






TEST REPORT IEC 62471 Photobiological safety of lamps and lamp systems	
Report Reference No.	KILT2003-F02334
Date of issue	March 25, 2020
Total number of pages	19 pages
Testing Laboratory	Korea Institute of Lighting and ICT
Address	A-403 Daewoo Technopark, 261, Doyak-ro, Wonmi-gu, Bucheon-si, Gyeonggi-do, Korea 14523
Applicant's name	MALTANI Corp.
Address	MALTANI B/D, 431, Yeoksam-Ro, Kangnam-Gu, Seoul 06196, Korea
Test specification:	
Standard	IEC 62471: 2006
Test procedure	CE
Non-standard test method	N/A
Test Report Form No.	IEC62471A
TRF Originator	VDE Testing and Certification Institute
Master TRF	Dated 2009-05
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This report is not valid as a CB Test Report unless signed by an approved CB Testing Laboratory and appended to a CB Test Certificate issued by an NCB in accordance with IECEE 02.	
Test item description	LED Recessed or LED Surface mounted light
Trade Mark	
Manufacturer	MALTANI Corp.
Address	80, Eumbongmyeon-ro, Eumbong-myeon, Asan-si, Chungcheongnam-do, Korea
Model/Type reference	S-RLP3029-50-C001 / CLEAN EDGE (Office lighting with the visible spectrum for Sterilization)
Ratings	200-250 V~, 50/60 Hz, 57 W





Testing procedure and testing location:	
<input checked="" type="checkbox"/> Testing Laboratory:	Korea Institute of Lighting and ICT
Testing location/ address	A-403 Daewoo Technopark, 261, Doyak-ro, Wonmi-gu, Bucheon-si, Gyeonggi-do, Korea 14523
<input type="checkbox"/> Associated Laboratory:	
Testing location/ address	
Tested by (name + signature)..... :	EunCheol Jung 
Approved by (+ signature)	HeeSuk Jeong 
<input type="checkbox"/> Testing procedure: TMP	
Tested by (name + signature)..... :	N/A
Approved by (+ signature)	N/A
Testing location/ address	N/A
<input type="checkbox"/> Testing procedure: WMT	
Tested by (name + signature)..... :	N/A
Witnessed by (+ signature)..... :	N/A
Approved by (+ signature)	N/A
Testing location/ address	N/A
<input type="checkbox"/> Testing procedure: SMT	
Tested by (name + signature)..... :	N/A
Approved by (+ signature)	N/A
Supervised by (+ signature)..... :	N/A
Testing location/ address	N/A
<input type="checkbox"/> Testing procedure: RMT	
Tested by (name + signature)..... :	N/A
Approved by (+ signature)	N/A
Supervised by (+ signature)..... :	N/A
Testing location/ address	N/A





List of Attachments (including a total number of pages in each attachment): a) Spectral Distribution (1 page) b) Photo (1 page)	
Summary of testing:	
Tests performed (name of test and test clause): Full type testing according to IEC 62 471: 2006 (First Edition)	Testing location: Korea Institute of Lighting and ICT A-403 Daewoo Technopark, 261, Doyak-ro, Wonmi-gu, Bucheon-si, Gyeonggi-do, Korea 14523
Summary of compliance with National Differences: <input checked="" type="checkbox"/> The product fulfils the requirements of standard EN 62 471: 2008. European Group Difference and National differences (2 pages not included in total number of pages)	
Copy of marking plate: N/A	





