

Goniophotometry Report

1_PHOT_NINETY-NINE-2350lmChip-4000K-WallWash_2309
www.factorylux.com



Tested Light Source - 1_PHOT_NINETY-NINE-2350lmChip-4000K-WallWash_2309

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

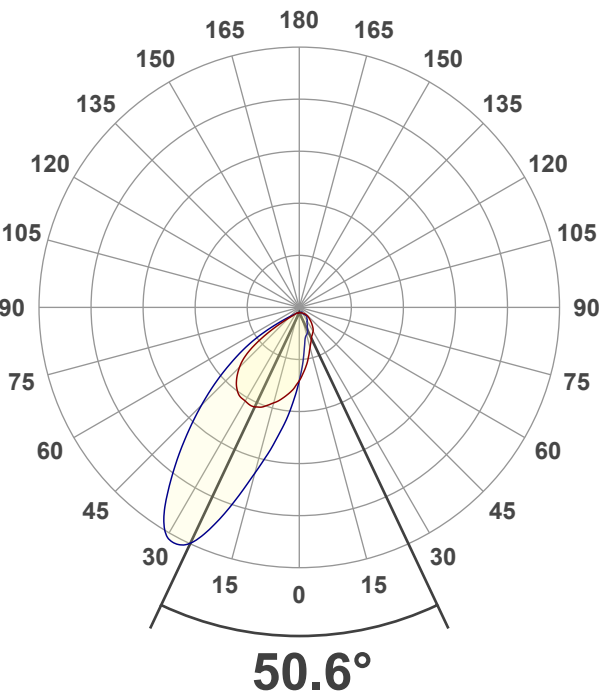
24 planes – 15°
1.5°
1.50 m
16.1 W – PF 0.99 – DPF 0.99
241 V – 0.068 A
50.1 Hz

Main Light Measurement Results

Output
Efficiency
Peak Intensity and Beam Angle
Color Rendering Index

1605 lm
100 lm/W
1728 cd – 50.6°
CRI 91.9

Light Intensity Distribution



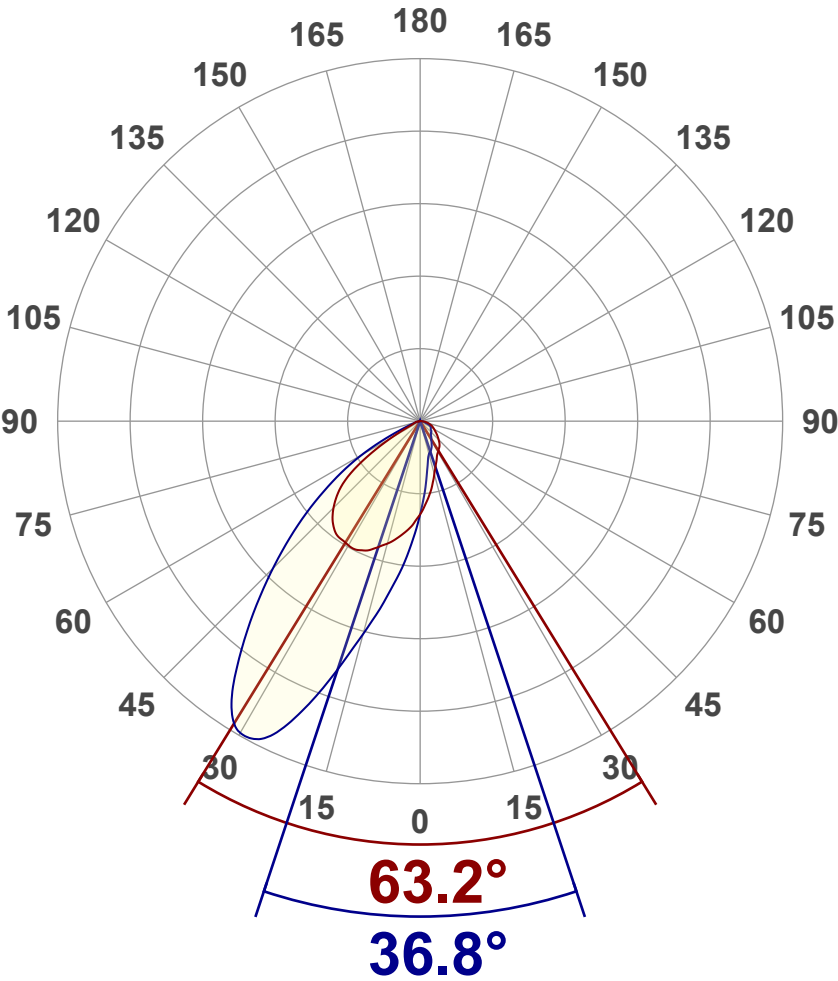
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Luminous Intensity diagram

