

APPLICATION REPORT

On Behalf of

Tea-Energy China Limited



LED Motion Sensor Ceiling Light

Model: CL-XXX-S-YY-BB, CL-028-S-NW-00
(XXX-Stands for Power(028-28W), S-Stands for
Micro-Wave motion Sensorbility, YY-Stands for
color temperature(CW-Cool White, NW-Natural
White, WW-Warm White), BB-Stands for Flow
Code(00-99)).

Prepared For : Tea-Energy China Limited
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Prepared By : Shenzhen LCS Compliance Testing Laboratory Ltd.
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Date of Test : October 03, 2014 – October 15, 2014
Date of Report : October 15, 2014
Report Number : LCS1412030153S

TEST REPORT**EN 60598-2-1****Luminaires****Part 2: Particular requirements****Section one – Fixed general purpose luminaires****Report reference No.** LCS1412030153S**Tested by(name + signature)** Liberal Li**Approved by(name + signature)** Hart Qiu**Date of issue** Octomber 15, 2014**Contents** 51 pages**Testing laboratory****Name** Shenzhen LCS Compliance Testing Laboratory Ltd.**Address** 1/F., Xingyuan Industrial Park, Tongda Road, Bao'an Avenue, Bao'an District, Shenzhen, Guangdong, China**Testing location** Same as above**Client****Name** Tea-Energy China Limited**Address** 4th Floor, 0100029 Building, Xiawei Industrial Zone, Xiahu Community, Guanlan Town, Longhua District, Shenzhen, China**Manufacturer****Name** Tea-Energy China Limited**Address** 4th Floor, 0100029 Building, Xiawei Industrial Zone, Xiahu Community, Guanlan Town, Longhua District, Shenzhen, China**Test specification****Standard** EN 60598-1: 2008+A11: 2009; EN 60598-2-1: 1989; EN 62471: 2008; EN 62031: 2008+A1: 2013; EN 62493: 2010**Test procedure** Compliance with EN 60598-1: 2008+A11: 2009; EN 60598-2-1: 1989; EN 62471: 2008; EN 62031: 2008+A1: 2013; EN 62493: 2010**Non-standard test method** N/A**Test item Description** LED Motion Sensor Ceiling Light**Trademark** QALEDO**Model and/or type reference** CL-XXX-S-YY-BB, CL-028-S-NW-00

(XXX-Stands for Power(028-28W), S-Stands for Micro-Wave motion Sensorbility, YY-Stands for color temperature(CW-Cool White, NW-Natural White, WW-Warm White), BB-Stands for Flow Code(00-99)).

Rating(s) 100-120V~/200-240V~, 50/60Hz, 28W

Test item particulars

Classification of installation and use: Class II

Supply Connection: Terminal block

Test case verdicts

Test case does not apply to the test object : N(N/A)

Test item does meet the requirement: P(Pass)

Test item does not meet the requirement ...: F(Fail)

Testing

Date of receipt of test item.....: October 03, 2014

Date(s) of performance of test.....: October 03, 2014 – October 15, 2014

General remarks

This report shall not be reproduced except in full without the written approval of the testing laboratory.

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

Clause numbers between brackets refer to clauses in EN 60598-1 (IEC 60598-1).

"(see remark #)" refers to a remark appended to the report.

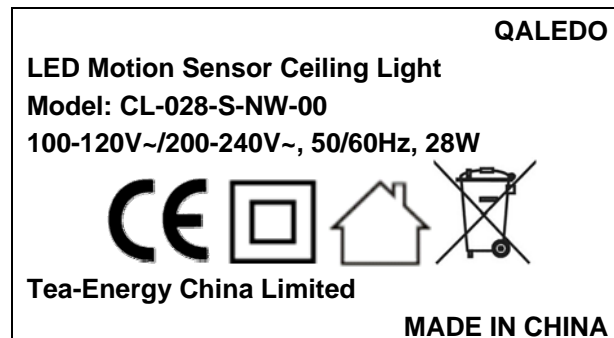
"(see Annex #)" refers to an annex appended to the report.

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

Remark

1. The laboratory ambient for testing: 24.0-26.0℃, 60%-73%R.H.
2. All models are similar except their appearance and model designation, and all tests were conducted on the model CL-028-S-NW-00.
3. The LED Driver has two Input parameter, 100-120V~ or 200-240V~.
4. The test report includes: Attachment No. 1: Report of EN 62471.(The EN 62471 isn't include in CNAS.)
Attachment No. 2: Report of EN 62031.
Attachment No. 3: 2 pages report of product photos.

Copy of marking plate



EN 60598-2-1			
Cl.	Requirement	Test	Result
			Verdict

1.2 (0)	GENERAL TEST REQUIREMENTS		P
1.2 (0.1)	Information for luminaires design considered	Yes [<input checked="" type="checkbox"/>] No [<input type="checkbox"/>]	P
1.2 (0.3)	More sections applicable	100-120V~/200-240V~	P

1.4 (2)	CLASSIFICATION		P
1.4 (2.2)	Type of protection	Class II	P
1.4 (2.3)	Degree of protection	IP20	P
1.4 (2.4)	Luminaire suitable for direct mounting on normally flammable surfaces		P
	Luminaire not suitable for direct mounting on normally flammable surfaces	No	N
1.4 (2.5)	Luminaire for normal use	Yes	P
	Luminaire for rough service	No	N

1.5 (3)	MARKING		P
1.5 (3.2)	Markings on luminaires	See marking label	P
	Position of the marking		P
	Format of symbols/text	The height of symbols more than 5mm, text more than 2mm	P
1.5 (3.3)	Additional information		P
	Language of instructions	English	P
1.5 (3.3.1)	Combination luminaires	Not combination luminaire	N
1.5 (3.3.2)	Nominal frequency in Hz	50/60Hz	P
1.5 (3.3.3)	Operating temperature		N
1.5 (3.3.4)	Symbol or warning notice		N
1.5 (3.3.5)	Wiring diagram	No wiring diagram	N
1.5 (3.3.6)	Special conditions	No such special conditions	N
1.5 (3.3.7)	Metal halid lamp luminaire – warning		N
1.5 (3.3.8)	Limitation for semi-luminaires		N
1.5 (3.3.9)	Power factor and supply current		N
1.5 (3.3.10)	Suitability for use indoors		P
1.5 (3.3.11)	Luminaires with remote control	Not such construction	N
1.5 (3.3.12)	Clip-mounted luminaire – warning		N
1.5 (3.3.13)	Specifications of protective shields		P
1.5 (3.3.14)	Symbol for nature of supply	~	P
1.5 (3.3.15)	Rated current of socket outlet	No socket outlet	N

EN 60598-2-1			
Cl.	Requirement Test	Result	Verdict
1.5 (3.3.16)	Rough service luminaire	Normal service luminaire	N
1.5 (3.3.17)	Mounting instruction for type Y, Type Z and some type X attachments		N
1.5 (3.3.18)	Non-ordinary luminaires with PVC cable		N
1.5 (3.3.19)	Protective conductor current in instruction if applicable		N
1.5 (3.3.20)	Provided with information if not intended to be mounted within arms reach		N
1.5 (3.4)	Test with water	15s	P
	Test with hexane	15s	P
	Legible after test	Still legible.	P
	Label attached	Still attached.	P
1.6 (4)	CONSTRUCTION		P
1.6 (4.2)	Components replaceable without difficulty		P
1.6 (4.3)	Wireways smooth and free from sharp edges	Tubing enclosed the internal wire, no sharp edges	P
1.6 (4.4)	Lampholders		N
1.6 (4.4.1)	Integral lampholder		N
1.6 (4.4.2)	Wiring connection		N
1.6 (4.4.3)	Lampholder for end-to-end mounting	No such lampholder	N
1.6 (4.4.4)	Positioning		N
	- pressure test (N).....:		N
	After test the lampholder comply with relevant standard sheets and show no damage		N
	After test on signal-capped lampholder the lampholder have not moved form its position and show no permanent deformation		N
	- bending test (N).....:		N
	After test the lamholder have not moved from its position and show no permanent deformation		N
1.6 (4.4.5)	Peak pulse voltage	Not ignitor	N
1.6 (4.4.6)	Centre contact	Not ignitor	N
1.6 (4.4.7)	Parts in rough service luminaires resistant to tracking	Not for rough service	N
1.6 (4.4.8)	Lamp connectors		N

EN 60598-2-1			
Cl.	Requirement Test	Result	Verdict
1.6 (4.4.9)	Caps and bases correctly used		N
1.6 (4.5)	Starter holders	No such parts	N
	Starter holder in luminaries other than Class II		N
	Starter holder Class II construction		N
1.6 (4.6)	Terminal blocks		P
	Tails		P
	Unsecured blocks		P
1.6 (4.7)	Terminals and supply connections		P
1.6 (4.7.1)	Contact to metal parts		P
1.6 (4.7.2)	Location stranded wires		P
	8 mm test live conductor		P
	8 mm test earth conductor	No such part	N
1.6 (4.7.3)	Terminals for supply conductors		P
1.6 (4.7.3.1)	Welded connections		N
	- stranded or solid conductor		N
	- spot welding		N
	- welding between wires		N
	- type Z attachment		N
	- mechanical test according to 15.8.2		N
	- electrical test according to 15.9		N
	- heat test according to 15.9.2.3 and 15.9.2.4		N
1.6 (4.7.4)	Terminals other than supply connection		P
1.6 (4.7.5)	Heat-resistant wiring/sleeves		N
1.6 (4.7.6)	Multi-pole plug	No plug	N
	- test at 30 N		N
1.6 (4.8)	Switches:	No switch	N
	- adequate rating		N
	- adequate fixing		N
	- polarized supply		N
	- Compliance with 61058-1 for electronic switches		N
1.6 (4.9)	Insulating lining and sleeves		P
1.6 (4.9.1)	Retention		P
	Method of fixing:		P
1.6 (4.9.2)	Insulated linings and sleeves		P

