

APPLICATION REPORT

On Behalf of

Global Tech. China Limited

16 Watt MightyLite

Model: 4030WXYZ


Prepared For : **Global Tech. China Limited**
3 Floor, Wai Yip Industrial Building, 171 Wai Yip Street, Kwun Tong,
Kowloon, Hong Kong

Prepared By : **Shenzhen LCS Compliance Testing Laboratory Ltd.**
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Date of Test : **July 24, 2014 – August 11, 2014**

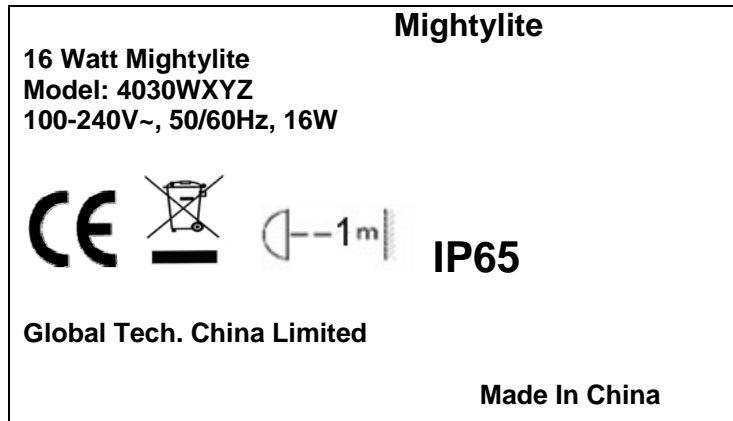
Date of Report : **August 11, 2014**

Report Number : **LCS1408070261S**

TEST REPORT EN 60598-2-5 Luminaires Part 2: Particular requirements Section Five – Floodlights	
Report reference No.	LCS1408070261S
Tested by(name + signature).....	Sara Tang 
Approved by(name + signature)	Hart Qiu 
Date of issue	August 11, 2014
Contents	74 pages
Testing laboratory	
Name	Shenzhen LCS Compliance Testing Laboratory Ltd.
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Testing location	As above
Client	
Name	Global Tech. China Limited
Address.....	3 Floor, Wai Yip Industrial Building, 171 Wai Yip Street, Kwun Tong, Kowloon, Hong Kong
Manufacturer	
Name	Global Tech. China Limited
Address.....	3 Floor, Wai Yip Industrial Building, 171 Wai Yip Street, Kwun Tong, Kowloon, Hong Kong
Test specification	
Standard	EN 60598-2-5: 1998; EN 62471: 2008; EN 62031: 2008+A1: 2013; EN 62493: 2010; EN 61347-2-13: 2006 & EN 61347-1: 2008+A1: 2011+A2: 2013(see also EN 60598-1: 2008+ A11: 2009)
Test procedure	Compliance with EN 60598-2-5: 1998; EN 62471: 2008; EN 62031: 2008+A1: 2013; EN 62493: 2010; EN 61347-2-13: 2006 & EN 61347-1: 2008+A1: 2011+A2: 2013(see also EN 60598-1: 2008+ A11: 2009)
Non-standard test method	N/A
Test item Description	16 Watt MightyLite
Trade Mark	MightyLite
Model and/or type reference.....	4030WXYZ
Rating(s)	100-240V~, 50/60Hz, Max.16W, IP65

<p>Test item particulars</p> <p>Classification of installation and use: Class I</p> <p>Supply Connection: Terminal block</p>
<p>Test case verdicts</p> <p>Test case does not apply to the test object : N(N/A)</p> <p>Test item does meet the requirement: P(Pass)</p> <p>Test item does not meet the requirement ...: F(Fail)</p>
<p>Testing</p> <p>Date of receipt of test item.....: July 24, 2014</p> <p>Date(s) of performance of test.....: July 24, 2014 – August 11, 2014</p>
<p>General remarks</p> <p>This report shall not be reproduced except in full without the written approval of the testing laboratory.</p> <p>The test results presented in this report relate only to the item tested.</p> <p>Clause numbers between brackets refer to clauses in EN 60598-1.</p> <p>"(see remark #)" refers to a remark appended to the report.</p> <p>"(see Annex #)" refers to an annex appended to the report.</p> <p>Throughout this report a comma is used as the decimal separator.</p>
<p>General product information</p> <ol style="list-style-type: none"> 1. All models are similar except their model names, power and appearance. All tests are conducted on model 4030WXYZ. 2. The laboratory ambient for testing: 22.0-28.0°C, 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 No. 4: 4 pages of product photos.

Copy of marking plate



Label of test

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 60598-2-5			
Clause	Requirement - Test	Result - Remark	Verdict
5.2 (0)	General test requirements		P
5.2 (0.1)	Information for luminaires design considered	Yes [<input checked="" type="checkbox"/>] No [<input type="checkbox"/>]	P
5.2 (0.3)	More sections applicable	100-240V	P
5.4 (2)	CLASSIFICATION		P
5.4 (2.2)	Type of protection	Class I	P
5.4 (2.3)	Degree of protection	IP65	P
5.4 (2.4)	Luminaire suitable for direct mounting on normally flammable surfaces	Fixed luminaire	P
	Luminaire not suitable for direct mounting on normally flammable surfaces	No	N
5.4 (2.5)	Luminaire for normal use	Yes	P
	Luminaire for rough service	No	N
5.5 (3)	MARKING		P
5.5 (3.2)	Markings on luminaires	See marking label	P
	Position of the marking	Bottom of the product	P
	Format of symbols/text	The height of symbols more than 5mm, text more than 2mm	P
5.5 (-)	Additional information		P
	Language of instructions	In English	P
	a) Operating position, if not universal.		N
	b) Weight and overall dimensions of the floodlight.		P
	c) Maximum projected area of the floodlight.		P
	d) Range of mounting heights.		P
	e) Suitability for use indoors.		P
5.5 (3.3.1)	Combination luminaires	Not combination luminaire	N
5.5 (3.3.2)	Nominal frequency in Hz	50/60Hz	P
5.5 (3.3.3)	Operating temperature		N
5.5 (3.3.4)	Symbol or warning notice		N
5.5 (3.3.5)	Wiring diagram		N
5.5 (3.3.6)	Special conditions	No such special conditions	N
5.5 (3.3.7)	Metal halid lamp luminaire – warning		N

EN 60598-2-5			
Clause	Requirement - Test	Result - Remark	Verdict
5.5 (3.3.8)	Limitation for semi-luminaires		N
5.5 (3.3.9)	Power factor and supply current		P
5.5 (3.3.10)	Suitability for use indoors		N
5.5 (3.3.11)	Luminaires with remote control	Not such construction	N
5.5 (3.3.12)	Clip-mounted luminaire - warning		N
5.5 (3.3.13)	Specifications of protective shields		P
5.5 (3.3.14)	Symbol for nature of supply	~	P
5.5 (3.3.15)	Rated current of socket outlet	No socket outlet	N
5.5 (3.3.16)	Rough service luminaire	Normal service luminaire	N
5.5 (3.3.17)	Mounting instruction for type Y, Type Z and some type X attachments		N
5.5 (3.3.18)	Non-ordinary luminaires with PVC cable		N
5.5 (3.3.19)	Protective conductor current in instruction if applicable		N
5.5 (3.3.20)	Provided with information if not intended to be mounted within arms reach		N
5.5 (3.4)	Test with water	15s	P
	Test with hexane	15s	P
	Legible after test	Still legible.	P
	Label attached	Still attached.	P

5.6 (4)	CONSTRUCTION		P
5.6 (4.2)	Components replaceable without difficulty	All components can not be replaced	P
5.6 (4.3)	Wireways smooth and free from sharp edges		P
5.6 (4.4)	Lamp holders	No lamp holder	N
5.6 (4.4.1)	Integral lamp holder		N
5.6 (4.4.2)	Wiring connection		N
5.6 (4.4.3)	Lamp holder for end-to-end mounting		N
5.6 (4.4.4)	Positioning		N
	- pressure test (N).....:		N
	After test the lamp holder comply with relevant standard sheets and show no damage		N

EN 60598-2-5			
Clause	Requirement - Test	Result - Remark	Verdict
	After test on singal-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
5.6 (4.4.5)	Peak pulse voltage	No ignitors	N
5.6 (4.4.6)	Centre contact	No ignitors	N
5.6 (4.4.7)	Parts in rough service luminaires resistant to tracking	Not for rough service	N
5.6 (4.4.8)	Lamp connectors	No lamp connector	N
5.6 (4.4.9)	Caps and bases correctly used		N
5.6 (4.5)	Starter holders	No starter holders	N
	Starter holder in luminaries other than Class II		N
	Starter holder Class II construction		N
5.6 (4.6)	Terminal blocks		P
	Tails		P
	Unsecured blocks		N
5.6 (4.7)	Terminals and supply connections		P
5.6 (4.7.1)	Contact to metal parts	Conductor is clamped by metal screw terminal	P
5.6 (4.7.2)	Location stranded wires		P
	8 mm test live conductor	The free wire of a conductor connected to a live terminal do not touch any live part which is accessible or connected to an accessible live part	P
	8 mm test earth conductor		N
5.6 (4.7.3)	Terminals for supply conductors		P
5.6 (4.7.3.1)	Welded connections		N
	- stranded or solider conductor		N
	- spot welding		N
	- welding between wires		N
	- type Z attachment		N

EN 60598-2-5			
Clause	Requirement - Test	Result - Remark	Verdict
	- 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
5.6 (4.7.4)	Terminals other than supply connection		N
5.6 (4.7.5)	Heat-resistant wiring/sleeves		P
5.6 (4.7.6)	Multi-pole plug		N
	- test at 30 N		N
5.6 (4.8)	Switches:	No switches	N
	- adequate rating		N
	- adequate fixing		N
	- polarized supply		N
	- Compliance with 61058-1 for electronic switches		N
5.6 (4.9)	Insulating lining and sleeves		P
5.6 (4.9.1)	Retainment		P
	Method of fixing.....:	Insulation sleeves	P
5.6 (4.9.2)	Insulated linings and sleeves		P
	Resistant to temperature >20°C to the wire temperature or		N
	a) & c) Insulation resistance and electric strength	Comply with requirements	P
	b) Ageing test. Temperature (°C).....:		N
5.6 (4.10)	Insulation of Class II luminaires	Class I appliance	N
5.6 (4.10.1)	No contact, mounting surface - accessible metal parts - wiring of basic insulation		N
	Safe installation fixed luminaires		N
	Capacitors and switches		N
	Interference suppression capacitors according to IEC 60384-14		N
5.6 (4.10.2)	Assembly gaps:		N
	- not coincidental		N
	- no straight access with test probe		N
5.6 (4.10.3)	Retainment of insulation:		N
	- fixed		N
	- unable to be replaced; luminaire inoperative		N
	- sleeves retained in position		N
	- lining in lamp holder		N

