



**Photobic**

Report reference No .....

Compiled by (+ signature) .....

Approved by (+ signature) .....

Date of issue .....

Testing laboratory .....

Address .....

Testing location .....

Applicant .....

Address .....

Standard .....

Test sample(s) received.....

Test in period.....

Procedure deviation .....

Non-standard test method .....

**Note:** This test report is for the c duplicated or used in part except Corp. (Dongguan).

Type of test object .....

Trademark .....

Model/type reference .....

Manufacturer.....

Rating .....

Copy of marking plate:  
None

**Test item particulars .....**

Tested lamp .....: LED  
 Tested lamp system .....: N.A.

**Lamp classification group.....: Exempt Group**

Lamp cap .....: N.A.  
 Bulb.....: N.A.  
 Rated of the lamp .....: N.A.  
 Furthermore marking on the lamp.....: N.A.  
 Seasoning of lamps according EN standard .....: No seasoning  
 Used measurement instrument.....: See appendix B for details  
 Temperature by measurement.....: 25.0°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(ass)  
 -test object does not meet the requirement.....:F(ail)

**General remarks:**

The test results presented in this report relates 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 point is used as the decimal separator.  
 List of test equipment must be kept on file and available for review.

**Remark:**

This report consists of 15 pages and following appendixes:  
 Appendix A EUT photos  
 Appendix B Test equipment list

**General product information:**

This product is a LED and manufactured by "Hongli Zhihui Group Co.,Ltd.", Test model is HL-A-4014H421W-S1-HR3-DM. Rated input is 2.8-3.4Vdc, 60mA.

IEC 62471:2006			
Clause	Requirement + Test	Result - Remark	Verdict
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	Rerer to Table 6.1	P
Annex ZB	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 $10^4 \text{ cd}\cdot\text{m}^{-2}$	$>10^4 \text{ cd}\cdot\text{m}^{-2}$	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 $30 \text{ J}\cdot\text{m}^{-2}$ 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:	Rerer to Table 6.1	P
	$E_s \cdot t = \int_{200}^{400} E(\lambda, t) \cdot S_{UV}(\lambda) \cdot t \cdot \lambda \leq 30 \text{ J}\cdot\text{m}^{-2}$		P
	The permissible time for exposure to ultraviolet radiation incident upon the unprotected eye or skin shall be computed by:		P
	$t_{\max} = 30/E_s$	$t_{\max} = 30/(6.2 \times 10^{-5}) = 4.84 \times 10^5 \text{ s}$	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 1000s. For exposure times greater than 1000 s (approximately 16 minutes) the UV-A irradiance for the unprotected eye, $E_{UVA}$ , shall not exceed $10 \text{ W}\cdot\text{m}^{-2}$	Rerer to Table 6.1	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
	$t_{\max} = 10000/E_{UVA} \text{ s}$		N



IEC 62471:2006			
Clause	Requirement + Test	Result - Remark	Verdict
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, EIR,over the wavelength range 780 nm to 3000 nm, for times less than 1000 s, shall not exceed:		N
	$E_{IR} = \sum_{780}^{3000} E_{\lambda} \cdot \Delta\lambda \leq 18000 \cdot t^{-0,75} \quad \text{W}\cdot\text{m}^{-2}$		N
	For times greater than 1000 s the limit becomes:		P
	$E_{IR} = \sum_{780}^{3000} E_{\lambda} \cdot \Delta\lambda \leq 100 \quad \text{W}\cdot\text{m}^{-2}$	Rerer to Table 6.1	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:		P
	$E_H \cdot t = \sum_{380}^{3000} \sum_t E_{\lambda}(\lambda, t) \cdot \Delta t \cdot \Delta\lambda \leq 20000 \cdot t^{0,25} \quad \text{J}\cdot\text{m}^{-2}$	$E_H \cdot t = 9.3 \times 10^{-1} \text{W}\cdot\text{m}^{-2} \times 10\text{s} = 9.3 \text{J}\cdot\text{m}^{-2}$	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)	30 min.	P
	Seasoning of lamps shall be done as stated in the Appropriate EN lamp standard.		N
5.1.2	Test environment	25.0	P
	For specific test conditions, see the appropriate EN 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

IEC 62471:2006			
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	– the appropriate EN lamp standard, or		N
	– the manufacturer' s recommendation		P
5.1.5	Lamp system operation		N
	The power source for operation of the test lamp shall be provided in accordani2 a		N

FINAL



IEC 62471:2006			
Clause	Requirement + Test	Result - Remark	Verdict
	– an actinic ultraviolet hazard (ES) within 1000 s exposure, nor		N
	– a near ultraviolet hazard (EUVA) within 100 s, nor		N
	– a retinal blue-light hazard (LB) within 0,25 s (aversion response), nor		N
	– a retinal thermal hazard (LR) within 0,25 s (aversion response), nor		N
	– an infrared radiation hazard for the eye (EIR) within 10 s		N
	Lamps that emit infrared radiation without a strong visual stimulus and do not pose a near-infrared retinal hazard (LIR), 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 manufacturer.		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



IEC 62471:2006

Clause	Requirement + Test	Result - Remark	Verdict
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Table 4.1		Spectral weighting function for assessing ultraviolet hazards for skin and eye		-
Wavelength <sup>1</sup> , nm	UV hazard function S <sub>uv</sub> ( )	Wavelength, nm	UV hazard function S <sub>uv</sub> ( )	
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	

<sup>1</sup> 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	Result - Remark	Verdict
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<b>Table 5.4</b>					-
Summary of the ELs for the surface of the skin or cornea (irradiance based values)					
Hazard Name	Relevant equation	Wavelength Range nm	Exposure aperture rad(deg)	Limiting aperture rad(deg)	EL in terms of constant irradiance $W.m^{-2}$
Actinic UV skin & eye	$E_s = E \cdot S(\cdot)$	200 – 400	< 30000	1.4 (80)	30/t
Eye UV-A	$E_{UVA} = E \cdot \cdot$	315 – 400	1000 >1000	1.4 (80)	10000/t 10
Blue-light small source	$E_B = E \cdot B(\cdot)$	300 – 700	100 >100	< 0.011	100/t 1,0
Eye IR	$E_{IR} = E \cdot \cdot$	780 – 3000	1000 >1000	1.4 (80)	18000/t <sup>0.75</sup> 100
Skin thermal	$E_H = E \cdot \cdot$	380 – 3000	< 10	2 sr	20000/t <sup>0.75</sup>

<b>Table 5.5</b>					-
Summary of the ELs for the retina (radiance based values)					
Hazard Name	Relevant equation	Wavelength Range nm	Exposure duration Sec	Field of view radians	EL in terms of constant radiance $W.m^{-2}.sr^{-1}$
Blue light	$L_B = L \cdot B(\cdot) \cdot$	300 – 700	0.25 – 10 10-100 100-10000 10000	0.011• (t/10) 0.011 0.0011• t 0.1	10 <sup>6</sup> /t 10 <sup>6</sup> /t 10 <sup>6</sup> /t 100
Retinal thermal	$L_R = L \cdot R(\cdot) \cdot$	380 – 1400	< 0,25 0.25 – 10	0,0017 0.011• (t/10)	50000/(•t <sub>0.25</sub> ) 50000/(•t <sub>0.25</sub> )

Retinal thermal (weak visual stimulus)

$L_{IR}$



# Figure of Spect

Spectral c