Test item particulars	
Tested lamp	<input checked="" type="checkbox"/> continuous wave lamps <input type="checkbox"/> pulsed lamps
Tested lamp system	
Lamp classification group	<input checked="" type="checkbox"/> exempt <input type="checkbox"/> risk 1 <input type="checkbox"/> risk 2 <input type="checkbox"/> risk 3
Lamp cap	N/A
Bulb	LED
Rated of the lamp	200-250 V~, 50/60 Hz, 57 W
Furthermore marking on the lamp	N/A
Seasoning of lamps according IEC standard	N/A
Used measurement instrument.....	Double monochromator
Temperature by measurement	(25 ± 3 °C)
Information for safety use.....	N/A
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	2020-03-20
Date (s) of performance of tests	2020-03-20
General remarks:	
The test results presented in this report relate only to the object tested. This report shall not be reproduced, except in full, without the written approval of the Issuing testing laboratory. "(See Enclosure #)" refers to additional information appended to the report. "(See appended table)" refers to a table appended to the report. Throughout this report a comma (point) is used as the decimal separator. List of test equipment must be kept on file and available for review.	
Manufacturer's Declaration per sub-clause 4.2.5 of IEC62471:	
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).....: N/A	





General product information:

This product is LED Recessed or LED Surface mounted light.
This product uses 405nm LED package to sterilize the used space.

Info of LED package is as below.

1. LED package (For normal mode)
 - Manufacturer : Samsung Electronics Co., Ltd.
 - Model : LM281B+
 - Rating : 3.1 Vdc, 200 mA
 - CCT : 5 000 K

2. LED package (For sterilization mode)
 - Manufacturer : Seoul Semiconductor Co., Ltd.
 - Model : Y1550-ED-40
 - Rating : 3.2 Vdc, 1 200 mA

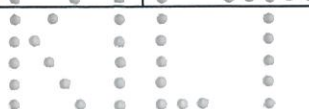


IEC 62471			
Clause	Requirement + Test	Result – Remark	Verdict
4	EXPOSURE LIMITS		P
4.1	General		P
	The exposure limits in this standard is not less than 0.01 ms and not more than any 8 hour period and should be used as guides in the control of exposure		P
	Detailed spectral data of a light source are generally required only if the luminance of the source exceeds 10^4 cd m^{-2}	see clause 4.3	P
4.3	Hazard exposure limits		P
4.3.1	Actinic UV hazard exposure limit for the skin and eye		P
	The exposure limit for effective radiant exposure is 30 J 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 J 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 W m^{-2} .		P
	The permissible time for exposure to ultraviolet radiation incident upon the unprotected eye for time less than 1000 s, shall be computed by:		P
	$t_{\max} \leq \frac{10\,000}{E_{UVA}} \quad \text{s}$		P
4.3.3	Retinal blue light hazard exposure limit		P

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Clause	Requirement + Test	Result – Remark	Verdict
	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
	$L_B \cdot t = \sum_{300}^{700} L_{\lambda}(\lambda, t) \cdot B(\lambda) \cdot \Delta\lambda \leq 10^6 \quad \text{J} \cdot \text{m}^{-2} \cdot \text{sr}^{-1}$	for $t \leq 10^4$ s $t_{\max} = \frac{10^6}{L_B}$	N/A
	$L_B = \sum_{300}^{700} L_{\lambda} \cdot B(\lambda) \cdot \Delta\lambda \leq 100 \quad \text{W} \cdot \text{m}^{-2} \cdot \text{sr}^{-1}$	for $t > 10^4$ s	P
4.3.4	Retinal blue light hazard exposure limit - small source		P
	Thus the spectral irradiance at the eye E_{λ} , weighted against the blue-light hazard function $B(\lambda)$ shall not exceed the levels defined by:	see table 4.2	P
	$E_B \cdot t = \sum_{300}^{700} E_{\lambda}(\lambda, t) \cdot B(\lambda) \cdot \Delta\lambda \leq 100 \quad \text{J} \cdot \text{m}^{-2}$	for $t \leq 100$ s	P
	$E_B = \sum_{300}^{700} E_{\lambda} \cdot B(\lambda) \cdot \Delta\lambda \leq 1 \quad \text{W} \cdot \text{m}^{-2}$	for $t > 100$ s	P
4.3.5	Retinal thermal hazard exposure limit		
	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:	see table 4.2	P
	$L_R = \sum_{380}^{1400} L_{\lambda} \cdot R(\lambda) \cdot \Delta\lambda \leq \frac{50\,000}{\alpha \cdot t^{0,25}} \quad \text{W} \cdot \text{m}^{-2} \cdot \text{sr}^{-1}$	(10 $\mu\text{s} \leq t \leq 10$ s)	P
4.3.6	Retinal thermal hazard exposure limit – weak visual stimulus		P
	For an infrared heat lamp or any near-infrared source where a weak visual stimulus is inadequate to activate the aversion response, the near infrared (780 nm to 1400 nm) radiance, L_{IR} , as viewed by the eye for exposure times greater than 10 s shall be limited to:		N/A
	$L_{IR} = \sum_{780}^{1400} L_{\lambda} \cdot R(\lambda) \cdot \Delta\lambda \leq \frac{6\,000}{\alpha} \quad \text{W} \cdot \text{m}^{-2} \cdot \text{sr}^{-1}$	$t > 10$ s	N/A
4.3.7	Infrared radiation hazard exposure limits for the eye		P

