



BLUEVIEW ELEC-OPTIC TECH CO.,LTD

CE LVD REPORT

Prepared For:	BLUEVIEW ELEC-OPTIC TECH CO.,LTD No.1000, Section 2, 2nd Konggang Road, Southwest Aviation Industrial Development Zone, Chengdu,Sichuan,China
Product Name:	LED LIGHTING
Main Test Model:	WBPS
Additional Model:	(X)FYDX-X , YZ9 (X)means connection way, the first X means LED type, the second X means LED qty or bar length;XXX: means LED color
Prepared By :	BST Testing (Shenzhen) Co.,Ltd.
	No.7, New Era Industrial Zone, Guantian, Bao'an District, Shenzhen, Guangdong, China
Test Date:	Dec. 23, 2019- Jan. 03, 2020
Date of Report :	Jan. 03, 2020
Report No.:	BSTXD200113663903SR

**TEST REPORT****EN 60598-2-1****Luminaires****Part 2: Particular requirements****Section One – Fixed general purpose luminaires****&EN 62031****LED modules for general lighting – Safety specifications****&EN 62471****Assessment of lighting equipment related to human exposure to electromagnetic fields****&EN 62493****Assessment of lighting equipment related to human exposure to electromagnetic fields**

Testing Laboratory Name	BST Testing (Shenzhen) Co.,Ltd.
Address	No.7, New Era Industrial Zone, Guantian, Bao'an District, Shenzhen, Guangdong, China
Testing location	BST Testing (Shenzhen) Co.,Ltd.
Applicant's Name	BLUEVIEW ELEC-OPTIC TECH CO.,LTD
Address	No.1000, Section 2, 2nd Konggang Road, Southwest Aviation Industrial Development Zone, Chengdu,Sichuan,China
Manufacturer	BLUEVIEW ELEC-OPTIC TECH CO.,LTD
Address	No.1000, Section 2, 2nd Konggang Road, Southwest Aviation Industrial Development Zone, Chengdu,Sichuan,China
Test specification	EN 60598-1:2015+A1:2018 EN 60598-2-1:1989
Standard	EN 62031:2008+A1:2013+A2:2015+ EN 62471:2008 EN 62493:2015
Procedure deviation	N/A
Non-standard test method	N/A
Test item description	LED LIGHTING
Trade Name	
Model and/or type reference	See Page 1
Rating(s)	DC24V 15.6W
Test case verdicts:	
Test case does not apply to the test object	N(/A)
Test item does meet the requirement	P(ass)
Test item does not meet the requirement	F(ail)



General remarks:

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

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

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

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

The series products have the same circuit diagram, PCB layout and functionality. The differences are the model name, so, we select WBPS to test.

Copy of marking plate:



Prepared by :

Engineer

Reviewer :

Supervisor

Approved & Authorized Signer :



Manager



EN 60598-2-1			
Clause	Requirement + Test	Result - Remark	Verdict
1.2 (0)	GENERAL TEST REQUIREMENTS		P
1.2 (0.1)	Information for luminaire design considered :	Yes ☒ No ☐ Lamp standard:	—
1.2 (0.3)	More sections applicable :	Yes ☐ No ☒ Section/s:	—
1.4 (2)	CLASSIFICATION OF LUMINAIRES		P
1.4 (2.2)	Type of protection :	Class III	—
1.4 (2.3)	Degree of protection..... :		—
1.4 (2.4)	Luminaire suitable for direct mounting on normally flammable surfaces..... :	Yes ☒ No ☐	—
1.4 (2.5)	Luminaire for normal use :	Yes ☒ No ☐	—
	Luminaire for rough service :	Yes ☐ No ☒	—
1.5 (3)	MARKING		P
1.5 (3.2)	Mandatory markings		P
	Position of the marking	On the Enclosure	P
	Format of symbols/text		P
1.5 (3.3)	Additional information		P
	Language of instructions	English	P
1.5 (3.3.1)	Combination luminaires		N
1.5 (3.3.2)	Nominal frequency in Hz		N
1.5 (3.3.3)	Operating temperature		N
1.5 (3.3.4)	Symbol or warning notice		N
1.5 (3.3.5)	Wiring diagram		N
1.5 (3.3.6)	Special conditions		N
1.5 (3.3.7)	Metal halide lamp luminaire – warning		N
1.5 (3.3.8)	Limitation for semi-luminaires		N
1.5 (3.3.9)	Power factor and supply current		P
1.5 (3.3.10)	Suitability for use indoors		P
1.5 (3.3.11)	Luminaires with remote control	Not remote control	N
1.5 (3.3.12)	Clip-mounted luminaire – warning		N



1.5 (3.3.13)	Specifications of protective shields		N
1.5 (3.3.14)	Symbol for nature of supply	---	P
1.5 (3.3.15)	Rated current of socket outlet	No socket outlet	N
1.5 (3.3.16)	Rough service luminaire		N
1.5 (3.3.17)	Mounting instruction for type Y, type Z and some type X attachments	Type Y	N
1.5 (3.3.18)	Non-ordinary luminaires with PVC cable		N
1.5 (3.3.19)	Protective conductor current in instruction if applicable		N
1.5 (3.3.20)	Provided with information if not intended to be mounted within arm's reach		N
1.5 (3.3.21)	Non replaceable and non-user replaceable light sources information provided		P
	Cautionary symbol		N
1.5 (3.3.22)	Controllable luminaires, classification of insulation provided		N
1.5 (3.4)	Test with water	15s	N
	Test with hexane	15s	N
	Legible after test	The marking is legible	N
	Label attached		N

1.6 (4)	CONSTRUCTION		P
1.6 (4.2)	Components replaceable without difficulty		N
1.6 (4.3)	Wireways smooth and free from sharp edges		P
1.6 (4.4)	Lampholders		N
1.6 (4.4.1)	Integral lampholder		N
1.6 (4.4.2)	Wiring connection		N
1.6 (4.4.3)	Lampholder for end-to-end mounting		N
1.6 (4.4.4)	Positioning		N
	- pressure test (N)		-
	After test the lampholder comply with relevant standard sheets and show no damage		N
	After test on single-capped lampholder the lampholder have not moved from its position and show no permanent deformation		N
	- bending test (Nm)		-
	After test the lampholder have not moved from its position and show no permanent deformation		N



1.6 (4.4.5)	Peak pulse voltage		N
1.6 (4.4.6)	Centre contact		N
1.6 (4.4.7)	Parts in rough service luminaires resistant to tracking		N
1.6 (4.4.8)	Lamp connectors		N
1.6 (4.4.9)	Caps and bases correctly used		N
1.6 (4.4.10)	Light source for lampholder or connection according IEC 60061 not connected another way		N
1.6 (4.5)	Starter holders		N
	Starter holder in luminaires other than class II		N
	Starter holder class II construction		N
1.6 (4.6)	Terminal blocks		N
	Tails		N
	Unsecured blocks		N
1.6 (4.7)	Terminals and supply connections		N
1.6 (4.7.1)	Contact to metal parts		N
1.6 (4.7.2)	Test 8 mm live conductor		N
	Test 8 mm earth conductor		N
1.6 (4.7.3)	Terminals for supply conductors		N
1.6 (4.7.3.1)	Welded method and material		N
	- stranded or solid conductor		N
	- spot welding		N
	- welding between wires		N
	- Type Z attachment		N
	- mechanical test according to 15.6.2		N
	- electrical test according to 15.6.3		N
	- heat test according to 15.6.3.2.3 and 15.6.3.2.4		N
1.6 (4.7.4)	Terminals other than supply connection		N
1.6 (4.7.5)	Heat-resistant wiring/sleeves		N
1.6 (4.7.6)	Multi-pole plug		N
	- test at 30 N		N
1.6 (4.8)	Switches		N
	- adequate rating		N
	- adequate fixing		N
	- polarized supply		N
	- compliance with IEC 61058-1 for electronic switches		N