EN 60598-2-5			
Clause	Requirement - Test	Result - Remark	Verdict
5.6 (4.11)	Electrical connections		P
5.6 (4.11.1)	Contact pressure		N
5.6 (4.11.2)	Screws:		P
	- Self-tapping screws		P
	- thread-cutting screws		N
5.6 (4.11.3)	Screw locking:		P
	- spring washer		P
	- rivets	No rivet provided	N
5.6 (4.11.4)	Material of current-carrying parts	> 50% copper	P
5.6 (4.11.5)	No contact to wood or mounting surface	No wood	P
5.6 (4.11.6)	Electro-mechanical contact systems	No such construction	N
5.6 (4.12)	Mechanical connections and glands		P
5.6 (4.12.1)	Screw not made of soft metal		P
	Screws of insulating material		N
	Torque test: torque (Nm); part	Fixed enclosure: 3.2mm, 0.6Nm	P
	Torque test: torque (Nm); part	Fix earthing terminal: 3.2mm, 0.6Nm	P
	Torque test: torque (Nm); part		N
5.6 (4.12.2)	Screw with diameter < 3 mm screw into metal		N
5.6 (4.12.4)	Locked connections:		N
	- fixed arms; torque (Nm)		N
	- lampholder; torque (Nm)		N
	- push-button switches; torque (Nm)	No such switches	N
5.6 (4.12.5)	Screwed glands; force (N)		P
5.6 (4.13)	Mechanical strength		P
5.6 (4.13.1)	Impact tests:		P
	- fragile parts; energy (Nm)	0.5Nm for lens	P
	- other parts; energy (Nm)	0.7Nm for plastic enclosure	P
	1) live parts	Inaccessible	P
	2) linings	No linings provided	P
	3) protection	IP65	P
	4) covers	No such covers	N

EN 60598-2-5			
Clause	Requirement - Test	Result - Remark	Verdict
5.6 (4.13.2)	Metal parts enclosing live parts shall have adequate mechanical strength		P
5.6 (4.13.3)	Straight test finger	30N	P
5.6 (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
5.6 (4.13.6)	Tumbling barrel		N
5.6 (4.14)	Suspensions and adjusting devices		P
5.6 (4.14.1)	Mechanical load:		P
	A) four times the weight	4x0.65Kg	P
	B) torque 2.5 Nm		N
	C) bracket arm; force (N)		N
	D) load track-mounted luminaires		N
	E) clip-mounted luminaires, glass-shelve; thickness (mm)		N
	metal rod; diameter (mm)		N
5.6 (4.14.2)	Load to flexible cables:		N
	mass (kg)		N
	stress in conductors (N/mm ²)		N
	Mass (kg) of semi-luminaires		N
	Bending moment (Nm) of semi-luminaires :		N
5.6 (4.14.3)	Adjusting devices:		P
	- flexing test; number of cycles		P
	- strands broken		P
	- electric strength test afterwards		P
5.6 (4.14.4)	Telescopic tubes: cords not fixed to tube; no strain on conductors	No such tubes	N
5.6 (4.14.5)	Guide pulleys	No such construction	N
5.6 (4.14.6)	Strain on socket-outlets	Not such unit	N
5.6 (4.15)	Flammable materials:	Terminal block	P
	- glow-wire test 650°C	Plastic enclosure	P

EN 60598-2-5			
Clause	Requirement - Test	Result - Remark	Verdict
	- spacing \geq 30 mm		P
	- screen withstanding test of 13.3.1		N
	- screen dimensions		N
	- no fiercely burning material		N
	- thermal protection		N
	- electronic circuits exempted		N
5.6 (4.15.2)	Luminaires made of thermoplastic material		N
	a) construction		N
	b) temperature sensing control		N
	c) surface temperature		N
5.6 (4.16)	Luminaires for mounting on normally flammable surfaces		P
	No lamp control gear		N
5.6 (4.16.1)	Lamp control gear shall spacing:		P
	- spacing 10 mm		N
	- spacing 35 mm		P
5.6 (4.16.2)	Thermal protection:		N
	- in lamp control gear		N
	- external		N
	- fixed position		N
	- temperature marked lamp control gear		N
5.6 (4.16.3)	Design to satisfy the test of 12.6		P
5.6 (4.17)	Drain holes	No drain holes	N
	Clearance at least 5 mm		N
5.6 (4.18)	Resistance to corrosion:		P
5.6 (4.18.1)	- rust-resistance	Painted with rust-resistance material	P
5.6 (4.18.2)	- season cracking in copper		N
5.6 (4.18.3)	- corrosion of aluminium	No aluminium used	N
5.6 (4.19)	Ignitors compatible with ballast	No ignitors used	N
5.6 (4.20)	Rough service vibration	Not such appliance	N
5.6 (4.21)	Protective shield		N
5.6 (4.21.1)	Shield fitted		N
	Shield of glass if tungsten halogen lamps		N

EN 60598-2-5			
Clause	Requirement - Test	Result - Remark	Verdict
5.6 (4.21.2)	Particles from a shattering lamp not impair safety		N
5.6 (4.21.3)	No direct path		N
5.6 (4.21.4)	Impact test on shield		N
	Glow-wire test on lamp compartment		N
5.6 (4.22)	Attachments to lamps	No such attachments	N
5.6 (4.23)	Semi-luminaires comply with Class II	Not such appliance	N
5.6 (4.24)	UV radiation for tungsten halogen lamps and metal halide lamps (Annex P)	No such appliance	N
5.6 (4.25)	No sharp point edges	No sharp points or edges	P
5.6 (4.26)	Short-circuit protection		N
5.6 (4.26.1)	Uninsulated accessible SELV parts		N
5.6 (4.26.2)	Short circuit test		N
5.6 (4.26.3)	Test chain according to figure 29		N
5.6.1(-)	Floodlights for use outdoors shall have protection against the ingress of moisture at least equivalent to IPX3.	IP65	P
5.6.2(-)	Lampholder brackets and lamp supports where used shall withstand normal usage throughout the life of the floodlight. They shall accept and retain lamps which are within the dimensional tolerances stated in the appropriate IEC publication where applicable, and locate the lamp or lamps in the designed relationship to the optical control devices in the floodlight.		P
5.6.3(-)	When provision is made for alternative sizes of lamps or light centre positions, the adjusting means shall be positive and firmly retained in the selected position.		N
5.6.4(-)	Refractors, reflectors or any other light controlling components shall be so marked or constructed that they can be fitted or replaced only in the correct relationship to the light source.		N
5.6.5(-)	The means for attaching the floodlight to its support shall be appropriate to the weight of the floodlight.	Mounting earth surface	N
	For floodlights for use above ground level outdoors, the connection shall withstand wind speeds of 150 km/h on the projected surface of the floodlight assembly without undue deflection.		N
	Parts of floodlights for mounting heights 3 m or higher which are fixed other than with at least two devices,		N

EN 60598-2-5			
Clause	Requirement - Test	Result - Remark	Verdict
5.6.6(-)	Where means for angular adjustment are provided, there shall be provision for positive locking after any such adjustments have been effected.		P
5.6.7(-)	Floodlights for use outdoors shall be resistant to the vibrations which may occur during normal use.		P
5.6.8(-)	Glass covers shall either consist of a glass that fractures into small pieces, or shall be provided with a guard of sufficiently small mesh or the use of a film-coated glass that retains glass fragments.		P

5.7 (11)	CREEPAGE DISTANCES AND CLEARANCES		P
	Working voltage (V)	100-240V~	P
	Voltage form	Sinusoidal [<input checked="" type="checkbox"/>] Non-sinusoidal [<input type="checkbox"/>]	P
	PTI	< 600 [<input checked="" type="checkbox"/>] ≥ 600 [<input type="checkbox"/>]	P
	Impulse 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=3.5mm,limit: 1.5mm cr=3.5mm, limit: 2.5mm	P
	(2) Current-carrying parts and accessible parts: cr (mm); cl (mm)	cl=6.5mm,limit: 1.5mm cr=6.5mm, limit: 2.5mm	P
	(3) Parts becoming live due to breakdown of basic insulation and metal parts: cr (mm); cl (mm)		N
	(4) Outer surface of cable where it is clamp and metal parts: cr (mm); cl (mm)		N
	(5)not used		N
	(6) Current-carrying parts and supporting surface: cr (mm); cl (mm)	cl=6.5mm,limit: 1.5mm cr=6.5mm, limit: 2.5mm	P

5.8 (7)	PROVISION FOR EARTHING		P
5.8 (7.2.1 + 7.2.3)	Accessible Metal parts		P
	metal parts in contact with supporting surface		P
	Resistance < 0.5Ω	0.08Ω	P
	Self-tapping screws used		P

EN 60598-2-5			
Clause	Requirement - Test	Result - Remark	Verdict
	Thread-forming screws		N
	Thread-forming screws used in a groove		N
	Earth makes contact first		P
5.8 (7.2.2 +7.2.3)	Earth continuity in joints etc.		N
5.8 (7.2.4)	Locking of clamping means		P
	Compliance with 4.7.3		P
	Terminal blocks with integrated screwless earthing contacts tested according Annex V		N
5.8 (7.2.5)	Earth terminal integral part of Connector socket		N
5.8 (7.2.6)	Earth terminal adjacent to mains terminals		P
5.8 (7.2.7)	Electrolytic Corrosion of the earth terminal		P
5.8 (7.2.8)	Material of earth terminal		P
	Contact surface bare metal		P
5.8 (7.2.10)	Class II luminaire for looping-in		N
	Double or reinforced insulation to functional earth		N
5.8 (7.2.11)	Earthing core coloured green-yellow		P
	Length of earth conductor		N
5.9 (14)	SCREW TERMINALS		P
	Separately approved: component list	See annex 3	P
	Part of the luminaire	See annex 3	P
5.9 (15)	SCREWLESS TERMINALS		--
	Separately approved: component list		N
	Part of the luminaire		N
5.10 (5)	EXTERNAL AND INTERNAL WIRING		P
5.10 (5.2)	Supply connection and external wiring		P
5.10 (5.2.1)	Means of connection.....:	Terminal block	P
5.10 (5.2.2)	Type of cable		N
	Nominal cross-section area (mm ²)		N
	Cables equal to IEC 60227 and IEC 60245		N
5.10 (5.2.3)	Type of attachment, X ,Y or Z		N

EN 60598-2-5			
Clause	Requirement - Test	Result - Remark	Verdict
5.10 (5.2.5)	Type Z not connected to screws		N
5.10 (5.2.6)	Cable entries		N
	- suitable for introduction		N
	- adequate degree of protection		N
5.10 (5.2.7)	Cable entries through rigid material have rounded edges		N
5.10 (5.2.8)	Insulating bushings:		N
	- suitably fixed		N
	- material in bushings		N
	- material not likely to deteriorate		N
	- tubes or guard made of insulating material		N
5.10 (5.2.9)	Locking of screw bushings		N
5.10 (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
5.10 (5.2.10.1)	Cord anchorage for type X attachment cord		N
	a) at least one part fixed		N
	b) types of cable		N
	c) no damaging of the cable		N
	d) whole cable can be mounted		N
	e) no touching of clamping screws		N
	f) metal screw not directly on cable		N
	g) replacement without special tool		N
	Glands not used as anchorage		N
	Labyrinth type anchorage		N
5.10 (5.2.10.2)	Adequate cord anchorages for type Y and type Z attachments		N
5.10 (5.2.10.3)	Tests:		N
	- impossible to push cable; unsafe		N
	- pull test: 25 times; pull (N)		N

EN 60598-2-5			
Clause	Requirement - Test	Result - Remark	Verdict
	- torque test: torque (Nm)		N
	- displacement ≤ 2 mm		N
	- no movement of conductors		N
	- no damage of cable or cord		N
5.10 (5.2.11)	External wiring passing into luminaire		N
5.10 (5.2.12)	Looping-in terminals	Not looping-in appliance	N
5.10 (5.2.13)	Wire ends not tinned		N
	Wire ends tinned: no cold flow		N
5.10 (5.2.14)	Mains plug same protection		N
	Class III luminaire plug		N
5.10 (5.2.16)	Appliance inlets (IEC 60320)	No appliance inlet	N
	Appliance couplers of class II type		N
5.10 (5.2.17)	No standardized in interconnecting cables assembled		N
5.10 (5.2.18)	Used plug in accordance with		N
	- IEC 60083		N
	- other standard		N
5.10 (5.3)	Internal wiring		P
5.10 (5.3.1)	Internal wiring of suitable size and type	20AWG	P
	Through wiring	>0.6mm	N
	- not delivered/ mounting instruction		N
	- factory assembled		N
	- socket outlet loaded (A).....:		N
	- temperatures.....:		N
	Green-yellow for earth only		P
5.10 (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
5.10 (5.3.1.2)	Internal wiring connected to fixed wiring via internal current-limited device		P
	Adequate cross-section area and insulation thickness		P
5.10 (5.3.1.3)	Double or reinforced insulation for class II	Class I appliance	N