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Cl.	Requirement Test	Result	Verdict
	Resistant to temperature >20°C to the wire temperature or		P
	a) & c) Insulation resistance and electric strength	Comply with requirements	N
	b) Ageing test. Temperature (°C).....:		N
1.6 (4.10)	Insulation of Class II luminaires	Class II luminaire	P
1.6 (4.10.1)	No contact, mounting surface – accessible metal parts – wiring of basic insulation		P
	Safe installation fixed luminaires		P
	Capacitors and switches		N
	Interference suppression capacitors according to IEC 60384-14		N
1.6 (4.10.2)	Assembly gaps:		P
	- not coincidental		P
	- no straight access with test probe		N
1.6 (4.10.3)	Retention of insulation:		N
	- fixed		N
	- unable to be replaced; luminaire inoperative		N
	- sleeves retained in position		N
	- lining in lampholder		N
1.6 (4.11)	Electrical connections		P
1.6 (4.11.1)	Contact pressure	No pressure transmitted to the insulating material	P
1.6 (4.11.2)	Screws:		P
	- Self-tapping screws		P
	- thread-cutting screws		N
1.6 (4.11.3)	Screw locking:		N
	- spring washer		N
	- rivets		N
1.6 (4.11.4)	Material of current-carrying parts	> 50% copper	P
1.6 (4.11.5)	No contact to wood or mounting surface		P
1.6 (4.11.6)	Electro-mechanical contact systems	No such construction	N
1.6 (4.12)	Mechanical connections and glands		P
1.6 (4.12.1)	Screw not made of soft metal		P
	Screws of insulating material		N
	Torque test: torque (Nm); part	3.2mm, Fixed enclosure, 0.8Nm	P
	Torque test: torque (Nm); part	2.8mm, Fixed LED driver,	P

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Cl.	Requirement Test	Result	Verdict
		0.4Nm	
	Torque test: torque (Nm); part		N
1.6 (4.12.2)	Screw with diameter < 3 mm screw into metal		N
1.6 (4.12.4)	Locked connections:		N
	- fixed arms; torque (Nm)		N
	- lampholder; torque (Nm)		N
	- push-button switches; torque (Nm)	No such switches	N
1.6 (4.12.5)	Screwed glands; force (N)		N
1.6 (4.13)	Mechanical strength		P
1.6 (4.13.1)	Impact tests:		P
	- fragile parts; energy (Nm)	0.2Nm for fragile parts	P
	- other parts; energy (Nm)	0.35Nm for enclosure	P
	1) live parts	Inaccessible	P
	2) linings	Doesn't impaired	P
	3) protection	IP20	P
	4) covers		P
1.6 (4.13.2)	Metal parts enclosing live parts shall have adequate mechanical strength		P
1.6 (4.13.3)	Straight test finger	30N	P
1.6 (4.13.4)	Rough service luminaires	Normal service luminaires	N
	IP 54 or higher		N
	a) fixed		N
	b) hand-held		N
	c) delivered with a stand		N
	d) for temporary installations and suitable for mounting on a stand		N
1.6 (4.13.6)	Tumbling barrel		N
1.6 (4.14)	Suspensions and adjusting devices		N
1.6 (4.14.1)	Mechanical load:		P
	A) four times the weight		P
	B) torque 2.5 Nm		N
	C) bracket arm; force (N)		N
	D) load track-mounted luminaires		N
	E) clip-mounted luminaires, glass-shelve; thickness (mm)		N
	metal rod; diameter (mm)		N
1.6 (4.14.2)	Load to flexible cables:	No flexible cables	N

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Cl.	Requirement Test	Result	Verdict
	mass (kg)		N
	stress in conductors (N/mm ²)		N
	Mass (kg) of semi-luminaires		N
	Bending moment (Nm) of semi-luminaires :		N
1.6 (4.14.3)	Adjusting devices:	No adjusting devices	N
	- flexing test; number of cycles		N
	- strands broken		N
	- electric strength test afterwards		N
1.6 (4.14.4)	Telescopic tubes: cords not fixed to tube; no strain on conductors		P
1.6 (4.14.5)	Guide pulleys	No such construction	N
1.6 (4.14.6)	Strain on socket-outlets	Not such unit	N
1.6 (4.15)	Flammable materials:		P
	- glow-wire test 650°C		P
	- spacing \geq 30 mm		N
	- screen withstanding test of 13.3.1		N
	- screen dimensions		N
	- no fiercely burning material		N
	- thermal protection		N
	- electronic circuits exempted		N
1.6 (4.15.2)	Luminaires made of thermoplastic material		P
	a) construction		N
	b) temperature sensing control		N
	c) surface temperature		P
1.6 (4.16)	Luminaires for mounting on normally flammable surfaces		P
	No lamp control gear		N
1.6 (4.16.1)	Lamp control gear shall spacing:		N
	- spacing 10 mm		N
	- spacing 35 mm		N
1.6 (4.16.2)	Thermal protection:	No such component	N
	- in lamp control gear		N
	- external		N
	- fixed position		N
	- temperature marked lamp control gear		N
1.6 (4.16.3)	Design to satisfy the test of 12.6		P
1.6 (4.17)	Drain holes	No drain holes	N

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Cl.	Requirement Test	Result	Verdict
	Clearance at least 5 mm		N
1.6 (4.18)	Resistance to corrosion:		P
1.6 (4.18.1)	- rust-resistance	Painted with rust-resistance material	P
1.6 (4.18.2)	- season cracking in copper		P
1.6 (4.18.3)	- corrosion of aluminium		P
1.6 (4.19)	Igniters compatible with ballast	No igniters used	N
1.6 (4.20)	Rough service vibration	No such appliance	N
1.6 (4.21)	Protective shield		N
1.6 (4.21.1)	Shield fitted		N
	Shield of glass if tungsten halogen lamps		N
1.6 (4.21.2)	Particles from a shattering lamp not impair safety		N
1.6 (4.21.3)	No direct path		N
1.6 (4.21.4)	Impact test on shield		N
	Glow-wire test on lamp compartment		N
1.6 (4.22)	Attachments to lamps	No such attachments	N
1.6 (4.23)	Semi-luminaires comply with Class II	No semi-luminaires	N
1.6 (4.24)	UV radiation for tungsten halogen lamps and metal halide lamps (Annex P)	No such appliance	N
1.6 (4.25)	No sharp point edges	No sharp points or edges	P
1.6 (4.26)	Short-circuit protection		N
1.6 (4.26.1)	uninsulated accessible SELV parts		N
1.6 (4.26.2)	Short circuit test		N
1.6 (4.26.3)	Test chain according to figure 29		N
1.7 (11)	CREEPAGE DISTANCES AND CLEARANCES		P
	Working voltage (V)	200-240V~	P
	Voltage form	Sinusoidal [✓] Non-sinusoidal []	P
	PTI	< 600 [✓] ≥ 600 []	P
	Impulse withstand category (normal category II) (category III annex U)		
	Rated pulse voltage (kV)		N
	(1) Current-carrying parts of different polarity: cr (mm); cl (mm)	cl>4.2mm, limit: 1.5mm cr>4.2mm, limit: 2.5mm	P
	(2) Current-carrying parts and accessible parts: cr (mm); cl (mm)	cl>6.3mm, limit: 3.0mm cr>6.3mm, limit: 5.0mm	P
	(3) Parts becoming live due to breakdown		N

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Cl.	Requirement Test	Result	Verdict
	of basic insulation and metal parts: cr (mm); cl (mm)		
	(4) Outer surface of cable where it is clamp and metal parts: cr (mm); cl (mm)		N
	(5)not used		N
	(6) Current-carrying parts and supporting surface: cr (mm); cl (mm)	cl>6.3mm, limit: 3.0mm cr>6.3mm, limit: 5.0mm	P
1.8 (7)	PROVISION FOR EARTHING		N
1.8 (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 screws used in a grove		N
	Earth markes contact first		N
1.8 (7.2.2 +7.2.3)	Earth continuity in joints etc.	No such parts	N
1.8 (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
1.8 (7.2.5)	Earth terminal integral part of Connector socket	No such part	N
1.8 (7.2.6)	Earth terminal adjacent to mains terminals		N
1.8 (7.2.7)	Electrolytic Corrosion of the earth terminal		N
1.8 (7.2.8)	Material of earth terminal		N
	Contact surface bare metal		N
1.8 (7.2.10)	Class II luminaire for looping-in		N
	Double or reinforced insulation to functional earth		N
1.8 (7.2.11)	Earthing core coloured green-yellow		N
	Length of earth conductor		N
1.9 (14)	SCREW TERMINALS		P
	Separately approved: component list	See annex 1	P
	Part of the luminaire	See annex 3	N

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Cl.	Requirement	Test	Result
			Verdict

1.9 (15)	SCREWLESS TERMINALS and electrical connections		N
	Separately approved: component list		N
	Part of the luminaire		N

