

Tested Light Source - 1_PHOT_REFLEKTER-L-4750lmChip-4000K-21Deg-HoneycombLouvre_2303

Laboratory and Equipment

Laboratory Owner and Location	Factorylux, Greenhill Mills, Hebden Bridge, HX7 5QF, UK
Goniospectrometer System and Type	BaseSpion – Type C, horizontal
Spectrometer Manufacturer and Model	Ibsen Photonics, Denmark – Freedom VIS (Custom Viso)

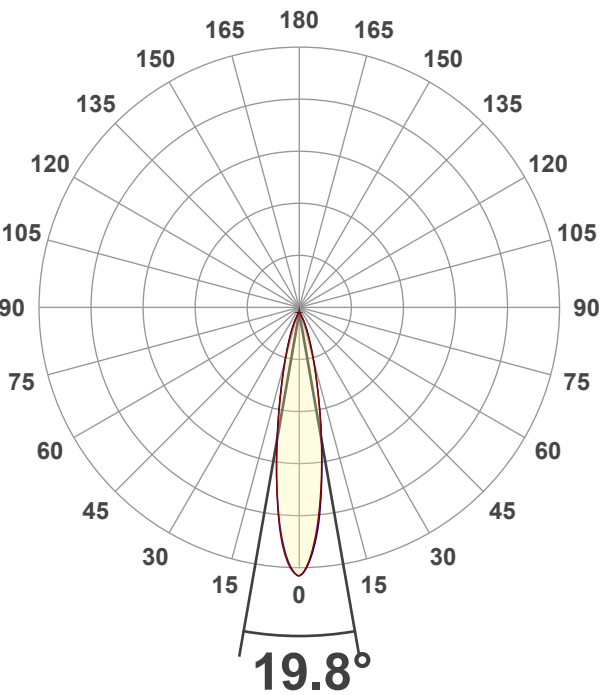
Measurement Conditions

Number of C-planes and Resolution	32 planes – 11.25°
γ (gamma)-Resolution	1°
Test Distance	3.00 m
Input Power, Power and Displ. Factors	41.3 W – PF 0.97 – DPF 0.97
Input RMS Voltage and Current	243 V – 0.176 A
Frequency of Input Power	50.1 Hz

Main Light Measurement Results

Output	2893 lm
Efficiency	70 lm/W
Peak Intensity and Beam Angle	16058 cd – 19.8°
Color Rendering Index	CRI 92.7

