APPLICATION FOR TEST REPORT

On Behalf of

TEA-Energy China Limited

T8 LED Tube

Model: See model list

Prepared For	:	**TEA-Energy China Limited** **0100029 Building, Xiawei Industrial Zone, Xiahu Community, Guanlan Town, Longhua District, Shenzhen, China**
Prepared By	:	**Shenzhen LCS Compliance Testing Laboratory Ltd.** **1/F., Xingyuan Industrial Park, Tongda Road, Bao'an Avenue, Bao'an District, Shenzhen, Guangdong, China**
Date of Test	:	**February 10, 2014 – February 27, 2014**
Date of Report	:	**February 27, 2014**
Report Number	:	**LCS140225047S**

TEST REPORT

EN 60598-1

Luminaires – Part 1: General requirements and tests

Report reference No..... :	LCS140225047S
Tested by(name + signature)..... :	Sara Tang
Approved by(name + signature)..... :	Hart Qiu
Date of issue ..... :	February 27, 2014
Contents..... :	72 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 ..... :	As above
Client	
Name ..... :	TEA-Energy China Limited
Address ..... :	0100029 Building, Xiawei Industrial Zone, Xiahu Community, Guanlan Town, Longhua District, Shenzhen, China
Manufacturer	
Name ..... :	TEA-Energy China Limited
Address ..... :	0100029 Building, Xiawei Industrial Zone, Xiahu Community, Guanlan Town, Longhua District, Shenzhen, China
Test specification	
Standard..... :	EN 60598-1: 2008+A11: 2009; EN 62471: 2008; EN 62493: 2010; EN 62031: 2008+A1: 2013; EN 61347-1: 2008+A1: 2011+A2: 2013; EN 61347-2-13: 2006
Test procedure ..... :	Compliance with EN 60598-1: 2008+A11: 2009; EN 62471: 2008; EN 62493: 2010; EN 62031: 2008+A1: 2013; EN 61347-1: 2008+A1: 2011+A2: 2013; EN 61347-2-13: 2006
Non-standard test method ..... :	N/A
Test item Description..... :	T8 LED Tube
Trademark ..... :	QALEDO
Model and/or type reference ..... :	See model list
Rating(s)..... :	100-240V~, 50/60Hz, Max.25W

Test item particulars

Classification of installation and use …….: Class II

Supply Connection ……..…: G13 lamp cap

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.....: February 10, 2014

Date(s) of performance of test.....: February 10, 2014 – February 27, 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.

"(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.

General product information;

1. All models are similar except their power and size. All tests were conducted on model T8-25W-150-ND-W-T00.

2. The laboratory ambient for testing: 22.0-28.0℃, 60%-73%R.H.

3. The test report includes: Attachment No.1: Report of EN 62471.
   Attachment No.2: Report of EN 61347-2-13.
   Attachment No.3: Report of EN 62031.
   Attachment 4: 3 pages report of product photos.

Copy of marking plate

QALEDO

T8 LED Tube
Model: T8-25W-150-ND-W-T00
100-240V~, 50/60Hz, 25W

TEA-Energy China Limited

Made In China

Label of testing

Rubbing for 15 s with a piece of cloth soaked with water. And a further 15 s with a piece of cloth soaked with petroleum.

EN 60598-1			
Clause	Requirement – Test	Result - Remark	Verdict

1.2 (0)	**General test requirements**		**P**
1.2 (0.1)	Information for luminaires design considered	Yes [√] No [ ]	P
1.2 (0.3)	More sections applicable		P

1.4 (2)	**CLASSIFICATION**		**P**
1.4 (2.2)	Type of protection .....:	Class II	P
1.4 (2.3)	Degree of protection .....:	IPX0	P
1.4 (2.4)	Luminaire suitable for direct mounting on normally flammable surfaces ……..:	Fixed luminaries	P
	Luminaire not suitable for direct mounting on normally flammable surfaces ……..:		N
1.4 (2.5)	Luminaire for normal use .....:		P
	Luminaire for rough service .....:		N

1.5 (3)	**MARKING**		**P**
1.5 (3.2)	Markings on luminaires	See marking label	P
	Position of the marking	Under the product	P
	Format of symbols/text	The height of symbols more than 5mm, text more than 2mm	P
1.5 (3.3)	Additional information	See marking label	P
	Language of instructions	In English and Chinese	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		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	Use indoor only	P
1.5 (3.3.11)	Luminaires with remote control	Not such construction	N
1.5 (3.3.12)	Clip-mounted luminaire - warning	Fixed luminaire	N
1.5 (3.3.13)	Specifications of protective shields		N
1.5 (3.3.14)	Symbol for nature of supply	~	P

EN 60598-1			
Clause	Requirement – Test	Result - Remark	Verdict
1.5 (3.3.15)	Rated current of socket outlet	No socket outlet	N
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	No cable was provided	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	All parts can't be replaced.	N
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	No lampholder	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		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 single-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	No ignitors	N
1.6 (4.4.6)	Centre contact	No ignitors	N
1.6 (4.4.7)	Parts in rough service luminaires resistant to tracking	Not for rough service	N

EN 60598-1			
Clause	Requirement – Test	Result - Remark	Verdict
1.6 (4.4.8)	Lamp connectors	No lamp connector	N
1.6 (4.4.9)	Caps and bases correctly used	G13 used	P
1.6 (4.5)	Starter holders	No starter holders	N
	Starter holder in luminaries other than Class II		N
	Starter holder Class II construction		N
1.6 (4.6)	Terminal blocks		N
	Tails		N
	Unsecured blocks		N
1.6 (4.7)	Terminals and supply connections		N
1.6 (4.7.1)	Contact to metal parts		N
1.6 (4.7.2)	Location stranded wires		N
	8 mm test live conductor		N
	8 mm test earth conductor		N
1.6 (4.7.3)	Terminals for supply conductors		N
1.6 (4.7.3.1)	Welded connections		N
	- stranded or solider 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
	- hest test according to 15.9.2.3 and 15.9.2.4		N
1.6 (4.7.4)	Terminals other than supply connection		N
1.6 (4.7.5)	Heat-resistant wiring/sleeves		P
1.6 (4.7.6)	Multi-pole plug	No plug	N
	- test at 30 N		N
1.6 (4.8)	Switches:	No switches	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)	Retainment	Insulation paper used to enclose the ballast	P

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Clause	Requirement – Test	Result - Remark	Verdict
	Method of fixing:		P
1.6 (4.9.2)	Insulated linings and sleeves		P
	Resistant to temperature >20℃ to the wire temperature or		P
	a) & c) Insulation resistance and electric strength	Comply with requirements	P
	b) Ageing test. Temperature (℃).....:		N
1.6 (4.10)	Insulation of Class II luminaires		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	No such parts	N
	Interference suppression capacitors according to IEC 60384-14		N
1.6 (4.10.2)	Assembly gaps:		N
	- not coincidental		N
	- no straight access with test probe		N
1.6 (4.10.3)	Retainment of insulation:		P
	- fixed		P
	- unable to be replaced; luminaire inoperative		N
	- sleeves retained in position		P
	- lining in lampholder		N
1.6 (4.11)	Electrical connections		P
1.6 (4.11.1)	Contact pressure		N
1.6 (4.11.2)	Screws:		P
	- Self-tapping screws		P
	- thread-cutting screws		N
1.6 (4.11.3)	Screw locking:		P
	- 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	No wood	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		P

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Clause	Requirement – Test	Result - Remark	Verdict
	Torque test: torque (Nm); part …….....:	Fix for lamp cap: 1.7mm, 0.4Nm	P
	Torque test: torque (Nm); part …….....:		N
	Torque test: torque (Nm); part …….....:		N
1.6 (4.12.2)	Screw with diameter < 3 mm screw into metal		P
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) .....:		N
	- other parts; energy (Nm) .....:	0.35Nm for enclosure	P
	1) live parts	Inaccessible	P
	2) linings	No linings provided	P
	3) protection		P
	4) covers		N
1.6 (4.13.2)	Metal parts enclosing live parts shall have adequate mechanical strength	No such parts	N
1.6 (4.13.3)	Straight test finger		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	No such device	N
1.6 (4.14.1)	Mechanical load:		P
	A) four times the weight	4x0.338Kg	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

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Clause	Requirement – Test	Result - Remark	Verdict
	metal rod; diameter (mm) .....:		N
1.6 (4.14.2)	Load to flexible cables:		N
	mass (kg) .....:		N
	stress in conductors (N/mm²) .....:		N
	Mass (kg) of semi-luminaires .....:		N
	Bending moment (Nm) of semi-luminaires :		N
1.6 (4.14.3)	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		N
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℃		P
	- spacing ≥ 30 mm		N
	- screen comply with the needle-flame 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		N
	a) construction		N
	b) temperature sensing control		N
	c) surface temperature		N
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:		P
	- spacing 10 mm		P
	- 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