Unit: 0-100% of peak intensity



Main Values

Output (total Lumen)	1605 lm
Peak Intensity	1728 cd
Beam Angle (50%)	50.6°
Beam Angle (90%)	36.8°
Beam Angle (10%)	80.3°

Cut-off Angle

Average 2,5%	149.6°
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Field Angle

Average 10%	99.5°
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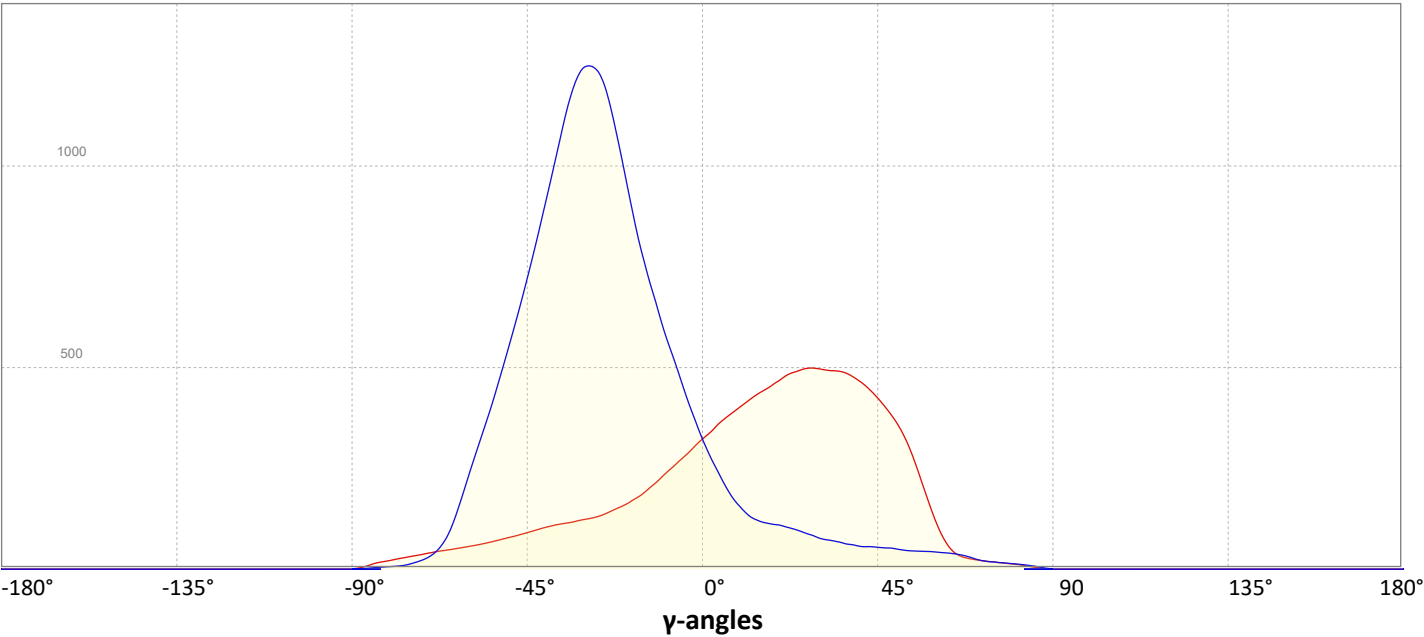
Intensity Ratio

