(1) **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

Report nr	: JM10518
Date of report	: 24-Oct-2014
Testfacility	: VarOptr
Operator	: J.Marinus
Responsible	: H.J.v.Aalderen
Meas type	: PhotoBiological

Photobiological safety evaluation report according to IEC 62471

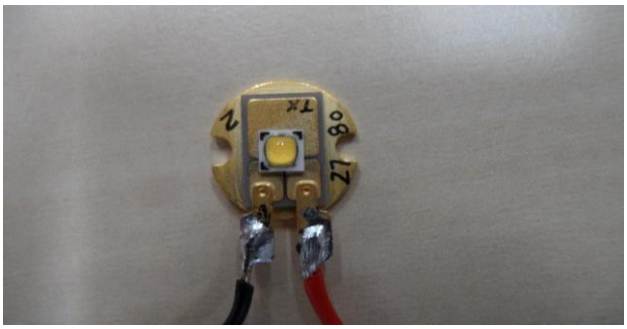
Customer	: Philips Lumileds Lighting Co LLC
Address	: 370 West Trimble Road| San Jose CA 95131USA
Organisation	: LumiLeds
Invoice Id	:

Measuring Conditions

Spectral Range [nm]	: 200-3000
Date Of Meas	: 21-Oct-2014
Burning position	: Horizontal
Meas.dist. Irradiance [mm]	: 200
Meas.dist. Radiance [mm]	: 200
Ambient temperature [°C]	: 25.2

Lamp Data

Lamp type	: LUXEON TX L1T2-2780
Lamp nr	: Sample 0002
Life time [h]	: 0
Gear	:
Description	: PHILIPS Lumileds Lighting Company BV
Reporting distance	: 200 mm (at 2426 lx)



Risk Categories Found (at reporting distance)

Hazards	
Actinic UV	: Exempt
Near UV	: Exempt
Retinal Blue SmallSrc	: Exempt
Retinal thermal	: Exempt
InfraRed Eye	: Exempt
Thermal Skin	: pass
	:

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

Remarks : L1T2-2780– x x y y s 0 0 0 0 z z z 0 is part of the product family LUXEON TX. The sample measured, L1T2-2780, is ANSI bin 2700K. The present classification is thus valid for all LUXEON TX from CCT bins equal or lower than 2700K as e.g. L1T2-2780– x x y y s 0 0 0 0 z z z 0 (see TR IEC62778).

Tested By: J.Marinus	**Approved By:** H.J.v.Aalderen
Signatures:	
Technical assistant	Head of Photobiological safety & Irradiance

notes: (1) RVA declaration of accreditation available at:
http://www.rva.nl/uri/?uri=AMGATE_10218_1_TICH_R11753221190060

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Operator	: J.Marinus
Responsible	: H.J.v.Aalderen
Software Version	: 1.6.1.0

Photobiological safety evaluation report according to IEC 62471

Lamp Data

Lamp type	: LUXEON TX L1T2-2780
Lamp nr	: Sample 0002
Life time [h]	: 0
Gear	:
Description	: PHILIPS Lumileds Lighting Company BV
Source subtense α [rad]	: 0.0100
Appar.Src.Size [mm]	: 2.00
Reporting distance	: 200 mm (at 2426 lx)

Measuring Conditions

Spectral Range [nm]	: 200-3000
Date Of Meas	: 21-Oct-2014
Ambient temperature [°C]	: 25.2
Reference plane	: optical radiating center
Azimuth, Elevation [deg]	: 0 , 0
Electrical setting parameter	: Lamp Current DC
Meas.dist. Irradiance [mm]	: 200
Meas.dist. Radiance [mm]	: 200

Remarks

Measured electrical quantities

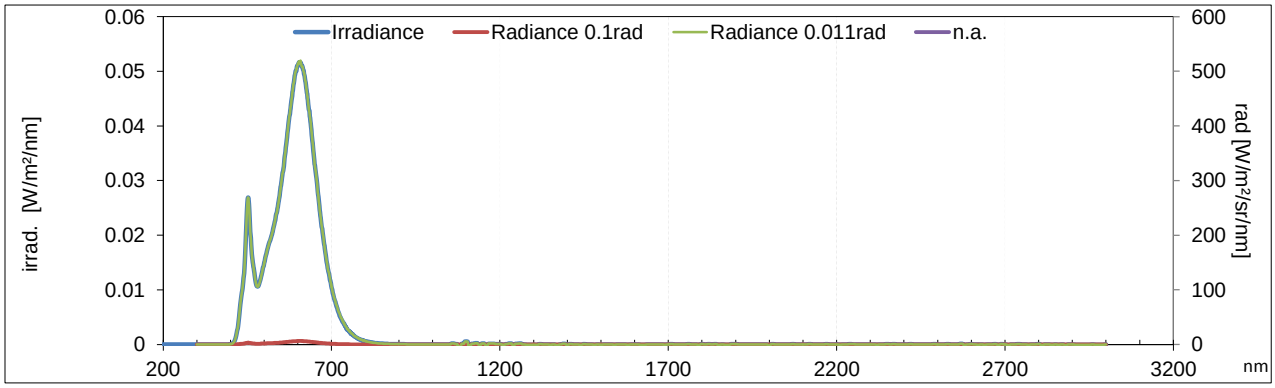
		Rated	
U lamp	: 3.123	n/a	V
I lamp	: 1.200	1.200	A
P lamp	: 3.747	n/a	W
	:		

