

TEST REPORT

IEC 62471

Photobiological safety of lamps and lamp systems

Report Number..... : FTS26DR-01883L

Tested by

(name + signature)..... : Tim Huang

Tim Huang

Reviewed by

(name + signature)..... : Bain Ye

Date of issue..... : 20 May 2026

Total number of pages : 19 pages

Name of Testing Laboratory

preparing the Report : Guangdong Future Test Services Co., Ltd.

Applicant's name : Mid Ocean Brands B.V.

Address : Unit 711-716, 7/F., Tower A, 83 King Lam Street, Cheung Sha Wan,
Kowloon, Hong Kong.

Test specification..... :

Standard..... : EN 62471:2008

Test procedure : Commission test

Non-standard test method : N/A

Test Report Form No. : TRF-LT0007-V01

Test Report Form(s) Originator : FTS

Master TRF..... : 2025-03-15

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Test item description : LED filament desktop lamp

Trade Mark : —

Manufacturer : Mid Ocean Brands B.V.

Address : Unit 711-716, 7/F., Tower A, 83 King Lam Street, Cheung Sha Wan,
Kowloon, Hong Kong.

Model/Type reference : CX1582-08

Ratings : Input: DC6V

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

ANNEX 1: Test result in graphical presentation	Pages 15 to 17
ANNEX 2: Photo document	Pages 18 fo 19

Summary of testing:

The product's have been tested according to standard EN 62471:2008 and found in compliance **Except Group(Exempt)**.

Tests performed (name of test and test clause):

The test samples meet the requirements of related standards and all tests are carried out

Testing location:

Guangdong Future Test Services Co., Ltd.

Room A01, A02, A03, No.228, Min'an South Road, Xiaolan, Zhongshan, Guangdong, China

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

Requirement of EU Group DIFFERENCES, UK

☒ The product fulfils the requirements of **EN 62471:2008**

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.

/

DESCRIPTION :	
Type of appliance..... :	LED filament desktop lamp
Type / model..... :	CX1582-08
Tested lamp..... :	☒ continuous wave lamps ☐ pulsed lamps
Lamp classification group	☒ Except Group (Exempt) ☐ Risk Group 1 (Low-Risk) ☐ Risk Group 2 (Moderate-Risk) ☐ Risk Group 3 (High-Risk)
Bulb..... :	--
Classification of installation and use..... :	Class III
Supply Connection..... :	DC6V
Rated of the lamp..... :	--
Used measurement instrument	EVERFINE OST-500 system
Notes	--
Possible test case verdicts:	
- test case does not apply to the test object..... : N/A - test object does meet the requirement	
- test object does not meet the requirement	
P (Pass) F (Fail)	
Testing:	
Date of receipt of test item	2026-04-30
Date (s) of performance of tests	2026-05-05
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 ☒ comma / ☐ point is used as the decimal separator. For European group deviation, see attachment.	
Manufacturer's Declaration per sub-clause 4.2.5 of IEC 60335-1:	
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..... :	☐ Yes ☒ Not applicable
Name and address of factory (ies)..... : Same as manufacturer	
General product information:	
1. This product is LED filament desktop lamp, model number: CX1582-08.	

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	N/A
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:		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
	$E_{UVA} \cdot t = \sum_{315}^{400} \sum_t E_{\lambda}(\lambda, t) \cdot \Delta t \cdot \Delta \lambda \leq 10000 \quad \text{J}\cdot\text{m}^{-2}$	$t < 1000 \text{ s}$	N/A
	$E_{UVA} \leq 10 \quad \text{W}\cdot\text{m}^{-2}$	$t \geq 1000 \text{ s}$	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/A
	$t_{\max} \leq \frac{10000}{E_{UVA}} \quad \text{s}$		N/A
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:	see table 4.2	P

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Clause	Requirement + Test	Result – Remark	Verdict
	$L_B \cdot t = \sum_{300}^{700} \sum_t L_\lambda(\lambda, t) \cdot B(\lambda) \cdot \Delta\lambda \leq 10^6 \text{ J} \cdot \text{m}^{-2} \cdot \text{sr}^{-1}$	for $t \leq 10^4$ s $t_{\max} = \frac{10^6}{L_B}$	N/A
	$L_B = \sum_{300}^{700} L_\lambda \cdot B(\lambda) \cdot \Delta\lambda \leq 100 \text{ W} \cdot \text{m}^{-2} \cdot \text{sr}^{-1}$	for $t > 10^4$ s	P
4.3.4	Retinal blue light hazard exposure limit - small source		N/A
	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:		N/A
	$E_B \cdot t = \sum_{300}^{700} \sum_t E_\lambda(\lambda, t) \cdot B(\lambda) \cdot \Delta\lambda \leq 100 \text{ J} \cdot \text{m}^{-2}$	for $t \leq 100$ s $t_{\max} = \frac{100}{E_B}$	N/A
	$E_B = \sum_{300}^{700} E_\lambda \cdot B(\lambda) \cdot \Delta\lambda \leq 1 \text{ W} \cdot \text{m}^{-2}$	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
	$L_R = \sum_{380}^{1400} L_\lambda \cdot R(\lambda) \cdot \Delta\lambda \leq \frac{50000}{\alpha \cdot t^{0.25}} \text{ W} \cdot \text{m}^{-2} \cdot \text{sr}^{-1}$	$10 \mu\text{s} \leq t \leq 10 \text{ s}$	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
	$L_{IR} = \sum_{780}^{1400} L_\lambda \cdot R(\lambda) \cdot \Delta\lambda \leq \frac{6000}{\alpha} \text{ W} \cdot \text{m}^{-2} \cdot \text{sr}^{-1}$	$t > 10 \text{ s}$	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:		N/A
	$E_{IR} = \sum_{780}^{3000} E_\lambda \cdot \Delta\lambda \leq 18000 \cdot t^{-0.75} \text{ W} \cdot \text{m}^{-2}$	$t \leq 1000 \text{ s}$	N/A
	For times greater than 1000 s the limit becomes:		P
	$E_{IR} = \sum_{780}^{3000} E_\lambda \cdot \Delta\lambda \leq 100 \text{ W} \cdot \text{m}^{-2}$	$t > 1000 \text{ s}$	P
4.3.8	Thermal hazard exposure limit for the skin		P