1.10 (5)	EXTERNAL AND INTERNAL WIRING	(Only internal wiring)	P
1.10 (5.2)	Supply connection and external wiring		N
1.10 (5.2.1)	Means of connection.....:		N
1.10 (5.2.2)	Type of cable		N
	Nominal cross-section area (mm ²)		N
	Cables equal to IEC 60227 and IEC 60245		N
1.10 (5.2.3)	Type of attachment, X ,Y or Z		N
1.10 (5.2.5)	Type Z not connected to screws		N
1.10 (5.2.6)	Cable entries		N
	- suitable for introduction		N
	- adequate degree of protection		N
1.10 (5.2.7)	Cable entries through rigid material have rounded edges		N
1.10 (5.2.8)	Insulating bushings:		N
	- suitably fixed		N
	- material in bushings		N
	- material not likely to deteriorate		N
	- tubes or guard made of insulating material		N
1.10 (5.2.9)	Locking of screw bushings		N
1.10 (5.2.10)	Cord anchorage:		N
	- covering protected from abrasion		N
	- clear how to be effective		N
	- no mechanical or thermal stress		N
	- no tying of cables into knots etc.		N
	- insulating material or lining		N
1.10 (5.2.10.1)	Cord anchorage for type X attachment cord		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

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Cl.	Requirement Test	Result	Verdict
	g) replacement without special tool		N
	Glands not used as anchorage		N
	Labyrinth type anchorage		N
1.10 (5.2.10.2)	Adequate cord anchorages for type Y and type Z attachments		N
1.10 (5.2.10.3)	Tests:		N
	- impossible to push cable; unsafe		N
	- pull test: 25 times; pull (N)		N
	- torque test: torque (Nm)		N
	- displacement ≤ 2 mm		N
	- no movement of conductors		N
	- no damage of cable or cord		N
1.10 (5.2.11)	External wiring passing into luminaire		N
1.10 (5.2.12)	Looping-in terminals	Not looping-in appliance	N
1.10 (5.2.13)	Wire ends not tinned		N
	Wire ends tinned: no cold flow		N
1.10 (5.2.14)	Mains plug same protection	Not plug	N
	Class III luminaire plug		N
1.10 (5.2.16)	Appliance inlets (IEC 60320)		N
	Appliance couplers of class II type		N
1.10 (5.2.17)	No standardized in interconnecting cables assembled		N
1.10 (5.2.18)	Used plug in accordance with		N
	- IEC 60083		N
	- other standard		N
1.10 (5.3)	Internal wiring		P
1.10 (5.3.1)	Internal wiring of suitable size and type	20AWG	P
	Through wiring		N
	- not delivered/ mounting instruction		N
	- factory assembled		N
	- socket outlet loaded (A).....:		N
	- temperatures.....:		N
	Green-yellow for earth only		N
1.10 (5.3.1.1)	Internal wiring connected directly to fixed wiring		P
	Cross-Sectional area (mm ²)	20AWG	P
	Insulation thickness	>0.6mm	P

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Cl.	Requirement	Test	Result	Verdict
	Extra insulation added where necessary			N
1.10 (5.3.1.2)	Internal wiring connected to fixed wiring via internal current-limited device			N
	Adequate cross-section area and insulation thickness			N
1.10 (5.3.1.3)	Double or reinforced insulation for class II	Class II luminaire		P
1.10 (5.3.1.4)	Conductors without insulation	Not used		N
1.10 (5.3.1.5)	SELV current-carrying parts	No such parts		N
1.10 (5.3.1.6)	Insulation thickness other than PVC or rubber			N
1.10 (5.3.2)	Sharp edges etc.			P
	No moving parts of switches etc.			N
	Joints, raising/lowering devices			P
	Telescopic tubes etc.			N
	No twisting over 360 ⁰			P
1.10 (5.3.3)	Insulating bushings			P
	- suitable fixed			P
	- material in bushings			P
	- material not likely to deteriorate			N
	- cables with protective sheath			N
1.10 (5.3.4)	Joints and Junctions effectively insulated			P
1.10 (5.3.5)	Strain on internal wiring			P
1.10 (5.3.6)	Wire carriers			N
1.10 (5.3.7)	Wire ends not tinned			P
	Wire ends tinned: no cold flow			N

1.11 (8)	PROTECTION AGAINST ELECTRIC SHOCK		P
1.11 (8.2.1)	Live parts not accessible with standard test finger		P
	Basic insulated parts not used on the outer surface without appropriate protection		P
	Basic insulated parts not accessible with standard test finger on portable and adjustable luminaires	Fixed luminaire	N
	Basic insulated parts not accessible with ø50mm probe from outside, within arms reach, on wall-mounted luminaires	Not wall-mounted luminaires	N
	Lamp and starholders in portable and adjustable luminaires comply with double or reinforced insulation requirements	Fixed luminaire	N

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Cl.	Requirement Test	Result	Verdict
	Basic insulation only accessible under lamp or starter replacement		P
	Double-ended tungsten filament lamp		N
	Insulation lacquer not reliable		P
	Double-ended high pressure discharge lamp		N
	Relevant warming according to 3.2.18 fitted to the luminaire		P
1.11 (8.2.2)	Portable luminaire adjusted in most unfavourable position		N
1.11 (8.2.3 a)	Class II luminaire:	Class II luminaires	P
	- basic insulated metal parts not accessible during starter or lamp replacement		P
	- basic insulated not accessible other than during starter or lamp replacement		P
	- glass protective shields not used as supplementary insulation	No such parts	N
1.11 (8.2.3b)	BC lampholder of metal in class I luminaires shall be earthed	No lamp cap	N
1.11 (8.2.3c)	Class III luminaires with expose SELV parts:	Class II luminaires	N
	Ordinary luminaire :		N
	- touch current		N
	- no-load voltage		N
	- other than ordinary luminaire:		N
	- nominal voltage		N
1.11 (8.2.4)	Portable luminaire:	Fixed luminaire	N
	- protection independent of supporting surface		N
	- terminal block completely covered		N
1.11 (8.2.5)	Compliance with the standard test finger or relevant probe		P
1.11 (8.2.6)	Covers reliably secured		N
1.11 (8.2.7)	Discharging of capacitors >0.5 μ F	No such capacitors	N
	Portable plug connected luminaire with capacitor		N
	Discharge device on or within capacitor		N
	Discharge device mounted separately		N
1.11.1 (-)	Protective parts for lamp caps not removable by hand in hand-held inspection luminaires		N

EN 60598-2-1			
Cl.	Requirement	Test	Result
Verdict			
1.11.2 (-)	Fixing of parts within 2 m from floor		N
1.12 (12)	ENDURANCE TEST AND THERMAL TEST		P
1.12 (12.3)	Endurance test:		P
	- mounting-position	Mounting wall or ceiling	P
	- test temperature (°C)	35°C	P
	- total duration (h)	240hrs. Totally 10 cycles, each 24h	P
	- supply voltage: Un factor; calculated voltage (V)	1.06x240V	P
	- lamp used		P
1.12 (12.3.2)	After endurance test:		P
	- no part unserviceable		P
	- luminaire not unsafe		P
	- no damage to track system		N
	- marking legible		P
	- no cracks, deformation etc.		P
1.12 (12.4)	Thermal test (normal operation)	(see table 12.4)	P
1.12 (12.5)	Thermal test (abnormal operation)		N
	Short-circuit of starter contacts		N
	Lamps removed and not replaced		N
1.12 (12.6)	Thermal test (failed lamp control gear condition):		N
1.12 (12.6.1)	Through wiring or looping-in wiring loaded by a current of (A)		N
	- case of abnormal conditions		N
	- electronic ballast		N
	- measured winding temperature (°C): at 1.1 Un		N
	- measured mounting surface temperature (°C): at 1.1 Un		N
	- calculated mounting surface temperature(°C)		N
	- track-mounted luminaires		N
1.12 (12.6.2)	Temperature sensing control:		N
	- manual reset cut-out		N
	- auto reset cut-out		N
	- track-mounted luminaires		N

EN 60598-2-1			
Cl.	Requirement	Test	Result
			Verdict
1.12 (12.7)	Thermal test (failed ballast or transformer in plastic luminaires):		N
1.12 (12.7.1)	Luminaire without temperature sensing control		N
1.12 (12.7.1.1)	Luminaire with fluorescent lamp $\leq 70W$		N
	Test method 12.7.1.1 or Annex V		N
	Test according to 12.7.1.1:		N
	- case of abnormal conditions		N
	- Ballast failure at supply voltage (V)		N
	- Components retained in place after the test		N
	- Test with standard test finger after the test		N
	Test according to Annex V:		N
	- case of abnormal conditions		N
	- measured winding temperature ($^{\circ}C$): at 1.1 Un..... :		N
	- measured temperature of fixing point/exposed part ($^{\circ}C$): at 1.1Un.....:		N
	- calculated temperature of fixing point/exposed part ($^{\circ}C$)		N
	Ball-pressure test:		N
	- part tested; temperature ($^{\circ}C$)..... :		N
	- part tested; temperature ($^{\circ}C$)..... :		N
1.12 (12.7.1.2)	Luminaire with discharge lamp, fluorescent lamp $> 70W$, transformer $> 10 VA$		--
	- case of abnormal conditions		N
	- measured winding temperature ($^{\circ}C$): at 1.1 Un. :		N
	- measured temperature of fixing point/exposed part ($^{\circ}C$): at 1.1 Un..... :		N
	- calculated temperature of fixing point/exposed part ($^{\circ}C$)		N
	Ball-pressure test:		--
	- part tested; temperature ($^{\circ}C$)..... :		N
	- part tested; temperature ($^{\circ}C$)..... :		N
1.12 (12.7.1.3)	Luminaire with short circuit proof transformers $\leq 10 VA$		--
	- case of abnormal conditions		N

EN 60598-2-1				
Cl.	Requirement	Test	Result	Verdict
	- Components retained in place after the test			N
	- Test with standard test finger after the test			N
1.12 (12.7.2)	Luminaire with temperature sensing control			--
	- thermal link			N
	- manual reset cut-out			N
	- auto reset cut-out			N
	- case of abnormal conditions			N
	- highest measured temperature of fixing point/exposed part (°C):..... :			N
	Ball-pressure test:			--
	- part tested; temperature (°C)..... :			N
	- part tested; temperature (°C)..... :			N

