APPLICATION FOR LOW VOLTAGE DIRECTIVE
On Behalf of
AOK LED Light Company Limited
LED Canopy Light
Model: AOK-150WiC，AOK-110WiC， AOK-75WiC

Prepared For : **AOK LED Light Company Limited**
Building 1, St George's Science and Technology Industrial Park, Shajin Street, Shenzhen, Guangdong Province, China

Prepared By : **Shenzhen Anbotek Compliance Laboratory Limited**
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Date of Test: Feb. 20, 2016 to Mar. 22, 2016
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Report Number: R011512691S

TEST REPORT
EN 60598-2-2
Luminaires –
Part 2: Particular requirements -- Section 2: Recessed luminaires

Report

Report reference No.	R011512691S
Tested by	Banson Qiu
Approved by	Luson Xiao
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Contents	48 pages report

Testing laboratory

Name	Shenzhen Anbotek Compliance Laboratory Limited
Address	1/F., Building 1, SEC Industrial Park, No.0409 Qianhai Road, Nanshan District, Shenzhen, Guangdong, China
Testing location	As above

Client

Name	AOK LED Light Company Limited
Address	Building 1, St George's Science and Technology Industrial Park, Shajin Street, Shenzhen, Guangdong Province, China

Test specification

Standard	EN 60598-2-2:2012 used in conjunction with EN 60598-1:2015
Procedure deviation	N.A.
Non-standard test method	N.A.

Test item

Description	LED Canopy Light
Trademark	AOK
Manufacturer	AOK LED Light Company Limited
Adderss	Building 1, St George's Science and Technology Industrial Park, Shajin Street, Shenzhen, Guangdong Province, China
Factory	AOK LED Light Company Limited
Adderss	Building 1, St George's Science and Technology Industrial Park, Shajin Street, Shenzhen, Guangdong Province, China
Model and/or type reference	AOK-150WiC , AOK-110WiC，AOK-75WiC
Rating(s)	100-240V~, 50/60Hz, See attachment on page 4

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)

Testing

Date of receipt of test item .....: Feb. 20, 2016

Date(s) of performance of test .....: Feb. 20, 2016 to Mar. 22, 2016

General remarks

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

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

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

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

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

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

According to the EU directives which have been aligned with EU NLF (new legislative framework), both of manufacturer and importer's name and address shall be affixed on the product or, where that is not possible, on its packaging or in a document accompanying the product before the product is placed on the EU market.

Tests performed

- EN 60598-1:2015
- EN 60598-2-2:2012
- EN 62031:2008+A1:2013 +A2:2015
- EN 62471:2008
- EN 62493:2010

The submitted samples were classified as exempt group according to EN 62471:2008.

The submitted samples were found to comply with the above specification.

Attachment to test report

1. Attachment I: Attached report of EN 62031.
2. Attachment II: Attached report of EN 62471.
3. Attachment III: Attached report of EN 62493.
4. Attachment IV: Photo documentation

Copy of marking plate:

for major model only.

LED Canopy Light
Model No.: AOK-150WiC
Rating: 100-240V~, 50/60Hz, 150W
ta: 50℃ IP65

AOK LED Light Company Limited
Building 1, St George's Science and Technology Industrial Park, Shajin Street, Shenzhen, Guangdong Province, China

General product information

Product: LED Canopy Light, 100-240V~, 50/60Hz, Class I, IP65, ta: 50℃， suitable for mounting on normal flammable surface.

1. Power supply board difference: only power difference, the sample resistance is different, other materials are the same
2. Unless otherwise specified, the models AOK-150WiC was chosen as representative model to perform all tests, other models were chosen to perform additional tests.

Details information are listed as follows:

Model No.	Power (W)	LED Quantity	Driver	Dimension （MM）	Wight
AOK-150WiC	150W	273	HLG-185H-48A	420*420*60	5.0KG
AOK-110WiC	110W	182	HLG-120H-48A	420*420*60	5.0KG
AOK-75WiC	75W	112	HLG-80H-48A	420*420*60	4.8KG

Main model: AOK-150WiC

Electrical rating: 100-240V~ 50/60Hz 150W

Additional model
AOK-110WiC
Similar to AOK-150WiC except for rated 110W and LED driver
AOK-75WiC
Similar to AOK-150WiC except 75W and LED driver

EN 60598-2-2			
Clause	Requirement - Test	Result - Remark	Verdict
2.2 (0)	**SCOPE**		**---**
2.2 (0.2)	Information for luminaire design considered.....:	Yes ☒ No ☐	---
2.2 (0.3)	More sections applicable.....:	Yes ☐ No ☒	---
2.4 (2)	**CLASSIFICATION**		**---**
2.4 (2.2)	Type of protection .....:	Class I	---
2.4 (2.3)	Degree of protection.....:	IP65	---
2.4 (2.4)	Fixed luminaire suitable for normally flammable surfaces.....:	Yes ☒ No ☐	---
	Fixed luminaire suitable for non-combustible materials only .....:	Yes ☐ No ☒	---
2.4 (2.5)	Luminaire for normal use .....:	Yes ☒ No ☐	---
	Luminaire for rough service .....:	Yes ☐ No ☒	---
2.5 (3)	**MARKING**		---
2.5 (3.2)	Mandatory markings		P
	Position of the marking		P
	Format of symbols/text		P
2.5 (3.3)	Additional information		P
	Language of instructions	English	P
2.5 (3.3.1)	Combination luminaries		N
2.5 (3.3.2)	Nominal frequency in Hz	50/60Hz	P
2.5 (3.3.3)	Operating temperature		N
2.5 (3.3.4)	Symbol or warning notice		N
2.5 (3.3.5)	Wiring diagram		N
2.5 (3.3.6)	Special conditions		N
2.5 (3.3.7)	Metal halid lamp luminaire – warning		N
2.5 (3.3.8)	Limitation for semi-luminaires		N
2.5 (3.3.9)	Power factor and supply current		N
2.5 (3.3.10)	Suitability for use indoors		N
2.5 (3.3.11)	Luminaires with remote control		N
2.5 (3.3.12)	Clip-mounted luminaire – warning		N
2.5 (3.3.13)	Specifications of protective shields		N
2.5 (3.3.14)	Symbol for nature of supply	~	P
2.5 (3.3.15)	Rated current of socket outlet		N
2.5 (3.3.16)	Rough service luminaire		N

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Clause	Requirement - Test	Result - Remark	Verdict
2.5 (3.3.17)	The mounting instructions for luminaires with type X, Y or Z attachments	Type Y	P
2.5 (3.3.18)	Information of luminaires provided with a PVC non-detachable calbe or cord		N
2.5 (3.4)	Test of marking		---
	Test with water		P
	Test with hexane		P
	Legible after test		P
	Label attached		P
2.5.1	Insulating ceiling F mark		P
2.6 (4)	**CONSTRUCTION**		**---**
2.6 (4.2)	Components replaceable without difficulty		N
2.6 (4.3)	Wireways smooth and free from sharp edges		P
2.6 (4.4)	Lampholders		---
2.6 (4.4.1)	Integral lampholder		N
2.6 (4.4.2)	Wiring connection		N
2.6 (4.4.3)	Lampholder for end-to-end mounting		N
2.6 (4.4.4)	Positioning		N
2.6 (4.4.5)	Peak pulse voltage		N
2.6 (4.4.6)	Centre contact		N
2.6 (4.4.7)	Rough service luminaires		N
2.6 (4.4.8)	Lamp connectors		N
2.6 (4.5)	Starter holders		---
	Starter holder in luminaires other than class II	Without starter	N
	Starter holder class II construction		N
2.6 (4.6)	Terminal blocks		---
	Tails		N
	Unsecured blocks		N
2.6 (4.7)	Terminals and supply connections		---
2.6 (4.7.1)	Contact to metal parts		P
2.6 (4.7.2)	Location stranded wires		N
	8 mm test live conductor		N
	8 mm test earth conductor		N
2.6 (4.7.3)	Terminals for supply conductors		P
2.6 (4.7.4)	Terminals other than supply connection		N

