

Customer:

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Projekt No: 17000298-1

Inspection order: Evaluation of Photobiological Safety of Lamps and Lampsystems according to DIN EN 62471:03-2009 and IEC TR 62778 Technical Report for the assessment of blue light hazard to light sources and luminaires

Measurement procedure: Measurement with doublemonochromator 200 - 3000 nm

Test sample description:

Type of luminaire: Bicolour, variable beam LED Fresnel light

Product name: Practilite 602 / Practilite 604

Control gear: AC Adapter Model: 190047400K
Output: 19V DC / 4,74A

Test configuration: Light Output: 100%
Colour Temp.: 6000K
Beam Angle: worst case condition

Measurement configuration

Ambient temperature: 25°C ± 1°C

Operating voltage: 230 V (constant < 0.5%)

Measurement distance: 200 mm

Reference point: Front of Fresnel Lens

Electrical operating conditions:

voltage: 230 V (const. < 0.5%)
current: 0,425 A
system power: 49,89 W
power factor: 0,510

1. Determination of Source location and subtense

The source emission profile was measured using the Bentham PSL profiler camera system, the resulting source size is calculated from 50% emission points.



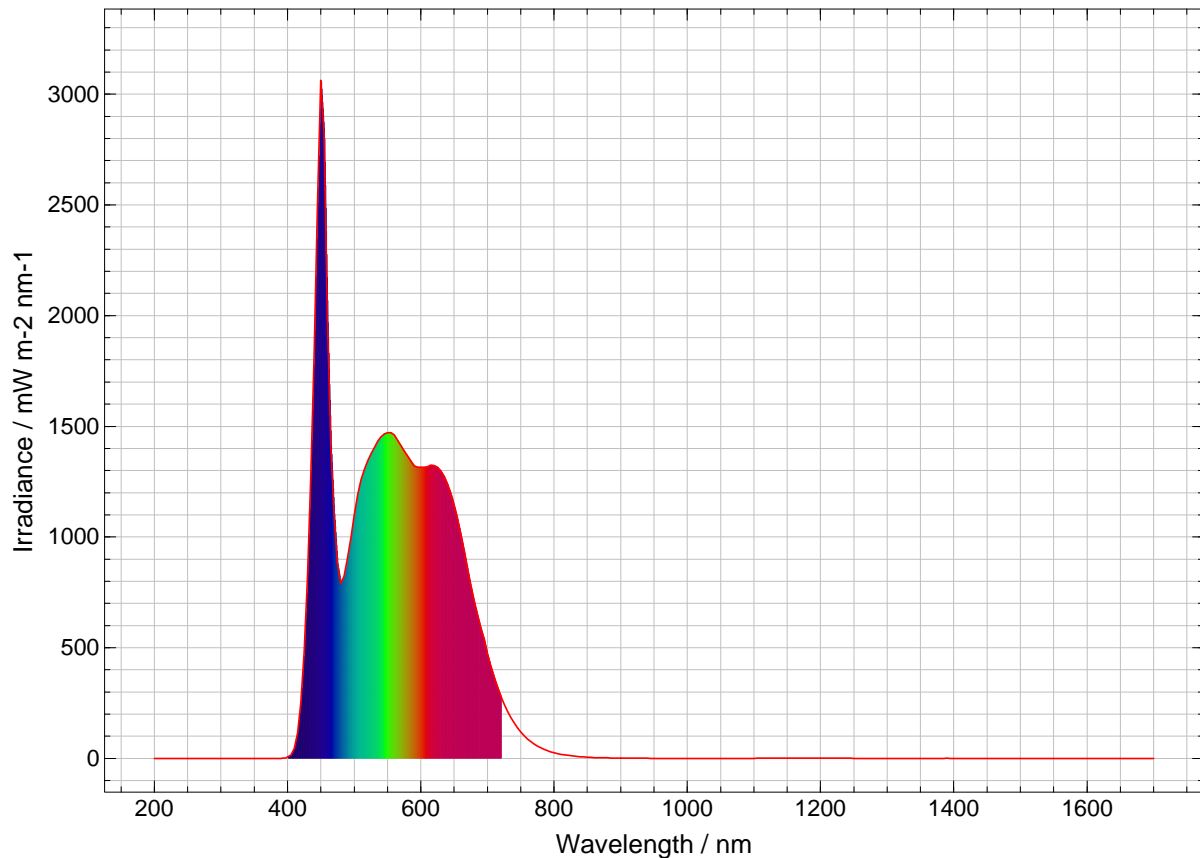
apparent source size:
50%-emission points
70,56 x 70,38 mm

