



TEST REPORT
IEC 62560
Self-Ballasted LED-Lamp
for general lighting services by voltage > 50V Safety specifications

Report Number: 704021669201-00

Date of issue: 2016-08-22

Total number of pages: 24

Name of Testing Laboratory preparing the Report: TÜV SÜD Certification and Testing (China) Co., Ltd. Shanghai Branch

Applicant's name: Haiyan Yaohua Lighting Co., Ltd.

Address: South of Jiuqugang, Tongbei Village, Tongyuan Town, Haiyan Country, Zhejiang, Province, P.R. China

Test specification:

Standard: IEC 62560:2011 (First Edition) + A1:2015

Test procedure.....: GS mark

Non-standard test method.....: N/A

Test Report Form No......: IEC62560B

Test Report Form(s) Originator.....: DEKRA Certification B.V.

Master TRF: Dated 2015-11

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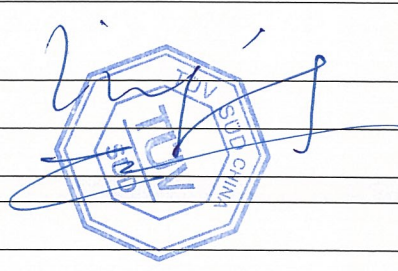
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Test item description	LED lamps	
Trade Mark	N/A	
Manufacturer	Same as applicant	
Model/Type reference	See model list on page 4-9	
Ratings	See model list on page 4-9	
Responsible Testing Laboratory (as applicable), testing procedure and testing location(s):		
<input checked="" type="checkbox"/> Testing Laboratory:	TÜV SÜD Certification and Testing (China) Co., Ltd. Shanghai Branch No.151 Heng Tong Road. Shanghai 200070 P.R. China	
Testing location/ address	No. 1999, Duhui Road, Shanghai, 201108, P. R. China	
<input type="checkbox"/> Associated Testing Laboratory:	N/A	
Testing location/ address		
Tested by (name, function, signature)	Ying LI	
Approved by (name, function, signature) ...	Huidong ZHANG	
<input type="checkbox"/> Testing procedure: Elsewhere:	N/A	
Testing location/ address		
Tested by (name, function, signature)		
Approved by (name, function, signature) ...		


<p>List of Attachments (including a total number of pages in each attachment): Requirements for photobiological safety for LED are considered in TRF EN/IEC 62471 with report No. 704021669201-00 attachment 1 (18 pages) Requirements of AfPS GS 2014:01 PAK 3.1 have been evaluated and found to be met by evaluation.</p>	
<p>Summary of testing: Determination of the test result includes consideration of measurement uncertainty from the test equipment and methods. Representative sample covered by this report has been tested and complies with the applicable requirements of this standard. All applicable hazards are covered by the harmonized standard.</p>	
<p>Tests performed (name of test and test clause): Complete test is performed for G125-8W-E27 Gauge test and Temperature Test also performed on G125-8W-B22d, C35-4W-E14 and C35-4W-B15d The model comply with the safety requirement.</p>	<p>Testing location: TÜV SÜD Certification and Testing (China) Co., Ltd. Shanghai Branch No. 1999, Duhui Road, Shanghai, 201108, P. R. China</p>
<p>Summary of compliance with National Differences (List of countries addressed): The deviation between EN 62560:2012+A1:2015 and IEC 62560:2011+A1:2015 is taken into account (see Appendix 2) <input checked="" type="checkbox"/> The product fulfils the requirements of EN 62560 :2012+A1:2015</p>	



<p>Copy of marking plate:</p> See the latest Data form for electrical equipment and machinery Note: Height of letter and numeral not less than 2mm, graphical symbol not less than 5mm, WEEE not less than 7mm.





Test item particulars: LED lamps (LED lamp)					
Classification of installation and use: N/A					
Supply Connection: E27, B22d, E14, B15d					
.....:					
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: 2016-07-10					
Date (s) of performance of tests: 2016-07-10 to 2016-08-22					
General remarks:					
"(See Enclosure #)" refers to additional information appended to the report. "(See appended table)" refers to a table appended to the report.					
Throughout this report a <input checked="" type="checkbox"/> comma / <input type="checkbox"/> point is used as the decimal separator.					
Remark 1:					
The following contents are included and as attachments of this test report:					
<ul style="list-style-type: none"> ● Test report IEC 62560:2011 + A1:2015 (15 pages) ● Appendix 1: ATTACHMENT TO TEST REPORT IEC 62560(1 page) ● Appendix 2: Thermal test (4 page) ● Appendix 3: comprising: Additional requirements of EN 62493: 2015 (1 page) ● Appendix 4: Photograph (3 pages) ● Data form for electrical equipment and machinery. 					
Name and address of factory (ies): Haiyan Yaohua Lighting Co., Ltd.					
South of Jiuqugang, Tongbei Village, Tongyuan Town, Haiyan Country, Zhejiang, Province, P.R. China					
General product information:					
All the lamps are have same circuit and PCB layout					
Photo	Model	Wattage	Voltage	Current	Cap
	A55-4W-E27	4W	AC 220-240V	34mA	E27
	A55-5W-E27	5W	AC 220-240V	40mA	E27

	A55-6W-E27	6W	AC 220-240V	48mA	E27
	A55-7W-E27	7W	AC 220-240V	56mA	E27
	A55-8W-E27	8W	AC 220-240V	64mA	E27
	A55-4W-B22d	4W	AC 220-240V	34mA	B22d
	A55-5W-B22d	5W	AC 220-240V	40mA	B22d
	A55-6W-B22d	6W	AC 220-240V	48mA	B22d
	A55-7W-B22d	7W	AC 220-240V	56mA	B22d
	A55-8W-B22d	8W	AC 220-240V	64mA	B22d
	A60-4W-E27	4W	AC 220-240V	34mA	E27
	A60-5W-E27	5W	AC 220-240V	40mA	E27
	A60-6W-E27	6W	AC 220-240V	48mA	E27
	A60-7W-E27	7W	AC 220-240V	56mA	E27
	A60-8W-E27	8W	AC 220-240V	64mA	E27
	A60-4W-B22d	4W	AC 220-240V	34mA	B22d
	A60-5W-B22d	5W	AC 220-240V	40mA	B22d
	A60-6W-B22d	6W	AC 220-240V	48mA	B22d
	A60-7W-B22d	7W	AC 220-240V	56mA	B22d
	A60-8W-B22d	8W	AC 220-240V	64mA	B22d
	G45-2W-E14	2W	AC 220-240V	18mA	E14
	G45-4W-E14	4W	AC 220-240V	34mA	E14
	G45-2W- B15d	2W	AC 220-240V	18mA	B15d
	G45-4W- B15d	4W	AC 220-240V	34mA	B15d
	G45-2W-E27	2W	AC 220-240V	18mA	E27
	G45-4W-E27	4W	AC 220-240V	34mA	E27
	G45-2W- B22d	2W	AC 220-240V	18mA	B22d
	G45-4W- B22d	4W	AC 220-240V	34mA	B22d
	C35-2W-E14	2W	AC 220-240V	18mA	E14
	C35-4W-E14	4W	AC 220-240V	34mA	E14