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Clause	Requirement + Test	Result – Remark	Verdict
	Visible and infrared radiant exposure (380 nm to 3000 nm) of the skin shall be limited to:		N/A
	$E_H \cdot t = \sum_{380}^{3000} E_{\lambda}(\lambda, t) \cdot \Delta\lambda \leq 20000 \cdot t^{0.25} \quad \text{J} \cdot \text{m}^{-2}$	$t \leq 10 \text{ s}$	N/A
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.		N/A
5.1.2	Test environment	1. Dark room 2. Temperature: 25.0°C	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.		N/A
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		N/A
	Operation of the test lamp shall be provided in accordance with:		N/A
	– the appropriate IEC lamp standard, or		N/A
	– 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.		P
	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

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Clause	Requirement + Test	Result – Remark	Verdict
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/A
	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/A
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.	$\alpha=0,1000$ rad	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		P
	The quality of all measurement results must be quantified by an analysis of the uncertainty.	see Annex C in the norm	P
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		N/A
	– for all other light sources, including pulsed lamp sources, the hazard values shall be reported at a distance of 200 mm		P
6.1	Continuous wave lamps		P
6.1.1	Except Group		P

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Clause	Requirement + Test	Result – Remark	Verdict
	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
	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

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Clause	Requirement + Test	Result – Remark	Verdict
	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

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Clause	Requirement + Test		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.			

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Clause	Requirement + Test		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	

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Clause	Requirement + Test		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)	
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	

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 10-100 100-10000 ≥ 10000	$0,011 \cdot \sqrt{(t/10)}$ 0,011 $0,0011 \cdot \sqrt{t}$ 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 $0,011 \cdot \sqrt{(t/10)}$	$50000/(\alpha \cdot t^{0,25})$ $50000/(\alpha \cdot t^{0,25})$	
Retinal thermal (weak visual stimulus)	$L_{IR} = \sum L_\lambda \cdot R(\lambda) \cdot \Delta\lambda$	780 – 1400	> 10	0,011	$6000/\alpha$	

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Clause	Requirement + Test	Result – Remark	Verdict
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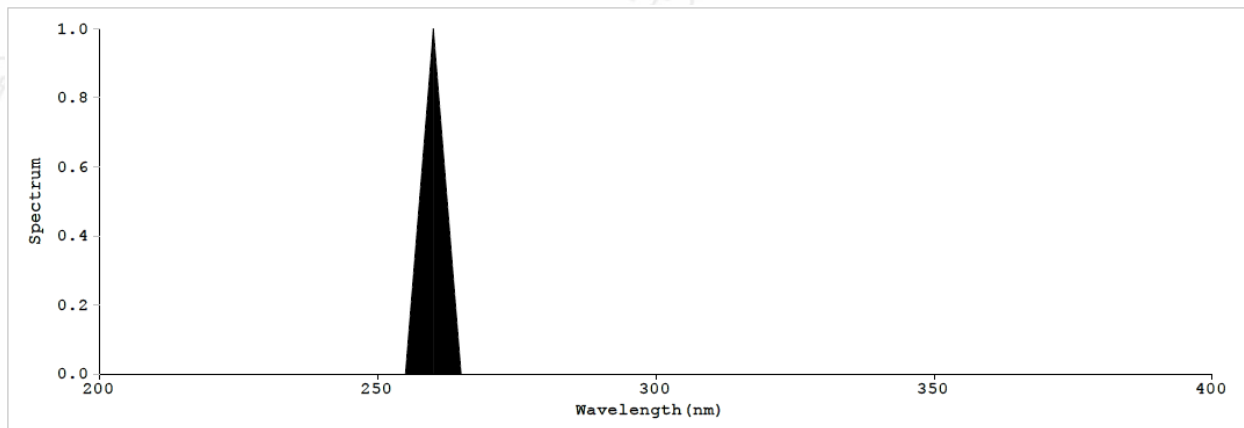
Table 6.1	Emission limits for risk groups of continuous wave lamps								N/A
Risk	Action spectrum	Symbol	Units	Emission Measurement					
				Exempt		Low risk		Mod risk	
				Limit	Result	Limit	Result	Limit	Result
Actinic UV	$S_{UV}(\lambda)$	E_s	$W \cdot m^{-2}$	0,001	---	0,003	---	0,03	---
Near UV		E_{UVA}	$W \cdot m^{-2}$	10	---	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*	---	1,0	---	400	---
Retinal thermal	$R(\lambda)$	L_R	$W \cdot m^{-2} \cdot sr^{-1}$	28000/ α	---	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	---	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									

IEC 62471 B ATTACHMENT				
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			
Annex Form No.	EU_GD_IEC62471B			
Annex Form Originator.....	OVE			
Master Annex Form	2019-01-24			
Copyright © 2019 IEC System for Conformity Testing and Certification of Electrical Equipment (IECEE), Geneva, Switzerland. All rights reserved.				
	CENELEC COMMON MODIFICATIONS			P
4	EXPOSURE LIMITS			P
	Contents of the whole Clause 4 of IEC 62471:2006 moved into a new informative Annex ZB			P
	Clause 4 replaced by the following:			P
	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			P
	First paragraph deleted			P