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Clause	Requirement - Test	Result - Remark	Verdict
2.6 (4.7.5)	Heat-resistant wiring/sleeves		N
2.6 (4.7.6)	Multi-pole plug	No Multi-pole plug provided	N
2.6 (4.8)	Switches:		---
	- adequate rating	No switch provided	N
	- adequate fixing		N
	- polarized supply		N
2.6 (4.9)	Insulating lining and sleeves		---
2.6 (4.9.1)	Retainment		N
	Method of fixing ..... :		N
2.6 (4.9.2)	Insulated linings and sleeves		---
	a) & c) Insulation resistance and electric strength		N
	b) Ageing test. Temperature (°C) .....:		N
2.6 (4.10)	Insulation of Class II luminaires		---
2.6 (4.10.1)	No contact, mounting surface - accessible metal parts - wiring of basic insulation		N
	Safe installation fixed luminaires		N
	Capacitors		N
	Interference suppression capacitors according to IEC 60384-14		N
2.6 (4.10.2)	Assembly joints:		---
	- not coincidental		N
	- no straight access		N
	- degree of protection		N
2.6 (4.10.3)	Retainment of insulation:		---
	- fixed		N
	- unable to be replaced; luminaire inoperative		N
	- sleeves retained in position		N
	- lining in lampholder		N
2.6 (4.11)	Electrical connections		---
2.6 (4.11.1)	Contact pressure		P
2.6 (4.11.2)	Screws:		---
	- spaced threaded screws		N
	- thread-cutting screws		N
	- earth continuity		N

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Clause	Requirement - Test	Result - Remark	Verdict
	- at least two screws		N
2.6 (4.11.3)	Screw locking:		---
	- spring washer		N
	- rivets		N
2.6 (4.11.4)	Material of current-carrying parts		P
2.6 (4.11.5)	No contact to wood	No wood used	P
2.6 (4.11.6)	Electro-mechanical contact systems		P
2.6 (4.12)	Mechanical connections and glands		---
2.6 (4.12.1)	Mechanical stress		P
	Not made of soft metal		P
	Screws of insulating material		N
	Torque test: torque (Nm); part.....:	Screws for fixing enclosure : 1.2Nm	P
	Torque test: torque (Nm); part.....:	Screws for fixing LED driver: 0.8Nm	P
	Torque test: torque (Nm); part.....:	Screws for fixing LED module: 0.6Nm	P
2.6 (4.12.2)	Screw diameter up to 3 mm		N
2.6 (4.12.4)	Locked connections:		---
	- fixed arms; torque (Nm) .....:		N
	- lampholder; torque (Nm).....:		N
	- push-button switches; torque (Nm).....:		N
2.6 (4.12.5)	Screwed glands; force (N).....:		N
2.6 (4.13)	Mechanical strength		---
2.6 (4.13.1)	Impact tests:		---
	- Parts (other than ceramic) providing protection against electric shock; 0,35Nm energy (Nm):	PC cover: 0.2Nm	P
	- Ceramic parts and all other parts of the luminaires; 0,20Nm energy (Nm) ..... :	Metal enclosure; 0.35Nm	P
	1) live parts		P
	2) linings		N
	3) protection		P
	4) covers		P
2.6 (4.13.3)	Straight test finger		P
2.6 (4.13.4)	Rough service luminaires		---
	a) fixed		N

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Clause	Requirement - Test	Result - Remark	Verdict
	b) hand-held		N
	c) delivered with a stand		N
	d) for temporary installations and suitable for mounting on a stand		N
2.6 (4.13.6)	Tumbling barrel		N
2.6 (4.14)	Suspensions and adjusting devices		---
2.6 (4.14.1)	Mechanical load:		---
	A) four times the weight	4X5.0Kg	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
2.6 (4.14.2)	Load to flexible cables		---
	Mass (kg).....:		N
	Stress in conductors (N/mm²) .....:		N
	Semi-luminaires – mass (kg) .....:		N
	Semi-luminaires – bending moment (Nm) .....:		N
2.6 (4.14.3)	Adjusting devices:		---
	- rotating test; number of cycles .....:		N
	- strands broken		N
	- high voltage test		N
2.6 (4.14.4)	Telescopic tubes: cords not fixed to tube; no strain on conductors		N
2.6 (4.14.5)	Guide pulleys		N
2.6 (4.14.6)	Strain on socket-outlets		N
2.6 (4.15)	Flammable materials:		---
	- glow-wire test 650 ℃	PC cover	P
	- spacing ⩾ 30 mm		P
	- screen withstanding test of 13.3.1		N
	- screen dimensions		N
	- no fiercely burning material		P
	- thermal protection		N
	- electronic circuits exempted		N

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Clause	Requirement - Test	Result - Remark	Verdict
2.6 (4.15.2)	Luminaires made of thermoplastic material		---
	a) construction		N
	b) temperature sensing control		N
	c) surface temperature		N
2.6 (4.16)	Luminaires for mounting on normally flammable surfaces		---
	No lamp control gear		N
2.6 (4.16.1)	Lamp control gear spacing:		---
	- spacing 35 mm		N
	- spacing 10 mm		N
2.6 (4.16.2)	Thermal protection:		---
	- in lamp control gear		N
	- external		N
	- fixed position		N
	- temperature marked lamp control gear		N
2.6 (4.16.3)	Design to satisfy the test of 12.6		N
2.6 (4.17)	Drain holes		N
	Clearance at least 5 mm		N
2.6 (4.18)	Resistance to corrosion:		---
2.6 (4.18.1)	- rust-resistance		N
2.6 (4.18.2)	- season cracking in copper		N
2.6 (4.18.3)	- corrosion of aluminium	IEC60598 Annex L.4 :Corrosion resistance Luminaires for use outdoors	P
2.6 (4.19)	Ignitors compatible with ballast		N
2.6 (4.20)	Rough service vibration.....:		N
2.6 (4.21)	Protective shield:		---
2.6 (4.21.1)	Shield fitted		N
2.6 (4.21.2)	Particles from a shattering lamp not impair safety		N
2.6 (4.21.3)	No direct path		N
2.6 (4.21.4)	Impact test on shield		N
	Glow-wire test on lamp compartment		N
2.6 (4.22)	Attachments to lamps		N
2.6 (4.23)	Semi-luminaires comply class II		N
2.6 (4.24)	UV radiation, metal halide lamps		N

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Clause	Requirement - Test	Result - Remark	Verdict
2.6 (4.25)	No sharp point or edges		P
2.6 (4.26)	Short-circuit protection:		---
2.6 (4.26.1)	Uninsulated accessible SELV parts		N
2.6 (4.26.2)	Short-circuit test		N
2.6 (4.26.3)	Test chain according to IEC 61032		N
2.7 (11)	**CREEPAGE DISTANCES AND CLEARANCES**		**---**
	Class of protection .....:	Class I	---
	Working voltage (V).....:	AC 100-240V	---
	Voltage form	Sinusoidal ☒ Non-sinusoidal ☐	---
	PTI	< 600 ☒ ≥ 600 ☐	---
	Rated pulse voltage (kV) .....:		---
	(1) Live parts of different polarity: cr (mm); cl (mm).....:	Approved LED driver	P
	(2) Live parts and accessible parts: cr (mm); cl (mm).....:	Class III construction part: Cr>2,5mm (Required: 1,2mm); cl>2,5mm (Required: 0,2mm)	P
	(3) Parts becoming live: cr (mm); cl (mm).....:		N
	(4) Outer surface of cable: cr (mm); cl (mm).....:		N
	(5) Live parts of switches: cr (mm); cl (mm).....:		N
	(6) Live parts and supporting surface: cr (mm); cl (mm).....:	Class III construction part: Cr>2,5mm (Required: 1,2mm); cl>2,5mm (Required: 0,2mm)	P
2.8 (7)	**PROVISION FOR EARTHING**		**---**
2.8 (7.2.1 + 7.2.3)	Metal parts		P
	Accessible metal parts		P
	Metal parts and supporting surface		P
	Resistance < 0,5 Ω	0,14Ω	P
	Two spaced threaded screws used		N
	Thread-forming screws		N
	Connector earthing first		N
2.8 (7.2.2 + 7.2.3)	Earth continuity		P
2.8 (7.2.4)	Locking of clamping means		P
	Compliance with 4.7.3		P

