




<p><b>TEST REPORT</b>  <b>IEC TR 62778</b>  <b>Application of IEC 62471 for the assessment of blue light hazard to light sources and luminaires</b></p>	
Report Number.....	6028811.50P
Date of issue .....	2018-04-09
Total number of pages .....	16
<p><b>Name of Testing Laboratory preparing the Report .....</b> : DEKRA Testing and Certification (Shanghai) Ltd.                  3/F, #250, Jiangchangsan Road building 16 Headquater Economy Park Shibe Hi-Tech Park, Zhabei District, Shanghai, P.R.C 200436</p>	
<p><b>Applicant's name .....</b> : Philips Lighting (China) investment Co., Ltd.  <b>Address.....</b> : No. 9, Lane 888, Tian Lin Road Shanghai P.R.C. 200233.</p>	
<p><b>Test specification:</b>  <b>Standard .....</b> : IEC TR 62778:2014 (Second Edition)  <b>Test procedure.....</b> : Type Test  <b>Non-standard test method.....</b> : N/A</p>	
<p><b>Test Report Form No. ....</b> : IEC62778A  <b>Test Report Form(s) Originator ....</b> : TÜV SÜD Product Service GmbH  <b>Master TRF .....</b> : Dated 2016-02</p>	
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<b>Test item description</b> .....	LED lamps	
<b>Trade Mark</b> .....	<b>PHILIPS</b>	
<b>Manufacturer</b> .....	Philips Lighting (China) investment Co., Ltd. No. 9, Lane 888, Tian Lin Road Shanghai P.R.C. 200233.	
<b>Model/Type reference</b> .....	9290018967, 9290018968	
<b>Ratings</b> .....	12 V AC electronic, 2,5 W, 330 mA, G4 pin	
<b>Responsible Testing Laboratory (as applicable), testing procedure and testing location(s):</b>		
<input checked="" type="checkbox"/>	<b>CB Testing Laboratory:</b>	DEKRA Testing and Certification (Shanghai) Ltd.
	<b>Testing location/ address</b> .....	3/F, #250, Jiangchangsan Road building 16 Headquater Economy Park Shibe Hi-Tech Park, Zhabei District, Shanghai, P.R.C 200436
<input type="checkbox"/>	<b>Associated CB Testing Laboratory:</b>	
	<b>Testing location/ address</b> .....	
	<b>Tested by (name, function, signature)</b> .....	Yuelie Wu 
	<b>Approved by (name, function, signature)</b> ...:	Hanson Zhang 
<input type="checkbox"/>	<b>Testing procedure: CTF Stage 1:</b>	
	<b>Testing location/ address</b> .....	
	<b>Tested by (name, function, signature)</b> .....	
	<b>Approved by (name, function, signature)</b> .....	
<input type="checkbox"/>	<b>Testing procedure: CTF Stage 2:</b>	
	<b>Testing location/ address</b> .....	
	<b>Tested by (name + signature)</b> .....	
	<b>Witnessed by (name, function, signature)</b> .....	
	<b>Approved by (name, function, signature)</b> .....	
<input type="checkbox"/>	<b>Testing procedure: CTF Stage 3:</b>	
<input type="checkbox"/>	<b>Testing procedure: CTF Stage 4:</b>	
	<b>Testing location/ address</b> .....	
	<b>Tested by (name, function, signature)</b> .....	

Witnessed by (name, function, signature) .....:		
Approved by (name, function, signature).....:		
Supervised by (name, function, signature) .....:		

<p><b>List of Attachments (including a total number of pages in each attachment):</b></p> <ul style="list-style-type: none"> <li>● Appendix 1: Photo Documentation</li> <li>● Appendix 2: Model List</li> <li>● Appendix 3: Relative Spectrum Of Tested Sample(s)</li> <li>● Appendix 4: Table 6.1 Based On IEC 62471:2006</li> <li>● Appendix 5: Table 6.1 Based On EN62471:2008, Attachment To IEC 62471 European Group Differences And National Differences</li> </ul>	
<p><b>Summary of testing:</b></p>	
<p><b>Tests performed (name of test and test clause):</b></p> <p>These tests fulfil the requirements of standard ISO/IEC 17025. When determining the test conclusion, the Measurement Uncertainty of test has been considered.</p> <p>The tested sample of 9290018968 Have been tested according to the IEC 62471 (first edition, 2006-07) <b>at 200mm</b> and been classified as <b>RG 0</b>. Have been tested according to the EN 62471:2008 <b>at 200mm</b> and been classified as <b>RG 0</b>. Have been tested according to the IEC/TR 62778:2014 and been classified as <b>RG 1 Unlimited for blue light hazard</b>.</p>	<p><b>Testing location:</b></p> <p>DEKRA Testing and Certification (Shanghai) Ltd. 3/F, #250, Jiangchangsang Road building 16 Headquater Economy Park Shibe Hi-Tech Park, Zhabei District, Shanghai, P.R.C 200436</p>
<p><b>Summary of compliance with National Differences (List of countries addressed): EN Standards</b></p> <p>EN 62471:2008</p> <p><input checked="" type="checkbox"/> <b>The product fulfills the requirements</b></p>	

