Safety Test Report

Report No.: HB-090E-0572/18

Product	:	LED Portable Luminaires
Model/Type	:	502172, 502173, 502174
Brand Name	:	Normann Copenhagen
Applicant	:	Normann Copenhagen Aps
Application No.	:	2018082303
Date of Issue	:	2018.10.16
Standards	:	EN 60598-2-4: 1997 EN 60598-1: 2015 EN 62031:2008+A1:2013+A2:2015 EN 62471:2008 EN 61058-1:2018 EN 62493:2015

Zhongshan Bontek Compliance Testing Laboratory Co., Ltd.

Tongyi Industrial Zone Dongxing East Road, Guzhen Town
Zhongshan City, Guangdong Province, China

TEST REPORT
IEC 60598-2-4
Luminaires
Part 2: Particular requirements
Section 4 – Portable general purpose luminaires

Report No. .....:	HB-090E-0572/18
Application No. .....:	2018082109
Testing Laboratory.....:	Zhongshan Bontek Compliance Testing Laboratory Co., Ltd.
Address .....:	Tongyi Industrial Zone Dongxing East Road, Guzhen Town, Zhongshan City, Guangdong Province, China
Applicant's name .....:	Normann Copenhagen Aps
Address .....:	Osterbrogade 70, 2100 Copenhagen, Demark
Test specification:	
Standards.....:	EN 60598-2-4:1997 use in conjunction with EN 60598-1:2015
Test procedure .....:	--
Non-standard test method .:	--
Test Report Form No. .....:	HB-4L-090E-2
TRF Originator .....:	LTS
Master TRF .....:	2018-06
Test item description .....:	LED portable luminaires
Trade Mark .....:	--
Model/Type reference .....:	502172, 502173, 502174
Ratings .....:	100-240V~, 50/60Hz, IP20, Class II for LED driver, Class III for luminaires

Zhongshan Bontek Compliance Testing Laboratory Co., Ltd.
Tongyi Industrial Zone Dongxing East Road, Guzhen Town, Zhongshan City, Guangdong Province, China.
http://www.zslts.com Tel: +86 760-22386277 Fax: +86 760-22349648-8012

Summary of testing:

The submitted samples are found to comply with the requirements of:

- EN 60598-2-4:1997
- EN 60598-1:2015
- EN 62031:2008+A1:2013+A2:2015
- EN 62471:2008
- EN 61058-1:2018
- EN 62493:2015

Tested by (signature) .....:	Zhaoyi Deng	Zhaoyi Deng
Reviewed by (signature) .....:	Lechun Guan	Lechun Guan
Approved by (signature) .....:	Zhaofu Peng	Z Peng
Date of issue .....:	2018.10.16	

General remarks:

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

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"(see Appendix #)" refers to additional information appended to the report.

"(see appended table)" refers to a table appended to the report.

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

Clause numbers between brackets of main report refer to clauses in EN 60598-1.

Main report:

Page 1 to 30 for EN 60598-2-4 test report

Attachment 1:

Page 31 to 34 for EN 62031 test report.

Attachment 2:

Page 35 to 42 for EN 62471 test report.

Attachment 3:

Page 43 for EN 61058-1 test report.

Attachment 4:

Page 44 for EN 62493 test report.

Attachment 5:

Page 45 to 50 for photo documentation.

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Test item particulars:

Equipment mobility ..... :	Portable
Operating condition ..... :	ta: 25°C
Class of equipment..... :	Class II for LED driver Class III for luminaire
Degree of protection..... :	IP20
Mass of equipment..... :	1.43kg
Supply connect..... :	Plug for LED driver DC inlet for luminaires

Possible test case verdicts:

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

Testing:

Date of receipt of test item ..... :	2018.09.08
Date (s) of performance of tests ..... :	2018.09.08 to 2018.10.16

Copy of marking plate:

NORMANN COPENHAGEN
Eddy lamp
Model: 502174
100-240V~ 50/60Hz
20W 0.3A

Importer: Normann Copenhagen Aps
Address: Osterbrogade 70, 2100 Copenhagen, Demark

Stick on package

NORMANN COPENHAGEN
Eddy lamp
Model: 502174-L
24VDC 750mA 18W

Importer: Normann Copenhagen Aps
Address: Osterbrogade 70, 2100 Copenhagen, Demark

Stick on the bottom of lamp base

1. The marking labels for other models are identical as above, except the model name.
2. The height of graphical symbols was not less than 5mm.
3. The height of letters and numerals was not less than 2mm.

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General product information:

1. The products are LED portable luminaires, for indoor use only, containing with class II LED driver and class III luminaire. IP20, ta:25°C
2. All models are identical except for the colour. The model 502174 was selected as representative model for full tests.
3. Input: 220-240V~, 50/60Hz, 20W. For more details, see model list below:

Model list:

No.	Model	Series name	Rated power	LED driver	Input for lamp	Colour	Photo
1	502172	Eddy Lamp	20W	HSP18-24V	24VDC 750mA	White	
2	502173					Grey	
3	502174					Black	

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

4.2 (0)	**GIECERAL INTRODUCTION**		**P**
4.2 (0.3)	More sections applicable.....	Yes ☐ No ☒	—
4.2 (0.5)	Components	(see Annex 1)	—
4.2 (0.7)	Information for luminaire design in light sources standards		—
4.2 (0.7.2)	Light source safety standard	EN 62031	—
	Luminaire design in the light source safety standard		P

4.4 (2)	**CLASSIFICATION**		**P**
4.4 (2.2)	Type of protection	Class II for LED driver Class III for luminaire	P
4.4 (2.3)	Degree of protection	IP20	—
4.4 (2.5)	Luminaire for normal use	Yes ☒ No ☐	—
	Luminaire for rough service	Yes ☐ No ☒	—
4.4.1 (-)	Ordinary luminaire.....	Yes ☒ No ☐	—
4.4.2 (-)	Portable luminaire for outdoor use	Yes ☐ No ☒	—
	Classified IPX4 or higher		N
4.4.3 (2.4)	Luminaire suitable for direct mounting on normally flammable surfaces	Yes ☒ No ☐	—

4.5 (3)	**MARKING**		P
4.5 (3.2)	Mandatory markings		P
	Position of the marking		P
	Format of symbols/text		P
4.5 (3.3)	Additional information		P
	Language of instructions	English	P
4.5 (3.3.1)	Combination luminaires		P
4.5 (3.3.2)	Nominal frequency in Hz	50/60Hz for LED driver	P
4.5 (3.3.3)	Operating temperature		N
4.5 (3.3.5)	Wiring diagram		N
4.5 (3.3.6)	Special conditions		N
4.5 (3.3.7)	Metal halide lamp luminaire – warning		N
4.5 (3.3.8)	Limitation for semi-luminaires		N
4.5 (3.3.9)	Power factor and supply current	~	P
4.5 (3.3.10)	Suitability for use indoors		P
4.5 (3.3.11)	Luminaires with remote control		N

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EN 60598-2-4			
Clause	**Requirement + Test**	**Result - Remark**	**Verdict**
4.5 (3.3.12)	Clip-mounted luminaire – warning		N
4.5 (3.3.13)	Specifications of protective shields		N
4.5 (3.3.14)	Symbol for nature of supply	~ for LED driver	P
4.5 (3.3.15)	Rated current of socket outlet		N
4.5 (3.3.16)	Rough service luminaire		N
4.5 (3.3.17)	Mounting instruction for type Y, type Z and some type X attachments	Type Y	P
4.5 (3.3.18)	Non-ordinary luminaires with PVC cable		N
4.5 (3.3.19)	Protective conductor current in instruction if applicable		N
4.5 (3.3.20)	Provided with information if not intended to be mounted within arm's reach		N
4.5 (3.3.21)	Non replaceable and non-user replaceable light sources information provided	Non replaceable	P
4.5 (3.3.22)	Controllable luminaires, classification of insulation provided		N
4.5 (3.4)	Test with water		P
	Test with hexane		P
	Legible after test		P
	Label attached		P

4.6 (4)	**CONSTRUCTION**		**P**
4.6 (4.2)	Components replaceable without difficulty		N
4.6 (4.3)	Wireways smooth and free from sharp edges		P
4.6 (4.4)	Lampholders		N
4.6 (4.4.1)	Integral lampholder		N
4.6 (4.4.2)	Wiring connection		N
4.6 (4.4.3)	Lampholder for end-to-end mounting		N
4.6 (4.4.4)	Positioning		N
	- pressure test (N) ..... :	--	N
	- bending test (N) ..... :	--	N
4.6 (4.4.5)	Peak pulse voltage		N
4.6 (4.4.6)	Centre contact point		N
4.6 (4.4.7)	Parts incorporated in rough service luminaires resistance to tracking		N
4.6 (4.4.8)	Lamp connectors		N
4.6 (4.4.9)	Caps and bases shall be correctly used		N