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Clause	Requirement - Test	Result - Remark	Verdict
	Adequate locking		N
	Loosening of clamping means		N
2.8 (7.2.5 + 7.2.9)	Connector socket		N
2.8 (7.2.6 + 7.2.9)	Position of the earth terminal		P
2.8 (7.2.7 + 7.2.9)	Corrosion of the earth terminal		P
2.8 (7.2.8 + 7.2.9)	Material of earth terminal		P
	Contact surface bare metal		P
2.8 (7.2.10)	Class II luminaire for looping-in		N
2.8 (7.2.11)	Earthing core coloured green-yellow		P
	Length of earth conductor		P
2.9 (14)	**SCREW TERMINALS**		**---**
	Separately approved; component list	(see Annex 1)	N
	Part of the luminaire	(see Annex 3)	N
2.9 (15)	**SCREWLESS TERMINALS**		**---**
	Separately approved; component list	(see Annex 1)	P
	Part of the luminaire	(see Annex 4)	P
2.10 (5)	**EXTERNAL AND INTERNAL WIRING**		**---**
2.10 (5.2)	Supply connection and external wiring		---
2.10 (5.2.1 + 5.2.4)	Means of connection .....:	Non-detachable supply cord without plug	P
2.10 (5.2.2 + 5.2.4)	Type of cable.....:	60245IEC 53	P
	Nominal cross-sectional area (mm²) .....:	3X1,0 mm²	P
2.10 (5.2.3 + 5.2.4)	Replacement of non-detachable cable and cords		N
2.10 (5.2.5)	Non-rewirable connection		P
2.10 (5.2.6)	Cable entries:		---
	- suitable for introduction		P
	- adequate degree of protection		P
2.10 (5.2.7)	Cable entries through rigid material have rounded edges		N
2.10 (5.2.8)	Insulating bushings:		---
	- suitably fixed		N

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Clause	Requirement - Test	Result - Remark	Verdict
	- material in bushings		N
	- tubes or guards made of insulating material		N
2.10 (5.2.9)	Locking of bushings		N
2.10 (5.2.10)	Cord anchorage:		---
	- covering protected from abrasion		P
	- clear how to be effective		P
	- no mechanical or thermal stress		P
	- no tying of cables into knots etc.		P
	- insulating material or lining		P
2.10 (5.2.10.1)	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
2.10 (5.2.10.2)	Adequate cord anchorage for type Y and type Z attachment	Type Y	P
2.10 (5.2.10.3)	Tests:		---
	- impossible to push cable; unsafe		P
	- pull test: 25 times; pull (N) .....:	60N	P
	- torque test: torque (Nm).....:	0.25Nm	P
	- displacement ⩽ 2 mm	0.4mm	P
	- no movement of conductors		P
	- no damage of cable or cord		P
2.10 (5.2.11)	External wiring passing into luminaire		N
2.10 (5.2.12)	Looping-in terminals		N
2.10 (5.2.13)	Wire ends not tinned		N
	Wire ends tinned: no cold flow		N

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Clause	Requirement - Test	Result - Remark	Verdict
2.10 (5.2.14)	Mains plug same protection		N
	Class III luminaire plug		N
2.10 (5.2.15)	Colour code low voltage		N
2.10 (5.2.16)	Appliance inlets (IEC 60320)	No inlets	N
	Appliance couplers of class II type		N
2.10 (5.3)	Internal wiring		---
2.10 (5.3.1)	Cross-sectional area (mm^2).....:		P
	Insulation thickness		N
	Temperature resistant		N
	Sleeves suitable for hot spots		N
	Green-yellow for earth only		P
	Through wiring		---
	- cross-sectional area (mm^2) .....:		N
	- not delivered/ mounting instruction		N
	- factory assembled		N
	- socket outlet loaded (A) .....:		N
	- temperatures.....:		N
2.10 (5.3.2)	Sharp edges etc.		P
	No moving parts of switches etc.	No such parts	N
	Joints, raising/lowering devices		N
	Telescopic tubes etc.		N
	No twisting over 360^o		N
2.10 (5.3.3)	Openings		N
	Bushings not removable		N
	Bushings in sharp openings		N
	Cables with protective sheath		N
2.10 (5.3.4)	Joints and junctions:		---
	- easily accessible		N
	- effectively insulated		N
2.10 (5.3.5)	Strain on internal wiring		N
2.10 (5.3.6)	Wire carriers		N
2.10 (5.3.7)	Wire ends not tinned		P

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Clause	Requirement - Test	Result - Remark	Verdict
	Wire ends tinned: no cold flow		N
2.11 (8)	**PROTECTION AGAINST ELECTRIC SHOCK**		**---**
2.11	The parts of the luminaire and components within the ceiling space or cavity shall provide the same degree of protection against electric shock as the luminaire parts below the ceiling space		P
2.11 (8.2.1 + 8.2.5)	Live parts not accessible		P
	Protection in any position		P
	Insulation lacquer not reliable		P
	Double-ended tungsten filament lamp		N
	Double-ended high pressure discharge lamp		N
2.11 (8.2.2 + 8.2.5)	Portable luminaire		N
2.11 (8.2.3 + 8.2.5)	Class II luminaire:		---
	- insulation-encased, reinforced insulation		N
	- metal-encased, double insulation		N
	- basic insulated metal parts or basic insulated live conductors only accessible during starter or lamp replacement		N
	- glass protective shields not used as supplementary insulation		N
	Class I luminaire with BC lampholder		N
2.11 (8.2.4 + 8.2.5)	Portable luminaire:		---
	- non-detachable cable		N
	- terminal block completely covered		N
2.11 (8.2.6)	Covers have adequate strength		P
	Covers reliably secured		P
2.11 (8.2.7)	Discharging of capacitors $\geqslant$ 0,5 µF		N
	Portable plug connected luminaire with capacitor		N
	Other plug connected luminaire with capacitor		N
	Discharge device on or within capacitor		N
	Discharge device mounted separately		N
2.12 (12)	**ENDURANCE TEST AND THERMAL TEST**		**---**
2.12 (12.3)	Endurance test:		---

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Clause	Requirement - Test	Result - Remark	Verdict
	- mounting-position.....:	(see Annex 2)	---
	- test temperature (℃).....:	60℃	---
	- total duration (h).....:	240h	---
	- supply voltage: Un factor; calculated voltage (V).....:	264V	---
	- lamp used.....:	LED module delivered by manufacturer	---
2.12 (12.3.2)	After endurance test:		---
	- no part unserviceable		P
	- luminaire not unsafe		P
	- no damage to track system	Not track-mounted luminaires	N
	- marking legible		P
	- no cracks, deformation etc.		P
2.12 (12.4)	Thermal test (normal operation)	(see Annex 2)	P
2.12 (12.5)	Thermal test (abnormal operation)	(see Annex 2)	N
2.12 (12.6)	Thermal test (failed lamp control gear condition):		---
2.12 (12.6.1)	- case of abnormal conditions .....:		N
	- electronic lamp control gear		N
	- measured winding temperature (℃) at 1,1 Un..:		N
	- measured mounting surface temperature (℃) at 1,1 Un.....:		N
	- calculated mounting surface temperature (℃)..:		N
	- track-mounted luminaires		N
2.12 (12.6.2)	Temperature sensing control		---
	- thermal link		N
	- manual reset cut-out		N
	- auto reset cut-out		N
	- measured mounting surface temperature (℃) :		N
	- track-mounted luminaires		N
2.12 (12.7)	Thermal test (failed lamp control gear in plastic luminaires):		---
	- case of abnormal conditions .....:		N
2.12 (12.7.1)	- measured winding temperature (℃) at 1,1 Un..:		N