EN 60598-2-5			
Clause	Requirement - Test	Result - Remark	Verdict
5.10 (5.3.1.4)	Conductors without insulation		N
5.10 (5.3.1.5)	SELV current-carrying parts		N
5.10 (5.3.1.6)	Insulation thickness other than PVC or rubber		N
5.10 (5.3.2)	Sharp edges etc.		P
	No moving parts of switches etc.		N
	Joints, raising/lowering devices		P
	Telescopic tubes etc.		N
	No twisting over 360 ⁰		P
5.10 (5.3.3)	Insulating bushings		N
	- suitable fixed		N
	- material in bushings		N
	- material not likely to deteriorate		N
	- cables with protective sheath		N
5.10 (5.3.4)	Joints and Junctions effectively insulated		N
5.10 (5.3.5)	Strain on internal wiring		P
5.10 (5.3.6)	Wire carriers		N
5.10 (5.3.7)	Wire ends not tinned		P
	Wire ends tinned: no cold flow		N
5.11 (8)	PROTECTION AGAINST ELECTRIC SHOCK		P
5.11 (8.2.1)	Live parts not accessible with standard test finger		P
	Basic insulated parts not used on the outer surface without appropriate protection		P
	Basic insulated parts not accessible with standard test finger on portable and adjustable luminaires		N
	Basic insulated parts not accessible with ø50mm probe from outside, within arms reach, on wall-mounted luminaires		N
	Lamp and starholders in portable and adjustable luminaires comply with double or reinforced insulation requirements		N
	Basic insulation only accessible under lamp or starter replacement		N
	Double-ended tungsten filament lamp		N
	Insulation lacquer not reliable		N

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Clause	Requirement - Test	Result - Remark	Verdict
	Double-ended high pressure discharge lamp		N
	Relevant warning according to 3.2.18 fitted to the luminaire		N
5.11 (8.2.2)	Portable luminaire adjusted in most unfavourable position	Fixed luminaire	N
5.11 (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		P
5.11 (8.2.3b)	BC lampholder of metal in class I luminaires shall be earthed		N
5.11 (8.2.3c)	Class III luminaires with expose SELV parts:		N
	Ordinary luminaire :		N
	- touch current		N
	- no-load voltage		N
	- other than ordinary luminaire:		N
	- nominal voltage		N
5.11 (8.2.4)	Portable luminaire:		N
	- protection independent of supporting surface		N
	- terminal block completely covered		N
5.11 (8.2.5)	Compliance with the standard test finger or relevant probe		N
5.11 (8.2.6)	Covers reliably secured	Cover not removable without tool	P
5.11 (8.2.7)	Discharging of capacitors >0.5 μ F		N
	Portable plug connected luminaire with capacitor		N
	Discharge device on or within capacitor		P
	Discharge device mounted separately		N
5.12 (12)	ENDURANCE TEST AND THERMAL TEST		P
5.12 (12.3)	Endurance test:		P
	- mounting-position	In draught-proof enclosure	P

EN 60598-2-5			
Clause	Requirement - Test	Result - Remark	Verdict
	- test temperature (°C)	35°C	P
	- total duration (h)	240hrs. Totally 10 cycles, each 24h, the first 9 cycles in normal operation, the 10th cycle in abnormal operation	P
	- supply voltage: Un factor; calculated voltage (V)	240Vx1.1	P
	- lamp used	LED lamp	P
5.12 (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
5.12 (12.4)	Thermal test (normal operation)		P
5.12 (12.5)	Thermal test (abnormal operation)		P
	Short-circuit of starter contacts		P
	Lamps removed and not replaced		P
5.12 (12.6)	Thermal test (failed lamp control gear condition):		N
5.12 (12.6.1)	Through wiring or looping-in wiring loaded by a current of (A)		N
	- case of abnormal conditions	No electronic circuit	N
	- electronic ballast		N
	- measured winding temperature (°C): at 1.1 Un		N
	- measured mounting surface temperature (°C): at 1,1 Un		N
	- calculated mounting surface temperature(°C)		N
	- track-mounted luminaires		N
5.12 (12.6.2)	Temperature sensing control:		N
	- manual reset cut-out		N
	- auto reset cut-out		N
	- track-mounted luminaires		N
5.12 (12.7)	Thermal test (failed ballast or transformer in plastic luminaires):		N
5.12 (12.7.1)	Luminaire without temperature sensing control		N

EN 60598-2-5			
Clause	Requirement - Test	Result - Remark	Verdict
5.12 (12.7.1.1)	Luminaire with fluorescent lamp $\leq 70W$		N
	Test method 12.7.1.1 or Annex V		N
	Test according to 12.7.1.1:		N
	- case of abnormal conditions		N
	- Ballast failure at supply voltage (V)		N
	- Components retained in place after the test		N
	- Test with standard test finger after the test		N
	Test according to Annex V:		N
	- case of abnormal conditions		N
	- measured winding temperature ($^{\circ}C$): at 1.1 Un..... :		N
	- measured temperature of fixing point/exposed part ($^{\circ}C$): at 1.1Un..... :		N
	- calculated temperature of fixing point/exposed part ($^{\circ}C$):		N
	Ball-pressure test:		N
	- part tested; temperature ($^{\circ}C$)..... :		N
	- part tested; temperature ($^{\circ}C$)..... :		N
5.12 (12.7.1.2)	Luminaire with discharge lamp, fluorescent lamp $> 70W$, transformer $> 10 VA$		N
	- case of abnormal conditions		N
	- measured winding temperature ($^{\circ}C$): at 1.1 Un..... :		N
	- measured temperature of fixing point/exposed part ($^{\circ}C$): at 1.1 Un..... :		N
	- calculated temperature of fixing point/exposed part ($^{\circ}C$):		N
	Ball-pressure test:		N
	- part tested; temperature ($^{\circ}C$)..... :		N
	- part tested; temperature ($^{\circ}C$)..... :		N
5.12 (12.7.1.3)	Luminaire with short circuit proof transformers $\leq 10 VA$		N
	- case of abnormal conditions		N
	- Components retained in place after the test		N
	- Test with standard test finger after the test		N

EN 60598-2-5			
Clause	Requirement - Test	Result - Remark	Verdict
5.12 (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 (°C):..... :		N
	Ball-pressure test:		N
	- part tested; temperature (°C)..... :		N
	- part tested; temperature (°C)..... :		N
5.12.1	When applying the limits in the tables 12-1 to 12-6 of section 12 of IEC 60598-1 to floodlights for use outdoors, 10 °C shall be deducted from the temperatures measured on the floodlight in the test enclosure to allow for the effects of natural air movement which occur in the working environment of the floodlight.		P

5.13 (9)	RESISTANCE TO DUST, SOLID OBJECTS AND MOISTURE		P
5.13 (9.2)	Tests for ingress of dust, solid objects and moisture:		P
	- classification according to IP: IP65		P
	- mounting position during test:		P
	- fixing screws tightened; torque (Nm)		P
	- tests according to clauses:		P
	- electric strength		P
	a) no deposit in dust-proof luminaire		N
	b) no talcum in dust-tight luminaire		P
	c) no trace of water on current-carrying parts or SELV parts or where it could become a hazard		P
	d) i) For luminaires without drain holes – no water entry		P
	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)		N
	f) no entry into enclosure (IP 3X and IP 4X)		N
	f) no contact with live parts (IP3X and IP4X)		N

EN 60598-2-5			
Clause	Requirement - Test	Result - Remark	Verdict
	g) no trace of water on part of lamp requiring protection from splashing water		N
	h) no damage of protective shield or glass envelope		P
5.13 (9.3)	Humidity test 48h	Relative humidity 93%, temperature 25°C, 48h, followed by electric strength test	P

5.14 (10)	INSULATION RESISTANCE AND ELECTRIC STRENGTH		P
5.14 (10.2.1)	Insulation resistance test:		P
	Cable or cord covered by metal foil or replaced by a metal rod of mm Ø	Class I	P
	Insulation resistance:		P
	SELV:		N
	- between current-carrying parts of different polarity.....		N
	- between current-carrying parts and mounting surface		N
	- between current-carrying parts and metal parts of the luminaire		N
	Other than SELV:		P
	- between live parts of different polarity	> 100MΩ, limit: 2MΩ	P
	- between live parts and mounting surface :	> 100MΩ, limit: 2MΩ	P
	- between live parts and metal parts.....	> 100MΩ, limit: 2MΩ	P
	- between live parts of different polarity through action of a switch		N
5.14 (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:		N
	- between current-carrying parts of different polarity.....		N
	- between current-carrying parts and mounting surface		N
	- between current-carrying parts and metal parts of the luminaire		N
	Other than SELV:		P
	- between live parts of different polarity	1480Vac, 1min, no breakdown	P
	- between live parts and mounting surface :	1480Vac, 1min, no breakdown	P

EN 60598-2-5			
Clause	Requirement - Test	Result - Remark	Verdict
	- between live parts and metal parts..... :	1480Vac, 1min, no breakdown	P
5.14 (10.3)	Touch current (mA)	0.08mA<3.5mA	P
5.15 (13)	RESISTANCE TO HEAT, FIRE AND TRACKING		P
5.15 (13.2.1)	Ball-pressure test:		P
	- part tested; temperature (°C)	Enclosure, 75°C, 0.5mm	P
	- part tested; temperature (°C)	Terminal block, 125°C, 0.6mm; PCB, 125°C, 0.8mm	P
	- part tested; temperature (°C)	Bobbin of transformer, 125°C, 0.8mm; Connector, 125°C, 0.6mm	N
5.15 (13.3.1)	Needle flame test (10 s):		P
	- part tested	PCB, Bobbin of transformer, Terminal block, connector, no burning	P
	- part tested		N
5.15 (13.3.2)	Glow-wire test (650 °C):		P
	- part tested	Enclosure, PCB, Bobbin of transformer, Terminal block, connector, no burning	P
	- part tested		N
5.15 (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
	- 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

EN 60598-2-5			
Clause	Requirement - Test	Result - Remark	Verdict

	IT: warning label on Class 0 luminaire		N
(4.5.1)	DK: socket-outlets		N
(5.2.1)	CY, DK, FI, SE, GB: type of plug		N

ZC	ANNEX ZC, NATIONAL DEVIATIONS (EN)		N
(4&5)	FR: Shuttered socket-outlets 10/16A		N
(13.3)	GB: Requirements according to United Kingdom Building Regulation		N
(13.3.2)	FR: Glow-wire test 850°C alt. 750°C for luminaires in premises open to public or 960°C for luminaires in emergency exits		N

EMF			
	The tested product also complies to the requirements of EN 62493: 2010		--
	Limit.....0.85	Measured max.:.....0.0017	P

