TESTING
CNAS L4595

TEST REPORT

IEC 60598-2-2

Luminaires

Part 2: Particular requirements

Section 2: Recessed luminaires

Report reference No. ..... :	LCS1411261123S
Tested by(name + signature) ..... :	Bright Li
Approved by(name + signature) ..... :	Hart Qiu
Date of issue ..... :	November 28, 2014
Contents ..... :	36 pages

Testing laboratory

Name ..... :	Shenzhen LCS Compliance Testing Laboratory Ltd.
Address ..... :	1/F., Xingyuan Industrial Park, Tongda Road, Bao'an Avenue, Bao'an District, Shenzhen, Guangdong, China
Testing location ..... :	As above

Client

Name ..... :	Eco Enigneer And Energy Solutions
Address ..... :	AMMAN-JORDAN

Manufacturer

Name ..... :	Shanghai Wellmax Lighting Industry Co., Ltd.
Address ..... :	10F, No.26 Building, No.1000 Jinhai Road, Pudong, Shanghai, China

Test specification

Standard ..... :	IEC 60598-2-2: 2011(see also IEC 60598-1: 2008); IEC 62031: 2008+A1: 2012; IEC 62493: 2009
Test procedure ..... :	Compliance with IEC 60598-2-2: 2011(see also IEC 60598-1: 2008); IEC 62031: 2008+A1: 2012; IEC 62493: 2009
Non-standard test method ..... :	N/A

Test item Description ..... :	LED Panel Light
Trademark ..... :	ECO
Model and/or type reference ..... :	4W DAYLIGHT, 4W WARM WHITE, 6W DAYLIGHT, 6W WARM WHITE, 9W DAYLIGHT, 9W WARM WHITE, 12W DAYLIGHT, 12W WARM WHITE, 15W DAYLIGHT, 15W WARM WHITE, 18W DAYLIGHT,18W WARM WHITE, ECO-PLR-18W
Rating(s) ..... :	85-265V~, 50/60Hz, Max.18W

Test item particulars	
Classification of installation and use …….:	Class II
Supply Connection ……..…:	Supply leads
Test case verdicts	
Test case does not apply to the test object :	N(N/A)
Test item does meet the requirement .....:	P(Pass)
Test item does not meet the requirement ...:	F(Fail)
Testing	
Date of receipt of test item.....:	November 11, 2014
Date(s) of performance of test.....:	November 11, 2014 – November 28, 2014

General remarks

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

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

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

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

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

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

Remarks

1. Models are similar except their model name, power and appearance. All tests are conducted on ECO-PLR-18W.
2. The maximum ambient temperature is +45 ℃.

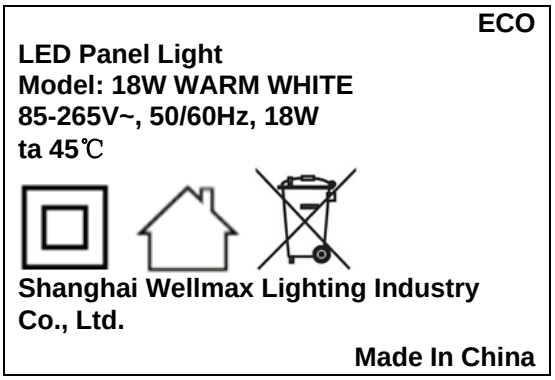
3. The report included: Attachment 1: Report of IEC 62031

Attachment 2: 1 pages of product photos.

4. Model list:

Model No.	Voltage(V)	Frequency(Hz)	Power(W)
ECO-PLR-18W	85-265V~	50/60Hz	18W
18W WARM WHITE	85-265V~	50/60Hz	18W
18W DAYLIGHT	85-265V~	50/60Hz	18W
15W WARM WHITE	85-265V~	50/60Hz	15W
15W DAYLIGHT	85-265V~	50/60Hz	15W
12W WARM WHITE	85-265V~	50/60Hz	12W
12W DAYLIGHT	85-265V~	50/60Hz	12W
9W WARM WHITE	85-265V~	50/60Hz	9W
9W DAYLIGHT	85-265V~	50/60Hz	9W
6W WARM WHITE	85-265V~	50/60Hz	6W
6W DAYLIGHT	85-265V~	50/60Hz	6W
4W WARM WHITE	85-265V~	50/60Hz	4W
4W DAYLIGHT	85-265V~	50/60Hz	4W