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Clause	Requirement - Test	Result - Remark	Verdict
	- measured temperature of fixing point/ exposed part (℃) at 1,1 Un .....:		N
	- calculated temperature of fixing point/ exposed part (℃) .....:		N
2.12 (12.7.2)	Temperature sensing control		---
	- thermal link		N
	- manual reset cut-out		N
	- auto reset cut-out		N
	- measured temperature of fixing point/ exposed part (℃) .....:		N
2.12.1	Wiring, for connection to the supply, which passes into or can touch the luminaire shall not reach unsafe temperature		P
	Checked by specified tests		P
2.12.2	Luminaires with an IP classification greater than IP20 shall be subjected to the relevant tests		P
2.13 (9)	**RESISTANCE TO DUST, SOLID OBJECTS AND MOISTURE**		**---**
2.13	For luminaires with an IP classification greater than IP20 the order of the tests specified in section 9 of IEC 60598-1 shall be as specified in clause 2.12		P
2.13 (9.2)	Tests for ingress of dust, solid objects and moisture:		---
	- classification according to IP.....:	IP65	---
	- mounting position during test.....:	As in normal use	---
	- fixing screws tightened; torque (Nm) .....:	--	---
	- tests according to clauses.....:	9.2.2&9.2.6	---
	- 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 live parts		P
	d) no accumulation of water in waterproof luminaire		P
	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
2.13 (9.3)	Humidity test 48 h	Humidity: 93% Temperature: 25℃	P

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Clause	Requirement - Test	Result - Remark	Verdict
2.14 (10)	**INSULATION RESISTANCE AND ELECTRIC STRENGTH**		**---**
2.14 (10.2.1)	Insulation resistance test:		---
	Class of protection .....:	Class I	---
	Insulation resistance (MΩ):		---
	SELV:		---
	- between current-carrying parts of different polarity.....:		N
	- between current-carrying parts and mounting surface.....:	More than 100 MΩ	P
	- between current-carrying parts and metal parts of the luminaire.....:	More than 100 MΩ	P
	Other than SELV:		---
	- between live parts of different polarity .....:		N
	- between live parts and mounting surface .....:	More than 100 MΩ	P
	- between live parts and metal parts .....:	More than 100 MΩ	P
	- between live parts of different polarity through action of a switch.....:		N
2.14 (10.2.2)	Electric strength test		---
	Class of protection .....:		---
	Dummy lamp		N
	Luminaires with ignitors after 24 h test	No ignitor	N
	Luminaires with manual ignitors	As above	N
	Test voltage (V):		---
	SELV:		---
	- between current carrying parts of different polarity.....:		N
	- between current carrying parts and mounting surface.....:	500V	P
	- between carrying parts parts and metal parts of the luminaire.....:	500V	P
	Other than SELV:		---
	- between live parts of different polarity .....:		N
	- between live parts and mounting surface .....:	1480V	P
	- between live parts and metal parts .....:	1480V	P
	- between live parts of different polarity through action of a switch.....:		N

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Clause	Requirement - Test	Result - Remark	Verdict
2.14 (10.3)	Touch current (mA) .....:	0,005mA (limit: 0,7mA)	P
2.15 (13)	**RESISTANCE TO HEAT, FIRE AND TRACKING**		**---**
2.15 (13.2.1)	Ball-pressure test:		---
	- part tested; temperature (℃)..... :	connector: 125°C; 1.0mm<2.0mm	P
	- part tested; temperature (℃)..... :	PC cover: 82.3°C 1.4mm<2.0mm	P
	- part tested; temperature (℃)..... :		N
	- part tested; temperature (℃)..... :		N
2.15 (13.3.1)	Needle flame test (10 s):		---
	- part tested .....:	Wire connector	P
	- part tested .....:		N
	- part tested .....:		N
2.15 (13.3.2)	Glow wire test (650 ℃):		---
	- part tested .....:	PC cover	P
2.15 (13.4.1)	Tracking test: part tested.....:		N

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Clause	Requirement - Test	Result - Remark	Verdict

ANNEX 1	**components**				**P**
object/part No.	manufacturer/ trademark	type/model	technical data	standard	mark(s) of conformity
Power cord	Ningbo Dabu Electric Appliance Co., Ltd	60245IEC 53 3X1.0mm²	3X1.0mm²	AS/NZS 60245.4:2003+A1	SAA130155EA
LED driver for AOK-150WiC AOK-110WiC AOK-75WiC	MEAN WELL	HLG-185H-48A	Input: 100-240V, 4.0A, 50-60Hz, Output: 48V, d.c., 3.9A	AS/NZS61347.1:2002	ESV110557/02
LED driver for AOK-110WiC	MEAN WELL	HLG-120H-48A	Input: 100-240V, 4.0A, 50-60Hz, Output: 48V, d.c., 2.5A	AS/NZS61347.1:2002	ESV110557/02
LED driver for AOK-75WiC	MEAN WELL	HLG-80H-48A	Input: 100-240V, 50-60Hz, Output: 48V, d.c.,1.7A	AS/NZS61347.1:2002	ESV110557/02
Internal wire	PACIFIC ECHO INC	DXOQ7 DXOQ²	Flexible Nonmetallic Conduit, Liquid-tight	--	UL E156545
connector	Suzhou Industrial Park Exceedconn Technology Co.,Ltd	Eco*681-0***-BF	IP68,Non-rewirable ,pollution degree 2, overvoltage Category II	EN61984	ITS SH10061189-V2
PC cover of LED module	Dongguan Hengli photoelectric Co Ltd	Lens	V-2, 125□ C	--	Test with appliance
PCB of LED module	SHENZHEN BOMIN XING ELECTRONIC CO LTD	BMX-04	V-0,120□	--	UL E226252
LED chip	Lumileds	LUXEON 3030 2D	6V 240mA	--	Test with appliance

ANNEX 2	**Temperature measurements, thermal tests of Section 12**		P
	Type reference:	AOK-150WiC	---
	Lamp used.....:	LED module delivered by the manufacturer	---
	Ballast used.....:	Integral electronic LED driver	---
	Mounting position of luminaire .....:	As in normal use	---
	Supply wattage (W).....:		---

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Clause	Requirement - Test	Result - Remark	Verdict

	Supply current (A) .....:		---
	Calculated power factor .....:	--	---
	Table: measured temperatures corrected for Ta = 50 ℃:		--
	- abnormal operating mode.....:	--	---
	- test 1: rated voltage .....:	--	---
	- test 2: 1,06 times rated voltage or 1,05 times rated wattage .....:	a) 1,06x240V=254,4V b) 1,06x100V=106V	---
	- 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 .....:	--	---

temperature (□) of part	clause 12.4 – normal					clause 12.5 – abnormal	
	test 1	test 2		test 3	limits	test 4	Limit
--	--	a)	b)	--	--	--	--
Supply cord	--	65.9	67.5	--	90	--	--
Output wire of LED driver	--	64.7	67.1	--	90	--	--
tc of LED driver	--	69.5	70.6	--	80	--	--
connector	--	60.0	58.4	--	REF.	--	--
PCB near LED module	--	64.5	66.3	--	130	--	--
PC cover	--	59.3	62.9	--	REF.	--	--
Mounting surface	--	52.3	51.2	--	90	--	--

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

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Clause	Requirement - Test	Result - Remark	Verdict
(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 under damage		N
ANNEX 4	**Screwless terminals (part of the luminaire)**		**---**
(15)	**SCREWLESS TERMINALS**		**---**
(15.2)	Type of terminal.....:		---
	Rated current (A).....:		---
(15.3.1)	Material		P
(15.3.2)	Clamping		P
(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		P
(15.3.7)	Clamping independently		P
(15.3.8)	Fixed in position		P
(15.3.10)	Conductor size		P
	Type of conductor		P
(15.5.1)	Terminals internal wiring		P
(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)		P
	Insertion force not exceeding 50 N		P
(15.5.2)	Permanent connections: pull-off test (20 N)		N
(15.6)	Electrical tests		--
	Voltage drop (mV) after 1 h (4 samples).....:	7,5mV	P