In 120° cone	91.9%
In 90° cone	66.4%

C000-C180

C090-C270

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

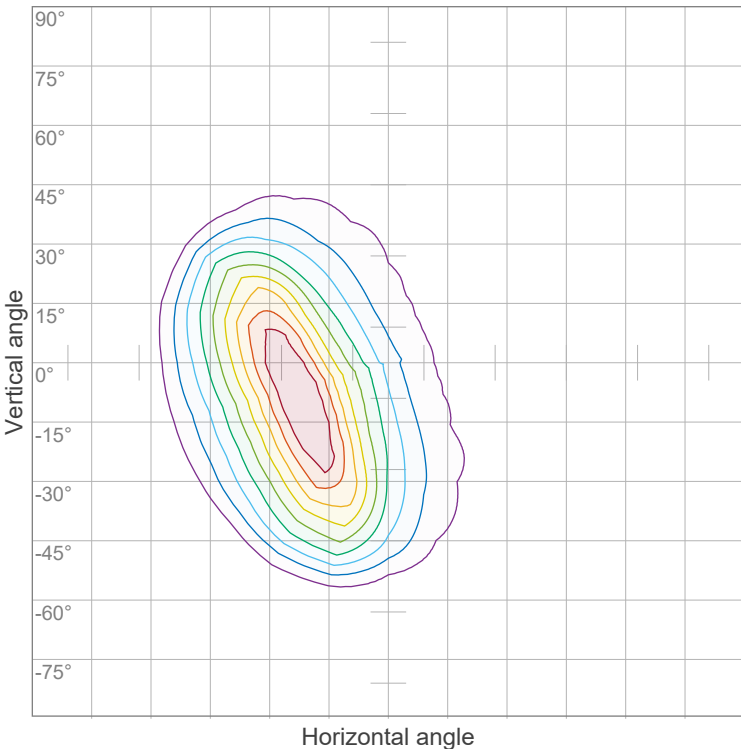


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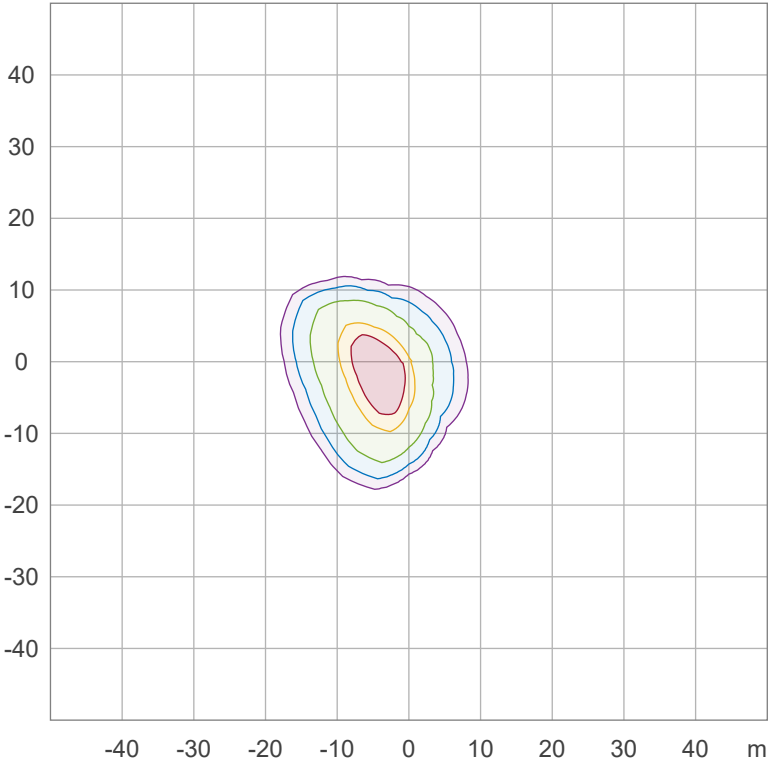
Iso-intensity Diagram (Iso-candela)



