





TEST REPORT IEC 62776 Double-capped LED lamps designed to retrofit linear fluorescent lamps – Safety specifications	
Report Number.....:	PTC24103104701S-LD01
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Name of Testing Laboratory preparing the Report..... :	Precise Testing & Certification (Guangdong) Co.,Ltd.
Applicant's name.....:	ZHONGSHAN PROTOSTAR optoelectronic Co.,Ltd
Address.....:	No.6,FuhengDong Road Yongxing Ind.Zone,Henglan Town 528478,Zhongshan,Guangdong,People's Republic of China
Test specification:	
Standard..... :	IEC 62776:2014 EN 62471:2008
Test procedure.....:	CE-LVD
Non-standard test method.....:	N/A
Test Report Form No.....:	IEC62776B
Test Report Form(s) Originator.....:	VDE Testing and Certification Institute
Master TRF.....:	2018-08-16
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General disclaimer:	
The test results presented in this report relate only to the object tested.	





Test item description :	FLUORESCENT LAMP	
Trade Mark(s) :	YONGXIN	
Manufacturer :	ZHONGSHAN PROTOSTAR optoelectronic Co.,Ltd	
Model/Type reference :	T8-18-12W LED,Details see model list on page 06.	
Ratings :	100-240V~; 50/60Hz; Details see model list on page 06.	
Responsible Testing Laboratory (as applicable), testing procedure and testing location(s):		
<input checked="" type="checkbox"/> Testing Laboratory:	Precise Testing & Certification (Guangdong) Co.,Ltd.	
Testing location/ address :	Building1,No.6,TongxinRoad,Dongcheng Street,Dongguan, Guangdong,China.	
Tested by (name, function, signature) :	Huangyongxian	
Approved by (name, function, signature) ... :	Matt Wu	
<input type="checkbox"/> Testing procedure: CTF Stage 1:	N/A	
Testing location/ address :		
Tested by (name, function, signature) :		
Approved by (name, function, signature) ... :		
<input type="checkbox"/> Testing procedure: CTF Stage 2:	N/A	
Testing location/ address :		
Tested by (name + signature) :		
Witnessed by (name, function, signature) .. :		
Approved by (name, function, signature) ... :		
<input type="checkbox"/> Testing procedure: CTF Stage 3:	N/A	
<input type="checkbox"/> Testing procedure: CTF Stage 4:	N/A	
Testing location/ address :		
Tested by (name, function, signature) :		
Witnessed by (name, function, signature) .. :		
Approved by (name, function, signature) ... :		
Supervised by (name, function, signature) :		



List of Attachments (including a total number of pages in each attachment):

Attachment 1: Acceptance test according to IEC 60155:1993 + A1:1995 + A2: 2006, EN 60155:1995+ A1:1995 + A2: 2007.

Attachment 2: According to EN 62471

Attachment 3: Photo documentation

Summary of testing:

1. Tests according to these standards are type tests.
2. All test items are conducted on model T8-18-12W LED according to these standards which mentioned in list of attachments on page 03. Only the most unfavourable results are recorded in this report.
3. Construction inspection for model T8-18-12W LED has been considered. And the test results comply with the requirements of these standards in this test report.

Tests performed (name of test and test clause):

All applicable tests as described in the compliance checklist were performed

Testing location:

Building1, No.6,TongxinRoad, Dongcheng Street,Dongguan,Guangdong,China.

Summary of compliance with National Differences (List of countries addressed):

The product fulfils the requirements of EN 62776:2015.



Copy of marking plate:

The artwork below may be only a draft.

FLUORESCENT LAMP
Model: T8-18-12W LED
100-240V~, 50/60Hz, 100mA, 12W
Ta25°C
CE
ZHONGSHAN PROTOSTAR optoelectronic Co.,Ltd

Location: Attached on the external surface and visible during installation

Remark:

1. The above marking is the minimum requirements by the safety standard. For the final production samples, the additional markings which do not give rise to misunderstanding may be added. The height of WEEE mark at least 7mm, height of other marks at least 5mm, height of letters and numerals at least 2mm.
2. The batch or serial number should be pasted to product before sell to EU market.
3. Manufacturer information (name/registered trademark/registered trade name and postal address) and importer information for manufacturer outside of the EU (name/registered trademark/registered trade name and postal address) should be pasted on product when sell the product to the EU market.



Test item particulars : FLUORESCENT LAMP	
Classification of installation and use : /	
Supply Connection : /	
Possible test case verdicts:	
- test case does not apply to the test object..... : N/A	
- test object does meet the requirement..... : P (Pass)	
- test object does not meet the requirement..... : F (Fail)	
Testing :	
Date of receipt of test item : November 04, 2024	
Date (s) of performance of tests : November 04, 2024 to November 12, 2024	
General remarks:	
<p>"(See Enclosure #)" refers to additional information appended to the report. "(See appended table)" refers to a table appended to the report.</p> <p>Throughout this report a <input type="checkbox"/> comma / <input checked="" type="checkbox"/> point is used as the decimal separator.</p> <p>Attention is drawn to the limitation of liability, indemnification and jurisdiction issues defined therein. Any holder of this document is advised that information contained hereon reflects the Company's findings at the time of its intervention only and within the limits of Client's instructions, if any. The Company's sole responsibility is to its Client and this document does not exonerate parties to a transaction from exercising all their rights and obligations under the transaction documents. This document cannot be reproduced except in full, without prior written approval of the Company. Any unauthorized alteration, forgery or falsification of the content or appearance of this document is unlawful and offenders may be prosecuted to the fullest extent of the law."</p> <p>Unless otherwise stated the results shown in this test report refer only to the sample(s) tested and such sample(s) are retained for 30 days only.</p>	
Manufacturer's Declaration per sub-clause 4.2.5 of IEC62776B:	
The application for obtaining a CB Test Certificate includes more than one factory location and a declaration from the Manufacturer stating that the sample(s) submitted for evaluation is (are) representative of the products from each factory has been provided..... :	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> Not applicable
When differences exist; they shall be identified in the General product information section.	
Name and address of factory (ies) : ZHONGSHAN PROTOSTAR optoelectronic Co.,Ltd No.6,FuhengDong Road Yongxing Ind.Zone,Henglan Town 528478,Zhongshan,Guangdong,People's Republic of China	
General product information and other remarks:	
<ol style="list-style-type: none"> 1. The LED glass tube is a unique power supply, without the drive shipment with supplied LED starter by qualified person, do not remove or modify conventional ballast, detail information is mentioned in instruction manual. 2. All models have the same electrical and mechanical construction. 3. LED tube use glass enclosure and adhesive is used for fixing cap to tube. 4. All models have the same external shape, only length is different. 5. Input:100-240V~,50/60Hz,ta:25°C, Model list as below for details. 	



6.Main inspection model: T8-18-12W LED
 Covers models T8 F12W LED, T8-15-10W LED, T8 F9W LED 299995
 T8 F8W LED 299996, T8 F12W LED 299997, T8 F10W LED 299998
 T8 F10W LED, T8 F7W LED, T8 F6.5W LED, T5 F4.5W LED
 T5 F4W LED, T5 F3W LED, T5 F2W LED, T8 5W LED 299944
 T8 7W LED 299988, T8 F2.5W LED

The difference between the main test model and the cover model is that the principle structure of the lamp circuit is exactly the same, and the difference is that the lamp size is different and the power is different.

No.	Model	Rating	caps	Power
1	T8-18-12W LED	100-240V~, 50/60Hz;	T8	12W
2	T8 F12W LED		T8	12W
3	T8-15-10W LED		T8	10W
4	T8 F9W LED 299995		T8	9W
5	T8 F8W LED 299996		T8	8W
6	T8 F12W LED 299997		T8	12W
7	T8 F10W LED 299998		T8	10W
8	T8 F10W LED		T8	10W
9	T8 F7W LED		T8	7W
10	T8 F6.5W LED		T8	6.5W
11	T5 F4.5W LED		T5	4.5W
12	T5 F4W LED		T5	4W
13	T5 F3W LED		T5	3W
14	T5 F2W LED		T5	2W
15	T8 5W LED 299944		T8	5W
16	T8 7W LED 299988		T8	7W
17	T8 F2.5W LED		T8	2.5W



