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Philips Lighting B.V.
Optical Calibrations and Measurements
Photobiological safety & Irradiance
High Tech Campus 48, 5656 AE Eindhoven

E-mail: henk.jan.van.aalderen@philips.com

(2)

Report nr : JM10534A
 Date of report : 09-Feb-2015
 Testfacility : VarOptr
 Operator : J.Marinus
 Responsible : H.J.v.Aalderen
 Meas type : PhotoBiological

Photobiological safety evaluation report according to IEC 62471

Customer : Philips Lumileds Lighting Co LLC
 Address : 370 West Trimble Road| San Jose CA 95131USA
 Organisation : LumiLeds
 Invoice Id :

Measuring Conditions

Spectral Range [nm] : 200-3000
 Date Of Meas : 26-Jan-2015
 Burning position : Horizontal
 Meas.dist. Irradiance [mm] : 200
 Meas.dist. Radiance [mm] : 200
 Ambient temperature [°C] : 25.2

Lamp Data

Lamp type : LUXEON MZ LXM7-SW65

 Lamp nr : Sample 0001
 Life time [h] : 00/01/1900
 Gear :
 Description : PHILIPS Lumileds Lighting Company BV
 Reporting distance : 200 mm (at 12205 lx)



Risk Categories Found (at reporting distance)

Hazards
 Actinic UV : Exempt
 Near UV : Exempt
 Retinal Blue Light : RiskGroup 2
 Retinal thermal : Exempt
 InfraRed Eye : Exempt
 Thermal Skin : pass
 :

Summary of evaluated Hazards : The product classified as Riskgroup 2 based on the reported Photobiological safety tests

Remarks : The measured LED LMZ7-SW65-xxxx is part of the LUXEON MZ product family and is ANSI 6500K. The present classification is thus valid (worst case) for all LUXEON LMZx-SWnn-xxxx, LMZx-RWnn-xxxx & LMZx-QWnn-xxxx with CCT equal to or lower than ANSI CCT 6500K (nn <= 65 i.e. 65 = 6500K, 57 = 5700K, etc). See TR IEC62778.

Tested By: J.Marinus

Signatures:

Technical assistant

Approved By: H.J.v.Aalderen

Head of Photobiological safety & Irradiance

- notes:
- (1) RVA declaration of accreditation available at: http://www.rva.nl/uri/?uri=AMGATE_10218_1_TICH_R11753221190060
 - (2) This report replaces previous report issued with nr 'JM10534'



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Report nr ⁽⁶⁾ : JM10534A
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 Operator : J.Marinus
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 Software Version : 1.6.1.0

Photobiological safety evaluation report according to IEC 62471

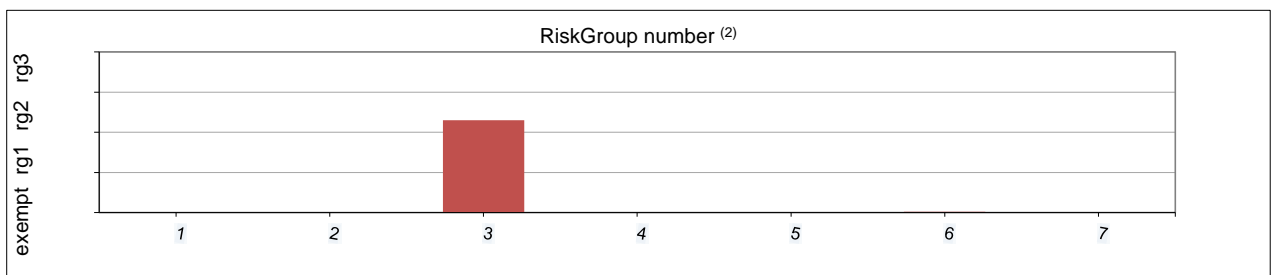
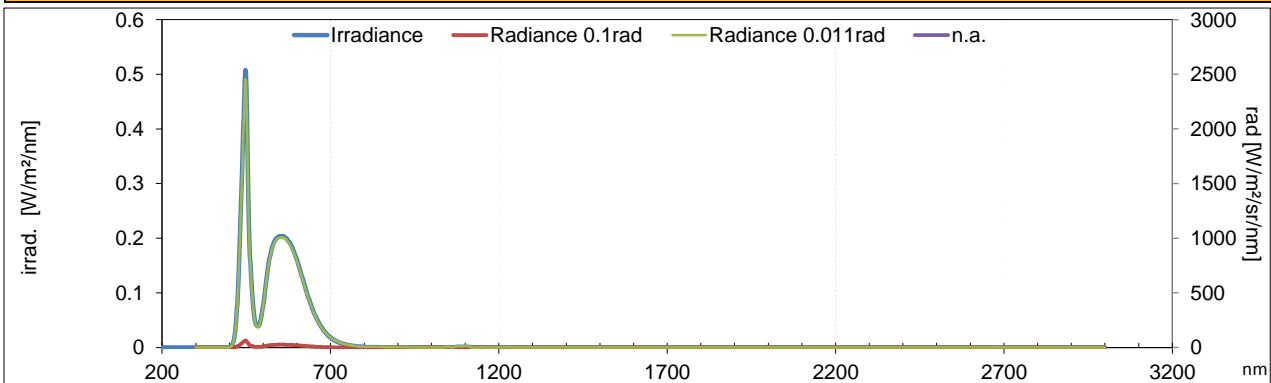
Lamp Data		Measuring Conditions	
Lamp type	: LUXEON MZ LXM7-SW65	Spectral Range [nm]	: 200-3000
Lamp nr	: Sample 0001	Date Of Meas	: 26-Jan-2015
Life time [h]	: 00/01/1900	Ambient temperature [°C]	: 25.2
Gear	:	Reference plane	: optical radiating center
Description	: PHILIPS Lumileds Lighting Company BV	Azimuth, Elevation [deg]	: 0 , 0
Source subtense α [rad]	: 0.0142	Electrical setting parameter	: Lamp Current DC
Appar.Src.Size [mm]	: 2.85	Meas.dist. Irradiance [mm]	: 200
Reporting distance	: 200 mm (at 12205 lx)	Meas.dist. Radiance [mm]	: 200