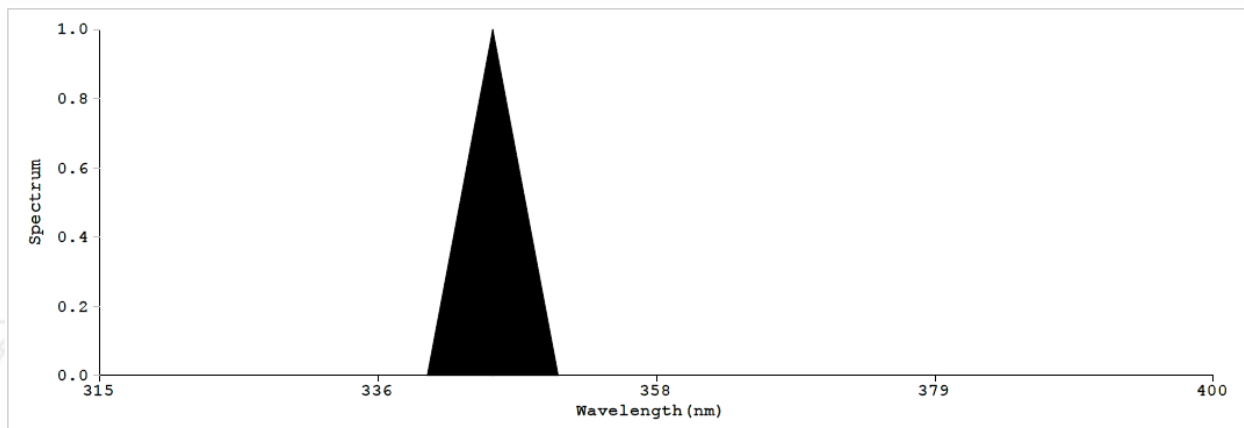
Table 6.1		Emission limits for risk groups of continuous wave lamps (Model: CX1582-08)($\alpha=0,1000\text{rad}$, tesd distance = 200,0mm)							P
Risk	Action spectrum	Symbol	Units	Emission Measurement					
				Exempt		Low risk		Mod risk	
				Limit	Result	Limit	Result	Limit	Result
Actinic UV	$S_{UV}(\lambda)$	E_s	$\text{W}\cdot\text{m}^{-2}$	0,001	3,071e-6	0,003	-	0,03	-
Near UV		E_{UVA}	$\text{W}\cdot\text{m}^{-2}$	0,33	1,547e-8	33	-	100	-
Blue light	$B(\lambda)$	L_B	$\text{W}\cdot\text{m}^{-2}\cdot\text{sr}^{-1}$	1,00e2	2,427e-1	1,00e4	-	4,00e6	-
Blue light, small source	$B(\lambda)$	E_B	$\text{W}\cdot\text{m}^{-2}$	0,01	-	1,0	-	400	-
Retinal thermal	$R(\lambda)$	L_R	$\text{W}\cdot\text{m}^{-2}\cdot\text{sr}^{-1}$	$28000/\alpha$	3,254e1	$28000/\alpha$	-	$71000/\alpha$	-
Retinal thermal, weak visual stimulus**	$R(\lambda)$	L_{IR}	$\text{W}\cdot\text{m}^{-2}\cdot\text{sr}^{-1}$	545000 $0,0017\leq \alpha \leq 0,011$	-				
				$6000/\alpha$ $0,011\leq \alpha \leq 0,1$	0,000e0				
IR radiation, eye		E_{IR}	$\text{W}\cdot\text{m}^{-2}$	100	0,000e0	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.								

ANNEX 1: Test result in graphical presentation

Spectral Distribution (200nm-400nm)
 $E_s = 3,071e-6 \text{ W/m}^2$



Spectral Distribution (315nm-400nm)
 $E_{uva} = 1,547e-8 \text{ W/m}^2$



ANNEX 1: Test result in graphical presentation

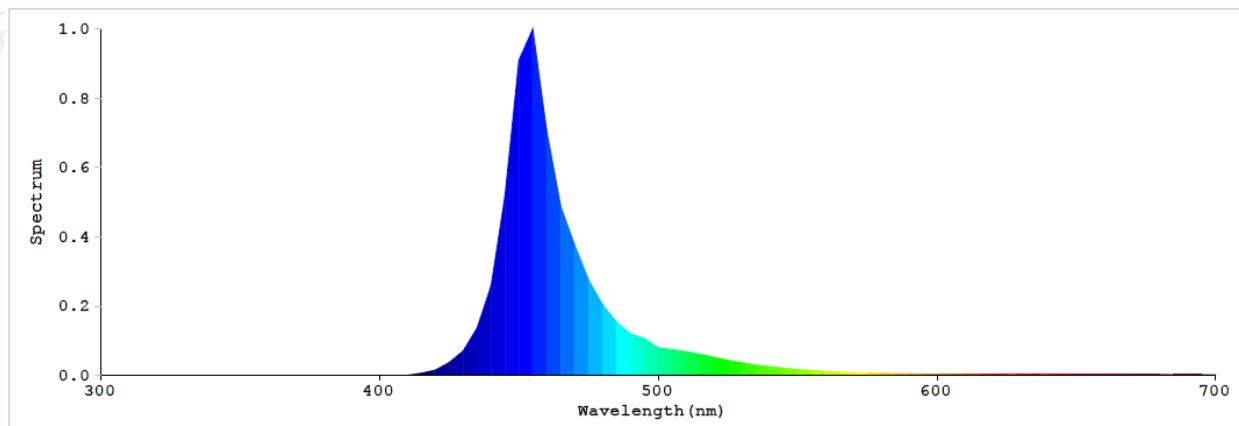
Spectral Distribution (300nm-700nm)