Copy of marking plate



ECO
LED Panel Light
Model: 18W DAYLIGHT
85-265V~, 50/60Hz, 18W
ta 45℃

Shanghai Wellmax Lighting Industry Co., Ltd.
Made In China

ECO
LED Panel Light
Model: 15W WARM WHITE
85-265V~, 50/60Hz, 15W
ta 45℃

Shanghai Wellmax Lighting Industry Co., Ltd.
Made In China

ECO
LED Panel Light
Model: 15W DAYLIGHT
85-265V~, 50/60Hz, 15W
ta 45℃

Shanghai Wellmax Lighting Industry Co., Ltd.
Made In China

ECO
LED Panel Light
Model: 12W WARM WHITE
85-265V~, 50/60Hz, 12W
ta 45℃

Shanghai Wellmax Lighting Industry Co., Ltd.
Made In China

ECO
LED Panel Light
Model: 12W DAYLIGHT
85-265V~, 50/60Hz, 12W
ta 45℃

Shanghai Wellmax Lighting Industry Co., Ltd.
Made In China

ECO
LED Panel Light
Model: 9W WARM WHITE
85-265V~, 50/60Hz, 9W
ta 45℃

Shanghai Wellmax Lighting Industry Co., Ltd.
Made In China

ECO
LED Panel Light
Model: 9W DAYLIGHT
85-265V~, 50/60Hz, 9W
ta 45℃

Shanghai Wellmax Lighting Industry Co., Ltd.
Made In China

ECO
LED Panel Light
Model: 6W WARM LIGHT
85-265V~, 50/60Hz, 6W
ta 45℃

Shanghai Wellmax Lighting Industry Co., Ltd.
Made In China

ECO
LED Panel Light
Model: 6W DAYLIGHT
85-265V~, 50/60Hz, 6W
ta 45℃

Shanghai Wellmax Lighting Industry Co., Ltd.
Made In China

ECO
LED Panel Light
Model: 4W WARM LIGHT
85-265V~, 50/60Hz, 4W
ta 45℃

Shanghai Wellmax Lighting Industry Co., Ltd.
Made In China

ECO
LED Panel Light
Model: 4W DAYLIGHT
85-265V~, 50/60Hz, 4W
ta 45℃

Shanghai Wellmax Lighting Industry Co., Ltd.
Made In China

Label testing

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

IEC 60598-2-2			
Clause	Requirement - Test	Result - Remark	Verdict
2.1 (0)	SCOPE		—
	Working voltage (V) .....:	85-265V~	P
2.4 (2)	CLASSIFICATION		—
2.4 (2.2)	Type of protection .....:	Class II	P
2.4 (2.3)	Degree of protection .....:	IP20	P
2.4 (2.4)	Portable and handheld luminaire .....:	Recessed luminaires	N
	Fixed luminaire suitable for normally flammable surfaces.....:	Yes	P
	Fixed luminaire suitable for non-combustible materials only .....:	No	N
2.4 (2.5)	Luminaire for normal use .....:	Yes	P
	Luminaire for rough service .....:	No	N
2.5 (3)	MARKING		—
2.5.1 (-)	Warning notice, if not suitable for insulating ceiling		N
2.5 (3.2)	Mandatory markings		P
	Position of the marking	Under the product	P
	Format of symbols/text	The height of symbols more than 5mm, text more than 2mm	P
2.5 (3.3)	Additional information		N
	Language of instructions	In English	P
2.5 (3.3.1)	Combination luminaires	Not such luminaires	N
2.5 (3.3.2)	Nominal frequency in Hz	50/60Hz	P
2.5 (3.3.3)	Operating temperatures	45℃	P
2.5 (3.3.4)	Symbol or warning notice	No such 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	No such luminaires	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 indoor		N
2.5 (3.3.11)	Luminaires with remote control	No remote control	N
2.5 (3.3.12)	Clip-mounted luminaire-warning		P

IEC 60598-2-2			
Clause	Requirement - Test	Result - Remark	Verdict
2.5 (3.3.13)	Specifications of protective shields	No protective shields	N
2.5 (3.3.14)	Symbol for nature of supply	~	P
2.5 (3.3.15)	Rated current of socket outlet	No such socket outlet	N
2.5 (3.3.16)	Rough service luminaire	Ordinary luminaire	N
2.5 (3.4)	Test of marking		P
	Test with water	15s	P
	Test with hexane	15s	P
	Legible after test	Still legible.	P
	Label attached	Still attached	P
2.6 (4)	CONSTRUCTION		—
2.6 (4.2)	Components replaceable without difficulty	All parts can not be replaced	N
2.6 (4.3)	Wireways smooth and free form 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	No ignitors	N
2.6 (4.4.6)	Centre contact	No ignitors	N
2.6 (4.4.7)	Rough service luminaires	Ordinary luminaires	N
2.6 (4.4.8)	Lamp connectors	No such component	N
2.6 (4.5)	Starter holders		—
	Starter holders in luminaires other than class II	No such component	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		N
2.6 (4.7.1)	Contact to metal parts		N
2.6 (4.7.2)	Location stranded wires		N
	8 mm test live conductor		N
	8 mm test earth conductor		N

IEC 60598-2-2			
Clause	Requirement - Test	Result - Remark	Verdict
2.6 (4.7.3)	Terminals for supply conductors		N
2.6 (4.7.4)	Terminals other than supply connection		N
2.6 (4.7.5)	Heat-resistant wiring/sleeves		P
2.6 (4.7.6)	Multi-pole plug	No plug	N
2.6 (4.8)	Switches:		N
	- adequate rating		N
	- adequate fixing		N
	- polarized supply		N
2.6 (4.9)	Insulating lining and sleeves		P
2.6 (4.9.1)	Retainment		P
	Method of fixing .....:		P
2.6 (4.9.2)	Insulated linings and sleeves		P
	a) & c) Insulation resistance and electric strength		P
	b) Ageing test. Temperature (℃) .....:		N
2.6 (4.10)	Insulation of Class II luminaires		P
2.6 (4.10.1)	No contact, mounting surface - accessible metal parts - wiring of basic insulation		P
	Safe installation fixed luminaires		P
	Capacitors		N
	Interference suppression capacitors according to IEC 60384-14		N
2.6 (4.10.2)	Assembly joints:		P
	- not coincidental		P
	- no straight access		P
	- degree of protection		P
2.6 (4.10.3)	Retainment of insulation:		P
	- fixed		P
	- unable to be replaced; luminaire inoperative		P
	- sleeves retained in position		P
	- lining in lampholder		N
2.6 (4.11)	Electrical connections		P
2.6 (4.11.1)	Contact pressure		P
2.6 (4.11.2)	Screws:		P
	- spaced threaded screws		P