Average angular subtense:
100 mrad

2. Spectral Check Measurement

Spectral Range: 200 - 1700 nm

Measurement Device: IDR 300 PSL with spectral check input optic



3. Resulting EN 62471 Classification

Irradiance

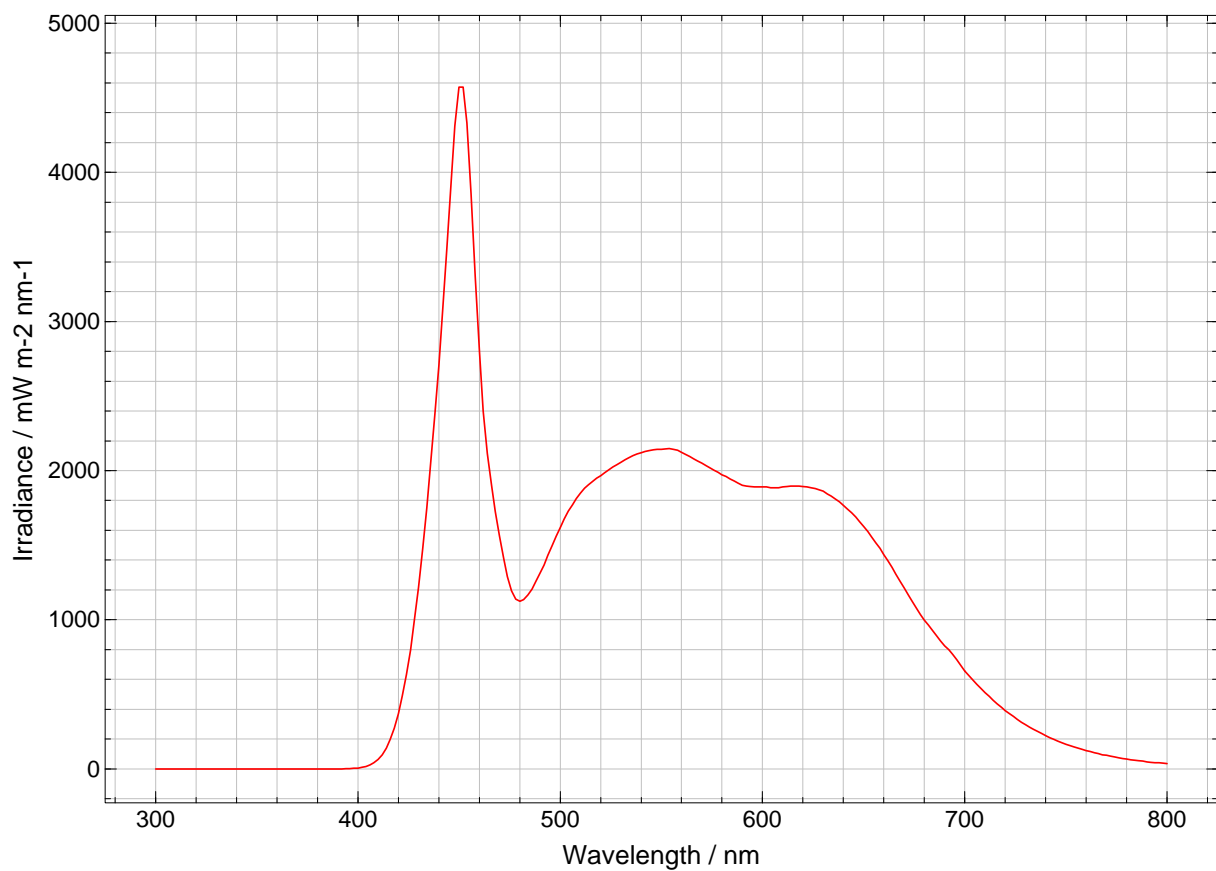
Hazard	Wavelength Range
Near UV	315 - 400 nm