Remarks

Measured electrical quantities		Rated		Calculated photometric quantities ⁽¹⁾	
U lamp	: 11.934	n/a	V	illuminance	: 12205.2 lx (± 5.7 %)
I lamp	: 1.200	1.200	A	Chromaticity x,y	: 0.304 0.303
P lamp	: 14.300	n/a	W	Colour temperature	: 7404 K
	:			Colour rendition avg8	: 73

Hazards at viewing distance	Emission Level	Emission Limit for Rg2	Uncertainty Emission Level (k=2) [%]	Emission Level Unit	RiskGroup number ⁽²⁾	RiskGroup	RG certainty ⁽⁴⁾ [%]	Emission Hazard Value ⁽³⁾
Actinic UV	: 1.17e-7	0.03	21.0	W/m ²	0	Exempt	100	0.00
Near UV	: 0.00303	100	6.2	W/m ²	0	Exempt	100	0.00
Retinal Blue Light	: 63700	4000000	5.9	W/m ² /sr	2.3	RiskGroup 2	100	0.02
Retinal thermal	: 7.49e+5	4982500	5.9	W/m ² /sr	0	Exempt	100	0.15
InfraRed Eye	: 0.166	3200	9.9	W/m ²	0	Exempt	100	0.00
Thermal Skin	: 40.7	3556.6	5.7	W/m ²	0.02	pass	100	0.01
:	:	:	:	:	:	:	:	:
:	:	:	:	:	:	:	:	:

Found: RiskGroup 2 **verdict: passed**



- notes :
- (1) from irradiance spectrum, for information only
 - (2) logarithmic interpolated inter Riskgroup number
 - (3) ratio 'Emission Level' / 'Emission Limit'
 - (4) Probability the Riskgroup classification is at most as indicated
 - (5) Signal below detection limit, emission level is below given value with uncertainty 3%
 - (6) This report replaces previous report issued with nr 'JM10534'



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Photobiological safety IEC 62471 results summary

Clause	Requirement + Test		Result - Remark						Verdict
Table 6.1	Emission limits for risk groups of continuous wave lamps							Pass	
Risk	Action spectrum	Symbol	Units	Exempt		Emission-Measurement		Mod.risk	
				Result	Limit	Result	Limit	Result	Limit
Actinic UV	Suv(λ)	E _s	W/m ²	1.16e-7	0.001		0.003		0.03
Near UV		E _{UVA}	W/m ²	0.00303	10		33		100
Retinal Blue Light	B(λ)	L _B	W/m ² /sr	1650	100	63700	10000		4000000
Retinal thermal	R(λ)	L _R	W/m ² /sr	19400	1964946	7.49e+5	1964946		4982540
InfraRed Eye		E _{IR}	W/m ²	0.166	100		570		3200
Thermal Skin		E _H	W/m ²	40.7	35566				
* 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. *** Signal below detection limit, emission level is below given value with uncertainty 3%									



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ATTACHMENT TO TEST REPORT IEC 62471
EUROPEAN GROUP DIFFERENCES AND NATIONAL DIFFERENCES.
Differences according to EN 62471:2008

Clause	Requirement + Test		Result - Remark							Verdict
Table 6.1	Emission limits for risk groups of continuous wave lamps									Pass
Risk	Action spectrum	Symbol	Units	Emission-Measurement						RG
				Exempt		Low-risk		Mod.risk		
				Result	Limit	Result	Limit	Result	Limit	
Actinic UV	Suv(λ)	E _s	W/m ²	1.16e-7	0.001		0.003		0.03	0
Near UV		E _{UVA}	W/m ²	0.00303	10		33.333		100	0
Retinal Blue Light	B(λ)	L _B	W/m ² /sr	1650	100	63700	10000.000		4000000	2
Retinal thermal	R(λ)	L _R	W/m ² /sr	19400	1973161	7.49e+5	1973161		4962237	0
InfraRed Eye		E _{IR}	W/m ²	0.166	101.2		569.2		3200.9	0
Thermal Skin		E _H	W/m ²	40.7	35566					0
* 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.										
*** Signal below detection limit, emission level is below given value with uncertainty 3%										
**** Limit for steady fixation of very small sources with angular subtense < 11 mrad. Due to eye movements during normal visual task the limit without eye stabilization is rather 1 W/m ²										