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Clause	Requirement – Test	Result - Remark	Verdict
1.6 (4.16.3)	Design to satisfy the test of 12.6		N
1.6 (4.17)	Drain holes	No drain holes	N
	Clearance at least 5 mm		N
1.6 (4.18)	Resistance to corrosion:		P
1.6 (4.18.1)	- rust-resistance	Anodized with surface	P
1.6 (4.18.2)	- season cracking in copper		P
1.6 (4.18.3)	- corrosion of aluminium	Anodized with surface	P
1.6 (4.19)	Ignitors compatible with ballast	No ignitors used	N
1.6 (4.20)	Rough service vibration .....:	Not 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	Not such appliance	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) .....:	100-240V~	P
	Voltage form	Sinusoidal [√] Non-sinusoidal [ ]	P
	PTI	< 600 [√] ≥ 600 [ ]	P
	Impusle withstand category (normal category II) (category III annex U)	Category II	P
	Rated pulse voltage (kV) .....:	<2.0kV	P
	(1) Current-carrying parts of different polarity: cr (mm); cl (mm) .....:	cl=3.8mm, limit: 1.5mm cr=3.8mm, limit: 2.5mm	P

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Clause	Requirement – Test	Result - Remark	Verdict
	(2) Current-carrying parts and accessible parts:cr (mm); cl (mm) .....:	cl=5.7mm, limit: 3.0mm cr=5.7mm, limit: 5.0mm	P
	(3) Parts becoming live due to breakdown of basic insulation and metal parts: cr (mm); cl (mm) .....:		P
	(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=5.7mm, limit: 3.0mm cr=5.7mm, limit: 5.0mm	P
1.8 (7)	**PROVISION FOR EARTHING**	Class II appliances	**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 marks contact first		N
1.8 (7.2.2 +7.2.3)	Earth continuity in joints etc.		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		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	Class II appliances	N
	Length of earth conductor		N

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Clause	Requirement – Test	Result - Remark	Verdict

1.9 (14)	**SCREW TERMINALS**		**N**
	Separately approved: component list	See annex 1	N
	Part of the luminaire	See annex 3	N

1.9 (15)	**SCREWLESS TERMINALS and electrical connections**		**N**
	Separately approved: component list	See annex 1	N
	Part of the luminaire	See annex 4	N

1.10 (5)	**EXTERNAL AND INTERNAL WIRING**	Only internal wire	**P**
1.10 (5.2)	Supply connection and external wiring		N
1.10 (5.2.1)	Means of connection.....:	G13 lamp cap	P
1.10 (5.2.2)	Type of cable .....:	No such cables	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	No such component	N
1.10 (5.2.9)	Locking of screw bushings	No such component	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	Not such construction	N

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Clause	Requirement – Test	Result - Remark	Verdict
	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 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	No plug	N
	Class III luminaire plug		N
1.10 (5.2.16)	Appliance inlets (IEC 60320)	No appliance inlet	N
	Appliance couplers of class II type		N
1.10 (5.2.17)	No standardized in interconnecting cables assembled	No such parts	N
1.10 (5.2.18)	Used plug in accordance with		N
	- IEC 60083		N
	- other standard		N
1.10 (5.3)	Internal wiring	20AWG	P
1.10 (5.3.1)	Internal wiring of suitable size and type		P
	Through wiring		N

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Clause	Requirement – Test	Result - Remark	Verdict
	- 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
	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		P
1.10 (5.3.1.4)	Conductors without insulation		N
1.10 (5.3.1.5)	SELV current-carrying parts	No such appliance	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		N
	Telescopic tubes etc.		N
	No twisting over 360^0		N
1.10 (5.3.3)	Insulating bushings		P
	- suitable fixed		N
	- material in bushings	Heat shrinkable tubing	P
	- material not likely to deteriorate		N
	- cables with protective sheath		N
1.10 (5.3.4)	Joints and Junctions effectively insulated		N
1.10 (5.3.5)	Strain on internal wiring		N
1.10 (5.3.6)	Wire carriers		N
1.10 (5.3.7)	Wire ends not tinned		N
	Wire ends tinned: no cold flow		N

EN 60598-1			
Clause	Requirement – Test	Result - Remark	Verdict

1.11 (8)	**PROTECTION AGAINST ELECTRIC SHOCK**		P
1.11 (8.2.1)	Live parts not accessible with standard test finger	Live parts enclosed by plastic enclosure and metal enclosure	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 luminaires	N
	Basic insulated parts not accessible with ø50mm probe from outside, within arms reach, on wall-mounted luminaires	Fixed luminaires	N
	Lamp and startholders in portable and adjustable luminaires comply with double or reinforced insulation requirements	Fixed luminaires	N
	Basic insulation only accessible under lamp or starter replacement		N
	Double-ended tungsten filament lamp		N
	Insulation lacquer not reliable		N
	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	Fixed luminaire	N
1.11 (8.2.3 a)	Class II luminaire:		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 appliance	N
1.11 (8.2.3b)	BC lampholder of metal in class I luminaires shall be earthed		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

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Clause	Requirement – Test	Result - Remark	Verdict
	- 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		P
1.11 (8.2.7)	Discharging of capacitors >0,5 µF		N
	Portable plug connected luminaire with capacitor		N
	Discharge device on or within capacitor		N
	Discharge device mounted separately		N
1.12 (12)	**ENDURANCE TEST AND THERMAL TEST**		P
1.12 (12.3)	Endurance test:		P
	- mounting-position .....:	Suitable lamp holder	P
	- test temperature (°C) .....:	35ºC	P
	- total duration (h) .....:	240hrs. Totally 10 cycles, each 24h. Appliance worked as normal	P
	- supply voltage: Un factor; calculated voltage (V) .....:	240Vx1.1	P
	- lamp used	LED lamp	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)		P
1.12 (12.5)	Thermal test (abnormal operation)		P
	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		N

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Clause	Requirement – Test	Result - Remark	Verdict
	1,1 Un		
	- 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
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 ≤ 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 (℃): at 1,1 Un.. :		N
	- measured temperature of fixing point/exposed part (℃): at 1,1Un..... :		N
	- calculated temperature of fixing point/exposed part (℃) .....:		N
	Ball-pressure test:		N
	- part tested; temperature (℃)..... :		N
	- part tested; temperature (℃)..... :		N
1.12 (12.7.1.2)	Luminaire with discharge lamp, fluorescent lamp > 70W, transformer > 10 VA		N
	- case of abnormal conditions		N
	- measured winding temperature (℃): at 1,1 Un.. :		N
	- measured temperature of fixing		N

EN 60598-1			
Clause	Requirement – Test	Result - Remark	Verdict
	point/exposed part (℃): at 1,1 Un..... :		
	- calculated temperature of fixing point/exposed part (℃) .... :		N
	Ball-pressure test:		N
	- part tested; temperature (℃)..... :		N
	- part tested; temperature (℃)..... :		N
1.12 (12.7.1.3)	Luminaire with short circuit proof transformers ≤ 10 VA		N
	- case of abnormal conditions		N
	- 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		N
	- 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 (℃):..... :		N
	Ball-pressure test:		N
	- part tested; temperature (℃)..... :		N
	- part tested; temperature (℃)..... :		N

1.13 (9)	**RESISTANCE TO DUST, SOLID OBJECTS AND MOISTURE**		**P**
1.12 (9.2)	Tests for ingress of dust, solid objects and moisture:		P
	- classification according to IP .....:	IPX0	P
	- mounting position during test .....:		N
	- fixing screws tightened; torque (Nm) .....:		N
	- tests according to clauses .....:		N
	- electric strength		N
	a) no deposit in dust-proof luminaire		N
	b) no talcum in dust-tight luminaire		N
	c) no trace of water on current-carrying parts or SELV parts or where it could become a hazard		N
	d) i) For luminaires without drain holes – no water entry		N

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Clause	Requirement – Test	Result - Remark	Verdict
	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
	h) no damage of protective shield or glass envelope		N
1.13 (9.3)	Humidity test 48h	Relative humidity 93%, temperature 25℃, 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.....:	Class II	N
	Insulation resistance:		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:		--
	- between live parts of different polarity .... :	>100 MΩ, limits: 2 MΩ	P
	- between live parts and mounting surface :	>100 MΩ, limits: 4 MΩ	P
	- between live parts and metal parts..... :	>100 MΩ, limits: 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:		--

EN 60598-1			
Clause	Requirement – Test	Result - Remark	Verdict
	- 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 .... :	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
1.14 (10.3)	Touch current (mA) .....:	0.05mA, limits: 0.7mA	P
1.15 (13)	**RESISTANCE TO HEAT, FIRE AND TRACKING**		P
1.15 (13.2.1)	Ball-pressure test:		P
	- part tested; temperature (°C) .....:	Translucent cover: 75°C, 0.9mm	P
	- part tested; temperature (°C) .....:	Lamp cap: 125°C, 0.8mm	P
	- part tested; temperature (°C) ……....:	PCB: 125°C, 0.9mm	P
	- part tested; temperature (°C) ……....:	Bobbin of T3: 125°C, 1.2mm	P
1.15 (13.3.1)	Needle flame test (10 s):		P
	- part tested .....:	Lamp cap, PCB, Bobbin of T3, no burning	P
	- part tested .....:		N
1.15 (13.3.2)	Glow-wire test (650 °C):		P
	- part tested .....:	Translucent cover, Lamp cap, 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		N
	- terminal block specified		N
	- relevant information provided		N

EN 60598-1			
Clause	Requirement – Test	Result - Remark	Verdict
	- compliance with 4.6, 4.7.1, 4.7.2, 4.10.1, 11.2,12 and 13.2 of Part 1		N
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℃ alt. 750℃ for luminaires in premises open to public or 960℃ for luminaires in emergency exits		N

EMF			
	The tested product also complies to the requirements of EN 62493: 2010		--
	Limit……..0.85	Measured max.:……0.00119	P