Light Intensity Distribution



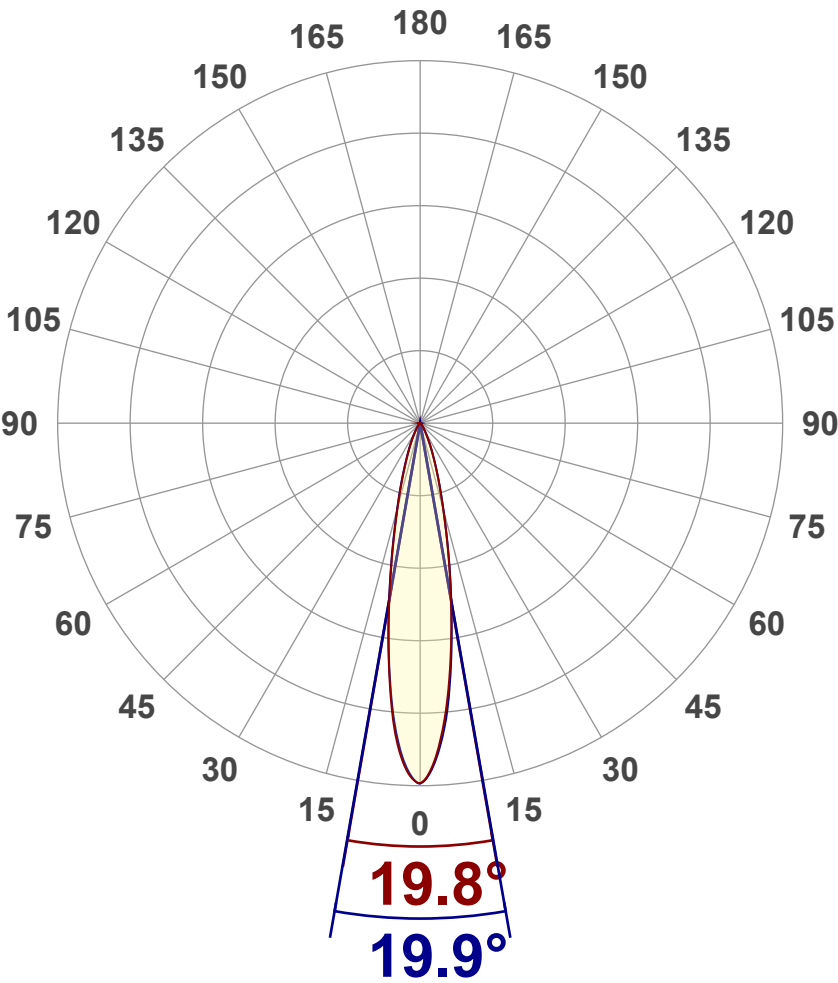
Goniophotometry Report

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Luminous Intensity diagram

Unit: 0-100% of peak intensity



Main Values

Output (total Lumen)	2893 lm
Peak Intensity	16058 cd
Beam Angle (50%)	19.8°
Beam Angle (90%)	19.9°
Beam Angle (10%)	19.8°

Cut-off Angle

Average 2,5%	61.9°
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Field Angle

Average 10%	42.6°
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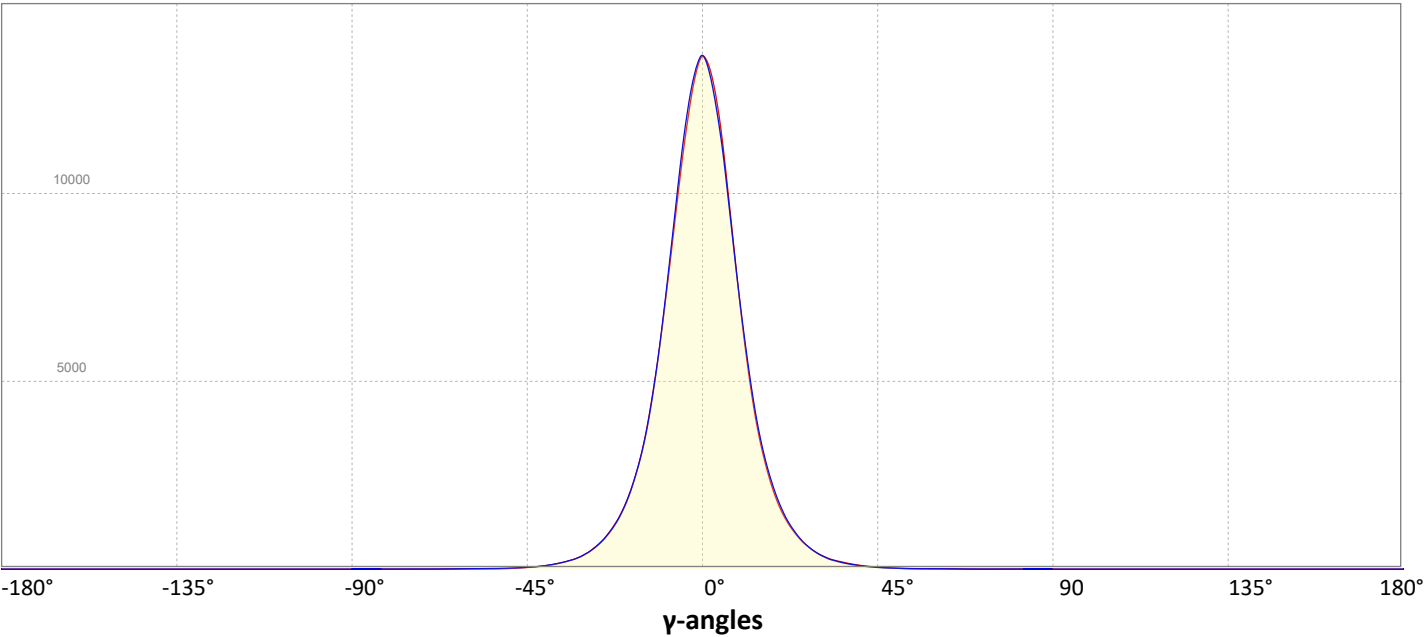
Intensity Ratio

