




Test Report issued under the responsibility of:



TEST REPORT IEC TR 62778 Application of IEC 62471 for the assessment of blue light hazard to light sources and luminaires	
Report Number.....	6174277.50P
Date of issue	2023-11-17
Total number of pages	26
Name of Testing Laboratory preparing the Report	DEKRA Testing and Certification (Shanghai) Ltd. 3/F, #250, Jiangchangsan Road building 16 Headquarter Economy Park Shibei Hi-Tech Park, Jing'an District, Shanghai, P.R.C 200436
Applicant's name	Lumileds (Shanghai) Management Co., Ltd.
Address.....	Building 1-A, No.19&20, Lane 299, Wenshui Road, JingAn District, 200072 Shanghai, China
Test specification:	
Standard	IEC TR 62778:2014 (Second Edition)
Test procedure	CB Scheme
Non-standard test method	N/A
Test Report Form No.	IEC62778A
Test Report Form(s) Originator	TÜV SÜD Product Service GmbH
Master TRF	Dated 2016-02
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Test item description :	LED package	
Trade Mark :	LUMILEDS	
Manufacturer	Lumileds (Shanghai) Management Co., Ltd. Building 1-A, No.19&20, Lane 299, Wenshui Road, JingAn District, 200072 Shanghai, China	
Model/Type reference	L130-AABB003000C2D; L130-AABBEF3000GK1; L130-NSC1EF3000GK1; L130-AABB003000Z21 (Detailed lists refer to Appendix 2: Model List)	
Ratings	Detailed lists refer to Appendix 2: Model List	
Responsible Testing Laboratory (as applicable), testing procedure and testing location(s):		
<input checked="" type="checkbox"/> CB Testing Laboratory:	DEKRA Testing and Certification (Shanghai) Ltd.	
Testing location/ address	3/F, #250, Jiangchangsan Road building 16 Headquarter Economy Park Shibe Hi-Tech Park, Jing'an District, Shanghai, P.R.C 200436	
<input type="checkbox"/> Associated CB Testing Laboratory:		
Testing location/ address		
Tested by (name, function, signature)	Nancy Wang	
Approved by (name, function, signature) ..	Hanson Zhang	
Testing procedure: CTF Stage 1:		
Testing location/ address		
Tested by (name, function, signature)		
Approved by (name, function, signature)		
Testing procedure: CTF Stage 2:		
Testing location/ address		
Tested by (name + signature)		
Witnessed by (name, function, signature)		
Approved by (name, function, signature)		
Testing procedure: CTF Stage 3:		
Testing procedure: CTF Stage 4:		
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):

- Appendix 1: Photo Documentation
- Appendix 2: Model List
- Appendix 3: Relative Spectrum Of Tested Sample(s)
- Appendix 4: Table 6.1 Based On IEC 62471:2006
- Appendix 5: Table 6.1 Based On EN62471:2008, Attachment To IEC 62471 European Group Differences And National Differences

Summary of testing:**Tests performed (name of test and test clause):**

These tests fulfil the requirements of standard ISO/IEC 17025.

When determining the test conclusion, the Measurement Uncertainty of test has been considered.

The tested sample of
L130-6570003000X21 (240mA)
Has been tested according to the IEC 62471(first edition, 2006-07) **at 200mm** and been classified as **RG 2**.
Has been tested according to the EN 62471:2008 **at 200mm** and been classified as **RG 2**.
Has been tested according to the IEC/TR 62778:2014 and been classified as **RG 2 for blue light hazard**.

The tested sample of
L130-4070003000X21 (240mA)
Has been tested according to the IEC 62471(first edition, 2006-07) **at 200mm** and been classified as **RG 0**.
Has been tested according to the EN 62471:2008 **at 200mm** and been classified as **RG 1**.
Has been tested according to the IEC/TR 62778:2014 and been classified as **RG 1 Unlimited for blue light hazard**.

The tested sample of
L130-4070HA30000C1 (480mA)
Has been tested according to the IEC 62471(first edition, 2006-07) **at 200mm** and been classified as **RG 0**.
Has been tested according to the EN 62471:2008 **at 200mm** and been classified as **RG 1**.
Has been tested according to the IEC/TR 62778:2014 and been classified as **RG 1 Unlimited for blue light hazard**.