Tables

object/part No.	code	manufacturer/trademark	type/model	technical data	standard	mark(s) of conformity
Internal wiring	B	DONGGUAN NISTAR TRANSMITTING TECHNOLOGY CO INC	3239	20AWG, 105℃, 300V	UL758	UL
Translucent enclosure	B	Kingfa Sci & Tech Co Ltd	JH830	V-0, 80°C	UL746	UL
Lamp cap	B	TEIJIN POLYCARBONATE SINGAPORE PTE LTD	LN-2250Z#	V-2, 80℃	--	UL
X-Capacitor (CX1)	B	KEYHOLD ELECTRONICS (SHENZHEN) CO LTD	KCMP	0.15μF,AC300V, X2,40/110/21	EN 60384-14	VDE 40028075
Alternative	D	SHENZHEN SU RONG CAPACITORS CO., LTD	MPX/MKP	0.15μF, AC300V, X2,40/100/21	EN 60384-14	VDE 40008924
Alternative	D	DAIN ELECTRONIC CO LTD	MPX	0.15μF, AC275V, X2,40/110/21	EN 60384-14	VDE 40018798
Y-capacitor (CY1)	B	SHANTOU HIGH-NEW TECHNOLOGY DEVELOPMNT ZONE SONGTIAN ENTERPRISE CO LTD	CD	2200pF, AC400V 25/125/21	IEC/EN 60384-14	VDE 40025754
Alternative	D	Shenzhen Teruixiang Electronic Co, Ltd.	TY	2200pF, AC400V 25/125/21	EN 60384-14	VDE 40023136
Alternative	D	SUCCESS ELECTRONICS CO LTD	SB	2200pF,AC400V 25/125/21	EN 60384-14	VDE 094680
Alternative	D	SUCCESS ELECTRONICS CO LTD	SF	2200pF,AC400V 25/125/21	EN 60384-14	VDE 128291
Alternative	D	Jyh Chung Electronic Co., Ltd.	JD	2200pF,AC400V 25/85/21	EN 60384-14	VDE 137027
VDR (Z1, Z2)	B	SUCCESS ELECTRONICS CO LTD	SVR10D561K	AC350V, 85°C	IEC61051	VDE 123677
Alternative	D	JOYIN CO LTD	10N561K	AC350V, 85°C,	IEC61051	VDE 005937
Alternative	D	SHANTOU HIGH-NEW TECHNOLOGY DEVELOPMNT ZONE SONGTIAN ENTERPRISE CO LTD	STE-10D561K	AC350V, 85°C	IEC61051	VDE 40023049
Alternative	D	BRIGHTKING (SHENZHEN) CO LTD	10D561K	AC 350V, 85°C	IEC61051	VDE 40027827
PCB	B	SHENZHEN DEZHONGXIN CIRCUIT CO LTD	DZX0002G2A	V-0, 130°C	UL 796	UL E353932
Alternative	D	GLOBAL PRECISION CIRCUITS CO LTD	T-1	V-0, 130°C.	UL796	UL E324220

Tables

Alternative	D	SHENZHEN HUIPUSI ELECTRONIC CO LTD	HPS-1	V-0, 130°C.	UL796	UL E330934
Transformer (T3)	B	Shenzhen Ledfriend Optoelectronics Co., Ltd	--	Class B	--	Test in appliance
-Bobbin	B	CHANG CHUN PLASTICS CO LTD	T375J	V-0, 150°C	UL94	UL E59481
Alternative	D	SUMITOMO BAKELITE CO LTD	PM-9820	V-0, 150°C	UL94	UL E41429
-Wire	B	SHEN ZHEN CITY CHENGWEI INDUSTRY CO LTD	2UEW	155°C	---	UL E227475
Alternative	D	SHANTOU SHENGANG ELECTRICAL INDUSTRIAL CO LTD	UEW/155°C	155°C	---	UL E239508
Alternative	D	TAI-I ELECTRIC WIRE & CABLE CO LTD	UEWB	130°C	---	UL E85640
Alternative	D	WA TAI ELECTROTECHNICAL MATERIALS FACTORY LTD	UEW	130°C	---	UL E243939
Alternative	D	SHENZHEN JIAZHENGXIN INDUSTRIAL CO LTD	xUEW@/155	155°C	---	UL E334055
-Insulation tape	B	JINGJIANG YAHUA PRESSURE SENSITIVE GLUE CO LTD	PZ, CT	130ºC	UL 510	UL E165111
Alternative	D	3M COMPANY ELECTRICAL MARKETS DIV (EMD)	1350F-1	130ºC	UL 510	UL E17385
-Varnish	B	HANG CHEUNG PETROCHEMICAL LTD	8562(a)	155ºC	UL 1446	UL E200154
Alternative	D	HONGDATONG INDUSTRY (DONGGUAN) CO LTD CHINA	WE-386	155ºC	UL 224	UL E238459
Fuse (F1)	B	DONGGUAN BETTER ELECTRONIC TECHNOLOGY CO LTD	316	T2A, 350V	IEC 60127-1; IEC 60127-2	VDE
Heat-shrinkable tube	B	SHENZHEN WOER HEAT-SHRINKABLE MATERIAL CO LTD.	RSFR-HPF	125℃, VW-1, 600V	UL224	UL

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

Tables

	ANNEX 2: temperature measurements, thermal tests of Section 12		**P**
	Type reference …….…..:	T8-25W-150-ND-W-T00	P
	Lamp used …….……....:	LED lamp	P
	Lamp control gear used…….....:	--	P
	Mounting position of luminaire……..:	See product manual	P
	Supply wattage (W) …….…….:	25.3W	P
	Supply current (A) ……..…….:	0.109A	P
	Calculated power factor……..:	0.965PF	P
	Table: measured temperatures corrected for ta = 25℃：		P
	- abnormal operating mode…….……..…….:		N
	- test 1: rated voltage……..……...:		N
	- test 2: 1,06 times rated voltage or 1,05 times Rated wattage …….……..…:	240Vacx1.06	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
	Through wiring or looping-in wiring loaded by acurrent of A during the test.....:	--	N

Temperature(℃) of part	Clause 12.4 - normal				Clause 12.5 - abnormal	
	Test 1	Test 2	Test 3	Limits(℃)	Test 4	Limit (℃)
Translucent enclosure	---	32.7	---	85	---	---
Input wire	---	40.1	---	105	---	---
Output wire	---	47.5	---	105	---	---
CX1	---	46.8	---	100	---	---
Z1	---	41.6	---	85	---	---
Z2	---	43.8	---	85	---	---
T1	---	48.9	---	130	---	---
T2	---	50.7	---	130	---	---
L1	---	53.4	---	130	---	---
C1	---	50.6	---	105	---	---
C3	---	55.4	---	105	---	---
CY1	---	56.8	---	125	---	---
Winding of T3	---	65.8	---	110	---	---
Bobbin of T3	---	60.4	---	110	---	---
PCB near T3	---	61.5	---	130	---	---
Lamp cap outside	---	28.6	---	80	---	---
Lamp cap inside	---	32.4	---	Ref.	---	---

Tables

Mounting surface	---	29.3	---	90	---	---
Ambient	---	25.2	---	---	---	---

Tables

	ANNEX 3: screw terminals (part of the luminaire)		**--**
(14)	**SCREW TERMINALS**		**--**
(14.2)	Type of terminal.....:		—
	Rated current (A).....:		—
(14.3.2.1)	One or more conductors		N
(14.3.2.2)	Special preparation		N
(14.3.2.3)	Terminal size		N
	Cross-sectional area (mm²).....:		N
(14.3.3)	Conductor space (mm).....:		N
(14.4)	Mechanical tests		N
(14.4.1)	Minimum distance		N
(14.4.2)	Cannot slip out		N
(14.4.3)	Special preparation		N
(14.4.4)	Nominal diameter of thread (metric ISO thread) .....:		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)		**--**
(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

Tables

(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. 25th cycle (4 samples) ..... :		N
	After ageing, voltage drop (mV) after 50th alt. 100th cycle (4 samples) ..... :		N
(15.7)	Terminals external wiring		N
	Terminal size and rating		N
(15.8.1)	Pull test spring-type terminals (4 samples); pull (N)		N
	Pull test pin or tab terminals (4 samples); pull (N)		N
(15.9)	Contact resistance test		N
	Voltage drop (mV) after 1 h		N

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

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

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

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

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

Tables

	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)										

Attachment No.1

TEST REPORT EN 62471 Photobiological safety of lamps and lamp systems	
Report reference No.....:	See report EN 60598-1
Tested by(name + signature).....:	See report EN 60598-1
Approved by(name + signature)....:	See report EN 60598-1
Date of issue .....:	See report EN 60598-1
Contents.....:	See report EN 60598-1
Testing laboratory	
Name ..... :	See report EN 60598-1
Address..... :	See report EN 60598-1
Testing location .....:	See report EN 60598-1
Client	
Name .....:	See report EN 60598-1
Address .....:	See report EN 60598-1
Manufacturer	
Name .....:	See report EN 60598-1
Address .....:	See report EN 60598-1
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 60598-1
Trademark .....:	See report EN 60598-1
Model and/or type reference.....:	See report EN 60598-1
Rating(s).....:	See report EN 60598-1

EN 62471			
Clause	Requirement - Test	Result - Remark	Verdict
1	SCOPE		P
	More sections applicable	Yes [√] No [ ]	—
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
	$t_{\max} = \frac{30}{E_s}$		N
4.3.2	Near-UV hazard exposure limit for the eye		N

