

Goniophotometry Report

1_PHOT_REFLEKTER-L-4750lmChip-4000K-58Deg_2303
www.factorylux.com



Tested Light Source - 1_PHOT_REFLEKTER-L-4750lmChip-4000K-58Deg_2303

Laboratory and Equipment

Laboratory Owner and Location
Goniospectrometer System and Type
Spectrometer Manufacturer and Model

Factorylux, Greenhill Mills, Hebden Bridge, HX7 5QF, UK
BaseSpion – Type C, horizontal
Ibsen Photonics, Denmark – Freedom VIS (Custom Viso)

Measurement Conditions

Number of C-planes and Resolution
 γ (gamma)-Resolution
Test Distance
Input Power, Power and Displ. Factors
Input RMS Voltage and Current
Frequency of Input Power

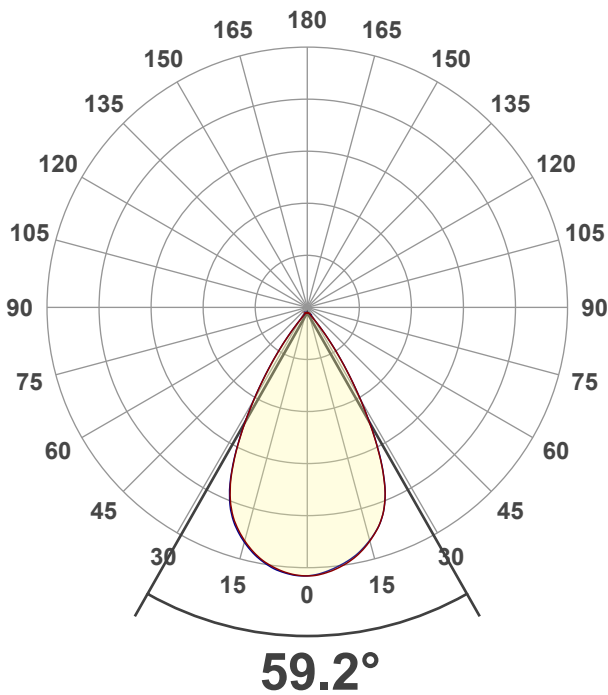
32 planes – 11.25°
2.5°
3.00 m
41.3 W – PF 0.97 – DPF 0.97
239 V – 0.179 A
50 Hz

Main Light Measurement Results

Output
Efficiency
Peak Intensity and Beam Angle
Color Rendering Index

4045 lm
98 lm/W
4565 cd – 59.2°
CRI 92.6

Light Intensity Distribution



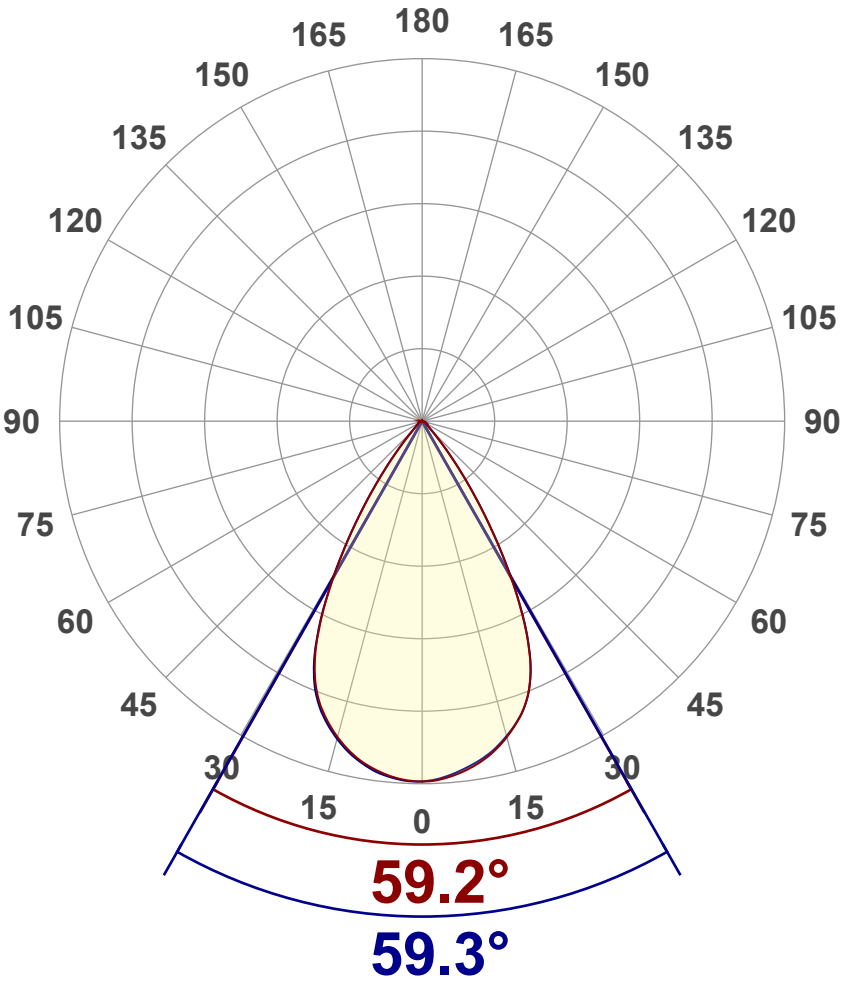
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Luminous Intensity diagram