EN 62776			
Clause	Requirement + Test	Result - Remark	Verdict
4	GENERAL REQUIREMENTS		P
4.1	The lamp shall be so designed and constructed that in normal use cause no danger to the user or surroundings		P
4.2	Double-capped LED lamps shall be specially prepared for fault condition. Opened lamps to verify conformity with clause 11, 12 and 14 of this standard.		P
4.3	All tests are carried out on each type or each power or representative selection of lamps.		P
4.4	When the lamp fails safely during one of the tests, it is replaced if no fire, smoke or flammable gas is produced.		P
4.5	Internal wiring shall be carried out as in Clause 5.3 of IEC 60598-1.		N
4.6	For construction of electrical circuit, cl.15.1, 15.2 of IEC 61347-1. For other parts, cl.4.11, 4.12, 4.25 of EN 60598-1 shall be regarded.		P
5	MARKING		P
5.1	Marking on the lamp		P
a)	– mark of origin	See marking plate	P
b)	– rated supply voltage (V).....: 220-240V		P
c)	– rated power (W).....: 12W		P
d)	– rated frequency (Hz).....: 50/60Hz		P
e)	– marked with symbol fig. 1.		N/A
	– marked with symbol fig 2.	See marking plate	P
f)	– symbol acc. to Fig.3 and “This lamp is not suitable to be used in emergency luminaires...”	See marking plate	P
g)	– replaced starter, tube marking “type ref”, starter marking “LED”, Fig.4	See marking plate	N/A
h)	– information on the ingress of dust and water marked with Fig. 5	See marking plate	N/A
i)	– rated ambient temperature range of the lamp.	See marking plate	P
5.2	Marking on the lamp, on the immediate lamp wrapping or in the instructions		P
	– explanation of Fig. 1 and Fig. 2 shall be given in instruction manual	Stated in the manual.	P
a)	– rated current (A).....: Stated on the immediate lamp wrapping		P
b)	– special conditions or restrictions; not suitable for dimming, symbol fig.6	See marking plate	P
5.3	Instruction manual		P



EN 62776			
Clause	Requirement + Test	Result - Remark	Verdict
5.3.1	General		P
	– instruction, describing all necessary steps for replacement LED lamp, replacement of starter.	Stated in the manual	P
	– required instructions shall be given either on the lamp,		N/A
	– on the product packaging		P
	– or in the manufacturer’s instructions provided with the lamp		N/A
	– explanation of the symbols in the instruction manual	Stated in the manual	P
5.3.2	Declaration of the product		--
(1)	– list of all supplied parts	Stated in the manual	P
(2)	– declaration of the replaced FLUORESCENT LAMPs	Stated in the manual	P
(3)	– Warning that no modification of the luminaire is to be made.	Stated in the manual	P
(4)	– The ambient temperature range shall be declared.	See marking plate	P
	– if higher than -20°C or lower than +60°C, additional information necessary	25°C	P
	– sentence “The lamp may not be suitable for use in all application ...”	Stated in the manual	P
(5)	– Declare: “This lamp is designed for general lighting service (excluding explosive atmospheres)”	Stated in the manual	P
5.3.3	Graphical instruction		P
	– Graphical instruction, Fig.7 or description	Stated in the manual	P
5.3.4	Mounting		P
	– Described steps instead of graphical instruction 5.3.3	Stated in the manual	P
5.4	Compliance		P
	rubbing 15 s water, 15 s petroleum; marking legible		P
6	INTERCHANGEABILITY		P
6.1	Interchangeability of the cap		P
	Cap interchangeability in accordance with IEC 60061-1		P
	Gauge in accordance with IEC 60061-3, G5/G13	G13 cap,	P
	LED replacement starter in accordance with the dimensions, electrical, mechanical and thermal tests required in Section 1 of IEC 60155	See Attachment 1	P
6.2	Mass		P



EN 62776			
Clause	Requirement + Test	Result - Remark	Verdict
	G5-capped lamp: limit 200g G13-capped lamp: limit 500g	G13-capped: <500g	P
6.3	Dimensions		P
6.3.1	The length of the lamp shall not change significantly within specified ambient temperature range of the lamp.		V
6.3.2	Double-capped LED lamps for use in FL luminaires shall comply with the dimensions and tolerances of the corresponding lamps as defined in IEC 60081 at 25 °C.	See appended table 3	P
6.3.3	Variation of dimension A due self-heating at 25° C.	See appended table 4	N/A
6.3.4	Dimensions of corresponding lamps of IEC 60081. min ambient temp.(e.g. -20 °C)	See appended table 4	N/A
6.3.5	Dimensions of corresponding lamps of IEC 60081. max ambient temp. (e.g. +60 °C)	See appended table 4	N/A
6.3.6	Compliance		N/A
	Dimensions A1, B1 of corresponding lamps of IEC 60081.	See appended table 5	P
6.4	Temperature		P
6.4.1	Temperature requirement		P
	LED temperature shall not be higher than 75 °C on any location of the lamp.	See annex 1	P
6.4.2	Power requirement		P
	Power consumed of LED lamp shall not higher than replaced FL lamp (described in 60081)		P
6.4.3	Compliance		P
	Compliance; ta 25 °C, horizontally, rated supply voltage. Max surface temp. shall not exceed 6.4.1 and 6.4.2.		P
6.5	Safety of the lamp in case a wrong starter-lamp combination is used		P
	– FL starter with LED lamp		P
	– LED starter with FL lamp		P
	– Starter compliance for all possible combinations in case of two FLUORESCENT LAMPs in series.		P
	– For LED replacement which replace shorted starter: combination “replaced starter for LED lamp and FL lamp” test not required.		P
	Rated voltage is taken as maximum voltage range.	240V	P
13.2	Testing under extreme electrical conditions		N/A
	Lamp withstands overpower condition (150 % of the rated power) >15 min.		P
	A lamp fails safe after 15 min overpower condition		P



EN 62776			
Clause	Requirement + Test	Result - Remark	Verdict
	Lamp with automatic protective device or power limiter, test performed 15 min. at limit.		P
13.3	Short-circuit across capacitors		N/A
	Only one component at a time allowed	see appended table 7	N/A
13.4	Fault conditions across electronic components		N/A
	Fault conditions: where diagram indicates fault condition impairs safety, electronic components have been short-circuited or disconnected.	see appended table 7	N/A
	Only one component at the time subjected.		P
13.5	Compliance		-
	During the tests 13.2 to 13.5 the lamp shall not:		P
	– catch fire		P
	– does not produce flammable gases or smoke		P
	– live parts not accessible		P
	After the tests the insulation resistance with d.c. 500 V complies with requirements of Cl. 8.3:		P
	To avoid any overheating during fault conditions, the impedance of the lamp shall be checked.	min. 500Ω >25Ω	P
	Overload due to rectifications of supply current shall be prevent. The difference of pos. and neg. semi waveform <30% of max. value.	Steady-state r.m.s. current through the lamp stays lower than the r.m.s. current of the corresponding FLUORESCENT LAMP in normal condition.	P
- (14.1)	Short-circuit of creepage distances and clearances if less than specified in clause 16 in Part 1 (except between live parts and accessible metal parts)	see appended table 7	N/A
	Creepage distances on printed boards less than specified in clause 16 in Part 1 provided with coating according to IEC 60664-3		N/A
- (14.3)	Short-circuit across insulation consisting of lacquer, enamel or textile	see appended table 7	N/A
13.7	Safety of the lamp with different types of controlgear		N/A
	LED lamp operate safely with any type of controlgear as following		P
	– with magnetic ballast		P
	– with HF ballast (fic. A.5, IEC 60081)		P
	LED lamp tested at max. rated voltage with max. rated power.		P
7	PIN-SAFETY DURING INSERTION		P
	G5 and G13 lamps shall not be any electrical continuity between two ends of lamp.		P
	Basic insulation during lamp insertion (IEC 60598-1)		P



EN 62776			
Clause	Requirement + Test	Result - Remark	Verdict
	clause 8)		
	Deactivation of the protection against electric shock is not permissible		P
	Electric strength test conducted with 1500 V (2 U + 1000 V) between both ends of the lamp	1500V	P
	Insulation resistance measured with about 500 V d.c. the minimum resistance shall be 2 MΩ	>100 MΩ(>2 MΩ)	P
	Clearance (according to IEC 61347-1) shall be applied based on 250V working voltage		P
	Creepage distances shall not be less than the required minimum clearance.		P
	Touch current shall not exceed 0,7mA peak at a test voltage of 500 V r.m.s. (50 Hz or 60Hz) acc. to Fig. 8	0.02mA	P
8	PROTECTION AGAINST ACCIDENTAL CONTACT WITH LIVE PARTS		N/A
8.1	General		N/A
	Adequate insulation resistance and electrical strength between live and accessible parts. For caps requirements of IEC 61195 clauses 2.4 and 2.5		N/A
8.2	Test to establish whether a conductive part may cause an electric shock during operation		N/A
	Lamp construction without any additional luminaire enclosure. Following parts are not accessible when lamp is installed:		N/A
	– internal metal parts		P
	– basic insulated external metal parts, other than caps		P
	– live metal parts of the lamp cap		P
	– live metal parts of the lamp itself		P
	Tested with a test finger with a force of 10 N		P
	External metal parts other than current-carrying parts of the cap shall not be live.		N/A
8.3	Insulation resistance		P
	After storage 48 h at 91-95% relative humidity and 20-30 °C measuring of insulation resistance with d.c. 500 V (MΩ):		P
	≥ 4 MΩ for double or reinforced insulation.....	Input(L,N) to enclosure >100 MΩ > 4 MΩ	P
8.4	Electric strength		P
	Immediately after clause 8.3 electric strength test for 1 min		P