EN 62471			
Clause	Requirement - Test	Result - Remark	Verdict
	For the spectral region 315 nm to 400 nm (UV-A) the total radiant exposure to the eye mshall not exceed 10000 J^{-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, *E*UVA, shall mnot exceed 10 W^{-2}.		N
	$E_{SUV} \bullet t = \sum_{315}^{400} \sum_{t} E_{\lambda}(\lambda,\ t) \bullet \Delta t \bullet \Delta\lambda \leq 1000$ $J \bullet m^{-2}$ (*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, *L*B, shall not exceed the levels defined by:		P
	$L_B \bullet t = \sum_{300}^{700} \sum_{t} L_{\lambda}(\lambda,\ t) \bullet B_{(\lambda)} \bullet \Delta t \bullet \Delta\lambda \leq 10^6$ $J \bullet m^{-2} \bullet sr^{-1}$	(for $t \leq 10^4 s$)	N
	$L_B = \sum_{300}^{700} L_{\lambda} \bullet B_{(\lambda)} \bullet \Delta\lambda \leq 100$ $W \bullet m^{-2} \bullet sr^{-1}$	For t>10^4S	P
4.3.4	Retinal blue light hazard exposure limit - small source		P
	Thus the spectral irradiance at the eye *E*λ, weighted against the blue-light hazard function *B(*λ*)* (see Table 4.2) shall not exceed the levels defined by:		N
	$E_B \bullet t = \sum_{300}^{700} \sum_{t} E_{\lambda}(\lambda,\ t) \bullet B(\lambda) \bullet \Delta t \bullet \Delta\lambda \leq 100$	(for t≥100s)	N
	$E_B = \sum_{300}^{700} E_{\lambda} \bullet B(\lambda) \bullet \Delta\lambda \leq 1$	For t ≤100s	N

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Clause	Requirement - Test	Result - Remark	Verdict
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
	$L_R = \sum_{380}^{1400} L_\lambda \bullet B(\lambda) \bullet \Delta\lambda \le \frac{50000}{\alpha \cdot t^{0.25}}$ J•m^{-2}•sr^{-1}	10us≤t≤10s	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
	$L_{IR} = \sum_{780}^{1400} L_\lambda \bullet B(\lambda) \bullet \Delta\lambda \le \frac{6000}{\alpha}$ J•m^{-2}•sr^{-1}	t>10s	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
	$E_{IR} = \sum_{780}^{3000} E_\lambda \bullet \Delta\lambda \le 1800 \cdot t^{-0.75}$ W•m^{-2}	T≤1000s	N
	For times greater than 1000 s the limit becomes:		N
	$E_{IR} = \sum_{780}^{3000} E_\lambda \bullet \Delta\lambda \le 100$ W•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

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Clause	Requirement - Test	Result - Remark	Verdict
	$E_H \cdot t = \sum_{380}^{3000} \sum_{t} E_\lambda(\lambda,t) \bullet \Delta\lambda \le 20000 \cdot t^{0.25}$		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
	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

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Clause	Requirement - Test	Result - Remark	Verdict
	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 a, the angle subtended ba a source, requires the determination of the 50% emission point of the source	0.188	P
5.2.4	Pulse width measurement for pulsed sources.....		N
	The determination of Δ*t*, 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 obtion intermediate point at the wavelength internals de-sired.	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
	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

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Clause	Requirement - Test	Result - Remark	Verdict
	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 II 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 (*E*UVA) within 1000 s, (about 16 min) nor		N
	--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.		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 (*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 (i.e., less than 10 cd•m^{-2}) and do not pose a near-infrared retinal hazard (*L*IR), 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 (*E*UVA) within 100 s, nor		N

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Clause	Requirement - Test	Result - Remark	Verdict
	--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
	lamps that emit infrared radiation without a strong visual stimulus (i.e., less than 10 cd•m^{-2}) and do not pose a near infrared retinal hazard (*L*IR) 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

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

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Clause	Requirement - Test	Result - Remark	Verdict
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
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

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Clause	Requirement - Test	Result - Remark	Verdict
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
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

EN 62471			
Clause	Requirement - Test	Result - Remark	Verdict
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

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 *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.

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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

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Clause	Requirement - Test	Result - Remark	Verdict

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	$20000/t^{0,75}$

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	$0{,}011 \cdot \sqrt{(t/10)}$ 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 $0{,}011 \cdot \sqrt{(t/10)}$	$50000/(\alpha \cdot t^{0,25})$ $50000/(\alpha \cdot t^{0,25})$
Retinal thermal (weak visual stimulus)	$L_{IR} = \sum L_\lambda \cdot R(\lambda) \cdot \Delta\lambda$	780 – 1400	> 10	0,011	6000/α

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Clause	Requirement - Test	Result - Remark	Verdict

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	$S_{UV}(\lambda)$	Es	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 α < 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 61347-2-13** **Lamp controlgear** **Part 1: General and safety requirements** **Part 2-13: Particular requirements for d.c. or a.c. supplied electronic controlgear for LED modules**
Report Reference No. ..... : See report EN 60598-1 Tested by (name + signature) ..... : See report EN 60598-1 Approved by (name + signature)..... : See report EN 60598-1 Date of issue ..... : See report EN 60598-1 Contents ..... : See report EN 60598-1
Testing laboratory Name ..... : See report EN 60598-1 Address ..... : See report EN 60598-1 Testing location..... .....: See report EN 60598-1
Client Name .....: See report EN 60598-1 Address.....: See report EN 60598-1 **Manufacturer** Name .....: See report EN 60598-1 Address.....: See report EN 60598-1
Test specification Standard..... : EN 61347-2-13: 2006 & EN 61347-1: 2008+A1: 2011+A2: 2013 Test procedure ..... : Compliance with EN 61347-2-13: 2006 & EN 61347-1: 2008+A1: 2011+A2: 2013 Non-standard test method ..... : N/A
Test item Description ..... : See report EN 60598-1 Trademark..... : See report EN 60598-1 Model and/or type reference..... : -- Rating(s) ……..: See report EN 60598-1

Test item particulars

Construction …….....:	Integral control gear
Lamp type …….....:	LED lamp
Operation model ……..……...:	Continuous
Maximum case temperature ……..…:	--
Supply connect ……..:	--
Output voltage ……..……..:	--

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 .....:	See report EN 60598-1
Date(s) of performance of test .....:	See report EN 60598-1

General remarks

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

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

Clause numbers between brackets refer to clauses in EN 61347-1.

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

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

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

General product information

The max. ambient temperature is 25℃.

EN 61347-2-13			
Clause	Requirement – Test	Result – Remark	Verdict

4(4)	**GENERAL REQUIREMENTS**		N
	Compliance of independent controlgear enclosure with EN 60598-1	Integral lamp controlgear	N
	Independent SELV controlgear comply with Annex I		N

6 (6)	CLASSIFICATION		---
	Independent controlgear	Yes☐ No ☒	---
	Built-in controlgear	Yes☐ No ☒	---
	Integral controlgear	Yes☒ No ☐	---
	SELV-equivalent or isolating controlgear	Yes☐ No ☒	---
	Auto-wound controlgear ..... :	Yes☐ No ☒	---
	Independent SELV controlgear	Yes☐ No ☒	---

7	**MARKING**		---
7.1 (7.1)	Mandatory markings:		P
	- mark of origin		P
	- model number, type reference ……..……..:		P
	- symbol for independent controlgear, if applicable		P
	- correlation between interchangeable parts and controlgear marked		P
	- rated supply voltage (V)	100-240V~	P
	- earthing symbol		N
	- wiring diagram		N
	- value of tc		N
	- symbol for declared temperature		N
	Constant voltage type:	Yes☐ No ☐	--
	- rated supply voltage (V) ..... :		N
	Constant current type:	Yes☐ No ☐	--
	- rated output current (A) ..... :		N
	- rated maximum output voltage (V) ..... :		N
	- indication if for LED modules only		N
7.2 (7.1)	- information to be provided, if applicable		---
	- declaration on protection against accidental contact		N

EN 61347-2-13			
Clause	Requirement – Test	Result – Remark	Verdict

	- cross-section of conductors (mm²) :		N
	- number, type and wattage of lamp(s)	LED lamp, 25W	N
	- directly mains-connected windings		N
	SELV-equivalent controlgear		N
- (7.2)	Marking durable and legible		N
	Rubbing 15 s water, 15 s petroleum; marking legible		N

8 (10)	**PROTECTION AGAINST ACCIDENTAL CONTACT WITH LIVE PARTS**		N
- (10.1)	Controlgear protected against accidental contact with live parts	See report EN 60598-1	N
- (A1)	The current flowing between the part concerned and earth is measured and does not exceed 0,7 mA (peak) or 2 mA d.c. ..... :		N
	For frequencies above 1 kHz, the current does not exceed 0,7 mA (peak) multiplied by the value of the frequency in kilohertz or 70 mA (peak) ..... :		N
- (A3)	The voltage between the part concerned and any accessible part is measured and does not exceed 34 V(peak) ..... :		N
- (10.1)	Lacquer or enamel not used for protection or insulation		N
	Adequate mechanical strength on parts providing protection		N
- (10.2)	Capacitors > 0,5 μF: voltage after 1 min (V): < 50V:		N
8.1(-)	SELV-equivalent controlgear accessible parts are insulated from live parts by double or reinforced insulation according 8.6 and 13.1 in IEC 60065		N
8.2(-)	Exposed terminals of SELV or SELV-equivalent controlgear are allowed if: - the rated or maximum output voltage does not exceeding 25 V r.m.s. - the no-load output voltage does not exceed 30 V r.m.s. or 33 √2 V peak		N
	Insulated terminals if rated output voltage >25 V		N