In 120° cone	99.6%
In 90° cone	98.5%

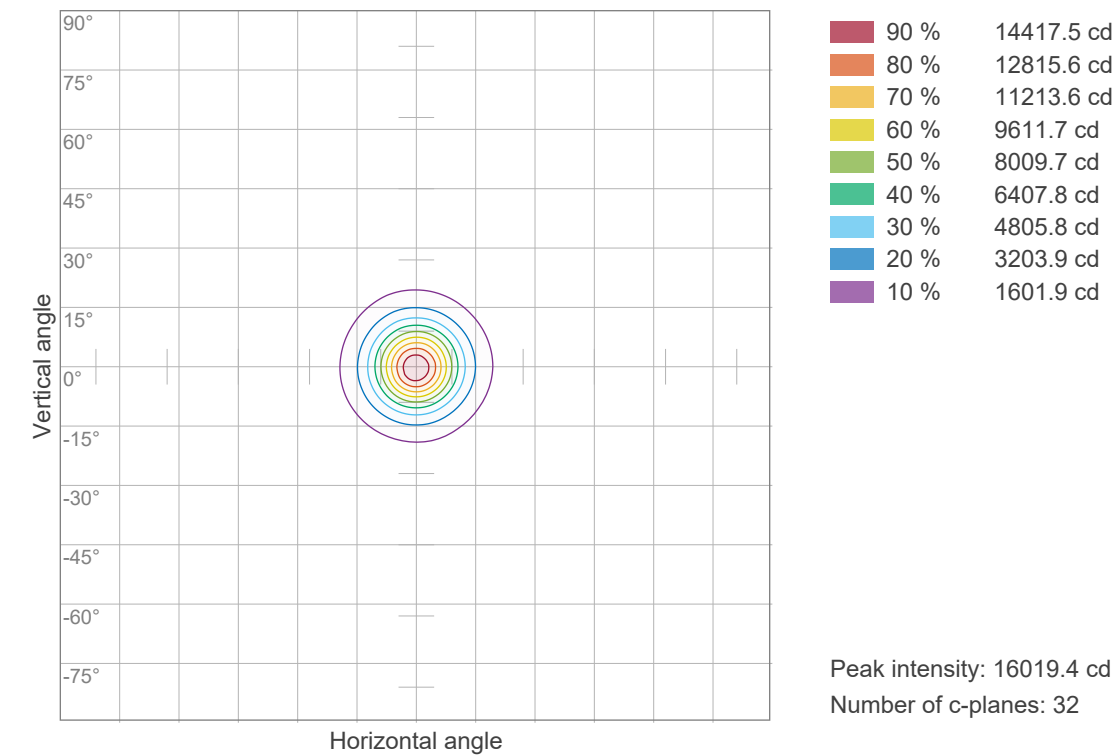
C000-C180

C090-C270

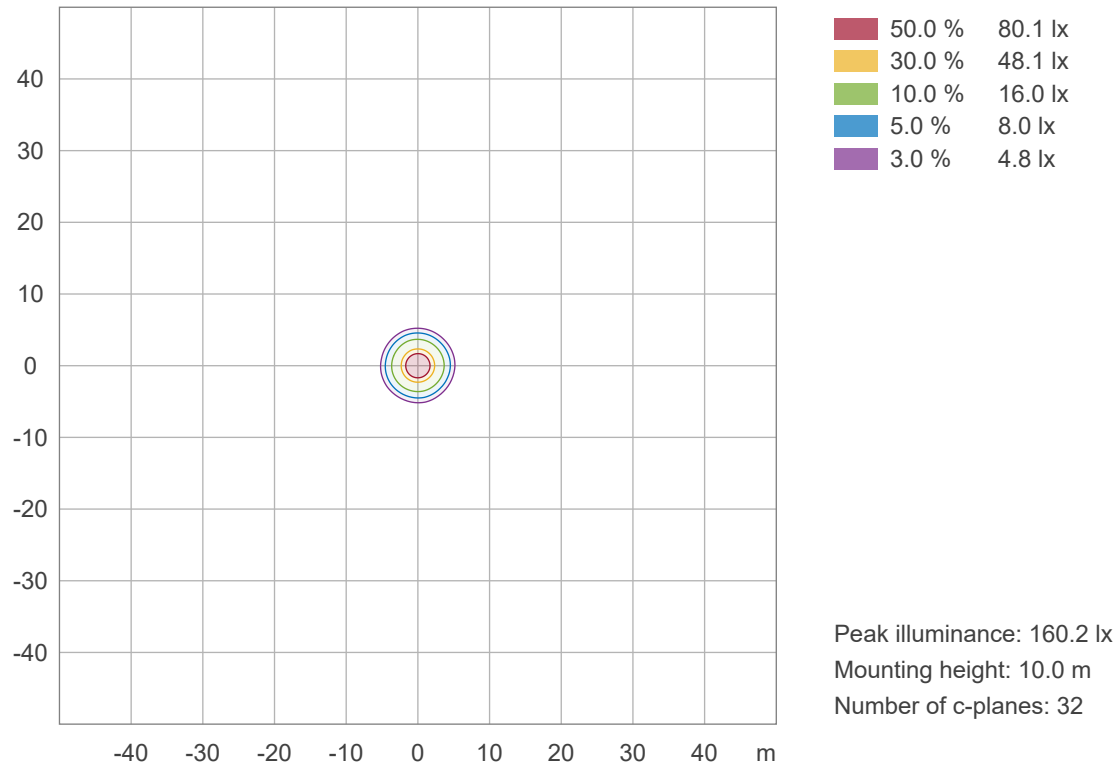
Linear distribution diagram - Intensity (candela) vs γ-angle



Iso-intensity Diagram (Iso-candela)



Iso-illuminance Diagram (Iso-lux)