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EN 60598-2-4			
Clause	**Requirement + Test**	**Result - Remark**	**Verdict**
1.6 (4.4.10)	Light source for lampholder or connection according to IEC 60061 not connected another way		N
4.6 (4.5)	Starter holders		N
	Starter holder in luminaires other than class II		N
	Starter holder of class II construction		N
4.6 (4.6)	Terminal blocks		N
	Connecting leads (tails)		N
	Unsecured terminal blocks		N
4.6 (4.7)	Terminals and supply connections		N
4.6 (4.7.1)	Contact to metal parts		N
4.6 (4.7.2)	Test 8mm live conductor		N
	Test 8mm earth conductor		N
4.6 (4.7.3)	Terminals for supply conductor.		N
4.6 (4.7.3.1)	Welding method and material		N
	- stranded or solid conductor		N
	- spot welding		N
	- Welding between wires		N
	- Type Z attachment		N
	- mechanical test according to 15.6.2		N
	- electrical test according to 15.6.3		N
	- heat test according to 15.6.3.2.3 and 15.6.3.2.4		N
4.6 (4.7.4)	Terminals other than supply connection		N
4.6 (4.7.5)	Heat-resisting wiring/sleeves		N
4.6 (4.7.6)	Multi-pole plug and socket		N
	- test at 30 N		N
4.6 (4.8)	Switches:		P
	- adequate rating and fixing		P
	- Switches in flexible cables or cords and switched lampholers shall not be used in non-ordinary luminaires.		N
	- polarized supply		P
	- compliance with 61058-1 for electronic switches		P
4.6 (4.9)	Insulating lining and sleeves		P
4.6 (4.9.1)	Retainment	Heat-shrinkable	P
4.6 (4.9.2)	Insulated linings and sleeves		P

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EN 60598-2-4			
Clause	**Requirement + Test**	**Result - Remark**	**Verdict**
	a) & c) Insulation resistance and electric strength		P
	b) Ageing test. Temperature (°C) ..... :		N
4.6 (4.10)	Double and reinforced insulation		P
4.6 (4.10.1)	For metal encased class II luminaires, contact between: - mounting surfaces and parts with basic insulation only, - accessible metal parts and basic insulation shall be prevented.		P
	The wiring includes internal and external wiring of the luminaire, and fixing wiring of the installation.		P
	Degree of protection against electric shock of class II shall not be impaired.		P
	The interference suppression capacitors shall comply with the requirements according to IEC 60384-14 and the method of their connection shall be in accordance with 8.6 of IEC 60065.		N
4.6 (4.10.2)	Assembly gaps greater than 0.3 mm:		P
	- neither be coincidental with any gap in basic insulation, nor be straight access to live parts		P
	- Openings larger than 0.3 mm in double or in reinforced insulation shall be so designed that live parts cannot be touched with the conical pin of test probe 13.		P
	The required degree of protection against electric shock shall be in accordance with the IP classification of the luminaire.		P
4.6 (4.10.3)	Retainment of insulation		P
	- either be fixed so that they cannot be removed without being seriously damaged;		P
	- or be unable to be replaced in an incorrect position		P
	The sleeving and lining shall be retained in position by positive means		N
4.6 (4.11)	Electrical connections and current-carrying parts		P
4.6 (4.11.1)	Contact pressure		P
4.6 (4.11.2)	Screws:		N
	- self-tapping screws		N
	- thread-cutting screws		N
	- at least two self-tapping screws		N

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EN 60598-2-4			
Clause	**Requirement + Test**	**Result - Remark**	**Verdict**
4.6 (4.11.3)	Screws and rivets shall be locked against loosening		P
	- Spring washers		P
	- rivets		N
4.6 (4.11.4)	Material of current-carrying parts	Copper	P
4.6 (4.11.5)	No direct contact with the mounting surface or wood.		P
4.6 (4.11.6)	Electro-mechanical contact systems		P
	After the test, the samples shall show		P
	- no wear impairing their further use;		P
	- no deterioration of enclosures or barriers		P
	- no loosing of electrical or mechanical connections		P
4.6 (4.12)	Screws and connections (mechanical) and glands		P
4.6 (4.12.1)	Screws not made of soft metal		P
	Screws of insulating material	0.5Nm	P
	Torque test: torque (Nm); part ..... :	Fix enclosure: 3.0mm, 0.5Nm	P
	Torque test: torque (Nm); part ..... :		N
4.6 (4.12.2)	Screws with diameter < 3 mm screwed into metal		N
4.6 (4.12.4)	Locked connections		P
	- fixed arms: torque (Nm) ..... :	2.5Nm	P
	- lampholder: torque (Nm); ..... :		N
	- push-button switches: torque 0.8 Nm ..... :		N
4.6 (4.12.5)	Torque test of screwed glands, and after the test, the luminaire and glands shall show no damage.		N
4.6 (4.13)	Mechanical strength		P
4.6 (4.13.1)	Impact test:		P
	- fragile parts: energy (Nm); ..... :		N
	- other parts: energy (Nm); ..... :	0.5Nm	P
	a) live parts		P
	b) linings		P
	c) protection		P
	d) covers		P
4.6 (4.13.3)	Straight test finger.	30N	P
4.6 (4.13.4)	Rough service luminaires		N
	- IP54 or higher		N

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EN 60598-2-4			
Clause	**Requirement + Test**	**Result - Remark**	**Verdict**
	a) fixed		N
	b) hand-held		N
	c) delivered with a stand		N
	d) for temporary installations and suitable for mounting on a stand		N
4.6 (4.13.6)	Tumbling barrel		N
4.6 (4.14)	Suspensions and means of adjustment		N
4.6 (4.14.1)	Mechanical suspension shall have adequate factors of safety.		N
	A) suspended luminaires: four times the weight:		N
	B) rigid suspension luminaires: torque 2.5 Nm:		N
	C) rigid suspension brackets: bracket arm; bending moment(Nm) ..... :		N
	D) load track-mounted luminaires:		N
	E) clip-mounted luminaires, glass-shelve. Thickness(mm) ..... :		N
4.6 (4.14.2)	Load to flexible cables		N
	Mass (kg) ..... :		N
	Stress in conductors (N/mm²) ..... :		N
	Semi-luminaire – mass (kg) ..... :		N
	Semi-luminaire – bending moment (Nm)..... :		N
4.6 (4.14.3)	Adjusting devices:		N
	- flexing test; number of cycles..... :		N
	- strands broken		N
	- electric strength test afterwards		N
4.6 (4.14.4)	Telescopic tubes: cords not fixed to tube; no strain on conductors		N
4.6 (4.14.5)	Guide pulleys		N
4.6 (4.14.6)	Strain on socket-outlets		N
4.6 (4.15)	Flammable materials		P
4.6 (4.15.1)	- glow-wire test 650 °C		P
	- spacing ≥ 30 mm		N
	- screen withstanding test of 13.3.1		N
	- screen dimensions		N
	- no fiercely burning material		P
	- thermal protection		N
	- electronic circuits exempted		N

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EN 60598-2-4			
Clause	**Requirement + Test**	**Result - Remark**	**Verdict**
4.6 (4.15.2)	Luminaires made of thermoplastic material shall withstand temperature rises.		N
	a) construction		N
	b) temperature sensing control		N
	c) surface temperature.		N
4.6 (4.16)	Luminaires for mounting on normally flammable surfaces		P
	Luminaires classified as suitable for mounting on a normally flammable surface shall comply with one of the following requirements of 4.16.1, 4.16.2, or 4.16.3.		N
4.6 (4.16.1)	Lamp control gear spacing:		N
	- spacing 10 mm		N
	- spacing 35 mm		N
4.6 (4.16.2)	Thermal protection:		N
	- in lamp control gear		N
	- external		N
	- fixed position		N
	- temperature marked lamp control gear		N
4.6 (4.16.3)	“F” curve measured		N
4.6 (4.17)	Drain holes		N
	Clearance at least 5mm		N
4.6 (4.18)	Resistance to corrosion:		N
4.6 (4.18.1)	- resistant to rust		N
4.6 (4.18.2)	- resistant to stress corrosion		N
4.6 (4.18.3)	- resistant to corrosion		N
4.6 (4.19)	Ignitors compatible with ballast		N
4.6 (4.20)	Rough service vibration		N
4.6 (4.21)	Protective shield:		N
4.6 (4.21.1)	Shield fitted		N
4.6 (4.21.2)	Particles from a shattering lamp cannot impair safety		N
4.6 (4.21.3)	No direct path		N
4.6 (4.21.4)	Impact test on shield		N
4.6 (4.22)	Attachments to lamps		N
4.6 (4.23)	Semi-luminaires comply class II		N
4.6 (4.24)	Photobiological hazards		P
4.6 (4.24.1)	UV radiation for tungsten halogen lamps and metal halide lamps (Annex P)		N