IEC 60598-2-2			
Clause	Requirement - Test	Result - Remark	Verdict
	- thread-cutting screws		N
	- earth continuity		N
	- at least two screws		N
2.6 (4.11.3)	Screw locking:		N
	- spring washer	No such parts	N
	- rivets	No rivet provided	N
2.6 (4.11.4)	Material of current-carrying parts	> 50% copper	P
2.6 (4.11.5)	No contact to wood	No wood	P
2.6 (4.11.6)	Electro-mechanical contact systems	No such construction	N
2.6 (4.12)	Mechanical connections and glands		P
2.6 (4.12.1)	Mechanical stress		P
	Not made of soft metal		P
	Screws of insulating material		N
	Torque test: torque (Nm); part .....:	0.5N.m, 3.0mm, fixed enclosure	P
	Torque test: torque (Nm); part .....:		N
	Torque test: torque (Nm); part .....:		N
2.6 (4.12.2)	Screw diameter up to 3 mm		P
2.6 (4.12.3)	Screws in insulation		N
2.6 (4.12.4)	Locked connections:		N
	- fixed arms; torque (Nm).....:	No such part	N
	- lampholder; torque (Nm) .....:		N
	- push-button switches; torque (Nm) .....:	No such part	N
2.6 (4.12.5)	Screwed glands; force (N) .....:		N
2.6 (4.13)	Mechanical strength		P
2.6 (4.13.1)	Impact tests:		P
2.6.1 (-)	- recessed parts (see Table I); energy (Nm):		P
2.6 (4.13.1)	- fragile parts; energy (Nm).....:	0.2Nm for lamp cover	P
	- other parts; energy (Nm) .....:	0.35Nm for enclosure	P
	1) live parts	Not accessible live parts	P
	2) linings		P
	3) protection		P
	4) covers		N
2.6 (4.13.3)	Straight test finger	30N	P
2.6 (4.13.4)	Rough service luminaires	(Normal service luminaires)	N

IEC 60598-2-2			
Clause	Requirement - Test	Result - Remark	Verdict
	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
2.6 (4.13.6)	Tumbling barrel	No such part or construction	N
2.6 (4.14)	Suspensions and adjusting devices		N
2.6 (4.14.1)	Mechanical load:		N
	A) four times the weight	4x0.505kg	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		N
	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:		N
	- 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	No such tubes	N
2.6 (4.14.5)	Guide pulleys	No such construction	N
2.6 (4.14.6)	Strain on socket-outlets	Not such unit	N
2.6 (4.15)	Flammable materials:		P
	- glow-wire test 650℃		P
	- spacing ≥ 30 mm		N
	- screen withstanding test of 13.3.1		N
	- screen dimensions		N
	- no fiercely burning material		N
	- thermal protection		N

IEC 60598-2-2			
Clause	Requirement - Test	Result - Remark	Verdict
	- electronic circuits exempted		N
1.6 (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 marked with "F" symbol		N
	No lamp control gear		N
2.6 (4.16.1)	Lamp control gear spacing:		N
	- spacing 35 mm		N
	- spacing 10 mm		N
2.6 (4.16.2)	Thermal protection:		—
	- in lamp control gear	No such component	N
	- external		N
	- fixed position		N
	- temperature marked lamp control gear		N
2.6 (4.16.3)	"F" curve measured(see 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		N
2.6 (4.19)	Ignitors compatible with ballast		N
2.6 (4.20)	Rough service vibration	Normal service luminaires	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

IEC 60598-2-2			
Clause	Requirement - Test	Result - Remark	Verdict
2.6 (4.25)	No sharp point or edges		P
2.6 (4.26)	Short-circuit protection:		P
2.6 (4.26.1)	Uninsulated accessible SELV parts		P
2.6 (4.26.2)	Short-circuit test		P
2.6 (4.26.3)	Test chain according to IEC 61032		P
2.7 (11)	**CREEPAGE DISTANCES AND CLEARANCES**		P
	Class of protection .....:	Class II	P
	Working voltage (V) .....:	85-265V~	P
	Voltage form	Sinusoidal [√] Non-sinusoidal [ ]	P
	PTI	< 600 [√] ≥ 600 [ ]	P
	Rated pulse voltage (kV)	Category II<2.0kV	P
	(1) Live parts of different polarity: cr (mm); cl (mm).....:	cl=4.3mm, limit: 1.7mm cr=4.3mm, limit: 2.7mm	P
	(2) Live parts and accessible parts: cr (mm); cl (mm) .....:	cl=5.8mm, limit: 3.2mm cr=5.8mm, limit: 5.2 mm	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) .....:	cl>6.0mm, limit: 3.2mm cr>6.0mm, limit: 5.2 mm	P
2.8 (7)	PROVISION FOR EARTHING		—
2.8 (7.2.1+ 7.2.3)	Metal parts	Class II	N
	Accessible metal parts		N
	Metal parts and supporting surface		N
	Resistance < 0,5 Ω		N
	Two spaced threaded screws used		N
	Thread-forming screws		N
	Connector earthing first		N
2.8 (7.2.2+ 7.2.3)	Earth continuity		N
2.8 (7.2.4)	Locking of clamping means		N
	Compliance with 4.7.3		N
	Adequate locking		N

IEC 60598-2-2			
Clause	Requirement - Test	Result - Remark	Verdict
	Loosening of clamping means		N
2.8(7.2.5 + 7.2.9)	Connector socket	No socket	N
2.8 (7.2.6+ 7.2.9)	Position of the earth terminal		N
2.8 (7.2.7+ 7.2.9)	Corrosion of the earth terminal		N
2.8 (7.2.8+ 7.2.9)	Material of earth terminal		N
	Contact surface bare metal		N
2.8 (7.2.10)	Class II luminaire for looping-in		N
2.8 (7.2.11)	Earthing core coloured green-yellow		N
	Length of earth conductor		N
2.9 (14)	SCREW TERMINALS		—
	Separately approved; component list	(see Annex 1)	N
	Part of the luminaire		N
2.9 (15)	SCREWLESS TERMINALS		—
	Separately approved; component list	(see Annex 1)	N
	Part of the luminaire		N
2.10 (5)	EXTERNAL AND INTERNAL WIRING		P
2.10 (5.2)	Supply connection and external wiring		P
2.10 (5.2.1 + 5.2.4)	Means of connection.....:	Supply lead	P
2.10 (5.2.2 + 5.2.4)	Type of cable .....:	H03VVH2-F	P
	Nominal cross-sectional area (mm²) .....:	2x0.75 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		N
2.10 (5.2.6)	Cable entries:		P
	- suitable for introduction		P
	- adequate degree of protection		P
2.10 (5.2.7)	Cable entries through rigid material have rounded edges		P
2.10 (5.2.8)	Insulating bushings:		—
	- suitably fixed		N
	- material in bushings		N