1.13 (9)	RESISTANCE TO DUST, SOLID OBJECTS AND MOISTURE			P
1.13 (9.2)	Tests for ingress of dust, solid objects and moisture:			P
	- classification according to IP	IP20		P
	- mounting position during test	See user manual		N
	- fixing screws tightened; torque (Nm)			N
	- tests according to clauses			N
	- electric strength			P
	a) no deposit in dust-proof luminaire			N
	b) no talcum in dust-tight luminaire			N
	c) no trace of water on current-carrying parts or SELV parts or where it could become a hazard			N
	d) i) For luminaires without drain holes – no water entry			N
	d) ii) For luminaires with drain holes – no hazardous water entry			N
	e) no water in watertight luminaire			N
	f) no contact with live parts (IP 2X)			P
	f) no entry into enclosure (IP 3X and IP 4X)			N
	f) no contact with live parts (IP3X and IP4X)			N
	g) no trace of water on part of lamp requiring protection from splashing water			N

EN 60598-2-1			
Cl.	Requirement	Test	Result
			Verdict
	h) no damage of protective shield or glass envelope		N
1.13 (9.3)	Humidity test 48h	Relative humidity 93%, temperature 25°C, 48h, followed by hi-pot test	P
1.13.1 (-)	Parts removed before humidity treatment		--
1.14 (10)	INSULATION RESISTANCE AND ELECTRIC STRENGTH		P
1.14 (10.2.1)	Insulation resistance test:		P
	Cable or cord covered by metal foil or replaced by a metal rod of mm Ø		N
	Insulation resistance:		P
	SELV:		N
	- between current-carrying parts of different polarity.....		N
	- between current-carrying parts and mounting surface		N
	- between current-carrying parts and metal parts of the luminaire		N
	Other than SELV:		
	- between live parts of different polarity	>100 MΩ, limit: 2 MΩ	P
	- between live parts and mounting surface..	>100 MΩ, limit: 4 MΩ	P
	- between live parts and metal parts.....	>100 MΩ, limit: 4 MΩ	P
	- between live parts of different polarity through action of a switch		N
1.14 (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):		P
	SELV:		--
	- between current-carrying parts of different polarity.....		N
	- between current-carrying parts and mounting surface		N
	- between current-carrying parts and metal parts of the luminaire		N
	Other than SELV:		--

EN 60598-2-1			
Cl.	Requirement Test	Result	Verdict

	- between live parts of different polarity	1480Vac, 1min, no breakdown	P
	- between live parts and mounting surface.....	2960Vac, 1min, no breakdown	P
	- between live parts and metal parts.....	2960Vac, 1min, no breakdown	P
	- between live parts of different polarity through action of a switch		N
1.14 (10.3)	Touch current (mA)	0.07mA<0.7mA	P

1.15 (13)	RESISTANCE TO HEAT, FIRE AND TRACKING		P
1.15 (13.2.1)	Ball-pressure test:		--
	- part tested; temperature (°C)	Terminal block, 125°C, 1.0mm limit: 2.0mm	P
	- part tested; temperature (°C)	Plastic enclosure, 125°C, 1.2mm limit: 2.0mm	P
	- part tested; temperature (°C)		N
1.15 (13.3.1)	Needle flame test (10 s):		--
	- part tested	Terminal block, no burning	P
	- part tested	Plastic enclosure, no burning	P
	- part tested		N
1.15 (13.3.2)	Glow-wire test (650 °C):		--
	- part tested	Terminal block, 650°C, no burning	P
	- part tested	Plastic enclosure, 650°C, no burning	P
	- part tested		N
1.15 (13.4.2)	Tracking test: part tested		N

	CENELEC COMMON MODIFICATIONS (EN)		--
1.5 (3)	MARKING		--
1.5.(3.3.301)	Adequate warning on the package		—
1.10 (5)	EXTERNAL AND INTERNAL WIRING		—
1.10 (5.2.1)	Connecting leads		N
	- without a means for connection to the supply		
	- terminal block specified		N
	- relevant information provided		N
	- compliance with 4.6, 4.7.1, 4.7.2, 4.10.1, 11.2,12 and 13.2 of Part 1		N

EN 60598-2-1			
Cl.	Requirement Test	Result	Verdict
1.10 (5.2.2)	Cables equal to HD21 S2 or HD22 S2		N
ZB	ANNEX ZB, SPECIAL NATIONAL CONDITIONS (EN)		N
(3.3)	DK: power supply cord with label		N
	IT: warning label on Class 0 luminaire		N
(4.5.1)	DK: socket-outlets		N
(5.2.1)	CY, DK, FI, SE, GB: type of plug		N
ZC	ANNEX ZC, NATIONAL DEVIATIONS (EN)		N
(4&5)	FR: Shuttered socket-outlets 10/16A		N
(13.3)	GB: Requirements according to United Kingdom Building Regulation		N
(13.3.2)	FR: Glow-wire test 850°C alt. 750°C for luminaires in premises open to public or 960°C for luminaires in emergency exits		N

Tables

ANNEX 1: components						P
object/part No.	Code	manufacturer/trademark	type/model	technical data	standard	mark(s) of conformity
Terminal block	B	Openwise	206	750V 24A 130°C	--	VDE
Plastic enclosure	B	Casetek Computer (Suzhou) Co Ltd	GE	V-0, 130°C	UL 746C	UL E161723
PCB of LED	B	Shenzhen Jove Enterprise Co Ltd	JYE-S4(e)	V-0, 130°C	UL 796	UL E232940
Internal wiring	B	Dongguan Wenchang Electronic Co Ltd	1015	VW-1,20AWG, 105°C, 600V	UL 758	UL E214500
LED Driver	B	Merry Tek	MLC28C-P	Input: 220-240V~, 50/60Hz Output: DC22-40V, Max. 700mA	EN 61347-2-13; EN 61347-1	CE

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 authorized by the test house

C – Integrated component tested together with the appliance

D – Alternative component

ANNEX 2:	Temperature measurements, thermal tests of Section 12		P
	Type reference	CL-028-S-NW-00	P
	Lamp used	LED Lamp	P
	Ballast used	Integral Ballast	P
	Mounting position of luminaire	See product manual	P
	Supply wattage (W).....	27.5W	P
	Supply current (A).....		N
	Calculated power factor	0.862	P
	Table: measured temperatures corrected for Ta =25°C:		P
	- abnormal operating mode.....		N
	- test 1: rated voltage	240V	P
	- test 2: 1,06 times rated voltage or 1,05 times rated wattage.....	1.06x240V	P
	- test 3: Load on wiring to socket-outlet, 1,06 times voltage or 1,05 times wattage ...:		N
	- test 4: 1,1 times rated voltage or 1,05 times rated wattage.....		N
temperature (°C) of part		clause 12.4 – normal	clause 12.5 – abnormal

Tables

	test 1	test 2	test 3	limits	test 4	Limit
Plastic enclosure	42.1	43.5	--	130	--	--
Enclosure of LED driver	64.5	65.1	--	80	--	--
PCB of LED	56.4	57.8	--	130	--	--
Internal wire	43.1	45.1	--	105	--	--
Terminal block	36.6	38.2	--	80	--	--
Mounting surface	37.2	39.1	--	90	--	--
Ambient	25.4	25.4	--	--	--	--

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

	ANNEX 4: screwless terminals (part of the luminaire)		--
--	---	--	----

Tables

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

Tables

		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									
		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. 100 th 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)											

ANNEX 5 EMF			
	The tested product also complies to the requirements of EN 62493: 2010		--
	Limit.....0.85	Measured max.:.....0.00019	P

Attachment No.1

TEST REPORT EN 62471 Photobiological safety of lamps and lamp systems	
Report reference No.....:	See report EN 60598-2-1
Tested by(name + signature).....:	See report EN 60598-2-1
Approved by(name +signature).....:	See report EN 60598-2-1
Date of issue	See report EN 60598-2-1
Contents.....:	See report EN 60598-2-1
Testing laboratory	
Name	See report EN 60598-2-1
Address.....:	See report EN 60598-2-1
Testing location	See report EN 60598-2-1
Client	
Name	See report EN 60598-2-1
Address	See report EN 60598-2-1
Manufacturer	
Name	See report EN 60598-2-1
Address	See report EN 60598-2-1
Test specification	
Standard.....:	EN 62471: 2008
Test procedure	Compliance with EN 62471: 2008
Non-standard test method	N/A
Test item Description.....:	See report EN 60598-2-1
Trademark	See report EN 60598-2-1
Model and/or type reference	See report EN 60598-2-1
Rating(s).....:	See report EN 60598-2-1

EN 62471			
Clause	Requirement - Test	Result - Remark	Verdict

1	SCOPE		P
	More sections applicable	Yes [<input checked="" type="checkbox"/>] No [<input type="checkbox"/>]	--

4	EXPOSURE LIMITS		P
4.1	General		P
	The exposure limits in this standard apply to continuous sources where the exposure duration is not less than 0,01 ms and not more than any 8-hour period, and should be used as guides in the control of exposure. The values should not be regarded as precisely defined lines between safe and unsafe levels.		P
	detailed spectral data of a light source are generally required only if the luminance of the source exceeds 104 cd•m ⁻² .	See clause 4.3	P
4.2	Specific factors involved in the determination and application of retinal exposure limits		N
4.2.1	Pupil diameter		P
4.2.2	Angular subtense of source and measurement field-of-view		P
4.3	Hazard exposure limits		P
4.3.1	Actinic UV hazard exposure limit for the skin and eye	LED light source	N
	The limits for exposure to ultraviolet radiation incident upon the unprotected skin or eye apply to exposure within any 8-hour period.		N
	To protect against injury of the eye or skin from ultraviolet radiation exposure produced by a broadband source, the effective integrated spectral irradiance, E_s , of the light source shall not exceed the levels defined by:		N
	$E_s \bullet t = \sum_{200}^{400} \sum_t E_{\lambda}(\lambda, t) \bullet S_{UV}(\lambda) \Delta t \bullet \Delta \lambda$ J•m ⁻²		N
	The permissible time for exposure to ultraviolet radiation incident upon the unprotected eye or skin shall be computed by:		N