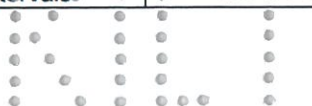
IEC 62471			
Clause	Requirement + Test	Result – Remark	Verdict
	The avoid thermal injury of the cornea and possible delayed effects upon the lens of the eye (cataractogenesis), ocular exposure to infrared radiation, E_{IR} , over the wavelength range 780 nm to 3000 nm, for times less than 1000 s, shall not exceed:	see table 4.2	P
	$E_{IR} = \sum_{780}^{3000} E_{\lambda} \cdot \Delta\lambda \leq 18\,000 \cdot t^{-0,75} \quad W \cdot m^{-2}$	$t \leq 1000 \text{ s}$	P
	For times greater than 1000 s the limit becomes:		P
	$E_{IR} = \sum_{780}^{3000} E_{\lambda} \cdot \Delta\lambda \leq 100 \quad W \cdot m^{-2}$	$t > 1000 \text{ s}$	P
4.3.8	Thermal hazard exposure limit for the skin		P
	Visible and infrared radiant exposure (380 nm to 3000 nm) of the skin shall be limited to:	see table 4.2	P
	$E_{H \cdot t} = \sum_{380}^{3000} \sum_t E_{\lambda}(\lambda, t) \cdot \Delta\lambda \leq 20\,000 \cdot t^{0,25} \quad J \cdot m^{-2}$		P

5	MEASUREMENT OF LAMPS AND LAMP SYSTEMS		P
5.1	Measurement conditions		P
	Measurement conditions shall be reported as part of the evaluation against the exposure limits and the assignment of risk classification.		P
5.1.1	Lamp ageing (seasoning)		P
	Seasoning of lamps shall be done as stated in the appropriate IEC lamp standard.		P
5.1.2	Test environment		P
	For specific test conditions, see the appropriate IEC lamp standard or in absence of such standards, the appropriate national standards or manufacturer's recommendations.		P
5.1.3	Extraneous radiation		P
	Careful checks should be made to ensure that extraneous sources of radiation and reflections do not add significantly to the measurement results.		P
5.1.4	Lamp operation		P
	Operation of the test lamp shall be provided in accordance with:		P
	– the appropriate IEC lamp standard, or		N/A





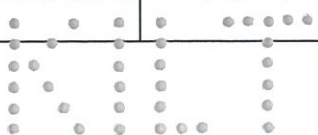
IEC 62471			
Clause	Requirement + Test	Result – Remark	Verdict
	– the manufacturer' s recommendation		P
5.1.5	Lamp system operation		P
	The power source for operation of the test lamp shall be provided in accordance with:		P
	– the appropriate IEC standard, or		N/A
	– the manufacturer' s recommendation		P
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
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	See Cl.5.5.2.1	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.	α : 100 mrad	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.	Continuous lamp	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.	see table 4.1	P