IEC 60598-2-2			
Clause	Requirement - Test	Result - Remark	Verdict
	- tubes or guards made of insulating material		N
2.10 (5.2.9)	Locking of bushings		N
2.10 (5.2.10)	Cord anchorage:		P
	- 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
	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 (5.2.10.1)	Tests:		—
	- impossible to push cable; unsafe		P
	- pull test: 25 times; pull (N).....:	60N	P
	- torque test: torque (Nm) .....:	0.15Nm	P
	- displacement ≤ 2 mm	1.2mm	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
2.10 (5.2.14)	Mains plug same protection	No plug	N
	Class III luminaire plug	Not looping-in appliance	N
2.10 (5.2.15)	Colour code low voltage		N
2.10 (5.2.16)	Appliance inlets (IEC 60320)		N
	Appliance couplers of class II type		N

IEC 60598-2-2			
Clause	Requirement - Test	Result - Remark	Verdict
2.10 (5.3)	Internal wiring		P
2.10 (5.3.1)	Cross-sectional area (mm²).....:	22AWG	P
	Insulation thickness	>0.6mm	P
	Temperature resistant		N
	Sleeves suitable for hot spots		N
	Green-yellow for earth only		N
	Through wiring		—
	- cross-sectional area (mm²).....:		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.		N
	Joints, raising/lowering devices		P
	Telescopic tubes etc. mm²		N
	No twisting over 360°		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		P
2.10 (5.3.5)	Strain on internal wiring		P
2.10 (5.3.6)	Wire carriers		N
2.10 (5.3.7)	Wire ends not tinned		P
	Wire ends tinned: no cold flow		N
2.11 (8)	PROTECTION AGAINST ELECTRIC SHOCK		—
2.11 (8.2.1 + 8.2.5)	Live parts not accessible	Live parts enclosed by enclosure	P
	Protection in any position		P
	Insulation lacquer not reliable		N

IEC 60598-2-2			
Clause	Requirement - Test	Result - Remark	Verdict
	Double-ended tungsten filament lamp		N
	Double-ended high pressure discharge lamp		N
2.11 (8.2.2 + 8.2.5)	Portable luminaire	Recessed luminaires	N
2.11 (8.2.3 + 8.2.5)	Class II luminaire:		—
	- insulation-encased, reinforced insulation		P
	- metal-encased, double insulation		P
	- basic insulated metal parts or basic insulated live conductors only accessible during starter or lamp replacement		P
	- glass protective shields not used as supplementary insulation		P
	Class I luminaire with BC lampholder		N
2.11 (8.2.4 + 8.2.5)	Portable luminaire:	(Recessed luminaires)	—
	- non-detachable cable		N
	- terminal block completely covered		N
2.11 (8.2.6)	Covers have adequate strength		—
	Covers reliably secured	Cover not removable without tool	P
2.11 (8.2.7)	Discharging of capacitors ≥ 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:		—
	- mounting-position .....:	Wall and ceiling	P
	- test temperature (℃) .....:	55℃	P
	- total duration (h) .....:	240hrs. Totally 10 cycles, each 24h. Appliance worked as normal	P
	- supply voltage: Un factor; calculated voltage (V).....:	1.1 x 265Vac	P

IEC 60598-2-2			
Clause	Requirement - Test	Result - Remark	Verdict
	- lamp used .....:	LED lamp	P
2.12 (12.3.2)	After endurance test:		—
	- no part unserviceable		P
	- luminaire not unsafe		P
	- no damage to track system		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)		P
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 .....:		—
	- 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		N
	- 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
	- measured winding temperature (℃) at 1,1 Un .....:		—
	- 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

IEC 60598-2-2			
Clause	Requirement - Test	Result - Remark	Verdict
	- auto reset cut-out		N
	- measured temperature of fixing point/ exposed part (℃) .....:		N
2.13 (9)	RESISTANCE TO DUST, SOLID OBJECTS AND MOISTURE		—
2.13 (9.2)	Tests for ingress of dust, solid objects and moisture:		P
	- classification according to IP .....:	IP20	—
	- mounting position during test .....:		—
	- fixing screws tightened; torque (Nm).....:		—
	- tests according to clauses .....:		—
	- electric strength		N
	a) no deposit in dust-proof luminaire		N
	b) no talcum in dust-tight luminaire		N
	c) no trace of water on live parts		N
	d) no accumulation of water in waterproof luminaire		N
	e) no water in watertight luminaire		N
	f) no contact with live parts (IP 2X)		P
	f) no entry into enclosure (IP 3X and IP 4X)		N
2.13 (9.3)	Humidity test 48 h	Relative humidity 93%, temperature 45℃, 120h, followed by hi-pot test	P
2.14 (10)	INSULATION RESISTANCE AND ELECTRIC STRENGTH		—
2.14 (10.2.1)	Insulation resistance test:		P
	Class of protection	Class II	—
	Insulation resistance (MΩ):>100MΩ		P
	SELV:		N
	- between current-carrying parts of different polarity .....:		N
	- between current-carrying parts and mounting surface .....:		N
	- between current-carrying parts and metal parts of the luminaire .....:		N
	Other than SELV:		P
	- between live parts of different polarity.....:	>100 MΩ, limits: 2 MΩ	P
	- between live parts and mounting surface.:	>100 MΩ, limits: 4 MΩ	P