EN 62776			
Clause	Requirement + Test	Result - Remark	Verdict
	Basic insulation; pcb-board, SELV-circuits: 500 V		N/A
	Double or reinforced insulation, 4U + 2000 V	Input(L,N) to enclosure	P
	No flashover or breakdown		P
9	MECHANICAL REQUIREMENTS FOR CAPS		P
9.1	Construction and assembly		P
	Caps shall be constructed and assembled to the bulb that they remain attached during and after operation as following		P
9.2	Torque test on unused lamps		P
	Compliance is checked by applying a torque test to the pins. The lamp cap shall remain firmly attached to the bulb. Angular displacement < 6°.	Measurement displacement 0° < 6°	P
	Lamps with adjustable caps. Rotated to both extreme positions		N/A
9.3	Torque test after heat treatment		P
	Fixing the cap by crimp, screw or similar connection, lamps are exempt from this clause	Adhesive materials used.	N/A
	Heat treatment for 2000h at 80°C		N/A
	Heat treatment for 100h at 80°C for other kind of fixing		P
	Lamps with adjustable caps. Rotated to its extreme positions (both)		N/A
9.4	Repetition of Clause 8.2		P
	Clause 8.2 shall comply after the mechanical strength test.		P
10	CAP TEMPERATURE RISE		P
	Lamp cap temperature shall not exceed 95K.	See appended table 9	P
11	RESISTANCE TO HEAT		P
	Parts of insulating material retaining live parts in position and other parts, enclosure of starter, ball-pressure test:		P
	– part; test temperature (°C)	See appended table 6	P
12	RESISTANCE TO FLAME AND IGNITION		P
	External parts of insulating material preventing electric shock, enclosure of starter, glow-wire test 650 °C	Plastic material of G13 Cap LED board	P
	– flame extinguished within 30 s		P
	– no flaming drops igniting tissue paper	no flaming drops	P
13	FAULT CONDITIONS		P
13.1	General		P
	Lamps shall not impair safety		P



EN 62776			
Clause	Requirement + Test	Result - Remark	Verdict
13.2	Testing under extreme electrical conditions		P
	Lamp withstands overpower condition (150 % of the rated power) >15 min.		P
	A lamp fails safe after 15 min overpower condition		N/A
	Lamp with automatic protective device or power limiter, test performed 15 min. at limit.		P
13.3	Short-circuit across capacitors		P
	Only one component at a time allowed	see appended table 7	N/A
13.4	Fault conditions across electronic components		N/A
	Fault conditions: where diagram indicates fault condition impairs safety, electronic components have been short-circuited or disconnected.	see appended table 7	P
	Only one component at the time subjected.		P
13.5	Compliance		P
	During the tests 13.2 to 13.5 the lamp shall not:		P
	– catch fire		P
	– does not produce flammable gases or smoke		P
	– live parts not accessible		P
	After the tests the insulation resistance with d.c. 500 V complies with requirements of Cl. 8.3:		N/A
	To avoid any overheating during fault conditions, the impedance of the lamp shall be checked.	Impedance: min. 500Ω>25 Ω	P
	Overload due to rectifications of supply current shall be prevent. The difference of pos. and neg. semi waveform <30% of max. value.		P
13.6	Further requirements		P
	In add. to fault conditions 13.2to 13.5, fault conditions Cl.14.1 of IEC 61347-1 and 14.3 and the additional tests in 13.7 are carried out.		P
- (14.1)	Short-circuit of creepage distances and clearances if less than specified in clause 16 in Part 1 (except between live parts and accessible metal parts)	See appended table 7	N/A
	Creepage distances on printed boards less than specified in clause 16 in Part 1 provided with coating according to IEC 60664-3		N/A
- (14.3)	Short-circuit across insulation consisting of lacquer, enamel or textile	See appended table 7	N/A
13.7	Safety of the lamp with different types of controlgear		N/A
	LED lamp operate safely with any type of controlgear as following		P
	– with magnetic ballast		P
	– with HF ballast (fic. A.5, IEC 60081)		P
	LED lamp tested at max. rated voltage with max.		P



EN 62776			
Clause	Requirement + Test	Result - Remark	Verdict
	rated power.		
13.8	Compliance for test with different type of controlgears		P
	During tests of 13.7 shall not catch fire, produce flammable gases or smoke, live parts shall not become accessible.		P
	Low impedance: max. 0.51 A when 3,6 V applied to the pins of a cap.	0A after 3s when applied 3.6V	P
13.9	Safety of the lamp in case the luminaire controlgear short circuits		N/A
	Ballast and starter are short-circuited in the luminaire.		N/A
14	CREEPAGE DISTANCES AND CLEARANCES		P
	Creepage distances and clearances according to IEC 61347-1 with add requirements.	see appended table 8	N/A
	Creepage distance between contact pins or metal shell of the cap according to IEC 60061-4	Between contacts pins and metal shell: 3.1 mm > 2.5 mm (Table 1 of 60061-4)	P
	For other parts creepage distances and clearances IEC 61347-1; accessible conductive parts IEC 60598-1, double or reinforced insulation.	Between live part and accessible conductive parts Cl. = 5.6 mm > 3 mm Cr. = 9.6 mm > 5 mm (Table 11.A and Table 11.B of IEC 60598-1)	P
15	LAMP WITH PROTECTION AGAINST DUST AND MOISTURE		N/A
15.1	Aim of the test		N/A
	Where the lamp is not marked acc. to Fig.5 tests 15.2 and 15.3 have to be conducted.		N/A
15.2	Thermal endurance		N/A
	- mounting- position:		N/A
	- test temperature (°C):		N/A
	- total duration (h):		N/A
	- supply voltage:		N/A
	Lamp shall not have become unsafe		N/A
	Marking legible		N/A
15.3	IP testing		P
- (9.2)	Tests for ingress of dust, solid objects and moisture:		P
	- classification according to IP:	IP20	P
	- mounting position during test:		N/A
	- fixing screws tightened; torque (Nm):		N/A
	- tests according to clauses:	9.2.0	P
	- electric strength test afterwards		P



EN 62776			
Clause	Requirement + Test	Result - Remark	Verdict
	a) no deposit in dust-proof lamp		N/A
	b) no talcum in dust-tight lamp		N/A
	c) no trace of water on current-carrying parts or on insulation where it could become a hazard		N/A
	d) i) For lamps without drain holes – no water entry		N/A
	d) ii) For lamps with drain holes – no hazardous water entry		N/A
	e) no water in watertight lamps		N/A
	h) no damage of protective shield or glass envelope		N/A
16	PHOTOBIOLOGICAL HAZARD		P
16.1	UV radiation		N/A
	UV radiation of LED lamp shall not exceed 2 mW/klm	This lamp not relying on the conversion of UV radiation	N/A
16.2	Blue light hazard		P
	Blue light hazard acc. IEC/TR 62778. LED lamps shall be classified as RG0 or RG1 unlimited.	RG0	P
16.3	Infrared radiation		N/A
	LED lamps do not require measurement		N/A



EN 62776						
Clause	Requirement + Test			Result - Remark		Verdict
ANNEX 1: components						
object/part No.	code	manufacturer/ trademark	type/model	technical data	standard	mark(s) of conformity
Glue	B	SHENZHEN SISUN SILICONE TECHNOLOGY CO LTD	XS1110-A	HB,105°C	IEC 62776	Tested with appliance *UL E332810
Lamp cap(G13)	B	Quzhou jinhao lighting electric appliance co. LTD	G13	Aluminum	IEC 62776	Tested with appliance
Alternative	D	CHI MEI CORPORATIO N	ABS	plastic	IEC 62776	UL E56070 And Tested with appliance
PC film (optional)	B	Zhongshan yongyi photoelectric technology co. LTD	PC07	V-0, 90°C	-	Tested in appliance
PCB of LED module	B	Shunde tongyu electronics co. LTD	HJUV2835- BL585W8D1T- 20C1D	V-0, 105°C	IEC 62776	Tested in appliance
LED chip	B	Shenzhen hanhua opto co.,ltd	HH- 2835UV395	If=90 mA, Vf=3.6V,	IEC TR 62778	Tested with appliance

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

*Component has been certified by UL according to UL standards. Compliance with the requirements of the product standard(s) (see page one of this test report) has been checked.