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EN 60598-2-4			
Clause	**Requirement + Test**	**Result - Remark**	**Verdict**
4.6 (4.24.2)	Retinal blue light hazard	RG0	P
	Luminaires with Ethr		N
	a) fixed luminaries		N
	- distance xm, borderline between RG1 and RG2		N
	- marking and instruction according 3.2.23		N
	b) portable and handheld luminaires		N
	- marking according to 3.2.23 if TG1 exceeded at 200mm according to IEC/TR 62778		N
	Portable luminaires for children IEC 60598-2-10 and mains socket outlet nightlights IEC 60598-2-12 not exceed RG1 at 200mm according to IEC/TR 62778		N
4.6 (4.25)	No sharp point or edges		P
4.6 (4.26)	Short-circuit protection:		N
4.6 (4.26.1)	Uninsulated accessible SELV parts		N
4.6 (4.26.2)	Short-circuit test		N
4.6 (4.26.3)	Test chain according to Figure 29		N
4.6 (4.27)	Terminal blocks with integrated screwless earthing contacts		N
4.6 (4.28)	Fixing of thermal sensing control		N
	Non plug-in or easily replaceable type		N
	Reliably kept in position		N
	No adhesive fixing if UV radiations from a lamp can degrade the fixing		N
	Not outside the luminaire enclosure		N
	Test of adhesive fixing		N
4.6 (4.29)	Luminaires with non-replaceable light source		P
	Not possible after parts have been opened by hand or tools		P
4.6 (4.30)	Luminaires with non-user replaceable light source		N
	If protective cover provide protection against electric shock and marked with “caution, electric shock risk” symbol, minimum two fixing means		N
4.6 (4.31)	Insulation between circuits		P
	Circuits insulated from LV supply fulfil 4.31.1-4.31.3		P

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EN 60598-2-4			
Clause	**Requirement + Test**	**Result - Remark**	**Verdict**
	Controllable luminaires requiring same level of insulation for all components, the insulation between control terminals and LV supply fulfil 4.31.1-4.31.3		N
4.6 (4.31.1)	SELV circuits		P
	Sources used to supply SELV circuits		P
	Voltage not higher the limits of ELV		P
	Insulation from LV supply, non SELV circuits, FELV circuits, SELV circuits and accessible conductive parts		P
	Plugs and socket-outlets in SELV systems		P
4.6 (4.31.2)	FELV circuits		N
	Sources used to supply FELV circuits		N
	Voltage not higher the limits of ELV		N
	Insulation from LV supply, FELV circuits, SELV circuits and accessible conductive parts		N
	Plugs and socket-outlets in FELV systems		N
4.6 (4.31.3)	Other circuits		P
	Insulation between circuits in accordance with the requirements in table X.1		P
	Equipotential bonding used in class II construction to protect against indirect contacts with live parts:		N
	- all conductive parts are connected together		N
	- test in 7.2.3 to check reliability		N
	- accessible conductive parts cannot cause electric shock in case of insulation fault		N
	- for master/slave applications, equipotential bonding used to prevent dangerous voltages		N
4.6 (4.32)	Overvoltage protective devices		N
	Comply with IEC 61643-11		N
	External to controlgear and connected to earth:		N
	- only in fixed luminaires, and		N
	- only connected to protective earth		N
4.6.1	Insulation of flexible cable shall not be damage		P
4.6.2	Wiring shall be fixed		P
4.6.3	Portable luminaire shall have adequate stability Luminaires which are fasten by clamps or similar devices are not subjected to this test.	Keep stable at 6°	P

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EN 60598-2-4			
Clause	**Requirement + Test**	**Result - Remark**	**Verdict**
4.6.4	Candlestick luminaires shall be provided with a switch		N
4.6.5	Requirement of E5 and E10 lampholder about rated voltage and rated wattage		N
4.7 (11)	**CREEPAGE DISTANCES AND CLEARANCES**		**P**
	Working voltage (V)..... :	100-240Vac for live parts 24Vdc for SELV parts	—
	Voltage form	Sinusoidal ☒ Non-sinusoidal ☒	—
	PTI	< 600 ☒ > 600 ☐	—
	Impulse withstand category (Normal category II) (Category III Annex U)	Category II ☒ Category III ☐	—
	Frequency	up to 30 kHz ☒ over 30 kHz ☐	—
	Rated pulse voltage (kV)..... :	——	—
	(1) Live parts of different polarity: cr: 2.5 (mm); cl: 1.5 (mm)..... :	cr : >3.0mm; cl: > 3.0 mm	P
	(2) Live parts and accessible metal parts: cr: 5.0 (mm); cl: 3.0 (mm)..... :	cr : > 5.0mm; cl: > 5.0 mm	P
	(3) Parts becoming live due to the breakdown of basic insulation and metal parts: cr (mm); cl (mm) ..... :		N
	(4) Outer surface of a flexible cord or cable and an accessible metal part: cr (mm); cl (mm) ..... :		N
	(5) Not used		—
	(6) Current-carrying parts and supporting surface: cr: 5.0 (mm); cl: 3.0 (mm)..... :	cr : > 5.0 mm; cl: > 5.0 mm	P
4.8 (7.2)	**PROVISION FOR EARTHING**		**N**
4.8 (7.2.1 + 7.2.3)	Accessible metal parts		N
	Metal parts in contact with supporting surface		N
	Resistance < 0,5 Ω		N
	Self-tapping screws used		N
	Thread-forming screws		N
	Thread-forming screw used in a grove		N
	Earth makes contact first		N
	Terminal blocks with integrated screwless earthing contacts tested according Annex V		N

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EN 60598-2-4			
Clause	**Requirement + Test**	**Result - Remark**	**Verdict**
	Protective earthing of the luminaire not via built-in control gear		N
4.8 (7.2.2 + 7.2.3)	Earth continuity in joints, etc.		N
4.8 (7.2.4)	Locking of clamping means		N
	Compliance with 4.7.3		N
	Terminal blocks with integrated screwless earthing contacts tested according Annex V		N
4.8 (7.2.5)	Earth terminal integral part of connector socket		N
4.8 (7.2.6)	Earth terminal adjacent to mains terminals		N
4.8 (7.2.7)	Electrolytic corrosion of the earth terminal		N
4.8 (7.2.8)	Material of earth terminal		N
	Contact surface bare metal		N
4.8 (7.2.10)	Class II luminaire for looping-in		N
	Double or reinforced insulation to functional earth		N
4.8 (7.2.11)	Earthing core coloured green-yellow		N
	Length of earth conductor		N
4.9 (14)	**SCREW TERMINALS**		**N**
	Separately approved; component list	(see Annex 1)	N
	Part of the luminaire	(see Annex 3)	N
4.9 (15)	**SCREWLESS TERMINALS AND ELECTRICAL CONNECTIONS**		**N**
	Separately approved; component list.....	(see Annex 1)	N
	Part of the luminaire.....	(see Annex 4)	N
4.10 (5)	**EXTERNAL AND INTERNAL WIRING**		**P**
4.10 (5.2)	Supply connection and external wiring		P
4.10 (5.2.1)	Means of connection.....	Plug for LED driver DC connector for luminaire	P
	Outdoor luminaire has not PVC insulated external wiring if not class III or SELV ≤ 25 V a.c./60 V d.c. or protected from outdoor environment		N
4.10 (5.2.2)	Type of cable.....	(see Annex 1)	P
	Nominal cross-sectional area (mm²)	(see Annex 1)	P
	Cable equal to HD21 S2 or HD22 S2 (EN)		P
4.10 (5.2.3)	Type of attachment, X, Y or Z	Type Y	P
4.10 (5.2.5)	Type Z not connected to screws		N

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EN 60598-2-4			
Clause	**Requirement + Test**	**Result - Remark**	**Verdict**
4.10 (5.2.6)	Cable entries:		P
	- suitable for introduction		P
	- adequate degree of protection		P
4.10 (5.2.7)	Cable entries through rigid material have rounded edges		N
4.10 (5.2.8)	Insulating bushings:		P
	- suitably fixed		P
	- material in bushings		P
	- material not likely to deteriorate		P
	- tubes or guards made of insulating material		P
4.10 (5.2.9)	Locking of screwed bushing		N
4.10 (5.2.10)	Cord anchorage:		P
	- covering protected from abrasion		P
	- clear how to be effective		P
	- no mechanical or thermal stress		P
	- no tying of cables into knots etc.		P
	- insulating material or lining		P
4.10 (5.2.10.1)	Cord anchorage for type X attachment:		N
	a) at least one part fixed		N
	b) types of cable		N
	c) no damaging of the cable		N
	d) whole cable can be mounted		N
	e) no touching of clamping screws		N
	f) metal screw not directly on cable		N
	g) replacement without special tool		N
	Glands not used as anchorage		N
	Labyrinth type anchorages		N
4.10 (5.2.10.2)	Adequate cord anchorage for type Y and type Z attachment		P
4.10 (5.2.10.3)	Tests:		P
	- impossible to push cable; unsafe		P
	- pull test: 25 times; pull (N)	60N	P
	- torque test: torque (Nm).....	0.15Nm	P
	- displacement ≤ 2 mm		P