EN 62471			
Clause	Requirement - Test	Result - Remark	Verdict
	$t_{\max} = \frac{30}{E_s}$		N
4.3.2	Near-UV hazard exposure limit for the eye		N
	For the spectral region 315 nm to 400 nm (UV-A) the total radiant exposure to the eye shall not exceed 10000 Jm ⁻² for exposure times less than 1000 s. For exposure times greater than 1000 s (approximately 16 minutes) the UV-A irradiance for the unprotected eye, EUVA, shall not exceed 10 Wm ⁻² .		N
	$E_{SUV} \bullet t = \sum_{315}^{400} \sum_t E_{\lambda}(\lambda, t) \bullet \Delta t \bullet \Delta \lambda \leq 10000$ J•m ⁻² (t < 1000 s)		N
	The permissible time for exposure to ultraviolet radiation incident upon the unprotected eye for times less than 1000 s, shall be computed by:		N
	$t_{\max} \leq \frac{1000}{E_{UVA}}$ S		N
4.3.3	Retinal blue light hazard exposure limit		P
	To protect against retinal photochemical injury from chronic blue-light exposure, the integrated spectral radiance of the light source weighted against the blue-light hazard function, B(λ), i.e., the blue light weighted radiance, LB, shall not exceed the levels defined by:		P
	$L_B \bullet t = \sum_{300}^{700} \sum_t L_{\lambda}(\lambda, t) \bullet B_{(\lambda)} \bullet \Delta t \bullet \Delta \lambda \leq 1$ J•m ⁻² •sr ⁻¹	(for t ≤ 10 ⁴ s)	N
	$L_B = \sum_{300}^{700} L_{\lambda} \bullet B_{(\lambda)} \bullet \Delta \lambda \leq 100$ W•m ⁻² •sr ⁻¹	For t > 10 ⁴ S	P
4.3.4	Retinal blue light hazard exposure limit - small source		P
	Thus the spectral irradiance at the eye Eλ, weighted against the blue-light hazard function B(λ) (see Table 4.2) shall not exceed the levels defined by:		N

EN 62471			
Clause	Requirement - Test	Result - Remark	Verdict
	$E_B \cdot t = \sum_{300}^{700} \sum_t E_\lambda(\lambda, t) \cdot B(\lambda) \cdot \Delta\lambda \leq 100$	(for $t \geq 100s$)	N
	$E_B = \sum_{300}^{700} E_\lambda \cdot B(\lambda) \cdot \Delta\lambda \leq 1$	For $t \leq 100s$	N
4.3.5	Retinal thermal hazard exposure limit		N
	To protect against retinal thermal injury, the integrated spectral radiance of the light source, L_λ , weighted by the burn hazard weighting function $B(\lambda)$ (from Figure 4.2 and Table 4.2), i.e., the burn hazard weighted radiance, shall not exceed the levels defined by:		N
	$L_R = \sum_{380}^{1400} L_\lambda \cdot B(\lambda) \cdot \Delta\lambda \leq \frac{50000}{\alpha \cdot t^{0.25}} \text{ J} \cdot \text{m}^{-2} \cdot \text{sr}^{-1}$	$10\text{us} \leq t \leq 10\text{s}$	N
4.3.6	Retinal thermal hazard exposure limit – weak visual stimulus		P
	For an infrared heat lamp or any near-infrared source where a weak visual stimulus is inadequate to activate the aversion response, the near infrared (780 nm to 1400 nm) radiance, L_{IR} , as viewed by the eye for exposure times greater than 10 s shall be limited to:		P
	$L_{IR} = \sum_{780}^{1400} L_\lambda \cdot B(\lambda) \cdot \Delta\lambda \leq \frac{6000}{\alpha} \text{ J} \cdot \text{m}^{-2} \cdot \text{sr}^{-1}$	$t > 10\text{s}$	P
4.3.7	Infrared radiation hazard exposure limits for the eye		N
	To avoid thermal injury of the cornea and possible delayed effects upon the lens of the eye (cataractogenesis), ocular exposure to infrared radiation, E_{IR} , over the wavelength range 780 nm to 3000 nm, for times less than 1000 s, shall not exceed:		N
	$E_{IR} = \sum_{780}^{3000} E_\lambda \cdot \Delta\lambda \leq 1800 \cdot t^{-0.75} \text{ W} \cdot \text{m}^{-2}$	$T \leq 1000\text{s}$	N
	For times greater than 1000 s the limit becomes:		N

EN 62471			
Clause	Requirement - Test	Result - Remark	Verdict

	$E_{IR} = \sum_{780}^{3000} E_{\lambda} \cdot \Delta\lambda \leq 100 \text{ W}\cdot\text{m}^{-2}$	T>1000s	N
4.3.8	Thermal hazard exposure limit for the skin		P
	Visible and infrared radiant exposure (380 nm to 3000 nm) of the skin shall be limited to:		P
	$E_H \cdot t = \sum_{380}^{3000} \sum_t E_{\lambda}(\lambda, t) \cdot \Delta\lambda \leq 20000 \cdot t^{0.25}$		P

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).....		P
	Seasoning of lamps shall be done as stated in the appropriate IEC lamp standard.		P
5.1.2	Test environment		P
	For specific test conditions, see the appropriate IEC lamp standard or in the absence of such standards, the appropriate national standards or manufacturer's recommendations.		P
5.1.3	Extraneous radiation		N
	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		P
	Operation of the test lamp shall be provided in accordance with:		P
	--the appropriate IEC lamp standard.		P
	--the lamp manufacturer's recommendation		P
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.		P
	-- the lamp manufacturer's recommendation		N
5.2	Measurement procedure		P
5.2.1	Irradiance measurements		P
	minimum input aperture diameter of 7 mm		N

EN 62471			
Clause	Requirement - Test	Result - Remark	Verdict
	maximum input aperture diameter of 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 measurement made with an optical system		P
	The instrument shall be calibrated to read in absolute incident radiant power per unit receiving area and per unit solid angle of acceptance averaged over the field of view (FOV) of the instrument.		P
5.2.2.2	Alternative method		P
	Alternative 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		
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 point of the source	0.18	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
	The standardize interpolated values, use linear interpolation on the log of given values to obtain intermediate point at the wavelength intervals desired.	See table 4.1	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

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Clause	Requirement - Test	Result - Remark	Verdict
	The quality of all measurement results must be quantified by an analysis of the uncertainty.	See annex C	P
6	LAMP CLASSIFICATION		P
	For the purposes of this standard it was decided that the values shall be reported as follows:		N
	for lamps intended for general lighting service (GLS), 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
6.1	Continuous wave lamps	Class I Laser Product	P
6.1.1	Exempt group		P
	the exempt group are lamps, which does not pose any photobiological. This requirement is met by any lamp that does not pose		P
	--an actinic ultraviolet hazard (E_s) within 8-hours exposure (30000 s), nor		N
	--a near-UV hazard (EUVA) within 1000 s, (about 16 min) nor		N
	--a retinal blue-light hazard (LB) within 10000 s (about 2,8 h), nor		P
	--a retinal thermal hazard (LR) within 10 s, nor		P
	--an infrared radiation hazard for the eye (EIR) within 1000 s.		N
6.1.2	Risk Group 1 (Low-Risk)		N
	In this group are lamps, which exceeds the limited 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 (EUVA) within 300 s, nor		N
	--a retinal blue-light hazard (LB) within 100 s, nor		N
	--a retinal thermal hazard (LR) within 10 s, nor		N
	--an infrared radiation hazard for the eye (EIR) within 100 s.		N

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Clause	Requirement - Test	Result - Remark	Verdict
	lamps that emit infrared radiation without a strong visual stimulus (i.e., less than $10 \text{ cd}\cdot\text{m}^{-2}$) and do not pose a near-infrared retinal hazard (LIR), within 100 s are in Risk Group 1 (Low-Risk).		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 (EUVA) within 100 s, nor		N
	--a retinal blue-light hazard (LB) within 0,25 s (aversion response), nor		N
	--a retinal thermal hazard (LR) within 0,25 s (aversion response), nor		N
	--an infrared radiation hazard for the eye (EIR) within 10 s.		N
	lamps that emit infrared radiation without a strong visual stimulus (i.e., less than $10 \text{ cd}\cdot\text{m}^{-2}$) and do not pose a near infrared retinal hazard (LIR) within 10 s are in Risk Group 2 (Moderate-Risk).		N
6.1.4	Risk Group 3 (High-Risk)		N
	Lamps which exceed the limits for Risk Group 2 (Moderate-Risk) are in Risk Group3 (High-Risk).		N
6.2	Pulsed lamps		N
	Pulsed lamp criteria shall apply to a single pulse and to any group of pulses within 0,25 second.		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 dose 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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Clause	Requirement - Test	Result - Remark	Verdict