Unit: 0-100% of peak intensity



Main Values

Output (total Lumen)	4045 lm
Peak Intensity	4565 cd
Beam Angle (50%)	59.2°
Beam Angle (90%)	59.3°
Beam Angle (10%)	59.2°

Cut-off Angle

Average 2,5%	97.3°
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Field Angle

Average 10%	80.9°
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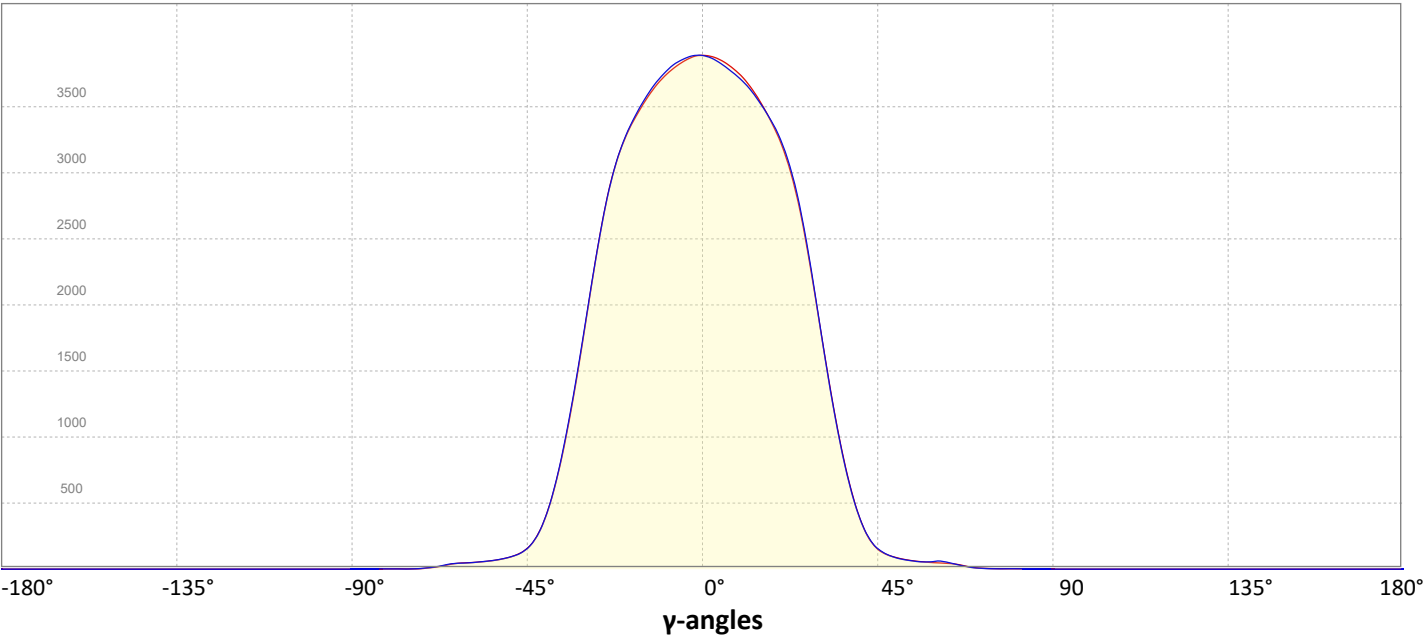
Intensity Ratio