Radiance

Hazard	Wavelength Range
Blue Light	300 - 700 nm
Retinal Thermal	380 - 1400 nm

4. Measurement Irradiance

Spectral Range: 300 - 800 nm
 Measurement Distance: 200 mm
 Measurement Device: IDR 300 PSL with D7 Cosine Diffuser Input Optic

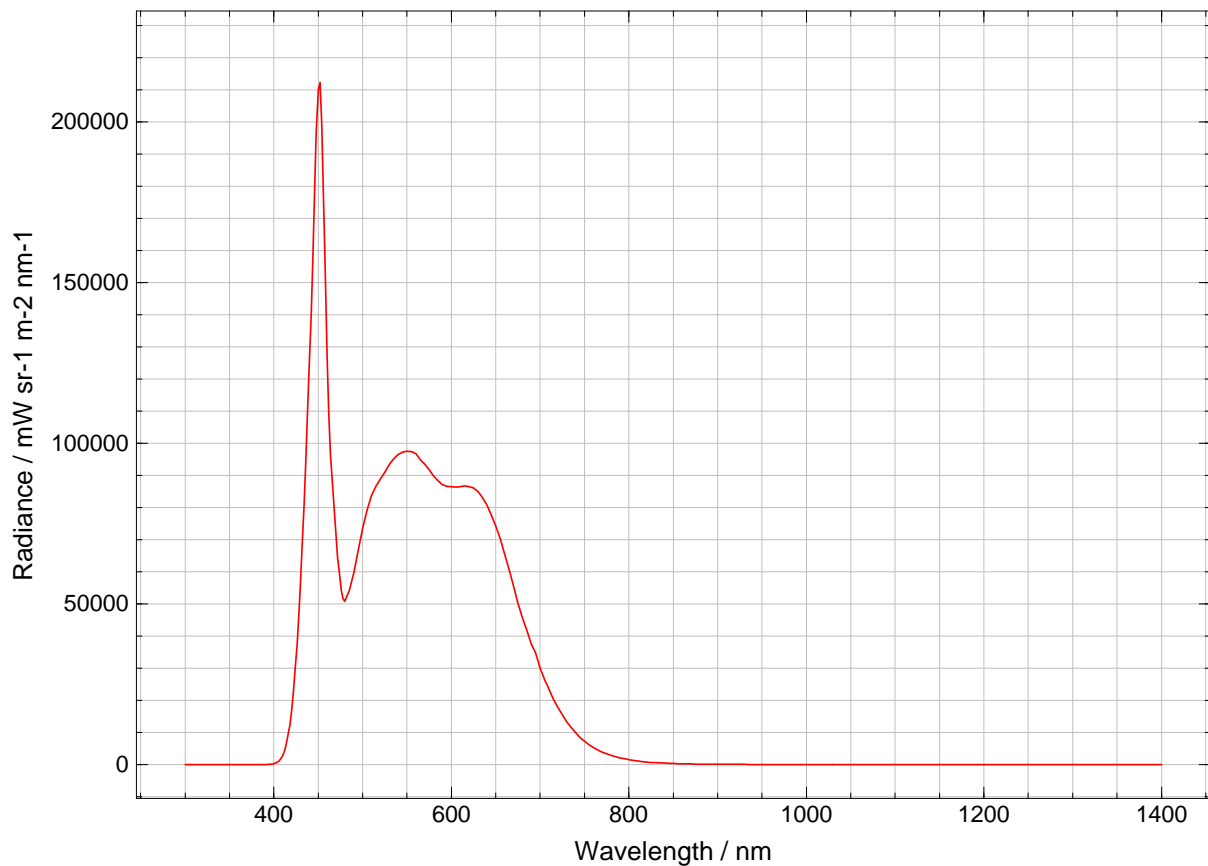


5. Evaluation Irradiance

Hazard	Measured value	Resulting risk group	Risk Group limit value	Time to Exposure Limit [s]
Actinic UV [mW m^{-2}]	n/a	n/a	n/a	n/a
Near UV [W m^{-2}]	$2,23 \times 10^{-2}$	Exempt	10	> 30000
Blue Light (small source) [W m^{-2}]	n/a	n/a	n/a	n/a
IR Radiation Eye [W m^{-2}]	n/a	n/a	n/a	n/a
Thermal Skin [W m^{-2}]	n/a	n/a	n/a	n/a

6. Measurement Radiance

Spectral Range: 300 - 1400 nm
 Measurement Distance: 200 mm
 FOV (field of view): 11 mrad
 Measurement Device: IDR 300 PSL with TEL 309 Telescope



7. Evaluation Radiance

Luminance in 11mrad: 6524942,92 cd/m²