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Clause	Requirement - Test	Result - Remark	Verdict

	Voltage drop of two inseparable joints		P
	Number of cycles.....:	25	---
	Voltage drop (mV) after 10th alt. 25th cycle (4 samples).....:	8,6mV	P
	Voltage drop (mV) after 50th alt. 100th cycle (4 samples).....:		N
	After ageing, voltage drop (mV) after 10th alt. 25th cycle (4 samples) .....:	8,9mV	P
	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		--
	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

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Clause	Requirement - Test	Result - Remark	Verdict

voltage drop (mV)										

Attachment I: Attached report of EN 62031			
Clause	Requirement - Test	Result - Remark	Verdict
1	**SCOPE**		**---**
	LED modules without integral control gear for operation under constant voltage, constant current or constant power	Yes	---
	self-ballasted LED modules for use on d.c. supplies up to 250 V or a.c. supplies up to 1000 V at 50 Hz or 60 Hz.	No	---
6	**CLASSIFICATION**		**---**
	Modules are classified, according to the method of installation, as:		---
	– Built-in	No	---
	– independent	No	---
	– integral	Yes	---
7	**MARKING**		---
7.1	Mandatory markings for built-in or independent modules		N
7.2	Location of marking		N
	For integral modules, no marking is required		N
7.3	Durability and legibility of marking		---
	Test with water		N
8	**TERMINALS**		**---**
	For screw terminals		N
	Separately approved; component list		N
	Part of the luminaire		N
	For screwless terminals		N
	Separately approved; component list		N
	Part of the luminaire		N
9	**PROVISIONS FOR PROTECTIVE EARTHING**		**---**
	The electrical connection / clamping means shall be adequately locked against loosening, and it shall not be possible to loosen the electrical connection/clamping means by hand without the use of a tool.		N
	For screwless terminals, it shall not be possible to loosen the clamping means/electrical connection unintentionally.		N

Attachment I: Attached report of EN 62031			
Clause	Requirement - Test	Result - Remark	Verdict
	Earthing of LED modules (other than independent LED modules) via means of fixing the LED modules to earthed metal is permitted. However, if a LED modules has an earthing terminal, this terminal shall only be used for earthing the LED modules		N
	All parts of an earthing terminal shall be such as to minimize the danger of electrolytic corrosion resulting from contact with the earth conductor or any other metal in contact with them.		N
	The screw and the other parts of the earthing terminal shall be made of brass or other metal no less resistant to corrosion, or material with a non-rusting surface and at least one of the contact surfaces shall be bare metal.		N
10	**PROTECTION AGAINST ACCIDENTAL CONTACT WITH LIVE PARTS**		**---**
10.1	LED modules which do not rely upon the luminaire enclosure for protection against electric shock shall be sufficiently protected against accidental contact with live parts (see Annex A) when installed as in normal use		N
	Integral LED modules, which relies upon the luminaire enclosure for protection, shall be tested according to its intended use.		N
	Lacquer or enamel is not considered to be adequate protection or insulation for the purpose of this requirement.		N
	Parts providing protection against accidental contact shall have adequate mechanical strength and shall not work loose in normal use. It shall not be possible to remove them without the use of a tool.		N
10.2	LED modules incorporating capacitors of total capacitance exceeding 0,5 µF shall be constructed so that the voltage at the LED modules terminations does not exceed 50 V, 1 min after disconnection of the LED modules from a source of supply at rated voltage.		N
11	**MOISTURE RESISTANCE AND INSULATION**		**---**
	LED modules shall be moisture-resistant. They shall not show any appreciable damage after being subjected to the following test.		P
	Humidity test 48 h	Humidity: 93% Temperature: 25℃	P
	a) between live parts of different polarity which are or can be separated	See EN 60598-1, evaluated with integral control gear	P

Attachment I: Attached report of EN 62031			
Clause	Requirement - Test	Result - Remark	Verdict
	b) between live parts and external parts, including fixing screws	Ditto	P
	c) between live parts and control terminals, where relevant		N
12	**ELECTRIC STRENGTH**		**---**
	LED modules shall have adequate electric strength		P
	Immediately after the measurement of the insulation resistance		P
	Test voltage (V):		---
	- a) between live parts of different polarity which are or can be separated .....:	See IEC 60598-2-2, evaluated with integral control gear	P
	- b) between live parts and external parts, including fixing screws.....:	Ditto	P
	- c) between live parts and control terminals, where relevant.....:		N
	No flashover or breakdown shall occur during the test		P
	The overcurrent relay shall not trip when the output current is less than 100 mA.		P
	The metal foil referred to in Clause 11 shall be placed so that no flashover occurs at the edges of the insulation		P
	Glow discharges without drop in voltage are neglected.		N
13	**FAULT CONDITIONS**		**---**
13.1	The module shall not impair safety when operated under fault conditions that may occur during the intended use		P
	When operated under fault conditions LED modules, compliance with :		---
	- does not emit flames or molten material		P
	- does not produce flammable gases		P
	- protection against accidental in accordance with 10.1 not impared		P
	- totally enclosed LED modules or components not be opened.		P
	-for LED modules marked with symbol of thermal protected, temperature at any place not exceed the marked temperature value		N
	Short circuit across creepage distance and clearance less than value specified in clause 16		N

Attachment I: Attached report of EN 62031			
Clause	Requirement - Test	Result - Remark	Verdict
	Short circuit across or interruption of semi-conductor devices		N
	Short circuit across insulation consisting of covering of lacuqer, enamel or textile		N
	Short circuit across electrolytic capacitors		P
13.2	Overpower condition		---
	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.		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		N
	After finalising the overpower mode, the module is operated under normal conditions until thermally being stable.		N
14	**CONFORMITY TESTING DURING MANUFACTURE**		**---**
	see Annex 2		---
15	**CONSTRUCTION**		**---**
	Wood, cotton, silk, paper and similar fibrous material shall not be used as insulation		P
16	**CREEPAGE DISTANCES AND CLEARANCES**		**---**
	The requirements of IEC 60598-2-1, Section 1.7, apply.		N
17	**SCREWS, CURRENT-CARRYING PARTS AND CONNECTIONS**		**---**
	Screws, current-carrying parts and mechanical connections, the failure of which might cause the lamp controlgear to become unsafe, shall withstand the mechanical stresses occurring in normal use.		N
	Screws, current-carrying parts and connections in compliance with IEC 60598-1 (clause numbers between parentheses refer to IEC 60598-1)		N
(4.11)	Electrical connections		---
(4.11.1)	Contact pressure		N
(4.11.2)	Screws:		---
	- self-tapping screws		P
	- thread-cutting screws		N
	- at least two self-tapping screws		N
(4.11.3)	Screw locking:		**---**
	- spring washer		N
	- rivets		N

Attachment I: Attached report of EN 62031			
Clause	Requirement - Test	Result - Remark	Verdict
(4.11.4)	Material of current-carrying parts		P
(4.11.5)	No contact to wood		P
(4.12)	Mechanical connections and glands		N
(4.12.1)	Mechanical stress		P
	Screws not made of soft metal		P
	Screws of insulating material		P
	Torque test: part; torque (Nm)	See IEC 60598-2-2	P
	Torque test: part; torque (Nm)		N
	Torque test: part; torque (Nm)		N
(4.12.2)	Screw diameter < 3mm screwed into metal		N
(4.12.3)	Void		---
(4.12.4)	Locked connections		N
(4.12.5)	Screwed glands: force (N)		N
18	**RESISTANCE TO HEAT, FIRE AND TRACKING**		---
18.1	Parts of insulating material either retaining live parts in position or providing protection against electric shock shall be sufficiently resistant to heat	See IEC 61347-2-13	P
	- retaining live part; test perature (℃)		P
	- provide protection against electric shock part; test temperature (℃)		P
18.2	External Parts of insulating material resistant to flame and ignition/fire		N
	Printed boards in accordance with IEC 60249-1, 4.3		N
18.3	External parts of insulating material preventing electric shock subjected for 30 s to the glow-wire test in accordance with IEC 60695-2-1		N
	-one specimen		N
	-a complete lamp controlgear		N
	-temperature of the tip of the glow-wire shall be 650℃		N
18.4	Parts of insulating material retaining live parts in position, needle-flame test in accordance with IEC 60695-2-2		N
	-one specimen		N
	-a complete lamp controlgear		N