Testing location:

DEKRA Testing and Certification (Shanghai) Ltd.
3/F, #250, Jiangchangsan Road building 16
Headquater Economy Park Shibe Hi-Tech Park,
Jing'an District, Shanghai, P.R.C 200436

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

EN 62471:2008

☒ **The product fulfills the requirements****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

Test item particulars.....: See below	
Product evaluated.....:	<input checked="" type="checkbox"/> LED package <input type="checkbox"/> LED module <input type="checkbox"/> Lamp <input type="checkbox"/> Luminaire
Rated voltage (V)	--
Rated current (mA)	240 mA
Rated CCT (K).....	--
Rated Luminance (Mcd/m²)	--
Component report data used	<input checked="" type="checkbox"/> Not applicable <input type="checkbox"/> LED package <input type="checkbox"/> LED module <input type="checkbox"/> Lamp Report number: --
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 2023-11	
Date (s) of performance of tests 2023-11	
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. 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 Decision rules applied Procedure 2 "Accuracy Method" as stated in the IEC Guide 115:2007.	
Manufacturer's Declaration per sub-clause 4.2.5 of IEC 60060-2:	
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) : Lumileds (Shanghai) Management Co., Ltd.
Building 1-A, No.19&20, Lane 299, Wenshui Road,
JingAn District, 200072 Shanghai, China

General product information:

Full tests were performed on model L130-4070003000X21 and L130-6570003000X21 and L130-4070HA30000C1.

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

The sample of L130-4070003000X21 was tested at 200mm from the light source. The CCT of spectral irradiance was found at 4141 K.

The sample of L130-6570003000X21 was tested at 200mm from the light source. The CCT of spectral irradiance was found at 6335 K.

The sample of L130-4070HA30000C1 was tested at 200mm from the light source. The CCT of spectral irradiance was found at 4092 K.

Base on the Model list which listed on the appendix 2, The tested sample can be considered as

☐ typical product ☒ worst product

Which the results can be reference used for the other models.

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

Amendment 1 report:

The original test report 6064152.50P, dated 2019-10-15 was modified to include the following additions:

- Model list was updated.

After review, no additional tests were considered necessary.

Amendment 2 report:

The original test report 6076414.50P, dated 2020-04-23 was modified to include the following additions:

- A new model L130-4070HA30000C1 with higher max current was added.

After review, full tests were performed on model **L130-4070HA30000C1**.

Amendment 3 report:

The original test report 6163765.50P, dated 2023-07-12 was modified to include the following additions:

- A new model L130-NSC1HA30000C1 was added.

After review, no additional tests were considered necessary.

Amendment 4 report:

The original test report 6165571.50P, dated 2023-07-25 was modified to include the following additions:

- A new model L130-AABB003000Z21 was added.

After review, no additional tests were considered necessary.

IEC TR 62778			
Clause	Requirement + Test	Result - Remark	Verdict
7	MEASUREMENT INFORMATION FLOW		P
7.1	Basic flow		P
	'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
7.2	Conditions for the radiance measurement		P
	Standard condition applied (200mm distance, 0,011rad field of view)		P
	Non-standard condition applied		N/A
7.3	Special cases (I): Replacement by a lamp or LED module of another type		N/A
	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
7.4	Special cases (II): Arrays and clusters of primary light sources		N/A
	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
8	RISK GROUP CLASSIFICATION		P
	Risk group achieved:		P
	- ..Risk Group 0 unlimited		N/A
	- ..Risk Group 1 unlimited	L130-4070003000X21 L130-4070HA30000C1	P
	- E_{thr} (lx) : Distance to reach RG1 (m) :	For L130-6570003000X21 Refer to the Supplementary information of TABLE: Spectroradiometric measurement as following	P