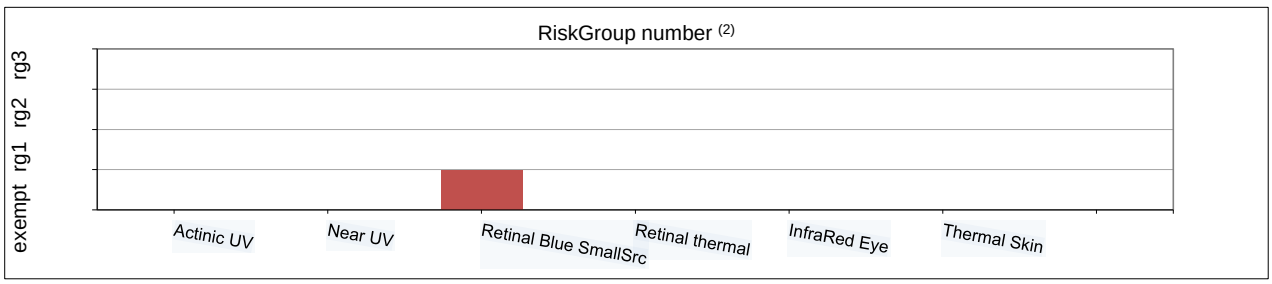
Calculated photometric quantities (1)

illuminance	: 2426.2	lx	(± 5.8 %)
Chromaticity x,y	: 0.440	0.389	
Colour temperature	: 2819	K	
Colour rendition avg8	: 82		

Hazards at viewing distance		Emission Level	Emission Limit for Exempt	Uncertainty Emission Level (k=2) [%]	Emission Level Unit	RiskGroup number (2)	RiskGroup	RG certainty (4) [%]	Emission Hazard Value (3)
Actinic UV	:	1.2e-5	0.001	8.9	W/m²	0	Exempt	100	0.01
Near UV	:	1.57e-4	10	6.5	W/m²	0	Exempt	100	0.00
Retinal Blue SmallSrc	:	0.847	1	6.0	W/m²	0.97	Exempt	100	0.85
Retinal thermal	:	1.48e+5	2800000	5.8	W/m²/sr	0	Exempt	100	0.05
InfraRed Eye	:	< 0.085 (5)	100		W/m²	0	Exempt	100	
Thermal Skin	:	7.92	3556.6	6.3	W/m²	0	pass	100	0.00
	:								
	:								

found:Exempt **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 clasification is at most as indicated
(5) Signal below detection limit, emission level is below given value with uncertainty 3%

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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	Emission-Measurement					
				Exempt		Low-risk		Mod.risk	
				Result	Limit	Result	Limit	Result	Limit
Actinic UV	Suv(λ)	E_s	W/m²	1.2e-5	0.001		0.003		0.03
Near UV		E_{UVA}	W/m²	1.57e-4	10		33		100
Retinal Blue small source	B(λ)	E_B	W/m²	0.847	1.0*		1.0		400
Retinal thermal	R(λ)	L_R	W/m²/sr	1790	2800023	1.48e+5	2800023		7100059
InfraRed Eye***		E_{IR}	W/m²	< 0.085 ***	100		570		3200
Thermal Skin		E_H	W/m²	7.92	35566				

* Small source defined as one with α < 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/m²	1.2e-5	0.001		0.003		0.03	0
Near UV		E_{UVA}	W/m²	1.57e-4	10		33.333		100	0
Retinal Blue small source*	B(λ)	E_B	W/m²		0.01****	0.847	1.000		400	1
Retinal thermal	R(λ)	L_R	W/m²/sr	1790	2811730	1.48e+5	2811730		7071127	0
InfraRed Eye		E_{IR}	W/m²	< 0.085 ***	101.2		569.2		3200.9	0
Thermal Skin		E_H	W/m²	7.92	35566					0

* Small source defined as one with α < 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/m²

Summary of evaluated Hazards : The product classified as Riskgroup 1 based on Photobiological safety tests according to EN 62471

Assumptions, anomalies and warnings

Possible product label text

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

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

DUTCH ACCREDITATION COUNCIL RvA

PO Box 2768 NL 3500 GT Utrecht

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**

RAAD VOOR ACCREDITATIE

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 62471-2[1]: 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