	C35-2W- B15d	2W	AC 220-240V	18mA	B15d
	C35-4W- B15d	4W	AC 220-240V	34mA	B15d
	C35-2W-E27	2W	AC 220-240V	18mA	E27
	C35-4W-E27	4W	AC 220-240V	34mA	E27
	C35-2W- B22d	2W	AC 220-240V	18mA	B22d
	C35-4W- B22d	4W	AC 220-240V	34mA	B22d
	C35T-2W-E14	2W	AC 220-240V	18mA	E14
	C35T-4W-E14	4W	AC 220-240V	34mA	E14
	C35T-2W- B15d	2W	AC 220-240V	18mA	B15d
	C35T-4W- B15d	4W	AC 220-240V	34mA	B15d
	C35T-2W-E27	2W	AC 220-240V	18mA	E27
	C35T-4W-E27	4W	AC 220-240V	34mA	E27
	C35T-2W- B22d	2W	AC 220-240V	18mA	B22d
	C35T-4W- B22d	4W	AC 220-240V	34mA	B22d
	C35F-2W-E14	2W	AC 220-240V	18mA	E14
	C35F-4W-E14	4W	AC 220-240V	34mA	E14
	C35F-2W- B15d	2W	AC 220-240V	18mA	B15d
	C35F-4W- B15d	4W	AC 220-240V	34mA	B15d
	C35F-2W-E27	2W	AC 220-240V	18mA	E27
	C35F-4W-E27	4W	AC 220-240V	34mA	E27
	C35F-2W- B22d	2W	AC 220-240V	18mA	B22d
	C35F-4W- B22d	4W	AC 220-240V	34mA	B22d
	G80-4W-E27	4W	AC 220-240V	34mA	E27
	G80-5W-E27	5W	AC 220-240V	40mA	E27
	G80-6W-E27	6W	AC 220-240V	48mA	E27
	G80-7W-E27	7W	AC 220-240V	56mA	E27
	G80-8W-E27	8W	AC 220-240V	64mA	E27
	G80-4W-B22d	4W	AC 220-240V	34mA	B22d


	G80-5W-B22d	5W	AC 220-240V	40mA	B22d
	G80-6W-B22d	6W	AC 220-240V	48mA	B22d
	G80-7W-B22d	7W	AC 220-240V	56mA	B22d
	G80-8W-B22d	8W	AC 220-240V	64mA	B22d
	G95-4W-E27	4W	AC 220-240V	34mA	E27
	G95-5W-E27	5W	AC 220-240V	40mA	E27
	G95-6W-E27	6W	AC 220-240V	48mA	E27
	G95-7W-E27	7W	AC 220-240V	56mA	E27
	G95-8W-E27	8W	AC 220-240V	64mA	E27
	G95-4W-B22d	4W	AC 220-240V	34mA	B22d
	G95-5W-B22d	5W	AC 220-240V	40mA	B22d
	G95-6W-B22d	6W	AC 220-240V	48mA	B22d
	G95-7W-B22d	7W	AC 220-240V	56mA	B22d
	G95-8W-B22d	8W	AC 220-240V	64mA	B22d
	G125-4W-E27	4W	AC 220-240V	34mA	E27
	G125-5W-E27	5W	AC 220-240V	40mA	E27
	G125-6W-E27	6W	AC 220-240V	48mA	E27
	G125-7W-E27	7W	AC 220-240V	56mA	E27
	G125-8W-E27	8W	AC 220-240V	64mA	E27
	G125-4W-B22d	4W	AC 220-240V	34mA	B22d
	G125-5W-B22d	5W	AC 220-240V	40mA	B22d
	G125-6W-B22d	6W	AC 220-240V	48mA	B22d
	G125-7W-B22d	7W	AC 220-240V	56mA	B22d
	G125-8W-B22d	8W	AC 220-240V	64mA	B22d
R50-2W-E14	2W	AC 220-240V	18mA	E14	
R50-4W-E14	4W	AC 220-240V	34mA	E14	
R63-4W-E27	4W	AC 220-240V	34mA	E27	
R63-6W-E27	6W	AC 220-240V	48mA	E27	

	R63-4W-B22d	4W	AC 220-240V	34mA	B22d
	R63-6W-B22d	6W	AC 220-240V	48mA	B22d
	R80-4W-E27	4W	AC 220-240V	34mA	E27
	R80-5W-E27	5W	AC 220-240V	40mA	E27
	R80-6W-E27	6W	AC 220-240V	48mA	E27
	R80-7W-E27	7W	AC 220-240V	56mA	E27
	R80-8W-E27	8W	AC 220-240V	64mA	E27
	R80-4W-B22d	4W	AC 220-240V	34mA	B22d
	R80-5W-B22d	5W	AC 220-240V	40mA	B22d
	R80-6W-B22d	6W	AC 220-240V	48mA	B22d
	R80-7W-B22d	7W	AC 220-240V	56mA	B22d
	R80-8W-B22d	8W	AC 220-240V	64mA	B22d
		ST64-4W-E27	4W	AC 220-240V	34mA
ST64-5W-E27		5W	AC 220-240V	40mA	E27
ST64-6W-E27		6W	AC 220-240V	48mA	E27
ST64-7W-E27		7W	AC 220-240V	56mA	E27
ST64-8W-E27		8W	AC 220-240V	64mA	E27
ST64-4W-B22d		4W	AC 220-240V	34mA	B22d
ST64-5W-B22d		5W	AC 220-240V	40mA	B22d
ST64-6W-B22d		6W	AC 220-240V	48mA	B22d
ST64-7W-B22d		7W	AC 220-240V	56mA	B22d
ST64-8W-B22d		8W	AC 220-240V	64mA	B22d
ST58-4W-E27		4W	AC 220-240V	34mA	E27
ST58-5W-E27		5W	AC 220-240V	40mA	E27
ST58-6W-E27		6W	AC 220-240V	48mA	E27
ST58-7W-E27		7W	AC 220-240V	56mA	E27
ST58-8W-E27		8W	AC 220-240V	64mA	E27
ST58-4W-B22d	4W	AC 220-240V	34mA	B22d	

	ST58-5W-B22d	5W	AC 220-240V	40mA	B22d
	ST58-6W-B22d	6W	AC 220-240V	48mA	B22d
	ST58-7W-B22d	7W	AC 220-240V	56mA	B22d
	ST58-8W-B22d	8W	AC 220-240V	64mA	B22d
	T8-2W-E14	2W	AC 220-240V	18mA	E14
	T8-4W-E14	4W	AC 220-240V	34mA	E14
	T8-2W-E27	2W	AC 220-240V	18mA	E27
	T8-4W-E27	4W	AC 220-240V	34mA	E27
	T8-2W-B22d	2W	AC 220-240V	18mA	B22d
	T8-4W-B22d	4W	AC 220-240V	34mA	B22d
	ST26-1W-E14	1W	AC 220-240V	9mA	E14
	T30-4W-E27	4W	AC 220-240V	34mA	E27
	T30-4W-B22d	4W	AC 220-240V	34mA	B22d
	T30-6W-E27	6W	AC 220-240V	48mA	E27
	T30-6W-B22d	6W	AC 220-240V	48mA	B22d
	T38-4W-E27	4W	AC 220-240V	34mA	E27
	T38-4W-B22d	4W	AC 220-240V	34mA	B22d
	T38-6W-E27	6W	AC 220-240V	48mA	E27
	T38-6W-B22d	6W	AC 220-240V	48mA	B22d