Tables

	ANNEX 1: components					P
object/part No.	Code	manufacturer/trademark	type/model	technical data	standard	mark(s) of conformity
Internal wire	B	LEE YUEN ELECTRICAL MFY LTD	1015	20AWG, 105°C, 600V	UL 758	UL
Transformer T1	B	LYGO ELECTRONIC PRODUCTS MFY	--	Class B	--	Test with appliance
-Bobbin	B	CHANG CHUN PLASTICS CO LTD	T375J	PMC, V-0, 150°C	UL 94	UL E59481
-Insulation tape	B	3M COMPANY ELECTRICAL MARKETS DIV (EMD)	1350	130°C	UL 510	UL E17385
-Winding	B	TAI-I ELECTRIC WIRE & CABLE CO LTD	UEW	130°C	UL 2353	UL E85640
-Triple Winding	B	DAH JIN TECHNOLOGY CO LTD	TLW-B	130°C	UL 2353	UL E236542
-Insulating tube	B	DONGGUAN QUANTAI INDUSTRIAL CO LTD	T-2	600V, 125°C	UL 224	UL E227336
-Varnish	B	JOHN C DOLPH CO	BC-359	155°C	UL 1446	UL E317427
Fuse	B	WALTER ELECTRONIC CO., LTD.	2010	T2.5A250V	IEC 60127-2	VDE 40018781
Inductor LF1	B	LYGO ELECTRONIC PRODUCTS MFY	--	Min.20mH	--	Test with appliance
-Winding	B	SHENZHEN CHENGWEI INDUSTRY CO LTD	2UEW	130°C	UL 1446	UL E227475
-Bobbin	B	CHANG CHUN PLASTICS CO LTD	T375J	PMC, V-0, 150°C	UL 94	UL E59481
PCB	B	DONGGUAN HUATUO ELECTRONIC CO LTD	YK-03	V-0, 130°C	UL 796	UL E234403
Terminal block	B	HONGSHANG PLASTICS ELECTRON CO LTD	CE 1	2.6mm, 300VAC, 24A 0.75mm ²	UL 486	UL E324556
RV1	B	GUANGXI NEW FUTURE INFORMATION INDUSTRY CO., LTD.	05D	130°C, 350V, 470pF	IEC 61051-1; IEC 61051-2; IEC 61051-2-2	VDE 40030322
Enclosure	B	HUIZHOU WOTE ADVANCED MATERIALS CO LTD	2000	V-0, 95°C	UL 746D	UL E310240

Tables

Y-capacitor	B	SHANTOU HIGH- NEW TECHNOLOGY DEV. ZONE SONGTIAN ENTERPRISE CO., LTD.	CE Series	Max.2200 pF, 250V~	IEC 60384-14	VDE 40025748
X-capacitor (CX1, CX2)	B	TENTA ELECTRIC INDUSTRIAL CO. LTD.	MEX	AC 275 V, 0.047uF	IEC 60384-14	VDE 119119

The codes above have the following meaning:

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

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

C - Integrated component tested together with the appliance

D - Alternative component

ANNEX 2: temperature measurements, thermal tests of Section 12					P	
Type reference	4030WXYZ			P		
Lamp used	LED lamp			P		
Lamp control gear used.....	Built-in lamp control gear			P		
Mounting position of luminaire.....	Fixed mounted			P		
Supply wattage (W)	16W			P		
Supply current (A)	--			P		
Calculated power factor.....				P		
Table: measured temperatures corrected for ta = 25°C:					P	
- abnormal operating mode.....				N		
- test 1: rated voltage.....				N		
- test 2: 1.06 times rated voltage or 1,05 times Rated wattage	1.06×240V normal operation			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	1.1X240V			P		
Through wiring or looping-in wiring loaded by current of A during the test	--			N		
Temperature(°C) of part	Clause 12.4 – normal				Clause 12.5 – abnormal	
	Test 1	Test 2	Test 3	Limits(°C)	Test 4	Limit (°C)
Input wire	--	53.4	--	105	--	--
Output wire	--	45.3	--	80	--	--
Outside enclosure	--	47.2	--	95	--	--
PCB	--	62.8	--	130	--	--
RV1	--	54.6	--	130	--	--

Tables

Surface 1m distance from lamp	--	35.2	--	90	--	--
Winding of T1	--	64.3	--	110	--	--
Bobbin of T1	--	63.5	--	110	--	--
Winding of LF1	--	61.4	--	110	--	--
Bobbin of LF1	--	61.7	--	110	--	--
Y-capacitors	--	56.5	--	125	--	--
CX1-capacitor	--	52.4	--	100	--	--
CX2-capacitor	--	50.7	--	100	--	--
Mounting surface	--	36.4		90	40.5	130
Ambient	--	25.1	--	--	25.2	--

	ANNEX 3: screw terminals	--
(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 (mm ²)..... :	N
(14.3.3)	Conductor space (mm)..... :	N
(14.4)	Mechanical tests	N
(14.4.1)	Minimum distance	N
(14.4.2)	Cannot slip out	N
(14.4.3)	Special preparation	N
(14.4.4)	Nominal diameter of thread (metric ISO thread)..... :	N
	External wiring	N
	No soft metal	N
(14.4.5)	Corrosion	N
(14.4.6)	Nominal diameter of thread (mm)..... :	N
	Torque (Nm)..... :	N
(14.4.7)	Between metal surfaces	N
	Lug terminal	N
	Mantle terminal	N
	Pull test; pull (N)..... :	N
(14.4.8)	Without undue damage	N

	ANNEX 4: screwless terminals	--
--	-------------------------------------	----

Tables

(15)		SCREWLESS TERMINALS										--
(15.2)	Type of terminal											—
	Rated current (A)											—
(15.3.1)	Material											N
(15.3.2)	Clamping											N
(15.3.3)	Stop											N
(15.3.4)	Unprepared conductors											N
(15.3.5)	Pressure on insulating material											N
(15.3.6)	Clear connection method											N
(15.3.7)	Clamping independently											N
(15.3.8)	Fixed in position											N
(15.3.10)	Conductor size											N
	Type of conductor											N
(15.5.1)	Terminals internal wiring											N
(15.5.1.1)	Pull test spring-type terminals (4 N, 4 samples)											N
(15.5.1.2)	Pull test pin or tab terminals (4 N, 4 samples)											N
	Insertion force not exceeding 50 N											N
(15.5.2)	Permanent connections: pull-off test (20 N)											N
(15.6)	Electrical tests											--
	Voltage drop (mV) after 1 h (4 samples).... :											N
	Voltage drop (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	

Tables

voltage drop (mV)											
	Voltage drop of two inseparable joints										
	Voltage drop after 10th alt. 25th cycle										
	Max. allowed voltage drop (mV) :										—
terminal	1	2	3	4	5	6	7	8	9	10	
voltage drop (mV)											
	Voltage drop after 50th alt. 100th cycle										
	Max. allowed voltage drop (mV) :										—
terminal	1	2	3	4	5	6	7	8	9	10	
voltage drop (mV)											
	Continued ageing: voltage drop after 10th alt. 25th cycle										
	Max. allowed voltage drop (mV) :										—
terminal	1	2	3	4	5	6	7	8	9	10	
voltage drop (mV)											
	Continued ageing: voltage drop after 50th alt. 100th cycle										
	Max. allowed voltage drop (mV) :										—
terminal	1	2	3	4	5	6	7	8	9	10	
voltage drop (mV)											

Attachment No.1

TEST REPORT EN 62471 Photobiological safety of lamps and lamp systems	
Report reference No.....:	See report EN 60598-2-5
Tested by(name + signature).....:	See report EN 60598-2-5
Approved by(name + signature)....:	See report EN 60598-2-5
Date of issue	See report EN 60598-2-5
Contents.....:	See report EN 60598-2-5
Testing laboratory	
Name	See report EN 60598-2-5
Address.....:	See report EN 60598-2-5
Testing location	See report EN 60598-2-5
Client	
Name	See report EN 60598-2-5
Address	See report EN 60598-2-5
Manufacturer	
Name	See report EN 60598-2-5
Address	See report EN 60598-2-5
Test specification	
Standard.....:	EN 62471: 2008
Test procedure	Compliance with EN 62471: 2008
Non-standard test method	N/A
Test item Description:	
Trademark	See report EN 60598-2-5
Model and/or type reference	See report EN 60598-2-5
Rating(s).....:	See report EN 60598-2-5

EN 62471			
Clause	Requirement - Test	Result - Remark	Verdict
1	SCOPE		P
	More sections applicable	Yes [<input checked="" type="checkbox"/>] No [<input type="checkbox"/>]	—
4	EXPOSURE LIMITS		P
4.1	General		P
	The exposure limits in this standard apply to continuous sources where the exposure duration is not less than 0,01 ms and not more than any 8-hour period, and should be used as guides in the control of exposure. The values should not be regarded as precisely defined lines between safe and unsafe levels.		P
	detailed spectral data of a light source are generally required only if the luminance of the source exceeds 104 cd•m ⁻² .	See clause 4.3	P
4.2	Specific factors involved in the determination and application of retinal exposure limits		N
4.2.1	Pupil diameter		P
4.2.2	Angular subtense of source and measurement field-of-view		P
4.3	Hazard exposure limits		P
4.3.1	Actinic UV hazard exposure limit for the skin and eye	LED light source	N
	The limits for exposure to ultraviolet radiation incident upon the unprotected skin or eye apply to exposure within any 8-hour period.		N
	To protect against injury of the eye or skin from ultraviolet radiation exposure produced by a broadband source, the effective integrated spectral irradiance, E_s , of the light source shall not exceed the levels defined by:		N
	$E_s \cdot t = \sum_{200}^{400} \sum_{\tau} E_{\lambda}(\lambda, \tau) \cdot S_{UV}(\lambda) \Delta t \cdot \Delta \lambda$ 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

EN 62471			
Clause	Requirement - Test	Result - Remark	Verdict
4.3.2	Near-UV hazard exposure limit for the eye		N
	For the spectral region 315 nm to 400 nm (UV-A) the total radiant exposure to the eye shall not exceed 10000 Jm ⁻² for exposure times less than 1000 s. For exposure times greater than 1000 s (approximately 16 minutes) the UV-A irradiance for the unprotected eye, EUVA, shall not exceed 10 Wm ⁻² .		N
	$E_{SUV} \bullet t = \sum_{315}^{400} \sum_t E_{\lambda}(\lambda, t) \bullet \Delta t \bullet \Delta \lambda \leq 1000$ J•m ⁻² (t < 1000 s)		N
	The permissible time for exposure to ultraviolet radiation incident upon the unprotected eye for times less than 1000 s, shall be computed by:		N
	$t_{max} \leq \frac{1000}{E_{UVA}} \text{ S}$		N
4.3.3	Retinal blue light hazard exposure limit		P
	To protect against retinal photochemical injury from chronic blue-light exposure, the integrated spectral radiance of the light source weighted against the blue-light hazard function, B(λ), i.e., the blue light weighted radiance, LB, shall not exceed the levels defined by:		P
	$L_B \bullet t = \sum_{300}^{700} \sum_t L_{\lambda}(\lambda, t) \bullet B_{(\lambda)} \bullet \Delta t \bullet \Delta \lambda \leq 10^6$ J•m ⁻² •sr ⁻¹	(for t ≤ 10 ⁴ s)	N
	$L_B = \sum_{300}^{700} L_{\lambda} \bullet B_{(\lambda)} \bullet \Delta \lambda \leq 100 \text{ W} \bullet \text{m}^{-2} \bullet \text{sr}^{-1}$	For t > 10 ⁴ S	P
4.3.4	Retinal blue light hazard exposure limit - small source		P
	Thus the spectral irradiance at the eye Eλ, weighted against the blue-light hazard function B(λ) (see Table 4.2) shall not exceed the levels defined by:		N
	$E_B \bullet t = \sum_{300}^{700} \sum_t E_{\lambda}(\lambda, t) \bullet B(\lambda) \bullet \Delta t \bullet \Delta \lambda \leq 100$	(for t ≥ 100s)	N