IEC 60598-2-2			
Clause	Requirement - Test	Result - Remark	Verdict
	- between live parts and metal parts.....:	>100 MΩ, limits: 4 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	Class II	—
	Dummy lamp		N
	Luminaires with ignitors after 24 h test		N
	Luminaires with manual ignitors		N
	Test voltage (V):		—
	SELV:		—
	- between current carrying parts of different polarity .....:		N
	- between current carrying parts and mounting surface .....:		N
	- between carrying parts parts and metal parts of the luminaire .....:		N
	Other than SELV:		P
	- between live parts of different polarity.....:	1530Vac, 1min, no damage	P
	- between live parts and mounting surface.:	3750Vac, 1min, no damage	P
	- between live parts and metal parts.....:	3750Vac, 1min, no damage	P
	- between live parts of different polarity through action of a switch.....:	No switch	N
2.14 (10.3.1)	Leakage current (mA).....:	0.15mA<0.7mA	P

2.15 (13)	RESISTANCE TO HEAT, FIRE AND TRACKING		—
2.15 (13.2.1)	Ball-pressure test:		P
	- part tested; temperature (℃).....:	Connector, 125℃, 0.9mm	P
	- part tested; temperature (℃).....:	PCB, 125°C, 0.7mm;	P
	- part tested; temperature (℃).....:		N
2.15 (13.3.1)	Needle flame test (10 s):		P
	- part tested.....:	Connector, no burning	P
	- part tested.....:	PCB, no burning	P
2.15 (13.3.2)	Glow-wire test (650 ℃):		P
	- part tested.....:	Lens, no burning	P
	- part tested.....:	Connector, no burning	P

IEC 60598-2-2			
Clause	Requirement - Test	Result - Remark	Verdict
2.15 (13.4.1)	Tracking test: part tested .....:		N
ZA	COMMON MODIFICATIONS		—
(5.2.2)	Cables equal to HD 21 S2 or HD 22 S2	No cord used	N
(5.2.15)	Colour code low voltage		N
ZB	ANNEX ZB, SPECIAL NATIONAL CONDITIONS		—
(2.2)	Class 0 not accepted	Class II	P
(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		—
(13.3)	DK: Needle flame test or glow-wire test 750℃ 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℃ alt. 750℃ for luminaires in premises open to public and workers		N

	ANNEX 1: components					P
object/part No.	Code	manufacturer/trademark	type/model	technical data	standard	mark(s) of conformity
Supply wire	B	Zhong Shan Yong Rui Electric Wire Co. Ltd.	H03VVH2-F	450/750V 2x0.75 mm^2	DIN VDE 0281-5	VDE 40021527
Internal wire	B	DONGGUAN WENCHANG ELECTRONIC CO LTD	1015	VW-1, 22AWG, 105℃, 600V	UL 758	UL E214500
Connector	B	2E MECHATRONIC GMBH & CO KG	H15	300V, 1.5mm^2	UL1997	UL
PCB	B	GENERAL ATRONICS CIRCUIT BOARD LTD	CA-08	V-0, 130℃	UL94 UL746	UL E129764
LED driver	B	Shanghai Wellmax Lighting Industry Co., Ltd.	18W	Input: 85-265V~, 50/60Hz,18-20W, Output: DC42-68V, 300mA	IEC 61347-2-13; IEC 61347-1	CE

The codes above have the following meaning:

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

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

C - Integrated component tested together with the appliance

D - Alternative component

	ANNEX 2: temperature measurements, thermal tests of Section 12		P
	Type reference ……..:	ECO-PLR-18W	P
	Lamp used ……..……....:	LED lamp	P
	Lamp control gear used…….....:	Independent controlgear	P
	Mounting position of luminaire……..:	See product manual	P
	Supply wattage (W) ……..…..……:	17.2W	P
	Supply current (A) ……..…..……:	0.121A	P
	Calculated power factor……..:	0.512	P
	Table: measured temperatures corrected for ta = 45℃：		P
	- abnormal operating mode……..……..……..……:		N
	- test 1: rated voltage……..……...:	--	N
	- test 2: 1,06 times rated voltage or 1,05 times Rated wattage ……..…:	1.06x265Vac	P
	- test 3: Load on wiring to socket-outlet, 1.06 times voltage or 1.05 times wattage .....:	--	N

	- test 4: 1,1 times rated voltage or 1,05 times rated wattage .....:	--	N
	Through wiring or looping-in wiring loaded by a current of A during the test .....:	--	N

Temperature(℃) of part	Clause 12.4 - normal				Clause 12.5 - abnormal	
	Test 1	Test 2	Test 3	Limits(℃)	Test 4	Limit (℃)
Enclosure of LED lamp	---	51.6	---	70	---	---
Internal wire	---	58.5	---	105	---	---
Connector	---	52.8	---	85	---	---
PCB of LED module	---	76.5	---	130	---	---
Body of LED driver	---	53.3	---	75	---	---
Mounting surface	---	52.6	---	90	---	---
Test box near LED Downlight	---	53.4	---	90	---	---
Ambient	---	45.1	---	---	---	---

	ANNEX 3: screw terminals (part of the luminaire)		—
(14)	SCREW TERMINALS		—
(14.2)	Type of terminal.....:		—
	Rated current (A).....:		—
(14.3.2.1)	One or more conductors		N
(14.3.2.2)	Special preparation		N
(14.3.2.3)	Terminal size		N
	Cross-sectional area (mm²).....:		N
(14.3.3)	Conductor space (mm).....:		N
(14.4)	Mechanical tests		N
(14.4.1)	Minimum distance		N
(14.4.2)	Cannot slip out		N
(14.4.3)	Special preparation		N
(14.4.4)	Nominal diameter of thread (metric ISO thread) .....:		N
	External wiring		N
	No soft metal		N
(14.4.5)	Corrosion		N
(14.4.6)	Nominal diameter of thread (mm) .....:		N
	Torque (Nm).....:		N
(14.4.7)	Between metal surfaces		N
	Lug terminal		N