In 120° cone	98.9%
In 90° cone	95.9%

C000-C180

C090-C270

Linear distribution diagram - Intensity (candela) vs γ-angle

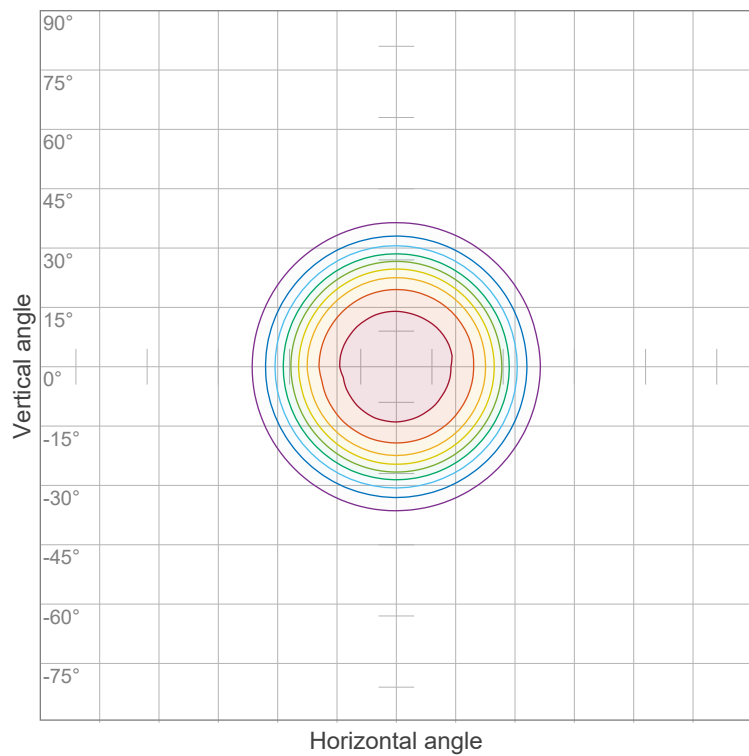


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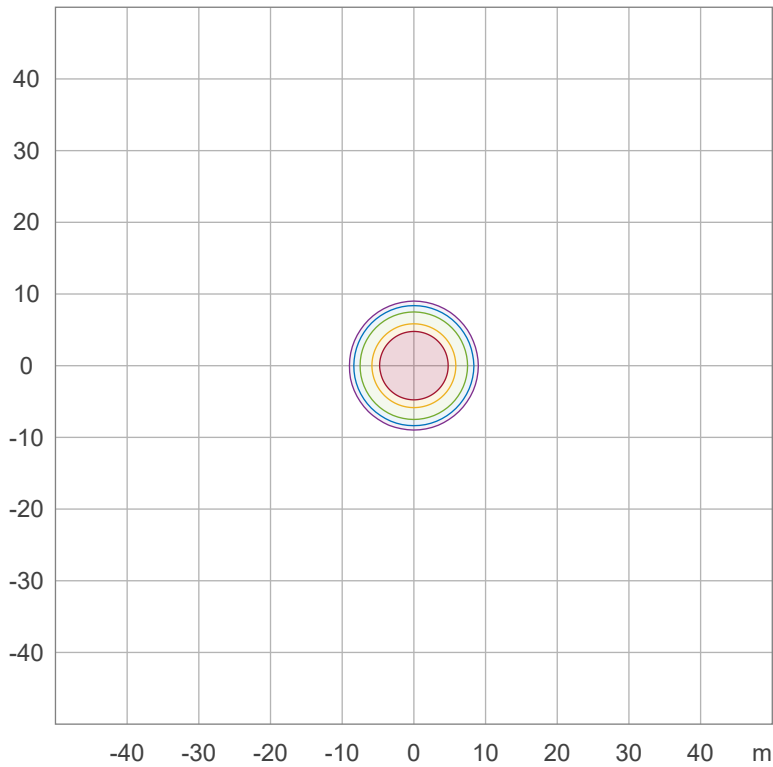
Iso-intensity Diagram (Iso-candela)



90 %	4107.6 cd
80 %	3651.2 cd
70 %	3194.8 cd
60 %	2738.4 cd
50 %	2282.0 cd
40 %	1825.6 cd
30 %	1369.2 cd
20 %	912.8 cd
10 %	456.4 cd

Peak intensity: 4564.0 cd
Number of c-planes: 32

Iso-illuminance Diagram (Iso-lux)