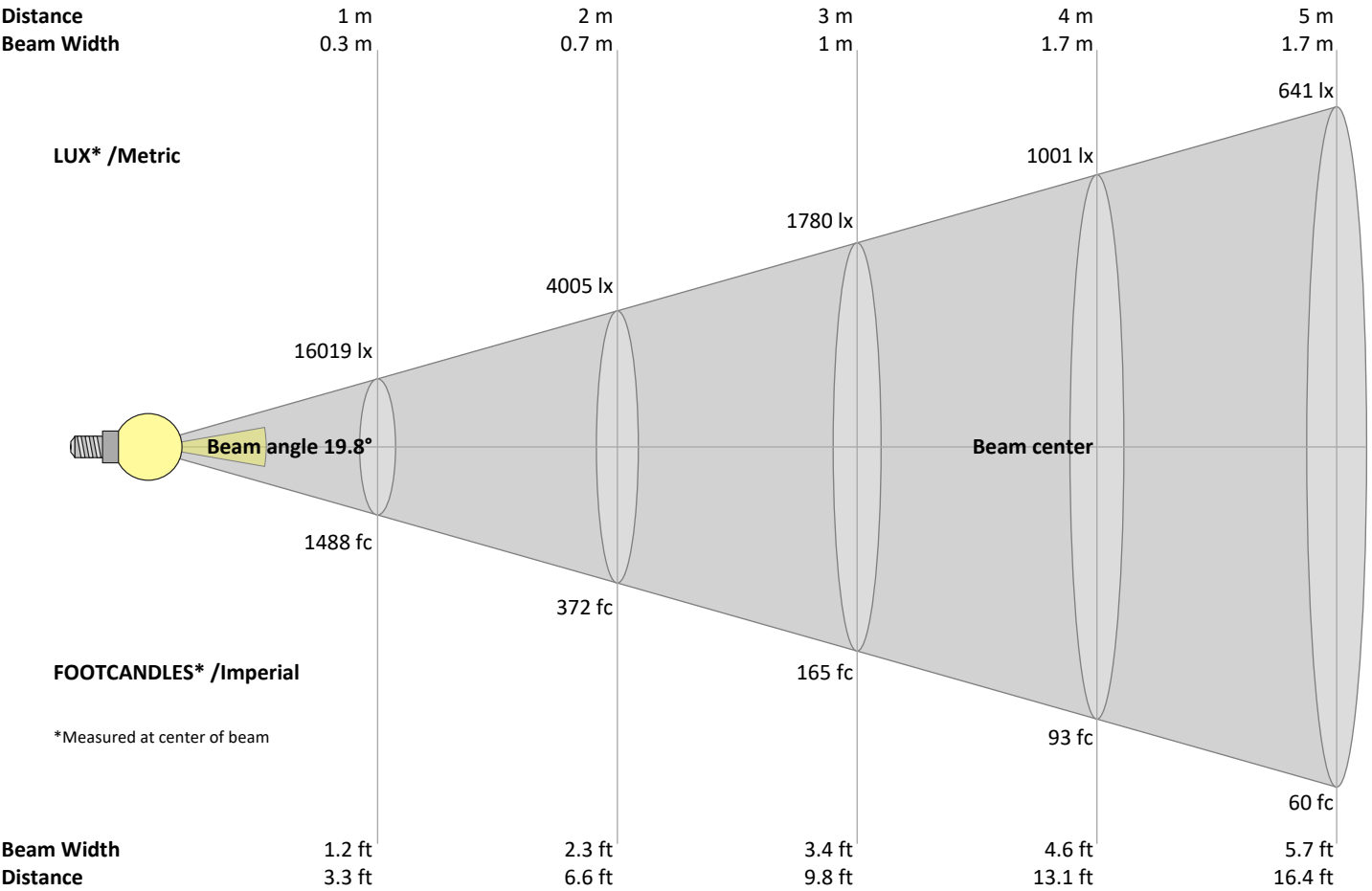


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Beam Details



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
16019	4005	1780	1001	641	445	327	250	198	160	132	111	95	82	71	63	55	49	44	40	lux
1488.3	372.1	165.4	93	59.5	41.3	30.4	23.3	18.4	14.9	12.3	10.3	8.8	7.6	6.6	5.8	5.1	4.6	4.1	3.7	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
16.0K	15.3K	13.8K	12.0K	9.9K	7.9K	6.1K	4.6K	3.5K	2.6K	2.0K	1.5K	1.1K	0.9K	0.6K	0.5K	0.4K	0.3K	0.2K	0.2K	cd
100%	95%	86%	75%	62%	49%	38%	29%	22%	16%	12%	9%	7%	5%	4%	3%	2%	2%	1%	1%	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
16.0K	15.4K	14.0K	12.2K	10.0K	8.0K	6.1K	4.6K	3.5K	2.6K	2.0K	1.5K	1.1K	0.8K	0.6K	0.5K	0.3K	0.3K	0.2K	0.2K	cd
100%	96%	88%	76%	63%	50%	38%	29%	22%	16%	12%	9%	7%	5%	4%	3%	2%	2%	1%	1%	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