EN 62471			
Clause	Requirement - Test	Result - Remark	Verdict
	$E_B = \sum_{300}^{700} E_\lambda \cdot B(\lambda) \cdot \Delta\lambda \leq 1$	For t ≤ 100s	N
4.3.5	Retinal thermal hazard exposure limit		N
	To protect against retinal thermal injury, the integrated spectral radiance of the light source, L_λ , weighted by the burn hazard weighting function $B(\lambda)$ (from Figure 4.2 and Table 4.2), i.e., the burn hazard weighted radiance, shall not exceed the levels defined by:		N
	$L_R = \sum_{380}^{1400} L_\lambda \cdot B(\lambda) \cdot \Delta\lambda \leq \frac{50000}{\alpha \cdot t^{0.25}} \text{ J} \cdot \text{m}^{-2} \cdot \text{sr}^{-1}$	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
	$L_{IR} = \sum_{780}^{1400} L_\lambda \cdot B(\lambda) \cdot \Delta\lambda \leq \frac{6000}{\alpha} \text{ J} \cdot \text{m}^{-2} \cdot \text{sr}^{-1}$	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
	$E_{IR} = \sum_{780}^{3000} E_\lambda \cdot \Delta\lambda \leq 1800 \cdot t^{-0.75} \text{ W} \cdot \text{m}^{-2}$	T ≤ 1000s	N
	For times greater than 1000 s the limit becomes:		N
	$E_{IR} = \sum_{780}^{3000} E_\lambda \cdot \Delta\lambda \leq 100 \text{ W} \cdot \text{m}^{-2}$	T > 1000s	N
4.3.8	Thermal hazard exposure limit for the skin		P

EN 62471			
Clause	Requirement - Test	Result - Remark	Verdict
	Visible and infrared radiant exposure (380 nm to 3000 nm) of the skin shall be limited to:		P
	$E_H \cdot t = \sum_{380}^{3000} \sum_t E_\lambda(\lambda, t) \cdot \Delta\lambda \leq 20000 \cdot t^{0.25}$		P

5	MEASUREMENT OF LAMPS AND LAMP SYSTEMS		P
5.1	Measurement conditions		P
	Measurement conditions shall be reported as part of the evaluation against the exposure limits and the assignment of risk classification.		P
5.1.1	Lamp ageing (seasoning).....		P
	Seasoning of lamps shall be done as stated in the appropriate IEC lamp standard.		P
5.1.2	Test environment		P
	For specific test conditions, see the appropriate IEC lamp standard or in the absence of such standards, the appropriate national standards or manufacturer's recommendations.		P
5.1.3	Extraneous radiation		N
	Careful checks should be made to ensure that extraneous sources of radiation and reflections do not add significantly to the measurement results.		P
5.1.4	Lamp operation		P
	Operation of the test lamp shall be provided in accordance with:		P
	--the appropriate IEC lamp standard.		P
	--the lamp manufacturer's recommendation		P
5.1.5	Lamp system operation.....		P
	The power source for operation of the test lamp shall be provided in accordance with		P
	--the appropriate IEC standard.		P
	-- the lamp manufacturer's recommendation		N
5.2	Measurement procedure		P
5.2.1	Irradiance measurements		P
	minimum input aperture diameter of 7 mm		N
	maximum input aperture diameter of 50 mm		P
	The measurement shall be made in that position of the beam giving the maximum reading.		P

EN 62471			
Clause	Requirement - Test	Result - Remark	Verdict
	The measurement instrument is adequate calibrated		P
5.2.2	Radiance measurements		P
5.2.2.1	Standard method.....		P
	The measurement made with an optical system		P
	The instrument shall be calibrated to read in absolute incident radiant power per unit receiving area and per unit solid angle of acceptance averaged over the field of view (FOV) of the instrument.		P
5.2.2.2	Alternative method		P
	Alternative to an imaging radiance set-up, an irradiance measurement set-up with a circular field stop placed at the source can be used to perform radiance measurements		
5.2.3	Measurement of source size		P
	The determination of α , the angle subtended by a source, requires the determination of the 50% emission point of the source	0.188	P
5.2.4	Pulse width measurement for pulsed sources		N
	The determination of Δt , the nominal pulse duration of a source, requires the determination of the time during which the emission is > 50% of its peak value.		N
5.3	Analysis methods		P
5.3.1	Weighting curve interpolations		P
	The standardized interpolated values, use linear interpolation on the log of given values to obtain intermediate point at the wavelength intervals desired.	See table 4.1	P
5.3.2	Calculations.....		P
	The calculation of source hazard values shall be performed by weighting the spectral scan by the appropriate function and calculating the total weighted energy.		P
5.3.3	Measurement uncertainty.....		P
	The quality of all measurement results must be quantified by an analysis of the uncertainty.	See annex C	P
6	LAMP CLASSIFICATION		P

EN 62471			
Clause	Requirement - Test	Result - Remark	Verdict
	For the purposes of this standard it was decided that the values shall be reported as follows:		N
	for lamps intended for general lighting service (GLS), the hazard values shall be reported as either irradiance or radiance values at a distance which produces an illuminance of 500 lux, but not at a distance less than 200 mm;		P
	for all other light sources, including pulsed lamp sources, the hazard values shall be reported at a distance of 200 mm.		N
6.1	Continuous wave lamps	Class I Laser Product	P
6.1.1	Exempt group		P
	the exempt group are lamps, which does not pose any photobiological. This requirement is met by any lamp that does not pose		P
	--an actinic ultraviolet hazard (<i>E_s</i>) within 8-hours exposure (30000 s), nor		N
	--a near-UV hazard (<i>EUVA</i>) within 1000 s, (about 16 min) nor		N
	--a retinal blue-light hazard (<i>LB</i>) within 10000 s (about 2,8 h), nor		P
	--a retinal thermal hazard (<i>LR</i>) within 10 s, nor		P
	--an infrared radiation hazard for the eye (<i>EIR</i>) 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 (<i>E_s</i>) within 10000 s, nor		N
	--a near ultraviolet hazard (<i>EUVA</i>) within 300 s, nor		N
	--a retinal blue-light hazard (<i>LB</i>) within 100 s, nor		N
	--a retinal thermal hazard (<i>LR</i>) within 10 s, nor		N
	--an infrared radiation hazard for the eye (<i>EIR</i>) 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 (<i>LIR</i>), 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 (<i>E_s</i>) within 1000 s exposure, nor		N

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Clause	Requirement - Test	Result - Remark	Verdict
	--a near ultraviolet hazard (EUVA) within 100 s, nor		N
	--a retinal blue-light hazard (LB) within 0,25 s (aversion response), nor		N
	--a retinal thermal hazard (LR) within 0,25 s (aversion response), nor		N
	--an infrared radiation hazard for the eye (EIR) within 10 s.		N
	lamps that emit infrared radiation without a strong visual stimulus (i.e., less than 10 cd·m ⁻²) and do not pose a near infrared retinal hazard (LIR) within 10 s are in Risk Group 2 (Moderate-Risk).		N
6.1.4	Risk Group 3 (High-Risk)		N
	Lamps which exceed the limits for Risk Group 2 (Moderate-Risk) are in Risk Group3 (High-Risk).		N
6.2	Pulsed lamps		N
	Pulsed lamp criteria shall apply to a single pulse and to any group of pulses within 0,25 second		N
	A pulsed lamp shall be evaluated at the highest nominal energy loading as specified by the manufacturer		N
	The risk group determination of the lamp being tested shall be made as follows:		N
	-- A lamp that exceeds the exposure limit shall be classified as belonging to Risk Group 3 (High-Risk).		N
	-- For single pulsed lamps, a lamp whose weighted radiant exposure or weighted radiance dose is below the EL shall be classified as belonging to the Exempt Group.		N
	-- For repetitively pulsed lamps, a lamp whose weighted radiant exposure or weighted radiance dose is below the EL, shall be evaluated using the Continuous wave risk criteria discussed in clause 6.1, using time averaged values of the pulsed emission.		N

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

EN 62471			
Clause	Requirement - Test	Result - Remark	Verdict
A.1.3	Peak of action spectrum: Not known; probably between 900-1000 nm.		N
A.1.4	State of knowledge: Limited threshold data available for acute cataract for rabbit at 1064 nm (Wolbarsht, 1992) and IR-A region (Pitts and Cullen, 1981); no data for man. Degree of additivity and action spectrum unknown. Good epidemiological evidence (Lydahl, 1984).		N
A.1.5	Time course: Noticeable clouding of the lens generally following years of chronic high-level exposure, the elapsed time depending upon how much difference between exposure and threshold, heavy exposures producing reaction in shortest time.		N
A.1.6	Mechanism: Generally presumed to be thermal, although recent evidence suggests possible photochemical reaction - details not understood. The lens may be heated either from direct irradiation (Vogt, 1919) or by conductive heating from the heated iris (Goldman, 1983).		N
A.1.7	Symptoms: Clouding of vision.		N
A.1.8	Needed information: Action spectrum, if existent, for acute and for effects of concomitant ultraviolet radiation exposure; additivity of multiple exposures, and the possibility of delayed effects from recurrent exposures.		N
A.1.9	Experience with lamps: Accidental injury is not known, even from exposure to heat lamps. Limited population exposed.		N
A.1.10	Key references		N

	Bioeffect datasheet #2		--
A.2	Bioeffect		P
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

EN 62471			
Clause	Requirement - Test	Result - Remark	Verdict
A.2.10	Key references		P
	Bioeffect datasheet #3		--
A.3	Bioeffect		N
A.3.1	Organ/Site		N
A.3.2	Spectral range		N
A.3.3	Peak of action spectrum		N
A.3.4	State of knowledge		N
A.3.5	Time course		N
A.3.6	Mechanism		N
A.3.7	Symptoms		N
A.3.8	Needed information		N
A.3.9	Experience with lamps		N
A.3.10	Key references		N
	Bioeffect datasheet #4		--
A.4	Bioeffect		N
A.4.1	Organ/Site		N
A.4.2	Spectral range		N
A.4.3	Peak of action spectrum		N
A.4.4	State of knowledge		N
A.4.5	Time course		N
A.4.6	Mechanism		N
A.4.7	Symptoms		N
A.3.8	Needed information		N
A.4.9	Experience with lamps		N
A.4.10	Key references		N
	Bioeffect datasheet #5		--
A.5	Bioeffect		N
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

EN 62471			
Clause	Requirement - Test	Result - Remark	Verdict
ANNEX B	MEASUREMENT METHOD		N
B.1	Instrumentation		N
B.1.1	Double monochromator: Recommended instrument		N
B.1.2	Broadband detectors		N
B.2	Instrument limitations		N
B.2.1	Noise equivalent irradiance		N
B.2.2	Instrument spectral response		N
B.2.3	Wavelength accuracy		N
B.2.4	Stray radiant power		N
B.2.5	Input optics for spectral irradiance measurements: Recommendation		N
B.2.6	Linearity		N
B.3	Calibration sources		N
ANNEX C	UNCERTAINTY ANALYSIS		P
ANNEX D	GENERAL REFERENCES		P
ANNEX ZA	Normative references to international publications with their corresponding European publications		N
ANNEX ZB	EXPOSURE LIMITS (EL'S)	See ANNEX ZB above	P

Tables

Table 4.1		Spectral weighting function for assessing ultraviolet hazards for skin and eye.		P
Wavelength ¹ λ , nm	UV hazard function SUV(λ)	Wavelength λ , nm	UV hazard function SUV(λ)	
200	0,030	313*	0,006	
205	0,051	315	0,003	
210	0,075	316	0,0024	
215	0,095	317	0,0020	
220	0,120	318	0,0016	
225	0,150	319	0,0012	
230	0,190	320	0,0010	
235	0,240	322	0,00067	
240	0,300	323	0,00054	
245	0,360	325	0,00050	
250	0,430	328	0,00044	
254*	0,500	330	0,00041	
255	0,520	333*	0,00037	
260	0,650	335	0,00034	
265	0,810	340	0,00028	
270	1,000	345	0,00024	
275	0,960	350	0,00020	
280	0,960	350	0,00020	
285	0,880	355	0,00016	
290	0,770	360	0,00013	
295	0,540	370	0,00009	
297*	0,460	375	0,000077	
300	0,300	380	0,000064	
303*	0,120	385	0,000053	
305	0,060	390	0,000044	
308	0,026	395	0,000036	
310	0,015	400	0,000030	
1 Wavelengths chosen are representative: other values should be obtained by logarithmic interpolation at intermediate wavelengths.				
* Emission lines of a mercury discharge spectrum.				

