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TEST REPORT			
Photobiological	IEC 62471 safety of lamps and lamp systems		
Report Reference No	GZES101200391131		
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Approved by (name + signature) :	Ryan Li Ryan 2i		
Date of issue:	2010-12-20		
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Testing Laboratory	SGS-CSTC Standards Technical Services Co., Ltd. GuangZhou Branch Testing Center		
Address:	No.198, Kezhu Road, Scientech Park, Guangzhou Economic & Technology Development District, Guangzhou, Guangdong, CHINA		
Applicant's name:	EA SRL		
Address:	St Degli Angariari, 25 47891 Falciano, Rep, San Marino		
Test specification:			
Standard:	IEC 62471:2006 (First Edition)		
Test procedure:	SGS-CSTC		
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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	part for non-commercial purposes as long as the IECEE is acknowledged as copyright o responsibility for and will not assume liability for damages resulting from the reader's ts placement and context.		
Test item description:	High Power LED		
Trade Mark:			
Manufacturer	Guangzhou Hongli Opto-electronic Co., Ltd. West Side of Dongfeng Highway, Auto City, Huadu District, Guangzhou City, Guangdong, China		
Model/Type reference:	HL-LB005F10W-5B2C3 WHITE		
Ratings::	8,5-9,0 Vd.c., 500 mA		



Summary of testing:

Due to the physical properties of the Lamp, this product does not contain any radiation above 800nm. Therefore the measured spectral range has been limited from 200nm up to and including 800nm.

The tests were conducted under 500 mA.

Tests performed (name of test and test clause): Te

Testing location:

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

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



Test item particulars				
Tested lamp:		wave lamps	🗌 puls	ed lamps
Tested lamp system:				
Lamp classification group:	exempt	🛛 risk 1	🗌 risk 2	risk 3
Lamp cap:				
Bulb:				
Rated of the lamp:				
Furthermore marking on the lamp:				
Seasoning of lamps according IEC standard:				
Used measurement instru				



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4	EXPOSURE LIMITS	
4.1	General	Р
	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 $10^4 \text{ cd}\text{ m}^{-2}$	P
4.3	Hazard exposure limits	Р
4.3.1	Actinic UV hazard exposure limit for the skin and eye	Р
	The exposure limit for effective radiant exposure is 30 J m ⁻² within any 8-hour period	Р
	To protect against injury of the eye or skin from ul- traviolet radiation exposure produced by a broad- band source, the effective integrated spectral ir- radiance, E_s , of the light source shall not exceed the levels defined by:	Р
		Р
	The permissible time for exposure to ultraviolet ra- diation incident upon the unprotected eye or skin shall be computed by:	Р
	rmax 30 s	Р
4.3.2	Near-UV hazard exposure limit for eye	Р
	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 ra- diation incident upon the unprotected eye for time less than 1000 s, shall be computed by:	Р
	Inos 10,000 S	Р
4.3.3	Retinal blue light hazard exposure limit	Р
	To protect against retinal photochemical injury from chronic blue-light exposure, the integrated spectral radiance of the light source weighted against the blue-light hazard function, $B(\lambda)$, i.e., the blue-light weighted radiance , L_B , shall not exceed the levels defined by:	P



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	for $t \le 10^4$ s	Р
	$L_{\rm B} = \sum_{0.00}^{700} L_{\rm c} B(2) \Delta \lambda \le 100$ W m ⁻² st ⁻¹	N
4.3.4	Retinal blue light hazard exposure limit - small source	Ν
	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
	$E_{\rm B} r = \sum_{300}^{700} \sum_{i} E_{i}(2,r) B(\lambda) \ \ \omega \ \ \omega \ \ \tilde{z} \ 100 \ \ \ {\rm J} \ {\rm m}^{-2}$	N
	$F_{\rm B} = \sum_{300}^{200} F_{\rm c} B(a) \ M^{-2}$	N
4.3.5	Retinal thermal hazard exposure limit	Р
	To protect against retinal thermal injury, the inte- grated 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 de- fined by:	P
	$L_{\rm B} = \sum_{k=1}^{1400} L_{\rm A} R(4) + 2^{3} < 50000$ (10 µs ≤ t ≤ 10 s)	Р
4.3.6	Retinal thermal hazard exposure limit – weak visual stimulus	N
	For an infrared heat lamp or any near-infrared source where a weak visual stimulus is inadequate to acti- vate 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
	$L_{\rm eff} = \frac{1400}{2} L_{\rm eff} R(A) \frac{1}{N} = \frac{1}{10} \frac{1}{10$	N
4.3.7	Infrared radiation hazard exposure limits for the eye	N
	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
		N
	For times greater than 1000 s the limit becomes:	Ν