16.0K	15.6K	14.3K	12.4K	10.1K	7.9K	6.0K	4.5K	3.4K	2.5K	1.9K	1.4K	1.1K	0.8K	0.6K	0.5K	0.4K	0.3K	0.2K	0.2K	cd
100%	97%	90%	77%	63%	49%	37%	28%	21%	16%	12%	9%	7%	5%	4%	3%	2%	2%	1%	1%	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
16.0K	15.5K	14.2K	12.3K	10.1K	8.0K	6.1K	4.6K	3.4K	2.6K	2.0K	1.5K	1.1K	0.9K	0.6K	0.5K	0.4K	0.3K	0.2K	0.2K	cd
100%	97%	88%	77%	63%	50%	38%	28%	21%	16%	12%	9%	7%	5%	4%	3%	2%	2%	1%	1%	of 0°val

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LAMPS (number of lamps)

[illegible]

Outdoor Light Planning

Lumen per Zone

Zone (γ)	Lumen	% Total
0-10°	1084 lm	37.5%
10-20°	1124 lm	38.9%
20-30°	458 lm	15.8%
30-40°	153 lm	5.3%
40-50°	46 lm	1.6%
50-60°	15 lm	0.5%
60-70°	6 lm	0.2%
70-80°	3 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	2893 lm	100.0%