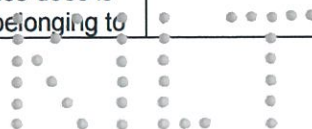


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Clause	Requirement + Test	Result – Remark	Verdict
	desired.		
5.3.2	Calculations		P
	The calculation of source hazard values shall be performed by weighting the spectral scan by the appropriate function and calculating the total weighted energy.		P
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	GLS Test distance : 1 957 mm	P
	– for all other light sources, including pulsed lamp sources, the hazard values shall be reported at a distance of 200 mm		N/A
6.1	Continuous wave lamps		P
6.1.1	Except Group		P
	In the except group are lamps, which does not pose any photobiological hazard. The requirement is met by any lamp that does not pose:		P
	– an actinic ultraviolet hazard (E_S) within 8-hours exposure (3 0000 s), nor		P
	– a near-UV hazard (E_{UVA}) within 1 000 s, (about 16 min), nor		P
	– a retinal blue-light hazard (L_B) within 10 000 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 1 000 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:	Except group	N/A
	– an actinic ultraviolet hazard (E_S) within 10 000 s, nor	Except group	N/A



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Clause	Requirement + Test	Result – Remark	Verdict
	– a near ultraviolet hazard (E_{UVA}) within 300 s, nor	Except group	N/A
	– a retinal blue-light hazard (L_B) within 100 s, nor	Except group	N/A
	– a retinal thermal hazard (L_R) within 10 s, nor	Except group	N/A
	– an infrared radiation hazard for the eye (E_{IR}) within 100 s	Except group	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.	Except group	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 1 000 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.	Except group	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.	No Pulsed lamps	N/A
	A pulsed lamp shall be evaluated at the highest nominal energy loading as specified by the manufacturer.		N/A
	The risk group determination of the lamp being tested shall be made as follows:		N/A
	– a lamp that exceeds the exposure limit shall be classified as belonging to Risk Group 3 (High-Risk)		N/A
	– for single pulsed lamps, a lamp whose weighted radiant exposure or weighted radiance does is below the EL shall be classified as belonging to		N/A





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Clause	Requirement + Test	Result – Remark	Verdict
	the Exempt Group		
	– 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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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	0.002 4	
215	0.095	317	0.002 0	
220	0.120	318	0.001 6	
225	0.150	319	0.001 2	
230	0.190	320	0.001 0	
235	0.240	322	0.000 67	
240	0.300	323	0.000 54	
245	0.360	325	0.000 50	
250	0.430	328	0.000 44	
254*	0.500	330	0.000 41	
255	0.520	333*	0.000 37	
260	0.650	335	0.000 34	
265	0.810	340	0.000 28	
270	1.000	345	0.000 24	
275	0.960	350	0.000 20	
280*	0.880	355	0.000 16	
285	0.770	360	0.000 13	
290	0.640	365*	0.000 11	
295	0.540	370	0.000 093	
297*	0.460	375	0.000 077	
300	0.300	380	0.000 064	
303*	0.120	385	0.000 053	
305	0.060	390	0.000 044	
308	0.026	395	0.000 036	
310	0.015	400	0.000 030	

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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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



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Table 4.2	Spectral weighting functions for assessing retinal hazards from broadband optical sources	P
450	0.94	9.4
455	0.90	9.0
460	0.80	8.0
465	0.70	7.0
470	0.62	6.2
475	0.55	5.5
480	0.45	4.5
485	0.40	4.0
490	0.22	2.2
495	0.16	1.6
500 - 600	$10^{[(450-\lambda)/50]}$	1.0
600 - 700	0.001	1.0
700 - 1 050		$10^{[(700-\lambda)/500]}$
1 050 - 1 150		0.2
1 150 - 1 200		$0.2 \cdot 10^{0.02(1150-\lambda)}$
1 200 - 1 400		0.02