IEC TR 62778			
Clause	Requirement + Test	Result - Remark	Verdict

	TABLE:Spectroradiometric measurement				
	Measurement performed on:	<input checked="" type="checkbox"/> LED package <input type="checkbox"/> LED module <input type="checkbox"/> Lamp <input type="checkbox"/> Luminaire			
	Model number.....	L130-4070003000X21			
	Test voltage (V)	6,6 Vdc			—
	Test current (mA)	240 mA			—
	Test frequency (Hz).....	--			—
	Ambient, t(°C)	25°C			—
	Measurement distance	<input checked="" type="checkbox"/> 20 cm <input type="checkbox"/> ... cm			—
	Source size	<input type="checkbox"/> Non-small <input checked="" type="checkbox"/> Small : 1,407 x 1,825 mm			—
	Field of view	<input type="checkbox"/> 100 mrad <input type="checkbox"/> 11 mrad <input checked="" type="checkbox"/> for small sources			—
Item		Symbol	Units	Result	Remark
Correlated colour temperature		CCT	K	4141	
x/y colour coordinates				0,3715 /0,3608	
Blue light hazard radiance		L _B	W/(m ² •sr ¹)	--	@11mrad
Blue light hazard irradiance		E _B	W/m ²	0,93E+00	
Luminance		L	cd/m ²	1,68E+07	@11mrad
Illuminance		E	lx	1,54E+03	
Supplementary information:					
N/A					

IEC TR 62778			
Clause	Requirement + Test	Result - Remark	Verdict

	TABLE:Spectroradiometric measurement				
	Measurement performed on:	<input checked="" type="checkbox"/> LED package <input type="checkbox"/> LED module <input type="checkbox"/> Lamp <input type="checkbox"/> Luminaire			
	Model number.....	L130-6570003000X21			
	Test voltage (V)	6,6 Vdc			—
	Test current (mA)	240 mA			—
	Test frequency (Hz).....	--			—
	Ambient, t(°C)	25°C			—
	Measurement distance.....	<input checked="" type="checkbox"/> 20 cm <input type="checkbox"/> ... cm			—
	Source size	<input type="checkbox"/> Non-small <input checked="" type="checkbox"/> Small : 1,407 x 1,825 mm			—
	Field of view	<input type="checkbox"/> 100 mrad <input type="checkbox"/> 11 mrad <input checked="" type="checkbox"/> for small sources			—
Item		Symb ol	Units	Result	Remark
Correlated colour temperature		CCT	K	6335	
x/y colour coordinates				0,3160 /0,3276	
Blue light hazard radiance		L _B	W/(m ² •sr ¹)	--	@11mrad
Blue light hazard irradiance		E _B	W/m ²	1,82E+00	
Luminance		L	cd/m ²	1,49E+07	@11mrad
Illuminance		E	lx	2,12E+03	
Supplementary information: Ethr=1165 lx Dmin=270 mm					

IEC TR 62778			
Clause	Requirement + Test	Result - Remark	Verdict

	TABLE:Spectroradiometric measurement				
	Measurement performed on:	<input checked="" type="checkbox"/> LED package <input type="checkbox"/> LED module <input type="checkbox"/> Lamp <input type="checkbox"/> Luminaire			
	Model number.....	L130-4070HA30000C1			
	Test voltage (V)	6,6 Vdc			—
	Test current (mA)	480 mA			—
	Test frequency (Hz).....	--			—
	Ambient, t(°C)	25°C			—
	Measurement distance.....	<input checked="" type="checkbox"/> 20 cm <input type="checkbox"/> ... cm			—
	Source size	<input type="checkbox"/> Non-small <input checked="" type="checkbox"/> Small : 1,407 x 1,825 mm			—
	Field of view	<input type="checkbox"/> 100 mrad <input type="checkbox"/> 11 mrad <input checked="" type="checkbox"/> for small sources			—
Item		Symb ol	Units	Result	Remark
Correlated colour temperature		CCT	K	4092	
x/y colour coordinates				0,3763 /0,3737	
Blue light hazard radiance		L _B	W/(m ² •sr ¹)	--	@11mrad
Blue light hazard irradiance		E _B	W/m ²	0,28E+00	
Luminance		L	cd/m ²	2,04E+07	@11mrad
Illuminance		E	lx	5,23E+02	
Supplementary information: N/A					