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EN 60598-2-4			
Clause	**Requirement + Test**	**Result - Remark**	**Verdict**
	- no movement of conductors		P
	- no damage of cable or cord		P
	- function independent of electrical connection		P
4.10 (5.2.11)	External wiring passing into luminaire		P
4.10 (5.2.12)	Looping-in terminals		N
4.10 (5.2.13)	Wire ends not tinned		N
	Wire ends tinned: no cold flow		N
4.10 (5.2.14)	Mains plug same protection		P
	Class III luminaire plug		P
	No unsafe compatibility		P
4.10 (5.2.16)	Appliance inlets (IEC 60320)		N
	Installation couplers (IEC 61535)		N
	Other appliance inlet or connector according relevant IEC standard		P
4.10 (5.2.17)	No standardized interconnecting cables properly assembled		N
4.10 (5.2.18)	Used plug in accordance with		P
	- IEC 60083		P
	- other standard		N
4.10 (5.3)	Internal wiring		P
4.10 (5.3.1)	Internal wiring of a suitable size and type		P
	Through wiring		N
	- not delivered/ mounting instruction		N
	- factory assembled		N
	- socket outlet loaded (A)		N
	- temperatures.....	(see Annex 2)	N
	Green-yellow for earth only		N
4.10 (5.3.1.1)	Internal wiring connected directly to fixed wiring		N
	Cross-sectional area (mm²).....		N
	Insulation thickness (mm) .....:		N
	Extra insulation added where necessary		N

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EN 60598-2-4			
Clause	**Requirement + Test**	**Result - Remark**	**Verdict**
4.10 (5.3.1.2)	Internal wiring connected to fixed wiring via internal current-limiting device		P
	Cross-sectional area (mm²)..... :	0.3mm^2	P
4.10 (5.3.1.3)	Double or reinforced insulation for class II		N
4.10 (5.3.1.4)	Conductors without insulation		N
4.10 (5.3.1.5)	SELV current-carrying parts		P
4.10 (5.3.1.6)	Insulation thickness other than PVC or rubber		N
4.10 (5.3.2)	Sharp edges etc.		P
	No moving parts of switches etc.		P
	Joints, raising/lowering devices		N
	Telescopic tubes etc.		N
	No twisting over 360°		P
4.10 (5.3.3)	Insulating bushings:		N
	- suitable fixed		N
	- material in bushings		N
	- material not likely to deteriorate		N
	- cables with protective sheath		N
4.10 (5.3.4)	Joints and junctions effectively insulated		P
4.10 (5.3.5)	Strain on internal wiring		P
4.10 (5.3.6)	Wire carriers		N
4.10 (5.3.7)	Wire ends not tinned		N
	Wire ends tinned: no cold flow		P
4.10.1 (-)	Indoor use luminaire The requirement of one part of cord anchorage to be fixed to the luminaire not applied for table lamps of glass or ceramic		—
4.10.2 (-)	Class I and class II indoor use Luminaire with a mass less than 1 kg the current ≤ 2,5 A and cable ≤ 2 m and conductor ≥ 0,5 mm²		N
4.10.3 (-)	Terminals, a cord anchorage and an inlet opening for the proper connection of the flexible cable or cord if for outdoor use and delivered without a flexible cable or cord and a plug.		N
4.10.4 (-)	Portable luminaires for outdoor use Insulation class I and class II, non-detachable flexible cables or cords at least type 245 IEC 57.		N

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Clause	**Requirement + Test**	**Result - Remark**	**Verdict**
4.11 (8)	**PROTECTION AGAINST ELECTRIC SHOCK**		**P**
4.11 (8.2.1)	Live parts not accessible		P
	Basic insulated parts not used on the outer surface without appropriate protection		P
	Basic insulated parts not accessible with standard test finger on portable, settable and adjustable luminaires		P
	Basic insulated parts not accessible with Ø 50 mm probe from outside, other types of luminaires		N
	Lamp and starterholders in portable and adjustable luminaires comply with double or reinforced insulation requirements		P
	Basic insulation only accessible under lamp or starter replacement		N
	Protection in any position		P
	Double-ended tungsten filament lamp		N
	Insulation lacquer not reliable		P
	Double-ended high-pressure discharge lamp		N
	Relevant warning according to 3.2.18 fitted to the luminaire		N
4.11 (8.2.2)	Portable luminaire adjusted in most unfavourable position		P
4.11 (8.2.3a)	Class II luminaire:		N
	- basic insulated metal parts not accessible during starter or lamp replacement		N
	- basic insulation not accessible other than during starter or lamp replacement		N
	- glass protective shields not used as supplementary insulation		N
4.11 (8.2.3.b)	BC lampholder of metal in class I luminaires shall be earthed		N
4.11 (8.2.3.c)	SELV circuits with exposed current carrying parts:		P
	Ordinary luminaire:		P
	- voltage under load (V).....:	24Vd.c.	P
	- no-load voltage (V).....:	24Vd.c.	P
	- touch current if applicable (mA) .....:		N
	One conductive part insulated if required		N
	Other than ordinary luminaire:		N

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EN 60598-2-4			
Clause	**Requirement + Test**	**Result - Remark**	**Verdict**
	- nominal voltage (V)		N
	Class III luminaire only for connection to SELV		N
	Class III luminaire not provided with means for protective earthing		N
4.11 (8.2.4)	Portable luminaire has protection independent of supporting surface		N
4.11 (8.2.5)	Compliance with the standard test finger or relevant probe		P
4.11 (8.2.6)	Covers reliably secured		N
4.11 (8.2.7)	Luminaire other than below with capacitor > 0,5 μF not exceed 50 V 1 min after disconnection		N
	Portable luminaire with capacitor > 0,1 μF (0.25) not exceed 34 V 1 s after disconnection	<0.1μF	N
	Other luminaires with capacitor > 0,1 μF (0.25) with plug and track adaptors not exceed 60 V 5 s after disconnection		N
4.11. (-)	Class I luminaire with bayonet lampholder:		N
	1) cap not accessible with test finger		N
	2) metal lampholder is earthed		N

4.12 (12)	**ENDURANCE TEST AND THERMAL TEST**		**P**
4.12 (-)	If IP > IP 20 relevant test of (12.4), (12.5) and (12.6) after (9.2) before (9.3) specified in 4.14		—
4.12 (12.2)	Selection of lamps and ballasts		P
	Lamp used according Annex B	(Lamp used see Annex 2)	—
	Controlgear if separate and not supplied	(Controlgear used see Annex 2)	—
4.12 (12.3)	Endurance test		P
	a) mounting-position	On the table	—
	b) test temperature (°C)	35	—
	c) total duration (h)	240	—
	d) supply voltage (V)	264	—
	d) if not equipped with controlgear, constant voltage/current (V) or (A)	--	—
	e) luminaire ceases to operate		—
4.12 (12.3.2)	After endurance test:		P
	- no part unserviceable		P

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EN 60598-2-4			
Clause	**Requirement + Test**	**Result - Remark**	**Verdict**
	- luminaire not unsafe		P
	- no damage to track system		N
	- marking legible		P
	- no cracks, deformation etc.		P
4.12 (12.4)	Thermal test (normal operation)	(see Annex 2)	P
4.12 (12.5)	Thermal test (abnormal operation)	(see Annex 2)	N
4.12 (12.6)	Thermal test (failed in lamp control gear):		N
4.12 (12.6.1)	Through wiring or looping-in wiring loaded by a current of (A)		—
	- case of abnormal conditions		—
	- electronic lamp control gear		N
	- measured winding temperature (°C): at 1,1 Un		—
	- measured mounting surface temperature (°C) at 1,1 Un		N
	- calculated mounting surface temperature (°C) .		N
	- track-mounted luminaires		N
4.12 (12.6.2)	Temperature sensing control		N
	- case of abnormal conditions		—
	- thermal link		N
	- manual reset cut-out		N
	- auto reset cut-out		N
	- measured mounting surface temperature (°C) .		N
	- track-mounted luminaires		N
4.12 (12.7)	Thermal test (failed lamp control gear in plastic luminaires):		N
4.12 (12.7.1)	Luminaire without temperature sensing control		N
4.12 (12.7.1.1)	Luminaire with fluorescent lamp ≤ 70W		N
	Test method 12.7.1.1 or Annex W		—
	Test according to 12.7.1.1:		N
	- case of abnormal conditions		—
	- Ballast failure at supply voltage (V)		—
	- Components retained in place after the test		N
	- Test with standard test finger after the test		N
	Test according to Annex W:		N