90 %	1554.2 cd
80 %	1381.5 cd
70 %	1208.8 cd
60 %	1036.1 cd
50 %	863.4 cd
40 %	690.7 cd
30 %	518.1 cd
20 %	345.4 cd
10 %	172.7 cd

Peak intensity: 1726.9 cd
Number of c-planes: 24

Iso-illuminance Diagram (Iso-lux)



50.0 %	6.5 lx
30.0 %	3.9 lx
10.0 %	1.3 lx
5.0 %	0.6 lx
3.0 %	0.4 lx

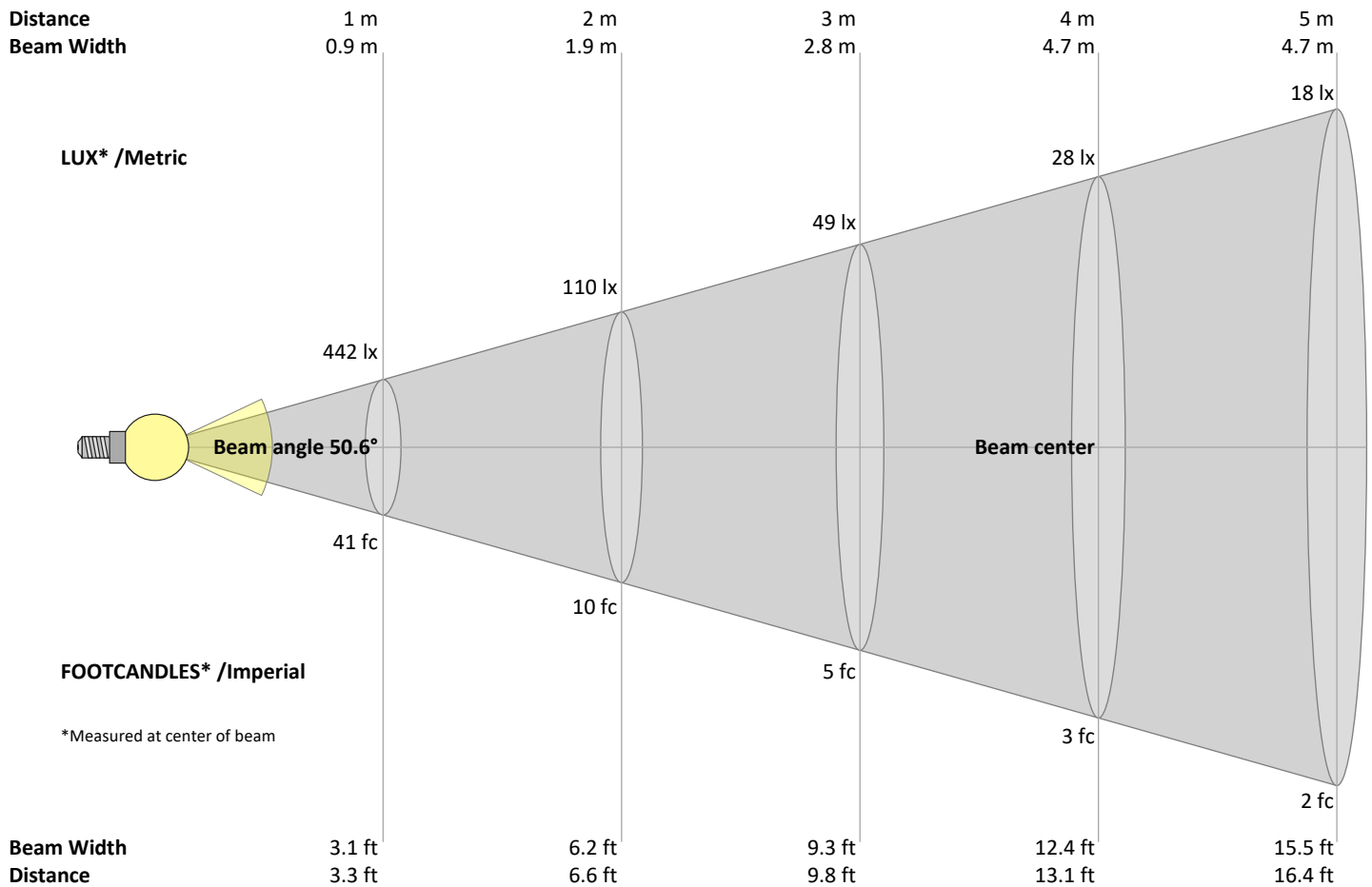
Peak illuminance: 12.9 lx
Mounting height: 10.0 m
Number of c-planes: 24