EN 62776			
Clause	Requirement + Test	Result - Remark	Verdict

TABLE 2: Dimensions according to Cap sheet in IEC 60061-1; 7004-51 (G13)							P
Object / part No.	A	D	E	F	G	H	N
G13 cap	24.69	12.65	2.39	7.40	-	-	8.92
Limit G13 lamp:	max. 25.78	12.70	2.29-2.67	6.60-7.62	-	-	min. 8.71

TABLE 3 Dimensions of the corresponding lamps of IEC 60081 25 °C					P
Object / part No.	A	B		C	D
	max	min	max	max	max
For 1.5m tube	1498.22	1505.47		1512.63	25.56
For 1.2m tube	1197.55	1205.63		1213.61	25.45
For 0.6m tube	587.85	593.88		603.61	25.33

TABLE 4 Variation of dimension A and B			
Object / part No.	A (in operation)	A: 45 °C	B: -20 °C
	max		min
For 1.5m tube	1498.20	1498.52	1505.46
For 1.2m tube	1197.49	1197.61	1204.13
For 0.6m tube	587.33	587.54	593.65

TABLE 5 Compliance acc. to clause 6.3.6 A1 = A _{max} + ΔA – A _{25°C} (t _{max} – 25 °C) 11,7*10-6 B1 = B _{min} – A _{25°C} (t _{min} – 25 °C) 11,7*10-6			P
Object / part No.	A1	B1	
For 1.5m tube	1498.15	1506.25	
For 1.2m tube	1197.27	1204.76	
For 0.6m tube	586.88	593.96	

TABLE 6 Ball Pressure Test of Thermoplastics			P
Allowed impression diameter (mm)			—
Part	Test temperature (°C)	Impression diameter (mm)	
Plastic of G13 cap	125°C	1.1	
LED board	125°C	0.8	
Supplementary information:			



EN 62776			
Clause	Requirement + Test	Result - Remark	Verdict
TABLE 7	Tests of fault conditions		P
Part	Simulated fault	Result	Hazard
BD1(+,-)	Short circuit	Fuse open,unit shut down,unrecoverable	NO
Supplementary information: 's-c' denote short circuit, 'o-p' denote open circuit			

TABLE 8 Clearance And Creep age Distance Measurements							P
clearance cl and creep age distance decry at/of:	Up (V)	U rams. (V)	required cr (mm)	Measured cr (mm)	required cl (mm)	measured cl (mm)	
Between live part of different polarity before fuse (L to N)	420	240	1.5	3.0	2.5	3.0	
Different poles of fuse resistor	--	--	--	--	--	--	
Live parts to accessible metal cap	--	--	--	--	--	--	
Supplementary information: The metal shell of the cap has been considered in accordance with the requirements in IEC 60061-4, sheet 7007-6.							

Table 9 Cap temperature rise and normal heating test			P		
Type reference :	T8-18-12W LED		—		
Load used :	Integrated LED		—		
Mounting position of luminaire :	Annex B of IEC 61195 ref.		—		
Used ballast :	Integral LED controlgear		—		
Ta :	25 °C		—		
- Test 1: rated voltage :	240 V		—		
- Test 2: test voltage (normal) :	Input: U = 264 V; I =0.060, P =12.4W		—		
- Test 3: test voltage (abnormal):	-		—		
Frequency (Hz):	50 Hz		—		
Normal operation					
Temperature (°C/K) of part	normal			abnormal	
	test 1	test 2/°C	Limit/°C	test 3	limit
Lamp cap outside(central position between pins)	-	33.5	95	-	-
Lamp cap inside(central position between pins)	-	44.1	Ref.	-	-
Internal Wire	-	55.3	130	-	-
LED board	-	75.6	130	-	-



EN 62776						
Clause	Requirement + Test			Result - Remark		Verdict
PC film	-	45.3	75	-	-	
Ambient	-	25.0	--	-	-	
Supplementary information:						



EN 62776			
Clause	Requirement + Test	Result - Remark	Verdict
	EMF		P
	EMF; The tested product complies to the requirements of EN 62493	See attachment	P
L	ANNEX L: PARTICULAR ADDITIONAL REQUIREMENTS FOR integrated HF-TRANSFORMERS PROVIDING SELV (IEC 61347-1)		N
L.3	Classification		N
	non-inherently short circuit proof controlgear	Yes <input type="checkbox"/> No <input type="checkbox"/>	—
	inherently short circuit proof controlgear	Yes <input type="checkbox"/> No <input type="checkbox"/>	—
	fail safe controlgear	Yes <input type="checkbox"/> No <input type="checkbox"/>	—
	non-short-circuit proof controlgear	Yes <input type="checkbox"/> No <input type="checkbox"/>	—
L.6	Heating		N
	No excessive temperatures in normal use		N
	Value if capacitor tc marked		—
	Winding insulation classified as Class		—
	Comply with tests of clause 14 of IEC 61558-1 with adjustments	See appended table	N
L.9	Construction		N
L.9.1	Transformer comply with 19.12 of IEC 61558-1 and 19 of IEC 61558-2-6		N
	HF transformer comply with 19 of IEC 61558-2-16		N
L.10	Components		
	Protective devices comply with 20.6 – 20.11 of IEC 61558-1		N
L.11	Creepage distances and clearances		N
	1. Insulation between input and output circuits, basic insulation:		N
	a) measured values > specified values (mm)		N
	b) measured values > specified values (mm)		N
	c) measured values > specified values (mm)		N
	2. Insulation between input and output circuits, double or reinforced insulation:		N
	a) measured values > specified values (mm)	See appended table 8	N
	b) measured values > specified values (mm)		N
	c) measured values > specified values (mm)		N
	3. Insulation between adjacent input circuits		N
	- measured values > specified values (mm)		N
	3. Insulation between adjacent output circuits		N
	- measured values > specified values (mm)		N



EN 62776			
Clause	Requirement + Test	Result - Remark	Verdict
	4. Insulation between terminals for external connection:		N
	- measured values > specified values (mm)		N
	5. Basic or supplementary insulation:		N
	a) measured values > specified values (mm)	See appended table	N
	b) measured values > specified values (mm)		N
	c) measured values > specified values (mm)		N
	d) measured values > specified values (mm)		N
	e) measured values > specified values (mm)		N
	6. Reinforced insulation or insulation:		N
	Between body and output circuit: measured values > specified values (mm)		N
	Between body and output circuit if provision against transient voltages: measured values > specified values (mm)		N
	7. Distance through insulation:		N
	a) measured values > specified values (mm)	See appended table	N
	b) measured values > specified values (mm)		N
	c) measured values > specified values (mm)		N



EN 62776			
Clause	Requirement + Test	Result - Remark	Verdict

Attachment 1: Acceptance test according to IEC 60155:1993 + A1:1995 + A2: 2006, EN 60155:1995+ A1:1995 + A2: 2007.

GENERAL AND SAFETY REQUIREMENTS

6	MARKING		
6.1	Mandatory markings:		P
	a) mark of origin.....	See LED starter marking plate	P
	b) type or catalogue reference.....	See LED starter marking plate	P
	c) Lamp(s) for which is intended.....		N/A
	d) Rated operating temperature range (°C).....		N/A
6.2	Information provided by the manufacturer in e.g. a catalogue:		N/A
	- Rated voltage (V)		N/A
	- Starter with operating time limit (if applicable).....		N/A
	- Other useful indications.....		N/A
6.3	The marking according to 7.11 durable and legible:		P
	- after test with water		P
	-after test with petroleum spirit		P

7	REQUIREMENTS AND TESTS FOR SAFETY (Samples 1 to 5)		
7.3	Protection against electric shocks		P
	Protection may be ensured either by an insulating enclosure, by an appropriate non-metallic lining, or other means	Plastic enclosure	P
7.4	Insulation resistance under humidity conditions		P
	After storage 48 h at 91-95% relative humidity and 20-27 °C measuring of insulation resistance after 1 minute at 500 V d.c.:		P
	between live parts and metal canister $\geq 2 M\Omega$	100 M Ω	P
7.5	Dielectric strength		P
	Immediately after clause 7.4 electric strength test for 1 min		P
	between live parts and metal canister 1500 V r.m.s.:	1500V	P
7.6	Dimensions		P
7.6.1	Starter dimensions comply with the requirements of Fig. 1, compliance shall be checked by the following gauges:		P
	- Figure 6		P
	- Figure 7		P
	- Figure 8		P
	Starter dimensions comply with the requirements of Fig. B.1, compliance shall be checked by the following gauges (only for starters for use in Class II fluorescent lamp luminaries).		N/A
	- Figure B.2		N/A
	- Figure 6		N/A
7.6.2	Creepage distances and clearances not less than specified minimum values measured:		P
	External creepage and clearance:		P