50.0 %	22.8 lx
30.0 %	13.7 lx
10.0 %	4.6 lx
5.0 %	2.3 lx
3.0 %	1.4 lx

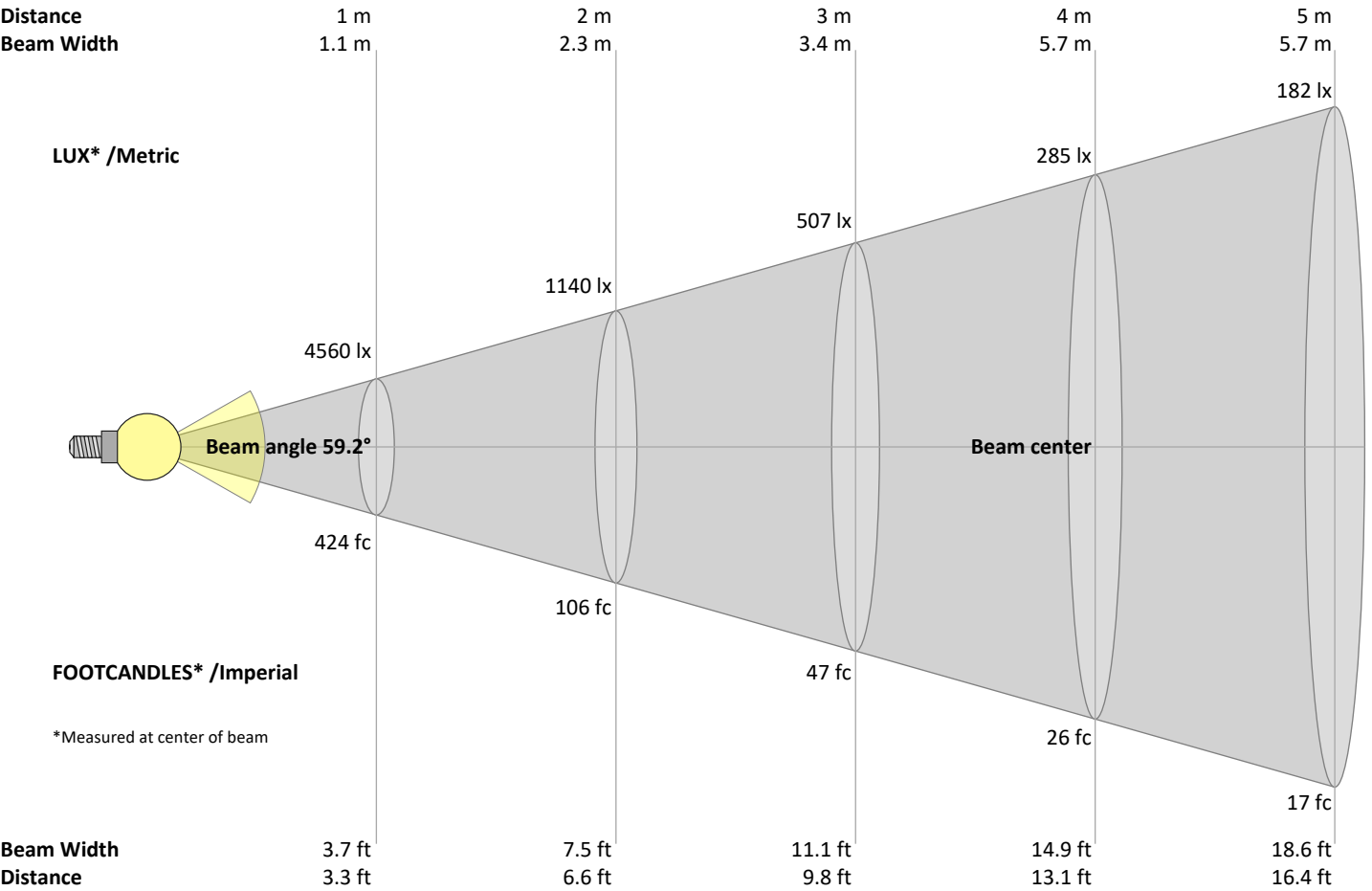
Peak illuminance: 45.6 lx
Mounting height: 10.0 m
Number of c-planes: 32