1.6 (4.9)	Insulating lining and sleeves		N
1.6 (4.9.1)	Retainment		N
	Method of fixing		N
1.6 (4.9.2)	Insulated linings and sleeves:		N
	Resistant to a temperature > 20 °C to the wire temperature or		N
	a) & c) Insulation resistance and electric strength		N
	b) Ageing test. Temperature (°C)		N
1.6 (4.10)	Double or reinforced insulation		N
1.6 (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
1.6 (4.10.2)	Assembly gaps:		N
	- not coincidental		N
	- no straight access with test probe		N
1.6 (4.10.3)	Retainment of insulation:		N
	- fixed		N
	- unable to be replaced; luminaire inoperative		N
	- sleeves retained in position		N
	- lining in lampholder		N
1.6 (4.10.4)	Protective impedance device		N
	Double or reinforced insulation bridged by appropriate and at least two resistors or two Y2 capacitors or one Y1 capacitor		N
	Y1 or Y2 capacitors comply with IEC 60384-14		N
	Resistors comply with test (a) in 14.1 of IEC 60065		N
1.6 (4.11)	Electrical connections and current-carrying parts		P
1.6 (4.11.1)	Contact pressure		P
1.6 (4.11.2)	Screws:		N
	- self-tapping screws		N
	- thread-cutting screws		N
1.6 (4.11.3)	Screw locking:		N
	- spring washer		N



	- rivets		N
1.6 (4.11.4)	Material of current-carrying parts		N
1.6 (4.11.5)	No contact to wood or mounting surface		N
1.6 (4.11.6)	Electro-mechanical contact systems		N
1.6 (4.12)	Screws and connections (mechanical) and glands		N
1.6 (4.12.1)	Screws not made of soft metal		N
	Screws of insulating material		N
	Torque test: torque (Nm); part		N
	Torque test: torque (Nm); part		N
	Torque test: torque (Nm); part		N
1.6 (4.12.2)	Screws with diameter < 3 mm screwed into metal		N
1.6 (4.12.4)	Locked connections:		N
	- fixed arms; torque (Nm)		N
	- lampholder; torque (Nm)		N
	- push-button switches; torque 0,8 Nm		N
1.6 (4.12.5)	Screwed glands; force (Nm)		N
1.6 (4.13)	Mechanical strength		P
1.6 (4.13.1)	Impact tests:		P
	- fragile parts; energy (Nm)	0.2 Nm	N
	- other parts; energy (Nm)	0.35 Nm	P
	1) live parts	Not access	P
	2) linings		N
	3) protection	Continue to afford the degree of protection against ingress of dust, solid objects and moisture	P
	4) covers	No break	P
1.6 (4.13.3)	Straight test finger	Can't touch with live part with 30N	P
1.6 (4.13.4)	Rough service luminaires		N
	- IP54 or higher		N
	a) fixed		N
	b) hand-held		N
	c) delivered with a stand		N
	d) for temporary installations and suitable for mounting on a stand		N
1.6 (4.13.6)	Tumbling barrel		N
1.6 (4.14)	Suspensions, fixings and means of adjusting		N



1.6 (4.14.1)	Mechanical load:	P
	A) four times the weight	N
	B) torque 2,5 Nm	N
	C) bracket arm; bending moment (Nm)	N
	D) load track-mounted luminaires	N
	E) clip-mounted luminaires, glass-shelve. Thickness (mm)	N
	Metal rod. diameter (mm)	N
	Fixed luminaire or independent control gear without fixing devices	N
1.6 (4.14.2)	Load to flexible cables	N
	Mass (kg)	—
	Stress in conductors (N/mm ²)	N
	Mass (kg) of semi-luminaire	N
	Bending moment (Nm) of semi-luminaire	N
1.6 (4.14.3)	Adjusting devices:	N
	- flexing test; number of cycles	N
	- strands broken	N
	- electric strength test afterwards	N
1.6 (4.14.4)	Telescopic tubes: cords not fixed to tube; no strain on conductors	N
1.6 (4.14.5)	Guide pulleys	N
1.6 (4.14.6)	Strain on socket-outlets	N
1.6 (4.15)	Flammable materials	P
	- glow-wire test 650°C	P
	- spacing ≥30 mm	N
	- screen withstanding test of 13.3.1	N
	- screen dimensions	N
	- no fiercely burning material	P
	- thermal protection	N
	- electronic circuits exempted	N
1.6 (4.15.2)	Luminaires made of thermoplastic material with lamp control gear	N
	a) construction	N
	b) temperature sensing control	N
	c) surface temperature	N
1.6 (4.16)	Luminaires for mounting on normally flammable surfaces	N



	No lamp control gear..... :	(compliance with Section 12)	N
1.6 (4.16.1)	Lamp control gear spacing:		N
	- spacing 35 mm		N
	- spacing 10 mm		N
1.6 (4.16.2)	Thermal protection:		N
	- in lamp control gear		N
	- external		N
	- fixed position		N
	- temperature marked lamp control gear		N
1.6 (4.16.3)	Design to satisfy the test of 12.6	(see clause 12.6)	N
1.6 (4.17)	Drain holes		N
	Clearance at least 5 mm		N
1.6 (4.18)	Resistance to corrosion		P
1.6 (4.18.1)	- rust-resistance		P
1.6 (4.18.2)	- season cracking in copper		N
1.6 (4.18.3)	- corrosion of aluminium		P
1.6 (4.19)	Ignitors compatible with ballast		N
1.6 (4.20)	Rough service vibration		N
1.6 (4.21)	Protective shield		N
1.6 (4.21.1)	Shield fitted if tungsten halogen lamps or metal halide lamps		N
	Shield of glass if tungsten halogen lamps		N
1.6 (4.21.2)	Particles from a shattering lamp not impair safety		N
1.6 (4.21.3)	No direct path		N
1.6 (4.21.4)	Impact test on shield		N
	Glow-wire test on lamp compartment :		N
1.6 (4.22)	Attachments to lamps not cause overheating or damage		N
1.6 (4.23)	Semi-luminaires comply Class II		N
1.6 (4.24)	Photobiological hazards		N
1.6 (4.24.1)	No excessive UV radiation if tungsten halogen lamps and metal halide lamps (Annex P)		N
1.6 (4.24.2)	Retinal blue light hazard		P
	Class of risk group assessed according to IEC/TR 62778		P
	Luminaires with E_{thr} :		P



	a) Fixed luminaires		P
	- distance x m, borderline between RG1 and RG2 .. :	RG0	N
	- marking and instruction according 3.2.23		N
	b) Portable and handheld luminaires		N
	- marking according 3.2.23 if RG1 exceeded at 200 mm according to IEC/TR 62778		N
	Portable luminaires for children IEC 60598-2-10 and Mains socket outlet nightlights IEC 60598-2-12 not exceed RG1 at 200 mm according to IEC/62778		N
1.6 (4.25)	Mechanical hazard		P
	No sharp point or edges		P
1.6 (4.26)	Short-circuit protection		N
1.6 (4.26.1)	Adequate means of uninsulated accessible SELV parts		P
1.6 (4.26.2)	Short-circuit test with test chain according 4.26.3		N
	Test chain not melt through		N
	Test sample not exceed values of Table 12.1 and 12.2		N
1.6 (4.27)	Terminal blocks with integrated screwless earthing contacts		N
	Test according Annex V		N
	Pull test of terminal fixing (20 N)		N
	After test, resistance < 0,05 Ω		N
	Pull test of mechanical connection (50 N)		N
	After test, resistance < 0,05 Ω		N
	Voltage drop test, resistance < 0,05 Ω		N
1.6 (4.28)	Fixing of thermal sensing control		N
	Not plug-in or easily replaceable type		N
	Reliably kept in position		N
	No adhesive fixing if UV radiations from a lamp can degrade the fixing		N
	Not outside the luminaire enclosure		N
	Test of adhesive fixing:		N
	Max. temperature on adhesive material (°C)		—
	100 cycles between t min and t max		N
	Temperature sensing control still in position		N
1.6 (4.29)	Luminaires with non-replaceable light source		P
	Not possible to replace light source		P



	Live part not accessible after parts have been opened by hand or tools		P
1.6 (4.30)	Luminaires with non-user replaceable light source		N
	If protective cover provide protection against electric shock and marked with "caution, electric shock risk" symbol:		N
	Minimum two fixing means		N
1.6 (4.31)	Insulation between circuits		N
	Circuits insulated from LV supply fulfil requirements according 4.31.1 – 4.31.3		N
	Controllable luminaires requiring same level of insulation for all components, the insulation between control terminals and LV supply fulfil requirements according 4.31.1 – 4.31.3		N
1.6 (4.31.1)	SELV circuits		P
	Used SELV source		P
	Voltage $\leq$ ELV		P
	Insulating of SELV circuits from LV supply		N
	Insulating of SELV circuits from other non SELV circuits		N
	Insulating of SELV circuits from FELV		N
	Insulating of SELV circuits from other SELV circuits		P
	SELV circuits insulated from accessible parts according Table X.1		N
	Plugs not able to enter socket-outlets of other voltage systems		N
	Socket outlets does not admit plugs of other voltage systems		N
	Plugs and socket-outlets does not have protective conductor contact		N
1.6 (4.31.2)	FELV circuits		N
	Used FELV source		N
	Voltage $\leq$ ELV		N
	Insulating of FELV circuits from LV supply		N
	FELV circuits insulated from accessible parts according Table X.1		N
	Plugs not able to enter socket-outlets of other voltage systems		N
	Socket outlets does not admit plugs of other voltage systems		N