IEC 62560			
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.		P
4.2	Self-ballasted LED-Lamp are non-repairable.		P

5	MARKING		P
5.1	Mandatory marking		P
	- mark of origin		P
	- rated supply voltage (V)	220-240	P
	- rated wattage (W)	See model list	P
	- rated frequency (Hz).....	50/60	P
5.2	Addition marking		P
	- rated current (A)	See model list	P
	- weight significantly higher		P
	- special conditions or restrictions		N/A
	Not suitable for dimming; symbol  used		P
	- not suitable for water contact		P
5.3	Marking durable and legible		P
	rubbing 15 s water, 15 s petroleum; marking legible		P

6	INTERCHANGEABILITY		P
6.1	Cap interchangeability in accordance with IEC 60061-1		P
	Gauge in accordance with IEC 60061-3		P
6.2	Bending moment and mass imparted by the lamp at the lampholder		P
	Bending moment imparted by the lamp at the lampholder (Nm)	For B22d and E27 < 2Nm For B15d and E14 < 1Nm	P
	Mass not exceeding value table 2 or as specified in IEC 60061-1 (kg)	0,048kg	P

7	PROTECTION AGAINST ACCIDENTAL CONTACT WITH LIVE PARTS		
	Internal, basic insulated or live metal parts not accessible		P
	Tested with a test finger with a force of 10 N		P

IEC 62560			
Clause	Requirement + Test	Result - Remark	Verdict
	Compliance checked with appropriate gauges		P

8	INSULATION RESISTANCE AND ELECTRIC STRENGTH		
8.2	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	>5 MΩ	P
8.3	Immediately after clause 8.2 electric strength test for 1 min		P
	Double or reinforced insulation, 4U + 2000 V	2960	P
	No flashover or breakdown		P

9	MECHANICAL STRENGTH		
	Torsion resistance of unused lamps		P
9.2.1	Torque test		P
	B15d or E14 Cap.....	1,15 Nm	P
	B22d, E26, E26d or E27 Cap.....	3,0 Nm	P
	E11 or E12 Cap.....	0,8 Nm	N/A
	E17 Cap	1,5 Nm	N/A
	E39 or E40 Cap.....	5,0 Nm	N/A
	GX53 Cap	3,0 Nm	N/A
9.3	Compliance criteria		P
	Clause 8 shall comply after the mechanical strength test.		P
9.4	Axial strength of Edison caps		P
	After full insertion into the gauge an axial force of Table 4 is applied to the central contact (N)	120N for E27 80N for E14	P
	The insulation around the central contact shall remain intact		P

10	CAP TEMPERATURE RISE		
	The cap temperature rise Δt_s of the lamp shall not exceed 120 K.		P

11	RESISTANCE TO HEAT		
			P

IEC 62560			
Clause	Requirement + Test	Result - Remark	Verdict
	Parts of insulating material providing protection against electric shock, retaining live parts in position, ball-pressure test:	(see appended table)	P

12	RESISTANCE TO FLAME AND IGNITION		P
	External parts of insulating material preventing electric shock glow-wire test 650 °C	(see appended table)	P

13	FAULT CONDITIONS		P
13.2	Fault conditions: where diagram indicates fault condition impairs safety, electronic components have been short-circuited or disconnected	(see appended table)	P
13.3	When operated under fault conditions the lamp		P
	- does not emit flames or molten material		P
	- does not produce flammable gases or smoke		P
	- live parts not accessible		P
	After the tests the insulation resistance with d.c. 1000 V complies with requirements of Cl. 8.1 :	>5 MΩ	P

14 (16)	CREEPAGE DISTANCES AND CLEARANCES		P
	Creepage distances and clearances according to IEC 61347-1	(see appended table)	P
	Conductive accessible parts according to IEC 60598-1	(see appended table)	P

15	ABNORMAL OPERATION		P
	Non-dimmable self-ballasted lamps are tested on a dimmer or an electronic switch according the test circuit shown in Figure 8		P
	Operate the lamp for 8 h at most onerous dimming level		P
	When operated under abnormal operation the lamp		P
	- does not catch fire		P
	- does not produce flammable gases		P
	- live parts not accessible		P

IEC 62560			
Clause	Requirement + Test	Result - Remark	Verdict
16	TEST CONDITIONS FOR DIMMABLE LAMPS		N/A
	Test are carried out at maximum power setting for Clause 10 and Clause 17		N/A
17	PHOTOBIOLOGICAL SAFETY		P
17.1	UV radiation		P
	The LED lamp doesn't exceed 2mW/klm		P
17.2	Blue light hazard		P
	Assessed according to IEC TR 62778		P
	LED lamps shall be RG0 or RG1	RG0	P
18	INGRESS PROTECTION		N/A
18.1	Lamps shall be suitable for water contact unless marked with Figure 6		N/A
18.2	The lamp is subjected to an IPX4 test according to IEC 60598-1		N/A
	The lamp complies with the compliance provisions of 9.2 of IEC 60598-1		N/A
	Lamps constructed so that it is sealed to exclude water need not to be tested		N/A

IEC 62560			
Clause	Requirement + Test	Result - Remark	Verdict

11	TABLE: Ball Pressure Test of Thermoplastics			P
Allowed impression diameter (mm)		2mm		—
Object/ Part No./ Material	Manufacturer/ trademark	Test temperature (°C)	Impression diameter (mm)	
PCB	see CDF	125	0,7	
Supplementary information: N/A				

12	TABLE: Resistance to heat and fire - Glow wire tests			P
Object/ Part No./ Material	Manufacturer/ trademark	Glow wire test (GWT); (°C)		Verdict
		650		
		te	ti	
PCB	see CDF	30	0	P

13	TABLE: tests of fault conditions			
Part	Simulated fault	Result	Hazard	
BD1	Short-circuit	No work, unrecovered	YES/NO	
C1	Short-circuit	No work, unrecovered	YES/NO	
C2	Short-circuit	No work, recovered	YES/NO	
C3	Short-circuit	No work, recovered	YES/NO	
C4	Short-circuit	No work, recovered	YES/NO	
LED	Open-circuit	No work, recovered	YES/NO	
150% power	150% power	Nothing impair safety	YES/NO	

IEC 62560			
Clause	Requirement + Test	Result - Remark	Verdict

14	TABLE: Clearance And Creepage Distance Measurements					P
clearance cl and creepage distance dcr at/of:	Up (V)	U r.m.s. (V)	Required cl (mm)	cl (mm)	required dcr (mm)	dcr (mm)
Live parts of different polarity	N/A	240V	1,5mm	2,7	2,5mm	2,7
Live parts and accessible parts	N/A	240V	3mm	5,2	5mm	5,2
Basic insulation and accessible parts	N/A	240V	3mm	5,2	5mm	5,2
Supplementary information: N/A						

TABLE: Critical components information					P
Object / part No.	Manufacturer/ trademark	Type / model	Technical data	Standard	Mark(s) of conformity ¹⁾
see the latest Data form for electrical equipment and machinery					
Supplementary information: ¹⁾ Provided evidence ensures the agreed level of compliance. See OD-CB2039.					