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Beam Details



Beam intensities from 1 – 20 m

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	m
3.3	6.6	9.8	13.1	16.4	19.7	23	26.2	29.5	32.8	36.1	39.4	42.7	45.9	49.2	52.5	55.8	59.1	62.3	65.6	ft
4560	1140	507	285	182	127	93	71	56	46	38	32	27	23	20	18	16	14	13	11	lux
423.6	105.9	47.1	26.5	16.9	11.8	8.6	6.6	5.2	4.2	3.5	2.9	2.5	2.2	1.9	1.7	1.5	1.3	1.2	1.1	fc

Intensities in 0° c-plane

0°	2°	4°	6°	8°	10°	12°	14°	16°	18°	20°	22°	24°	26°	28°	30°	32°	34°	36°	38°	γ
4560	4553	4524	4482	4429	4365	4288	4195	4083	3959	3809	3617	3368	3027	2622	2190	1764	1367	1013	729	cd
100%	100%	99%	98%	97%	96%	94%	92%	90%	87%	84%	79%	74%	66%	57%	48%	39%	30%	22%	16%	of 0°val

Intensities in 90° c-plane

0°	2°	4°	6°	8°	10°	12°	14°	16°	18°	20°	22°	24°	26°	28°	30°	32°	34°	36°	38°	γ
4560	4541	4504	4456	4402	4342	4269	4176	4072	3954	3810	3623	3368	3030	2632	2201	1766	1363	1018	730	cd
100%	100%	99%	98%	97%	95%	94%	92%	89%	87%	84%	79%	74%	66%	58%	48%	39%	30%	22%	16%	of 0°val

Intensities in 180° c-plane

0°	2°	4°	6°	8°	10°	12°	14°	16°	18°	20°	22°	24°	26°	28°	30°	32°	34°	36°	38°	γ
4560	4552	4529	4492	4441	4377	4293	4193	4077	3946	3792	3589	3329	3004	2617	2194	1771	1378	1030	734	cd
100%	100%	99%	99%	97%	96%	94%	92%	89%	87%	83%	79%	73%	66%	57%	48%	39%	30%	23%	16%	of 0°val

Intensities in 270° c-plane

0°	2°	4°	6°	8°	10°	12°	14°	16°	18°	20°	22°	24°	26°	28°	30°	32°	34°	36°	38°	γ
4560	4559	4540	4507	4461	4396	4315	4216	4102	3972	3820	3625	3358	3020	2627	2203	1774	1383	1034	738	cd
100%	100%	100%	99%	98%	96%	95%	92%	90%	87%	84%	79%	74%	66%	58%	48%	39%	30%	23%	16%	of 0°val

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LAMPS (number of lamps)

[illegible]

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Outdoor Light Planning

Lumen per Zone

Zone (γ)	Lumen	% Total
0-10°	426 lm	10.5%
10-20°	1161 lm	28.7%
20-30°	1424 lm	35.2%
30-40°	757 lm	18.7%
40-50°	167 lm	4.1%
50-60°	65 lm	1.6%
60-70°	38 lm	0.9%
70-80°	5 lm	0.1%
80-90°	3 lm	0.1%
90-100°	0 lm	0.0%
100-110°	0 lm	0.0%
110-120°	0 lm	0.0%
120-130°	0 lm	0.0%
130-140°	0 lm	0.0%
140-150°	0 lm	0.0%
150-160°	0 lm	0.0%
160-170°	0 lm	0.0%
170-180°	0 lm	0.0%
Total	4045 lm	100.0%