	Socket-outlets does not have protective conductor contact		N
1.6 (4.31.3)	Other circuits		N
	Other circuits insulated from accessible parts according Table X.1		N
	Class II construction with equipotential bonding for protection against indirect contacts with live parts:		N
	- conductive parts are connected together		N
	- test according 7.2.3		N
	- conductive part not cause an electric shock in case of an insulation fault		N
	- equipotential bonding in master/slave applications		N
	- master luminaire provided with terminal for accessible conductive parts of slave luminaires		N
	- slave luminaire constructed as class I		N
1.6 (4.32)	Overvoltage protective devices		N
	Comply with IEC 61643-11		N
	External to controlgear and connected to earth:		N
	- only in fixed luminaires		N
	- only connected to protective earth		N

1.7 (11)	CREEPAGE DISTANCES AND CLEARANCES		N
	Working voltage (V)..... :	24V	—
	Voltage form	Sinusoidal	—
	PTI	< 600V	—
	Rated pulse voltage (kV) :		—
	(1) Current-carrying parts of different polarity: cr (mm); cl (mm) :	Cr >3.0mm, Cl>1.5mm	N
	(2) Current-carrying parts and accessible parts: cr (mm); cl (mm)..... :	Cr >3.0mm, Cl>1.5mm	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 clamped and metal parts: cr (mm); cl (mm)..... :		N
	(5) Current-carrying parts of switches and metal parts, after removal of insulation: cr (mm); cl (mm)..... :		N
	(6) Current-carrying parts and supporting surface: cr (mm); cl (mm)..... :	Cr >5.0mm, Cl>3.0mm	N



1.8 (7)	PROVISION FOR EARTHING		N
1.8 (7.2.1 + 7.2.3)	Accessible metal parts		N
	Metal parts in contact with supporting surface		N
	Resistance < 0,5 Ω :		N
	Self-tapping screws used		N
	Thread-forming screws		N
	Thread-forming screw used in a grove		N
	Earth makes contact first		N
	Terminal blocks with integrated screwless earthing contacts tested according Annex V		N
	Protective earthing of the luminaire not via built-in control gear		N
1.8 (7.2.2 + 7.2.3)	Earth continuity in joints, etc.		N
1.8 (7.2.4)	Locking of clamping means		N
	Compliance with 4.7.3		N
	Terminal blocks with integrated screwless earthing contacts tested according Annex V		N
1.8 (7.2.5)	Earth terminal integral part of connector socket		N
1.8 (7.2.6)	Earth terminal adjacent to mains terminals		N
1.8 (7.2.7)	Electrolytic corrosion of the earth terminal		N
1.8 (7.2.8)	Material of earth terminal		N
	Contact surface bare metal		N
1.8 (7.2.10)	Class II luminaire for looping-in		N
	Double or reinforced insulation to functional earth		N
1.8 (7.2.11)	Earthing core coloured green-yellow		N
	Length of earth conductor		N

1.9 (14)	SCREW TERMINALS		N
	Separately approved; component list		N
	Part of the luminaire		N

1.9 (15)	SCREWLESS TERMINALS AND ELECTRICAL CONNECTIONS		N
	Separately approved; component list..... :		N
	Part of the luminaire :		N



1.10 (5)	EXTERNAL AND INTERNAL WIRING	P
1.10 (5.2)	Supply connection and external wiring	P
1.10 (5.2.1)	Means of connection :	N
	Outdoor luminaire has not PVC insulated external wiring if not class III or SELV ≤ 25 V a.c./60 V d.c. or protected from outdoor environment	N
1.10 (5.2.2)	Type of cable..... :	P
	Nominal cross-sectional area (mm ²)..... :	N
	Cables equal to IEC 60227 or IEC 60245	N
1.10 (5.2.3)	Type of attachment, X, Y or Z	N
1.10 (5.2.5)	Type Z not connected to screws	N
1.10 (5.2.6)	Cable entries:	N
	- suitable for introduction	N
	- adequate degree of protection	N
1.10 (5.2.7)	Cable entries through rigid material have rounded edges	N
1.10 (5.2.8)	Insulating bushings:	N
	- suitably fixed	N
	- material in bushings	N
	- material not likely to deteriorate	N
	- tubes or guards made of insulating material	N
1.10 (5.2.9)	Locking of screwed bushings	N
1.10 (5.2.10)	Cord anchorage:	N
	- covering protected from abrasion	N
	- clear how to be effective	N
	- no mechanical or thermal stress	N
	- no tying of cables into knots etc.	N
	- insulating material or lining	N
1.10 (5.2.10.1)	Cord anchorage for type X attachment:	N
	a) at least one part fixed	N
	b) types of cable	N
	c) no damaging of the cable	N
	d) whole cable can be mounted	N
	e) no touching of clamping screws	N



	f) metal screw not directly on cable		N
	g) replacement without special tool		N
	Glands not used as anchorage		N
	Labyrinth type anchorages		N
1.10 (5.2.10.2)	Adequate cord anchorage for type Y and type Z attachment	Y	N
1.10 (5.2.10.3)	Tests:		N
	- impossible to push cable; unsafe		N
	- pull test: 25 times; pull (N)		N
	- torque test: torque (Nm).....		N
	- displacement ≤ 2 mm		N
	- no movement of conductors		N
	- no damage of cable or cord		N
	- function independent of electrical connection		N
1.10 (5.2.11)	External wiring passing into luminaire		N
1.10 (5.2.12)	Looping-in terminals		N
1.10 (5.2.13)	Wire ends not tinned		N
	Wire ends tinned: no cold flow		N
1.10 (5.2.14)	Mains plug same protection		N
	Class III luminaire plug		N
	No unsafe compatibility		N
1.10 (5.2.15)	Colour code low voltage		N
1.10 (5.2.16)	Appliance inlets (IEC 60320)		N
	Installation couplers (IEC 61535)		N
	Other appliance inlet or connector according relevant IEC standard		N
1.10 (5.2.17)	No standardized interconnecting cables properly assembled		N
1.10 (5.2.18)	Used plug in accordance with		N
	- IEC 60083		N
	- other standard		N



1.10 (5.3)	Internal wiring		P
1.10 (5.3.1)	Internal wiring of suitable size and type		P
	Through wiring		N
	- not delivered/ mounting instruction		N
	- factory assembled		N
	- socket outlet loaded (A)		N
	- temperatures..... : (see Annex 2)		N
	Green-yellow for earth only		N
1.10 (5.3.1.1)	Internal wiring connected directly to fixed wiring		P
	Cross-sectional area (mm ²)		P
	Insulation thickness		P
	Extra insulation added where necessary		P
1.10 (5.3.1.2)	Internal wiring connected to fixed wiring via internal current-limiting device		N
	Adequate cross-sectional area and insulation thickness		N
1.10 (5.3.1.3)	Double or reinforced insulation for class II		N
1.10 (5.3.1.4)	Conductors without insulation		N
1.10 (5.3.1.5)	SELV current-carrying parts		P
1.10 (5.3.1.6)	Insulation thickness other than PVC or rubber		N
1.10 (5.3.2)	Sharp edges etc.		P
	No moving parts of switches etc.		N
	Joints, raising/lowering devices		N
	Telescopic tubes etc.		N
	No twisting over 360°		P
1.10 (5.3.3)	Insulating bushings:		N
	- suitable fixed		N
	- material in bushings		N
	- material not likely to deteriorate		N
	- cables with protective sheath		N
1.10 (5.3.4)	Joints and junctions effectively insulated		N
1.10 (5.3.5)	Strain on internal wiring		N
1.10 (5.3.6)	Wire carriers		N