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Clause	Requirement – Test	Result – Remark	Verdict
	One capacitor Y1 or two capacitors Y2 of the same values used in series between SELV or SELV equivalent output and primary circuits - Capacitor complying with EN 60384-14 - Other components bridging the separating transformer complying with EN 60065, clause 14		N
9 (8)	**TERMINALS**		N
	Screw terminals: compliance with Section 14 of EN 60598-1		N
	Screwless terminals: compliance with Section 15 of EN 60598-1		N
10 (9)	**PROVISION FOR EARTHING**		**--**
	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 Ω		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

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Clause	Requirement – Test	Result – Remark	Verdict

11 (11)	**MOISTURE RESISTANCE AND INSULATION**		**---**
	After storage 48 h at 91-95% relative humidity and 20-30℃ measuring of insulation resistance with d.c. 500 V (MΩ):		P
	⩾ 2 MΩ for basic insulation..... :	See report EN 60598-1	P
	⩾ 4 MΩ for double or reinforced insulation ..... :	See report EN 60598-1	P
11(-)	Adequate insulation between input and output terminals not bounded together in SELV-equivalent controlgear		N

12 (12)	**ELECTRIC STRENGTH**		**---**
	Immediately after clause 11 electric strength test for 1 min		P
	Working voltage ≤ 42 V, test voltage 500 V		N
	Working voltage > 42 V, test voltage (V):		P
	Basic insulation, 2U + 1000 V	See report EN 60598-1	P
	Reinforced insulation, test voltage (V): ..... :		N
	No flashover or breakdown	See report EN 60598-1	P
	Windings in separating transformers in SELV equivalent control gear according to 14.3.2 of EN 60065		P

13 (13)	**THERMAL ENDURANCE FOR WINDINGS(Not applicable)**		**---**

14 (14)	**FAULT CONDITIONS**		P
	When operated under fault conditions the controlgear:		P
	- does not emit flames or molten material		P
	- does not produce flammable gases		P
	- protection against accidental contact not impaired		P
	Thermally protected controlgear does not exceed the marked temperature value	Not thermally protected ballasts	P
	Fault conditions: capacitors, resistors or inductors without proof of compliance with relevant specifications have been short-circuited or disconnected	See appended table	P
- (14.1)	Short-circuit of creepage distances and clearances if less than specified in clause 16 in Part 1 (except between live parts and accessible metal parts)		P
	Distances on printed boards provided with coating according to EN 60664-3		N
- (14.2)	Short-circuit or interruption of semiconductor devices	See appended table	P
- (14.3)	Short-circuit across insulation consisting of lacquer, enamel or textile		P

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Clause	Requirement – Test	Result – Remark	Verdict

- (14.4)	Short-circuit across electrolytic capacitors	See appended table	P
- (14.5)	After the tests the insulation resistance with d.c. 500 V (MΩ) are ⩾ 1 MΩ ..... :	>100MΩ	P
	After the tests the accessible parts has not become live		P
	During the tests, a five-layer tissue paper, where the test specimen is wrapped, does not ignite		P
	Temperature declared thermally protected controlgear fulfil the requirements in Annex C		N

15	**Transformer heating**		**---**
	Windings of separating transformer in a SELV equivalent controlgear fulfil the requirements according to 7.1 and 11.2 of IEC 60065	See appended table	P
15.1	Temperatures do not exceed the changed values of the values in column 2 of Table 3 of IEC 60065, in respect to relevant ambient temperature at tc, under normal operation		P
15.2	Temperatures do not exceed the changed values of the values in column 3 of Table 3 of IEC 60065, in respect to relevant ambient temperature at tc, under abnormal conditions of Cl. 16 and fault conditions of Cl. 14		P
	Ambient temperature at tc.....:		N

16	**ABNORMAL CONDITIONS**		P
	Safety not impaired when the controlgear is operated at any voltage between 90% and 110% of rated voltage	1.1x240Vac	P
16.1	Control gear which are of the constant voltage output type:		--
	a) No LED module inserted		N
	b) Double LED modules or equivalent load connected to the output terminals		N
	c) Output terminal short-circuited (20 cm and 200 cm or declared length)		N
	During and at the end of the tests no defect impairing safety, nor any smoke or flammable gases produced		N
16.2	Control gear which are of the constant current output type:		--
	a) No LED module connected		P
	b) Double the LED modules or equivalent load connected in series to the output terminals		P

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Clause	Requirement – Test	Result – Remark	Verdict

	c) Output terminal short-circuited (20 cm and 200 cm or declared length)		P
	Maximum output voltage not exceeded		P
	During and at the end of the tests no defect impairing safety, nor any smoke or flammable gases produced		P

17 (15)	**CONSTRUCTION**		**P**
- (15.1)	Wood, cotton, silk, paper and similar fibrous material not used as insulation		P
- (15.2)	Printed boards used as internal connections complies with clause 14 of EN 61347-1		P
	Socket-outlet in the output circuit does not accept plugs complying with EN 60083 and EN 60906		N
	Not possible to engage plugs accepted by socketoutlet in the output circuit with socket-outlets complying with IEC 60083 and EN 60906		N

18 (16)	**CREEPAGE DISTANCES AND CLEARANCES**		**---**
	Creepage distances and clearances according to Table 3 and 4, as appropriate		P
	Printed boards see clause 14 of EN 61347-1		P
	Insulating lining of metallic enclosures		N

19 (17)	**SCREWS, CURRENT-CARRYING PARTS AND CONNECTIONS**		**---**
	Screws, current-carrying parts and connections in compliance with EN 62560 (clause numbers between parentheses refer to EN 62560)		P
(4.11)	Electrical connections		---
(4.11.1)	Contact pressure		P
(4.11.2)	Screws:		N
	- self-tapping screws		N
	- thread-cutting screws	Not such screws	N
	- at least two self-tapping screws	Not such condition	N
(4.11.3)	Screw locking:		N
	- spring washer		N
	- rivets		N
(4.11.4)	Material of current-carrying parts		P
(4.11.5)	No contact to wood		P

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Clause	Requirement – Test	Result – Remark	Verdict

(4.12)	Mechanical connections and glands		--
(4.12.1)	Mechanical stress		N
	Screws not made of soft metal		N
	Screws of insulating material		N
	Torque test: part; torque (Nm) …….. .:		N
	Torque test: part; torque (Nm) ……...:		N
	Torque test: part; torque (Nm) ……...:		N
(4.12.2)	Screw diameter < 3 mm screwed into metal		N
(4.12.3)	Void		--
(4.12.4)	Locked connections		N
(4.12.5)	Screwed glands: force (N) ..... :	Not applicable	N

20 (18)	**RESISTANCE TO HEAT, FIRE AND TRACKING**		P
20 (18.1)	Parts of insulating material retaining live parts in position, ball-pressure test:		P
	- part; test temperature (℃) ..... ….:	See report EN 60598-1	P
	- part; test temperature (℃) ..... :	See report EN 60598-1	P
	- part; test temperature (℃) ..... :		N
20 (18.2)	Printed boards in accordance with IEC 60249-1, 4.3		P
20 (18.3)	External parts of insulating material preventing electric shock glow-wire test 650 ℃	See report EN 60598-1	P
20 (18.4)	Parts of insulating material retaining live parts in position, needle-flame test 10 s:		P
	- flame extinguished within 30 s	See report EN 60598-1	P
	- no flaming drops igniting tissue paper		N
20 (18.5)	Tracking test		N

21 (19)	**RESISTANCE TO CORROSION**		P
	Rust protection:		P
	- test according 4.18.1 of EN 60598-1		P
	- adequate varnish on the outer surface		P

- 20	**NO-LOAD OUTPUT VOLTAGE**		**P**
	No load output voltage not differ more than 10 % from rated voltage		P
	- test according 4.18.1 of EN 60598-1		P
	- adequate varnish on the outer surface		N

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Clause	Requirement – Test	Result – Remark	Verdict

A	**ANNEX A (NORMATIVE), TEST TO ESTABLISH WHETHER A CONDUCTIVE PART IS A LIVE PART WHICH MAY CAUSE AN ELECTRIC SHOCK**		**P**
A.2	See clause 8 A.2 in this Test Report		P
A.3	See clause 8 A.3 in this Test Report		P

C	**ANNEX C – PARTICULAR REQUIREMENTS FOR ELECTRONIC BALLASTS WITH MEANS OF PROTECTION AGAINST OVERHEATING**		**---**
C3	**GENERAL REQUIREMENTS**		**---**
C3.1	Thermal protection means integral with the controlgear, protected against mechanical damage		N
	Renewable only by means of a tool		N
	If function depending on polarity, for cord-connected equipment protection means in both leads		N
	Thermal links comply with EN 60691		N
	Electrical controls comply with EN 60730-2-3		N
C3.2	No risk of fire by breaking (clause C7)		N