ANNEX A	SUMMARY OF BIOLOGICAL EFFECTS		--
	Bioeffect datasheet #1: Infrared cataract		N
A.1	Bioeffect: INFRARED CATARACT also known as "industrial heat cataract, "furnaceman's cataract", or "glassblower's cataract".		N
A.1.1	Organ/Site: Eye/Crystalline Lens.		N
A.1.2	Spectral range: 700 nm to 1400 nm and possibly to 3000 nm.		N
A.1.3	Peak of action spectrum: Not known; probably between 900-1000 nm.		N
A.1.4	State of knowledge: Limited threshold data available for acute cataract for rabbit at 1064 nm (Wolbarsht, 1992) and IR-A region (Pitts and Cullen, 1981); no data for man. Degree of additivity and action spectrum unknown. Good epidemiological evidence (Lydahl, 1984).		N
A.1.5	Time course: Noticeable clouding of the lens generally following years of chronic high-level exposure, the elapsed time depending upon how much difference between exposure and threshold, heavy exposures producing reaction in shortest time.		N
A.1.6	Mechanism: Generally presumed to be thermal, although recent evidence suggests possible photochemical reaction - details not understood. The lens may be heated either from direct irradiation (Vogt, 1919) or by conductive heating from the heated iris (Goldman, 1983).		N
A.1.7	Symptoms: Clouding of vision.		N
A.1.8	Needed information: Action spectrum, if existent, for acute and for effects of concomitant ultraviolet radiation exposure; additivity of multiple exposures, and the possibility of delayed effects from recurrent exposures.		N
A.1.9	Experience with lamps: Accidental injury is not known, even from exposure to heat lamps. Limited population exposed.		N
A.1.10	Key references		N

	Bioeffect datasheet #2		--
A.2	Bioeffect		P

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Clause	Requirement - Test	Result - Remark	Verdict
A.2.1	Organ/Site		P
A.2.2	Spectral range		P
A.2.3	Peak of action spectrum		P
A.2.4	State of knowledge		P
A.2.5	Time course		P
A.2.6	Mechanism		P
A.2.7	Symptoms		P
A.2.8	Needed information		P
A.2.9	Experience with lamps		P
A.2.10	Key references		P
	Bioeffect datasheet #3		--
A.3	Bioeffect		N
A.3.1	Organ/Site		N
A.3.2	Spectral range		N
A.3.3	Peak of action spectrum		N
A.3.4	State of knowledge		N
A.3.5	Time course		N
A.3.6	Mechanism		N
A.3.7	Symptoms		N
A.3.8	Needed information		N
A.3.9	Experience with lamps		N
A.3.10	Key references		N
	Bioeffect datasheet #4		--
A.4	Bioeffect		N
A.4.1	Organ/Site		N
A.4.2	Spectral range		N
A.4.3	Peak of action spectrum		N
A.4.4	State of knowledge		N
A.4.5	Time course		N
A.4.6	Mechanism		N
A.4.7	Symptoms		N
A.3.8	Needed information		N
A.4.9	Experience with lamps		N
A.4.10	Key references		N
	Bioeffect datasheet #5		--
A.5	Bioeffect		N

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Clause	Requirement - Test	Result - Remark	Verdict
A.5.1	Organ/Site		N
A.5.2	Spectral range		N
A.5.3	Peak of action spectrum		N
A.5.4	State of knowledge		N
A.5.5	Time course		N
A.5.6	Mechanism		N
A.5.7	Symptoms		N
A.5.8	Needed information		N
A.5.9	Experience with lamps		N
A.5.10	Key references		N
ANNEX B	MEASUREMENT METHOD		N
B.1	Instrumentation		N
B.1.1	Double monochromator: Recommended instrument		N
B.1.2	Broadband detectors		N
B.2	Instrument limitations		N
B.2.1	Noise equivalent irradiance		N
B.2.2	Instrument spectral response		N
B.2.3	Wavelength accuracy		N
B.2.4	Stray radiant power		N
B.2.5	Input optics for spectral irradiance measurements: Recommendation		N
B.2.6	Linearity		N
B.3	Calibration sources		N
ANNEX C	UNCERTAINTY ANALYSIS		P
ANNEX D	GENERAL REFERENCES		P
ANNEX ZA	Normative references to international publications with their corresponding European publications		N
ANNEX ZB	EXPOSURE LIMITS (EL'S)	See ANNEX ZB above	P

Tables

Table 4.1		Spectral weighting function for assessing ultraviolet hazards for skin and eye.		P
Wavelength ¹ λ , nm	UV hazard function SUV(λ)	Wavelength λ , nm	UV hazard function SUV(λ)	
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	0,960	350	0,00020	
285	0,880	355	0,00016	
290	0,770	360	0,00013	
295	0,540	370	0,00009	
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.				

Tables

Table 4.2	Spectral weighting functions for assessing retinal hazards from broadband optical sources.		P
Wavelength nm	Blue-light hazard function $B(\lambda)$	Burn hazard function $R(\lambda)$	
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	

Tables

Table 4.2	Spectral weighting functions for assessing retinal hazards from broadband optical sources.		P
480	0,45	4,5	
485	0,40	4,0	
490	0,22	2,2	
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 $W \cdot m^{-2}$	
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	2 sr	20000/t ^{0,75}	

Tables

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 irradiance $W \cdot m^{-2} \cdot sr^{-1}$	
Blue light	$L_B = \sum L_\lambda \cdot B(\lambda) \cdot \Delta\lambda$	300 – 700	0,25 – 10 10-100 100-10000 ≥ 10000	$0,011 \cdot \sqrt{(\#10)}$ 0,011 $0,0011 \cdot \sqrt{t}$ 0,1	$106/t$ $106/t$ $106/t$ 100	
Retinal thermal	$L_R = \sum L_\lambda \cdot R(\lambda) \cdot \Delta\lambda$	380 – 1400	< 0,25 0,25 – 10	0,0017 $0,011 \cdot \sqrt{(\#10)}$	$50000/(\alpha \cdot t^{0,25})$ $50000/(\alpha \cdot t^{0,25})$	
Retinal thermal (weak visual stimulus)	$L_{IR} = \sum L_\lambda \cdot R(\lambda) \cdot \Delta\lambda$	780 – 1400	> 10	0,011	6000/ α	

Table 6.6		Emission limits for risk groups of continuous wave lamps.				P
Risk	Action spectrum	Symbol	Emission limits			Units
			Exempt	Low risk	Mod risk	
Actinic UV	$S_{UV}(\lambda)$	E_S	0,001	0,003	0,03	$W \cdot m^{-2}$
Near UV		E_{UVA}	10	33	100	$W \cdot m^{-2}$
Blue light	$B(\lambda)$	L_B	100	10000	4000000	$W \cdot m^{-2} \cdot sr^{-1}$
Blue light, small source	$B(\lambda)$	E_B	1,0*	1,0	400	$W \cdot m^{-2}$
Retinal thermal	$R(\lambda)$	L_R	28000/ α	28000/ α	71000/ α	$W \cdot m^{-2} \cdot sr^{-1}$
Retinal thermal, weak visual stimulus**	$R(\lambda)$	L_{IR}	6000/ α	6000/ α	6000/ α	$W \cdot m^{-2} \cdot sr^{-1}$
IR radiation, eye		E_{IR}	100	570	3200	$W \cdot m^{-2}$
* Small source defined as one with $\alpha < 0,011$ radian. Averaging field of view at 10000 s is 0,1 radian. ** Involves evaluation of non-GLS source						

Attachment No.2

TEST REPORT	
EN 62031 LED modules for general lighting - Safety specifications	
Report reference No.....:	See report EN 60598-2-1
Tested by(name + signature).....:	See report EN 60598-2-1
Approved by(name +signature).....:	See report EN 60598-2-1
Date of issue	See report EN 60598-2-1
Contents.....:	See report EN 60598-2-1
Testing laboratory	
Name	See report EN 60598-2-1
Address.....:	See report EN 60598-2-1
Testing location	See report EN 60598-2-1
Client	
Name	See report EN 60598-2-1
Address	See report EN 60598-2-1
Manufacturer	
Name	See report EN 60598-2-1
Address	See report EN 60598-2-1
Test specification	
Standard.....:	EN 62031: 2008+A1: 2013
Test procedure	Compliance with EN 62031: 2008+A1: 2013
Non-standard test method	N/A
Test item Description.....:	
Trademark	See report EN 60598-2-1
Model and/or type reference	See report EN 60598-2-1
Rating(s).....:	DC22-40V, Max. 700mA

EN 62031			
Clause	Requirement - Test	Result - Remark	Verdict

4	General requirements		---
4.1	Modules shall be so designed and constructed that in normal use (see manufacturer's instruction) they operate without danger to the user or surroundings:		P
4.2	For LED modules, all electrical measurements, unless otherwise specified, shall be carried out at voltage limits (min/max), current limits (min/max) or power limits (min/max) and minimum frequency, in a draught-free room at the temperature limits of the allowed range specified by the manufacturer. Unless the manufacturer indicates the most critical combination, all combinations (min/max) of voltage/current/power and temperature shall be tested.		P
4.3	For self-ballasted LED modules, the electrical measurements shall be carried out at the tolerance limit values of the marked supply voltage.		N
4.4	Integral modules not having their own enclosure shall be treated as integral components of luminaires as defined in IEC 60598-1, Clause 0.5. They shall be tested assembled in the luminaire, and as far as applicable with the present standard.		P
4.5	Independent modules shall comply, in addition to this standard, with the requirements of relevant clauses of IEC 60598-1, where these requirements are not already covered in this standard.		N
4.6	If the module is a factory sealed unit, it shall not be opened for any tests. In the case of doubt based on the inspection of the module and the examination of the circuit diagram, and in agreement with the manufacturer or responsible vendor, such specially prepared modules shall be submitted for testing so that a fault condition can be simulated.	Unsealed	N