Tables

Table 4.2	Spectral weighting functions for assessing retinal hazards from broadband optical sources.		P
Wavelength nm	Blue-light hazard function $B(\lambda)$	Burn hazard function $R(\lambda)$	
300	0,01		
305	0,01		
310	0,01		
315	0,01		
320	0,01		
325	0,01		
330	0,01		
335	0,01		
340	0,01		
345	0,01		
350	0,01		
355	0,01		
360	0,01		
365	0,01		
370	0,01		
375	0,01		
380	0,01		0,1
385	0,013		0,13
390	0,025		0,25
395	0,05		0,5
400	0,10		1,0
405	0,20		2,0
410	0,40		4,0
415	0,80		8,0
420	0,90		9,0
425	0,95		9,5
430	0,98		9,8
435	1,00		10,0
440	1,00		10,0
445	0,97		9,7
450	0,94		9,4
455	0,90		9,0
460	0,80		8,0
465	0,70		7,0
470	0,62		6,2
475	0,55		5,5

Tables

Table 4.2		Spectral weighting functions for assessing retinal hazards from broadband optical sources.	P
480		0,45	4,5
485		0,40	4,0
490		0,22	2,2
495		0,16	1,6
500-600		$10^{[(450-\lambda)/50]}$	1,0
600-700		0,001	1,0
700-1050			$10^{[(700-\lambda)/500]}$
1050-1150			0,2
1150-1200			$0,2 \cdot 10^{0,02(1150-\lambda)}$
1200-1400			0,02

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

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

Tables

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

Attachment No.2

<p>TEST REPORT EN 61347-2-13 Lamp controlgear</p> <p>Part 1: General and safety requirements</p> <p>Part 2-13: Particular requirements for d.c. or a.c. supplied electronic controlgear for LED modules</p>	
Report Reference No.	: See report EN 60598-2-5
Tested by (name + signature)	: See report EN 60598-2-5
Approved by (name + signature).....	: See report EN 60598-2-5
Date of issue	: See report EN 60598-2-5
Contents	: See report EN 60598-2-5
Testing laboratory	
Name	: See report EN 60598-2-5
Address	: See report EN 60598-2-5
Testing location.....	: See report EN 60598-2-5
Client	
Name	: See report EN 60598-2-5
Address.....	: See report EN 60598-2-5
Manufacturer	
Name	: See report EN 60598-2-5
Address.....	: See report EN 60598-2-5
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	
: LED Driver	
Trademark.....	: N/A
Model and/or type reference.....	: --
Rating(s)	: See report EN 60598-2-5

Test item particulars

Construction: Built-in control gear
 Lamp type: LED lamp
 Operation model: Continuous
 Maximum case temperature: --
 Supply connect: Terminal block
 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 60598-2-5
 Date(s) of performance of test: See report EN 60598-2-5

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°C.

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

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

6 (6)	CLASSIFICATION		---
	Independent controlgear	Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>	---
	Built-in controlgear	Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>	---
	Integral controlgear	Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>	---
	SELV-equivalent or isolating controlgear	Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>	---
	Auto-wound controlgear	Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>	---
	Independent SELV controlgear	Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>	---

7	MARKING		---
7.1 (7.1)	Mandatory markings:		N
	- mark of origin		N
	- model number, type reference		N
	- symbol for independent controlgear, if applicable	Built-in controlgear	N
	- correlation between interchangeable parts and controlgear marked		N
	- rated supply voltage (V)		N
	- earthing symbol		N
	- wiring diagram	See marking label	N
	- value of tc	See marking label	N
	- symbol for declared temperature		N
	Constant voltage type:	Yes <input type="checkbox"/> No <input type="checkbox"/>	--
	- rated supply voltage (V)		N
	Constant current type:	Yes <input type="checkbox"/> No <input type="checkbox"/>	--
	- 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	All conductive part is not a live part	N

EN 61347-2-13			
Clause	Requirement - Test	Result - Remark	Verdict
	- cross-section of conductors (mm ²) :	20AWG	N
	- number, type and wattage of lamp(s)		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		P
- (10.1)	Controlgear protected against accidental contact with live parts		P
- (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. :	0.07mA	P
	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) :		P
- (A3)	The voltage between the part concerned and any accessible part is measured and does not exceed 34 V(peak) :	6.3V	P
- (10.1)	Lacquer or enamel not used for protection or insulation		P
	Adequate mechanical strength on parts providing protection		N
- (10.2)	Capacitors > 0,5 μF: voltage after 1 min (V): < 50V:	<0,5 μF	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		P

EN 61347-2-13			
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	Y1 type capacitor approved by VDE	P
--	--	-----------------------------------	---

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		N
	External metal parts connected to the earth terminal:		N
	- compliance with 7.2.1 in EN 60598-1		N
	Test with a current of 10 A between earthing terminal and each of the accessible metal parts; measured resistance (Ω): $< 0,5 \Omega$		N
	Protective earth, symbol		N
	Terminal complying with clause 8 in Part 1		N
	Locked against loosening and not possible to loosen by hand		N
	Not possible to loosen clamping means unintentionally on screwless terminals		N
	Earthing via means of fixing		N
	Earthing terminal only used for the earthing of the control gear		N
	All parts of material minimizing the danger of electrolytic corrosion		N
	Made of brass or equivalent material		N
	Contact surface bare metal		N
	Conductors by tracks on printed circuit boards:		N
	- a.c. current of 25 A for 1 min between earthing terminal and accessible metal parts		N
	- compliance with clause 7.2.1 in EN 60598-1		N

EN 61347-2-13			
Clause	Requirement - Test	Result - Remark	Verdict
11 (11)	MOISTURE RESISTANCE AND INSULATION		---
	After storage 48 h at 91-95% relative humidity and 20-30°C measuring of insulation resistance with d.c. 500 V (MΩ):		P
	≥ 2 MΩ for basic insulation..... :	>100 MΩ	P
	≥ 4 MΩ for double or reinforced insulation :	>100 MΩ	P
11(-)	Adequate insulation between input and output terminals not bounded together in SELV-equivalent controlgear		P
12 (12)	ELECTRIC STRENGTH		---
	Immediately after clause 11 electric strength test for 1 min		P
	Working voltage ≤ 50 V, test voltage 500 V		N
	Working voltage > 50 V, test voltage (V):		P
	Basic insulation, 2U + 1000 V	Different polarity of input (L & N) with fuse open: 1500Vac;	P
	Reinforced insulation, test voltage 4U + 2000 V.... :	Input (L&N) – Enclosure : 3000Vac; no damage; Input(L&N)-output: 3000Vac; no damage	P
	No flashover or breakdown		P
	Windings in separating transformers in SELV equivalent control gear according to 14.3.2 of IEC 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 below.	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)	Refer to table 14	P
	Distances on printed boards provided with coating according to IEC 60664-3		P

EN 61347-2-13			
Clause	Requirement - Test	Result - Remark	Verdict
- (14.2)	Short-circuit or interruption of semiconductor devices	Refer to table 14	P
- (14.3)	Short-circuit across insulation consisting of lacquer, enamel or textile	Refer to table 14	P
- (14.4)	Short-circuit across electrolytic capacitors	Refer to table 14	P
- (14.5)	After the tests the insulation resistance with d.c. 500 V ($M\Omega$) are $\geq 1 M\Omega$		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		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 t_c , 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 t_c , under abnormal conditions of Cl. 16 and fault conditions of Cl. 14		P
	Ambient temperature at t_c:		P

16	ABNORMAL CONDITIONS		P
	Safety not impaired when the controlgear is operated at any voltage between 90% and 110% of rated voltage	240Vx 1.1=264Va.c.	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

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

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
	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	See Table 18 (16)	P
	Printed boards see clause 14 of IEC 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 60598-1 (clause numbers between parentheses refer to EN 60598-1)		P
(4.11)	Electrical connections		---
(4.11.1)	Contact pressure		P
(4.11.2)	Screws:		P
	- self-tapping screws		P
	- thread-cutting screws	Not such screws	N
	- at least two self-tapping screws	Not such condition	N
(4.11.3)	Screw locking:		N

EN 61347-2-13			
Clause	Requirement - Test	Result - Remark	Verdict
	- spring washer		N
	- rivets		N
(4.11.4)	Material of current-carrying parts		P
(4.11.5)	No contact to wood		P
(4.12)	Mechanical connections and glands		--
(4.12.1)	Mechanical stress		P
	Screws not made of soft metal		P
	Screws of insulating material		N
	Torque test: part; torque (Nm)	See report EN 60598-2-5	P
	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 (°C)	See report EN 60598-2-5	P
	- part; test temperature (°C)	See report EN 60598-2-5	P
20 (18.2)	Printed boards in accordance with IEC 60249-1, 4.3		N
20 (18.3)	External parts of insulating material preventing electric shock glow-wire test 650 °C		P
	- part tested	See report EN 60598-2-5	P
	- part tested	See report EN 60598-2-5	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 60598-2-5	P
	- no flaming drops igniting tissue paper	See report EN 60598-2-5	P
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

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

EN 61347-2-13			
Clause	Requirement - Test	Result - Remark	Verdict
	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) °C is obtained		N
	No operation of the protection device		N
	Introducing of the most onerous test condition determined during test of clause 14		N
	Output of windings connected to the mains supply short-circuited, and other part of the controlgear operated under normal conditions		N
	Increasing of the current through the windings continuously until operation of the protection means		N
	Continuous measuring of the highest surface temperature		N
	Controlgear according to C5 a) or C5 e) operated until stable conditions are achieved		N
	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

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

	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
	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 <input type="checkbox"/> NO <input type="checkbox"/>	---
	Class II	YES <input type="checkbox"/> NO <input type="checkbox"/>	---
I.3.2	a) non-inherently short circuit proof controlgear	YES <input type="checkbox"/> NO <input type="checkbox"/>	---
	b) non-inherently open circuit proof controlgear	YES <input type="checkbox"/> NO <input type="checkbox"/>	---
	c) inherently short circuit proof controlgear	YES <input type="checkbox"/> NO <input type="checkbox"/>	---
	d) inherently open circuit proof controlgear	YES <input type="checkbox"/> NO <input type="checkbox"/>	---
	e) fail safe controlgear	YES <input type="checkbox"/> NO <input type="checkbox"/>	---
	f) non-short-circuit proof controlgear	YES <input type="checkbox"/> NO <input type="checkbox"/>	---
	g) non-open-circuit proof controlgear	YES <input type="checkbox"/> NO <input type="checkbox"/>	---
I.4	Marking		N
	Adequate symbols are used	See rating label	N

EN 61347-2-13			
Clause	Requirement - Test	Result - Remark	Verdict
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	Class II equipment	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
	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

EN 61347-2-13			
Clause	Requirement - Test	Result - Remark	Verdict
	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 _____		---
	Stated value of t_a _____		---
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

EN 61347-2-13			
Clause	Requirement - Test	Result - Remark	Verdict
I.7.1	U _{pri} : 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
	- 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	- U _{pri} : 1.06 times rated supply voltage V:		---
	- I _{sec} : 1.5 times rated output current A:		---
	- time until steady-state conditions t ₁ (h) :		---
	- time until failure t ₂ (h): < t ₁ ; < 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-to-secondary 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