C5	**CLASSIFICATION**		**---**
	a) automatic resetting type		N
	b) manual resetting type		N
	c) non-renewable, non-resetting type		N
	d) renewable, non-resetting type		N
	e) other type of thermal protection; description :		N
C6	**MARKING**		**---**
C6.1	Symbol for temperature declared thermally protected ballasts		N
C6.2	Declaration of the type of protection provided		N
C7	**LIMITATION OF HEATING**		**---**
C7.1	Preselection test		N
	Test sample placed for at least 12 h in an oven having temperature (tc - 5) K		N
	No operation of the protection device		N
C7.2	Functioning of protection means		N
	Normal operation of the sample in a test enclosure according to Annex D at an ambient temperature such that (tc +0; -5) ℃ is obtained		N
	No operation of the protection device		N

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Clause	Requirement – Test	Result – Remark	Verdict

	Introducing of the most onerous test condition determined during test of clause 14		N
	Output of windings connected to the mains supply short-circuited, and other part of the controlgear operated under normal conditions		N
	Increasing of the current through the windings continuously until operation of the protection means		N
	Continuous measuring of the highest surface temperature		N
	Controlgear according to C5 a) or C5 e) operated until stable conditions are achieved		N
	Automatic-resetting thermal protectors working 3 times		N
	Controlgear according to C5 b) working 6 times		N
	Controlgear according to C5 c) and C5) d) working once		N
	Highest temperature does not exceed the marked value		N
	Any overshoot of 10% over the marked value within 15 min		N

D	**ANNEX D – REQUIREMENTS FOR CARRY OUT THE HEATING TESTS OF THERMALLY PROTECTED LAMP CONTROLGEAR**	N
	Tests in C7 performed in accordance with Annex D, if applicable	N

E	**ANNEX E – USE OF CONSTANT S OTHER THAN 4500 IN t_w TESTS**		N
E1	Constant S claimed		N
	Claimed test method		N
E2	Procedure A		N
	Adequate data provided by the manufacturer		N
	The inverse of the slope is greater than or equal to the claimed value of S		N
	Compliance with the failure criteria for procedure B		N
E3	Procedure B		N
	Claimed value of T1		N
	Claimed value of T2		N
	Endurance test carried out at:		N
	T1 (7 samples)		N
	T2 (7 samples)		N

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Clause	Requirement – Test	Result – Remark	Verdict

	Duration of test calculated from equation (2)		N
	T1		N
	T2		N
	During the test: - No open circuit - No breakdown insulation		N
	The claimed constant S is deemed to be verified		N

F	**ANNEX F - DRAUGHT-PROOF ENCLOSURE**		N
	Draught-proof enclosure in accordance with the description		N
	Dimensions of the enclosure		N
	Other design; description		N

I	**ANNEX I - PARTICULAR ADDITIONAL REQUIREMENTS FOR INDEPENDENT SELV D.C. OR A.C. SUPPLIED ELECTRONIC CONTROLGEAR FOR LED MODULES**		N
I.3	Classification	Integral controlgear	---
I.3.1	Class I	YES ☐ NO ☐	---
	Class II	YES ☐ NO ☐	---
I.3.2	a) non-inherently short circuit proof controlgear	YES ☐ NO ☐	---
	b) non-inherently open circuit proof controlgear	YES ☐ NO ☐	---
	c) inherently short circuit proof controlgear	YES ☐ NO ☐	---
	d) inherently open circuit proof controlgear	YES ☐ NO ☐	---
	e) fail safe controlgear	YES ☐ NO ☐	---
	f) non-short-circuit proof controlgear	YES ☐ NO ☐	---
	g) non-open-circuit proof controlgear	YES ☐ NO ☐	---
I.4	Marking		N
	Adequate symbols are used		N
I.5	Protection against electric shock		N
I.5.1	No connection between output winding and body		N
	No connection between output winding and protective earthing circuit		N
I.5.2	Input and output circuits electrically separated from each other		N
I.5.2.1	Insulation between input and output winding of the HF-transformer consists of double or reinforced insulation		N

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Clause	Requirement – Test	Result – Remark	Verdict
	Class II: insulation between input/output and body consists of double or reinforced insulation		N
	Class I: insulation between input and body consists of basic and between output and body supplementary insulation		N
I.5.2.2	Insulation between input and output winding via the core consists of double or reinforced insulation		N
	Insulation between cord and windings of the HF - transformer consists of basic insulation		N
I.5.2.3	Serrated tape, additional layer		N
I.5.2.4	Class I controlgear for fixed connection provided with basic insulation plus protective screening comply with the following conditions:		N
	a) Insulation between the input winding and the protective screen complies with the requirements for basic insulation		N
	b) Insulation between the protective screen and the output winding complies with the requirements for basic insulation		N
	c) Metal screen consists of a metal foil or of a wire wound screen		N
	d) Metal screen so arranged that both edges cannot simultaneously touch a magnetic core		N
	e) Metal screen and its lead-out wire have a crosssection sufficient to ensure that an overload device will open the circuit before the screen is destroyed		N
	f) Lead-out wire sufficiently fixed to the metal screen		N
I.5.2.5	Last turn of each winding of the transformer retained by positive means		N
	Impregnated winding		N
	Winding held together by means of insulating material		N
I.5.3	Components bridging between input and output circuit		N
I.5.3.1	Used capacitors and resistors comply with 8.2		N
I.5.3.2	Used opto-couplers		N
I.6	Heating		---
I.6.1	No excessive temperatures in normal use		N
	Used material classified as Class ____		---

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Clause	Requirement – Test	Result – Remark	Verdict
	Stated value of ta ____		---
I.6.2	Upri: 1.06 time supply rated voltage		---
	Determined temperature rises in windings: - Primary: ____ K - Limit max: ____ K - Core: ____ K - Limit max: ____ K		N
	After the test:		N
	- no connections have worked loose		N
	- no reduction of creepage distances and clearances		N
	- no flow of sealing compound		N
	- no operation of protecting devices		N
	- electric strength test between input and output windings		N
I.6.3	Cycling test (10 cycles):		N
I.6.3.1	- heat run at ____ K		N
I.6.3.2	- moisture treatment 48 h		N
I.6.3.3	- vibration test 1 h; 1,5 g		N
I.6.3.4	After the tests:		N
	- insulation resistance		N
	- dielectric strength test at 35 % of specified value; test voltage ____ V		N
	- Current or the ohmic component does not deviates by more than 30 %		N
I.7	Short-circuit and overload protection		N
I.7.1	Upri: 1.06 times rated voltage or 0.94 and 1.06 times rated supply voltage - used voltage _____ V		N
I.7.2 **I.7.3** **I.7.4**	Determined temperature rise in windings and on other parts:		N
	- test according to Clause _____		N
	- Primary winding ____ K		N
	- Limit max ____ K		N
	- Core ____ K		N

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Clause	Requirement – Test	Result – Remark	Verdict
	- Limit max ____ K		N
	- External enclosure ____ K		N
	- Limit max ____ K		N
	- Rubber insulation of wiring ____ K		N
	- Limit max ____ K		N
	- PVC insulation of wiring ____ K		N
	- Limit max ____ K		N
	- Supports ____ K		N
	- Limit max ____ K		N
I.7.5	Fail-safe convertors		N
I.7.5.1	- Upri: 1.06 times rated supply voltage V:		---
	- Isec: 1.5 times rated output current A:		---
	- time until steady-state conditions t1 (h) :		---
	- time until failure t2 (h): < t1; < 5 h		N
I.7.5.2	During the test:		N
	- no flames, molten material, etc.		N
	- temperature rise of enclosure < 150 K		N
	- temperature rise of plywood support < 100 K		N
	After the test:		N
	- electric strength (test voltage; 35 % of specified value); no flashover or breakdown for primary-tosecondary and for primary-to-body		N
	- live parts not accessible by test finger through holes of enclosure		N
I.8	Insulation resistance and electric strength		N
I.8.1	Conditioned 48 h between 91 % and 95 %		N
I.8.2	Adequate insulation (500 V d.c. for 1 min) between:		N
	Live parts and the body -for basic insulation not less than 2 MΩ ..... :		N
	Live parts and the body -for reinforced insulation not less than 4 MΩ ..... :		N
	Input- and output circuits not less than 5 MΩ ..... :		N
	Metal parts of class II controlgear which are separated from live parts by basic insulation only and the body not less than 5 MΩ ..... :		N

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Clause	Requirement – Test	Result – Remark	Verdict
	Metal foil in contact with the inner and outer surfaces of enclosures of insulating material not less than 2 MΩ ..... :		N
I.8.3	Electric strength test:		N
	1) Between live parts of input circuits and live parts of output circuits.....:		N
	2) Over basic or supplementary insulation between:		N
	a) live parts which are or may become of different polarity ..... :		N
	b) live parts and body if intended to be connected to protective earth ..... :		N
	c) accessible metal parts and a metal rod of the same diameter as the flexible cable or cord ..... :		N
	d) live parts and an intermediate metal part ..... :		N
	e) intermediate metal parts and the body ..... :		N
	3) Over reinforced insulation between the body and live parts ..... :		N
	No flashover or breakdown occurred		N
I.9	Construction		N
I.9.1	Comply with all requirements		N
I.9.2	The distance between input and output terminals shall not be less than 25 mm ..... :		N
I.10	Components		N
I.10.1	Socket-outlets in the output circuit does not accept plugs complying with IEC 60083 and IEC 60906-1		N
I.10.2	Self-resetting protective devices shall not be used unless it is certain that there will be no hazards		N
	Compliance is checked by connecting the controlgear for 48 h at 1.06 times the rated voltage with the output short-circuited		N
I.11	Creepage distances and clearances		N
	1. Insulation between input and output circuits:		N
	a) measured values > specified values (mm) ..... :		N
	b) measured values > specified values (mm) ..... :		N
	c) measured values > specified values (mm) ..... :		N
	2. Insulation between adjacent input circuits: measured values > specified values (mm) ..... :		N
	3. Insulation between terminals for external connection:		N
	a) measured values > specified values (mm) ..... :		N