5	General test requirements		---
5.1	Tests according to this standard are type tests		P
5.2	Unless otherwise specified, the tests are carried out at an ambient temperature of 10°C to 30°C		P

EN 62031			
Clause	Requirement - Test	Result - Remark	Verdict
5.3	Unless otherwise specified, the type test is carried out on one sample consisting of one or more items submitted for the purpose of the type test.		P
5.4	If the light output has detectably changed, the module shall not be used for further tests.		P
5.5	For SELV-operated LED modules, the requirements of IEC 61347-2-13, Annex I, apply additionally.		N

6	CLASSIFICATION		---
	Independent		N
	Built-in		N
	Integral		P

7	MARKING		---
7.1	Mandatory marking for built-in or independent modules		N
	a) Mark of origin (trade mark, manufacturer's name or name of the responsible vendor/supplier).		N
	b) Model number or type reference of the manufacturer.		N
	c) Either the -rated supply voltage(s), or voltage range, supply frequency or/and -rated supply current(s) or current range, supply frequency (the supply current may be given in the manufacturer's literature) or/and -rated input power, or power range.		N
	d) Nominal power.		N
	e) Indication of position and purpose of the connections where it is necessary for safety. In case of connecting wires, a clear indication shall be given in a wiring diagram.		N
	f) Value of t_c . If this relates to a certain place on the LED module, this place shall be indicated or specified in the manufacturer's literature.		N
	g) For eye protection, see requirements of IEC 62471.		N

EN 62031			
Clause	Requirement - Test	Result - Remark	Verdict
	h) Built-in modules shall be marked in order to separate them from independent modules. The mark shall be located on the packaging or on the module itself.		N
7.2	Location of marking		---
	Items a), b), c) and f) of 7.1 shall be marked on the module.		N
	Items d), e), g) and h) of 7.1 shall be marked legible on the module or on the module data sheet.		N
	For integral modules, no marking is required, but the information given in 7.1 a) to g) shall be provided in the technical literature of the manufacturer.		N
7.3	Durability and legibility of marking		N
	Rubbing 15 s water, 15 s petroleum; marking legible		N
8 (14)	SCREW TERMINALS		N
	Separately approved: component list	See annex 1	N
	Part of the luminaire	See annex 3	N
8 (15)	SCREWLESS TERMINALS and electrical connections		N
	Separately approved: component list	See annex 1	N
	Part of the luminaire	See annex 4	N

EN 62031			
Clause	Requirement - Test	Result - Remark	Verdict
9	PROVISION FOR EARTHING		N
	External metal parts connected to the earth terminal:		N
	- compliance with 7.2.1 in EN 60598-1		N
	Test with a current of 10 A between earthing terminal and each of the accessible metal parts; measured resistance (Ω): $< 0,5 \Omega$		N
	Protective earth, symbol		N
	Terminal complying with clause 8 in Part 1		N
	Locked against loosening and not possible to loosen by hand		N
	Not possible to loosen clamping means unintentionally on screwless terminals		N
	Earthing via means of fixing		N
	Earthing terminal only used for the earthing of the control gear		N
	All parts of material minimizing the danger of electrolytic corrosion		N
	Made of brass or equivalent material		N
	Contact surface bare metal		N
	Conductors by tracks on printed circuit boards:		N
	- a.c. current of 25 A for 1 min between earthing terminal and accessible metal parts		N
	- compliance with clause 7.2.1 in EN 60598-1		N
10	PROTECTION AGAINST ACCIDENTAL CONTACT WITH LIVE PARTS		N
10.1	Ballast protected against accidental contact with live parts		N
A1	Current measured according to EN 60990, figure 4 and clause 7.1: max. 0,7 mA (peak) or 2,0 mA d.c., for $f \geq 1000$ Hz max. 70 mA		N
A2	Voltage at $50 \text{ k}\Omega$ (V): max. 34 V (peak)		N
	Lacquer or enamel not considered to be adequate protection		N
	Adequate mechanical strength on parts providing protection		N
10.2	Capacitors $> 0,5 \mu\text{F}$: voltage after 1 min (V): $< 50 \text{ V}$		N
11	MOISTURE RESISTANCE AND INSULATION		P

EN 62031			
Clause	Requirement - Test	Result - Remark	Verdict

	After storage 48 h at 91-95% relative humidity and 20-30 °C measuring of insulation resistance with d.c. 500 V (MΩ): ≥ 2 MΩ	Refer to table 11	P
	The leakage current shall not exceed the values shown in figure 2 when measured in accordance with annex I	Refer to table 11	P

12	ELECTRIC STRENGTH		P
	Immediately after clause 11 electric strength test for 1 min	Refer to table 12	P
	Working voltage ≤ 50 V, test voltage 500 V	DC22-40V, Max. 700mA	P
	Working voltage > 50 V, test voltage (V): 2U + 1000 V		N
	Reinforced insulation, test voltage (V):		P
	No flashover or breakdown		P

13	Fault conditions		---
	Windings of ballasts shall have adequate thermal endurance	No such parts	N
13.1	General		N
	When operated under fault conditions the ballast: - does not emit flames or molten material	No such parts	N
	- does not produce flammable gases		N
	- protection against accidental contact not impaired		N
	Thermally protected ballasts does not exceed the marked temperature value	Not thermally protected ballasts	N
	Fault conditions: capacitors, resistors or inductors without proof of compliance with relevant specifications have been short-circuited or disconnected		N
	Short-circuit of creepage distances and clearances if less than specified in clause 18 (except between live parts and accessible metal parts)	Refer to table 13	N
	Short-circuit or interruption of semiconductor devices	Refer to table 13	N
	Short-circuit across insulation consisting of lacquer, enamel or textile	Refer to table 13	N
	Short-circuit across electrolytic capacitors	Refer to table 13	N
	During the tests, a five-layer tissue paper, where the test specimen is wrapped, does not ignite	No ignition	N
13.2	Overpower condition		N

EN 62031			
Clause	Requirement - Test	Result - Remark	Verdict
	The test shall be started at an ambient temperature as specified in Annex A.		N
	The module shall be switched on and the power monitored (at the input side) and increased until 150 % of the rated voltage, current or power is reached. The test shall be continued until the module is thermally stabilised. A stable condition is reached, if the temperature does not change by more than 5 K in 1 h. The temperature shall be measured in the tc point. The module shall withstand the overpower condition for at least 15 min, the time period of which can lie within the stabilisation period if the temperature change is ≤ 5 K.		N
	If the module contains an automatic protective device or circuit which limits the power, it is subjected to a 15 min operation at this limit. If the device or circuit effectively limits the power over this period, the module has passed the test, provided the compliance (4.1 and last paragraph of 13.2) is fulfilled.		N
	After finalising the overpower mode, the module is operated under normal conditions until thermally being stable.		N
	A module fails safe if no fire, smoke or flammable gas is produced and if the 15 min overpower condition has been withstood. To check whether molten material might present a safety hazard, a tissue paper, as specified in 4.187 of ISO 4046-4, spread below the module shall not ignite.		N
15	Construction		P
	Wood, cotton, silk, paper and similar fibrous material shall not be used as insulation.		P
16	Creepage distances and clearances		P
	Working voltage (V)	DC22-40V	P
	Voltage form	Sinusoidal [] Non-sinusoidal [<input checked="" type="checkbox"/>]	P
	PTI	< 600 [<input checked="" type="checkbox"/>] > 600 []	P
	Impulse withstand category (normal category II) (category III annex U)	Normal category II	P
	Rated pulse voltage (kV)		N

EN 62031			
Clause	Requirement - Test	Result - Remark	Verdict

	(1) Current-carrying parts of different polarity: cr (mm); cl (mm)	cl>2.4mm, limit: 0.2mm cr>2.4mm, limit: 1.2mm	P
	(2) Current-carrying parts and accessible parts: cr (mm); cl (mm)	cl>3.4mm, limit: 0.2mm cr>3.4mm, limit: 1.2 mm	P
	(3) Parts becoming live due to breakdown of basic insulation and metal parts: cr (mm); cl (mm)		N
	(4) Outer surface of cable where it is clamp and metal parts: cr (mm); cl (mm)		N
	(5)not used		N
	(6) Current-carrying parts and supporting surface: cr (mm); cl (mm)	cl>3.4mm, limit: 0.2mm cr>3.4mm, limit: 1.2 mm	P

17	SCREWS, CURRENT-CARRYING PARTS AND CONNECTIONS		P
17 (4.11)	Electrical connections		P
17(4.11.1)	Contact pressure	No pressure transmitted to the insulating material	N
17 (4.11.2)	Screws:		N
	- Self-tapping screws		N
	- thread-cutting screws		N
17 (4.11.3)	Screw locking:		N
	- spring washer		N
	- rivets	No rivet provided	N
17 (4.11.4)	Material of current-carrying parts	> 50% copper	P
17 (4.11.5)	No contact to wood or mounting surface	No wood	P
17 (4.11.6)	Electro-mechanical contact systems	No such construction	N
17 (4.12)	Mechanical connections and glands		P
17 (4.12.1)	Screw not made of soft metal		P
	Screws of insulating material		N
	Torque test: torque (Nm); part	See report EN 60598-2-1	P
	Torque test: torque (Nm); part		N
17 (4.12.2)	Screw with diameter < 3 mm screw into metal		P
17 (4.12.4)	Locked connections:		N
	- fixed arms; torque (Nm)		N
	- lampholder; torque (Nm)		N
	- push-button switches; torque (Nm)	No such switches	N
1.6 (4.12.5)	Screwed glands; force (N) :		N