**Copy of marking plate:**

**The artwork below may be only a draft. The use of certification marks on a product must be authorized by the respective NCBs that own these marks.**

N/A

<b>Test item particulars</b> .....: See below	
<b>Product evaluated</b> .....: <input type="checkbox"/> LED package <input type="checkbox"/> LED module <input checked="" type="checkbox"/> Lamp <input type="checkbox"/> Luminaire	
<b>Rated voltage (V)</b> .....: 12 Vac	
<b>Rated current (mA)</b> .....: --	
<b>Rated CCT (K)</b> .....: --	
<b>Rated Luminance (Mcd/m<sup>2</sup>)</b> .....: --	
<b>Component report data used</b> .....: <input checked="" type="checkbox"/> Not applicable <input type="checkbox"/> LED package <input type="checkbox"/> LED module <input type="checkbox"/> Lamp Report number: --	
<b>Possible test case verdicts:</b>	
- 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)	
<b>Testing</b> .....: --	
<b>Date of receipt of test item</b> .....: 2018-04-08	
<b>Date (s) of performance of tests</b> .....: 2018-04-08 to 2018-04-09	
<b>General remarks:</b>	
"(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.	
The product complied with the following standards: <input checked="" type="checkbox"/> IEC 62471:2006 <input checked="" type="checkbox"/> EN 62471:2008 <input type="checkbox"/> IEC/TR 62471-2:2009 <input checked="" type="checkbox"/> IEC/TR 62778:2014	
<b>Manufacturer's Declaration per sub-clause 4.2.5 of IEC 60385-02:</b>	
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 checked="" type="checkbox"/> Yes <input type="checkbox"/> Not applicable

**When differences exist; they shall be identified in the General product information section.**

**Name and address of factory (ies) .....** : Zhejiang Shenghui Lighting Co., Ltd  
Jiachuang South Road, Jiaxing City, Zhejiang  
Province, P. R. China.

Sengled Optoelectronics Co., Ltd.  
Minhe Economic Zone, 314501, Tongxiang,  
Zhejiang, P. R. China.

**General product information:**

Full tests were performed on model 9290018968.

The products considered as worst case which should be evaluated at 200mm.

The sample of 9290018968 was tested at 200mm from the light source. CCT of spectral irradiance was found at 3078 K.

Type test was performed according to IEC 62471:2006 procedure.

IEC TR 62778			
Clause	Requirement + Test	Result - Remark	Verdict
<b>7</b>	<b>MEASUREMENT INFORMATION FLOW</b>		<b>P</b>
<b>7.1</b>	<b>Basic flow</b>		<b>P</b>
	'Law of conservation of luminance' applied		N/A
	Use of only true luminance/radiance values		P
	In case of luminaire: The light source is operated in the luminaire under similar conditions as when tested as a component		N/A
	In case $E_{thr}$ value for RG2 was established the peak value was derived from angular light distribution		N/A
<b>7.2</b>	<b>Conditions for the radiance measurement</b>		<b>P</b>
	Standard condition applied (200mm distance, 0,011rad field of view)		P
	Non-standard condition applied		N/A
<b>7.3</b>	<b>Special cases (I): Replacement by a lamp or LED module of another type</b>		<b>N/A</b>
	Light source is a white light source		N/A
	Evaluation done based on highest luminance		N/A
	Evaluation done based on CCT value		N/A
<b>7.4</b>	<b>Special cases (II): Arrays and clusters of primary light sources</b>		<b>N/A</b>
	LED package is evaluated as ..... : <input type="checkbox"/> RG0 unlimited <input type="checkbox"/> RG1 unlimited		N/A
	$E_{thr}$ of LED package applies to array		N/A
<b>8</b>	<b>RISK GROUP CLASSIFICATION</b>		<b>P</b>
	Risk group achieved:		P
	- .. Risk Group 0 unlimited		N/A
	- .. Risk Group 1 unlimited		P
	- $E_{thr}$ ..... (lx) : Distance to reach RG1 ..... (m) :		N/A