IEC 62560- Appendix 1			
Clause	Requirement + Test	Result - Remark	Verdict

ATTACHMENT TO TEST REPORT IEC 62560 EUROPEAN GROUP DIFFERENCES AND NATIONAL DIFFERENCES Self-ballasted LED-lamps for general lighting services by voltage > 50 V - Safety specifications Differences according.....:EN 62560:2012+A1:2015

COMMON MODIFICATIONS (EN)	P
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Lamps with the following caps are excluded from EN 62560:2012/A1:2015 as they do not comply with European safety requirements:			
	E11		N/A
	E12		N/A
	E17		N/A
	E26		N/A
	E26d		N/A
	E39		N/A
	Delete from the contents page the line on Annex B		N/A
	Delete from Clause 5.2 the item a)		N/A
	Include in Clause 14 the Corrigendum January 2012		N/A
	Delete Annex B		N/A

IEC 62560- Appendix 2			
Clause	Requirement + Test	Result - Remark	Verdict

	Type reference	G125-8W-E27	—
	Lamp used.....	LED lamp	—
	Lamp control gear used.....	N/A	—
	Mounting position of luminaire	Normal use	—
	Supply wattage (W)	7,6	—
	Supply current (A)	0,06	—
	Calculated power factor.....	0,53	—
	Table: measured temperatures corrected for $t_a = 25\text{ }^\circ\text{C}$:		
	- abnormal operating mode	N/A	—
	- test 1: rated voltage.....	240V~	—
	- test 2: 1,06 times rated voltage or 1,05 times rated wattage.....	N/A	—
	- test 3: Load on wiring to socket-outlet, 1,06 times voltage or 1,05 times wattage.....	N/A	—
	- test 4: 1,1 times rated voltage or 1,05 times rated wattage.....	N/A	—
	Through wiring or looping-in wiring loaded by a current of A during the test	N/A	—

temperature ($^\circ\text{C}$) of part	normal				abnormal	
	test 1	test 2	test 3	limit	test 4	limit
Cap	40,1	---	---	120K	---	---

IEC 62560- Appendix 2			
Clause	Requirement + Test	Result - Remark	Verdict

	Type reference	G125-8W-B22d	—
	Lamp used.....	LED lamp	—
	Lamp control gear used.....	N/A	—
	Mounting position of luminaire	Normal use	—
	Supply wattage (W)	7,6	—
	Supply current (A)	0,06	—
	Calculated power factor.....	0,53	—
	Table: measured temperatures corrected for $t_a = 25\text{ °C}$:		
	- abnormal operating mode	N/A	—
	- test 1: rated voltage.....	240V~	—
	- test 2: 1,06 times rated voltage or 1,05 times rated wattage.....	N/A	—
	- test 3: Load on wiring to socket-outlet, 1,06 times voltage or 1,05 times wattage.....	N/A	—
	- test 4: 1,1 times rated voltage or 1,05 times rated wattage.....	N/A	—
	Through wiring or looping-in wiring loaded by a current of A during the test	N/A	—

temperature (°C) of part	normal				abnormal	
	test 1	test 2	test 3	limit	test 4	limit
Cap	37,3	---	---	120K	---	---

IEC 62560- Appendix 2			
Clause	Requirement + Test	Result - Remark	Verdict

	Type reference	C35-4W-E14	—
	Lamp used.....	LED lamp	—
	Lamp control gear used.....	N/A	—
	Mounting position of luminaire	Normal use	—
	Supply wattage (W)	3,6	—
	Supply current (A)	0,03	—
	Calculated power factor.....	0,5	—
	Table: measured temperatures corrected for $t_a = 25\text{ °C}$:		
	- abnormal operating mode	N/A	—
	- test 1: rated voltage.....	240V~	—
	- test 2: 1,06 times rated voltage or 1,05 times rated wattage.....	N/A	—
	- test 3: Load on wiring to socket-outlet, 1,06 times voltage or 1,05 times wattage.....	N/A	—
	- test 4: 1,1 times rated voltage or 1,05 times rated wattage.....	N/A	—
	Through wiring or looping-in wiring loaded by a current of A during the test	N/A	—

temperature (°C) of part	normal				abnormal	
	test 1	test 2	test 3	limit	test 4	limit
Cap	58,6	---	---	120K	---	---

IEC 62560- Appendix 2			
Clause	Requirement + Test	Result - Remark	Verdict

	Type reference	C35-4W-B15d	—
	Lamp used.....	LED lamp	—
	Lamp control gear used.....	N/A	—
	Mounting position of luminaire	Normal use	—
	Supply wattage (W)	3,6	—
	Supply current (A)	0,03	—
	Calculated power factor.....	0,5	—
	Table: measured temperatures corrected for $t_a = 25\text{ }^\circ\text{C}$:		
	- abnormal operating mode	N/A	—
	- test 1: rated voltage.....	240V~	—
	- test 2: 1,06 times rated voltage or 1,05 times rated wattage.....	N/A	—
	- test 3: Load on wiring to socket-outlet, 1,06 times voltage or 1,05 times wattage.....	N/A	—
	- test 4: 1,1 times rated voltage or 1,05 times rated wattage.....	N/A	—
	Through wiring or looping-in wiring loaded by a current of A during the test	N/A	—

temperature ($^\circ\text{C}$) of part	normal				abnormal	
	test 1	test 2	test 3	limit	test 4	limit
Cap	55,7	---	---	120K	---	---

IEC 62560- Appendix 3			
Clause	Requirement + Test	Result - Remark	Verdict
4	LIMITS		N/A
4.1	General		N/A
	Comply with Van der Hoofden test limit in 4.2.3 or inherently compliant in 4.2.2 and pass assessment procedure for intentional radiators in 4.3		N/A
4.2	Unintentional radiating part of lighting equipment		P
4.2.2	Lighting equipment deemed to comply with the Van der Hoofden test without testing		P
	1) electronic controlgear	Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>	—
	2) incandescent-lamp technology	Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>	—
	3) LED-light-source technology	Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>	—
	4) OLED-light-source technology	Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>	—
	5) high-pressure discharge lamp LED-light-source technologies	Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>	—
	6) low-pressure discharge lamp technologies with exposure distance ≥ 50 cm	Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>	—
	7) independent auxiliary	Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>	—
	Not fulfil any of 1-7 above subject to 4.2.3		—
4.2.3	Applications of limits		N/A
	Not fulfil any of 1-7 in 4.2.2 but the compliance factor F is ≤ 1		N/A
4.3	Intentional radiating part of lighting equipment		N/A
	Comply with one of methods in Clause 7 if intentional radiator		N/A

Photographs- Appendix 4

Clause	Requirement + Test	Result - Remark	Verdict
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Over view