1.10 (5.3.7)	Wire ends not tinned		N
	Wire ends tinned: no cold flow		N
1.11 (8)	PROTECTION AGAINST ELECTRIC SHOCK		P
1.11 (8.2.1)	Live parts not accessible		P
	Basic insulated parts not used on the outer surface without appropriate protection		P
	Basic insulated parts not accessible with standard test finger on portable, settable and adjustable luminaires		N
	Basic insulated parts not accessible with Ø 50 mm probe from outside, other types of luminaires		N
	Lamp and starterholders in portable and adjustable luminaires comply with double or reinforced insulation requirements		N
	Basic insulation only accessible under lamp or starter replacement		N
	Protection in any position		N
	Double-ended tungsten filament lamp		N
	Insulation lacquer not reliable		N
	Double-ended high pressure discharge lamp		N
	Relevant warning according to 3.2.18 fitted to the luminaire		N
1.11 (8.2.2)	Portable luminaire adjusted in most unfavourable position		N
1.11 (8.2.3.a)	Class II luminaire:		N
	- basic insulated metal parts not accessible during starter or lamp replacement		N
	- basic insulation not accessible other than during starter or lamp replacement		N
	- glass protective shields not used as supplementary insulation		N
1.11 (8.2.3.b)	BC lampholder of metal in class I luminaires shall be earthed		N
1.11 (8.2.3.c)	SELV circuits with exposed current carrying parts:		N
	Ordinary luminaire:		N
	- voltage under load (V)..... :		N
	- no-load voltage (V)..... :		N



	- touch current if applicable (mA)		N
	One conductive part insulated if required		N
	Other than ordinary luminaire:		N
	- nominal voltage (V)		N
	Class III luminaire only for connection to SELV		N
	Class III luminaire not provided with means for protective earthing		N
1.11 (8.2.4)	Portable luminaire have protection independent of supporting surface		N
1.11 (8.2.5)	Compliance with the standard test finger or relevant probe		N
1.11 (8.2.6)	Covers reliably secured		N
1.11 (8.2.7)	Luminaire other than below with capacitor > 0,5 μ F not exceed 50 V 1 min after disconnection		N
	Portable luminaire with capacitor > 0,1 μ F (0.25) not exceed 34 V 1 s after disconnection		N
	Other luminaires with capacitor > 0,1 μ F (0.25) with plug and track adaptors not exceed 60 V 5 s after disconnection		N

1.12 (12)	ENDURANCE TEST AND THERMAL TEST		P
1.12 (-)	If IP > IP 20 relevant test of (12.4), (12.5) and (12.6) after (9.2) before (9.3) specified in 1.13		—
1.12 (12.3)	Endurance test:		P
	- mounting-position.....	Normal position	—
	- test temperature (°C)	35°C	—
	- total duration (h)	240h	—
	- supply voltage: Un factor; calculated voltage (V) ...	24x1.1=26.4V	—
	- lamp used	LED	—
1.12 (12.3.2)	After endurance test:		P
	- no part unserviceable		P
	- luminaire not unsafe		P
	- no damage to track system		N
	- marking legible		P
	- no cracks, deformation etc.		P
1.12 (12.4)	Thermal test (normal operation)	(see Annex 2)	P
1.12 (12.5)	Thermal test (abnormal operation)	(see Annex 2)	N



1.12 (12.6)	Thermal test (failed lamp control gear condition):	N
1.12 (12.6.1)	Through wiring or looping-in wiring loaded by a current of (A)	—
	- case of abnormal conditions	—
	- electronic lamp control gear	
	- measured winding temperature (°C): at 1,1 Un	—
	- measured mounting surface temperature (°C) at 1,1 Un.....	N
	- calculated mounting surface temperature (°C)	N
	- track-mounted luminaires	N
1.12 (12.6.2)	Temperature sensing control	N
	- case of abnormal conditions	—
	- thermal link	N
	- manual reset cut-out	N
	- auto reset cut-out	N
	- measured mounting surface temperature (°C)	N
	- track-mounted luminaires	N
1.12 (12.7)	Thermal test (failed lamp control gear in plastic luminaires):	N
1.12 (12.7.1)	Luminaire without temperature sensing control	N
1.12 (12.7.1.1)	Luminaire with fluorescent lamp ≤ 70W	N
	Test method 12.7.1.1 or Annex W	—
	Test according to 12.7.1.1:	N
	- case of abnormal conditions	—
	- Ballast failure at supply voltage (V)	—
	- Components retained in place after the test	N
	- Test with standard test finger after the test	N
	Test according to Annex W:	N
	- case of abnormal conditions	—
	- measured winding temperature (°C): at 1,1 Un	—
	- measured temperature of fixing point/exposed part (°C): at 1,1 Un	—
	- calculated temperature of fixing point/exposed part (°C).....	—
	Ball-pressure test	N



1.12 (12.7.1.2)	Luminaire with discharge lamp, fluorescent lamp > 70W, transformer > 10 VA	N
	- case of abnormal conditions	—
	- measured winding temperature (°C): at 1,1 Un	—
	- measured temperature of fixing point/exposed part (°C): at 1,1 Un	—
	- calculated temperature of fixing point/exposed part (°C)	—
	Ball-pressure test	N
1.12 (12.7.1.3)	Luminaire with short circuit proof transformers ≤ 10 VA	N
	- case of abnormal conditions	—
	- Components retained in place after the test	N
	- Test with standard test finger after the test	N
1.12 (12.7.2)	Luminaire with temperature sensing control	N
	- thermal link	—
	- manual reset cut-out	—
	- auto reset cut-out	—
	- case of abnormal conditions	—
	- highest measured temperature of fixing point/ exposed part (°C):	—
	Ball-pressure test:	N

1.13 (9)	RESISTANCE TO DUST AND MOISTURE		P
1.13 (-)	If IP > IP 20 the order of tests as specified in clause 1.12		P
1.13 (9.2)	Tests for ingress of dust, solid objects and moisture:		P
	- classification according to IP	IP67	—
	- mounting position during test		—
	- fixing screws tightened; torque (Nm)		—
	- tests according to clauses		—
	- electric strength test afterwards		N
	a) no deposit in dust-proof luminaire		P
	b) no talcum in dust-tight luminaire		P
	c) no trace of water on current-carrying parts or on insulation where it could become a hazard		P



	c.1) For luminaires without drain holes – no water entry		P
	c.2) For luminaires with drain holes – no hazardous water entry		N
	d) no water in watertight or pressure watertight luminaire		P
	e) no contact with live parts (IP 2X)		N
	e) no entry into enclosure (IP 3X and IP 4X)		N
	e) no contact with live parts through drain holes and ventilation slots (IP3X and IP4X)		N
	f) no trace of water on part of lamp requiring protection from splashing water		P
	g) no damage of protective shield or glass envelope		P
1.13 (9.3)	Humidity test 48 h	R.H.:95% T: 25°C	P

1.14 (10)	INSULATION RESISTANCE AND ELECTRIC STRENGTH		P
1.14 (10.2.1)	Insulation resistance test		P
	Cable or cord covered by metal foil or replaced by a metal rod of mm Ø		P
	Insulation resistance (MΩ)		P
	SELV		P
	- between current-carrying parts of different polarity :	> 10MΩ	P
	- between current-carrying parts and mounting surface	> 10MΩ	P
	- between current-carrying parts and metal parts of the luminaire..... :	> 10MΩ	P
	- between the outer surface of a flexible cord or cable where it is clamped in a cord anchorage and accessible metal parts		N
	- Insulation bushings as described in Section 5		N
	Other than SELV		N
	- between live parts of different polarity		N
	- between live parts and mounting surface		N
	- between live parts and metal parts		N
	- between live parts of different polarity through action of a switch..... :		N



	- between the outer surface of a flexible cord or cable where it is clamped in a cord anchorage and accessible metal parts		N
	- Insulation bushings as described in Section 5		N
1.14 (10.2.2)	Electric strength test		P
	Dummy lamp		N
	Luminaires with ignitors after 24 h test		N
	Luminaires with manual ignitors		N
	Test voltage (V)		P
	SELV		P
	- between current-carrying parts of different polarity :	DC500V	P
	- between current-carrying parts and mounting surface	DC500V	P
	- between current-carrying parts and metal parts of the luminaire.....	DC500V	P
	- between the outer surface of a flexible cord or cable where it is clamped in a cord anchorage and accessible metal parts		N
	- Insulation bushings as described in Section 5		N
	Other than SELV		N
	- between live parts of different polarity		N
	- between live parts and mounting surface		N
	- between live parts and metal parts		N
	- between live parts of different polarity through action of a switch.....		N
	- between the outer surface of a flexible cord or cable where it is clamped in a cord anchorage and accessible metal parts		N
	- Insulation bushings as described in Section 5		N
1.14 (10.3)	Touch current or protective conductor current (mA):	0.025mA < 0.7mA	N