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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
442	110	49	28	18	12	9	7	5	4	4	3	3	2	2	2	2	1	1	1	lux
41	10.3	4.6	2.6	1.6	1.1	0.8	0.6	0.5	0.4	0.3	0.3	0.2	0.2	0.2	0.2	0.1	0.1	0.1	0.1	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
442	413	386	363	339	315	290	268	247	231	216	204	192	181	173	168	163	157	152	148	cd
100%	93%	87%	82%	77%	71%	66%	61%	56%	52%	49%	46%	43%	41%	39%	38%	37%	35%	35%	33%	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
442	378	327	277	235	205	180	165	156	151	147	140	133	123	114	104	98	94	88	83	cd
100%	86%	74%	63%	53%	46%	41%	37%	35%	34%	33%	32%	30%	28%	26%	24%	22%	21%	20%	19%	of 0°val

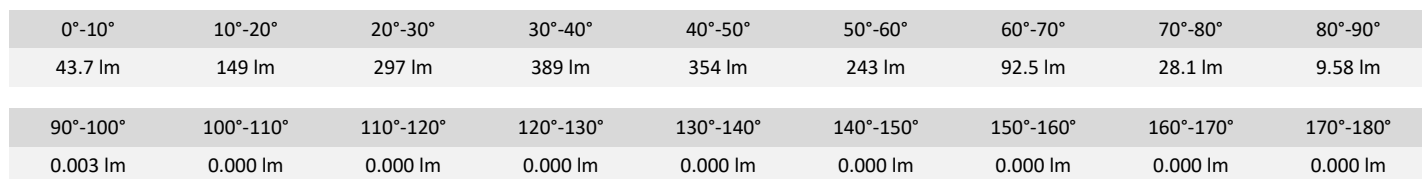
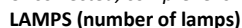
Intensities in 180° c-plane

0°	2°	4°	6°	8°	10°	12°	14°	16°	18°	20°	22°	24°	26°	28°	30°	32°	34°	36°	38°	γ
442	460	486	508	528	548	568	587	602	619	636	653	663	672	675	673	669	666	662	651	cd
100%	104%	110%	115%	120%	124%	129%	133%	136%	140%	144%	148%	150%	152%	153%	152%	151%	151%	150%	147%	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
442	504	575	653	730	807	897	986	1086	1203	1332	1458	1571	1650	1686	1687	1654	1581	1478	1363	cd
100%	114%	130%	148%	165%	183%	203%	223%	246%	272%	302%	330%	356%	374%	382%	382%	375%	358%	335%	309%	of 0°val

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Outdoor Light Planning

Lumen per Zone

Zone (γ)	Lumen	% Total
0-10°	44 lm	2.7%
10-20°	149 lm	9.3%
20-30°	297 lm	18.5%
30-40°	389 lm	24.2%
40-50°	354 lm	22.1%
50-60°	243 lm	15.1%
60-70°	92 lm	5.8%
70-80°	28 lm	1.7%
80-90°	10 lm	0.6%
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	1605 lm	100.0%