	Mantle terminal		N
	Pull test; pull (N) ..... :		N
(14.4.8)	Without undue damage		N

	ANNEX 4: screwless terminals (part of the luminaire)		—
(15)	SCREWLESS TERMINALS		—
(15.2)	Type of terminal ..... :		—
	Rated current (A) ..... :		—
(15.3.1)	Material		N
(15.3.2)	Clamping		N
(15.3.3)	Stop		N
(15.3.4)	Unprepared conductors		N
(15.3.5)	Pressure on insulating material		N
(15.3.6)	Clear connection method		N
(15.3.7)	Clamping independently		N
(15.3.8)	Fixed in position		N
(15.3.10)	Conductor size		N
	Type of conductor		N
(15.5.1)	Terminals internal wiring		N
(15.5.1.1)	Pull test spring-type terminals (4 N, 4 samples)		N
(15.5.1.2)	Pull test pin or tab terminals (4 N, 4 samples)		N
	Insertion force not exceeding 50 N		N
(15.5.2)	Permanent connections: pull-off test (20 N)		N
(15.6)	Electrical tests		--
	Voltage drop (mV) after 1 h (4 samples).... :		N
	Voltage drop of two inseparable joints		N
	Number of cycles ..... :		N
	Voltage drop (mV) after 10th alt. 25th cycle (4 samples) ..... :		N
	Voltage drop (mV) after 50th alt. 100th cycle (4 samples)..... :		N
	After ageing, voltage drop (mV) after 10th alt. 25th cycle (4 samples) ..... :		N
	After ageing, voltage drop (mV) after 50th alt. 100th cycle (4 samples) ..... :		N
(15.7)	Terminals external wiring		N
	Terminal size and rating		N

(15.8.1)	Pull test spring-type terminals (4 samples); pull (N)									N
	Pull test pin or tab terminals (4 samples); pull (N)									N
(15.9)	Contact resistance test									N
	Voltage drop (mV) after 1 h									N
terminal	1	2	3	4	5	6	7	8	9	10
voltage drop (mV)										
	Voltage drop of two inseparable joints									
	Voltage drop after 10th alt. 25th cycle									
	Max. allowed voltage drop (mV) ..... :									—
terminal	1	2	3	4	5	6	7	8	9	10
voltage drop (mV)										
	Voltage drop after 50th alt. 100th cycle									
	Max. allowed voltage drop (mV) ..... :									—
terminal	1	2	3	4	5	6	7	8	9	10
voltage drop (mV)										
	Continued ageing: voltage drop after 10th alt. 25th cycle									
	Max. allowed voltage drop (mV) ..... :									—
terminal	1	2	3	4	5	6	7	8	9	10
voltage drop (mV)										
	Continued ageing: voltage drop after 50th alt. 100th cycle									
	Max. allowed voltage drop (mV) ..... :									—
terminal	1	2	3	4	5	6	7	8	9	10
voltage drop (mV)										

ANNEX 5:	EMF		
	The tested product also complies to the requirements of IEC 62493: 2009		--
	Limit……..0.85	Measured max.:……0.0025	P

Attachment No.1

TEST REPORT **IEC 62031** **LED MODULES FOR GENERAL LIGHTING-SAFETY SPECIFICATIONS**	
Report reference No. ..... :	See report IEC 60598-2-2
Tested by(name + signature) ..... :	See report IEC 60598-2-2
Approved by(name + signature)... :	See report IEC 60598-2-2
Date of issue ..... :	See report IEC 60598-2-2
Contents ..... :	See report IEC 60598-2-2
Testing laboratory	
Name .....:	See report IEC 60598-2-2
Address .....:	See report IEC 60598-2-2
Testing location ..... :	See report IEC 60598-2-2
Client	
Name ..... :	See report IEC 60598-2-2
Address..... :	See report IEC 60598-2-2
Manufacturer	
Name ..... :	See report IEC 60598-2-2
Address..... :	See report IEC 60598-2-2
Test specification	
Standard ..... :	IEC 62031: 2008+A1: 2012
Test procedure ..... :	Compliance with IEC 62031: 2008+A1: 2012
Non-standard test method ..... :	N/A
Test item Description ..... :	See report IEC 60598-2-2
Trademark ..... :	See report IEC 60598-2-2
Model and/or type reference..... :	See report IEC 60598-2-2
Rating(s) ..... :	42-68V⎓, 0.3A,

IEC 62031			
Clause	Requirement - Test	Result - Remark	Verdict
4	**General requirements**		**---**
4.1	Modules shall be so designed and constructed that in normal use (see manufacturer's instruction) they operate without danger to the user or surroundings:		P
4.2	For LED modules, all electrical measurements, unless otherwise specified, shall be carried out at voltage limits (min/max), current limits (min/max) or power limits (min/max) and minimum frequency, in a draught-free room at the temperature limits of the allowed range specified by the manufacturer. Unless the manufacturer indicates the most critical combination, all combinations (min/max) of voltage/current/power and temperature shall be tested.		P
4.3	For self-ballasted LED modules, the electrical measurements shall be carried out at the tolerance limit values of the marked supply voltage.		N
4.4	Integral modules not having their own enclosure shall be treated as integral components of luminaires as defined in IEC 60598-1, Clause 0.5. They shall be tested assembled in the luminaire, and as far as applicable with the present standard.		P
4.5	Independent modules shall comply, in addition to this standard, with the requirements of relevant clauses of IEC 60598-1, where these requirements are not already covered in this standard.		N
4.6	If the module is a factory sealed unit, it shall not be opened for any tests. In the case of doubt based on the inspection of the module and the examination of the circuit diagram, and in agreement with the manufacturer or responsible vendor, such specially prepared modules shall be submitted for testing so that a fault condition can be simulated.	Unealed	N
5	**General test requirements**		---
5.1	Tests according to this standard are type tests		P
5.2	Unless otherwise specified, the tests are carried out at an ambient temperature of 10℃ to 30℃		P