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	$E_{1P2} = \sum_{780}^{3.004} E_{3} = 5.2 \le 100$ VVa m ⁻²	N	
4.3.8	Thermal hazard exposure limit for the skin	N	
	Visible and infrared radiant exposure (380 nm to 3000 nm) of the skin shall be limited to:	N	
	1+1+2=2000 10 1 1 1 1 2 20000 10 55 1 1 H 2	Ν	
5	MEASUREMENT OF LAMPS AND LAMP SYSTEM	S	
5.1	Measurement conditions	Р	
	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)	N	
	Seasoning of lamps shall be done as stated in the appropriate IEC lamp standard.	N	
5.1.2	Test environment	Р	
	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	Р	
	Careful checks should be made to ensure that ex- traneous sources of radiation and reflections do not add significantly to the measurement results.	P	
5.1.4	Lamp operation	Р	
	Operation of the test lamp shall be provided in ac- cordance with:	P	
	- the appropriate IEC lamp standard, or	N	
	 the manufacturer's recommendation 	Р	
5.1.5	Lamp system operation	Р	
	The power source for operation of the test lamp shall be provided in accordance with:	Р	
	 the appropriate IEC standard, or 	N	
	 the manufacturer's recommendation 	P	
5.2	Measurement procedure	Р	
5.2.1	Irradiance measurements	P	
	Minimum aperture diameter 7mm.	P	
	Maximum aperture diameter 50 mm.	Р	



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	The measurement shall be made in that position of the beam giving the maximum reading.		Р
	The measurement instrument is adequate calibrated.		Р
5.2.2	Radiance measurements		Р
5.2.2.1	Standard method		Ν
	The measurements made with an optical system.		N
	The instrument shall be calibrated to read in absolute radiant power per unit receiving area and per unit solid angle to acceptance averaged over the field of view of the instrument.		N
5.2.2.2	Alternative method		Р
	Alternatively to an imaging radiance set-up, an ir- radiance measurement set-up with a circular field stop placed at the source can be used to perform radiance measurements.		Р
5.2.3	Measurement of source size		Р
	The determination of α , the angle subtended by a source, requires the determination of the 50% emission points of the source.		Ρ
5.2.4	Pulse width measurement for pulsed sources		Ν
	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
5.3	Analysis methods		Р
5.3.1	Weighting curve interpolations		Р
	To standardize interpolated values, use linear in- terpolation on the log of given values to obtain in- termediate points at the wavelength intervals de- sired.	see table 4.1	Р
5.3.2	Calculations		Р
	The calculation of source hazard values shall be performed by weighting the spectral scan by the appropriate function and calculating the total weighted energy.		Р
5.3.3	Measurement uncertainty		Р
	The quality of all measurement results must be quantified by an analysis of the uncertainty.	see Annex C in the norm	Р
6	LAMP CLASSIFICATION	+	
	For the purposes of this standard it was decided that the values shall be reported as follows:	see table 6.1	Р



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	 for lamps intended for general lighting service, the hazard values shall be reported as either ir- radiance or radiance values at a distance which produces an illuminance of 500 lux, but not at a distance less than 200 mm 	N
	 for all other light sources, including pulsed lamp sources, the hazard values shall be reported at a distance of 200 mm 	Р
6.1	Continuous wave lamps	Р
6.1.1	Exempt Group	N
	In the exempt group are lamps, which does not pose any photobiological hazard. The requirement is met by any lamp that does not pose:	N
	 an actinic ultraviolet hazard (E_s) within 8-hours exposure (30000 s), nor 	N
	 a near-UV hazard (E_{UVA}) within 1000 s, (about 16 min), nor 	N
	 a retinal blue-light hazard (L_B) within 10000 s (about 2,8 h), nor 	N
	- a retinal thermal hazard (L _R) within 10 s, nor	N
	 an infrared radiation hazard for the eye (E_{IR}) within 1000 s 	N
6.1.2	Risk Group 1 (Low-Risk)	Р
	In this group are lamps, which exceeds the limits for the exempt group but that does not pose:	Р
	 an actinic ultraviolet hazard (E_s) within 10000 s, nor 	Р
	 a near ultraviolet hazard (E_{UVA}) within 300 s, nor 	Р
	- a retinal blue-light hazard (L _B) within 100 s, nor	Р
	– a retinal thermal hazard (L_R) within 10 s, nor	Р
	 an infrared radiation hazard for the eye (E_{IR}) within 100 s 	N
	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.	Ν
6.1.3	Risk Group 2 (Moderate-Risk)	N
	This requirement is met by any lamp that exceeds the limits for Risk Group 1, but that does not pose:	N
	 an actinic ultraviolet hazard (E_s) within 1000 s exposure, nor 	N
	 a near ultraviolet hazard (E_{UVA}) within 100 s, nor 	N
	 a retinal blue-light hazard (L_B) within 0,25 s (aversion response), nor 	N