$E_b = 9,272e-3 \text{ W/m}^2$

$L_b(100\text{mrad}) = 2,427e-1 \text{ W/m}^2/\text{sr}$

$L_b(11\text{mrad}) = 1,207e0 \text{ W/m}^2/\text{sr}$

$L_b(1,7\text{mrad}) = 2,138e0 \text{ W/m}^2/\text{sr}$



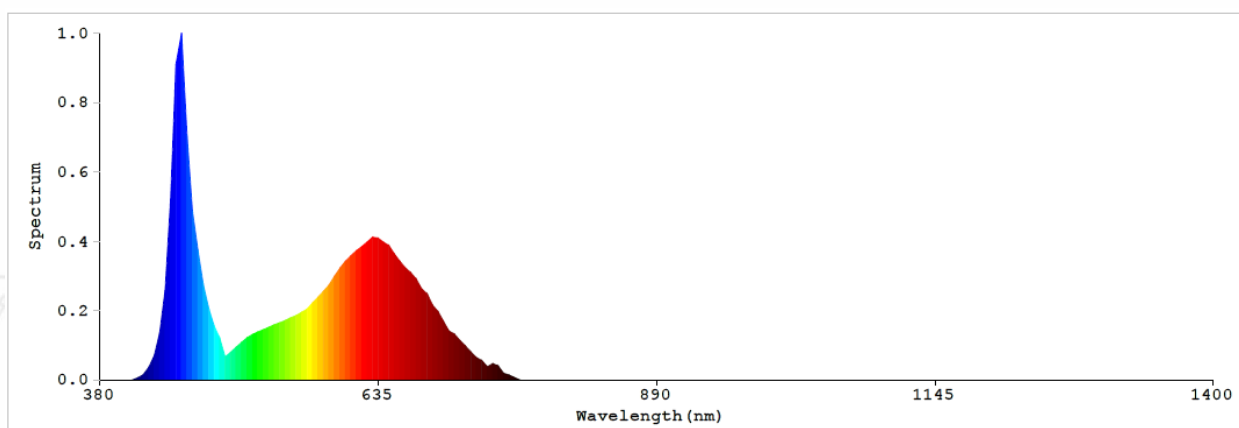
Spectral Distribution (380nm-1400nm)

$L_{ir} = 0,000e0 \text{ W/m}^2/\text{sr}$

$L_r(100\text{mrad}) = 3,254e1 \text{ W/m}^2/\text{sr}$

$L_r(11\text{mrad}) = 3,254e1 \text{ W/m}^2/\text{sr}$

$L_r(1,7\text{mrad}) = 5,764e1 \text{ W/m}^2/\text{sr}$

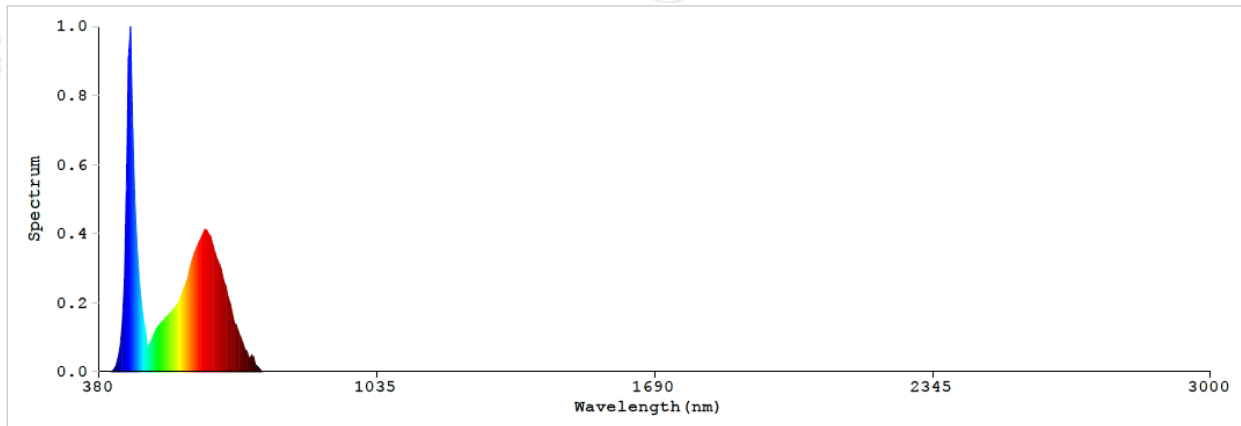


ANNEX 1: Test result in graphical presentation

Spectral Distribution (380nm-3000nm)

Eir = 0,000e0 W/m²/sr

Eh = 8,913e-2 W/m²/sr



Color parameters

Chromaticity Coordinate:x=0.4881 y=0.4065/u'=0.2829 v'=0.5301

Tc=2320K

Dominant WL:Ld=587.3nm

Peak WL:Lp=630.0nm

Purity=68.5%

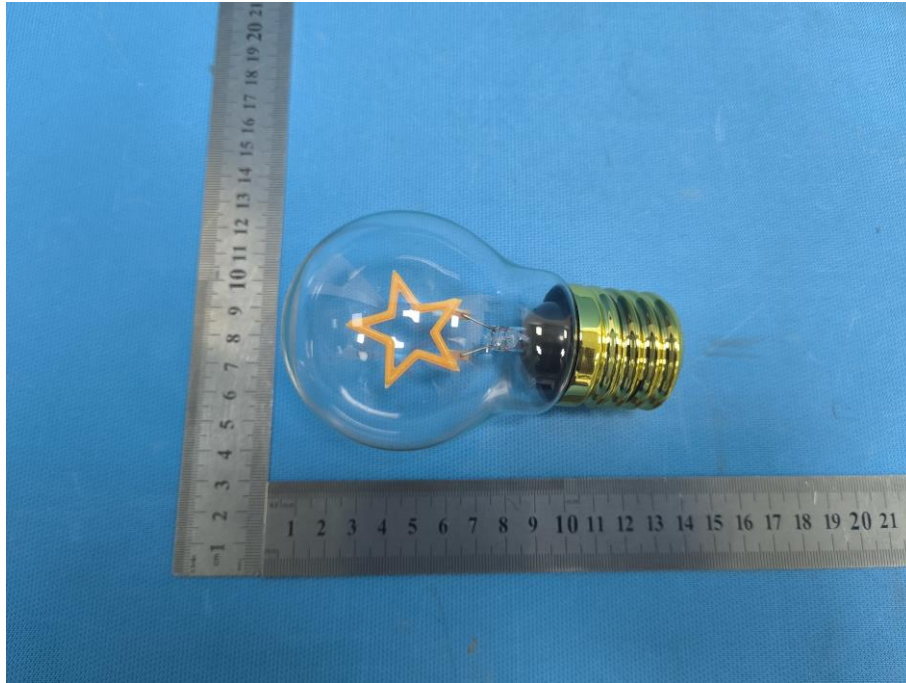
Red Ratio:R=32.7%

Render Index:Ra=95.5

FWHM=117.3nm

Ri:	R1 =98	R2 =99	R3 =99	R4 =97	R5 =99	R6 =95	R7 =92
R8 =86	R9 =72	R10=99	R11=96	R12=89	R13=99	R14=98	R15=94

ANNEX 2: Photo document



List of test equipment used:

No.	Measuring Equipment	Model	Equipment ID	Next Calibration Date	Testing Use
1	Optical Radiation Safety Test System	OST-500	FTS-124	2026-12-28	√
2	Pupil Imaging Radiance Meter	CX-2K	FTS-126	2026-12-28	√
3	UV-VIS-near IR Spectrophotometer	PMS-2000	FTS-127	2026-12-28	√
4	AC Testing Power Source	DPS1020	FTS-119	2026-05-29	
5	Digital CC&CV DC Power Supply	WY3010	FTS-128	2026-12-17	
6	Digital power meter	WT310	FTS-123	2026-12-17	

—END OF THE REPORT—

TEST REPORT IEC 62471

Photobiological safety of lamps and lamp systems

Report Number : FTS26DR-01882L

Tested by

(name + signature) : Tim Huang

Tim Huang

Reviewed by

(name + signature) : Bain Ye

Date of issue : 20 May 2026

Total number of pages : 19 pages

Name of Testing Laboratory

preparing the Report : Guangdong Future Test Services Co., Ltd.

Applicant's name : Mid Ocean Brands B.V.

Address : Unit 711-716, 7/F., Tower A, 83 King Lam Street, Cheung Sha Wan, Kowloon, Hong Kong.

Test specification :

Standard : EN 62471:2008

Test procedure : Commission test

Non-standard test method : N/A

Test Report Form No. : TRF-LT0007-V01

Test Report Form(s) Originator : FTS

Master TRF : 2025-03-15

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Test item description : LED filament desktop lamp

Trade Mark : —

Manufacturer : Mid Ocean Brands B.V.

Address : Unit 711-716, 7/F., Tower A, 83 King Lam Street, Cheung Sha Wan, Kowloon, Hong Kong.

Model/Type reference : CX1582-68

Ratings : Input: DC6V

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

ANNEX 1: Test result in graphical presentation	Pages 15 to 17
ANNEX 2: Photo document	Pages 18 fo 19

Summary of testing:

The product's have been tested according to standard EN 62471:2008 and found in compliance **Except Group(Exempt)**.

Tests performed (name of test and test clause):

The test samples meet the requirements of related standards and all tests are carried out

Testing location:

Guangdong Future Test Services Co., Ltd.

Room A01, A02, A03, No.228, Min'an South Road, Xiaolan, Zhongshan, Guangdong, China

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

Requirement of EU Group DIFFERENCES, UK

☒ The product fulfils the requirements of **EN 62471:2008**

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.

/

DESCRIPTION :	
Type of appliance..... :	LED filament desktop lamp
Type / model..... :	CX1582-68
Tested lamp..... :	☒ continuous wave lamps ☐ pulsed lamps
Lamp classification group	☒ Except Group(Exempt) ☐ Risk Group 1(Low-Risk) ☐ Risk Group 2 (Moderate-Risk) ☐ Risk Group 3 (High-Risk)
Bulb..... :	---
Classification of installation and use..... :	Class III
Supply Connection..... :	DC6V
Rated of the lamp..... :	---
Used measurement instrument	EVERFINE OST-500 system
Notes	---
Possible test case verdicts:	
- test case does not apply to the test object..... : N/A	
- test object does meet the requirement	
- test object does not meet the requirement	
Testing:	
Date of receipt of test item	2026-04-30
Date (s) of performance of tests	2026-05-05
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 ☒ comma / ☐ point is used as the decimal separator. For European group deviation, see attachment.	
Manufacturer's Declaration per sub-clause 4.2.5 of IEC60335-1:	
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..... :	☐ Yes ☒ Not applicable
Name and address of factory (ies)..... : Same as manufacturer	
General product information:	
1. This product is LED filament desktop lamp, model number: CX1582-68.	

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	N/A
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:		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
	$E_{UVA} \cdot t = \sum_{315}^{400} \sum_t E_{\lambda}(\lambda, t) \cdot \Delta t \cdot \Delta \lambda \leq 10000 \quad \text{J}\cdot\text{m}^{-2}$	$t < 1000 \text{ s}$	N/A
	$E_{UVA} \leq 10 \quad \text{W}\cdot\text{m}^{-2}$	$t \geq 1000 \text{ s}$	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/A
	$t_{\max} \leq \frac{10000}{E_{UVA}} \quad \text{s}$		N/A
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:	see table 4.2	P