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Clause	Requirement – Test	Result – Remark	Verdict

	b) measured values > specified values (mm)..... :		N
	c) measured values > specified values (mm) ..... :		N
	4. Basic or supplementary insulation:		N
	a) measured values > specified values (mm) ..... :		N
	b) measured values > specified values (mm) ..... :		N
	c) measured values > specified values (mm) ..... :		N
	5. Reinforced insulation: measured values > specified values (mm) ..... :		N
	6. Distance through insulation:		N
	a) measured values > specified values (mm) ..... :		N
	b) measured values > specified values (mm)..... :		N
	c) measured values > specified values (mm) ..... :		N
	d) measured values > specified values (mm) ..... :		N

14	**TABLE: tests of fault conditions**		P
Part	Simulated fault	Test result	Hazard
D1	s-c	Fuse opened. No hazard.	~~YES~~ /NO
L1	s-c	Fuse opened. No hazard.	~~YES~~ /NO
Q1 (G-D)	s-c	Lamp shut down, Q1 damaged, no flame, no flammable gas, no molten parts, no hazard.	~~YES~~ /NO
Q1 (D-S)	s-c	Lamp shut down, Q1 damaged, no flame, no flammable gas, no molten parts, no hazard.	~~YES~~ /NO
Q1 (G-S)	s-c	The unit shutdown immediately. Recoverable after fault condition removed. No damage, no hazards	~~YES~~ /NO
C3	s-c	Fuse open, no flame, no flammable gas, no molten parts, recoverable, no hazard.	~~YES~~ /NO
C1	s-c	The unit shutdown immediately. Recoverable after fault condition removed. No damage, no hazards	~~YES~~ /NO
Output	s-c	The lamp shut down, recoverable, no hazard.	~~YES~~ /NO
T1 pri. (1-2)	s-c	Fuse open, no flame, no flammable gas, no molten parts, recoverable, no hazard.	~~YES~~ /NO
T1 pri. (3-4)	s-c	Fuse open, no flame, no flammable gas, no molten parts, recoverable, no hazard.	~~YES~~ /NO
T1 secondary	o-l	The temperature rise: T1 winding: 98.6℃	~~YES~~ /NO
D2	s-c	The unit shutdown immediately. Recoverable after fault condition removed. No damage, no hazards	~~YES~~ /NO

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Clause	Requirement – Test	Result – Remark	Verdict

18 (16)	TABLE: creepage distances and clearances					P
	Minimum distances for a.c. (50/60Hz) sinusoidal voltages					
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.						
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.						
- 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							
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							
See report EN 60598-1							

15	TABLE: Transformer heating		P
	Type reference ……..:	See report EN 60598-1	P

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Clause	Requirement – Test	Result – Remark	Verdict

	Lamp used ……..……...:		N
	Lamp control gear used…….....:		N
	Mounting position of luminaire……..……..:		N
	Supply wattage (W) ……..……..……..:		N
	Supply current (A) ……..……..……..:		N
	Calculated power factor……..:		N
	Table: measured temperatures corrected for ta = 25℃：		N
	- abnormal operating mode…….…….…….:		N
	- test 1: rated voltage…….……....:		N
	- test 2: 1.06 times rated voltage or 1,05 times Rated wattage ……..…..…..…..:		N
	- 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
	Through wiring or looping-in wiring loaded by current of A during the test ….....:		N

Temperature(℃) of part	Clause 12.4 – normal				Clause 12.5 – abnormal	
	Test 1	Test 2	Test 3	Limits(℃)	Test 4	Limit (℃)

	ANNEX 3: screw terminals (part of the luminaire)		**N**
(14)	**SCREW TERMINALS**		**--**
(14.2)	Type of terminal ..... :		**--**
	Rated current (A)..... :		**--**
(14.3.2.1)	One or more conductors		N
(14.3.2.2)	Special preparation		N
(14.3.2.3)	Terminal size		N
	Cross-sectional area (mm²) ..... :		N
(14.3.3)	Conductor space (mm) ..... :		N
(14.4)	Mechanical tests		N
(14.4.1)	Minimum distance		N
(14.4.2)	Cannot slip out		N
(14.4.3)	Special preparation		N
(14.4.4)	Nominal diameter of thread (metric ISO thread) :		N
	External wiring		N

EN 61347-2-13			
Clause	Requirement – Test	Result – Remark	Verdict

	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

Attachment No.3

TEST REPORT EN 62031 LED modules for general lighting - Safety specifications	
Report reference No.....:	See report EN 60598-1
Tested by(name + signature).....:	See report EN 60598-1
Approved by(name + signature)....:	See report EN 60598-1
Date of issue .....:	See report EN 60598-1
Contents.....:	See report EN 60598-1
Testing laboratory	
Name ..... :	See report EN 60598-1
Address..... :	See report EN 60598-1
Testing location .....:	See report EN 60598-1
Client	
Name .....:	See report EN 60598-1
Address .....:	See report EN 60598-1
Manufacturer	
Name .....:	See report EN 60598-1
Address .....:	See report EN 60598-1
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.....:	See report EN 60598-1
Trademark .....:	See report EN 60598-1
Model and/or type reference .....:	See report EN 60598-1
Rating(s).....:	See report EN 60598-1

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.		N
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.		P
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℃ to 30℃		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).	See table of page 3	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 tc. 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.	See EN 62471 report	P
	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		---

EN 62031			
Clause	Requirement – Test	Result – Remark	Verdict
	Items a), b), c) and f) of 7.1 shall be marked on the module.		P
	Items d), e), g) and h) of 7.1 shall be marked legible on the module or on the module data sheet.		P
	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		P
	Rubbing 15 s water, 15 s petroleum; marking legible		P

8 (14)	**SCREW TERMINALS**		**N**
	Separately approved: component list		N
	Part of the luminaire		N

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

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 Ω .....:		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

EN 62031			
Clause	Requirement – Test	Result – Remark	Verdict

	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	See report EN 60598-1	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 ≥ 1000 Hz max. 70 mA		N
A2	Voltage at 50 kΩ (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 μF: voltage after 1 min (V): < 50 V		N

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): ≥ 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 ≤ 42 V, test voltage 500 V		N
	Working voltage > 42 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

EN 62031			
Clause	Requirement – Test	Result – Remark	Verdict
13.1	General		P
	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)		N
	Short-circuit or interruption of semiconductor devices		N
	Short-circuit across insulation consisting of lacquer, enamel or textile		N
	Short-circuit across electrolytic capacitors		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
	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

EN 62031			
Clause	Requirement – Test	Result – Remark	Verdict
	After finalising the overpower mode, the module is operated under normal conditions until thermally being stable.		P
	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) .....:	100-240Vac	P
	Voltage form	Sinusoidal [√] Non-sinusoidal [ ]	P
	PTI	< 600 [√] > 600 [ ]	P
	Impulse withstand category (normal category II) (category III annex U)	Normal category II	P
	Rated pulse voltage (kV) .....:		N
	(1) Current-carrying parts of different polarity: cr (mm); cl (mm) .....:	See report EN 60598-1	P
	(2) Current-carrying parts and accessible parts: cr (mm); cl (mm) .....:	See report EN 60598-1	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) .....:	See report EN 60598-1	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	P
17 (4.11.2)	Screws:		N
	- Self-tapping screws		N
	- thread-cutting screws		N
17 (4.11.3)	Screw locking:		N

EN 62031			
Clause	Requirement – Test	Result – Remark	Verdict
	- 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	No screw	N
	Screws of insulating material		N
	Torque test: torque (Nm); part		N
	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:		P
	- part; test temperature (°C)		P
18.2	Printed boards in accordance with IEC 60249-1, 4.3		P
18.3	External parts of insulating material preventing electric shock glow-wire test 650 °C		P
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

Tables

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		
Input Line	Output	>100MΩ	4MΩ

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		
Input Line	Enclosure	2960Vac	No breakdown

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

18 (16)	**TABLE: Clearance And Creep age Distance Measurements**	**P**
See report EN 60598-1		

ATTACHMENT 4

Photo Documentation

View:
Model:
T8-25W-150-ND-W-T00

[X]General
[ ]Front
[ ]Rear
[ ]Internal
[ ]Top
[ ]Bottom
[ ]PWB

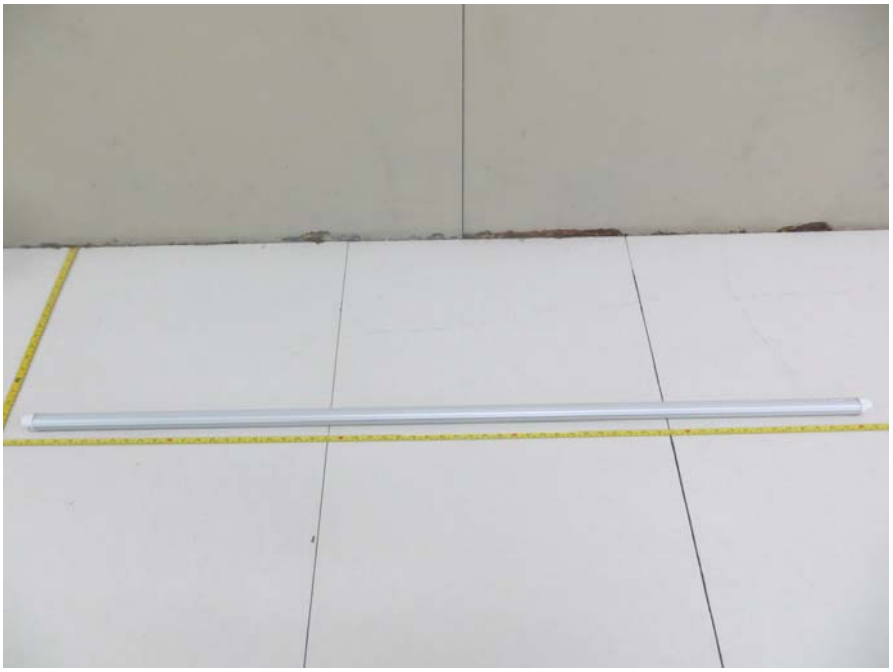

Figure 1

View:

[ ]General
[ ]Front
[ ]Rear
[X]Internal
[ ]Top
[ ]Bottom
[ ]PWB

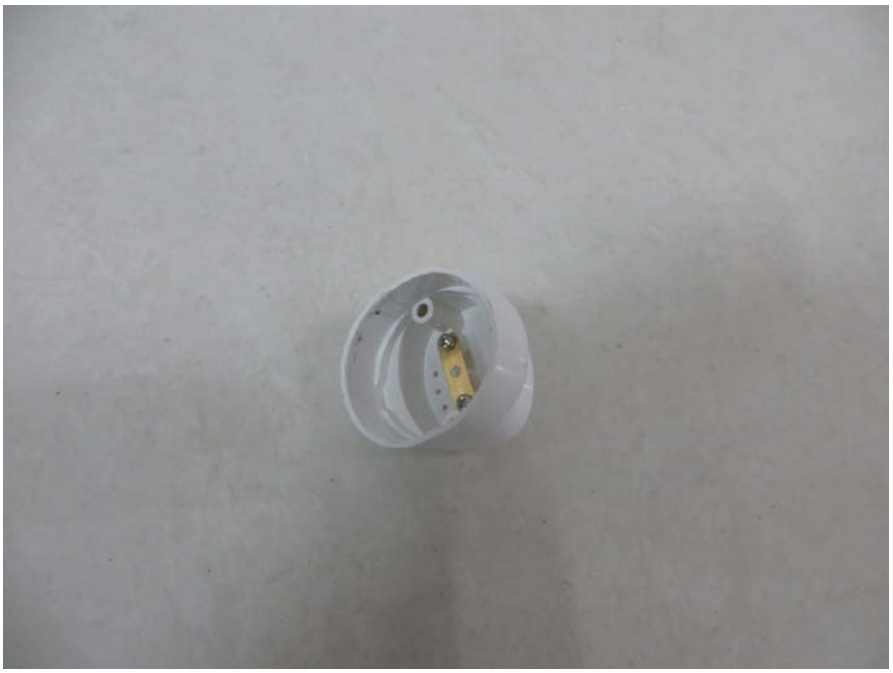

Figure 2

ATTACHMENT 4

Photo Documentation

View:

[ ]General
[ ]Front
[ ]Rear
[X]Internal
[ ]Top
[ ]Bottom
[ ]PWB

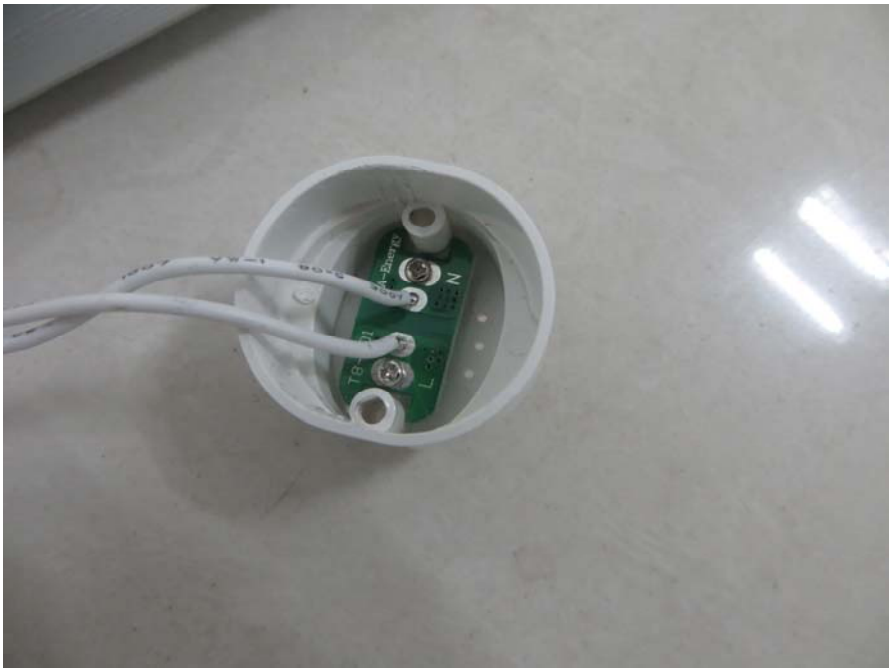

Figure 3

View:

[ ]General
[ ]Front
[ ]Rear
[ ]Internal
[ ]Top
[ ]Bottom
[X]PWB

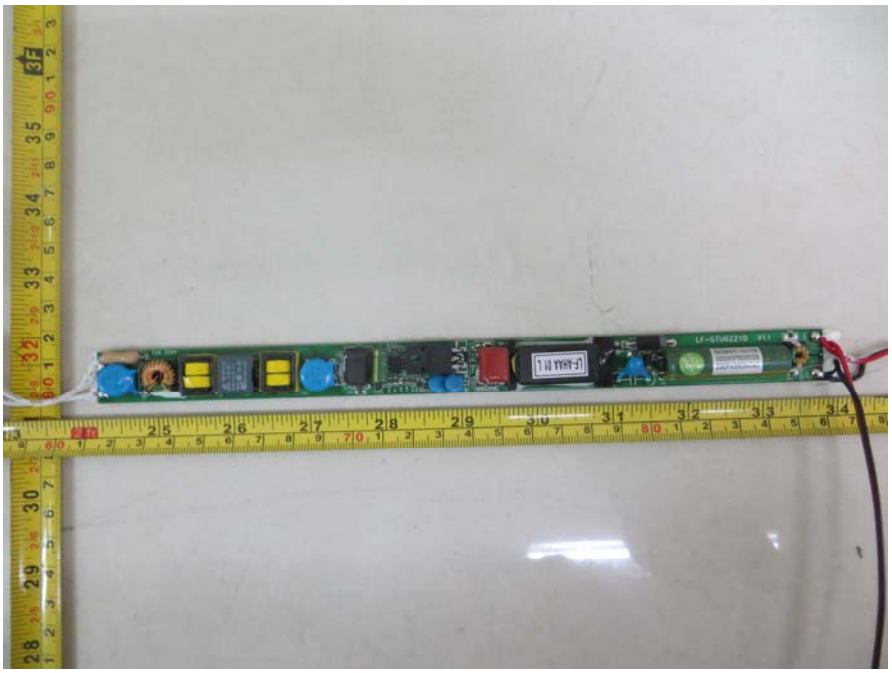

Figure 4

ATTACHMENT 4

Photo Documentation

View:

[ ]General
[ ]Front
[ ]Rear
[ ]Internal
[ ]Top
[ ]Bottom
[X]PWB

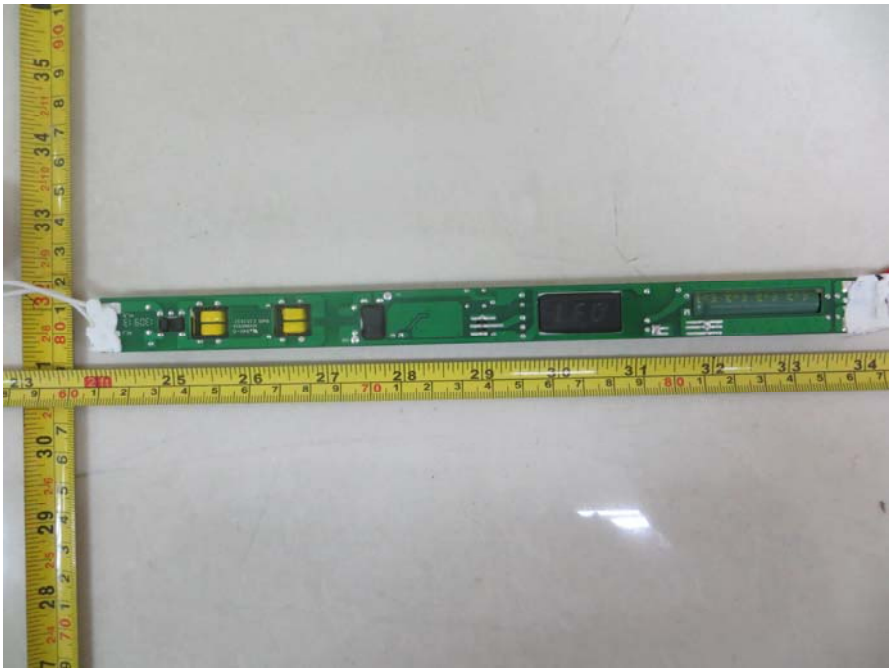

Figure 5