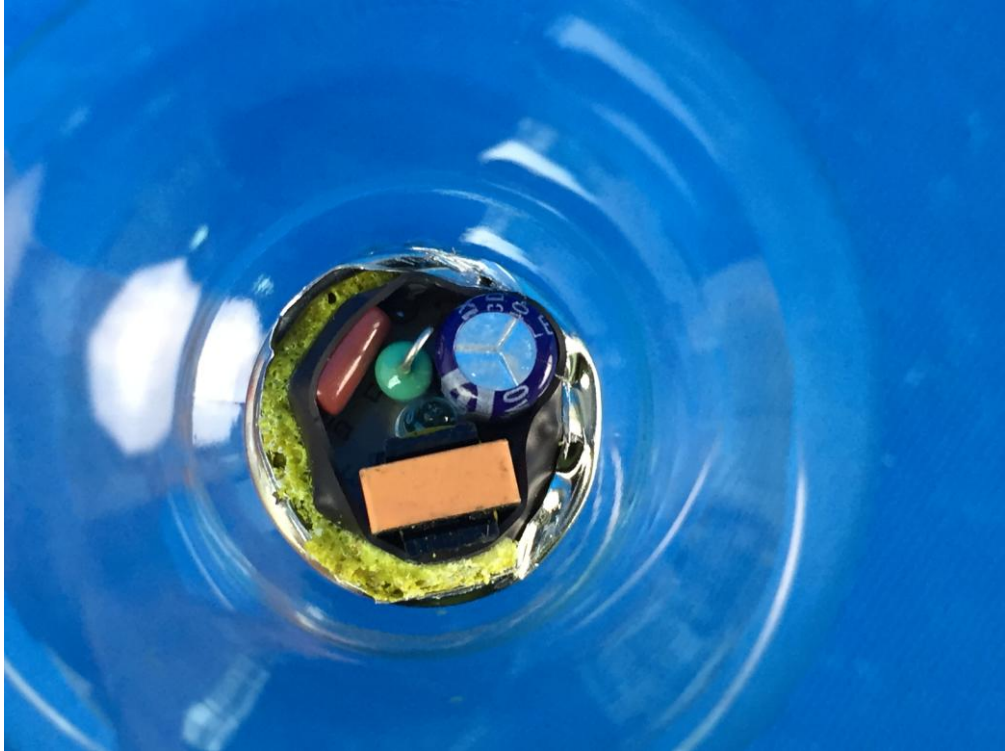
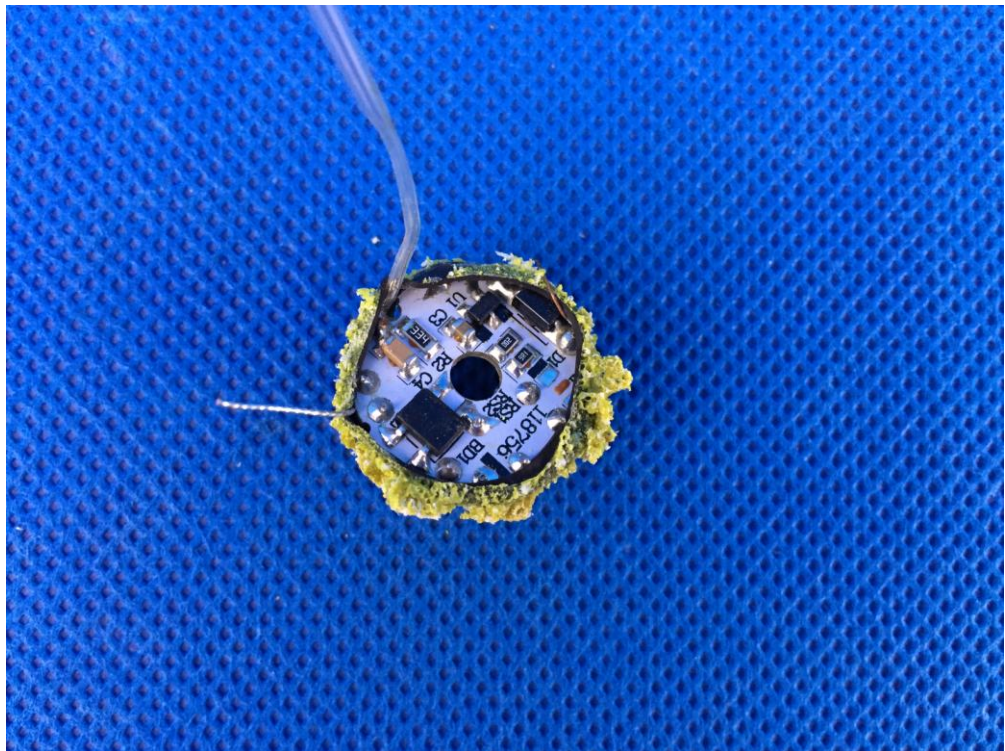


Lamp cap



Photographs- Appendix 4

Clause	Requirement + Test	Result - Remark	Verdict
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Top view of PCBBackview of PCB



TEST REPORT
IEC 62471
Photobiological safety of lamps and lamp systems

Report Reference No......: 704021669201-00 attachment 1

Date of issue: 2016-08-22

Total number of pages: 18 pages

CB Testing Laboratory.....: TÜV SÜD Certification and Testing (China) Co., Ltd. Shanghai Branch

Address: No.151 Heng Tong Road. Shanghai 200070 P.R. China

Applicant's name.....: Haiyan Yaohua Lighting Co., Ltd.

Address: South of Jiuqugang, Tongbei Village, Tongyuan Town, Haiyan Country, Zhejiang, Province, P.R. China

Test specification:

Standard.....: IEC 62471:2006 (First Edition)

Test procedure: GS mark

Non-standard test method.....: N/A

Test Report Form No......: IEC62471A

TRF Originator.....: VDE Testing and Certification Institute

Master TRF: Dated 2009-05

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This report is not valid as a CB Test Report unless signed by an approved CB Testing Laboratory and appended to a CB Test Certificate issued by an NCB in accordance with IECEE 02.

Test item description: LED lamps (LED lamp)

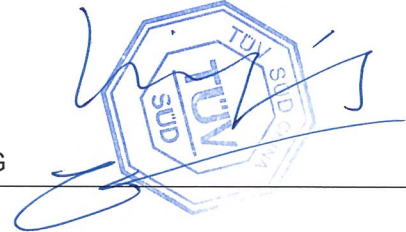
Trade Mark: N/A

Manufacturer: Haiyan Yaohua Lighting Co., Ltd.