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EN 60598-2-4			
Clause	**Requirement + Test**	**Result - Remark**	**Verdict**
	- 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 Test Table 4.16 (13.2.1)	N
4.12 (12.7.1.2)	Luminaire with discharge lamp, fluorescent lamp > 70W, transformer > 10 VA		N
	- case of abnormal conditions		—
	- measured winding temperature (°C): at 1,1 Un..		—
	- measured temperature of fixing point/exposed part (°C): at 1,1 Un		—
	- calculated temperature of fixing point/exposed part (°C)		—
	Ball-pressure test	See Test Table 4.16 (13.2.1)	N
4.12 (12.7.1.3)	Luminaire with short circuit proof transformers ≤ 10 VA		N
	- case of abnormal conditions		—
	- Components retained in place after the test		N
	- Test with standard test finger after the test		N
4.12 (12.7.2)	Luminaire with temperature sensing control		N
	- thermal link	Yes ☐ No ☐	—
	- manual reset cut-out	Yes ☐ No ☐	—
	- auto reset cut-out	Yes ☐ No ☐	—
	- case of abnormal conditions		—
	- highest measured temperature of fixing point/ exposed part (°C):		—
	Ball-pressure test:	See Test Table 4.16 (13.2.1)	N

4.13 (9)	**RESISTANCE TO DUST, SOLID OBJECTS AND MOISTURE**		**P**
4.13 (-)	If IP > IP 20 the order of tests as specified in clause 4.13		P
4.13 (9.2)	Tests for ingress of dust, solid objects and moisture:		P
	- classification according to IP.....	IP20	—

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EN 60598-2-4			
Clause	**Requirement + Test**	**Result - Remark**	**Verdict**
	- mounting position during test	On the table	—
	- fixing screws tightened; torque (Nm)	--	—
	- tests according to clauses.....	9.2.0	P
	- electric strength test afterwards		N
	a) no deposit in dust-proof luminaire		N
	b) no talcum in dust-tight luminaire		N
	c) no trace of water on current-carrying parts or on insulation where it could become a hazard		N
	c.1) For luminaires without drain holes – no water entry		N
	c.2) For luminaires with drain holes – no hazardous water entry		N
	d) no water in watertight or pressure watertight luminaire		N
	e) no contact with live parts (IP 2X)		P
	e) no entry into enclosure (IP 3X and IP 4X)		N
	e) no contact with live parts through drain holes and ventilation slots (IP3X and IP4X)		N
	f) no trace of water on part of lamp requiring protection from splashing water		N
	g) no damage of protective shield or glass envelope		N
4.13 (9.3)	Humidity test 48 h	25°C, 93%RH	P
4.13 (-)	Portable luminaire for outdoor use tested in the most unfavourable of the overturned positions likely to occur		N

4.14 (10)	**INSULATION RESISTANCE AND ELECTRIC STRIECGTH**		**P**
4.14 (10.2.1)	Insulation resistance test		P
	Cable or cord covered by metal foil or replaced by a metal rod of mm Ø	Metal foil	—
	Insulation resistance (MΩ)	See below	—
	SELV:		P
	- between current-carrying parts of different polarity		N
	- between current-carrying parts and mounting surface	>100 MΩ	P
	- between current-carrying parts and metal parts of the luminaire	>100 MΩ	P

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EN 60598-2-4			
Clause	**Requirement + Test**	**Result - Remark**	**Verdict**
	- between the outer surface of a flexible cord or cable where it is clamped in a cord anchorage and accessible metal parts.....	>100 MΩ	P
	- Insulation bushings as described in Section 5 ..	>100 MΩ	P
	Other than SELV:		P
	- between live parts of different polarity.....		N
	- between live parts and mounting surface.....	>100 MΩ	P
	- between live parts and metal parts.....	>100 MΩ	P
	- between live parts of different polarity through action of a switch		N
	- between the outer surface of a flexible cord or cable where it is clamped in a cord anchorage and accessible metal parts.....		N
	- Insulation bushings as described in Section 5 ..		N
4.14 (10.2.2)	Electric strength test		P
	Dummy lamp		N
	Luminaires with ignitors after 24 h test		N
	Luminaires with manual ignitors		N
	Test voltage (V)	See below	—
	SELV		P
	- between current-carrying parts of different polarity		N
	- between current-carrying parts and mounting surface	500V	P
	- between current-carrying parts and metal parts of the luminaire	500V	P
	- between the outer surface of a flexible cord or cable where it is clamped in a cord anchorage and accessible metal parts.....	500V	P
	- Insulation bushings as described in Section 5 ..	500V	P
	Other than SELV:		P
	- between live parts of different polarity.....		N
	- between live parts and mounting surface.....	2960V	P
	- between live parts and metal parts.....	2960V	P
	- between live parts of different polarity through action of a switch		N
	- between the outer surface of a flexible cord or cable where it is clamped in a cord anchorage and accessible metal parts.....		N

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EN 60598-2-4			
Clause	**Requirement + Test**	**Result - Remark**	**Verdict**
	- Insulation bushings as described in Section 5 ..		N
4.14 (10.3)	Touch current or protective conductor current (mA)	Max. 0.054mA	P
4.15 (13)	**RESISTANCE TO HEAT, FIRE AND TRACKING**		P
4.15 (13.2.1)	Ball-pressure test:		P
	- part tested; temperature (°C) ..... :	DC connector, 125°C, 1.5mm	P
	- part tested; temperature (°C) ..... :	PCB of touch switch, 125°C, 0.8mm	P
	- part tested; temperature (°C) ..... :	Close-end connector, 125°C, 0.4mm	P
4.15 (13.3.1)	Needle flame test (10 s):		P
	- part tested ..... :	DC connector, no ignition	P
	- part tested ..... :	PCB of touch switch, no ignition	P
	- part tested ..... :	Close-end connector, no ignition	P
4.15 (13.3.2)	Glow-wire test (650°C):		P
	- part tested ..... :	Lamp cover, no ignition	P
	- part tested ..... :		N
	- part tested ..... :		N
4.15 (13.4)	Proof tracking test (IEC 60112)		N
	- part tested ..... :		N
	- part tested ..... :		N
	- part tested ..... :		N

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

ANNEX 1	**TABLE: Critical components information**	P

object/part No.	code	manufacturer/ trademark	type/model	technical data	standard	mark(s) of conformity
LED driver	B		HSP18-24V	Input: 100-240V, 50/60Hz, 0.31A; Output: 24VDC, 750mA, 18W, SELV; independent type, ta: 50°C, tc: 80°C, class II	EN 61347-2-13 EN 61347-1	TUV SUD Z1 073485 0116
Output wire of LED driver			H03VVH2-F	2x0.5mm^2	EN 50525-2-11	VDE 40022346
Close-end connector			CE2	300V, 105°C, 22-14AWG	--	Tested with appliance & UL E113650
Internal wire	B		1007	300V, 80°C, 22AWG	--	UL E214500
Touch switch	B		T-108	Input: 9-24Vdc, Max 2A; Load: 9-24Vdc, Max 2A;	EN 61058-1	Tested with appliance
- PCB	B,C		KB-5150	CEM-1, 130°C, V-0, thickness: min. 1.2mm	--	Tested with appliance & UL E123995
Lead wire of LED module	B		(N)6YAF	300/500V, 180°C, 22AWG	VDE 0250-106	VDE 40029535
Heat-shrinkable tube	B		SALIPT S-901-600	600V, 125°C, black	--	UL E209436
	D		CYG-FEP-S	600V, 200°C, clear	--	UL E180908

The codes above have the following meaning:

A - The component is replaceable with another one, also certified, with equivalent characteristics

B - The component is replaceable if authorised by the test house

C - Integrated component tested together with the appliance

D - Alternative component

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

ANNEX 2	**TABLE: Thermal tests of Section 12**	**P**

	Type reference ..... :	502174	—
	Lamp used ..... :	LED	—
	Lamp control gear used..... :	HSP18-24V	—
	Mounting position of luminaire..... :	On the table	—
	Supply wattage (W) ..... :	19.9W	
	Supply current (A) ..... :	0.148A	
	Temperatures in test 1 - 4 below are corrected for ta (°C) ..... :	25	
	- abnormal operating mode ..... :	--	—
4.13 (12.4)	- test 1: rated voltage ..... :	--	—
	- test 2: 1,06 times rated voltage or 1,05 times rated wattage or 1,1 times constant voltage/current ..... :	U=1.06×240=254.4V	—
	- test 3: Load on wiring to socket-outlet, 1,06 times voltage or 1,05 times wattage ..... :	--	—
	Through wiring or looping-in wiring loaded by a current of A during the test ..... :	--	—
4.13 (12.5)	- test 4: 1,1 times rated voltage or 1,05 times rated wattage or 1,1 times constant voltage/current..... :	--	—