IEC TR 62778			
Clause	Requirement + Test	Result - Remark	Verdict

	TABLE: Angular light distribution	N/A

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	2023/2/25	2024/2/24
7	Irradiance measurements	CL6 Spectral irradiance standard (SH 350)	300-3000nm	2023/2/25	2024/2/24
7	Irradiance measurements	CL7 Spectral irradiance standard (SH 351)	200-400nm	2023/2/25	2024/2/24
7	Irradiance measurements	Photometric detector head (SH 359)	380nm-800nm	2023/2/26	2024/2/25
7	Irradiance measurements Radiance measurements	Wattmeter (SH030)	500V,40A	2023/10/10	2024/10/10

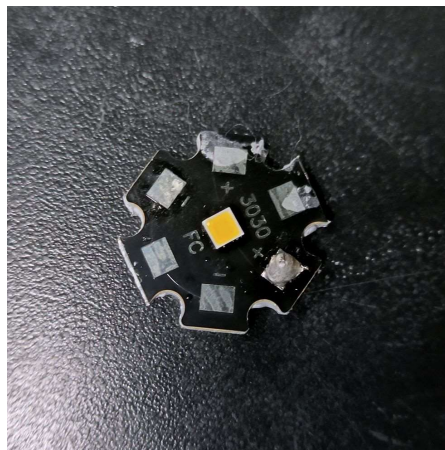
Appendix 1: Photo Documentation



L130-4070003000X21



L130-6570003000X21



L130-4070HA30000C1

Appendix 2: Model List

L130-6570003000X21, with ANSI bin 6500K, is part of Lumileds LUXEON 3030 product line consisting of LUXEON 3030 2D and LUXEON 3030 HE Plus. The tested sample of L130-6570003000X21 is with the highest CCT in that product line. The present classification is thus valid (worst case) within the LUXEON 3030 product line with part number L130-AABB003000C2D or L130-AABBEF3000GK1, where AA represents nominal ANSI CCT bins can be equal to 6500K or lower (see TR IEC62778), and BB represents CRI ranging from 70 and above, and C represents package type, and D, EF, GK represent Lumileds internal code. See the appendix below for an explanation of the type designation.

L130-AABB003000C2D, or L130-AABBEF3000GK1

Where

AA: designates nominal CCT (e.g. 22=2200K, 27=2700K, 30=3000K, 35=3500K, 40=4000K, 50=5000K, 57=5700K, 65=6500K or any nominal CCT less than 6500K);

BB: designates minimum CRI (e.g. 70=70CRI, 80=80CRI, 90=90CRI or any CRI greater than min 70);

NSC1: designates Nightscape;

C: designates package type (W=Round LES, X=Square LES);

D: designates Lumileds internal code (1 = base part and can be any alphanumeric for marketing use but share same base part configuration);

EF: designates Lumileds internal code (HA = LUXEON 3030 HE Plus, HB = LUXEON 3030 HE);

GK: designates Lumileds internal code (00, 0B, DD=deep dimming application);

Model No.	Drive current (mA)	CCT						
		2200/2700K	3000K	3500K	4000K	5000K	5700K	6500K
L130-AABB003000X21	130	RG1 Unlimited	RG1 Unlimited	RG1 Unlimited	RG1 Unlimited	RG1 Unlimited	RG1 Unlimited	RG1 Unlimited
	240	RG1 Unlimited	RG1 Unlimited	RG1 Unlimited	RG1 Unlimited	RG2	RG2	RG2
L130-AABB003000W21	130	RG1 Unlimited	RG1 Unlimited	RG1 Unlimited	RG1 Unlimited	RG1 Unlimited	RG1 Unlimited	RG1 Unlimited
	240	RG1 Unlimited	RG1 Unlimited	RG1 Unlimited	RG1 Unlimited	RG2	RG2	RG2
L130-AABBHA3000001	260	RG1 Unlimited	RG1 Unlimited	RG1 Unlimited	RG1 Unlimited	RG1 Unlimited	RG1 Unlimited	RG1 Unlimited