Intensity peaks

Max intensity	16058 cd
Intensity, 90°	0 cd
Intensity, 0°	16019 cd

Zonal Lumen summary

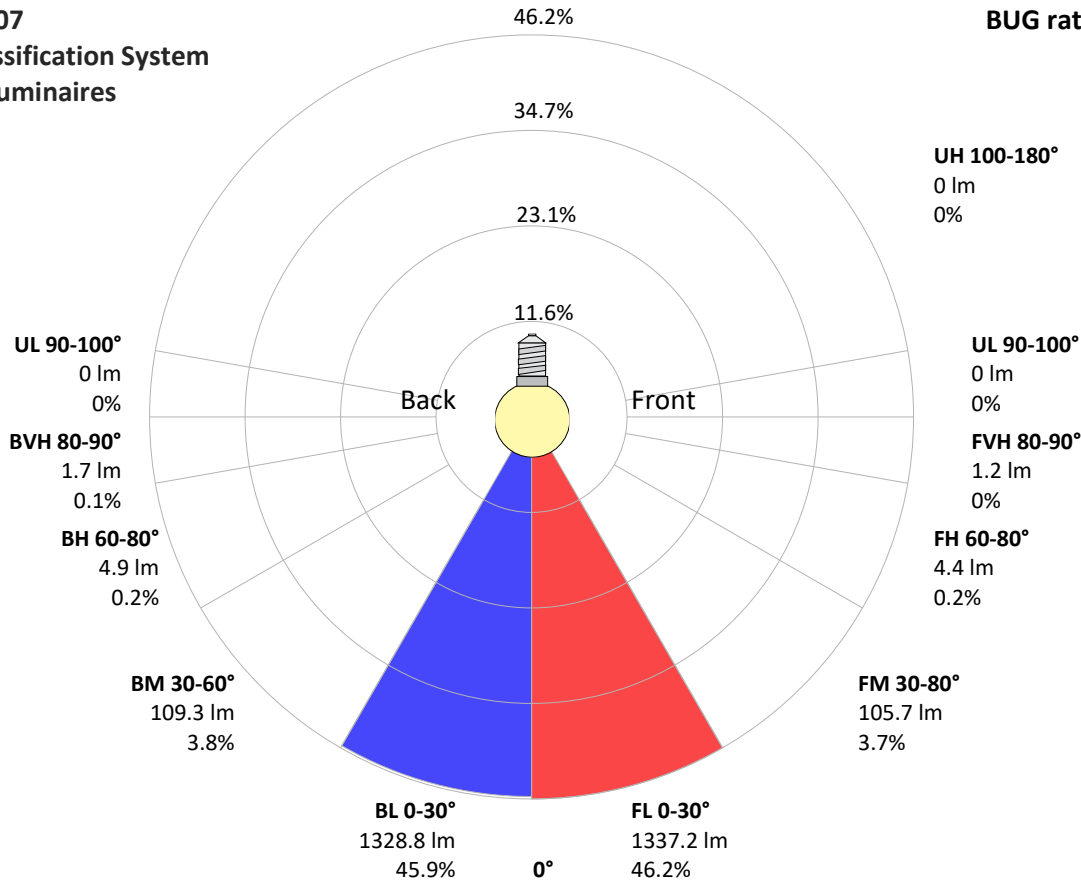
Zone (γ)	Lumen	% Total
0-30°	2666 lm	92.2%
0-40°	2819 lm	97.5%
0-60°	2881 lm	99.6%
60-90°	12 lm	0.4%
70-100°	6 lm	0.2%
90-120°	0 lm	0.0%
0-90°	2893 lm	100.0%
90-180°	0 lm	0.0%
0-180°	2893 lm	100.0%