Hazard	measured value [W sr ⁻¹ m ⁻²]	Risk group limit value [W sr ⁻¹ m ⁻²]	risk group tested	Pass / Fail
Blue Light hazard 100 mrad FOV	3,33 x 10 ³	100	Exempt	Fail
Blue Light hazard 11 mrad FOV	6,01 x 10 ³	1 x 10 ⁴	Group 1	Pass
Blue Light hazard 1.7 mrad FOV	n/a	n/a	Group 2	n/a
Retinal thermal 11 mrad FOV	7,50 x 10 ⁴	2,8 x 10 ⁵	Exempt	Pass
Retinal thermal 1.7 mrad FOV	n/a	n/a	Group 2	n/a
Retinal thermal 35 mrad FOV (weak visual)	n/a	n/a	Exempt	n/a
Retinal thermal 11 mrad FOV (weak visual)	n/a	n/a	Group 1	n/a


8. Classification according to DIN EN 62471

The tested LED luminaire corresponds, according to DIN EN 62471:2009-03, in the region „Blue Light“ to the Risk Group „1“. For this product, labeling is not required.

Hazard	Risk Group
Near UV	Exempt
Blue Light	Group 1
Retinal thermal	Exempt

The company ILUmetriX insures that all statements are made by the best of knowledge, according to European standards.