	480	RG1 Unlimited	RG1 Unlimited	RG1 Unlimited	RG1 Unlimited	RG2	RG2	RG2
L130- AABBHA30000B1	260	RG1 Unlimited	RG1 Unlimited	RG1 Unlimited	RG1 Unlimited	RG1 Unlimited	RG1 Unlimited	RG1 Unlimited
	480	RG1 Unlimited	RG1 Unlimited	RG1 Unlimited	RG1 Unlimited	RG2	RG2	RG2
L130- AABBHA3000DD1	260	RG1 Unlimited	RG1 Unlimited	RG1 Unlimited	RG1 Unlimited	RG1 Unlimited	RG1 Unlimited	RG1 Unlimited
	480	RG1 Unlimited	RG1 Unlimited	RG1 Unlimited	RG1 Unlimited	RG2	RG2	RG2
L130- AABBHB30000B1	130	RG1 Unlimited	RG1 Unlimited	RG1 Unlimited	RG1 Unlimited	RG1 Unlimited	RG1 Unlimited	RG1 Unlimited
	240	RG1 Unlimited	RG1 Unlimited	RG1 Unlimited	RG1 Unlimited	RG2	RG2	RG2
L130- AABBHA30000C1	260	RG1 Unlimited	RG1 Unlimited	RG1 Unlimited	RG1 Unlimited	RG1 Unlimited	RG1 Unlimited	RG1 Unlimited
	480	RG1 Unlimited	RG1 Unlimited	RG1 Unlimited	RG1 Unlimited	RG2	RG2	RG2
L130- AABB003000Z21	130	RG1 Unlimited	RG1 Unlimited	RG1 Unlimited	RG1 Unlimited	RG1 Unlimited	RG1 Unlimited	RG1 Unlimited
	240	RG1 Unlimited	RG1 Unlimited	RG1 Unlimited	RG1 Unlimited	RG2	RG2	RG2

L130-NSC1EF3000GK1

Where

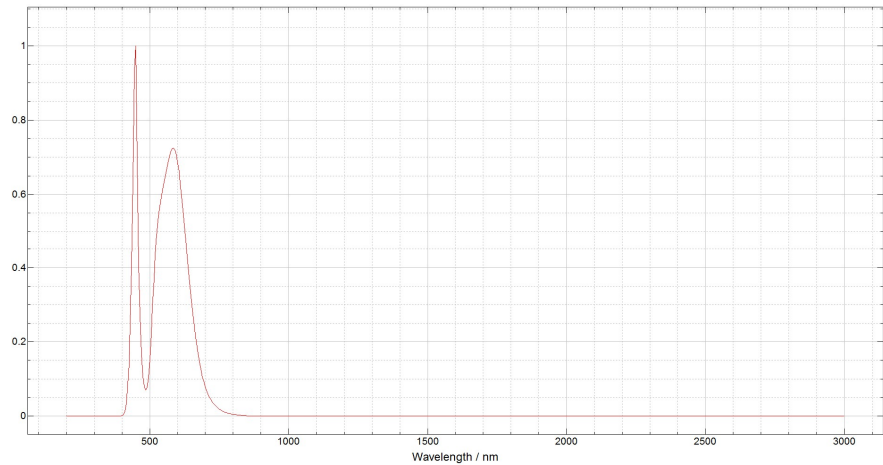
NSC1: designates Nightscape;

EF: designates Lumileds internal code (HA = LUXEON 3030 HE Plus, HB = LUXEON 3030 HE);

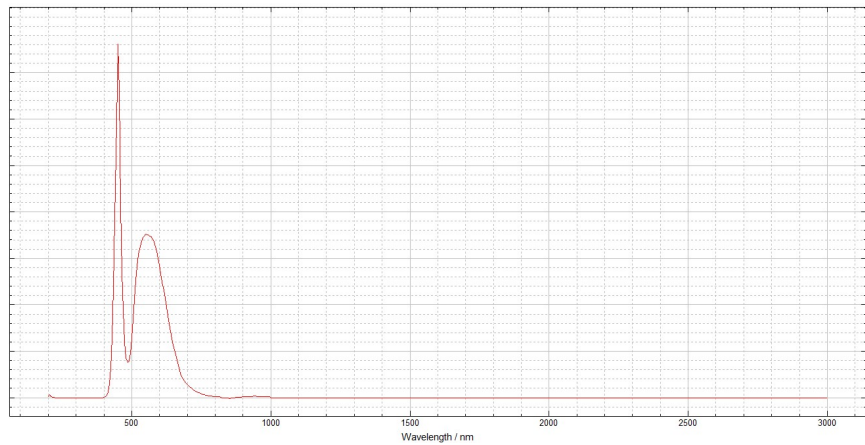
GK: designates Lumileds internal code (00, 0B, DD, 0C=deep dimming application);