Attachment I: Attached report of EN 62031			
Clause	Requirement - Test	Result - Remark	Verdict
	- test flame applied to the centre of the suface		N
	- duration of application 10s		N
	-extinguish within 30 s of removal of glow wire and any flaming drops not ignite a piece of tissue paper		N
18.5	Tracking test		N
19	**RESISTANCE TO CORROSION**		**---**
	Ferrous parts, protected against rusting		N
	- 10% solution of ammonium chloride in water		N
	- adequate varnish on the outer surface		N
ANNEX A	**TESTS**		**---**
-A.1	Ambient temperature and test room		P
-A.2	Supply voltage and frequency		P
-A.2.1	Test voltage and frequency		P
-A.2.2	Stability of supply and frequency		P
-A.2.3	Supply voltage waveform for reference LED module only		P
-A.3	Electrical characteristics of LED module		P
-A.4	Magnetic effects		P
-A.5	Mounting and connection of reference lamps		P
-A.6	Reference LED module stability		P
-A.7	Instrument characteristics		P
-A.7.1	Potential		P
-A.7.2	Current circuits		N
-A.7.3	RMS measurements		N
-A.8	Invertor power sources		N
-A.9	Reference LED module		N
-A.10	Reference LED module		N
-A.11	Test conditions		N
-A.11.1	Resistance measurement delays		N
-A.11.2	Electrical resistance of contacts and leads		N

Attachment I: Attached report of EN 62031			
Clause	Requirement - Test	Result - Remark	Verdict
-A.12	LED module heating		P
-A.12.1	Built-in LED module		N
-A.12.1.1	Temperature of LED module parts		P
-A.12.1.2	Temperature of l LED module windings		N
-A.12.2	Independent LED module		N
-A.12.3	Integral LED module		P
-A.12.4	Test conditions		P
Annex C	**Conformity testing during manufacture**		---
	This test is carried out at 100 % of production. It is combined with the measurement of input power at rated voltage/current. The luminous flux of no module should be significantly lower than that of the rest of the production.		N

Attachment II: Attached report of EN 62471			
Clause	Requirement - Test	Result - Remark	Verdict

4	**EXPOSURE LIMITS**		—
4.1	General		N
	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		N
	Detailed spectral data of a light source are generally required only if the luminance of the source exceeds 10^4 cd·m^{-2}	see clause 4.3	N
4.3	Hazard exposure limits		N
4.3.1	Actinic UV hazard exposure limit for the skin and eye		N
	The exposure limit for effective radiant exposure is 30 J·m^{-2} 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
	$E_s \cdot t = \sum_{200}^{400} \sum_{t} E_\lambda(\lambda,t) \cdot S_{UV}(\lambda) \cdot \Delta t \cdot \Delta\lambda \le 30$ J·m^{-2}		N
	The permissible time for exposure to ultraviolet radiation incident upon the unprotected eye or skin shall be computed by:		N
	$t_{max} = \frac{30}{E_s}$ s		N
4.3.2	Near-UV hazard exposure limit for eye		N
	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 1000 s. 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}.		N
	The permissible time for exposure to ultraviolet radiation incident upon the unprotected eye for time less than 1000 s, shall be computed by:		N
	$t_{max} \le \frac{10\,000}{E_{UVA}}$ s		N
4.3.3	Retinal blue light hazard exposure limit		N
	To protect against retinal photochemical injury from chronic blue-light exposure, the integrated spectral radiance of the light source weighted		N

Attachment II: Attached report of EN 62471			
Clause	Requirement - Test	Result - Remark	Verdict
	against the blue-light hazard function, B(λ), i.e., the blue-light weighted radiance , L_B, shall not exceed the levels defined by:		
	$L_B \cdot t = \sum_{300}^{700} \sum_{t} L_\lambda(\lambda,t) \cdot B(\lambda) \cdot \Delta t \cdot \Delta\lambda \le 10^6$ $J \cdot m^{-2} \cdot sr^{-1}$	for t ≤ 10^4 s $t_{max} = \frac{10^6}{L_B}$	N
	$L_B = \sum_{300}^{700} L_\lambda \cdot B(\lambda) \cdot \Delta\lambda \le 100$ $W \cdot m^{-2} \cdot sr^{-1}$	for t > 10^4 s	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 function B(λ) shall not exceed the levels defined by:	see table 4.2	N
	$E_B \cdot t = \sum_{300}^{700} \sum_{t} E_\lambda(\lambda,t) \cdot B(\lambda) \cdot \Delta t \cdot \Delta\lambda \le 100$ $J \cdot m^{-2}$	for t ≤ 100 s	N
	$E_B = \sum_{300}^{700} E_\lambda \cdot B(\lambda) \cdot \Delta\lambda \le 1$ $W \cdot m^{-2}$	for t > 100 s	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 $R(_\lambda)$ (from Figure 4.2 and Table 4.2), i.e., the burn hazard weighted radiance, shall not exceed the levels defined by:		N
	$L_R = \sum_{380}^{1400} L_\lambda \cdot R(\lambda) \cdot \Delta\lambda \le \frac{50\,000}{\alpha \cdot t^{0,25}}$ $W \cdot m^{-2} \cdot sr^{-1}$	(10 µs ≤ t ≤ 10 s)	N
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
	$L_{IR} = \sum_{780}^{1400} L_\lambda \cdot R(\lambda) \cdot \Delta\lambda \le \frac{6\,000}{\alpha}$ $W \cdot m^{-2} \cdot sr^{-1}$	t > 10 s	N
4.3.7	Infrared radiation hazard exposure limits for the eye		N
	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:		N

Attachment II: Attached report of EN 62471			
Clause	Requirement - Test	Result - Remark	Verdict
	$E_{IR} = \sum_{780}^{3\,000} E_\lambda \cdot \Delta\lambda \le 18\,000 \cdot t^{-0,75}$ W · m^{-2}	t ≤ 1000 s	N
	For times greater than 1000 s the limit becomes:		N
	$E_{IR} = \sum_{780}^{3\,000} E_\lambda \cdot \Delta\lambda \le 100$ W · m^{-2}	t > 1000 s	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
	$E_H \cdot t = \sum_{380}^{3\,000} \sum_{t} E_\lambda(\lambda,t) \cdot \Delta t \cdot \Delta\lambda \le 20\,000 \cdot t^{0,25}$ J · m^{-2}		N
5	**MEASUREMENT OF LAMPS AND LAMP SYSTEMS**		—
5.1	Measurement conditions		P
	Measurement conditions shall be reported as part of the evaluation against the exposure limits and the assignment of risk classification.		P
5.1.1	Lamp ageing (seasoning)		N
	Seasoning of lamps shall be done as stated in the appropriate IEC lamp standard.		N
5.1.2	Test environment		P
	For specific test conditions, see the appropriate IEC lamp standard or in absence of such standards, the appropriate national standards or manufacturer's recommendations.		P
5.1.3	Extraneous radiation		P
	Careful checks should be made to ensure that extraneous sources of radiation and reflections do not add significantly to the measurement results.		P
5.1.4	Lamp operation		N
	Operation of the test lamp shall be provided in accordance with:		N
	– the appropriate IEC lamp standard, or		N
	– the manufacturer' s recommendation		N
5.1.5	Lamp system operation		P
	The power source for operation of the test lamp shall be provided in accordance with:		P
	– the appropriate IEC standard, or		N
	– the manufacturer' s recommendation		P
5.2	Measurement procedure		P

Attachment II: Attached report of EN 62471			
Clause	Requirement - Test	Result - Remark	Verdict
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.		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 in the norm	P