BUG rating

	Lumen	% Total
Forward light		
Low(0-30°)	1337 lm	46.2%
Medium(30-60°)	106 lm	3.7%
High(60-80°)	4 lm	0.2%
Very high(80-90°)	1 lm	0.0%
Back light		
Low(0-30°)	1329 lm	45.9%
Medium(30-60°)	109 lm	3.8%
High(60-80°)	5 lm	0.2%
Very high(80-90°)	2 lm	0.1%
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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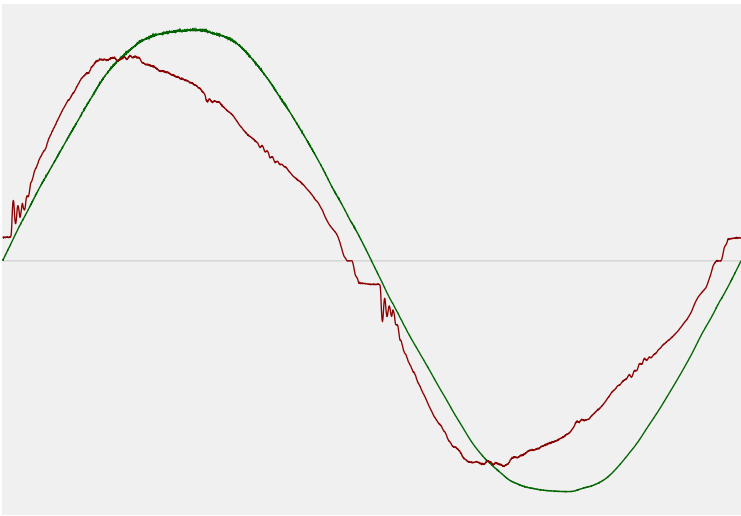


Power Details

Input Power

Power feed to light source	41.3 W
Frequency of input power	50.1 Hz
RMS Input voltage feed, V_{RMS}	243 V
RMS Input current feed, I_{RMS}	0.176 A
Volt-Ampere or apparent power = $V_{RMS} \cdot I_{RMS}$	42.77 VA
Displacement factor of AC power feed	0.97
Power factor of AC current feed	0.97
Total harmonic distortion of the current	11.09%
Total harmonic distortion of the voltage	1.38%

Input Power Curve



Efficiency

Radiated power efficiency	25.4%
Lumen efficiency	70 lm/W

Goniophotometry Report

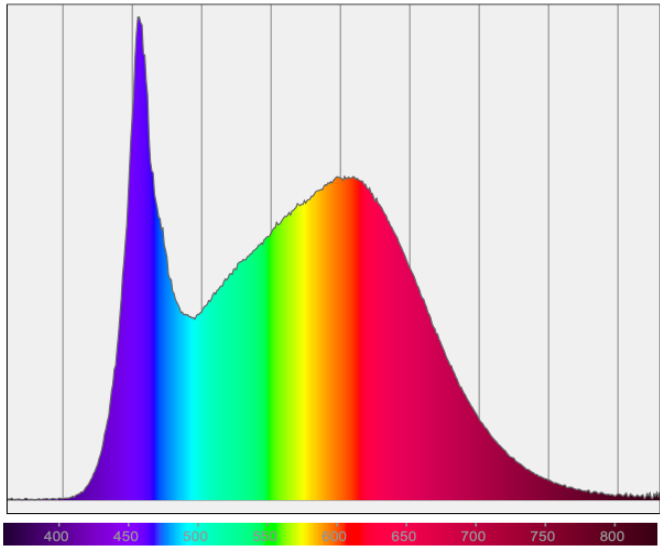
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Color Measurements

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

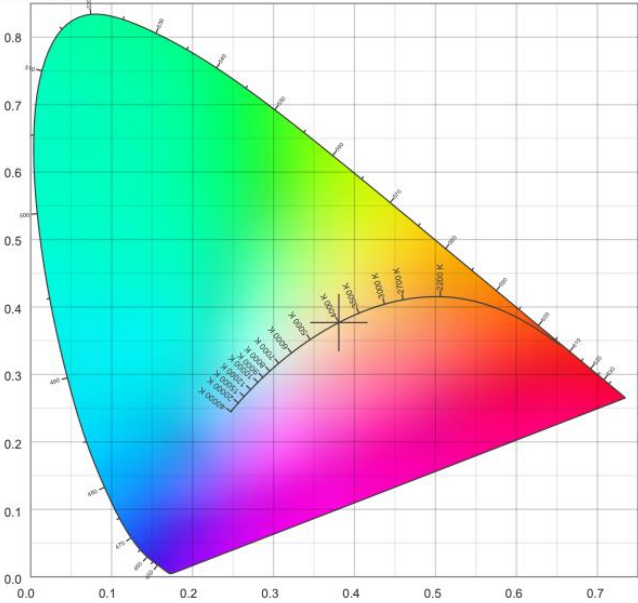
Correlated Color Temperature	CCT = 4000 K	Color coordinates CIE 1931	(x;y) = (0.381;0.377)
Color Rendering Index	CRI 92.6	Color coordinate CIEs 1960	(u;v) = (0.225;0.334)
Color Rendering Index, R9 (red component)	R9 = 72.2	Color deviation from BBL	Duv = ±0.0003
Color Rendering TM30-18	R _f 88.9 – R _g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