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	– a retinal thermal hazard (L_R) within 0,25 s (aver-	N
	sion response), nor	
	 an infrared radiation hazard for the eye (E_{IR}) within 10 s 	N
	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
6.1.4	Risk Group 3 (High-Risk)	N
	Lamps which exceed the limits for Risk Group 2 are in Group 3.	N
6.2	Pulsed lamps	N
	Pulse lamp criteria shall apply to a single pulse and to any group of pulses within 0,25 s.	N
	A pulsed lamp shall be evaluated at the highest nominal energy loading as specified by the manu- facturer.	N
	The risk group determination of the lamp being tested shall be made as follows:	N
	 a lamp that exceeds the exposure limit shall be classified as belonging to Risk Group 3 (High-Risk) 	N
	 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
	 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



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Wavelength		Wavelength	UV hazard functio
, nm	S _{uv} ()	, nm	S _{uv} ()
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



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Table 4.2	Spectral weighting fund sources	ctions for assessing retinal hazards	from broadband optical	Р
۷	Wavelength nm	Blue-light hazard function B (



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Table 5.4	Summary of the ELs for the surface of the skin or cornea (irradiance based values)						
Hazard Name		Relevant equation	Wavelength range nm			EL in terms stant irra W•m	diance
Actinic UV skin & eye		$E_{S} = \sum E_{\lambda} \bullet S(\lambda) \bullet \Delta \lambda$	200 - 400	< 30000	1,4 (80)	30/	t
Eye UV-A		$E_{UVA} = \sum E_{\lambda} \bullet \Delta \lambda$	315 – 400	≤1000 >1000	1,4 (80)	1000 10	

Blue-light $E_B = \sum E_{\lambda}$." small source



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Table 6.1	Emission limits for risk groups of continuous wave lamps					Р			
						Emission M	easurement		
Risk Action spectrum		Symbol Units	Units E		empt	Low	risk	Mod risk	
				Limit	Result	Limit	Result	Limit	Result
Actinic UV	S _{UV} (λ)	Es	W•m⁻²	0,001	0	0,003		0,03	
Near UV		E _{UVA}	W•m ⁻²	10	0,0003	33		100	

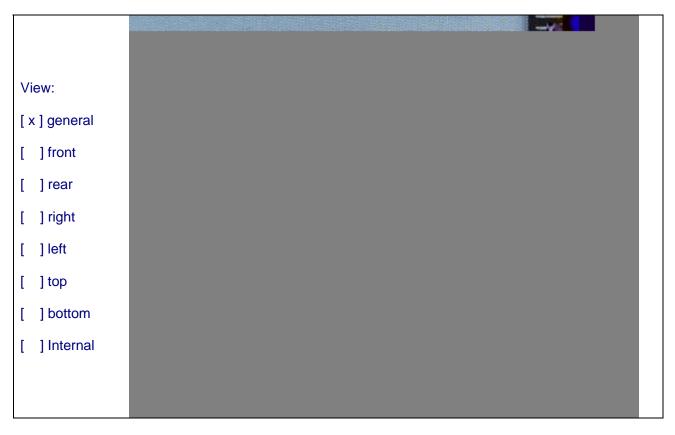


List of test equipment used:

Clause	Measurement / testing	Testing / measuring equipment / material used	Range used	Calibration date
5	Irradiance and Ra- diance measure- ments	Spectroradiometer	200 – 800 nm	Last cal. date: 2010-04-08 Next cal. date: 2011-04-08
5	Irradiance and Ra- diance measure- ments	HP 34401A multimeter		Last cal. date: 2010-09-09 Next cal. date: 2011-09-09

Photo documentation

Details of:



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