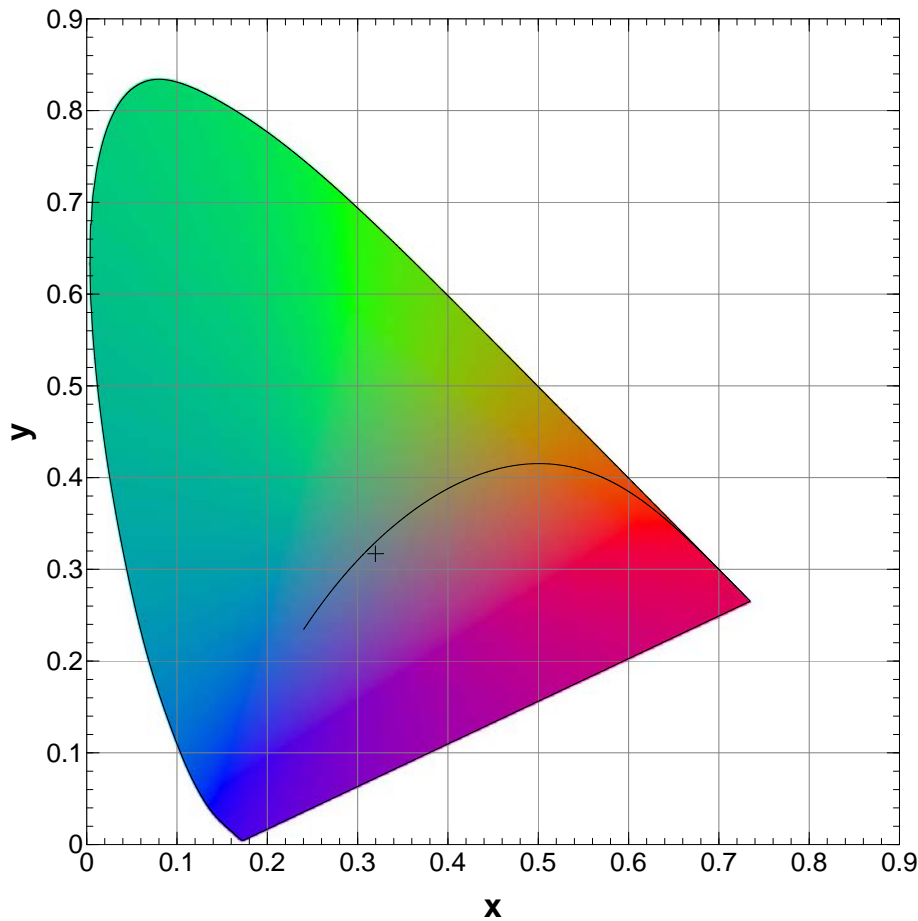
Meschede, 28.11.2017



F. Siepe (management board)

annex: page 6 test sample
page 7 colorimetry
page 8 test equipment

colorimetric data based on Irradiance measurement:



x: 0.3197
y: 0.3171
z: 0.3633
X: 105812.3577
Y: 104957.1570
Z: 120246.3858
u: 0.2074
v: 0.3086
u': 0.2074
v': 0.4628
Dominant Wavelength: 514 nm
Purity: 5.8 %
Colour Temperature: 6194 K
Ra: 93.0 %
R1: 97.0 %
R2: 94.0 %
R3: 86.8 %
R4: 92.9 %
R5: 96.8 %
R6: 88.3 %
R7: 92.8 %
R8: 95.5 %
R9: 96.2 %
R10: 83.6 %
R11: 92.7 %
R12: 73.8 %
R13: 96.2 %
R14: 92.1 %

Test equipment spectrometry - ILUmetriX GmbH

IDR 300-PSL Spectroradiometer System, Bentham Instruments Ltd. UK

Monochromator configuration: Symmetric, Single Czerny-Turner
 Monochromator focal length: Single 300mm, double 600mm
 Bandwidth: Software controlled motorised slit
 Number of gratings: 1-3 mounted On turret

Resolution:		Single	Double
	2400g/mm	-	0,075 nm
	1200g/mm	0,3 nm	0,15 nm
	400g/mm	0,9 nm	0,45 nm
Dispersion:	2400g/mm	-	0,68 nm/mm
	1200g/mm	2,7 nm/mm	1,35 nm/mm
	400g/mm	8,1 nm/mm	4,05 nm/mm
Wavelength accuracy:	2400g/mm	-	±0,1 nm
	1200g/mm	±0,2 nm	±0,2 nm
	400g/mm	±0,6 nm	±0,6 Nm

Detection Electronics

Current amplifier: Six decade trans-impedance amplifier
 Gain ranges: $10^{10} - 10^5$ V/A
 Analogue digital converter: 100ms Integration

Input Optics

Light Transport: Flexible quartz fibre bundle, 200 - 1400 nm
 Diffuser cosine response: f^2 error <1% 200 - 1100 nm
 Sphere cosine response: f^2 error <5% 200 - 3000 nm
 Telescope, fields of view: 1.7 + 11 mrad
 Tel- measurement range: 200mm to 50m

PSL Profiler

Optics: UV grade silica, CMOS 2048 x 1536 camera
 Working distance: 100mm to 50m
 Spectral range: 350 - 1100 nm

Calibration Standards

Irradiance: CL6 Irradiance Standard / Serial No: 13449/1
 Certificate No: E2015200701

Radiance: SRS12 Radiance Standard / Serial No: 13559/1
 Certificate No: E2015200702

Traceability: NPL, UK