EN 61347-2-13			
Clause	Requirement - Test	Result - Remark	Verdict
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 M Ω		N
	Live parts and the body -for reinforced insulation not less than 4 M Ω		N
	Input- and output circuits not less than 5 M Ω		N
	Metal parts of class II controlgear which are separated from live parts by basic insulation only and the body not less than 5 M Ω		N
	Metal foil in contact with the inner and outer surfaces of enclosures of insulating material not less than 2 M Ω		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	No such parts	N
I.10.2	Self-resetting protective devices shall not be used unless it is certain that there will be no hazards	Ditto	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

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

Tables

14	TABLE: tests of fault conditions		P
Part	Simulated fault	Test result	Hazard
BD1	s-c	Fuse opened. Unrecoverable, No hazards.	YES /NO
C2	s-c	Fuse opened. Unrecoverable, No hazards.	YES /NO
C4	s-c	Fuse opened. Unrecoverable, No hazards.	YES /NO
Output	s-c	Shut down instantly, recoverable.	YES /NO
T1 secondary	o-l	The temperature rise: T1 winding: 114.5°C	YES /NO
T1 (pin 1-2)	s-c	Shut down instantly, recoverable.	YES /NO
T1 (pin 3-4)	s-c	Shut down instantly, recoverable.	YES /NO
T1 (pin 5-6)	s-c	Shut down instantly, recoverable.	YES /NO
Q1(G-S)	s-c	Output decreased to 0V immediately. Recoverable. No hazard.	YES /NO
Q1(D-S)	s-c	Fuse open, Unrecoverable, No hazards.	YES /NO
Q1(G-D)	s-c	Fuse open, Unrecoverable, No hazards.	YES /NO
C8	s-c	Shut down instantly, recoverable.	YES /NO
C9	s-c	Shut down instantly, recoverable.	YES /NO

15	TRANSFORMER HEATING				P	
	Type reference	See report EN 60598-2-5			P	
	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 $t_a = 25^\circ\text{C}$:				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 a current of A during the test				N	
Temperature(°C) of part	Clause 12.4 – normal				Clause 12.5 – abnormal	
	Test 1	Test 2	Test 3	Limits	Test 4	Limit

Tables

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18 (16)	TABLE: Clearance And Creep age Distance Measurements						P
clearance cl and creepage distance cr at/of:	Up (V)	U rms.(V)	Required cl (mm)	cl (mm)	required cr (mm)	cr (mm)	
L and N	--	240	2.5	3.5	2.6	3.5	
Two ends of current fuse	--	240	2.5	3.3	2.6	3.3	
Between primary live part and enclosure	--	240	4.7	6.5	5.0	6.5	
Between primary components and second components	--	250	4.7	6.5	5.0	6.5	

	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 (mm ²)	N
(14.3.3)	Conductor space (mm)	N
(14.4)	Mechanical tests	N
(14.4.1)	Minimum distance	N
(14.4.2)	Cannot slip out	N
(14.4.3)	Special preparation	N
(14.4.4)	Nominal diameter of thread (metric ISO thread) :	N
	External wiring	N
	No soft metal	N
(14.4.5)	Corrosion	N
(14.4.6)	Nominal diameter of thread (mm)	N
	Torque (Nm).....	N
(14.4.7)	Between metal surfaces	N
	Lug terminal	N
	Mantle terminal	N
	Pull test; pull (N).....	N
(14.4.8)	Without undue damage	N

	ANNEX 4: screwless terminals	--
(15)	SCREWLESS TERMINALS	--
(15.2)	Type of terminal	---

Tables

	Rated current (A)		—							
(15.3.1)	Material		N							
(15.3.2)	Clamping		N							
(15.3.3)	Stop		N							
(15.3.4)	Unprepared conductors		N							
(15.3.5)	Pressure on insulating material		N							
(15.3.6)	Clear connection method		N							
(15.3.7)	Clamping independently		N							
(15.3.8)	Fixed in position		N							
(15.3.10)	Conductor size		N							
	Type of conductor		N							
(15.5.1)	Terminals internal wiring		N							
(15.5.1.1)	Pull test spring-type terminals (4 N, 4 samples)		N							
(15.5.1.2)	Pull test pin or tab terminals (4 N, 4 samples)		N							
	Insertion force not exceeding 50 N		N							
(15.5.2)	Permanent connections: pull-off test (20 N)		N							
(15.6)	Electrical tests		--							
	Voltage drop (mV) after 1 h (4 samples).... :		N							
	Voltage drop (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									

Tables

	Max. allowed voltage drop (mV) :										—
terminal	1	2	3	4	5	6	7	8	9	10	
voltage drop (mV)											
	Voltage drop after 50th alt. 100th cycle										
	Max. allowed voltage drop (mV) :										—
terminal	1	2	3	4	5	6	7	8	9	10	
voltage drop (mV)											
	Continued ageing: voltage drop after 10th alt. 25th cycle										
	Max. allowed voltage drop (mV) :										—
terminal	1	2	3	4	5	6	7	8	9	10	
voltage drop (mV)											
	Continued ageing: voltage drop after 50th alt. 100th cycle										
	Max. allowed voltage drop (mV) :										—
terminal	1	2	3	4	5	6	7	8	9	10	
voltage drop (mV)											

Attachment No.3

TEST REPORT	
EN 62031 LED modules for general lighting - Safety specifications	
Report reference No:	See report EN 60598-2-5
Tested by (name + signature).....:	See report EN 60598-2-5
Approved by (name + signature).....:	See report EN 60598-2-5
Date of issue	See report EN 60598-2-5
Contents:	See report EN 60598-2-5
Testing laboratory	
Name	See report EN 60598-2-5
Address:	See report EN 60598-2-5
Testing location	See report EN 60598-2-5
Client	
Name	See report EN 60598-2-5
Address	See report EN 60598-2-5
Manufacturer	
Name	See report EN 60598-2-5
Address	See report EN 60598-2-5
Test specification	
Standard:	EN 62031: 2008+A1: 2013
Test procedure	Compliance with EN 62031: 2008+A1: 2013
Non-standard test method	N/A
Test item Description:	
Trademark	See report EN 60598-2-5
Model and/or type reference	See report EN 60598-2-5
Rating(s):	See report EN 60598-2-5

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.		P
4.4	Integral modules not having their own enclosure shall be treated as integral components of luminaires as defined in IEC 60598-1, Clause 0.5. They shall be tested assembled in the luminaire, and as far as applicable with the present standard.		P
4.5	Independent modules shall comply, in addition to this standard, with the requirements of relevant clauses of IEC 60598-1, where these requirements are not already covered in this standard.		N
4.6	If the module is a factory sealed unit, it shall not be opened for any tests. In the case of doubt based on the inspection of the module and the examination of the circuit diagram, and in agreement with the manufacturer or responsible vendor, such specially prepared modules shall be submitted for testing so that a fault condition can be simulated.	Sealed	P
5	General test requirements		---
5.1	Tests according to this standard are type tests		P
5.2	Unless otherwise specified, the tests are carried out at an ambient temperature of 10°C to 30°C		P

EN 62031			
Clause	Requirement - Test	Result - Remark	Verdict
5.3	Unless otherwise specified, the type test is carried out on one sample consisting of one or more items submitted for the purpose of the type test.		P
5.4	If the light output has detectably changed, the module shall not be used for further tests.		P
5.5	For SELV-operated LED modules, the requirements of IEC 61347-2-13, Annex I, apply additionally.		N
6	CLASSIFICATION		---
	Independent		N
	Built-in		N
	Integral		P
7	MARKING		---
7.1	Mandatory marking for built-in or independent modules		N
	a) Mark of origin (trade mark, manufacturer's name or name of the responsible vendor/supplier).		N
	b) Model number or type reference of the manufacturer.		N
	c) Either the -rated supply voltage(s), or voltage range, supply frequency or/and -rated supply current(s) or current range, supply frequency (the supply current may be given in the manufacturer's literature) or/and -rated input power, or power range.		N
	d) Nominal power.		N
	e) Indication of position and purpose of the connections where it is necessary for safety. In case of connecting wires, a clear indication shall be given in a wiring diagram.		N
	f) Value of t_c . If this relates to a certain place on the LED module, this place shall be indicated or specified in the manufacturer's literature.		N
	g) For eye protection, see requirements of IEC 62471.		N
	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

EN 62031			
Clause	Requirement - Test	Result - Remark	Verdict
7.2	Location of marking		---
	Items a), b), c) and f) of 7.1 shall be marked on the module.		N
	Items d), e), g) and h) of 7.1 shall be marked legible on the module or on the module data sheet.		N
	For integral modules, no marking is required, but the information given in 7.1 a) to g) shall be provided in the technical literature of the manufacturer.		N
7.3	Durability and legibility of marking		P
	Rubbing 15 s water, 15 s petroleum; marking legible		P
8 (14)	SCREW TERMINALS		N
	Separately approved: component list	See annex 1	N
	Part of the luminaire	See annex 3	N
8 (15)	SCREWLESS TERMINALS and electrical connections		N
	Separately approved: component list	See annex 1	N
	Part of the luminaire	See annex 4	N
9	PROVISION FOR EARTHING		N
	External metal parts connected to the earth terminal:		N
	- compliance with 7.2.1 in EN 60598-1		N
	Test with a current of 10 A between earthing terminal and each of the accessible metal parts; measured resistance (Ω): $< 0,5 \Omega$		N
	Protective earth, symbol		N
	Terminal complying with clause 8 in Part 1		N
	Locked against loosening and not possible to loosen by hand		N
	Not possible to loosen clamping means unintentionally on screwless terminals		N
	Earthing via means of fixing		N
	Earthing terminal only used for the earthing of the control gear		N
	All parts of material minimizing the danger of electrolytic corrosion		N

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		P
10.1	Ballast protected against accidental contact with live parts		P
A1	Current measured according to EN 60990, figure 4 and clause 7.1: max. 0,7 mA (peak) or 2,0 mA d.c., for $f \geq 1000$ Hz max. 70 mA		P
A2	Voltage at 50 k Ω (V): max. 34 V (peak)		P
	Lacquer or enamel not considered to be adequate protection		P
	Adequate mechanical strength on parts providing protection		P
10.2	Capacitors > 0,5 μ F: 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 (M Ω): ≥ 2 M Ω	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		P
	Working voltage ≤ 42 V, test voltage 500 V		P
	Working voltage > 42 V, test voltage (V): $2U + 1000$ V		N
	Reinforced insulation, test voltage (V):		N
	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		N
	When operated under fault conditions the ballast: - does not emit flames or molten material	No such parts	N
	- does not produce flammable gases		N
	- protection against accidental contact not impaired		N
	Thermally protected ballasts does not exceed the marked temperature value	Not thermally protected ballasts	N
	Fault conditions: capacitors, resistors or inductors without proof of compliance with relevant specifications have been short-circuited or disconnected		N
	Short-circuit of creepage distances and clearances if less than specified in clause 18 (except between live parts and accessible metal parts)		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 t_c 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.		N
	A module fails safe if no fire, smoke or flammable gas is produced and if the 15 min overpower condition has been withstood. To check whether molten material might present a safety hazard, a tissue paper, as specified in 4.187 of ISO 4046-4, spread below the module shall not ignite.		N
15	Construction		P
	Wood, cotton, silk, paper and similar fibrous material shall not be used as insulation.		P
16	Creepage distances and clearances		N
	Working voltage (V)	15-24VDC	N
	Voltage form	Sinusoidal [<input checked="" type="checkbox"/>] Non-sinusoidal [<input type="checkbox"/>]	N
	PTI	< 600 [<input checked="" type="checkbox"/>] > 600 [<input type="checkbox"/>]	N
	Impulse withstand category (normal category II) (category III annex U)	Normal category II	N
	Rated pulse voltage (kV)		N
	(1) Current-carrying parts of different polarity: cr (mm); cl (mm)		N
	(2) Current-carrying parts and accessible parts: cr (mm); cl (mm)		N
	(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)		N
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:		P
	- Self-tapping screws		N
	- thread-cutting screws		P
17 (4.11.3)	Screw locking:		P