IEC TR 62778			
Clause	Requirement + Test	Result - Remark	Verdict

TABLE:Spectroradiometric measurement					
	<b>Measurement performed on:</b>	<input type="checkbox"/> LED package <input type="checkbox"/> LED module <input checked="" type="checkbox"/> Lamp <input type="checkbox"/> Luminaire			
	<b>Model number</b> .....	9290018968			
	<b>Test voltage (V)</b> .....	12 Vac			—
	<b>Test current (mA)</b> .....	--			—
	<b>Test frequency (Hz)</b> .....	50 Hz			—
	<b>Ambient, t(°C)</b> .....	25°C			—
	<b>Measurement distance</b> .....	<input checked="" type="checkbox"/> 20 cm <input type="checkbox"/> ... cm			—
	<b>Source size</b> .....	<input checked="" type="checkbox"/> Non-small <input type="checkbox"/> Small :			—
	<b>Field of view</b> .....	<input type="checkbox"/> 100 mrad <input checked="" type="checkbox"/> 11 mrad <input type="checkbox"/> 1,7 mrad (for small sources)			—
Item	Symb ol	Units	Result	Remark	
Correlated colour temperature	CCT	K	3078		
x/y colour coordinates			0,4278 /0,3942		
Blue light hazard radiance	L <sub>B</sub>	W/(m <sup>2</sup> •sr <sup>1</sup> )	6,39E+02	@11mrad	
Blue light hazard irradiance	E <sub>B</sub>	W/m <sup>2</sup>	--		
Luminance	L	cd/m <sup>2</sup>	1,58E+06	@11mrad	
Illuminance	E	lx	1,52E+03		
Supplementary information: N/A					

IEC TR 62778			
Clause	Requirement + Test	Result - Remark	Verdict

	<b>TABLE: Angular light distribution</b>	<b>N/A</b>

**List of test equipment used:**

A completed list of used test equipment shall be provided in the Test Reports when a Manufacturer Testing Laboratory according to CTF stage 1 or CTF stage 2 procedure has been used.

Note: This page may be removed when CTF stage 1 CTF stage 2 are not used. See also clause 4.8 in OD 2020 for more details.

Clause	Measurement / testing	Testing / measuring equipment / material used, (Equipment ID)	Range used	Last Calibration date	Calibration due date
7	Irradiance measurements Radiance measurements	IDR 300 Monochromator (SH 344)	200-3000nm	/	/
7	Radiance measurements	S009 Telescope (SH 345)	300-1400nm	/	/
7	Radiance measurements	SRS 12 Radiance Standard (SH 348)	300-1400nm	2017/4/25	2018/4/25
7	Irradiance measurements	CL6 Spectral irradiance standard (SH 350)	300-3000nm	2017/4/25	2018/4/25
7	Irradiance measurements	CL7 Spectral irradiance standard (SH 351)	200-400nm	2017/4/25	2018/4/25
7	Irradiance measurements	Photometric detector head (SH 359)	380nm-800nm	2017/4/25	2018/4/25
7	Irradiance measurements Radiance measurements	Wattmeter (SH030)	500V,40A	2017/10/09	2018/10/09