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Table 5.4 Summary of the ELs for the surface of the skin or cornea (irradiance based values)					P
Hazard Name	Relevant equation	Wavelength range nm	Exposure duration sec	Limiting aperture rad (deg)	EL in terms of constant irradiance $W \cdot m^{-2}$
Actinic UV skin & eye	$E_S = \sum E_\lambda \cdot S(\lambda) \cdot \Delta\lambda$	200 – 400	< 30 000	1.4 (80)	30/t
Eye UV-A	$E_{UVA} = \sum E_\lambda \cdot \Delta\lambda$	315 – 400	$\leq 1\ 000$ $> 1\ 000$	1.4 (80)	10 000/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 – 3 000	$\leq 1\ 000$ $> 1\ 000$	1.4 (80)	18 000/t ^{0.75} 100
Skin thermal	$E_H = \sum E_\lambda \cdot \Delta\lambda$	380 – 3 000	< 10	2 π sr	20 000/t ^{0.75}

Table 5.5 Summary of the ELs for the retina (radiance based values)					P
Hazard Name	Relevant equation	Wavelength range nm	Exposure duration sec	Field of view radians	EL in terms of constant radiance $W \cdot m^{-2} \cdot sr^{-1}$
Blue light	$L_B = \sum L_\lambda \cdot B(\lambda) \cdot \Delta\lambda$	300 – 700	0.25 – 10	0.011 $\cdot\sqrt{(t/10)}$	10 ⁶ /t
			10 - 100	0.011	10 ⁶ /t
			100 – 10 000	0.0011 $\cdot\sqrt{t}$	10 ⁶ /t
			$\geq 10\ 000$	0.1	100
Retinal thermal	$L_R = \sum L_\lambda \cdot R(\lambda) \cdot \Delta\lambda$	380 – 1 400	< 0.25	0.001 7	50 000/($\alpha \cdot t^{0.25}$)
			0.25 – 10	0.011 $\cdot\sqrt{(t/10)}$	50 000/($\alpha \cdot t^{0.25}$)
Retinal thermal (weak visual stimulus)	$L_{IR} = \sum L_\lambda \cdot R(\lambda) \cdot \Delta\lambda$	780 – 1 400	> 10	0.011	6 000/ α



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Risk	Emission limits for risk groups of continuous wave lamps					Emission Measurement						P
	Action spectrum	Symbol	Units	Exempt		Low risk		Mod risk				
				Limit	Result	Limit	Result	Limit	Result			
Actinic UV	$S_{UV}(\lambda)$	E_s	$W \cdot m^{-2}$	0,001	0.0003116	0,003	-	0,03	-	-	-	
Near UV		E_{UVA}	$W \cdot m^{-2}$	10	0.09027	33	-	100	-	-	-	
Blue light	$B(\lambda)$	L_B	$W \cdot m^{-2} \cdot sr^{-1}$	100	1.063	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	$W \cdot m^{-2} \cdot sr^{-1}$	$\frac{28000}{\alpha} = 280000$	167.3	$\frac{28000}{\alpha} = 280000$	-	$\frac{71000}{\alpha} = 710000$	-	-	-	
Retinal thermal, weak visual stimulus**	$R(\lambda)$	L_{IR}	$W \cdot m^{-2} \cdot sr^{-1}$	$\frac{6000}{\alpha} = 60000$	0.02118	$\frac{6000}{\alpha} = 60000$	-	$\frac{6000}{\alpha} = 60000$	-	-	-	
IR radiation, eye		E_{IR}	$W \cdot m^{-2}$	100	0.002498	570	-	3200	-	-	-	