EN 62776			
Clause	Requirement + Test	Result - Remark	Verdict
	- Between live parts of different polarity $\geq 3\text{mm}$:	cl.:11.5mm cr.:9.8mm	P
	- Between live parts and access. metal parts $\geq 3\text{mm}$:	cl.:5.2mm cr.:5.2mm	P
	Internal creepage:		P
	- Between live parts and access. metal parts $\geq 2\text{mm}$:		N/A
7.7	Torsion test		P
	Torsion test of 0,6Nm		P
7.8	Mechanical strength		P
	Tumbling barrel test (20 times, 500 mm)		P
7.9	Connections		P
	Contact pressure not transmitted through insulating material, other than ceramic.		P
7.10	Resistance to heat and fire		P
7.10.1	Enclosures and other external parts of insulating material shall be sufficiently resistant to heat at the temperature of 125 °C for 168 h.		P
	During the test, the samples shall not undergo any change impairing their safety.		P
	- no reduction of protection against electric shock		P
	- no loosening of electrical contacts		P
	- no cracks, swelling or shrinking		P
	At the end of the test, the dimensions shall comply with the requirements of 7.6.1		P
7.10.2	Ball-pressure test on enclosure at temperature of 125 °C.		N/A
	Diameter of impression not exceeding 2 mm		N/A
	Ball-pressure test on external parts at temperature of 125 °C.		N/A
	Diameter of impression not exceeding 2 mm		N/A
7.10.3	Glow-wire test 650 °C on enclosure and other external parts.	LED PCB	P
	Any flame or glowing extinguished within 30 s, and any flaming drops do not ignite tissue paper	No flame, no drop	P
7.11	Quality of marking		N/A
	Rubbing 15 s water, 15 s petroleum; marking legible		N/A
7.12	Radio interference suppression capacitors		N/A
7.12.1	The starter shall incorporate a radio interference suppression capacitor value between 5 nF and 20 nF.		N/A
7.12.2	Insulation resistance under humidity conditions (Sample 6 to 15)		N/A
	Capacitor shall be conditioned 48 h with humidity between 91%-95% and 20-30 °C		N/A
	Test voltage at 2000 V d.c. for 1min		N/A
7.12.3	Capacitor shall be resistant to flame and ignition		N/A
	Breakdown of capacitor increasing the a.c. voltage		N/A



EN 62776			
Clause	Requirement + Test	Result - Remark	Verdict
	Capacitor shall be completely wrapped with tissue paper and shall be connected in series with a 40 W ballast and operated for 5 min, during the test the capacitor shall not inflame the tissue paper.		N/A
7.13	Heating of starters with operating time limitation (Sample 16 to 20)		N/A
	- Highest wattage rating marked.....:		N/A
	- Test voltage 110% Vn of ballast.....:		N/A
	- Highest value of temperature marked..... :		N/A
	Duration test.....:	168h	-
	During normal and abnormal operation, the safety is not impaired.		N/A

PERFORMANCE SPECIFICATION

8 and 9	STARTING AND ENDURANCE TESTS (Samples 21 to 25)		
8.3.3	- Ballast used..... :		-
8.3.4	- Lamp used..... :		-
8.3.5	The total harmonic content of the supply voltage shall not exceed 3%..... :		N/A
8.4	Speed of operation		N/A
	- Testing voltage as specified in "Starting characteristics" of IEC 60081 or IEC 60901.....:		-
	During 25 s, the starter contacts shall open not less than 7 times (before endurance).		N/A
	During 25 s, the starter contacts shall open not less than 7 times (after endurance).		N/A
8.5	Closed time		N/A
	During 25 s (referred to in 8.4), the starter contacts shall be closed for a minimum total period of 10s (before endurance).		N/A
	During 25 s (referred to in 8.4), the starter contacts shall be closed for a minimum total period of 10s (after endurance).		N/A
8.6	Non reclosure voltage		N/A
	- Voltage as specified in "Information for starter design" of IEC 60081 or IEC 60901..... :		-
	Starter contacts shall not reclose within 1 min (before endurance).		N/A
	Starter contacts shall not reclose within 1 min (after endurance).		N/A
8.7	Pulse voltage		N/A
	- Testing voltage as specified in "Starting characteristics" of IEC 60081 or IEC 60901, shall be applied for 25 s..... :		-



EN 62776			
Clause	Requirement + Test	Result - Remark	Verdict
	- Pulse voltage as specified in "Information for starter design" of IEC 60081 or IEC 60901.....:		-
	- Minimum peak voltage measured shall be more than of pulse voltage (before endurance).....:		N/A
	- Minimum peak voltage measured shall be more than of pulse voltage (after endurance).....:		N/A
9.3	- Ballast used.....:		-
	- Lamp used.....:		-
	The test voltage shall be applied to the circuit for 6000 cycles, each of 1 min. During each cycle, the voltage shall be applied for 20 s to 30 s.		N/A

8 and 10	STARTING AND DEACTIVED LAMP TESTS FOR STARTERS WITHOUT OPERATING TIME LIMITATION (Sample 26 to 30)		
8.3.3	- Ballast used.....:		-
8.3.4	- Lamp used.....:		-
8.3.5	The total harmonic content of the supply voltage shall not exceed 3%.....:		N/A
10.3	- Ballast used.....:		-
	- Lamp used.....:		-
	The test voltage shall be applied for 3 h.		N/A
8.4	Speed of operation		N/A
	- Testing voltage as specified in "Starting characteristics" of IEC 60081 or IEC 60901.....:		-
	During 25 s, the starter contacts shall open not less than 7 times (before deactivated lamp test).		N/A
	During 25 s, the starter contacts shall open not less than 7 times (after deactivated lamp test).		N/A
8.5	Closed time		N/A
	During 25 s (referred to in 8.4), the starter contacts shall be closed for a minimum total period of 10s (before deactivated lamp test).		N/A
	During 25 s (referred to in 8.4), the starter contacts shall be closed for a minimum total period of 10s (after deactivated lamp test).		N/A
8.6	Non reclosure voltage		N/A
	- Voltage as specified in "Information for starter design" of IEC 60081 or IEC 60901.....:		-
	Starter contacts shall not reclose within 1 min (before deactivated lamp test).		N/A
	Starter contacts shall not reclose within 1 min (after deactivated lamp test).		N/A
8.7	Pulse voltage		N/A



EN 62776			
Clause	Requirement + Test	Result - Remark	Verdict
	- Testing voltage as specified in "Starting characteristics" of IEC 60081 or IEC 60901, shall be applied for 25 s..... :		-
	- Pulse voltage as specified in "Information for starter design" of IEC 60081 or IEC 60901..... :		—
	- Minimum peak voltage measured shall be more than of pulse voltage (before deactivated lamp test). :		N/A
	- Minimum peak voltage measured shall be more than of pulse voltage (after deactivated lamp test).. :		N/A



EN 62776			
Clause	Requirement + Test	Result - Remark	Verdict

B	ANNEX B – STARTER FOR CLASS II FLUORESCENT LAMP LUMINAIRES		N/A
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7	REQUIREMENTS AND TESTS FOR SAFETY		P
7.3	Protection against electric shocks		P
	Enclosure of accessible starters shall consist of insulating material		P
7.6	Dimensions		P
7.6.1	Starter dimensions comply with the requirements of Fig. B.1, compliance shall be checked by the following gauges		P
	- Figure B.2		P
	- Figure 6		P

D	ANNEX D (NORMATIVE), STARTER CONTACTS – SUITABLE MATERIAL		P
	Examples of suitable metals for current-carrying parts, referred to in Subclause 7.9, when used within the permissible temperature range and under normal conditions of chemical pollution are:		P
	- copper or an alloy containing ≥ 58 % copper for parts made from rolled sheet (in cold condition) or ≥ 50 % copper for other parts..... :		P
	- stainless steel containing ≥ 13 % chromium and $\leq 0,09$ % carbon..... :		N/A
	- steel provided with an electroplated coating of zinc, according to ISO 2081, with coating having a thickness ≥ 5 μm ISO service condition No. 1 (for ordinary equipment) :		N/A
	- steel provided with an electroplated coating of nickel and chromium according to ISO 1456, the coating having a thickness ≥ 20 μm ISO service condition No. 2 (for ordinary equipment) :		N/A
	- steel provided with an electroplated coating of tin, according to ISO 2093, the coating having a thickness ≥ 12 μm ISO service condition No. 2 (for ordinary equipment) :		N/A
	- pure nickel (≥ 99 %)..... :		N/A
	- aluminium or an alloy having a hardness of at least HB 100. :		N/A