Intensity peaks

Max intensity	4565 cd
Intensity, 90°	0 cd
Intensity, 0°	4560 cd

Zonal Lumen summary

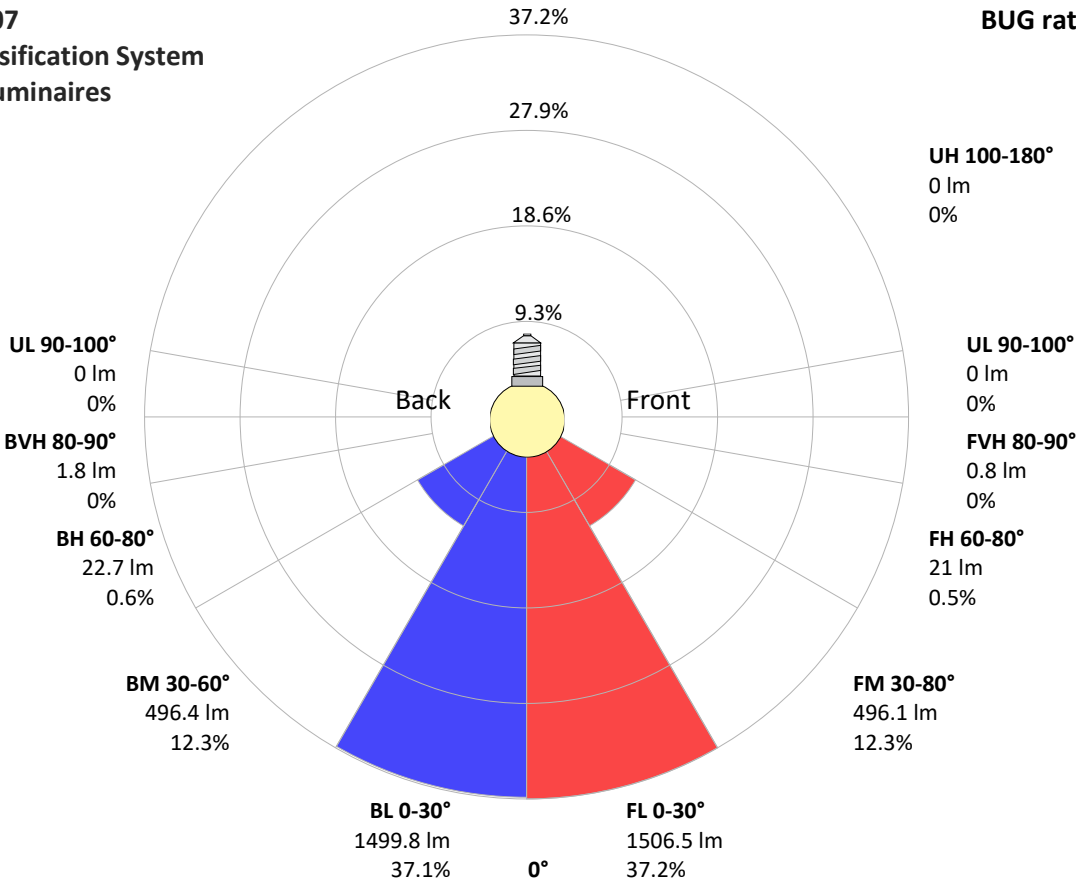
Zone (γ)	Lumen	% Total
0-30°	3011 lm	74.4%
0-40°	3767 lm	93.1%
0-60°	3999 lm	98.9%
60-90°	46 lm	1.1%
70-100°	8 lm	0.2%
90-120°	0 lm	0.0%
0-90°	4045 lm	100.0%
90-180°	0 lm	0.0%
0-180°	4045 lm	100.0%

BUG rating

	Lumen	% Total
Forward light		
Low(0-30°)	1507 lm	37.2%
Medium(30-60°)	496 lm	12.3%
High(60-80°)	21 lm	0.5%
Very high(80-90°)	1 lm	0.0%
Back light		
Low(0-30°)	1500 lm	37.1%
Medium(30-60°)	496 lm	12.3%
High(60-80°)	23 lm	0.6%
Very high(80-90°)	2 lm	0.0%
Uplight		
Low(90-100°)	0 lm	0.0%
High(100-180°)	0 lm	0.0%

IESNA TM-15-07 Luminaire Classification System For Outdoor Luminaires

BUG rating B3 U1 G0



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Power Details

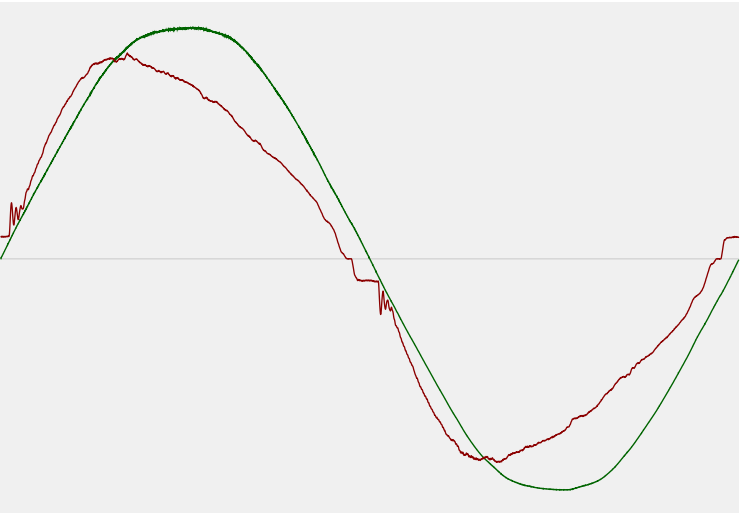
Input Power

Power feed to light source	41.3 W
Frequency of input power	50 Hz
RMS Input voltage feed, V_{RMS}	239 V
RMS Input current feed, I_{RMS}	0.179 A
Volt-Ampere or apparent power = $V_{RMS} \cdot I_{RMS}$	42.69 VA
Displacement factor of AC power feed	0.97
Power factor of AC current feed	0.97
Total harmonic distortion of the current	11.15%
Total harmonic distortion of the voltage	1.49%