Part	Ambient	Cl. 12.4 – normal				Cl. 12.5 – abnormal	
		test 1	test 2	test 3	limit	test 4	limit
Tc of LED driver	25	--	39.5	--	80	--	--
SELV wire near LED driver	25	--	29.7	--	90	--	--
DC connector	25	--	26.5	--	Ref.	--	--
Close-end connector	25	--	29.5	--	Ref.	--	--
PCB of touch switch	25	--	30.6	--	Ref.	--	--
Lead wire near LED module	25	--	34.7	--	180	--	--
LED chip	25	--	41.3	--	Ref.	--	--
Metal enclosure	25	--	32.5	--	60	--	--
Lamp cover	25	--	30.4	--	70	--	--
Supporting surface	25	--	25.2	--	90	--	--

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

ANNEX 3	**Screw terminals (part of the luminaire)**	**N**

(14)	**SCREW TERMINALS**		**N**
(14.2)	Type of terminal..... :		—
	Rated current (A)..... :		—
(14.3.2.1)	One or more conductors		N
(14.3.2.2)	Special preparation		N
(14.3.2.3)	Terminal size		N
	Cross-sectional area (mm²)..... :		—
(14.3.3)	Conductor space (mm)..... :		N
(14.4)	Mechanical tests		N
(14.4.1)	Minimum distance		N
(14.4.2)	Cannot slip out		N
(14.4.3)	Special preparation		N
(14.4.4)	Nominal diameter of thread (metric ISO thread).. :	M	N
	External wiring		N
	No soft metal		N
(14.4.5)	Corrosion		N
(14.4.6)	Nominal diameter of thread (mm)..... :		N
	Torque (Nm) ..... :		N
(14.4.7)	Between metal surfaces		N
	Lug terminal		N
	Mantle terminal		N
	Pull test; pull (N)..... :		N
(14.4.8)	Without undue damage		N

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

ANNEX 4	**Screwless terminals (part of the luminaire)**	**N**

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

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EN 60598-2-4			
Clause	**Requirement + Test**	**Result - Remark**	**Verdict**
(15.6.2.1)	Pull test spring-type terminals or welded connections (4 samples); pull (N) ..... :		N
(15.6.2.2)	Pull test pin or tab terminals (4 samples); pull (N) ..... :		N
(15.6.3)	Contact resistance test		N
	Tests according 15.6.3.1 + 15.6.3.2 in IEC 60598-1		N

(15.6.3.1) (15.6.3.2)	TABLE: Contact resistance test / Heating tests									N
	Voltage drop (mV) after 1 h									N
terminal	1	2	3	4	5	6	7	8	9	10
voltage drop (mV)										
	Voltage drop of two inseparable joints									N
	Voltage drop after 10th alt. 25th cycle									N
	Max. allowed voltage drop (mV) ..... :									—
terminal	1	2	3	4	5	6	7	8	9	10
voltage drop (mV)										
	Voltage drop after 50th alt. 100th cycle									N
	Max. allowed voltage drop (mV) ..... :									—
terminal	1	2	3	4	5	6	7	8	9	10
voltage drop (mV)										
	Continued ageing: voltage drop after 10th alt. 25th cycle									N
	Max. allowed voltage drop (mV) ..... :									—
terminal	1	2	3	4	5	6	7	8	9	10
voltage drop (mV)										
	Continued ageing: voltage drop after 50th alt. 100th cycle									N
	Max. allowed voltage drop (mV) ..... :									—
terminal	1	2	3	4	5	6	7	8	9	10
voltage drop (mV)										

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Attachment 1: EN 62031			
Clause	**Requirement + Test**	**Result - Remark**	**Verdict**
4	**GENERAL REQUIREMENTS**		**P**
4.4	Integral modules treated as part of luminaires defined in clause 0.5 of IEC 60598-1		P
4.5	Independent modules comply with requirements in IEC 60598-1		N
5	**GENERAL TEST REQUIREMENTS**		**N**
5.5	SELV-operated LED modules comply with Annex I of IEC 61347-2-13		N
6	**CLASSIFICATION**		—
	Built-in module ..... :	Yes ☐ No ☒	—
	Independent module ..... :	Yes ☐ No ☒	—
	Integral module ..... :	Yes ☒ No ☐	—
	For Integral module; Note to 1.2.1 in IEC 60598-1 applies.		—
7	**MARKING**		**N**
8	**TERMINALS**		**N**
9(9)	**PROVISIONS FOR PROTECTIVE EARTHING**		**N**
10 (10)	**PROTECTION AGAINST ACCIDENTAL CONTACT WITH LIVE PARTS**		**N**
11 (11)	**MOISTURE RESISTANCE AND INSULATION**		**P**
	After storage 48 h at 91-95% relative humidity and 20-30 °C measuring of insulation resistance with d.c. 500 V (MΩ):		P
	≥ 2 MΩ for basic insulation ..... :	> 100 MΩ (between input and mounting surface)	P
	-between live parts and outer metal parts		N
	-between live parts and control terminals		N
	≥ 4 MΩ for double or reinforced insulation between live parts and the body		N
12 (12)	**ELECTRONIC STRENGTH**		**P**

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Attachment 1: EN 62031			
Clause	**Requirement + Test**	**Result - Remark**	**Verdict**
	Immediately after clause 11 electric strength test for 1 min		P
	Basic insulation for SELV, test voltage 500 V	Between input and mounting surface	P
	Working voltage ≤ 50 V, test voltage 500 V		N
	Working voltage > 50 V, ≤ 1000 V, test voltage (V):		N
	-Basic insulation, 2U + 1000 V		N
	-Supplementary insulation, 2U + 1000 V		N
	-Double or reinforced insulation, 4U + 2000 V		N
	No flashover or breakdown		P

13	**FAULT CONDITIONS**		**P**
13.1	When operated under fault conditions, the LED module:		N
	- does not emit flames or molten material		N
	- does not produce flammable gases		N
	- protection against accidental contact shall not be impaired		N
	Fault conditions: capacitors, resistors or inductors not complying with a relevant standard shall be short-circuited or disconnected	(see appended table)	N
	Thermally protected controlgear does not exceed the marked temperature value		N
- (14.1)	Short-circuit of creepage distances and clearances if less than specified in clause 16 in Part 1 (except between live parts and accessible metal parts)	(see appended table)	N
	Distances on printed boards provided with coating according to IEC 60664-3l		N
- (14.2)	Short-circuit or interruption of semiconductor devices	(see appended table)	N
- (14.3)	Short-circuit across insulation consisting of lacquer, enamel or textile	(see appended table)	N
- (14.4)	Short-circuit across electrolytic capacitors	(see appended table)	N
- (14.5)	Compliance by operating the LED module at the rated supply voltage, with the lamp(s) connected and the lamp controlgear case at t_c		—
	After the tests, the insulation resistance with d.c. 500 V (MΩ) are ≥ 1 MΩ ..... :		N

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Attachment 1: EN 62031			
Clause	**Requirement + Test**	**Result - Remark**	**Verdict**
	During the tests, a five-layer tissue paper, where the test specimen is wrapped, does not ignite		N
	Temperature declared thermally protected controlgear fulfill the requirements in Annex C of IEC61347-1		N
- (14.6)	Relevant fault condition tests with high-power supply		—
13.2(-)	Module withstands overpower condition >15 min.		P
	Module with automatic protective device or power limiter, test performed 15 min. at limit.		N
	During the tests, tissue paper, spread below module, does not ignite		P
14	**CONFORMITY TESTING DURING MANUFACTURE**		**N**
15	**CONSTRUCTION**		**P**
	Wood, cotton, silk, paper and similar fibrous material not used as insulation		P
16	**CREEPAGE DISTANCES AND CLEARANCES**		**N**
	Creepage distances and clearances according to Table 3 and 4 of EN 61347-1, as appropriate	Less than 60Vdc	N
	Printed boards see clause 14 of EN 61347-1		N
	Insulating lining of metallic enclosures		N
17 (17)	**SCREWS, CURRENT-CARRYING PARTS AND CONNECTIONS**		**N**
	Screws, current-carrying parts and connections in compliance with IEC 60598-1		N
18 (18)	**RESISTANCE TO HEAT, FIRE AND TRACKING**		**N**
19 (19)	**RESISTANCE TO CORROSION**		**N**
20	**INFORMATION FOR LUMINAIRE DESIGN**		**N**
	See annex D		N

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Attachment 1: EN 62031			
Clause	**Requirement + Test**	**Result - Remark**	**Verdict**

21	**HEAT MANAGEMENT**		**N**
	This clause is applicable for exchangeable module		N
21.2	Heat-conducting foil and paste		N
	Heat-conducting foil can be necessary		N
	Heat-conducting foil shall be delivered within the LED module packaging.		N
	Heat-conducting paste shall not be used		N
21.3	LED modules shall be equipped with a device that cuts the power off or reduces it when t_c is exceeded.		N
21.4	The heat-conduction should be separate unless the contrary is proven safe		N