Summary of evaluated Hazards : The product classified as Riskgroup 2 based on Photobiological safety tests according to EN 62471



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Blue light hazard assessment according to IEC/TR 62778 ⁽¹⁾

Measuring Conditions

Spectral Range	: 200-3000	[nm]
Reporting distance	: 200 mm (at 12205 lx)	[mm]
Smallest source subtense α	: 0.0142	[rad]
Field of view (for assessment)	: 0.0110	[rad]

Measurements

L_{avg} average luminance over field of view	: 60223028.2	[cd/m ²]
E Illuminance at reporting distance	: 12205.2	[lux]

Assessment results

RiskGroup (Retinal blue light)	: Ethr for Rg2	
E_{thr} threshold illuminance where source is at riskgroup 2 limit	: 930.03	[lux]
d_{min} threshold distance where source is at riskgroup 2 limit ($E = E_{thr}$)	: 0.69	[m]
L_B blue light weighted radiance	: 63679.0	[W/m ² /sr]
E_B blue light weighted Irradiance	: Not applicable	[W/m ²]
$K_{B,v}$ blue light hazard efficacy of luminous radiation	: 1.0752	[mW/lm]
η_B blue light hazard efficiency of radiation	: 0.3235	

Remarks

Field Of View underfills the lightsource. True Radiance measurement assumed, source having uniform radiance distribution

note: (1) Results shown on this page are not within RvA accreditation scope

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Assumptions, anomalies and warnings

Possible product label text

CAUTION

Possibly hazardous optical radiation emitted from this product Do not stare at operating lamp. May be harmful to the eyes.

Assumptions

Spatially uniform irradiance distribution (not a beam)

Continuous wave Lamp (not pulsed)

High Luminance of source (> 10000 cd/m²)

Anomalies (may cause unreliable results). Results are only for information if items are listed

Remarks

RetinalBlue not tested for RG3, but assuming RG2 classification as LB<<4000000



Terms and Conditions

This evaluation report has been executed in accordance with the measurements standards as provided in the international standard CEI IEC 62471:2006 and Technical report IEC/TR 62471-2.

Deviation from the methods that are described in the standard CEI IEC 62471 will be expressed clearly in this report

On request of the customer, the reported parameters that are not defined in the standard CEI IEC 62471, will be explained by the test laboratory

This evaluation report is applicable only to the product which is unambiguously identified in the report

If the product has no identification, the test laboratory will compute and report an unique identification for the specimen tested.

The customer is at all times responsible for the (technical) information, such as optical properties, provided by him

Reproduction of the complete report is allowed. Parts of the report may only be reproduced with written approval of the test laboratory.

The test laboratory shall not hand over measurement data and evaluation report to other parties than the customer unless there is written approval of the customer

This evaluation report is issued under the restriction that the test laboratory will not be held liable for any (direct and/or consequential) damage resulting directly or indirectly from the test activities

The Raad voor Accreditatie (RvA) is a member of the European Co-operation for Accreditation (EA) and is one of the signatories to the EA multilateral Agreement and to the ILAC Mutual Recognition Arrangements (MRA) for the mutual recognition of test reports



The Dutch Accreditation Council RvA, by law appointed as the national accreditation body for The Netherlands, hereby declares that accreditation has been granted to:

**Philips Lighting B.V.
Optical Calibrations and Measurements
Eindhoven**

The organisation has demonstrated to be able to generate technical valid results in a competent way and work according to a management system.

This accreditation is based on an assessment against the requirements as laid down in ISO/IEC 17025:2005.

The accreditation covers the activities as specified in the authorized annex bearing the registration number.

The accreditation is valid provided that the organisation continues to meet the requirements.

The accreditation with registration number:

L 533

is granted on 29 August 2012

This declaration is valid until
1 September 2016

The accreditation has been granted for the first time on
29 August 2012

The Chief Executive

Ir. J.C. van der Poel

Annex to ISO/IEC 17025 declaration of accreditation
for registration number: L 533



of **Philips Lighting B.V.**
Optical Calibrations and Measurements
Eindhoven

This annex is valid from: **29-08-2012** to **01-09-2016**

Replaces annex dated: **n.a.**

Premises: **Eindhoven**

No.	Material or product	Type of activity	Internal reference number
1	Lamps and lamp systems	Spectral, optical measurements in the wavelength range from 200 nm through 3000 nm for the evaluation of photo biological safety.	WI04 in accordance with CEI IEC 62471 and IEC/TR 62471-2 ¹

IEC/TR 62471-2¹: with the exception of pulsed lamps and lamps systems (par. 6.2)

This annex has been approved by:

Ir. J.C. van der Poel
Chief Executive