1.15 (13)	RESISTANCE TO HEAT, FIRE AND TRACKING		P
1.15 (13.2.1)	Ball-pressure test:		P
	- part tested; temperature (°C).....		P
1.15 (13.3.1)	Needle flame test (10 s):		P
	- part tested.....		P



1.15 (13.3.2)	Glow wire test (650°C):		P
	- part tested.....:		P
1.15 (13.4.1)	Tracking test: part tested		N

	COMMON MODIFICATIONS		N
(3.3.101 + 5.2.1)	For luminaires connected by tails, information about terminal block		N
(5.2.2)	Cables equal to HD 21 S2 or HD 22 S2		N
(5.2.15)	Colour code low voltage		N

ZB	ANNEX ZB, SPECIAL NATIONAL CONDITIONS		N
(2.2)	Class 0 not accepted		N
(3.3)	DK: power supply cord with label		N
	IT: warning label on Class 0 luminaire		N
(4.5.1)	DK: socket-outlets		N
(4.5.1)	FR: socket-outlets		N
(5.2.1)	DK, FI, SE, GB: type of plug		N

ZC	ANNEX ZC, NATIONAL DEVIATIONS		N
(13.3)	DK: Needle flame test or glow-wire test 750°C for luminaires in access routes		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 and workers		N

	ANNEX 1: components				P
object/part No.	manufacturer/ trademark	type/model	technical data	standard	mark(s) of conformity
LED	Samsung Electronics Co., Ltd.	FM-P3535	VF=DC2.8- 3.5V,IF=1500mA 3500-6500K	UL 8750	UL E347623
PCB	(TIANMU) ELECTRONICS CO LTD	AL	V-0,105°C	UL E336407	UL E336407



WIRE	SHENZHEN DONGZHANW WANG ELECTRONIC COLTD	UL 2468	MIN.24AWG 80℃, 300V	-	UL E362344
------	--	---------	------------------------	---	---------------

ANNEX 2	TABLE: Temperature measurements, thermal tests of Section 12		P				
	Type reference	WBPS	—				
	Lamp used	LED	—				
	Lamp control gear used	No use	—				
	Mounting position of luminaire	Surface mounting	—				
	Supply wattage (W)	15.6W	—				
	Supply current (A)	0.29A	—				
	Calculated power factor	>0.5	—				
	Table: measured temperatures corrected for ta = 25 °C:		P				
	- abnormal operating mode		—				
	- test 1: rated voltage		—				
	- test 2: 1,06 times rated voltage or 1,05 times rated wattage.....	24V x1.06=25.4V	—				
	- test 3: Load on wiring to socket-outlet, 1,06 times voltage or 1,05 times wattage		—				
	- test 4: 1,1 times rated voltage or 1,05 times rated wattage.....		—				
	Through wiring or looping-in wiring loaded by a current of A during the test		—				
Temperature measurements, (°C)							
Part	Ambient	Clause 12.4 – normal				Clause 12.5 – abnormal	
		test 1	test 2	test 3	limit	test 4	limit
Power cord	25.0		41.2		90		
Mounting surface	25.0		34.2		90		
Supplementary information:							

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



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

ANNEX 4	Screwless terminals (part of the luminaire)		N
(15)	SCREWLESS TERMINALS		N
(15.2)	Type of terminal		—
	Rated current (A).....		—
(15.3.1)	Material		N
(15.3.2)	Clamping		N
(15.3.3)	Stop		N
(15.3.4)	Unprepared conductors		N
(15.3.5)	Pressure on insulating material		N
(15.3.6)	Clear connection method		N



(15.3.7)	Clamping independently		N
(15.3.8)	Fixed in position		N
(15.3.10)	Conductor size		N
	Type of conductor		N
(15.5)	Terminals and connections for internal wiring		N
(15.5.1)	Mechanical tests		N
(15.5.1.1.1)	Pull test spring-type terminals (4 N, 4 samples)		N
(15.5.1.1.2)	Pull test pin or tab terminals (4 N, 4 samples)		N
	Insertion force not exceeding 50 N		N
(15.5.1.2)	Permanent connections: pull-off test (20 N)		N
(15.5.2)	Electrical tests		N
	Voltage drop (mV) after 1 h (4 samples).....		N
	Voltage drop of two inseparable joints		N
	Number of cycles:		—
	Voltage drop (mV) after 10th alt. 25th cycle (4 samples)		N
	Voltage drop (mV) after 50th alt. 100th cycle (4 samples)		N
	After ageing, voltage drop (mV) after 10th alt. 25th cycle (4 samples)		N
	After ageing, voltage drop (mV) after 50th alt. 100th cycle (4 samples)		N
(15.6)	Terminals and connections for external wiring		N
(15.6.1)	Conductors		N
	Terminal size and rating		N
15.6.2	Mechanical tests		N
(15.6.2.1)	Pull test spring-type terminals or welded connections (4 samples); pull (N)		N
(15.6.2.2)	Pull test pin or tab terminals (4 samples); pull (N)		N
(15.6.3)	Electrical tests		N
	Tests according 15.6.3.1 + 15.6.3.2 in IEC 60598-1		N

(15.6.3.1)	TABLE: Contact resistance test / Heating tests									N
(15.6.3.2)										—
	Voltage drop (mV) after 1 h									
terminal	1	2	3	4	5	6	7	8	9	10



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



EN 62031			
Cl.	Requirement – Test	Result	Verdict
3	Terms and definitions		P
3.10	rated maximum temperature	see marking label	--
4	General requirements		P
4.1	Modules shall be so designed and constructed that in normal use they operate without danger to the user or surroundings	(see manufacturer's instruction)	P
4.2	All electrical measurements shall be carried out		P
	at voltage limits (min/max)		--
	Current limits (min/max)		--
	Power limits (min/max)		--
	Minimum frequency		--
	In a draught-free room at the temperature limits		--
4.3	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.		N
4.5	Independent modules shall comply 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.		P
	In the case of doubt based on the inspection of the module.		N
5	General test requirements		P
5.1	Tests according to this standard shall be type tests.		P
5.2	Unless otherwise specified, the tests shall be carried out at an ambient temperature of 10 °C to 30 °C.		P
5.3	Type test shall be carried out on one sample consisting of one or more items submitted for the purpose of the type test		P



EN 62031			
Cl.	Requirement – Test	Result	Verdict
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.		P
	General conditions for tests are given in Annex A.		N
6	Classification		P
	According to the method of installation		P
	– built-in;		N
	– independent;		P
	– integral.		N
	For integral modules, the NOTE to 1.2.1 in IEC 60598-1 applies.		P
7	Marking		P
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).		P
	b) Model number or type reference of the manufacturer.		P
	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.		P
	d) Nominal power.		P
	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.		P
	g) For eye protection, see requirements of IEC 62471.		P
	h) Built-in modules shall be marked in order to separate them from independent modules.		N



EN 62031			
Cl.	Requirement – Test	Result	Verdict
	The mark shall be located on the packaging or on the module itself.		P
7.2	Location of marking		P
7.3	Durability and legibility of marking		P
	the marking by rubbing the area lightly by hand for 15 s with a piece of smooth cloth, dampened with water.		P
	Marking shall be durable and legible.		P
8	Terminals		N
	For screw terminals, the requirements of IEC 60598-1, Section 14, shall be used, if applicable.		N
	For screwless terminals, the requirements of IEC 60598-1, Section 15, shall be used, if applicable.		N
	For connectors, the requirements of IEC 60838-2-2 shall be used, if applicable		N
9	Provisions for protective earthing		N
	The requirements of IEC 61347-1, Clause 9, apply.		N
10	Protection against accidental contact with live parts		P
	The requirements of IEC 61347-1, Clause 10, apply.		P
11	Moisture resistance and insulation		P
	The requirements of IEC 61347-1, Clause 11, apply.		P
12	Electric strength		P
	The requirements of IEC 61347-1, Clause 12, apply		P
13	Fault conditions		P
13.1	General		--
	The module shall not impair safety when operated under fault conditions		P
	The requirements of IEC 61347-1, Clause 14, apply.		P
13.2	Overpower condition		P
	Annex A		P
	150 % of the rated voltage		P