14	**TABLE: tests of fault conditions**	**N**
Part	Simulated fault	Hazard
/	/	/

ANNEX A	**TEST (NORMATIVE)**		**P**
	All tests performed in accordance with the advise given in Annex H of IEC 61347-1, if applicable		P

-	**SELV- operated LED modules**	**N**

	CENELEC COMMON MODIFICATIONS (EN)	**P**
	No common modification	P

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Tongyi Industrial Zone Dongxing East Road, Guzhen Town, Zhongshan City, Guangdong Province, China.
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Attachment 2: EN 62471			
Clause	**Requirement + Test**	**Result - Remark**	**Verdict**
5	**MEASUREMENT OF LAMPS AND LAMP SYSTEMS**		P
5.1	Measurement conditions		P
	Measurement conditions shall be reported as part of the evaluation against the exposure limits and the assignment of risk classification.		P
5.1.1	Lamp ageing (seasoning)		N
	Seasoning of lamps shall be done as stated in the appropriate IEC lamp standard.		N
5.1.2	Test environment		P
	For specific test conditions, see the appropriate IEC lamp standard or in absence of such standards, the appropriate national standards or manufacturer's recommendations.		P
5.1.3	Extraneous radiation		P
	Careful checks should be made to ensure that extraneous sources of radiation and reflections do not add significantly to the measurement results.		P
5.1.4	Lamp operation		N
	Operation of the test lamp shall be provided in accordance with:		N
	– the appropriate IEC lamp standard, or		N
	– the manufacturer' s recommendation		N
5.1.5	Lamp system operation		P
	The power source for operation of the test lamp shall be provided in accordance with:		P
	– the appropriate IEC standard, or		N
	– the manufacturer' s recommendation		P
5.2	Measurement procedure		P
5.2.1	Irradiance measurements		P
	Minimum aperture diameter 7mm.		P
	Maximum aperture diameter 50 mm.		P
	The measurement shall be made in that position of the beam giving the maximum reading.		P
	The measurement instrument is adequate calibrated.		P
5.2.2	Radiance measurements		P
5.2.2.1	Standard method		P
	The measurements made with an optical system.		P

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Attachment 2: EN 62471			
Clause	**Requirement + Test**	**Result - Remark**	**Verdict**
	The instrument shall be calibrated to read in absolute radiant power per unit receiving area and per unit solid angle to acceptance averaged over the field of view of the instrument.		P
5.2.2.2	Alternative method		N
	Alternatively to an imaging radiance set-up, an irradiance measurement set-up with a circular field stop placed at the source can be used to perform radiance measurements.		N
5.2.3	Measurement of source size		P
	The determination of α, the angle subtended by a source, requires the determination of the 50% emission points of the source.		P
5.2.4	Pulse width measurement for pulsed sources		N
	The determination of Δt, the nominal pulse duration of a source, requires the determination of the time during which the emission is > 50% of its peak value.		N
5.3	Analysis methods		P
5.3.1	Weighting curve interpolations		P
	To standardize interpolated values, use linear interpolation on the log of given values to obtain intermediate points at the wavelength intervals desired.		P
5.3.2	Calculations		P
	The calculation of source hazard values shall be performed by weighting the spectral scan by the appropriate function and calculating the total weighted energy.		P
5.3.3	Measurement uncertainty		P
	The quality of all measurement results must be quantified by an analysis of the uncertainty.		P

6	**LAMP CLASSIFICATION**		P
	For the purposes of this standard it was decided that the values shall be reported as follows:	see table 6.1	P
	– for lamps intended for general lighting service, the hazard values shall be reported as either irradiance or radiance values at a distance which produces an illuminance of 500 lux, but not at a distance less than 200 mm		P
	– for all other light sources, including pulsed lamp sources, the hazard values shall be reported at a distance of 200 mm		N

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Attachment 2: EN 62471			
Clause	**Requirement + Test**	**Result - Remark**	**Verdict**
6.1	Continuous wave lamps		P
6.1.1	Exempt Group		P
	In the except group are lamps, which does not pose any photobiological hazard. The requirement is met by any lamp that does not pose:		P
	– an actinic ultraviolet hazard (E_S) within 8-hours exposure (30000 s), nor		P
	– a near-UV hazard (E_{UVA}) within 1000 s, (about 16 min), nor		P
	– a retinal blue-light hazard (L_B) within 10000 s (about 2,8 h), nor		P
	– a retinal thermal hazard (L_R) within 10 s, nor		P
	– an infrared radiation hazard for the eye (E_{IR}) within 1000 s		P
6.1.2	Risk Group 1 (Low-Risk)		N
	In this group are lamps, which exceeds the limits for the except group but that does not pose:		N
	– an actinic ultraviolet hazard (E_S) within 10000 s, nor		N
	– a near ultraviolet hazard (E_{UVA}) within 300 s, nor		N
	– a retinal blue-light hazard (L_B) within 100 s, nor		N
	– a retinal thermal hazard (L_R) within 10 s, nor		N
	– an infrared radiation hazard for the eye (E_{IR}) within 100 s		N
	Lamps that emit infrared radiation without a strong visual stimulus and do not pose a near-infrared retinal hazard (L_{IR}), within 100 s are in Risk Group 1.		N
6.1.3	Risk Group 2 (Moderate-Risk)		N
	This requirement is met by any lamp that exceeds the limits for Risk Group 1, but that does not pose:		N
	– an actinic ultraviolet hazard (E_S) within 1000 s exposure, nor		N
	– a near ultraviolet hazard (E_{UVA}) within 100 s, nor		N
	– a retinal blue-light hazard (L_B) within 0,25 s (aversion response), nor		N
	– a retinal thermal hazard (L_R) within 0,25 s (aversion response), nor		N
	– an infrared radiation hazard for the eye (E_{IR}) within 10 s		N

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Attachment 2: EN 62471			
Clause	**Requirement + Test**	**Result - Remark**	**Verdict**
	Lamps that emit infrared radiation without a strong visual stimulus and do not pose a near-infrared retinal hazard (L_{IR}), within 10 s are in Risk Group 2.		N
6.1.4	Risk Group 3 (High-Risk)		N
	Lamps which exceed the limits for Risk Group 2 are in Group 3.		N
6.2	Pulsed lamps		N
	Pulse lamp criteria shall apply to a single pulse and to any group of pulses within 0,25 s.		N
	A pulsed lamp shall be evaluated at the highest nominal energy loading as specified by the manufacturer.		N
	The risk group determination of the lamp being tested shall be made as follows:		N
	– a lamp that exceeds the exposure limit shall be classified as belonging to Risk Group 3 (High-Risk)		N
	– for single pulsed lamps, a lamp whose weighted radiant exposure or weighted radiance does is below the EL shall be classified as belonging to the Exempt Group		N
	– for repetitively pulsed lamps, a lamp whose weighted radiant exposure or weighted radiance dose is below the EL, shall be evaluated using the continuous wave risk criteria discussed in clause 6.1, using time averaged values of the pulsed emission		N

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Attachment 2: EN 62471			
Clause	**Requirement + Test**	**Result - Remark**	**Verdict**

Table 4.1	Spectral weighting function for assessing ultraviolet hazards for skin and eye		P
Wavelength[1] λ, nm	**UV hazard function $S_{UV}(\lambda)$**	**Wavelength λ, nm**	**UV hazard function $S_{UV}(\lambda)$**
200	0,030	313*	0,006
205	0,051	315	0,003
210	0,075	316	0,0024
215	0,095	317	0,0020
220	0,120	318	0,0016
225	0,150	319	0,0012
230	0,190	320	0,0010
235	0,240	322	0,00067
240	0,300	323	0,00054
245	0,360	325	0,00050
250	0,430	328	0,00044
254*	0,500	330	0,00041
255	0,520	333*	0,00037
260	0,650	335	0,00034
265	0,810	340	0,00028
270	1,000	345	0,00024
275	0,960	350	0,00020
280*	0,880	355	0,00016
285	0,770	360	0,00013
290	0,640	365*	0,00011
295	0,540	370	0,000093
297*	0,460	375	0,000077
300	0,300	380	0,000064
303*	0,120	385	0,000053
305	0,060	390	0,000044
308	0,026	395	0,000036
310	0,015	400	0,000030

[1] Wavelengths chosen are representative: other values should be obtained by logarithmic interpolation at intermediate wavelengths.
* Emission lines of a mercury discharge spectrum.