Model/Type reference: Refer to 704021669201-00

Ratings: Refer to 704021669201-00

Testing procedure and testing location:	
<input checked="" type="checkbox"/> CB Testing Laboratory:	TÜV SÜD Certification and Testing (China) Co., Ltd. Shanghai Branch
Testing location/ address	No. 1999, Duhui Road, Shanghai, 201108, P. R. China
<input type="checkbox"/> Associated CB Laboratory:	
Testing location/ address	N/A
Tested by (name + signature).....:	Ying LI
Approved by (+ signature)	Huidong ZHANG
<input type="checkbox"/> Testing procedure: TMP	
Tested by (name + signature).....:	N/A
Approved by (+ signature)	N/A
Testing location/ address	N/A
<input type="checkbox"/> Testing procedure: WMT	
Tested by (name + signature).....:	N/A
Witnessed by (+ signature).....:	N/A
Approved by (+ signature)	N/A
Testing location/ address	N/A
<input type="checkbox"/> Testing procedure: SMT	
Tested by (name + signature).....:	N/A
Approved by (+ signature)	N/A
Supervised by (+ signature).....:	N/A
Testing location/ address	N/A
<input type="checkbox"/> Testing procedure: RMT	
Tested by (name + signature).....:	N/A
Approved by (+ signature)	N/A
Supervised by (+ signature).....:	N/A
Testing location/ address	N/A



Summary of testing:

Representative sample covered by this report has been tested and complies with the applicable requirements of this standard.

This report shall be read in conjunction with test report EN 62560 with report No. 704021669201-00

Tests performed (name of test and test clause):

Complete test
The test results comply with the requirements.

Testing location:

TÜV SÜD Certification and Testing (China) Co., Ltd.
Shanghai Branch

No. 1999, Duhui Road, Shanghai, 201108, P. R.
China

Summary of compliance with National Differences:

The deviation between EN 62471:2008 and of IEC 62471:2006 (First Edition) is taken into account at the end of the report, please refer to appendix 1 of this report.

Copy of marking plate:

N/A

Test item particulars	LED lamps
Tested lamp	<input checked="" type="checkbox"/> continuous wave lamps <input type="checkbox"/> pulsed lamps
Tested lamp system	Integral LED lamp
Lamp classification group	<input checked="" type="checkbox"/> exempt <input type="checkbox"/> risk 1 <input type="checkbox"/> risk 2 <input type="checkbox"/> risk 3
Lamp cap	E27
Bulb	Refer to latest Data form for electrical equipment and machinery
Rated of the lamp	Ditto
Furthermore marking on the lamp.....	N/A
Seasoning of lamps according IEC standard	N/A
Used measurement instrument	Digital power meter, spectroradiometric system, instant luminosity meter, Lux meter
Temperature by measurement.....	25 °C
Information for safety use	For general purpose use
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.....	2016-07-10
Date (s) of performance of tests.....	2016-07-10 to 2016-08-22
General remarks:	
<p>The test results presented in this report relate only to the object tested. This report shall not be reproduced, except in full, without the written approval of the Issuing testing laboratory. "(See Enclosure #)" refers to additional information appended to the report. "(See appended table)" refers to a table appended to the report. Throughout this report a comma (point) is used as the decimal separator. List of test equipment must be kept on file and available for review.</p>	
Remark 1:	
<p>The following contents are included and as attachments of this test report:</p> <ul style="list-style-type: none"> ● Test report IEC 62471:2006 (15 pages) ● Appendix 1: Comprising deviation of EN 62471:2008 (3 pages) ● Data form for electrical equipment and machinery 	
Remark 3:	
<p>Name of Factory: Haiyan Yaohua Lighting Co., Ltd. Address: South of Jiuqugang, Tongbei Village, Tongyuan Town, Haiyan Country, Zhejiang, Province, P.R. China</p>	
General product information:	
Refer to 704021669201-00	

IEC 62471			
Clause	Requirement + Test	Result – Remark	Verdict
4	EXPOSURE LIMITS		P
4.1	General		P
	The exposure limits in this standard is not less than 0,01 ms and not more than any 8-hour period and should be used as guides in the control of exposure		P
	Detailed spectral data of a light source are generally required only if the luminance of the source exceeds $10^4 \text{ cd}\cdot\text{m}^{-2}$	see clause 4.3	P
4.3	Hazard exposure limits		P
4.3.1	Actinic UV hazard exposure limit for the skin and eye		P
	The exposure limit for effective radiant exposure is $30 \text{ J}\cdot\text{m}^{-2}$ within any 8-hour period		P
	To protect against injury of the eye or skin from ultraviolet radiation exposure produced by a broad-band source, the effective integrated spectral irradiance, E_s , of the light source shall not exceed the levels defined by:		P
	$E_s \cdot t = \sum_{200}^{400} \sum_t E_\lambda(\lambda, t) \cdot S_{UV}(\lambda) \cdot \Delta t \cdot \Delta \lambda \leq 30 \quad \text{J}\cdot\text{m}^{-2}$		P
	The permissible time for exposure to ultraviolet radiation incident upon the unprotected eye or skin shall be computed by:		P
	$t_{\max} = \frac{30}{E_s} \quad \text{s}$		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 1000 s. For exposure times greater than 1000 s (approximately 16 minutes) the UV-A irradiance for the unprotected eye, E_{UVA} , shall not exceed $10 \text{ W}\cdot\text{m}^{-2}$.		P
	The permissible time for exposure to ultraviolet radiation incident upon the unprotected eye for time less than 1000 s, shall be computed by:		P
	$t_{\max} \leq \frac{10\,000}{E_{UVA}} \quad \text{s}$		P
4.3.3	Retinal blue light hazard exposure limit		P
	To protect against retinal photochemical injury from chronic blue-light exposure, the integrated spectral radiance of the light source weighted against the blue-light hazard function, $B(\lambda)$, i.e., the blue-light weighted radiance, L_B , shall not exceed the levels defined by:		P
	$L_B \cdot t = \sum_{300}^{700} \sum_t L_\lambda(\lambda, t) \cdot B(\lambda) \cdot \Delta t \cdot \Delta \lambda \leq 10^6 \quad \text{J} \cdot \text{m}^{-2} \cdot \text{sr}^{-1}$	for $t \leq 10^4 \text{ s}$	$t_{\max} = \frac{10^6}{L_B}$ N/A

IEC 62471			
Clause	Requirement + Test	Result – Remark	Verdict
	$L_B = \sum_{300}^{700} L_\lambda \cdot B(\lambda) \cdot \Delta\lambda \leq 100 \quad W \cdot m^{-2} \cdot sr^{-1}$	for $t > 10^4$ s	P
4.3.4	Retinal blue light hazard exposure limit - small source		P
	Thus the spectral irradiance at the eye E_λ , weighted against the blue-light hazard function $B(\lambda)$ shall not exceed the levels defined by:	see table 4.2	P
	$E_B \cdot t = \sum_{300}^{700} \sum_t E_\lambda(\lambda, t) \cdot B(\lambda) \cdot \Delta\lambda \leq 100 \quad J \cdot m^{-2}$	for $t \leq 100$ s	N/A
	$E_B = \sum_{300}^{700} E_\lambda \cdot B(\lambda) \cdot \Delta\lambda \leq 1 \quad W \cdot m^{-2}$	for $t > 100$ s	N/A
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
	$L_R = \sum_{380}^{1400} L_\lambda \cdot R(\lambda) \cdot \Delta\lambda \leq \frac{50\,000}{\alpha \cdot t^{0,25}} \quad W \cdot m^{-2} \cdot sr^{-1}$	($10 \mu s \leq t \leq 10$ s)	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
	$L_{IR} = \sum_{780}^{1400} L_\lambda \cdot R(\lambda) \cdot \Delta\lambda \leq \frac{6\,000}{\alpha} \quad W \cdot m^{-2} \cdot sr^{-1}$	$t > 10$ s	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:		P
	$E_{IR} = \sum_{780}^{3000} E_\lambda \cdot \Delta\lambda \leq 18\,000 \cdot t^{-0,75} \quad W \cdot m^{-2}$	$t \leq 1000$ s	N/A
	For times greater than 1000 s the limit becomes:		P
	$E_{IR} = \sum_{780}^{3000} E_\lambda \cdot \Delta\lambda \leq 100 \quad W \cdot m^{-2}$	$t > 1000$ s	P
4.3.8	Thermal hazard exposure limit for the skin		P