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

IEC 62031			
Clause	Requirement - Test	Result - Remark	Verdict
	h) Built-in modules shall be marked in order to separate them from independent modules. The mark shall be located on the packaging or on the module itself.		N
	i) The heat transfer temperature *t*d (if the LED module is provided with a cap enabling the insertion and the withdrawal without the use of tools and reliant on heat-conduction to theluminaire).		N
	k) Working voltage at which the insulation is designed.		N
7.2	Location of marking		N
	Items a), b), c) and f) of 7.1 shall be marked on the module.		N
	Items d), e), g), h), i) and j) shall be marked legible on the LED module or on the LED module data sheet. Item k) should be in the manufacturer's literature.		N
	For integral modules, no marking is required, but the information given in 7.1 a) to g) shall be provided in the technical literature of the manufacturer.		N
7.3	Durability and legibility of marking		P
	Rubbing 15 s water, 15 s petroleum; marking legible		P
8 (14)	**SCREW TERMINALS**		**N**
	Separately approved: component list		N
	Part of the luminaire		N
8 (15)	**SCREWLESS TERMINALS and electrical connections**		**N**
	Separately approved: component list		N
	Part of the luminaire		N

IEC 62031			
Clause	Requirement - Test	Result - Remark	Verdict

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

	Conductors by tracks on printed circuit boards:		N
	- a.c. current of 25 A for 1 min between earthing terminal and accessible metal parts		N
	- compliance with clause 7.2.1 in IEC 60598-1		N

10	**PROTECTION AGAINST ACCIDENTAL CONTACT WITH LIVE PARTS**		**P**
10.1	Ballast protected against accidental contact with live parts		P
A1	Current measured according to IEC 60990, figure 4 and clause 7.1: max. 0,7 mA (peak) or 2,0 mA d.c., for f ≥ 1000 Hz max. 70 mA .....:		P
A2	Voltage at 50 kΩ (V): max. 34 V (peak) .....:		P
	Lacquer or enamel not considered to be adequate protection		P
	Adequate mechanical strength on parts providing protection		N
10.2	Capacitors > 0,5 μF: voltage after 1 min (V): < 50 V .....:		N

11	**MOISTURE RESISTANCE AND INSULATION**		**P**

IEC 62031			
Clause	Requirement - Test	Result - Remark	Verdict
	After storage 48 h at 91-95% relative humidity and 20-30 °C measuring of insulation resistance with d.c. 500 V (MΩ): ≥ 2 MΩ ..... :		P
	The leakage current shall not exceed the values shown in figure 2 when measured in accordance with annex I ..... :		N
12	**ELECTRIC STRENGTH**		**P**
	Immediately after clause 11 electric strength test for 1 min	Refer to table 12	P
	Working voltage ≤ 50 V, test voltage 500 V		N
	Working voltage > 50 V, test voltage (V): 2U + 1000 V .....:		P
	Reinforced insulation, test voltage (V)..... :		N
	No flashover or breakdown		P
13	**Fault conditions**		**---**
	Windings of ballasts shall have adequate thermal endurance	No such parts	N
13.1	General		N
	When operated under fault conditions the ballast: - does not emit flames or molten material	No such parts	N
	- does not produce flammable gases		N
	- protection against accidental contact not impaired		N
	Thermally protected ballasts does not exceed the marked temperature value	Not thermally protected ballasts	N
	Fault conditions: capacitors, resistors or inductors without proof of compliance with relevant specifications have been short-circuited or disconnected		N
	Short-circuit of creepage distances and clearances if less than specified in clause 18 (except between live parts and accessible metal parts)		N
	Short-circuit or interruption of semiconductor devices		N
	Short-circuit across insulation consisting of lacquer, enamel or textile		N
	Short-circuit across electrolytic capacitors		N
	During the tests, a five-layer tissue paper, where the test specimen is wrapped, does not ignite	No ignition	N
13.2	Overpower condition		P

IEC 62031			
Clause	Requirement - Test	Result - Remark	Verdict
	The test shall be started at an ambient temperature as specified in Annex A.		P
	The module shall be switched on and the power monitored (at the input side) and increased until 150 % of the rated voltage, current or power is reached. The test shall be continued until the module is thermally stabilised. A stable condition is reached, if the temperature does not change by more than 5 K in 1 h. The temperature shall be measured in the tc point. The module shall withstand the overpower condition for at least 15 min, the time period of which can lie within the stabilisation period if the temperature change is ≤ 5 K.		P
	If the module contains an automatic protective device or circuit which limits the power, it is subjected to a 15 min operation at this limit. If the device or circuit effectively limits the power over this period, the module has passed the test, provided the compliance (4.1 and last paragraph of 13.2) is fulfilled.		N
	After finalising the overpower mode, the module is operated under normal conditions until thermally being stable.		P
	A module fails safe if no fire, smoke or flammable gas is produced and if the 15 min overpower condition has been withstood. To check whether molten material might present a safety hazard, a tissue paper, as specified in 4.187 of ISO 4046-4, spread below the module shall not ignite.		N
15	**Construction**		**P**
	Wood, cotton, silk, paper and similar fibrous material shall not be used as insulation.		P
16	**Creepage distances and clearances**		**P**
	Working voltage (V) .....:	42-68V⎓	P
	Voltage form	Sinusoidal [√] Non-sinusoidal [ ]	N
	PTI	< 600 [√] > 600 [ ]	P
	Impulse withstand category (normal category II) (category III annex U)	Normal category II	P
	Rated pulse voltage (kV) .....:		N