EN 62031			
Cl.	Requirement – Test	Result	Verdict
	The test shall be continued until the module is thermally stabilised		P
	After finalising the overpower mode, the module is operated under normal conditions until thermally being stable.		P
	A module fails safe if no fire, smoke or flammable gas is produced and if the 15 min overpower condition has been withstood		P
	A tissue paper, as specified in 4.187 of ISO 4046-4, spread below the module shall not ignite.		P
14	Conformity testing during manufacture		P
15	Construction		P
	Wood, cotton, silk, paper and similar fibrous material shall not be used as insulation. Compliance is checked by inspection.		P
16	Creepage distances and clearances		P
	The requirements of IEC 60598-1, Section 11, apply		P
17	Screws, current-carrying parts and connections		N
	The requirements of IEC 61347-1, Clause 17, apply.		N
18	Resistance to heat, fire and tracking		P
	The requirements of IEC 61347-1, Clause 18, apply.		P
19	Resistance to corrosion		P
	The requirements of IEC 61347-1, Clause 19, apply.		P

Annex A	Tests	P
---------	-------	---

Annex B	Overview of systems composed of LED modules and control gear	P
---------	--	---

Annex C	Conformity testing during manufacture	P
---------	---------------------------------------	---



EN 62471			
Cl.	Requirement – Test	Result	Verdict
4	EXPOSURE LIMITS		P
4.1	General		P
	The exposure limits in this standard 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	Conform	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
4.3	Hazard exposure limits		P
4.3.1	Actinic UV hazard exposure limit for the skin and eye		P
	The exposure limit for effective radiant exposure is 30 J.m ⁻² within any 8-hour period	Conform	P
	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:		P
	$E_s \cdot t = \sum_{200}^{400} E_{\lambda}(\lambda, t) \cdot S_{uv}(\lambda) \cdot \Delta t \cdot \Delta \lambda \leq 30 \text{ J} \cdot \text{m}^{-2}$		P
	The permissible time for exposure to ultraviolet radiation incident upon the unprotected eye or skin shall be computed by:		P
	$t_{\max} = 30/E_s \geq 30000 \text{ s}$		P
4.3.2	Near-UV hazard exposure limit for eye		P
	For the spectral region 315 nm to 400 nm (UV-A) the total radiant exposure to the eye shall not exceed 10000 J.m ⁻² for exposure times less than 1000s. For exposure times greater than 1000 s (approximately 16 minutes) the UV-A irradiance for the unprotected eye, E _{UVA} , shall not exceed 10 W.m ⁻²		P
	The permissible time for exposure to ultraviolet radiation incident upon the unprotected eye for time less than 1000 s, shall be computed by:		P
	$t_{\max} \leq 10000/E_{UVA} \text{ s}$		P
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



	$L_B \cdot t = \sum_{300}^{700} L_{\lambda}(\lambda, t) \cdot B(\lambda) \cdot \Delta\lambda \leq 10^6 \text{ J} \cdot \text{m}^{-2} \cdot \text{sr}^{-1}$		P
	$L_B = \sum_{300}^{700} L_{\lambda} \cdot B(\lambda) \cdot \Delta\lambda \leq 100 \text{ W} \cdot \text{m}^{-2} \cdot \text{sr}^{-1}$		N
4.3.4	Retinal blue light hazard exposure limit - small source		N
	Thus the spectral irradiance at the eye E_{λ} , weighted against the blue-light hazard weighting function $B(\lambda)$ shall not exceed the levels defined by: see table 4.2	See table 4.2	N
	$E_B \cdot t = \sum_{300}^{700} E_{\lambda}(\lambda, t) \cdot B(\lambda) \cdot \Delta\lambda \leq 100 \text{ J} \cdot \text{m}^{-2}$		N
	$E_B = \sum_{300}^{700} E_{\lambda} \cdot B(\lambda) \cdot \Delta\lambda \leq 1 \text{ W} \cdot \text{m}^{-2}$		N
4.3.5	Retinal thermal hazard exposure limit		P
	To protect against retinal thermal injury, the integrated spectral radiance of the light source, L_{λ} , weighted by the burn hazard weighting function $R(\lambda)$ (from Figure 4.2 and Table 4.2), i.e., the burn hazard weighted radiance, shall not exceed the levels defined by:		P
	$L_R = \sum_{380}^{1400} L_{\lambda} \cdot R(\lambda) \cdot \Delta\lambda \leq \frac{50000}{\alpha \cdot t^{0,25}} \text{ W} \cdot \text{m}^{-2} \cdot \text{sr}^{-1}$		P
4.3.6	Retinal thermal hazard exposure limit – weak visual stimulus		N
	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:		N
	$L_{IR} = \sum_{780}^{1400} L_{\lambda} \cdot R(\lambda) \cdot \Delta\lambda \leq \frac{6000}{\alpha} \text{ W} \cdot \text{m}^{-2} \cdot \text{sr}^{-1}$		N
4.3.7	Infrared radiation hazard exposure limits for the eye		P
	The 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:		P
	$E_{IR} = \sum_{780}^{3000} E_{\lambda} \cdot \Delta\lambda \leq 18000 \cdot t^{-0,75} \text{ W} \cdot \text{m}^{-2}$		P
	For times greater than 1000 s the limit becomes:		N



	$E_{IR} = \sum_{780}^{3000} E_{\lambda} \cdot \Delta\lambda \leq 100 \quad \text{W}\cdot\text{m}^{-2}$		N
4.3.8	Thermal hazard exposure limit for the skin		N
	Visible and infrared radiant exposure (380 nm to 3000 nm) of the skin shall be limited to:		N
	$E_H \cdot t = \sum_{380}^{3000} \sum_t E_{\lambda}(\lambda, t) \cdot \Delta t \cdot \Delta\lambda \leq 20000 \cdot t^{0.25} \quad \text{J}\cdot\text{m}^{-2}$		N
5	MEASUREMENT OF LAMPS AND LAMP SYSTEMS		P
5.1	Measurement conditions	Seasoned for 24h before measurement	P
	Measurement conditions shall be reported as part of the evaluation against the exposure limits and the assignment of risk classification.	See above	P
5.1.1	Lamp ageing (seasoning)	See above	P
	Seasoning of lamps shall be done as stated in the Appropriate EN lamp standard.	Under manufacture's recommendation	P
5.1.2	Test environment	Under manufacture's recommendation	P
	For specific test conditions, see the appropriate EN lamp standard or in absence of such standards, the appropriate national standards or manufacturer's recommendations.	Under manufacture's recommendation	P
5.1.3	Extraneous radiation	Considered	P
	Careful checks should be made to ensure that extraneous sources of radiation and reflections do not add significantly to the measurement results.	Considered	P
5.1.4	Lamp operation	Under manufacture's recommendation	P
	Operation of the test lamp shall be provided in accordance with:		P
	– the appropriate EN lamp standard, or		N
	– the 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 EN standard, or		N
	– the manufacturer's recommendation		P
5.2	Measurement procedure		P
5.2.1	Irradiance measurements		P
	Minimum aperture diameter 7mm.		P



	Maximum aperture diameter 50 mm.		P
	The measurement shall be made in that position of the beam giving the maximum reading.		P
	The measurement instrument is adequate calibrated.		P
5.2.2	Radiance measurements		P
5.2.2.1	Standard method		P
	The measurements made with an optical system.		P
	The instrument shall be calibrated to read in absolute radiant power per unit receiving area and per unit solid angle to acceptance averaged over the field of view of the instrument.		P
5.2.2.2	Alternative method		N
	Alternatively to an imaging radiance set-up, an irradiance measurement set-up with a circular field stop placed at the source can be used to perform radiance measurements.		N
5.2.3	Measurement of source size		P
	The determination of α , the angle subtended by a source, requires the determination of the 50% emission points of the source.		P
5.2.4	Pulse width measurement for pulsed sources		N
	The determination of Δt , the nominal pulse duration of a source, requires the determination of the time during which the emission is > 50% of its peak value.		N
5.3	Analysis methods		P
5.3.1	Weighting curve interpolations		P
	To standardize interpolated values, use linear interpolation on the log of given values to obtain intermediate points at the wavelength intervals desired.	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.		P
6	LAMP CLASSIFICATION		P
	For the purposes of this standard it was decided that the values shall be reported as follows:	see table 6.1	P