IEC 62471			
Clause	Requirement + Test	Result – Remark	Verdict
	Visible and infrared radiant exposure (380 nm to 3000 nm) of the skin shall be limited to:		P
	$E_H \cdot t = \sum_{380}^{3000} \sum_t E_\lambda(\lambda, t) \cdot \Delta t \cdot \Delta \lambda \leq 20\,000 \cdot t^{0,25} \quad \text{J} \cdot \text{m}^{-2}$		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)		P
	Seasoning of lamps shall be done as stated in the appropriate IEC lamp standard.		P
5.1.2	Test environment		P
	For specific test conditions, see the appropriate IEC lamp standard or in 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 IEC lamp standard, or		P
	– the manufacturer's recommendation		N/A
5.1.5	Lamp system operation		P
	The power source for operation of the test lamp shall be provided in accordance with:		P
	– the appropriate IEC standard, or		P
	– the manufacturer's recommendation		N/A
5.2	Measurement procedure		P
5.2.1	Irradiance measurements		P
	Minimum aperture diameter 7mm.		N/A
	Maximum aperture diameter 50 mm.		P
	The measurement shall be made in that position of the beam giving the maximum reading.		P
	The measurement instrument is adequate calibrated.		P
5.2.2	Radiance measurements		P
5.2.2.1	Standard method		N/A

IEC 62471			
Clause	Requirement + Test	Result – Remark	Verdict
	The measurements made with an optical system.		N/A
	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.		N/A
5.2.2.2	Alternative method		P
	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.		P
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/A
	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/A
5.3	Analysis methods		P
5.3.1	Weighting curve interpolations		P
	To standardize interpolated values, use linear interpolation on the log of given values to obtain intermediate points at the wavelength intervals desired.	see table 4.1	P
5.3.2	Calculations		P
	The calculation of source hazard values shall be performed by weighting the spectral scan by the appropriate function and calculating the total weighted energy.		P
5.3.3	Measurement uncertainty		N/A
	The quality of all measurement results must be quantified by an analysis of the uncertainty.	see Annex C in the norm	N/A
6	LAMP CLASSIFICATION		P
	For the purposes of this standard it was decided that the values shall be reported as follows:	see table 6.1	P
	– for lamps intended for general lighting service, the hazard values shall be reported as either irradiance or radiance values at a distance which produces an illuminance of 500 lux, but not at a distance less than 200 mm		P
	– for all other light sources, including pulsed lamp sources, the hazard values shall be reported at a distance of 200 mm		N/A
6.1	Continuous wave lamps		P

IEC 62471			
Clause	Requirement + Test	Result – Remark	Verdict
6.1.1	Except Group		P
	In the except group are lamps, which does not pose any photobiological hazard. The requirement is met by any lamp that does not pose:		P
	– an actinic ultraviolet hazard (E_S) within 8-hours exposure (30000 s), nor		P
	– a near-UV hazard (E_{UVA}) within 1000 s, (about 16 min), nor		P
	– a retinal blue-light hazard (L_B) within 10000 s (about 2,8 h), nor		P
	– a retinal thermal hazard (L_R) within 10 s, nor		P
	– an infrared radiation hazard for the eye (E_{IR}) within 1000 s		P
6.1.2	Risk Group 1 (Low-Risk)		N/A
	In this group are lamps, which exceeds the limits for the except group but that does not pose:		N/A
	– an actinic ultraviolet hazard (E_S) within 10000 s, nor		N/A
	– a near ultraviolet hazard (E_{UVA}) within 300 s, nor		N/A
	– a retinal blue-light hazard (L_B) within 100 s, nor		N/A
	– a retinal thermal hazard (L_R) within 10 s, nor		N/A
	– an infrared radiation hazard for the eye (E_{IR}) within 100 s		N/A
	Lamps that emit infrared radiation without a strong visual stimulus and do not pose a near-infrared retinal hazard (L_{IR}), within 100 s are in Risk Group 1.		N/A
6.1.3	Risk Group 2 (Moderate-Risk)		N/A
	This requirement is met by any lamp that exceeds the limits for Risk Group 1, but that does not pose:		N/A
	– an actinic ultraviolet hazard (E_S) within 1000 s exposure, nor		N/A
	– a near ultraviolet hazard (E_{UVA}) within 100 s, nor		N/A
	– a retinal blue-light hazard (L_B) within 0,25 s (aversion response), nor		N/A
	– a retinal thermal hazard (L_R) within 0,25 s (aversion response), nor		N/A
	– an infrared radiation hazard for the eye (E_{IR}) within 10 s		N/A
	Lamps that emit infrared radiation without a strong visual stimulus and do not pose a near-infrared retinal hazard (L_{IR}), within 10 s are in Risk Group 2.		N/A
6.1.4	Risk Group 3 (High-Risk)		N/A

IEC 62471			
Clause	Requirement + Test	Result – Remark	Verdict
	Lamps which exceed the limits for Risk Group 2 are in Group 3.		N/A
6.2	Pulsed lamps		N/A
	Pulse lamp criteria shall apply to a single pulse and to any group of pulses within 0,25 s.		N/A
	A pulsed lamp shall be evaluated at the highest nominal energy loading as specified by the manufacturer.		N/A
	The risk group determination of the lamp being tested shall be made as follows:		N/A
	– a lamp that exceeds the exposure limit shall be classified as belonging to Risk Group 3 (High-Risk)		N/A
	– 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/A
	– 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/A

IEC 62471			
Clause	Requirement + Test	Result – Remark	Verdict

Table 4.1	Spectral weighting function for assessing ultraviolet hazards for skin and eye			P
Wavelength ¹ λ , nm	UV hazard function $S_{uv}(\lambda)$	Wavelength λ , nm	UV hazard function $S_{uv}(\lambda)$	
200	0,030	313*	0,006	
205	0,051	315	0,003	
210	0,075	316	0,0024	
215	0,095	317	0,0020	
220	0,120	318	0,0016	
225	0,150	319	0,0012	
230	0,190	320	0,0010	
235	0,240	322	0,00067	
240	0,300	323	0,00054	
245	0,360	325	0,00050	
250	0,430	328	0,00044	
254*	0,500	330	0,00041	
255	0,520	333*	0,00037	
260	0,650	335	0,00034	
265	0,810	340	0,00028	
270	1,000	345	0,00024	
275	0,960	350	0,00020	
280*	0,880	355	0,00016	
285	0,770	360	0,00013	
290	0,640	365*	0,00011	
295	0,540	370	0,000093	
297*	0,460	375	0,000077	
300	0,300	380	0,000064	
303*	0,120	385	0,000053	
305	0,060	390	0,000044	
308	0,026	395	0,000036	
310	0,015	400	0,000030	