IEC 62031			
Clause	Requirement - Test	Result - Remark	Verdict
	(1) Current-carrying parts of different polarity: cr (mm); cl (mm) .....:	See table 16	P
	(2) Current-carrying parts and accessible parts: cr (mm); cl (mm) .....:	See table 16	P
	(3) Parts becoming live due to breakdown of basic insulation and metal parts: cr (mm); cl (mm) .....:		N
	(4) Outer surface of cable where it is clamp and metal parts: cr (mm); cl (mm) .....:		N
	(5)not used		N
	(6) Current-carrying parts and supporting surface: cr (mm); cl (mm) .....:	See table 16	P

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

18	**RESISTANCE TO HEAT, FIRE AND TRACKING**		**---**
18.1	Parts of insulating material retaining live parts in position, ball-pressure test:		P
	- part; test temperature (°C)	See report IEC 60598-2-2	P
18.2	Printed boards in accordance with IEC 60249-1, 4.3		P

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Clause	Requirement - Test	Result - Remark	Verdict
18.3	External parts of insulating material preventing electric shock glow-wire test 650 °C	See report IEC 60598-2-2	P
18.4	Parts of insulating material retaining live parts in position, needle-flame test 10 s:		P
	- flame extinguished within 30 s		P
	- no flaming drops igniting tissue paper		N
18.5	Tracking test	Ordinary	N
19	**RESISTANCE TO CORROSION**		**---**
	Rust protection:		P
	-10% solution of ammonium chloride in water		N
	- adequate varnish on the outer surface		P
20	**Information for luminaire design**		**---**
	Information is given in Annex D.		N
21	**Heat management**		**---**
21.1	General		N
	Clause 21 is applicable for exchangeable modules. It is not applicable for non-exchangeable modules. Exchangeability is safeguarded by means of a cap or base and a lampholder. Precondition is that a heat conducting thermal interface to the luminaire is needed for keeping the temperature below the rated maximum temperature *tc*.		N
21.2	**Heat-conducting foil and paste**		N
	For the purpose of heat-transfer from the LED module to the luminaire, the use of a heatconducting foil can be necessary. Any heat-conducting foil shall be delivered within the LED module packaging.		N
21.3	**Heat protection (under consideration)**		N
	LED modules shall be equipped with a device that cuts the power off or reduces it when *tc* is exceeded.		N
21.4	**Construction**		N
	The heat-conduction from the LED module to the luminaire, the electrical connection and the mechanical holding in the cap/holder system should be separate unless the contrary is proven safe (under consideration).		N

IEC 62031			
Clause	Requirement - Test	Result - Remark	Verdict

Annex D	**Information for luminaire design**		--
D.1	General		N
	For safe operation of these LED modules, it is essential to observe the recommendations of this annex.		N
D.2	Design freedom		N
	A diagrammatic cross section of an LED module fixed by means of a lampholder to a luminaire with the locations for temperature measurements (*t*a, *t*c, *t*d, *t*j and *t*l) and thermal resistances (*R*th, module, *R*th, luminaire and *R*th, ambient) is given with Figure D.1.		N
D.3	Testing in the luminaire		N
	The knowledge of *t*d and *P*d as provided by the LED module manufacturer, of the geometry and the surface properties of the cap and of the *t*a of the luminaire to be designed, will allow for designing a luminaire that will most probably keep the *t*c of the LED module. However, testing in the luminaire if the luminaires does so will still be necessary.		N

Table 11(a)	**Humidity test**			**P**
Test condition:	Temperature	Relative Humidity	Duration	Breakdown (Y/N)
	45°C	93%	120 hours	N

Test points		Measured insulation	Limited insulation
Between	To		
+ & -	Enclosure	>100MΩ	1MΩ

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

Table 12	**Electric strength**		**P**
Test points		Test voltage	Results
Between	To		
+ & -	Enclosure	1138Vac	No breakdown

13	**TABLE: tests of fault conditions**		**P**
Part	Simulated fault	Test result	Hazard
Output	S-C	Unit Shut down immediately, recoverable, no damage	No

16	**TABLE: creepage distances and clearances**						P
	Minimum distances for a.c. (50/60 Hz) sinusoidal voltages						P
RMS working voltage (V) not exceeding		50	150	250	500	750	1000
1 minimum distances between live parts of different polarity. Specify the value measured.			Cr＞1.6mm Cl＞1.4mm				
2 minimum distances between live parts and accessible parts which are permanently fixed to the ballast, including screws or devices for fixing covers or fixing the ballast to its support. Specify the value measured.			Cr＞1.6mm Cl＞1.4mm				
- required creepage distances (mm), insulation PTI ≥ 600		0,6	1,4	1,7	3	4	5,5
- required creepage distances (mm), insulation PTI < 600		1,2	1,6	2,5	5	8	10
- required clearances (mm)		0,2	1,4	1,7	3	4	5,5
3 minimum distances between live parts and a flat supporting surface or a loose metal cover, if any, if the construction does not ensure that the values under 2 above are maintained under the most unfavourable circumstances							
- required clearances (mm)		2	3,2	3,6	4,8	6	8
	Minimum distances for non-sinusoidal pulse voltages						N
rated pulse voltage (peak kV)	2,0	2,5	3,0	4,0	5,0	6,0	8,0

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

ATTACHMENT 2

Photo Documentation

View:
Model:
ECO-PLR-18W

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

Figure 1

View:

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

Figure 2