Appendix 1: Photo Documentation

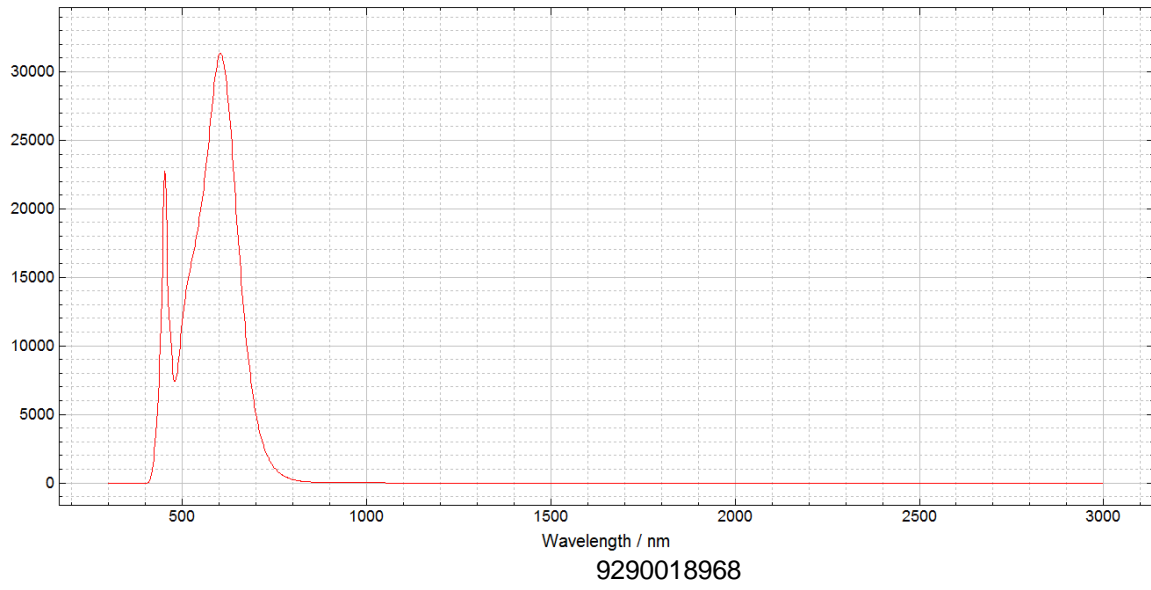


Overview

Appendix 2: Model List

N/A

Appendix 3: Relative Spectrum Of Tested Sample(s)



Appendix 4: Table 6.1 Based On IEC 62471:2006

DUT: 9290018968, Evaluation Distance: 200mm, Angular subtense of the apparent source  $\alpha$ : 100 mrad

IEC 62471									
Clause	Requirement + Test				Result – Remark				Verdict
<b>Table 6.1</b>	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	0,0000	0,003		0,03	
Near UV		$E_{UVA}$	$W \cdot m^{-2}$	10	0,0000	33		100	
Blue light	$B(\lambda)$	$L_B$	$W \cdot m^{-2} \cdot sr^{-1}$	100	6,85E+01	10000		4000000	
Blue light, small source	$B(\lambda)$	$E_B$	$W \cdot m^{-2}$	1,0*	--	1,0		400	
Retinal thermal	$R(\lambda)$	$L_R$	$W \cdot m^{-2} \cdot sr^{-1}$	28000/ $\alpha$	1,02E+04	28000/ $\alpha$		71000/ $\alpha$	
Retinal thermal, weak visual stimulus**	$R(\lambda)$	$L_{IR}$	$W \cdot m^{-2} \cdot sr^{-1}$	6000/ $\alpha$	--	6000/ $\alpha$		6000/ $\alpha$	
IR radiation, eye		$E_{IR}$	$W \cdot m^{-2}$	100	0,13	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									

Appendix 5: Table 6.1 Based On EN62471:2008, Attachment To IEC 62471 European Group Differences And National Differences

DUT: 9290018968, Evaluation Distance: 200mm, Angular subtense of the apparent source  $\alpha$ : 100 mrad

EN 62471										
Clause	Requirement + Test			Result – Remark				Verdict		
<b>Table 6.1</b>	Emission limits for risk groups of continuous wave lamps (based on EU Directive 2006/25/EC)								P	
Risk	Action spectrum	Symbol	Units	Emission Measurement						
				Exempt		Low risk		Mod risk		
				Limit	Result	Limit	Result	Limit	Result	
Actinic UV	$S_{UV}(\lambda)$	$E_s$	$W \cdot m^{-2}$	0,001	0,0000	--	--	--	--	
Near UV		$E_{UVA}$	$W \cdot m^{-2}$	0,33	0,0000	--	--	--	--	
Blue light	$B(\lambda)$	$L_B$	$W \cdot m^{-2} \cdot sr^{-1}$	100	6,85E+01	10000		4000000		
Blue light, small source	$B(\lambda)$	$E_B$	$W \cdot m^{-2}$	0,01*	--	1,0		400		
Retinal thermal	$R(\lambda)$	$L_R$	$W \cdot m^{-2} \cdot sr^{-1}$	28000/ $\alpha$	1,02E+04	28000/ $\alpha$		71000/ $\alpha$		
Retinal thermal, weak visual stimulus**	$R(\lambda)$	$L_{IR}$	$W \cdot m^{-2} \cdot sr^{-1}$	545000 0,0017 ≤ $\alpha$ ≤ 0,011	--					
				6000/ $\alpha$ 0,011 ≤ $\alpha$ ≤ 0,1	--					
IR radiation, eye		$E_{IR}$	$W \cdot m^{-2}$	100	0,13	570		3200		
<p>* Small source defined as one with <math>\alpha &lt; 0,011</math> 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  The applicable aperture diameters: see 4.2.1  The limitations for the angular subtenses: see 4.2.2  The related measurement condition 5.2.3 and the range of acceptance angles: see Table 5.5.</p>										

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