Attachment II: Attached report of EN 62471			
Clause	Requirement - Test	Result - Remark	Verdict
6	**LAMP CLASSIFICATION**		—
	For the purposes of this standard it was decided that the values shall be reported as follows:		P
	– for lamps intended for general lighting service, the hazard values shall be reported as either irradiance or radiance values at a distance which produces an illuminance of 500 lux, but not at a distance less than 200 mm		P
	– for all other light sources, including pulsed lamp sources, the hazard values shall be reported at a distance of 200 mm		N
6.1	Continuous wave lamps		P
6.1.1	Except Group		P
	In the except group are lamps, which does not pose any photobiological hazard. The requirement is met by any lamp that does not pose:		P
	– an actinic ultraviolet hazard (E_S) within 8-hours exposure (30000 s), nor		P
	– a near-UV hazard (E_{UVA}) within 1000 s, (about 16 min), nor		P
	– a retinal blue-light hazard (L_B) within 10000 s (about 2,8 h), nor		P
	– a retinal thermal hazard (L_R) within 10 s, nor		P
	– an infrared radiation hazard for the eye (E_{IR}) within 1000 s		P
6.1.2	Risk Group 1 (Low-Risk)		N
	In this group are lamps, which exceeds the limits for the except group but that does not pose:		N
	– an actinic ultraviolet hazard (E_S) within 10000 s, nor		N
	– a near ultraviolet hazard (E_{UVA}) within 300 s, nor		N
	– a retinal blue-light hazard (L_B) within 100 s, nor		N
	– a retinal thermal hazard (L_R) within 10 s, nor		N
	– an infrared radiation hazard for the eye (E_{IR}) within 100 s		N
	Lamps that emit infrared radiation without a strong visual stimulus and do not pose a near-infrared retinal hazard (L_{IR}), within 100 s are in Risk Group 1.		N
6.1.3	Risk Group 2 (Moderate-Risk)		N
	This requirement is met by any lamp that exceeds		N

Attachment II: Attached report of EN 62471			
Clause	Requirement - Test	Result - Remark	Verdict
	the limits for Risk Group 1, but that does not pose:		
	– an actinic ultraviolet hazard (E_S) within 1000 s exposure, nor		N
	– a near ultraviolet hazard (E_{UVA}) within 100 s, nor		N
	– a retinal blue-light hazard (L_B) within 0,25 s (aversion response), nor		N
	– a retinal thermal hazard (L_R) within 0,25 s (aversion response), nor		N
	– an infrared radiation hazard for the eye (E_{IR}) within 10 s		N
	Lamps that emit infrared radiation without a strong visual stimulus and do not pose a near-infrared retinal hazard (L_{IR}), within 10 s are in Risk Group 2.		N
6.1.4	Risk Group 3 (High-Risk)		N
	Lamps which exceed the limits for Risk Group 2 are in Group 3.		N
6.2	Pulsed lamps		N
	Pulse lamp criteria shall apply to a single pulse and to any group of pulses within 0,25 s.		N
	A pulsed lamp shall be evaluated at the highest nominal energy loading as specified by the manufacturer.		N
	The risk group determination of the lamp being tested shall be made as follows:		N
	– a lamp that exceeds the exposure limit shall be classified as belonging to Risk Group 3 (High-Risk)		N
	– for single pulsed lamps, a lamp whose weighted radiant exposure or weighted radiance does is below the EL shall be classified as belonging to the Exempt Group		N
	– for repetitively pulsed lamps, a lamp whose weighted radiant exposure or weighted radiance dose is below the EL, shall be evaluated using the continuous wave risk criteria discussed in clause 6.1, using time averaged values of the pulsed emission		N

Attachment II: Attached report of EN 62471			
Clause	Requirement - Test	Result - Remark	Verdict

Table 4.1	Spectral weighting function for assessing ultraviolet hazards for skin and eye	P

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

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

Attachment II: Attached report of EN 62471			
Clause	Requirement - Test	Result - Remark	Verdict

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

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

Attachment II: Attached report of EN 62471			
Clause	Requirement - Test	Result - Remark	Verdict

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

Attachment II: Attached report of EN 62471			
Clause	Requirement - Test	Result - Remark	Verdict

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	2π sr	$20000/t^{0,75}$

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

Attachment II: Attached report of EN 62471			
Clause	Requirement + Test	Result – Remark	Verdict

Table 6.1	Emission limits for risk groups of continuous wave lamps (based on EU Directive 2006/25/EC)									P
Risk	Action spectrum	Symbol	Units	Emission Measurement						
				Exempt		Low risk		Mod risk		
				Limit	Result	Limit	Result	Limit	Result	
Actinic UV	$S_{UV}(\lambda)$	E_s	$W \cdot m^{-2}$	0,001	0	-	-	-	-	
Near UV		E_{UVA}	$W \cdot m^{-2}$	0,33	0,00089	-	-	-	-	
Blue light	$B(\lambda)$	L_B	$W \cdot m^{-2} \cdot sr^{-1}$	100	1,1458	10000	-	4000000	-	
Blue light, small source	$B(\lambda)$	E_B	$W \cdot m^{-2}$	0,01*	0,02231	1,0	-	400	-	
Retinal thermal	$R(\lambda)$	L_R	$W \cdot m^{-2} \cdot sr^{-1}$	28000/α	433,1216	28000/α	-	71000/α	-	
Retinal thermal, weak visual stimulus**	$R(\lambda)$	L_{IR}	$W \cdot m^{-2} \cdot sr^{-1}$	545000 0,0017≤ α ≤ 0,011	-					
				6000/α 0,011≤ α ≤ 0,1	-					
IR radiation, eye		E_{IR}	$W \cdot m^{-2}$	100	9,2457	570	-	3200	-	

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

Attachment III: Attached report of EN 62493			
Clause	Requirement - Test	Result - Remark	Verdict

4.2	**APPLICATION OF LIMITS (Test summary)**		**--**
	Specific absorption rate (SAR)		--
a)	CISPR 15 clause 4.3.1 Disturbance voltage mains terminals 20 kHz – 30 MHz	*)	P
b)	CISPR 15 clause 4.4 Radiated electromagnetic disturbances 100 kHz – 30 MHz	*)	P
c)	CISPR 15 clause 4.4.2 Radiated electromagnetic disturbances 30 MHz – 300 MHz	*)	P
*)	☒ See separate Test Report for measurements of a), b) and c) above Test Report with Ref. No.: R011512692E ☐ Only measurement of d) below. See measurement results below. In this case this test report does not show compliance with EN 62493.		—
	Induced current density		P
d)	Induced current density 20 kHz – 10 MHz	See measurement results Below	P
4.2.d	**INDUCED CURRENT DENSITY**		
	Power supply system utilised:		—
	Voltage .....:	100-240V~	—
	Frequency .....:	50/60Hz	—
	Environmental conditions:		—
	Temperature .....:	25°C	—
	Humidity .....:	93%	—
	EuT operation mode:		—
	☒ Normal operation		—
	☐ Other operation:		—
4.2.d	**MEASUREMENT RESULTS**		**---**
	Measuring with “Van der Hoofden” test head		---

Location of EuT	Measuring distance	Result (F)	Limit (F)	Verdict
Front of EUT	30 cm	0,22	0,85	P
Rear of EUT	30 cm	0,19	0,85	P
Side of EUT	30 cm	0,18	0,85	P