Model No.	Drive current (mA)	CCT
		1800K
L130-NSC1HA30000C1	480	RG1 Unlimited

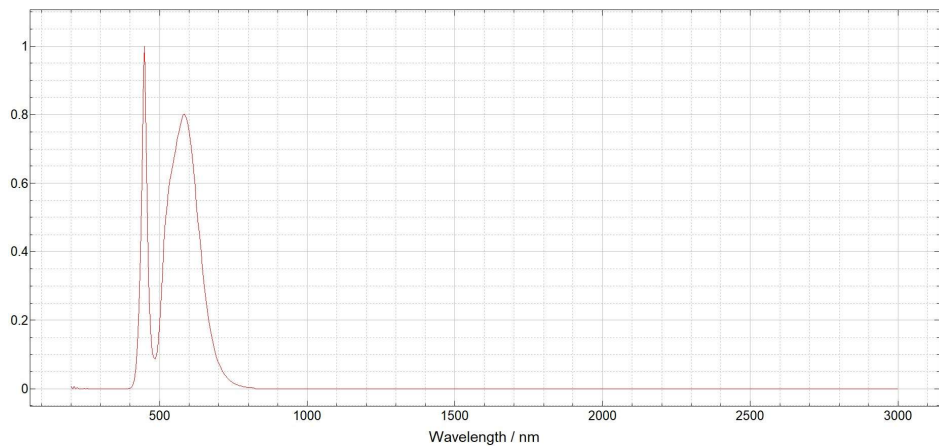
Appendix 3: Relative Spectrum Of Tested Sample(s)



L130-4070003000X21



L130-6570003000X21



L130-4070HA30000C1

Appendix 4: Table 6.1 Based On IEC 62471:2006

DUT: L130-4070003000X21 (240mA), Evaluation Distance: 200mm, Angular subtense of the apparent source α : 8,1 mrad

IEC 62471									
Clause	Requirement + Test				Result – Remark				Verdict

Table 6.1		Emission limits for risk groups of continuous wave lamps							
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	--	10000		4000000	
Blue light, small source	$B(\lambda)$	E_B	$W \cdot m^{-2}$	1,0*	0,93E+00	1,0		400	
Retinal thermal	$R(\lambda)$	L_R	$W \cdot m^{-2} \cdot sr^{-1}$	28000/ α	2,23E+05	28000/ α		71000/ α	
Retinal thermal, weak visual stimulus**	$R(\lambda)$	L_{IR}	$W \cdot m^{-2} \cdot sr^{-1}$	6000/ α	--	6000/ α		6000/ α	
IR radiation, eye		E_{IR}	$W \cdot m^{-2}$	100	0,02	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									

DUT: L130-6570003000X21 (240mA), Evaluation Distance: 200mm, Angular subtense of the apparent source α : 8,1 mrad

IEC 62471									
Clause	Requirement + Test				Result – Remark			Verdict	

Table 6.1 Emission limits for risk groups of continuous wave lamps									
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	--	10000		4000000	
Blue light, small source	$B(\lambda)$	E_B	$W \cdot m^{-2}$	1,0*	1,82E+00	1,0	1,82E+00	400	1,82E+00
Retinal thermal	$R(\lambda)$	L_R	$W \cdot m^{-2} \cdot sr^{-1}$	28000/ α	2,91E+05	28000/ α		71000/ α	
Retinal thermal, weak visual stimulus**	$R(\lambda)$	L_{IR}	$W \cdot m^{-2} \cdot sr^{-1}$	6000/ α	--	6000/ α		6000/ α	
IR radiation, eye		E_{IR}	$W \cdot m^{-2}$	100	0,09	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									

DUT: L130-4070HA30000C1 (480mA), Evaluation Distance: 200mm, Angular subtense of the apparent source α : 8,1 mrad