	– for lamps intended for general lighting service, the hazard values shall be reported as either irradiance or radiance values at a distance which produces an illuminance of 500 lux, but not at a distance less than 200 mm		P
	– for all other light sources, including pulsed lamp sources, the hazard values shall be reported at a distance of 200 mm		P
6.1	Continuous wave lamps		P
6.1.1	Exempt Group		P
	In the except group are lamps, which does not pose any photobiological hazard. The requirement is met by any lamp that does not pose:		P
	– an actinic ultraviolet hazard (ES) within 8-hours exposure (30000 s), nor		P
	– a near-UV hazard (EUVA) within 1000 s, (about 16 min), nor		P
	– a retinal blue-light hazard (LB) within 10000 s (about 2,8 h), nor		P
	– a retinal thermal hazard (LR) within 10 s, nor		P
	– an infrared radiation hazard for the eye (EIR) within 1000 s		P
6.1.2	Risk Group 1 (Low-Risk)	Exempt Group provided	N
	In this group are lamps, which exceeds the limits for the except group but that does not pose:		N
	– an actinic ultraviolet hazard (ES) within 10000 s, nor		N
	– a near ultraviolet hazard (EUVA) within 300 s, nor		N
	– a retinal blue-light hazard (LB) within 100 s, nor		N
	– a retinal thermal hazard (LR) within 10 s, nor		N
	– an infrared radiation hazard for the eye (EIR) within 100 s		N
	Lamps that emit infrared radiation without a strong visual stimulus and do not pose a near-infrared retinal hazard (LIR), within 100 s are in Risk Group 1.		N
6.1.3	Risk Group 2 (Moderate-Risk)	Exempt Group provided	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 (ES) within 1000 s exposure, nor		N
	– a near ultraviolet hazard (EUVA) within 100 s, nor		N
	– a retinal blue-light hazard (LB) within 0,25 s (aversion response), nor		N
	– a retinal thermal hazard (LR) within 0,25 s (aversion response), nor		N
	– an infrared radiation hazard for the eye (EIR) within 10 s		N



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

Table 4.1		Spectral weighting function for assessing ultraviolet hazards for skin and eye		P
Wavelength ¹ λ , nm	UV hazard function $S_{UV}(\lambda)$	Wavelength λ , nm	UV hazard function $S_{UV}(\lambda)$	
200 0	0.030	313* 0	0.006	
205 0	0.051	315 0	0.003	
210 0	0.075	316 0	0.0024	
215 0	0.095	317 0	0.0020	
220 0	0.120	318 0	0.0016	
225 0	0.150	319 0	0.0012	
230 0	0.190	320 0	0.0010	
235 0	0.240	322 0	0.00067	
245 0	0.360	325 0	0.00050	
250 0	0.430	328 0	0.00044	
254* 0	0.500	330 0	0.00041	
255 0	0.520	333* 0	0.00037	
260 0	0.650	335 0	0.00034	
265 0	0.810	340 0	0.00028	
270 1	0.000	345 0	0.00024	
275 0	0.960	350 0	0.00020	
280* 0	0.880	355 0	0.00016	
285 0	0.770	360 0	0.00013	
290 0	0.640	365* 0	0.00011	
295 0	0.540	370 0	0.000093	



297* 0	0.460	375 0	0.000077
300 0	0.300	380 0	0.000064
303* 0	0.120	385 0	0.000053
305 0	0.060	390 0	0.000044
308 0	0.026	395 0	0.000036
310 0	0.015	400 0	0.000030
* Wavelengths chosen are representative: other values should be obtained by logarithmic interpolation at intermediate wavelengths.			
* Emission lines of a mercury discharge spectrum.			

Table 4.2		Spectral weighting functions for assessing retinal hazards from broadband optical sources		-
Wavelength nm	Blue-light hazard function B(λ)	Burn hazard function R(λ)		
300	0,01	-		
305	0,01	-		
310	0,01	-		
315	0,01	-		
320	0,01	-		
325	0,01	-		
330	0,01	-		
335	0,01	-		
340	0,01	-		
345	0,01	-		
350	0,01	-		
355	0,01	-		
360	0,01	-		
365	0,01	-		
370	0,01	-		
375	0,01	-		
380	0,01	0,1		
385	0,013	0,13		
390	0,025	0,25		
395	0,05	0,5		
400	0,10	1,0		
405	0,20	2,0		
410	0,40	4,0		
415	0,80	8,0		
420	0,90	9,0		
425	0,95	9,5		
430	0,98	9,8		
435	1,00	10,0		
440	1,00	10,0		
445	0,97	9,7		
450	0,94	9,4		
455	0,90	9,0		
460	0,80	8,0		
465	0,70	7,0		
470	0,62	6,2		
475	0,55	5,5		
480	0,45	4,5		
485	0,40	4,0		



490	0,22	2,2
495	0,16	1,6
500-600	$10^{[(450-\lambda)/50]}$	1,0
600-700	0,001	1,0
700-1050	0,013	$10^{[(700-\lambda)/500]}$
1050-1150	0,025	0,2
1150-1200	0,05	$0,2 \cdot 100 \cdot 0,2^{(1150-\lambda)}$
1200-1400	0,10	0,02

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

Table 5.4 Summary of the ELs for the surface of the skin or cornea (irradiance based values)					-
Hazard Name	Relevant equation	Wavelength Range nm	Exposure aperture rad(deg)	Limiting aperture rad(deg)	EL in items of constant irradiance $W \cdot m^{-2}$
Actinic UV skin & eye	$E_s = \sum E_\lambda \cdot S(\lambda)$	200 – 400	< 30000	1,4 (80)	30/t
Eye UV-A	$E_{UVA} = \sum E \cdot \Delta\lambda$	315 – 400	1000 >1000	1,4 (80)	10000/t 10
Blue-light small source	$E_B = \sum E \cdot B(\lambda) \cdot \Delta\lambda$	300 – 700	100 >100	< 0,011	100/t 1,0
Eye IR	$E_{IR} = \sum E \cdot \Delta\lambda$	780-3000	1000 >1000	1,4 (80)	$18000/t^{0.75}$ 100
Skin thermal	$E_H = \sum E \cdot \Delta\lambda$	380-3000	<10	2 sr	$20000/t^{0.75}$

Table 5.5 Summary of the ELs for the retina (radiance based values)					
Hazard Name	Relevant equation	Wavelength Range nm	Exposure duration Sec	Field of view radians	EL in terms of constant radiance $W \cdot m^{-2} \cdot sr^{-1}$
Blue light	$LB = \sum L_\lambda \cdot B(\lambda) \cdot \Delta\lambda$	300-700	0.25-10 10-100 100-10000 10000	0.011.(t/10) 0.011 0.0011.t 0.1	$10^6/t$ $10^6/t$ $10^6/t$ 100
Retinal thermal	$LR = \sum L_\lambda \cdot R(\lambda) \cdot \Delta\lambda$	380-1400	<0.25 0.25-10	0.0017 0.011.(t/10)	$50000/(t^{0.25})$ $50000/(t^{0.25})$
Retinal thermal(weak visual stimulus)	$LIR = \sum L_\lambda \cdot R(\lambda) \cdot \Delta\lambda$	780-1400	>10	0.011	6000/

Table 6.1 Emission limits for risk groups of continuous wave lamps						P
Risk	Action	Units	Symbol	Exempt	Low risk	Mod risk



	spectrum			Limit	Result	Limit	Result	Limit	Result
Actinic UV	$S_{uv}(\lambda)$	$W \cdot m^{-2}$	E_S	0.001	2.71e-08	0.003	0.00e+00	0.03	0.00e+00
Near UV		$W \cdot m^{-2}$	E_{UVA}	0.3	0	31.0	0	100.0	0
Blue light	$B(\lambda)$	$W \cdot m^{-2} \cdot sr^{-1}$	L_B	100	1.96e+01	10000		4000000	
Blue light, small source	$B(\lambda)$	$W \cdot m^{-2}$	E_B	-		-	-	-	-
Retinal thermal	$R(\lambda)$	$W \cdot m^{-2} \cdot sr^{-1}$	L_R	2.80e+05	3.35e+02	2.70e+05	0.00e+00	7.10e+05	0.00e+00
Retinal thermal, Weak visual stimulus**	$R(\lambda)$	$W \cdot m^{-2} \cdot sr^{-1}$	L_{IR}	6.00e+04	0.00e+00	6.00e+05	0.00e+00	6.00e+04	0.00e+00
IR radiation Eye		$W \cdot m^{-2}$	E_{IR}	100.0	0.00e+00	530.0	0.00e+00	3200.0	0.00e+00
* Small source defined as one with $\alpha < 0,011$ radian. Averaging field of view at 10000 s is 0,1 radian. ** Involves evaluation of non-GLS source									



EN 62493-2015

Test Report

1) Test Summary:

The EMF (Electromagnetic Field) measurement at the highest level component for the LED LIGHTING

Model: WBPS was shown as below:

Test Result Summary:

Model	Maximal test result (mA/m ²)	Weighted result	Maximum Limit(mA/m ²)	Pass / Fail
WBPS	0.288	N/A	8	Pass

2) Test condition:

Power Source of EUT: 24V~

Operation Condition: EUT continuously on .