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Attachment 2: EN 62471			
Clause	**Requirement + Test**	**Result - Remark**	**Verdict**

Table 4.2	Spectral weighting functions for assessing retinal hazards from broadband optical sources	P

Wavelength nm	**Blue-light hazard function B (λ)**	**Burn hazard function R (λ)**
300	0,01	—
305	0,01	—
310	0,01	—
315	0,01	—
320	0,01	—
325	0,01	—
330	0,01	—
335	0,01	—
340	0,01	—
345	0,01	—
350	0,01	—
355	0,01	—
360	0,01	—
365	0,01	—
370	0,01	—
375	0,01	—
380	0,01	0,1
385	0,013	0,13
390	0,025	0,25
395	0,05	0,5
400	0,10	1,0
405	0,20	2,0
410	0,40	4,0
415	0,80	8,0
420	0,90	9,0
425	0,95	9,5
430	0,98	9,8
435	1,00	10,0
440	1,00	10,0
445	0,97	9,7
450	0,94	9,4
455	0,90	9,0
460	0,80	8,0
465	0,70	7,0
470	0,62	6,2
475	0,55	5,5
480	0,45	4,5
485	0,40	4,0
490	0,22	2,2

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Attachment 2: EN 62471			
Clause	**Requirement + Test**	**Result - Remark**	**Verdict**

Table 4.2	Spectral weighting functions for assessing retinal hazards from broadband optical sources	P
495	0,16	1,6
500-600	$10^{[(450-\lambda)/50]}$	1,0
600-700	0,001	1,0
700-1050	—	$10^{[(700-\lambda)/500]}$
1050-1150	—	0,2
1150-1200	—	$0{,}2 \cdot 10^{0{,}02(1150-\lambda)}$
1200-1400	—	0,02

Table 5.4	Summary of the ELs for the surface of the skin or cornea (irradiance based values)				P
Hazard Name	**Relevant equation**	**Wavelength range nm**	**Exposure duration sec**	**Limiting aperture rad (deg)**	**EL in terms of constant irradiance W•m^{-2}**
Actinic UV skin & eye	$E_S = \sum E_\lambda \cdot S(\lambda) \cdot \Delta\lambda$	200 – 400	< 30000	1,4 (80)	30/t
Eye UV-A	$E_{UVA} = \sum E_\lambda \cdot \Delta\lambda$	315 – 400	≤1000 >1000	1,4 (80)	10000/t 10
Blue-light small source	$E_B = \sum E_\lambda \cdot B(\lambda) \cdot \Delta\lambda$	300 – 700	≤100 >100	< 0,011	100/t 1,0
Eye IR	$E_{IR} = \sum E_\lambda \cdot \Delta\lambda$	780 –3000	≤1000 >1000	1,4 (80)	$18000/t^{0,75}$ 100
Skin thermal	$E_H = \sum E_\lambda \cdot \Delta\lambda$	380 – 3000	< 10	2π sr	$20000/t^{0,75}$

Table 5.5	Summary of the ELs for the retina (radiance based values)				P
Hazard Name	**Relevant equation**	**Wavelength range nm**	**Exposure duration sec**	**Field of view radians**	**EL in terms of constant radiance W•m^{-2}•sr^{-1})**
Blue light	$L_B = \sum L_\lambda \cdot B(\lambda) \cdot \Delta\lambda$	300 – 700	0,25 – 10 10-100 100-10000 ≥ 10000	0,011•√(t/10) 0,011 0,0011•√t 0,1	$10^6/t$ $10^6/t$ $10^6/t$ 100
Retinal thermal	$L_R = \sum L_\lambda \cdot R(\lambda) \cdot \Delta\lambda$	380 – 1400	< 0,25 0,25 – 10	0,0017 0,011•√(t/10)	$50000/(\alpha \cdot t^{0,25})$ $50000/(\alpha \cdot t^{0,25})$
Retinal thermal (weak visual stimulus)	$L_{IR} = \sum L_\lambda \cdot R(\lambda) \cdot \Delta\lambda$	780 – 1400	> 10	0,011	6000/α

Zhongshan Bontek Compliance Testing Laboratory Co., Ltd.
Tongyi Industrial Zone Dongxing East Road, Guzhen Town, Zhongshan City, Guangdong Province, China.
http://www.zslts.com Tel: +86 760-22386277 Fax: +86 760-22349648-8012

Attachment 2: EN 62471			
Clause	**Requirement + Test**	**Result - Remark**	**Verdict**

	CENELEC COMMON MODIFICATIONS (EN)		**P**
4	**EXPOSURE LIMITS**		P
	Contents of the whole Clause 4 of IEC 62471:2006 moved into a new informative Annex ZB		—
	Clause 4 replaced by the following:		P
	Limits of the Artificial Optical Radiation Directive (2006/25/EC) have been applied instead of those fixed in IEC 62471:2006	See appended Table 6.1 RG1	P
4.1	General		P
	First paragraph deleted		—

Table 6.1	Emission limits for risk groups of continuous wave lamps (based on EU Directive 2006/25/EC)			P
Optical hazard	Test result	Used hazard exposure limit		Ref.
1. E_s	7.994E-08 W/ m^2	0.001 W/m^2	200-800 nm	P
2. E_{UVA}	1.588E-03 W/ m^2	0.33 W/m^2	200-800 nm	P
3. L_B	2.236E+00 W/ m^{2}sr	100 W/m^{2}sr	300-700 nm	P
4. $E_{B(small\ source)}$	--	--	--	N
5. L_R	1.813E+02 W/ m^{2}sr	3.931E+05 W/m^{2}sr	380-1400 nm	P
6. L_{IR}	1.054E-01 W/ m^{2}sr	8.424E+04 W/m^{2}sr	380-1400 nm	P
7. E_{IR}	4.034E-02 W/ m^2	100 W/m^2	380-3000 nm	P
8. E_H	2.372E+01 W/ m^2	3556.56 W/m^2	380-3000 nm	P

* Small source defined as one with α < 0,011 radian. Averaging field of view at 10000 s is 0,1 radian.
** Involves evaluation of non-GLS source

NOTE The action functions: see Table 4.1 and Table 4.2
The applicable aperture diameters: see 4.2.1
The limitations for the angular subtenses: see 4.2.2
The related measurement condition 5.2.3 and the range of acceptance angles: see Table 5.5.

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Tongyi Industrial Zone Dongxing East Road, Guzhen Town, Zhongshan City, Guangdong Province, China.
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Attachment 3: EN 61058-1			
Clause	**Requirement + Test**	**Result - Remark**	**Verdict**

17	Endurance test		
Test condition	a) At ambient 25°C, test in table lamp b) SMD LED declared as client c) Tested in a circuit as shown in figure 19		
17.2.4.5	Increased-voltage test at accelerated speed (TC 5)		
Model	HSP18-24V		
Sample No.	1#	2#	3#
Input voltage	24V DC	24V DC	24V DC
Max. current	0.75A	0.75A	0.75A
20 cycle	P	P	P
17.2.4.8	Endurance test (TC 8)		
Input voltage	24V DC	24V DC	24V DC
Max. current	0.75A	0.75A	0.75A
9980 cycle	P	P	P

17.2.5.1	Functional compliance (TE1)		
Requirement	After tests of 17.2.4 1) All actions function as declared. 2) No loosening of electrical or mechanical connection occur. 3) Sealing compound shall not flow to such an extend that live parts are exposed.		
Model	HSP18-24V		
Sample No.	1#	2#	3#
	P	P	P

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Attachment 4: EN 62493			
Clause	**Requirement + Test**	**Result - Remark**	**Verdict**
4	**Limits**		**P**
4.2	Unintentional radiating part of lighting equipment		P
4.2.2	Lighting equipment deemed to comply with the Van der Hoofden test without testing:		P
	1) not contain electronic controlgear	☐Yes ☒No	—
	2) incandescent-lamp technology, including halogen	☐Yes ☒No	—
	3) LED-light-source technology	☒Yes ☐No	—
	4) OLED light-source technology	☐Yes ☒No	—
	5) high-pressure discharge lamp technologies	☐Yes ☒No	—
	6) based on low-pressure discharge lamp technologies with an exposure distance larger than or equal to 50cm	☐Yes ☒No	—
	7) independent auxiliary	☐Yes ☒No	—
4.2.3	Lighting equipment described in this scope and not contained in 4.2.2, the comply factor shall not larger than 1		N
4.3	Intentional radiating part of lighting equipment		N
	Lighting equipment containing intentional radiators shall comply with clause 7	No intentional radiators	N

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Attachment 5: Photo Documentation

Picture 1: whole view of 502174

Picture 2: top view

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Attachment 5: Photo Documentation

Picture 3: LED driver

Picture 4: DC connector

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Attachment 5: Photo Documentation

Picture 5: cord entrance

Picture 6: bottom view

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Attachment 5: Photo Documentation

Picture 7: internal view

Picture 8: internal view

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Attachment 5: Photo Documentation

Picture 9: touch switch

Picture 10: internal view of lamp

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Attachment 5: Photo Documentation

Picture 11: LED module

--- END OF TEST REPORT ---

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