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

IEC 62471			
Clause	Requirement + Test	Result – Remark	Verdict

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

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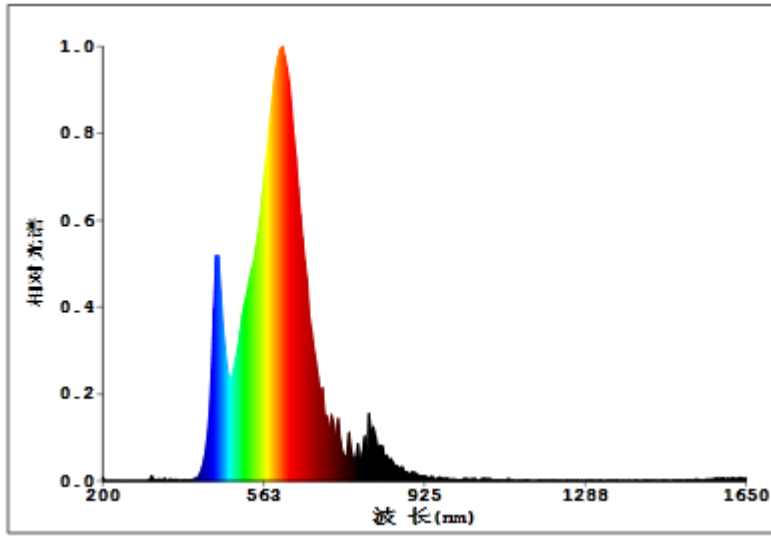
Table 5.4		Summary of the ELs for the surface of the skin or cornea (irradiance based values)				P
Hazard Name	Relevant equation	Wavelength range nm	Exposure duration sec	Limiting aperture rad (deg)	EL in terms of constant irradiance $W \cdot m^{-2}$	
Actinic UV skin & eye	$E_S = \sum E_\lambda \cdot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

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

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Clause	Requirement + Test	Result – Remark	Verdict

Table 6.1		Emission limits for risk groups of continuous wave lamps								P
Risk	Action spectrum	Symbol	Units	Emission Measurement						
				Exempt		Low risk		Mod risk		
				Limit	Result	Limit	Result	Limit	Result	
Actinic UV	$S_{UV}(\lambda)$	E_s	$W \cdot m^{-2}$	0,001	$4,0 \times 10^{-6}$	0,003	--	0,03	--	
Near UV		E_{UVA}	$W \cdot m^{-2}$	10	$1,2 \times 10^{-4}$	33	--	100	--	
Blue light	$B(\lambda)$	L_B	$W \cdot m^{-2} \cdot sr^{-1}$	100	89	10000	--	4000000	--	
Blue light, small source	$B(\lambda)$	E_B	$W \cdot m^{-2}$	1,0*	$7,0 \times 10^{-3}$	1,0	--	400	--	
Retinal thermal	$R(\lambda)$	L_R	$W \cdot m^{-2} \cdot sr^{-1}$	$28000/\alpha$	$4,2 \times 10^4$	$28000/\alpha$	--	$71000/\alpha$	--	
Retinal thermal, weak visual stimulus**	$R(\lambda)$	L_{IR}	$W \cdot m^{-2} \cdot sr^{-1}$	$6000/\alpha$	$9,6 \times 10^2$	$6000/\alpha$	--	$6000/\alpha$	--	
IR radiation, eye		E_{IR}	$W \cdot m^{-2}$	100	0	570	--	3200	--	
* Small source defined as one with $\alpha < 0,011$ radian. Averaging field of view at 10000 s is 0,1 radian. ** Involves evaluation of non-GLS source										

Furthermore remarks:



IEC62471A - Appendix 1			
Clause	Requirement + Test	Result - Remark	Verdict

ATTACHMENT TO TEST REPORT IEC 62471 EUROPEAN GROUP DIFFERENCES AND NATIONAL DIFFERENCES Photobiological safety of lamps and lamps systems	
Differences according to.....:	EN 62471:2008
Attachment Form No.....:	EU_GD_IEC62471A
Attachment Originator	IMQ S.p.A.
Master Attachment.....:	2009-07
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CENELEC COMMON MODIFICATIONS (EN)			
4	EXPOSURE LIMITS		
	Contents of the whole Clause 4 of IEC 62471:2006 moved into a new informative Annex ZB		—
	Clause 4 replaced by the following:		
	Limits of the Artificial Optical Radiation Directive (2006/25/EC) have been applied instead of those fixed in IEC 62471:2006	See appended Table 6.1	P
4.1	General		
	First paragraph deleted		—

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Clause	Requirement + Test	Result – Remark	Verdict

Table 6.1			Emission limits for risk groups of continuous wave lamps (based on EU Directive 2006/25/EC)							P
Risk	Action spectrum	Symbol	Units	Emission Measurement						
				Exempt		Low risk		Mod risk		
				Limit	Result	Limit	Result	Limit	Result	
Actinic UV	$S_{UV}(\lambda)$	E_s	$W \cdot m^{-2}$	0,001	$4,0 \times 10^{-6}$	-	-	-	-	
Near UV		E_{UVA}	$W \cdot m^{-2}$	0,33	$1,2 \times 10^{-4}$	-	-	-	-	
Blue light	$B(\lambda)$	L_B	$W \cdot m^{-2} \cdot sr^{-1}$	100	89	10000	---	4000000	---	
Blue light, small source	$B(\lambda)$	E_B	$W \cdot m^{-2}$	0,01*	$7,0 \times 10^{-3}$	1,0	---	400	---	
Retinal thermal	$R(\lambda)$	L_R	$W \cdot m^{-2} \cdot sr^{-1}$	$28000/\alpha$	$4,2 \times 10^4$	$28000/\alpha$	---	$71000/\alpha$	---	
Retinal thermal, weak visual stimulus**	$R(\lambda)$	L_{IR}	$W \cdot m^{-2} \cdot sr^{-1}$	545000 $0,0017 \leq \alpha \leq 0,011$	N/A					
				$6000/\alpha$ $0,011 \leq \alpha \leq 0,1$	$9,6 \times 10^2$					
IR radiation, eye		E_{IR}	$W \cdot m^{-2}$	100	0	570	---	3200	---	

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Clause	Requirement + Test	Result – Remark	Verdict

Table 6.1	Emission limits for risk groups of continuous wave lamps (based on EU Directive 2006/25/EC)	P
<p>* Small source defined as one with $\alpha < 0,011$ radian. Averaging field of view at 10000 s is 0,1 radian.</p> <p>** Involves evaluation of non-GLS source</p> <p>NOTE The action functions: see Table 4.1 and Table 4.2</p> <p>The applicable aperture diameters: see 4.2.1</p> <p>The limitations for the angular subtenses: see 4.2.2</p> <p>The related measurement condition 5.2.3 and the range of acceptance angles: see Table 5.5.</p>		