EN 62471			
Clause	Requirement + Test	Result - Remark	Verdict

Attachment No. 2: According to EN 62471

4	EXPOSURE LIMITS		P
4.1	General		P
	The exposure limits in this standard is not less than 0,01 ms and not more than any 8-hour period and should be used as guides in the control of exposure		P
	Detailed spectral data of a light source are generally required only if the luminance of the source exceeds $10^4 \text{ cd} \cdot \text{m}^{-2}$	$>10^4 \text{ cd} \cdot \text{m}^{-2}$	P
4.3	Hazard exposure limits		P
4.3.1	Actinic UV hazard exposure limit for the skin and eye		P
	The exposure limit for effective radiant exposure is $30 \text{ J} \cdot \text{m}^{-2}$ within any 8-hour period		P
	To protect against injury of the eye or skin from ultraviolet radiation exposure produced by a broadband source, the effective integrated spectral irradiance, E_s , of the light source shall not exceed the levels defined by:	See the Table 6.1	P
	$ES \cdot t = \sum \sum E\lambda(\lambda, t) \cdot s_{uv}(\lambda) \cdot \Delta t \cdot \Delta \lambda \leq 30 \text{ J} \cdot \text{m}^{-2}$ <p style="text-align: center;">200 t</p>		P
	The permissible time for exposure to ultraviolet radiation incident upon the unprotected eye or skin shall be computed by:		P
	$t_{\max} = 30/E_s$	$t_{\max} = 30/(2.5 \times 10^{-9}) = 1.2 \times 10^{10} \text{ s}$	P
4.3.2	Near-UV hazard exposure limit for eye		P
	For the spectral region 315 nm to 400 nm (UV-A) the total radiant exposure to the eye shall not exceed $10000 \text{ J} \cdot \text{m}^{-2}$ for exposure times less than 1000s. For exposure times greater than 1000 s (approximately 16 minutes) the UV-A irradiance for the unprotected eye, E_{UVA} , shall not exceed $10 \text{ W} \cdot \text{m}^{-2}$	See the Table 6.1	P
	The permissible time for exposure to ultraviolet radiation incident upon the unprotected eye for time less than 1000 s, shall be computed by:		N
	$t_{\max} \leq 10000/E_{UVA} \text{ s}$		N
4.3.3	Retinal blue light hazard exposure limit		P
	To protect against retinal photochemical injury from chronic blue-light exposure, the integrated spectral radiance of the light source weighted against the blue-light hazard function, $B(_)$, i.e., the blue-light weighted radiance, LB , shall not exceed the levels defined by:		P
	$LB \cdot t = \sum \sum L\lambda(\lambda, t) \cdot B(\lambda) \cdot \Delta t \cdot \Delta \lambda \leq 10^6 \text{ J} \cdot \text{m}^{-2} \cdot \text{sr}^{-1}$ <p style="text-align: center;">300 t</p>		N

EN 62471			
Clause	Requirement + Test	Result - Remark	Verdict
	$LB = \sum_{300}^{700} L_{\lambda} \cdot B(\lambda) \cdot \Delta\lambda \leq 100 \quad W \cdot m^{-2} \cdot sr^{-1}$	See the Table 6.1	P
4.3.4	Retinal blue light hazard exposure limit - small source	$\alpha=0.1000rad$	N
	Thus the spectral irradiance at the eye E_{λ} , weighted against the blue-light hazard function $B(\lambda)$ shall not exceed the levels defined by: see table 4.2		N
	$EB \cdot t = \sum_{300}^{700} E_{\lambda}(\lambda, t) \cdot B(\lambda) \cdot \Delta\lambda \leq 100 \quad J \cdot m^{-2}$		N
	$EB = \sum_{300}^{700} E_{\lambda} \cdot B(\lambda) \cdot \Delta\lambda \leq 1 \quad W \cdot m^{-2}$		N
4.3.5	Retinal thermal hazard exposure limit		P
	To protect against retinal thermal injury, the integrated spectral radiance of the light source, L_{λ} , weighted by the burn hazard weighting function $R(\lambda)$ (from Figure 4.2 and Table 4.2), i.e., the burn hazard weighted radiance, shall not exceed the levels defined by:		P
	$L_R = \sum_{380}^{1400} L_{\lambda} \cdot R(\lambda) \cdot \Delta\lambda \leq \frac{50000}{\alpha \cdot t^{0,25}} \quad W \cdot m^{-2} \cdot sr^{-1}$	See the Table 6.1	P
4.3.6	Retinal thermal hazard exposure limit – weak visual stimulus		P
	For an infrared heat lamp or any near-infrared source where a weak visual stimulus is inadequate to activate the aversion response, the near infrared (780 nm to 1400 nm) radiance, L_{IR} , as viewed by the eye for exposure times greater than 10 s shall be limited to:		P
	$L_{IR} = \sum_{780}^{1400} L_{\lambda} \cdot R(\lambda) \cdot \Delta\lambda \leq \frac{6000}{\alpha} \quad W \cdot m^{-2} \cdot sr^{-1}$	See the Table 6.1	P
4.3.7	Infrared radiation hazard exposure limits for the eye		P
	The avoid thermal injury of the cornea and possible delayed effects upon the lens of the eye (cataractogenesis), ocular exposure to infrared radiation, E_{IR} , over the wavelength range 780 nm to 3000 nm, for times less than 1000 s, shall not exceed:		N
	$E_{IR} = \sum_{780}^{3000} E_{\lambda} \cdot \Delta\lambda \leq 18000 \cdot t^{-0,75} \quad W \cdot m^{-2}$		N
	For times greater than 1000 s the limit becomes:		P

EN 62471			
Clause	Requirement + Test	Result - Remark	Verdict
	$E_{IR} = \sum_{780}^{3000} E_{\lambda} \cdot \Delta\lambda \leq 100 \quad \text{W}\cdot\text{m}^{-2}$	See the Table 6.1	P
4.3.8	Thermal hazard exposure limit for the skin		P
	Visible and infrared radiant exposure (380 nm to 3000 nm) of the skin shall be limited to:		P
	$E_H \cdot t = \sum_{380}^{3000} \sum_t E_{\lambda}(\lambda, t) \cdot \Delta t \cdot \Delta\lambda \leq 20000 \cdot t^{0,25} \quad \text{J}\cdot\text{m}^{-2}$	$E_H \cdot t = 1.5 \text{W}\cdot\text{m}^{-2} \times 10\text{s}$ $= 15 \text{J}\cdot\text{m}^{-2}$	P
5	MEASUREMENT OF LAMPS AND LAMP SYSTEMS		P
5.1	Measurement conditions		P
	Measurement conditions shall be reported as part of the evaluation against the exposure limits and the assignment of risk classification.		P
5.1.1	Lamp ageing (seasoning)		N
	Seasoning of lamps shall be done as stated in the Appropriate EN lamp standard.		N
5.1.2	Test environment	25.5°C	P
	For specific test conditions, see the appropriate EN lamp standard or in absence of such standards, the appropriate national standards or manufacturer's recommendations.		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		P
	Operation of the test lamp shall be provided in accordance with:		P
	– the appropriate EN lamp standard, or		N
	– the manufacturer' s recommendation		P
5.1.5	Lamp system operation		N
	The power source for operation of the test lamp shall be provided in accordance with:		N
	– the appropriate EN standard, or		N
	– the manufacturer' s recommendation		N
5.2	Measurement procedure		P
5.2.1	Irradiance measurements		P
	Minimum aperture diameter 7mm.		P
	Maximum aperture diameter 50 mm.		P



EN 62471			
Clause	Requirement + Test	Result - Remark	Verdict
	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		N
	To standardize interpolated values, use linear interpolation on the log of given values to obtain intermediate points at the wavelength intervals desired.		N
5.3.2	Calculations		P
	The calculation of source hazard values shall be performed by weighting the spectral scan by the appropriate function and calculating the total weighted energy.		P
5.3.3	Measurement uncertainty		P
	The quality of all measurement results must be quantified by an analysis of the uncertainty.		P
6	LAMP CLASSIFICATION		P
	For the purposes of this standard it was decided that the values shall be reported as follows:		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	500lux at 223mm	P