18	RESISTANCE TO HEAT, FIRE AND TRACKING		---
18.1	Parts of insulating material retaining live parts in position, ball-pressure test:		N
	- part; test temperature (°C)	See report EN 60598-2-1	N

EN 62031			
Clause	Requirement - Test	Result - Remark	Verdict
18.2	Printed boards in accordance with IEC 60249-1, 4.3		N
18.3	External parts of insulating material preventing electric shock glow-wire test 650 °C	See report EN 60598-2-1	N
18.4	Parts of insulating material retaining live parts in position, needle-flame test 10 s:		N
	- flame extinguished within 30 s		N
	- no flaming drops igniting tissue paper		N
18.5	Tracking test	Ordinary	N
19	RESISTANCE TO CORROSION		---
	Rust protection:		P
	-10% solution of ammonium chloride in water		N
	- adequate varnish on the outer surface		P

Table 11(a)		Humidity test				P
Test condition:		Temperature	Relative Humidity	Duration	Breakdown (Y/N)	
		25°C	93%	48 hours	N	
Test points			Measured insulation		Limited insulation	
Between	To					
+ & -	Enclosure	>100MΩ		1MΩ		

Table 11(b)	Touch current measurement (mA)				N
Condition	Normal		Reverse		
Model No.	ON	OFF	ON	OFF	

Table 12	Electric strength				P
Test points		Test voltage		Results	
Between	To				
+ & -	Enclosure	500Vac		No breakdown	

13	TABLE: tests of fault conditions				N
Part	Simulated fault	Test result			Hazard
--	--	--			--

16	TABLE: creepage distances and clearances						P	
	Minimum distances for a.c. (50/60 Hz) sinusoidal voltages						P	
RMS working voltage (V) not exceeding		50	150	250	500	750	1000	
1 minimum distances between live parts of different polarity. Specify the value measured.		>3.4						
2 minimum distances between live parts and accessible parts which are permanently fixed to the ballast, including screws or devices for fixing covers or fixing the ballast to its support. Specify the value measured.		>2.4						
- required creepage distances (mm), insulation PTI ≥ 600		0,6	1,4	1,7	3	4	5,5	
- required creepage distances (mm), insulation PTI < 600		1,2	1,6	2,5	5	8	10	
- required clearances (mm)		0,2	1,4	1,7	3	4	5,5	
3 minimum distances between live parts and a flat supporting surface or a loose metal cover, if any, if the construction does not ensure that the values under 2 above are maintained under the most unfavourable circumstances								
- required clearances (mm)		2	3,2	3,6	4,8	6	8	
	Minimum distances for non-sinusoidal pulse voltages						N	
rated pulse voltage (peak kV)		2,0	2,5	3,0	4,0	5,0	6,0	8,0

required minimum distances, clearances (mm)	1,0	1,5	2	3	4	5,5	8
Specify the value measured							
rated pulse voltage (peak kV)	10	12	15	20	25	30	40
required minimum distances, clearances (mm)	11	14	18	25	33	40	60
Specify the value measured							
rated pulse voltage (peak kV)	50	60	80	100	-	-	-
required minimum distances, clearances (mm)	75	90	130	170	-	-	-
Specify the value measured							

ATTACHMENT 3

Photo Documentation

View:
Model:
CL-028-S-
NW-00

☒ General
☐ Front
☐ Rear
☐ Internal
☐ Top
☐ Bottom
☐ PWB

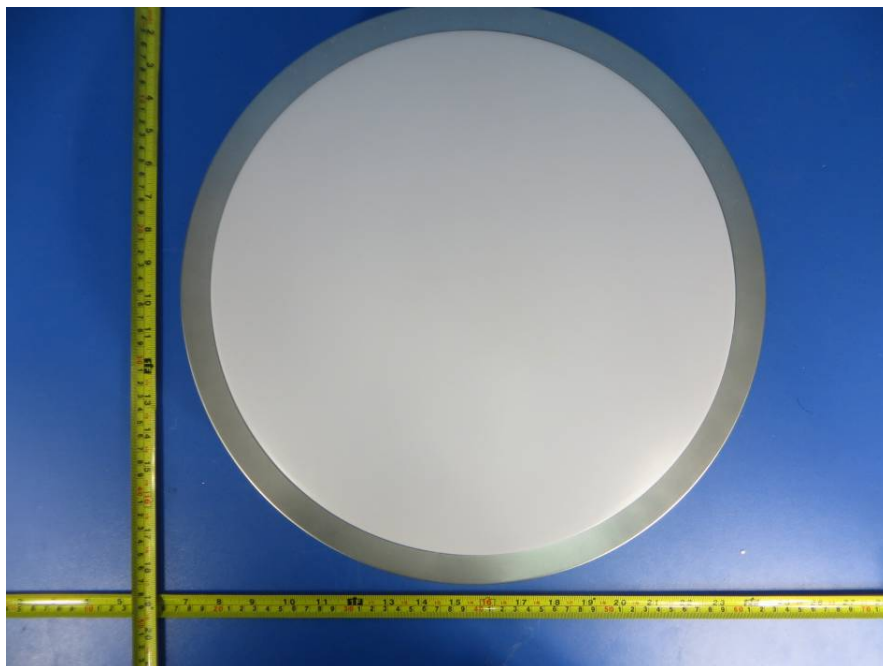


Figure 1

View:

☐ General
☐ Front
☒ Rear
☐ Internal
☐ Top
☐ Bottom
☐ PWB

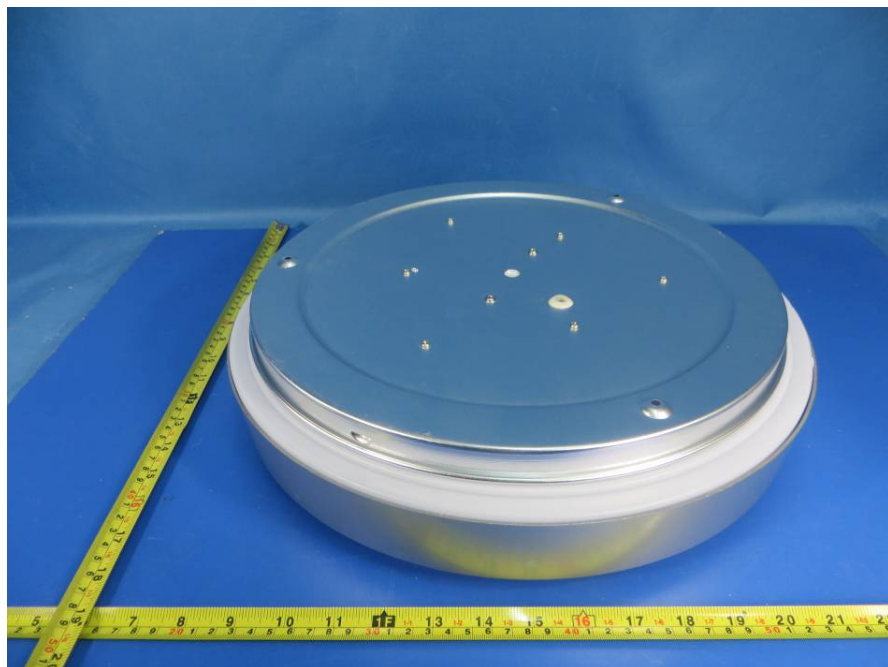


Figure 2

ATTACHMENT 3

Photo Documentation

View:

- ☐ General
- ☐ Front
- ☐ Rear
- ☒ Internal
- ☐ Top
- ☐ Bottom
- ☐ PWB

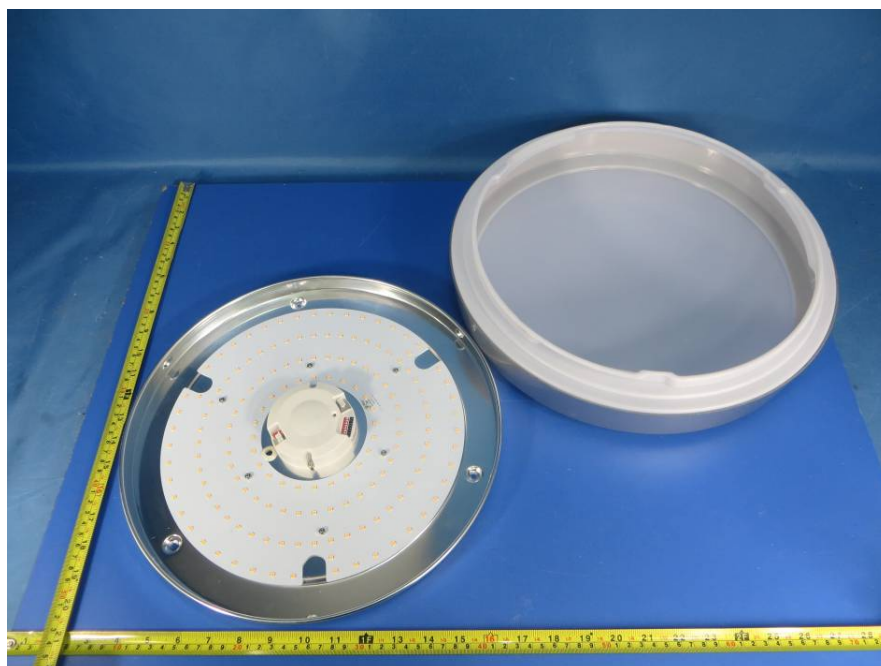


Figure 3

View:

- ☐ General
- ☐ Front
- ☐ Rear
- ☒ Internal
- ☐ Top
- ☐ Bottom
- ☐ PWB



Figure 4