IEC 62471			
Clause	Requirement + Test	Result – Remark	Verdict

Table 6.1		Emission limits for risk groups of continuous wave lamps							
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	--	10000		4000000	
Blue light, small source	$B(\lambda)$	E_B	$W \cdot m^{-2}$	1,0*	0,28E+00	1,0		400	
Retinal thermal	$R(\lambda)$	L_R	$W \cdot m^{-2} \cdot sr^{-1}$	28000/ α	2,14E+05	28000/ α		71000/ α	
Retinal thermal, weak visual stimulus**	$R(\lambda)$	L_{IR}	$W \cdot m^{-2} \cdot sr^{-1}$	6000/ α	--	6000/ α		6000/ α	
IR radiation, eye		E_{IR}	$W \cdot m^{-2}$	100	0,06	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: L130-4070003000X21 (240mA), Evaluation Distance: 200mm, Angular subtense of the apparent source α : 8,1 mrad

EN 62471									
Clause	Requirement + Test				Result – Remark			Verdict	

Table 6.1 Emission limits for risk groups of continuous wave lamps (based on EU Directive 2006/25/EC)									
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	--	10000		4000000	
Blue light, small source	$B(\lambda)$	E_B	$W \cdot m^{-2}$	0,01*	0,93E+00	1,0	0,93E+00	400	
Retinal thermal	$R(\lambda)$	L_R	$W \cdot m^{-2} \cdot sr^{-1}$	28000/ α	2,23E+05	28000/ α		71000/ α	
Retinal thermal, weak visual stimulus**	$R(\lambda)$	L_{IR}	$W \cdot m^{-2} \cdot sr^{-1}$	545000 0,0017 ≤ α ≤ 0,011	--				
				6000/ α 0,011 ≤ α ≤ 0,1	--				
IR radiation, eye		E_{IR}	$W \cdot m^{-2}$	100	0,02	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

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.

DUT: L130-6570003000X21 (240mA), Evaluation Distance: 200mm, Angular subtense of the apparent source α : 8,1 mrad

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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)									
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	--	10000		4000000	
Blue light, small source	$B(\lambda)$	E_B	$W \cdot m^{-2}$	0,01*	1,82E+00	1,0	1,82E+00	400	1,82E+00
Retinal thermal	$R(\lambda)$	L_R	$W \cdot m^{-2} \cdot sr^{-1}$	28000/ α	2,91E+05	28000/ α		71000/ α	
Retinal thermal, weak visual stimulus**	$R(\lambda)$	L_{IR}	$W \cdot m^{-2} \cdot sr^{-1}$	545000 0,0017 ≤ α ≤ 0,011	--				
				6000/ α 0,011 ≤ α ≤ 0,1	--				
IR radiation, eye		E_{IR}	$W \cdot m^{-2}$	100	0,09	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

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.

DUT: L130-4070HA30000C1 (480mA), Evaluation Distance: 200mm, Angular subtense of the apparent source α : 8,1 mrad

EN 62471									
Clause	Requirement + Test				Result – Remark			Verdict	

Table 6.1 Emission limits for risk groups of continuous wave lamps (based on EU Directive 2006/25/EC)									
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	--	10000		4000000	
Blue light, small source	$B(\lambda)$	E_B	$W \cdot m^{-2}$	0,01*	0,28E+00	1,0	0,28E+00	400	
Retinal thermal	$R(\lambda)$	L_R	$W \cdot m^{-2} \cdot sr^{-1}$	28000/ α	2,14E+05	28000/ α		71000/ α	
Retinal thermal, weak visual stimulus**	$R(\lambda)$	L_{IR}	$W \cdot m^{-2} \cdot sr^{-1}$	545000 0,0017 ≤ α ≤ 0,011	--				
				6000/ α 0,011 ≤ α ≤ 0,1	--				
IR radiation, eye		E_{IR}	$W \cdot m^{-2}$	100	0,06	570		3200	
<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 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>									

Appendix 6: Blue Light Hazard-Forward Current Relationship (Non-mandatory Information)

The diagram below shows the different blue light hazards against different forward currents. It is additional information for reference only.