Ambient Condition: 25 °C

Background Level: 1.028%

Measuring Distance: 50cm

Coupling Factor: $0.12 < 0.85$

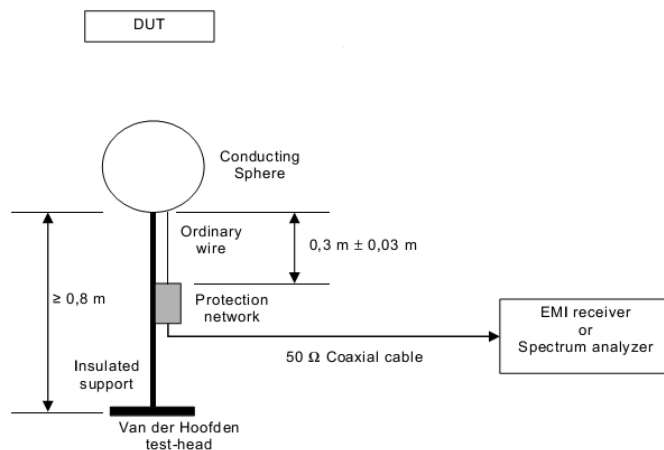
Sensor Locations: Around

3) Test data: (unit: mA/m²)

Measuring Positions	Front	Left	Right	Rear	Top	Bottom
Test result	0.234	0.221	0.227	0.226	0.243	0.195

4) Notes:

1. In accordance to EN 62493, The measurement frequency range considered is from 20 kHz to 10 MHz.
2. Measure set-up



3. Test time: 15mins.

***** End of Page*****



ANNEX A:

Photo-documentation



Photo 1 General Appearance of the EUT

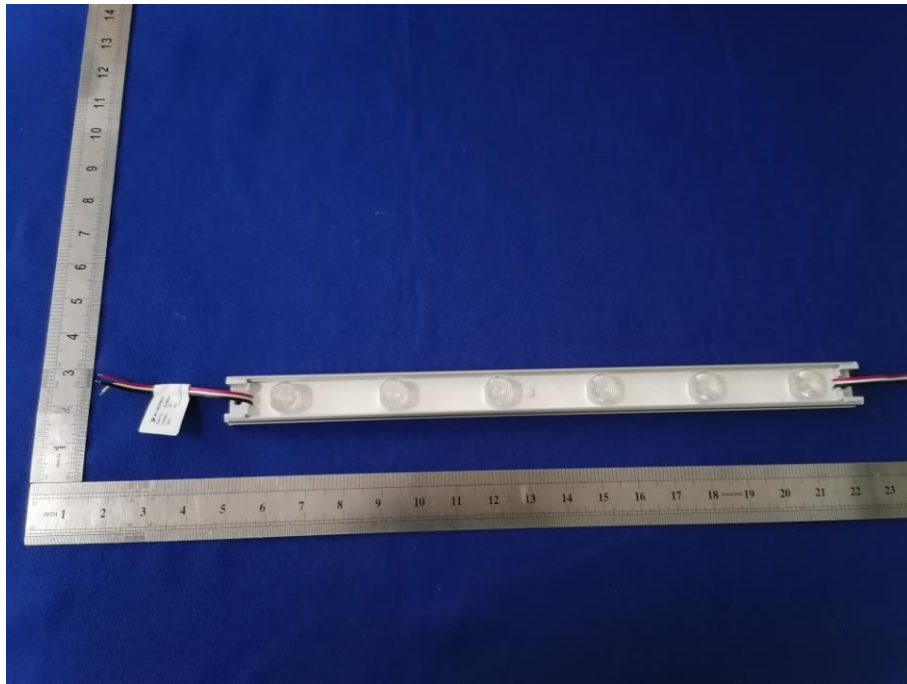


Photo 2 General Appearance of the EUT

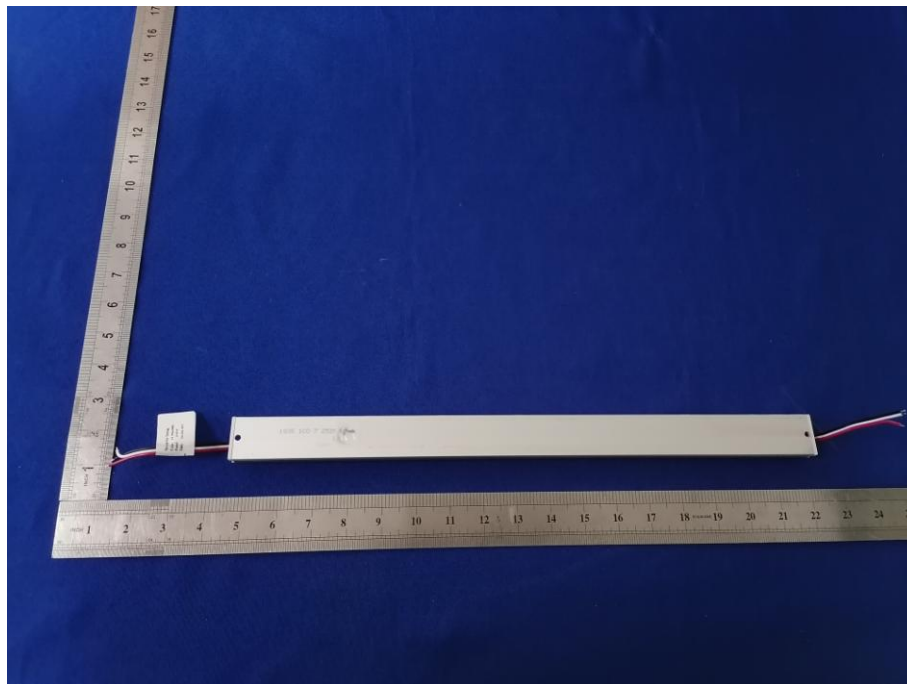




Photo 3 General Appearance of the EUT

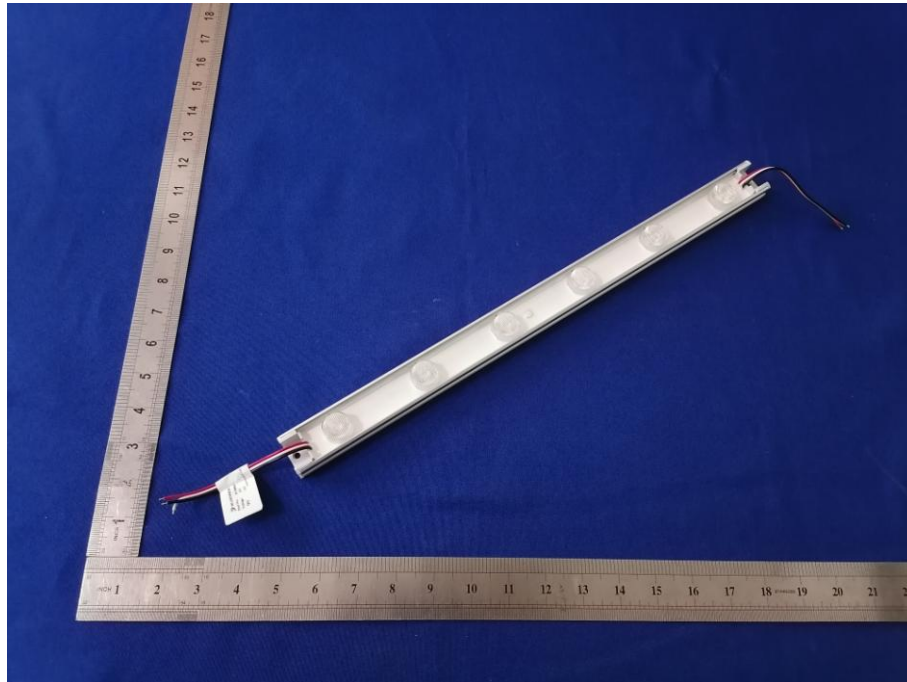


Photo 4 General Appearance of the EUT



Photo 5 General Appearance of the EUT



Photo 6 General Appearance of the EUT



End of the report