Efficiency

Radiated power efficiency	35.5%
<div><div></div></div>	
Lumen efficiency	98 lm/W
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Input Power Curve



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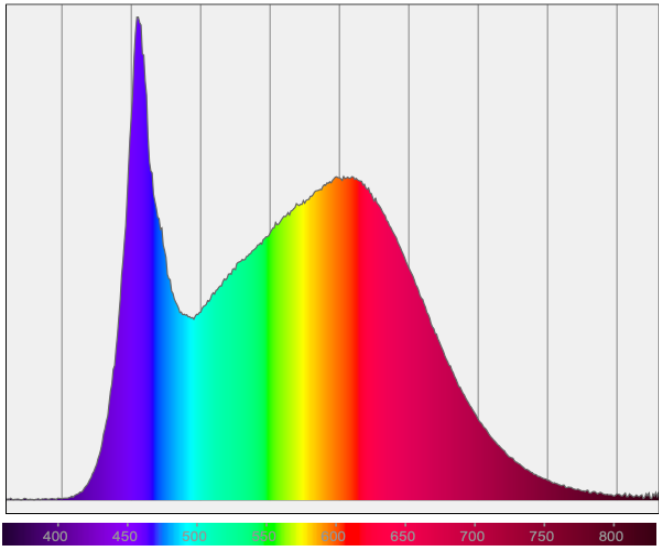
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Color Measurements

Correlated Color Temperature	CCT = 4000 K
Color Rendering TM30-18	R _f 88.9 – R _g 98.5
Color Shift, CIE duv	Duv ±0.0003

Spectral distribution



Color details

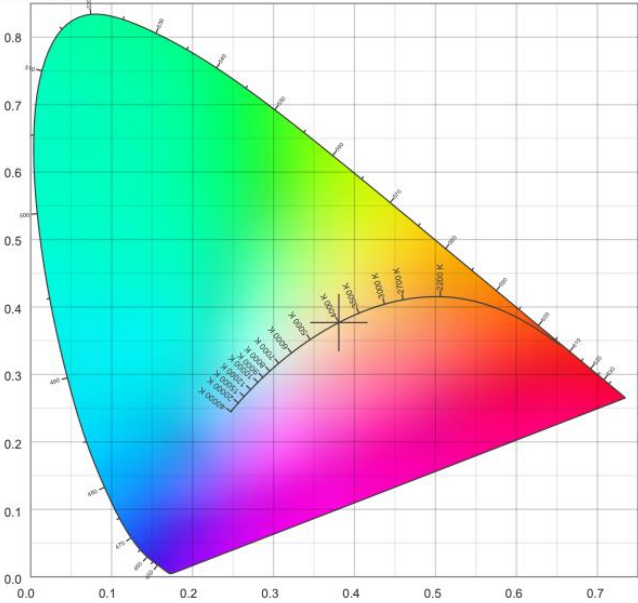
Correlated Color Temperature	CCT = 4000 K	Color coordinates CIE 1931	(x;y) = (0.381;0.377)
Color Rendering Index	CRI 92.6	Color coordinate CIEs 1960	(u;v) = (0.225;0.334)
Color Rendering Index, R9 (red component)	R9 = 72.2	Color deviation from BBL	Duv = ±0.0003
Color Rendering TM30-18	R _f 88.9 – R _g 98.5	Color coordinate CIEs 1976 (CIELUV)	(u';v') = (0.225;0.225)
Color Quality Scale	CQS = 88.9		