Photo Documentation

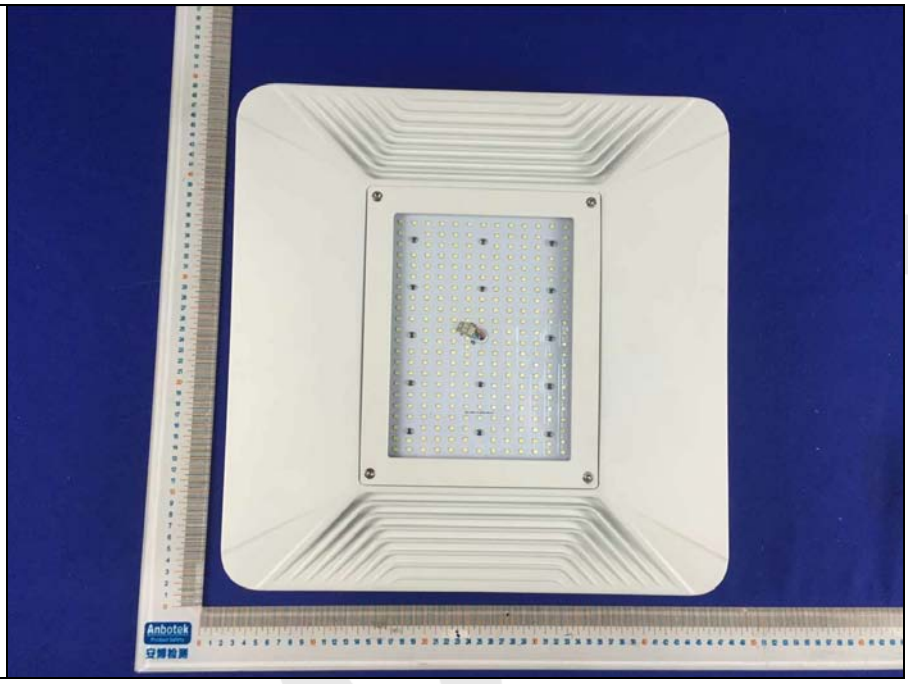
Photo 1 Overall view	

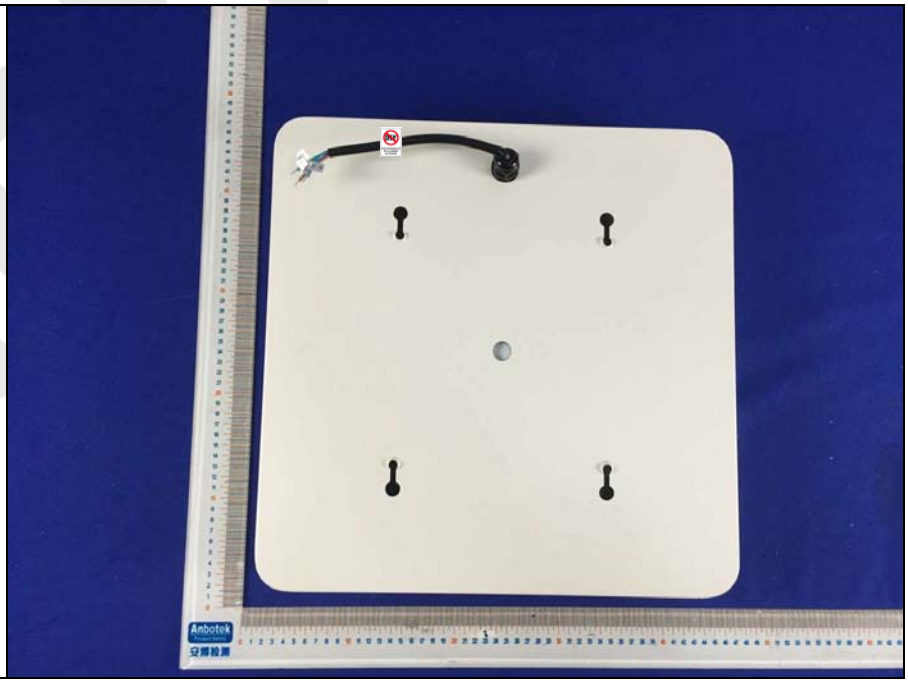
Photo 2 Overall view	

Photo Documentation

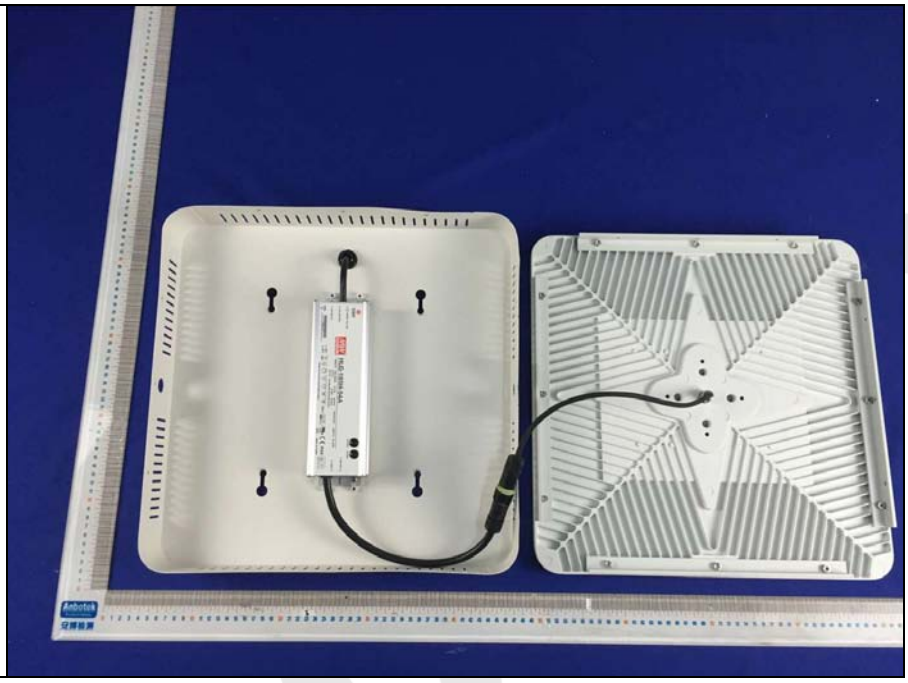
Photo 3 earthing terminal	
Photo 4 Wire connector	

Photo Documentation

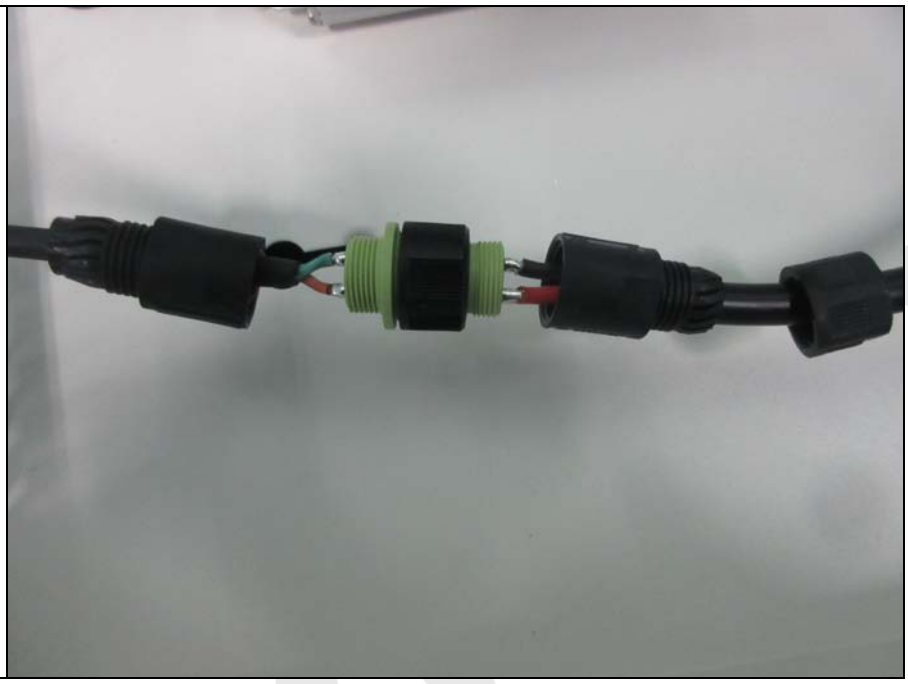
Photo 5 Wire connector	
Photo 6 PCB	

Photo Documentation

Photo 7 PCB	
Photo 8 LED driver	

Photo Documentation

Photo 9 Earth terminal