IEC 62471			
Clause	Requirement + Test	Result – Remark	Verdict
	$L_B \cdot t = \sum_{300}^{700} \sum_t L_\lambda(\lambda, t) \cdot B(\lambda) \cdot \Delta\lambda \leq 10^6 \text{ J} \cdot \text{m}^{-2} \cdot \text{sr}^{-1}$	for $t \leq 10^4$ s $t_{\max} = \frac{10^6}{L_B}$	N/A
	$L_B = \sum_{300}^{700} L_\lambda \cdot B(\lambda) \cdot \Delta\lambda \leq 100 \text{ W} \cdot \text{m}^{-2} \cdot \text{sr}^{-1}$	for $t > 10^4$ s	P
4.3.4	Retinal blue light hazard exposure limit - small source		N/A
	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:		N/A
	$E_B \cdot t = \sum_{300}^{700} \sum_t E_\lambda(\lambda, t) \cdot B(\lambda) \cdot \Delta\lambda \leq 100 \text{ J} \cdot \text{m}^{-2}$	for $t \leq 100$ s $t_{\max} = \frac{100}{E_B}$	N/A
	$E_B = \sum_{300}^{700} E_\lambda \cdot B(\lambda) \cdot \Delta\lambda \leq 1 \text{ W} \cdot \text{m}^{-2}$	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
	$L_R = \sum_{380}^{1400} L_\lambda \cdot R(\lambda) \cdot \Delta\lambda \leq \frac{50000}{\alpha \cdot t^{0.25}} \text{ W} \cdot \text{m}^{-2} \cdot \text{sr}^{-1}$	$10 \mu\text{s} \leq t \leq 10 \text{ s}$	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
	$L_{IR} = \sum_{780}^{1400} L_\lambda \cdot R(\lambda) \cdot \Delta\lambda \leq \frac{6000}{\alpha} \text{ W} \cdot \text{m}^{-2} \cdot \text{sr}^{-1}$	$t > 10 \text{ s}$	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:		N/A
	$E_{IR} = \sum_{780}^{3000} E_\lambda \cdot \Delta\lambda \leq 18000 \cdot t^{-0.75} \text{ W} \cdot \text{m}^{-2}$	$t \leq 1000 \text{ s}$	N/A
	For times greater than 1000 s the limit becomes:		P
	$E_{IR} = \sum_{780}^{3000} E_\lambda \cdot \Delta\lambda \leq 100 \text{ W} \cdot \text{m}^{-2}$	$t > 1000 \text{ s}$	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:		N/A
	$E_H \cdot t = \sum_{380}^{3000} E_{\lambda}(\lambda, t) \cdot \Delta\lambda \leq 20000 \cdot t^{0.25} \quad \text{J} \cdot \text{m}^{-2}$	$t \leq 10 \text{ s}$	N/A
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.		N/A
5.1.2	Test environment	1. Dark room 2. Temperature: 25.0°C	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.		N/A
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		N/A
	Operation of the test lamp shall be provided in accordance with:		N/A
	– the appropriate IEC lamp standard, or		N/A
	– 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.		P
	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

IEC 62471			
Clause	Requirement + Test	Result – Remark	Verdict
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/A
	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/A
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.	$\alpha=0,1000$ rad	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		P
	The quality of all measurement results must be quantified by an analysis of the uncertainty.	see Annex C in the norm	P
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		N/A
	– for all other light sources, including pulsed lamp sources, the hazard values shall be reported at a distance of 200 mm		P
6.1	Continuous wave lamps		P
6.1.1	Except Group		P

IEC 62471			
Clause	Requirement + Test	Result – Remark	Verdict
	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
	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

IEC 62471			
Clause	Requirement + Test	Result – Remark	Verdict
	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		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		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	

IEC 62471			
Clause	Requirement + Test		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)	
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	

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 10-100 100-10000 ≥ 10000	$0,011 \cdot \sqrt{(t/10)}$ 0,011 $0,0011 \cdot \sqrt{t}$ 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 $0,011 \cdot \sqrt{(t/10)}$	$50000/(\alpha \cdot t^{0,25})$ $50000/(\alpha \cdot t^{0,25})$	
Retinal thermal (weak visual stimulus)	$L_{IR} = \sum L_\lambda \cdot R(\lambda) \cdot \Delta\lambda$	780 – 1400	> 10	0,011	$6000/\alpha$	

IEC 62471

Clause	Requirement + Test	Result – Remark	Verdict
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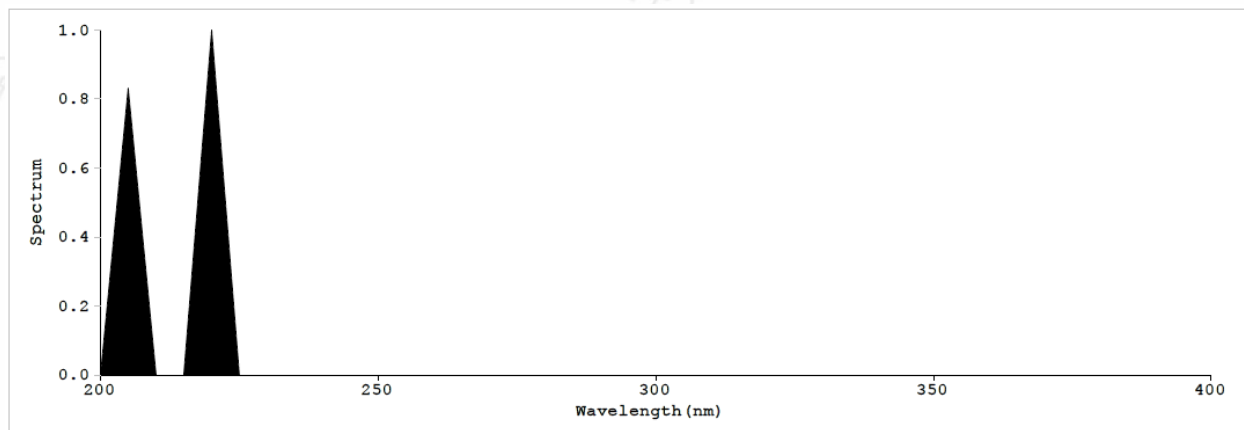
Table 6.1	Emission limits for risk groups of continuous wave lamps								N/A
Risk	Action spectrum	Symbol	Units	Emission Measurement					
				Exempt		Low risk		Mod risk	
				Limit	Result	Limit	Result	Limit	Result
Actinic UV	$S_{UV}(\lambda)$	E_s	$W \cdot m^{-2}$	0,001	---	0,003	---	0,03	---
Near UV		E_{UVA}	$W \cdot m^{-2}$	10	---	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*	---	1,0	---	400	---
Retinal thermal	$R(\lambda)$	L_R	$W \cdot m^{-2} \cdot sr^{-1}$	28000/ α	---	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	---	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									