Goniophotometry Report

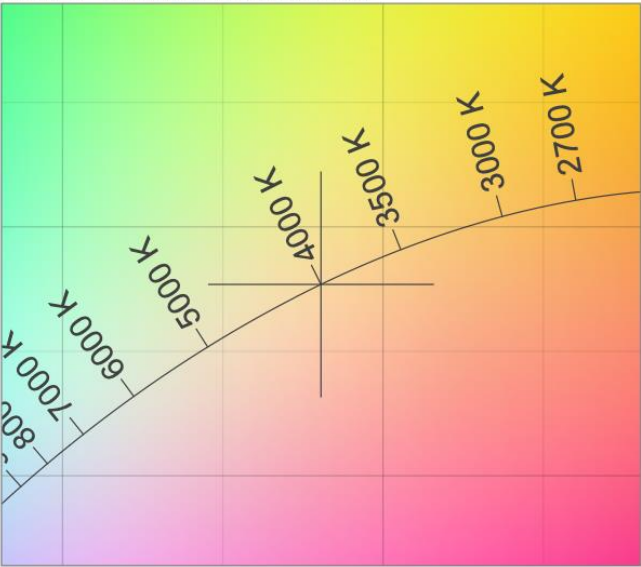
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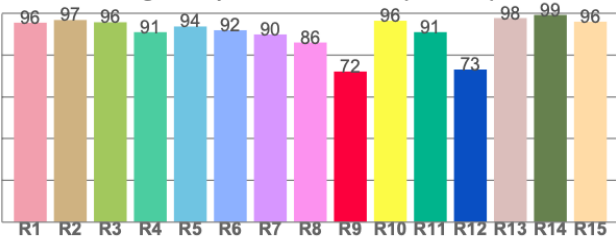
CIE 1931



CIE 1931 – zoomed on Planckian locus



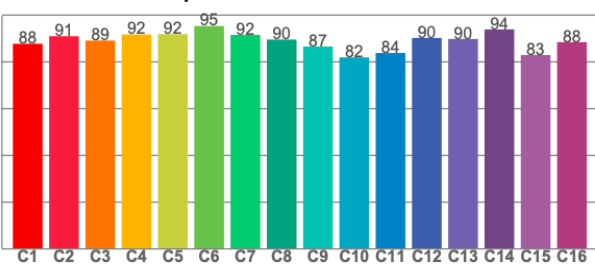
Color Rendering Index per reference color (CIE 1995)



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

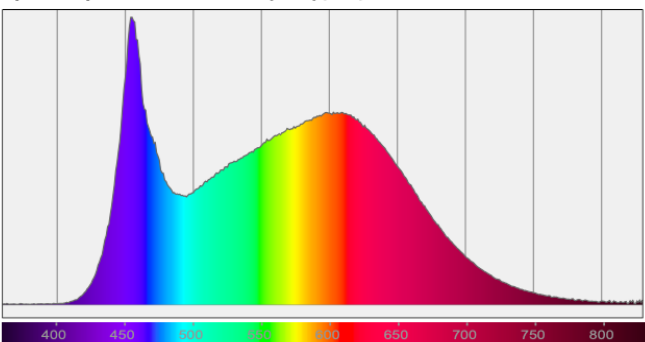
TM30-18 Rf-values per hue bin



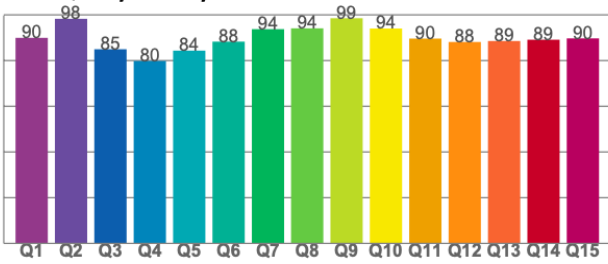
TM30 C values, 16 binned values out of total of 99 C values

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