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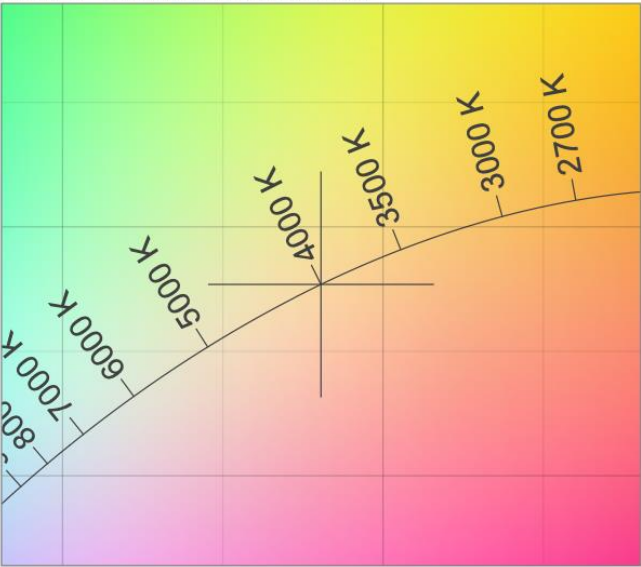
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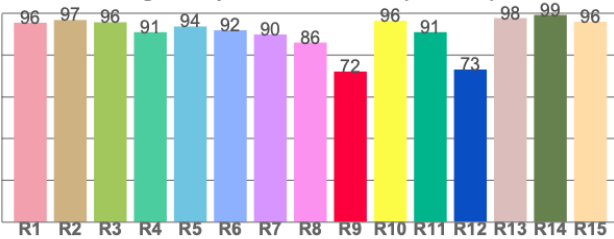
CIE 1931



CIE 1931 – zoomed on Planckian locus



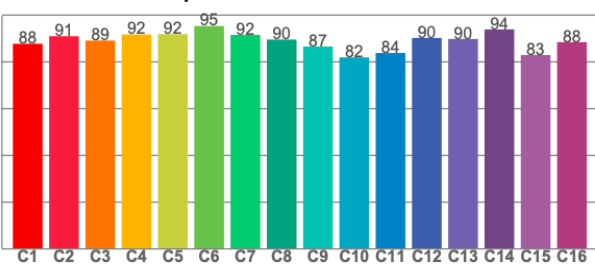
Color Rendering Index per reference color (CIE 1995)



CRI R values, only R1-R8 are used to calculate final CRI value

R1	R2	R3	R4	R5	R6	R7	R8	R9	R10	R11	R12	R13	R14	R15
95.5	96.8	95.7	91.0	93.7	91.9	89.9	86.0	72.2	96.4	91.0	73.1	97.7	99.2	96.0

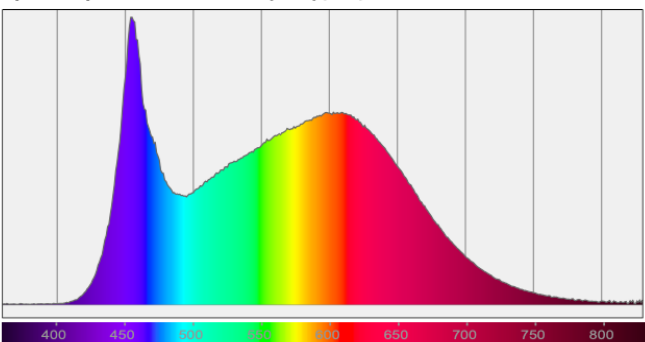
TM30-18 Rf-values per hue bin



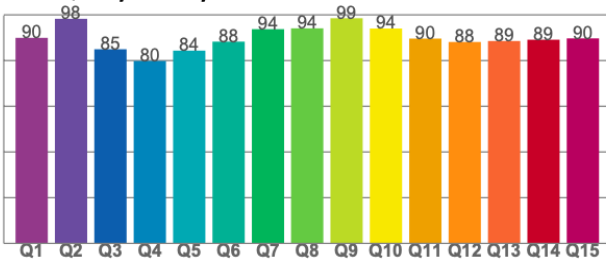
TM30 C values, 16 binned values out of total of 99 C values

C1	C2	C3	C4	C5	C6	C7	C8	C9	C10	C11	C12	C13	C14	C15	C16
87.8	91.0	89.1	91.7	91.9	95.3	91.5	89.6	86.6	81.9	83.8	90.3	89.8	93.9	83.0	88.4

Spectral power distribution (SPD) / W/nm – 0-100%



Color Quality Scale by reference color



CQS Q values

Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10	Q11	Q12	Q13	Q14	Q15
89.9	98.3	84.9	79.8	84.3	88.3	93.7	94.1	98.5	94.0	89.6	88.1	88.6	89.1	89.7