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Clause	Requirement + Test	Result - Remark	Verdict
	– 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	Exempt Group		P
	In the except group are lamps, which does not pose any photobiological hazard. The requirement is met by any lamp that does not pose:		P
	– an actinic ultraviolet hazard (ES) within 8-hours exposure (30000 s), nor		P
	– a near-UV hazard (EUVA) within 1000 s, (about 16 min), nor		P
	– a retinal blue-light hazard (LB) within 10000 s (about 2,8 h), nor		P
	– a retinal thermal hazard (LR) within 10 s, nor		P
	– an infrared radiation hazard for the eye (EIR) within 1000 s		P
6.1.2	Risk Group 1 (Low-Risk)		N
	In this group are lamps, which exceeds the limits for the except group but that does not pose:		N
	– an actinic ultraviolet hazard (ES) within 10000 s, nor		N
	– a near ultraviolet hazard (EUVA) within 300 s, nor		N
	– a retinal blue-light hazard (LB) within 100 s, nor		N
	– a retinal thermal hazard (LR) within 10 s, nor		N
	– an infrared radiation hazard for the eye (EIR) within 100 s		N
	Lamps that emit infrared radiation without a strong visual stimulus and do not pose a near-infrared retinal hazard (LIR), within 100 s are in Risk Group 1.		N
6.1.3	Risk Group 2 (Moderate-Risk)		N
	This requirement is met by any lamp that exceeds the limits for Risk Group 1, but that does not pose:		N
	– an actinic ultraviolet hazard (ES) within 1000 s exposure, nor		N
	– a near ultraviolet hazard (EUVA) within 100 s, nor		N
	– a retinal blue-light hazard (LB) within 0,25 s (aversion response), nor		N
	– a retinal thermal hazard (LR) within 0,25 s (aversion response), nor		N
	– an infrared radiation hazard for the eye (EIR) within 10 s		N
	Lamps that emit infrared radiation without a strong visual stimulus and do not pose a near-infrared retinal hazard (LIR), within 10 s are in Risk Group 2.		N
6.1.4	Risk Group 3 (High-Risk)		N
	Lamps which exceed the limits for Risk Group 2 are in Group 3.		N
6.2	Pulsed lamps		N



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Clause	Requirement + Test	Result - Remark	Verdict
	Pulse lamp criteria shall apply to a single pulse and to any group of pulses within 0,25 s.		N
	A pulsed lamp shall be evaluated at the highest nominal energy loading as specified by the manufacturer.		N
	The risk group determination of the lamp being tested shall be made as follows:		N
	– a lamp that exceeds the exposure limit shall be classified as belonging to Risk Group 3 (High-Risk)		N
	– for single pulsed lamps, a lamp whose weighted radiant exposure or weighted radiance does is below the EL shall be classified as belonging to the Exempt Group		N
	– for repetitively pulsed lamps, a lamp whose weighted radiant exposure or weighted radiance dose is below the EL, shall be evaluated using the continuous wave risk criteria discussed in clause 6.1, using time averaged values of the pulsed emission		N

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



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Clause	Requirement + Test	Result - Remark	Verdict

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



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Clause	Requirement + Test	Result - Remark	Verdict

Table 4.2	Spectral weighting functions for assessing retinal hazards from broadband optical Sources		-
Wavelength nm	Blue-light hazard function B()	Burn hazard function R()	
300	0,01	-	
305	0,01	-	
310	0,01	-	
315	0,01	-	
320	0,01	-	
325	0,01	-	
330	0,01	-	
335	0,01	-	
340	0,01	-	
345	0,01	-	
350	0,01	-	
355	0,01	-	
360	0,01	-	
365	0,01	-	
370	0,01	-	
375	0,01	-	
380	0,01	0,1	
385	0,013	0,13	
390	0,025	0,25	
395	0,05	0,5	
400	0,10	1,0	
405	0,20	2,0	
410	0,40	4,0	
415	0,80	8,0	
420	0,90	9,0	
425	0,95	9,5	
430	0,98	9,8	
435	1,00	10,0	
440	1,00	10,0	
445	0,97	9,7	
450	0,94	9,4	
455	0,90	9,0	
460	0,80	8,0	
465	0,70	7,0	
470	0,62	6,2	
475	0,55	5,5	
480	0,45	4,5	
485	0,40	4,0	
490	0,22	2,2	
495	0,16	1,6	
500-600	$10^{[(450-\lambda)/50]}$	1,0	
600-700	0,001	1,0	
700-1050	0,013	$10^{[(700-\lambda)/500]}$	
1050-1150	0,025	0,2	
1150-1200	0,05	$0,2 \cdot 100,02^{(1150-\lambda)}$	
1200-1400	0,10	0,02	

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



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Clause	Requirement + Test	Result - Remark	Verdict

Table 5.4					
Summary of the ELs for the surface of the skin or cornea (irradiance based values)					-
Hazard Name	Relevant equation	Wavelength Range nm	Exposure aperture rad(deg)	Limiting aperture rad(deg)	EL in items of constant irradiance W.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)					-
Hazard Name	Relevant equation	Wavelength Range nm	Exposure duration Sec	Field of view radians	EL in terms of constant radiance W.m ⁻² .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•√(t/10) 0,011 0,0011•√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•√(t/10)	50000/(α•t ^{0,25}) 50000/(α•t ^{0,25})
Retinal thermal (weak visual stimulus)	$L_{IR} = \sum L_\lambda \cdot R(\lambda) \cdot \Delta\lambda$	780 – 1400	> 10	0,011	6000/α



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Clause	Requirement + Test	Result - Remark	Verdict

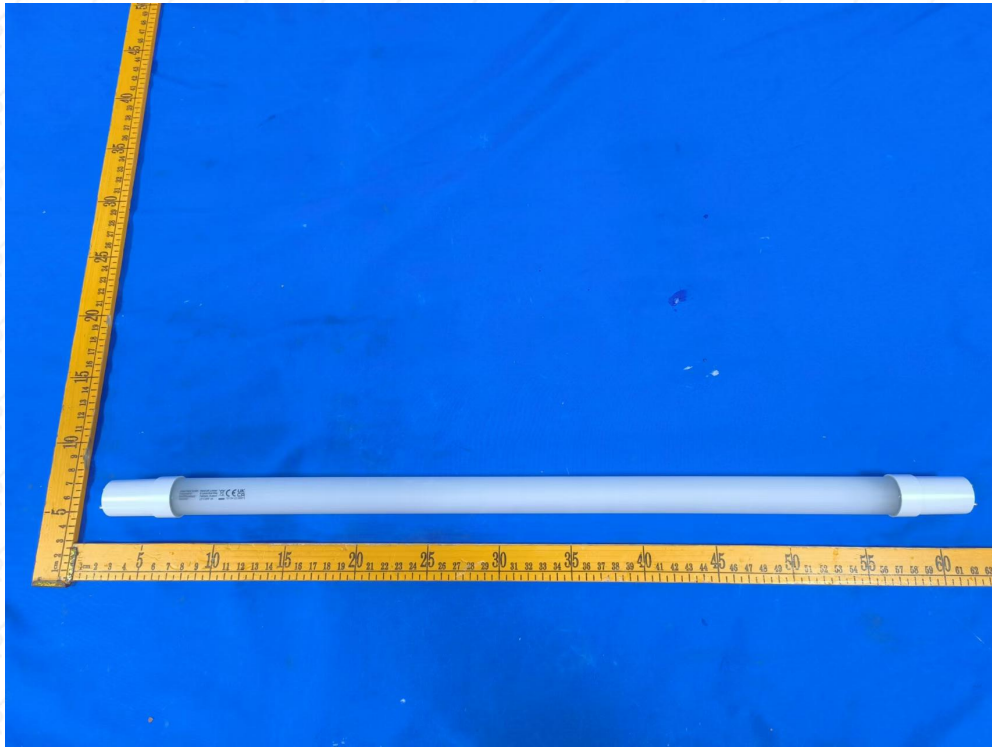
Table 6.1	Emission limits for risk groups of continuous wave lamps base on Directive	P
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Test Results							
Emission Limits for Risk Group of Continuous Wave Lamps							
Risk	Units	Exempt		Low Risk		Mod Risk	
		Limit	Result	Limit	Result	Limit	Result
Actinic UV, Es	W·m-2	0.001	3.546E+00	0.003	3.546E+00	0.03	3.546E+00
Near UV, Euva	W·m-2	10	8.074E+00	33	8.074E+00	100	8.074E+00
Blue light, Lb	W·m-2·sr-1	100	1.400E+00	10000	3.269E+00	4000000	3.374E+00
Blue light, small source, Eb	W·m-2	-	-	-	-	-	-
Retinal thermal, Lr	W·m-2·sr-1	4.057E+05	1.284E+01	4.057E+05	1.284E+01	1.029E+06	1.325E+01
Retinal thermal, weak visual stimulus, Lir	W·m-2·sr-1	8.694E+04	0.000E+00	8.694E+04	0.000E+00	8.694E+04	0.000E+00
IR radiation, eye, Eir	W·m-2	100	0.000E+00	570	0.000E+00	3200	0.000E+00
IR radiation, skin, Eh	W·m-2	3556.56	1.152E+00	NA	NA	NA	NA
Angular subtense of apparent source				α=69.01mrad			