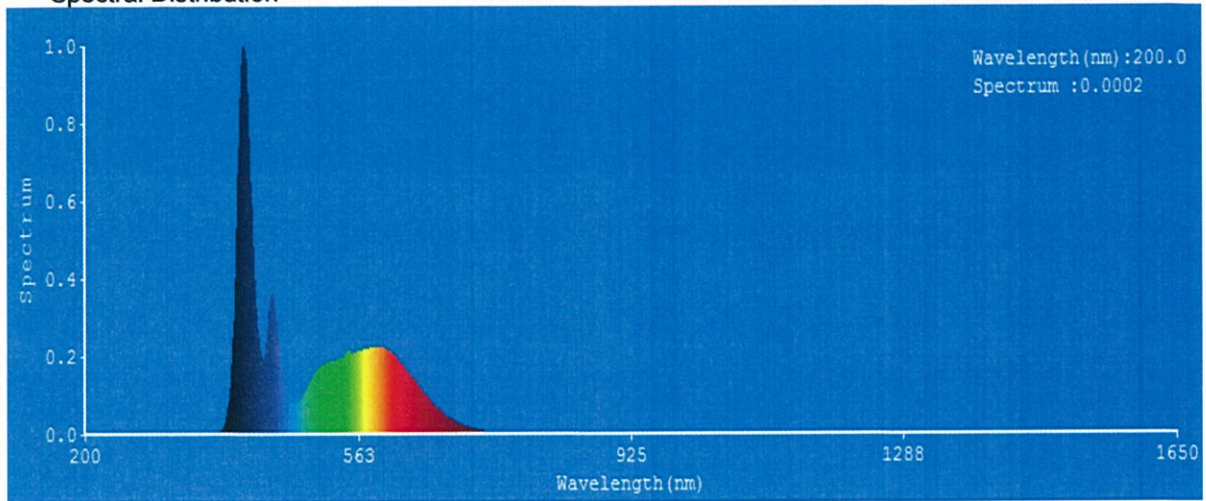
* Small source defined as one with $\alpha < 0.011$ radian. Averaging field of view at 10 000 s is 0.1 radian.

** Involves evaluation of non-GLS source

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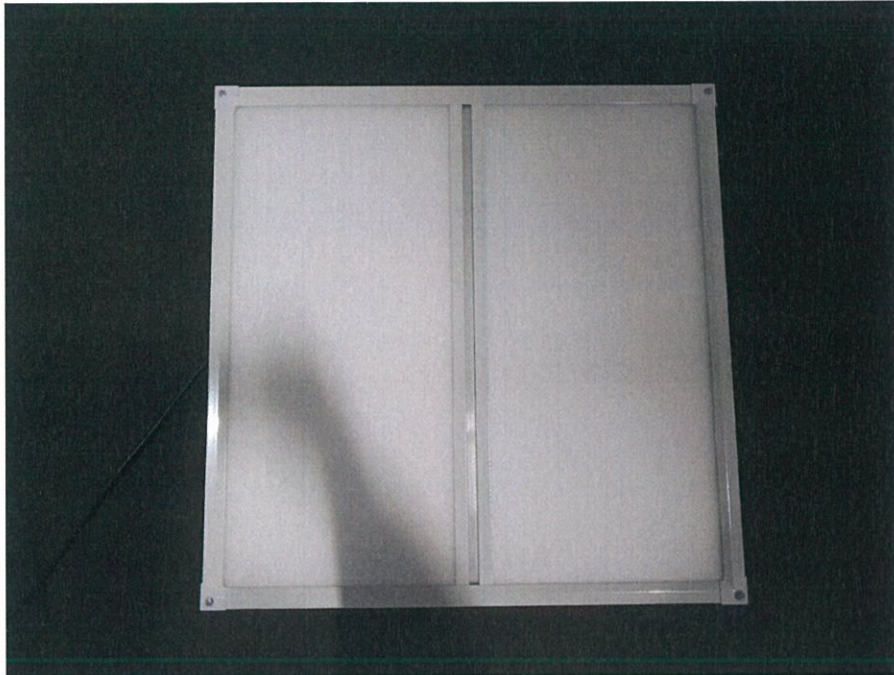
Furthermore remarks:

- Spectral Distribution

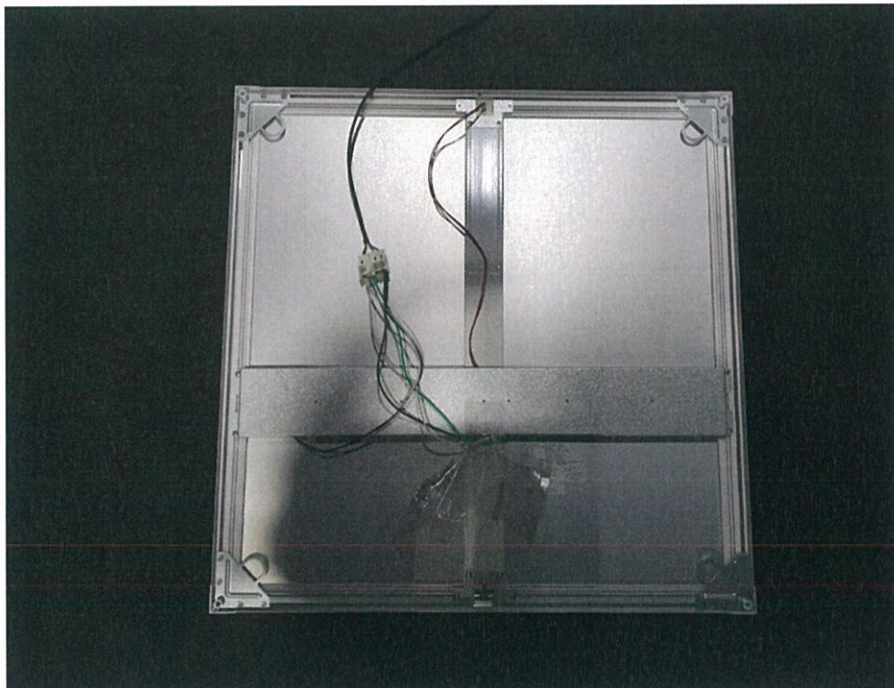


Furthermore remarks:

- Photo



[Figure 1 - Front view of product]



[Figure 2 – Rear view of product]



IEC62471A - 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			
Attachment Form No.: EU_GD_IEC62471A			
Attachment Originator.....: IMQ S.p.A.			
Master Attachment: 2009-07			
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	CENELEC COMMON MODIFICATIONS (EN)		P
4	EXPOSURE LIMITS		P
	Contents of the whole Clause 4 of IEC 62471: 2006 moved into a new informative Annex ZB		—
	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		—
	First paragraph deleted		—



IEC62471A - ATTACHMENT

Risk	Emission limits for risk groups of continuous wave lamps (based on EU Directive 2006/25/EC)										P
	Action spectrum	Symbol	Units	Exempt		Emission Measurement					
				Limit	Result	Low risk	Mod risk	Limit	Result		
Actinic UV	$S_{UV}(\lambda)$	E_s	$W \cdot m^{-2}$	0,001	0.0003116	-	-	-	-	-	-
Near UV		E_{UVA}	$W \cdot m^{-2}$	0.33	0.09027	-	-	-	-	-	-
Blue light	$B(\lambda)$	L_B	$W \cdot m^{-2} \cdot sr^{-1}$	100	1.063	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	$W \cdot m^{-2} \cdot sr^{-1}$	$28000/\alpha = 280000$	167.3	$28000/\alpha = 280000$	-	$71000/\alpha = 710000$	-	-	-
Retinal thermal, weak visual stimulus**	$R(\lambda)$	L_{IR}	$W \cdot m^{-2} \cdot sr^{-1}$	545 000	N/A	N/A	N/A	N/A	N/A	N/A	N/A
				$0.0017 \leq \alpha \leq 0.011$							
IR radiation, eye		E_{IR}	$W \cdot m^{-2}$	$6\ 000/\alpha$	0.002498	570	N/A	3 200	N/A	N/A	N/A
				$0.011 \leq \alpha \leq 0.1$							

* Small source defined as one with $\alpha < 0.011$ radian. Averaging field of view at 10 000 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.