Intensity peaks

Max intensity	1728 cd
Intensity, 90°	1 cd
Intensity, 0°	442 cd

Zonal Lumen summary

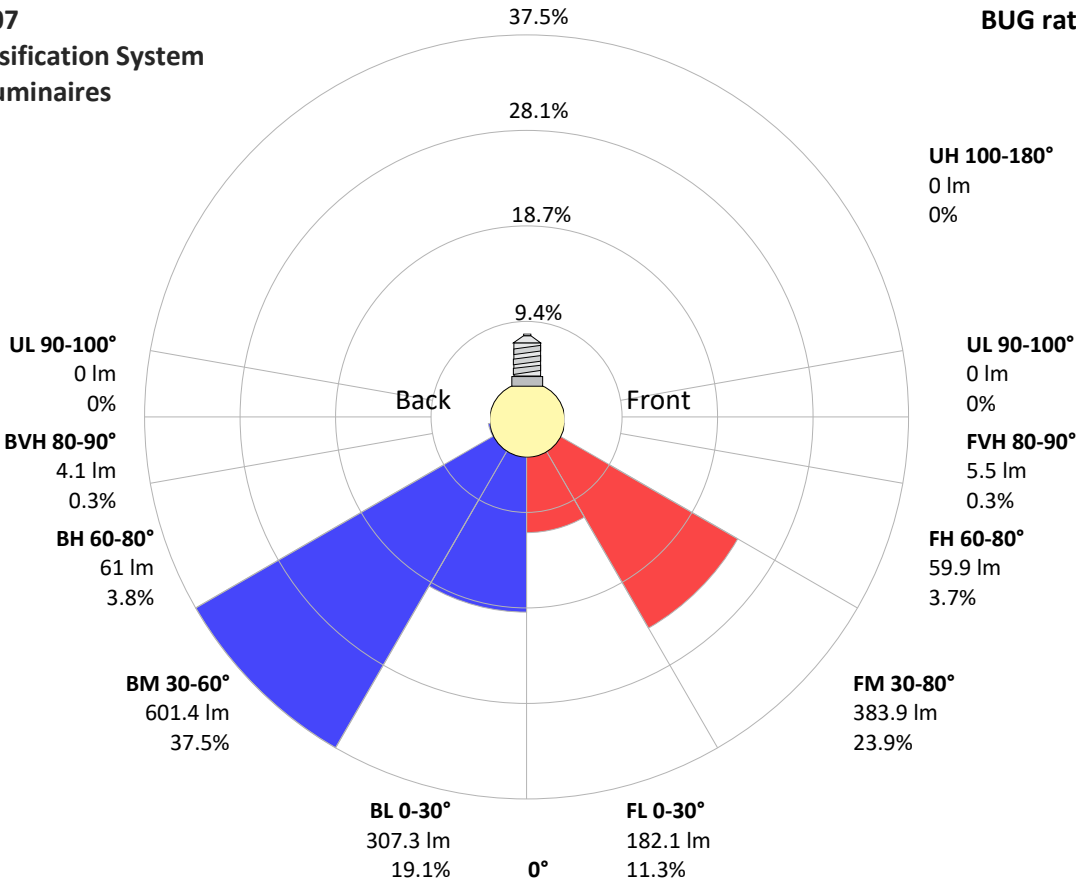
Zone (γ)	Lumen	% Total
0-30°	490 lm	30.5%
0-40°	878 lm	54.7%
0-60°	1475 lm	91.9%
60-90°	130 lm	8.1%
70-100°	38 lm	2.3%
90-120°	0 lm	0.0%
0-90°	1605 lm	100.0%
90-180°	0 lm	0.0%
0-180°	1605 lm	100.0%