Luminance Test Results			
Symbol	FOV(mrad)	Units	Results
L1	1.7	cd·m-2	3.688E+00
L2	11	cd·m-2	3.574E+00
L3	100	cd·m-2	1.530E+00
Over view of Classification			
Hazard		Risk Group	
Actinic UV		High Risk	
Near UV		Exempt Group	
Blue light		Exempt Group	
Retinal thermal		Exempt Group	
Retinal thermal, weak visual stimulus		Exempt Group	
IR radiation, eye		Exempt Group	
Classification group		High Risk	

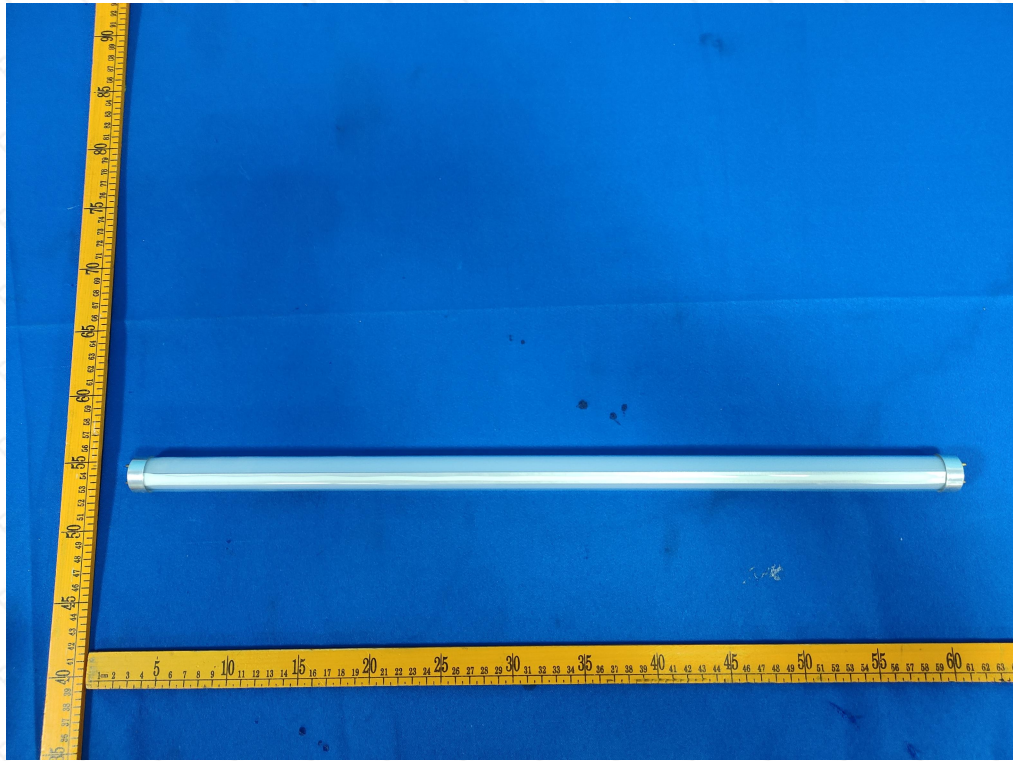


Attachment 3 photos
Model:T8-18-12W LED



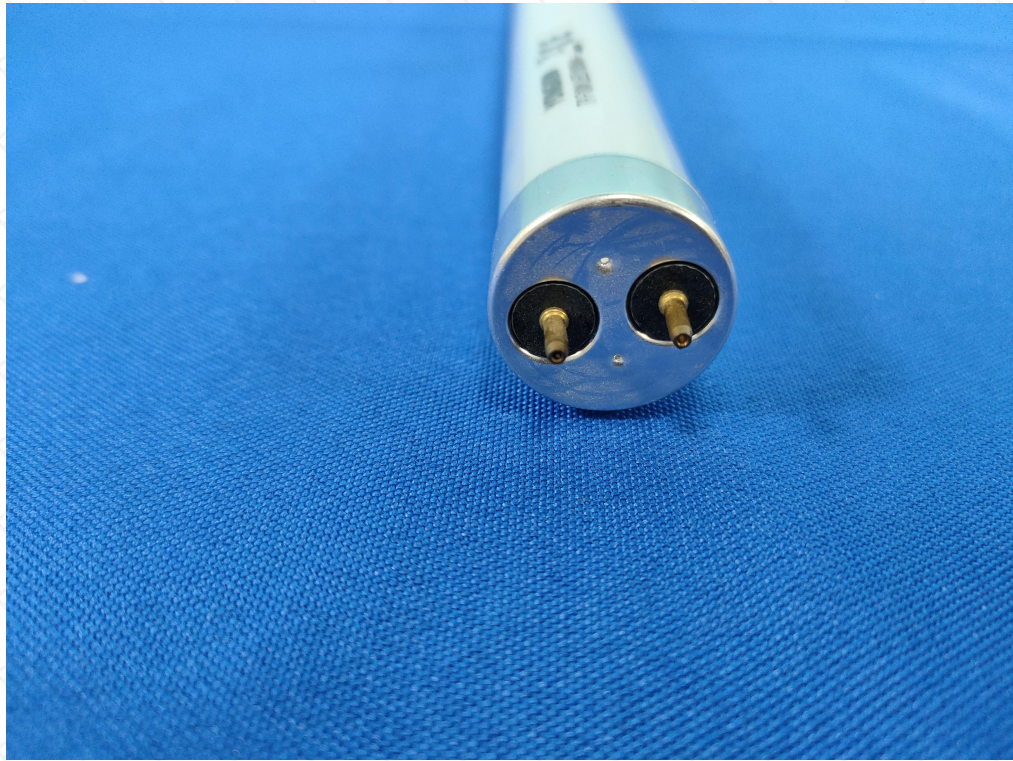


Model: T8 F10W LED

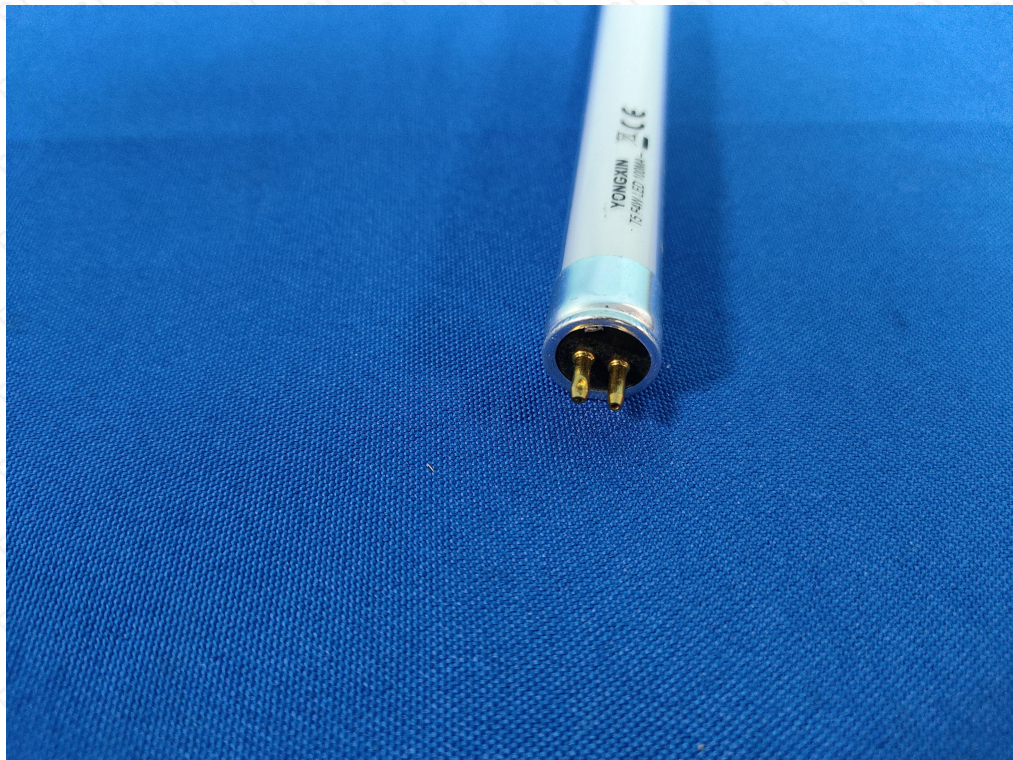




Model: T8 F10W LED



Model: T5 F4W LED





Report No.: PTC24103104701S-LD01

Model: T5 F4W LED



===== End of Report =====