IEC 62471 B ATTACHMENT				
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			
Annex Form No.	EU_GD_IEC62471B			
Annex Form Originator.....	OVE			
Master Annex Form	2019-01-24			
Copyright © 2019 IEC System for Conformity Testing and Certification of Electrical Equipment (IECEE), Geneva, Switzerland. All rights reserved.				
	CENELEC COMMON MODIFICATIONS			P
4	EXPOSURE LIMITS			P
	Contents of the whole Clause 4 of IEC 62471:2006 moved into a new informative Annex ZB			P
	Clause 4 replaced by the following:			P
	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			P
	First paragraph deleted			P

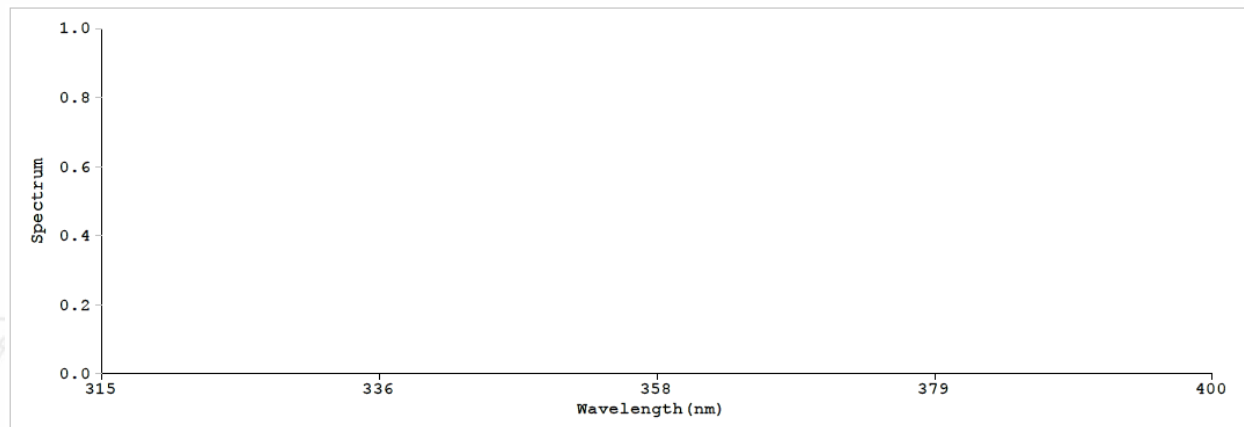
Table 6.1		Emission limits for risk groups of continuous wave lamps (Model: CX1582-68)($\alpha=0,1000\text{rad}$, test distance = 200,0mm)							P
Risk	Action spectrum	Symbol	Units	Emission Measurement					
				Exempt		Low risk		Mod risk	
				Limit	Result	Limit	Result	Limit	Result
Actinic UV	$S_{UV}(\lambda)$	E_s	$\text{W}\cdot\text{m}^{-2}$	0,001	4,376e-7	0,003	-	0,03	-
Near UV		E_{UVA}	$\text{W}\cdot\text{m}^{-2}$	0,33	0,000e0	33	-	100	-
Blue light	$B(\lambda)$	L_B	$\text{W}\cdot\text{m}^{-2}\cdot\text{sr}^{-1}$	1,00e2	1,486e-1	1,00e4	-	4,00e6	-
Blue light, small source	$B(\lambda)$	E_B	$\text{W}\cdot\text{m}^{-2}$	0,01	-	1,0	-	400	-
Retinal thermal	$R(\lambda)$	L_R	$\text{W}\cdot\text{m}^{-2}\cdot\text{sr}^{-1}$	28000/ α	2,079e1	28000/ α	-	71000/ α	-
Retinal thermal, weak visual stimulus**	$R(\lambda)$	L_{IR}	$\text{W}\cdot\text{m}^{-2}\cdot\text{sr}^{-1}$	545000 $0,0017 \leq \alpha \leq 0,011$	-				
				6000/ α $0,011 \leq \alpha \leq 0,1$	0,000e0				
IR radiation, eye		E_{IR}	$\text{W}\cdot\text{m}^{-2}$	100	0,000e0	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.									

ANNEX 1: Test result in graphical presentation

Spectral Distribution (200nm-400nm)
 $E_s = 4,376e-7 \text{ W/m}^2$



Spectral Distribution (315nm-400nm)
 $E_{uva} = 0,000e0 \text{ W/m}^2$



ANNEX 1: Test result in graphical presentation

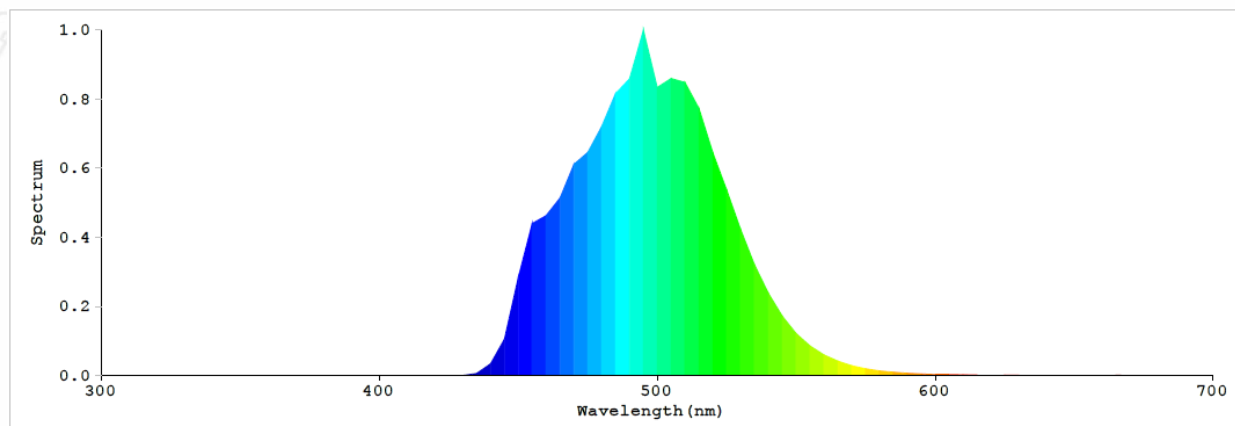
Spectral Distribution (300nm-700nm)