BUG rating

	Lumen	% Total
Forward light		
Low(0-30°)	182 lm	11.3%
Medium(30-60°)	384 lm	23.9%
High(60-80°)	60 lm	3.7%
Very high(80-90°)	5 lm	0.3%
Back light		
Low(0-30°)	307 lm	19.1%
Medium(30-60°)	601 lm	37.5%
High(60-80°)	61 lm	3.8%
Very high(80-90°)	4 lm	0.3%
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 B1 U1 G0



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Power Details

Input Power

Power feed to light source	16.1 W
Frequency of input power	50.1 Hz
RMS Input voltage feed, V_{RMS}	241 V
RMS Input current feed, I_{RMS}	0.068 A
Volt-Ampere or apparent power = $V_{RMS} * I_{RMS}$	16.29 VA
Displacement factor of AC power feed	0.99
Power factor of AC current feed	0.99
Total harmonic distortion of the current	6.77%
Total harmonic distortion of the voltage	1.16%

Efficiency

Radiated power efficiency	36.7%
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Lumen efficiency	100 lm/W
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Input Power Curve



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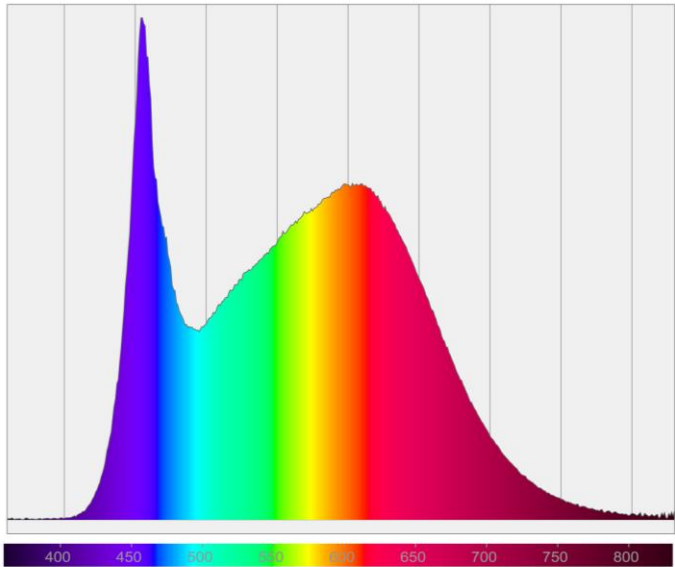
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Color Measurements

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

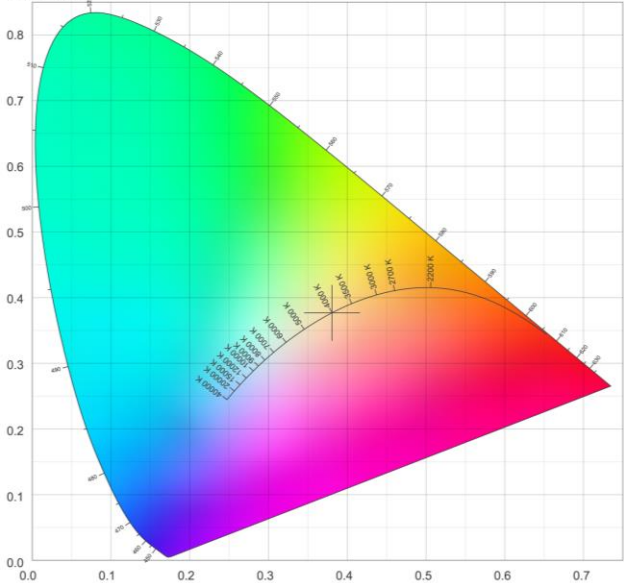
Correlated Color Temperature	CCT = 4000 K	Color coordinates CIE 1931	(x;y) = (0.381;0.377)
Color Rendering Index	CRI 92.6	Color coordinate CIEs 1960	(u;v) = (0.225;0.334)
Color Rendering Index, R9 (red component)	R9 = 72.2	Color deviation from BBL	Duv = ±0.0003
Color Rendering TM30-18	R _f 88.9 — R _g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

