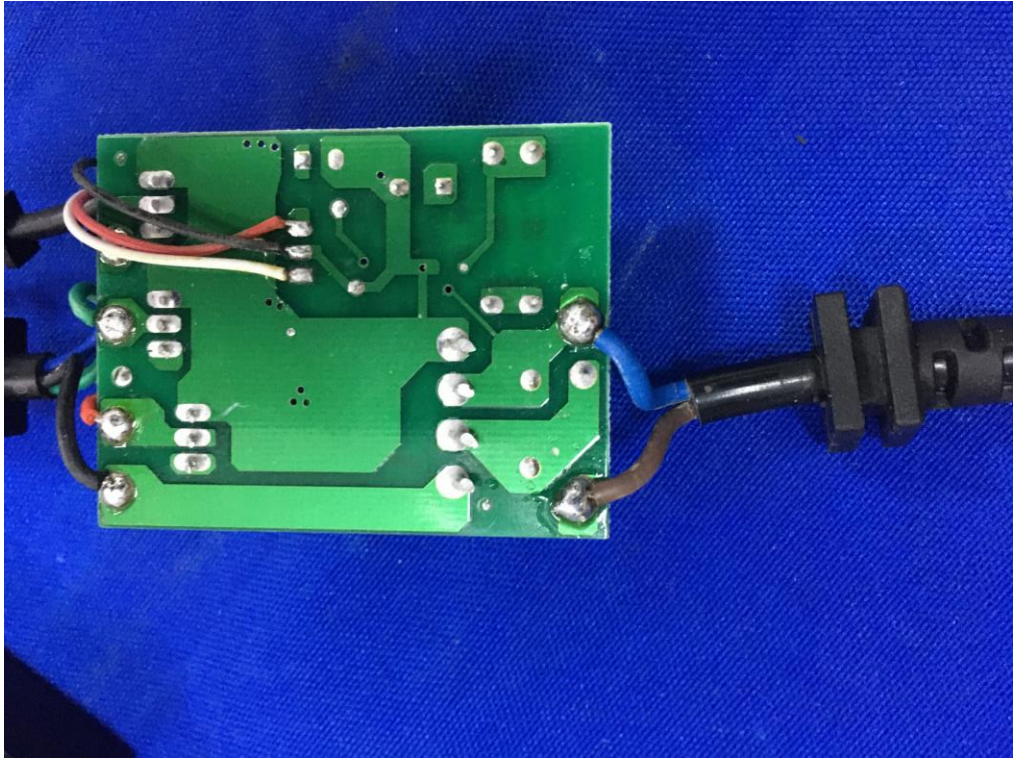


Figure 17 PCB view of rectifier bridge for RGB

- END OF REPORT -