$E_b = 6,377e-3 \text{ W/m}^2$

$L_b(100\text{mrad}) = 1,462e-1 \text{ W/m}^2/\text{sr}$

$L_b(11\text{mrad}) = 8,788e-1 \text{ W/m}^2/\text{sr}$

$L_b(1,7\text{mrad}) = 1,208e0 \text{ W/m}^2/\text{sr}$



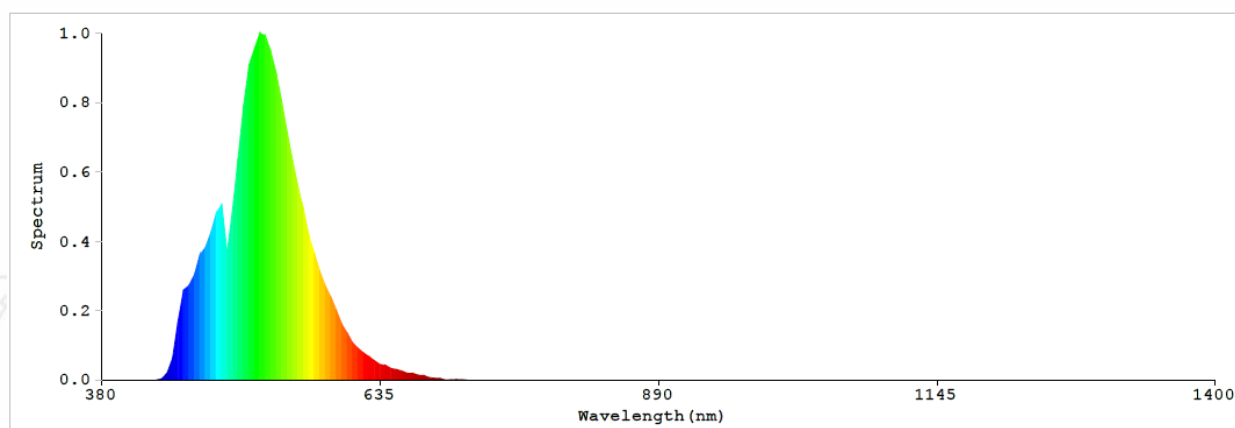
Spectral Distribution (380nm-1400nm)

$L_{ir} = 0,000e0 \text{ W/m}^2/\text{sr}$

$L_r(100\text{mrad}) = 2,065e1 \text{ W/m}^2/\text{sr}$

$L_r(11\text{mrad}) = 2,065e1 \text{ W/m}^2/\text{sr}$

$L_r(1,7\text{mrad}) = 2,838e1 \text{ W/m}^2/\text{sr}$

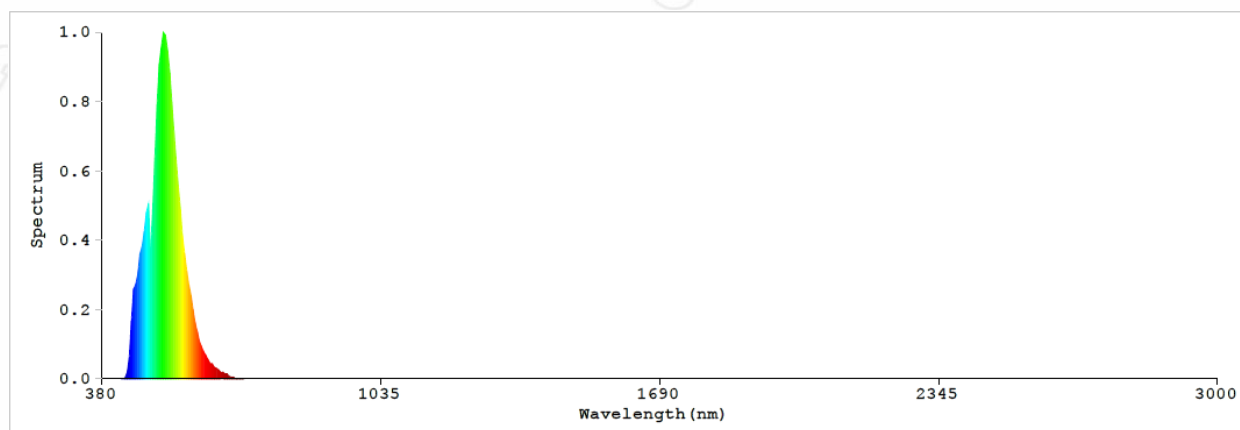


ANNEX 1: Test result in graphical presentation

Spectral Distribution (380nm-3000nm)

Eir = 0,000e0 W/m²/sr

Eh = 6,624e-2 W/m²/sr



Color parameters

Chromaticity Coordinate: x=0.2858 y=0.6253/u'=0.1151 v'=0.5666

Tc=6263K

Dominant WL: Ld=545.6nm

Peak WL: Lp=525.0nm

Purity=75.4%

Red Ratio: R=3.4%

Render Index: Ra=12.3

FWHM=63.9nm

Ri:	R1 =-0	R2 =29	R3 =33	R4 =-23	R5 =14	R6 =27	R7 =29
R8 =-11	R9 =-271	R10=-30	R11=-42	R12=7	R13=2	R14=66	R15=-14

ANNEX 2: Photo document



List of test equipment used:

No.	Measuring Equipment	Model	Equipment ID	Next Calibration Date	Testing Use
1	Optical Radiation Safety Test System	OST-500	FTS-124	2026-12-28	√
2	Pupil Imaging Radiance Meter	CX-2K	FTS-126	2026-12-28	√
3	UV-VIS-near IR Spectrophotometer	PMS-2000	FTS-127	2026-12-28	√
4	AC Testing Power Source	DPS1020	FTS-119	2026-05-29	
5	Digital CC&CV DC Power Supply	WY3010	FTS-128	2026-12-17	
6	Digital power meter	WT310	FTS-123	2026-12-17	

——END OF THE REPORT——