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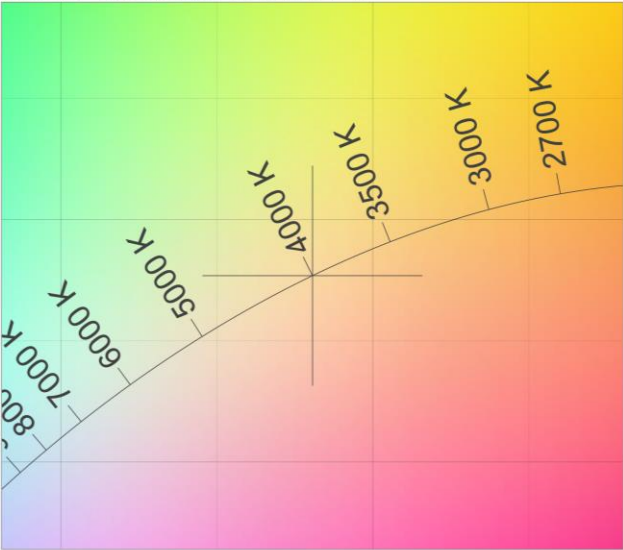
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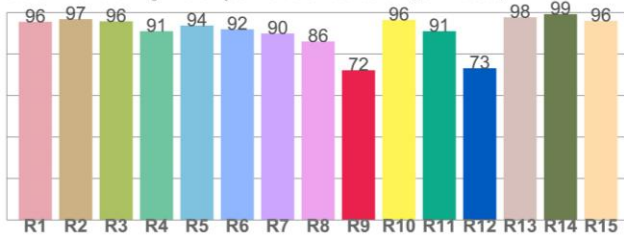
CIE 1931



CIE 1931 – zoomed on Planckian locus



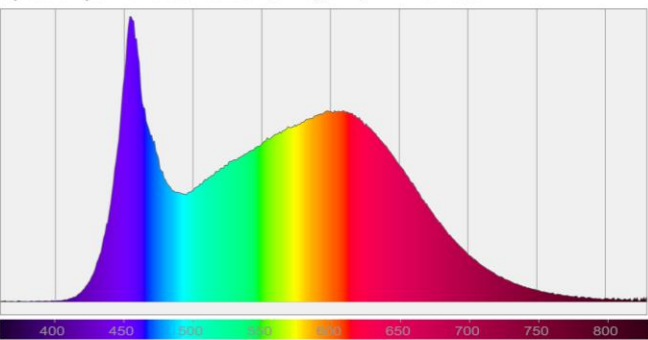
Color Rendering Index per reference color (CIE 1995)



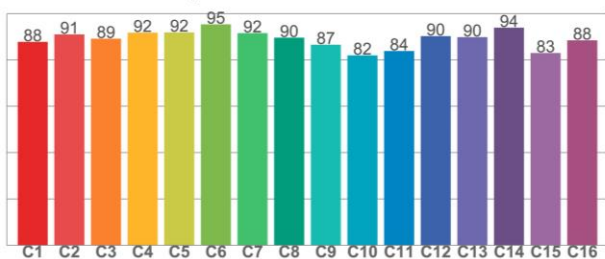
CRI R values, only R1-R8 are used to calculate final CRI value

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

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



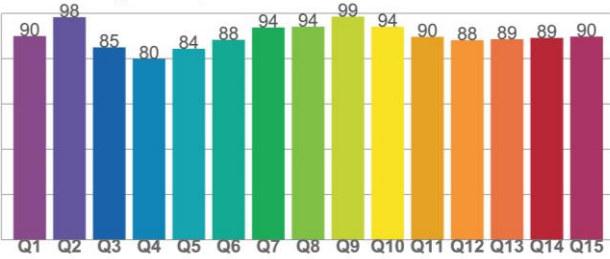
TM30-18 Rf-values per hue bin



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

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