EN 62031			
Clause	Requirement - Test	Result - Remark	Verdict
	- spring washer		P
	- rivets	No rivet provided	N
17 (4.11.4)	Material of current-carrying parts	> 50% copper	P
17 (4.11.5)	No contact to wood or mounting surface	No wood	P
17 (4.11.6)	Electro-mechanical contact systems	No such construction	N
17 (4.12)	Mechanical connections and glands		P
17 (4.12.1)	Screw not made of soft metal		P
	Screws of insulating material		N
	Torque test: torque (Nm); part	See report EN 60598-2-5	P
	Torque test: torque (Nm); part		N
17 (4.12.2)	Screw with diameter < 3 mm screw into metal		P
17 (4.12.4)	Locked connections:		N
	- fixed arms; torque (Nm)		N
	- lampholder; torque (Nm)		N
	- push-button switches; torque (Nm)	No such switches	N
1.6 (4.12.5)	Screwed glands; force (N) :		N
18	RESISTANCE TO HEAT, FIRE AND TRACKING		---
18.1	Parts of insulating material retaining live parts in position, ball-pressure test:		N
	- part; test temperature (°C)		N
18.2	Printed boards in accordance with IEC 60249-1, 4.3		N
18.3	External parts of insulating material preventing electric shock glow-wire test 650 °C		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
20	Information for luminaire design		---
	Information is given in Annex D.		N
21	Heat management		---
21.1	General		N

EN 62031			
Clause	Requirement - Test	Result - Remark	Verdict
	Clause 21 is applicable for exchangeable modules. It is not applicable for non-exchangeable modules. Exchangeability is safeguarded by means of a cap or base and a lampholder. Precondition is that a heat conducting thermal interface to the luminaire is needed for keeping the temperature below the rated maximum temperature t_c .		N
21.2	Heat-conducting foil and paste		N
	For the purpose of heat-transfer from the LED module to the luminaire, the use of a heatconducting foil can be necessary. Any heat-conducting foil shall be delivered within the LED module packaging.		N
21.3	Heat protection (under consideration)		N
	LED modules shall be equipped with a device that cuts the power off or reduces it when t_c is exceeded.		N
21.4	Construction		N
	The heat-conduction from the LED module to the luminaire, the electrical connection and the mechanical holding in the cap/holder system should be separate unless the contrary is proven safe (under consideration).		N

Annex D	Information for luminaire design		--
D.1	General		N
	For safe operation of these LED modules, it is essential to observe the recommendations of this annex.		N
D.2	Design freedom		N
	A diagrammatic cross section of an LED module fixed by means of a lampholder to a luminaire with the locations for temperature measurements (t_a , t_c , t_d , t_j and t_l) and thermal resistances ($R_{th, module}$, $R_{th, luminaire}$ and $R_{th, ambient}$) is given with Figure D.1.		N
D.3	Testing in the luminaire		N

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				
+ & -	Enclosure	>100MΩ		2MΩ	

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

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

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

18 (16)		TABLE: Clearance And Creep age Distance Measurements					N
clearance cl and creepage distance cr at/of:		Up (V)	U rms.(V)	Required cl (mm)	cl (mm)	Required cr (mm)	cr (mm)

ATTACHMENT 4

Photo Documentation

View:
Model:
4030WXYZ

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



Figure 1

View:

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



Figure 2

ATTACHMENT 4

Photo Documentation

View:

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

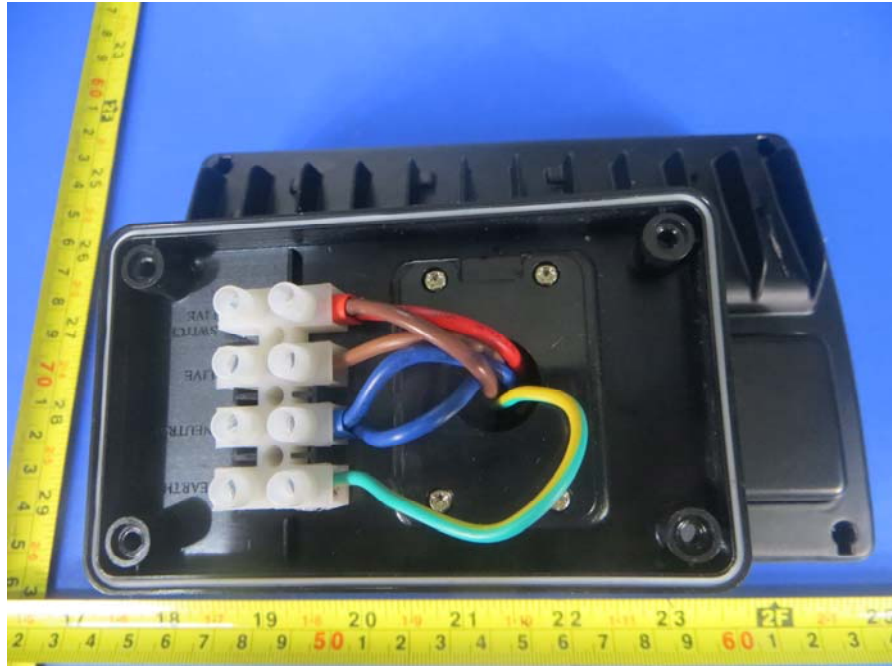


Figure 3

View:

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

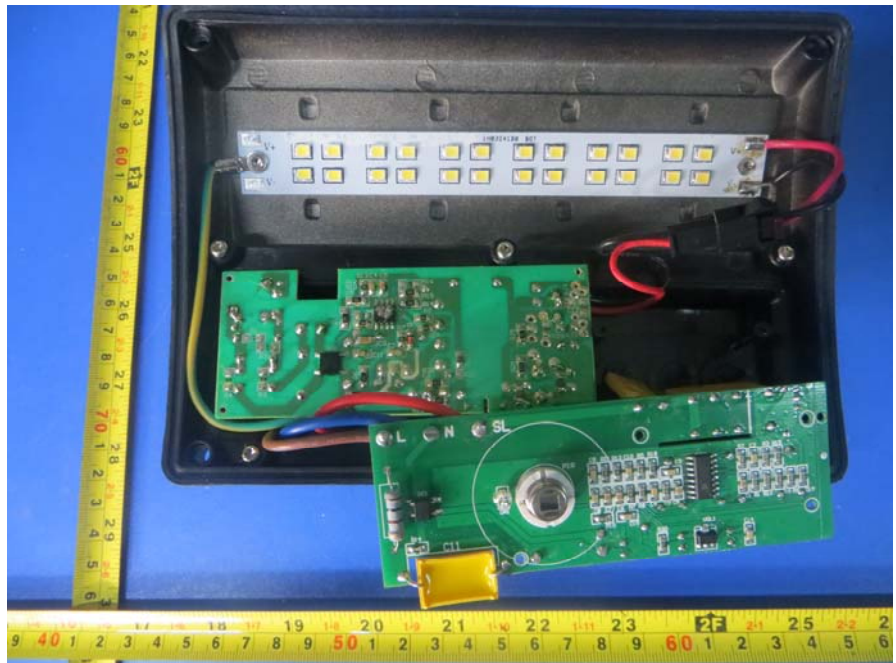


Figure 4

ATTACHMENT 4

Photo Documentation

View:

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



Figure 5

View:

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



Figure 6

ATTACHMENT 4

Photo Documentation

View:

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

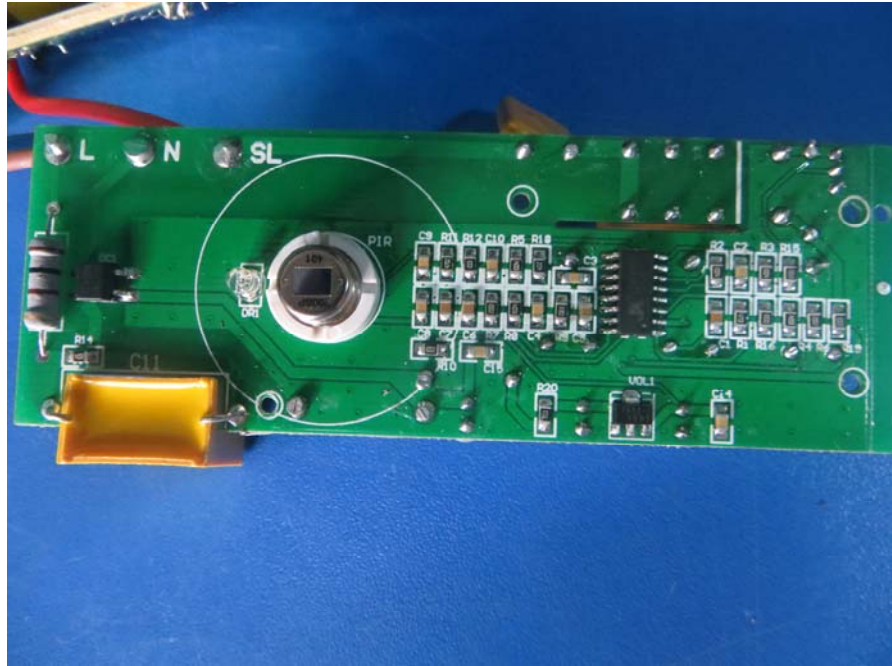


Figure 7

View:

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

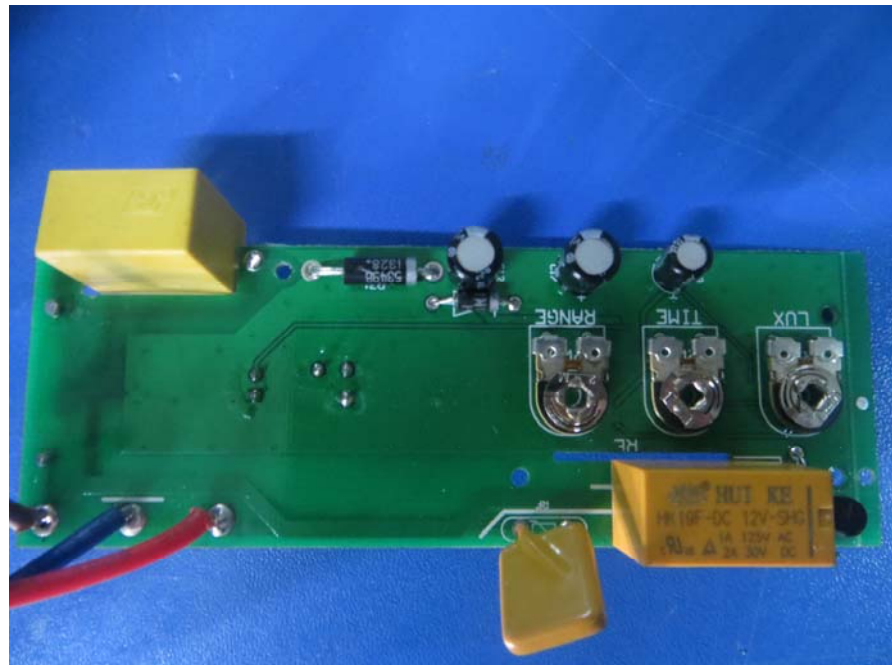


Figure 8