

Tested Light Source - 1_PHOT_REFLEKTER-L-4600lmChip-3500K-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)

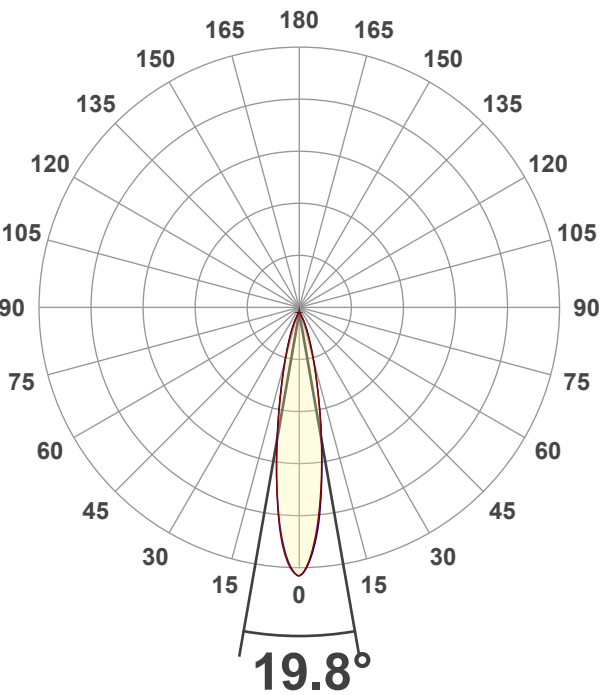
Measurement Conditions

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	2801 lm
Efficiency	68 lm/W
Peak Intensity and Beam Angle	15547 cd – 19.8°
Color Rendering Index	CRI 92.7

Light Intensity Distribution



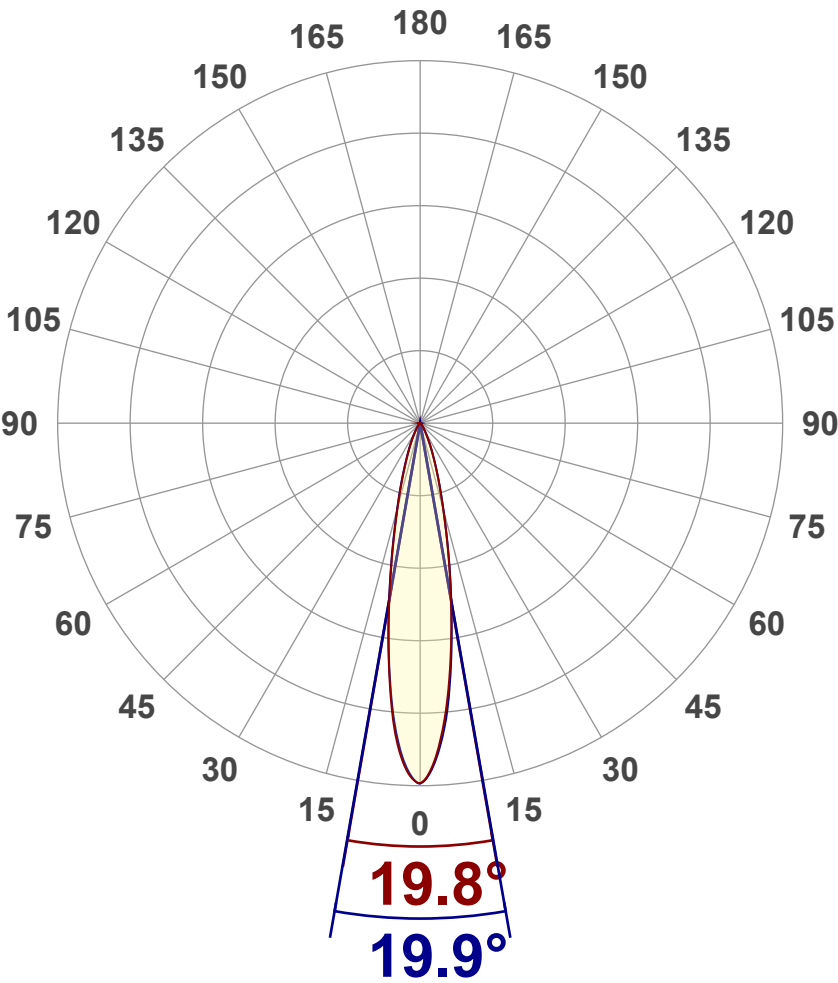
Goniophotometry Report

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Luminous Intensity diagram

Unit: 0-100% of peak intensity



Main Values

Output (total Lumen)	2801 lm
Peak Intensity	15547 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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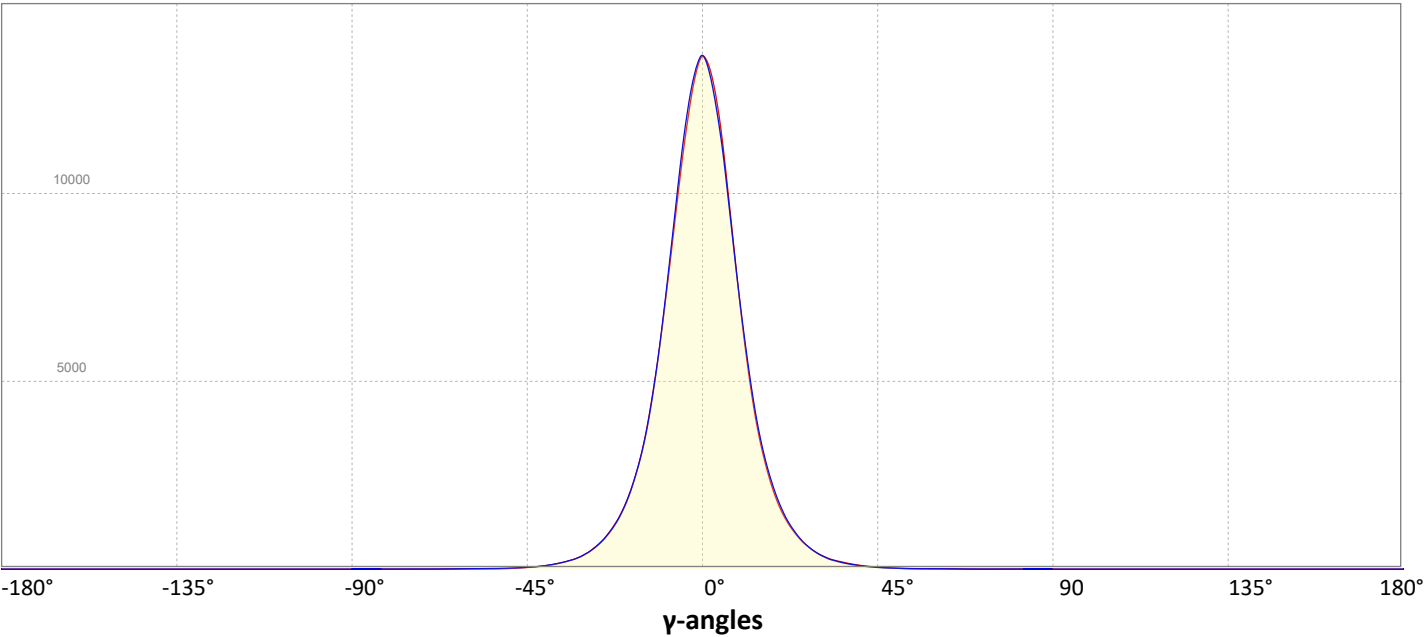
Intensity Ratio

In 120° cone	99.6%
In 90° cone	98.5%

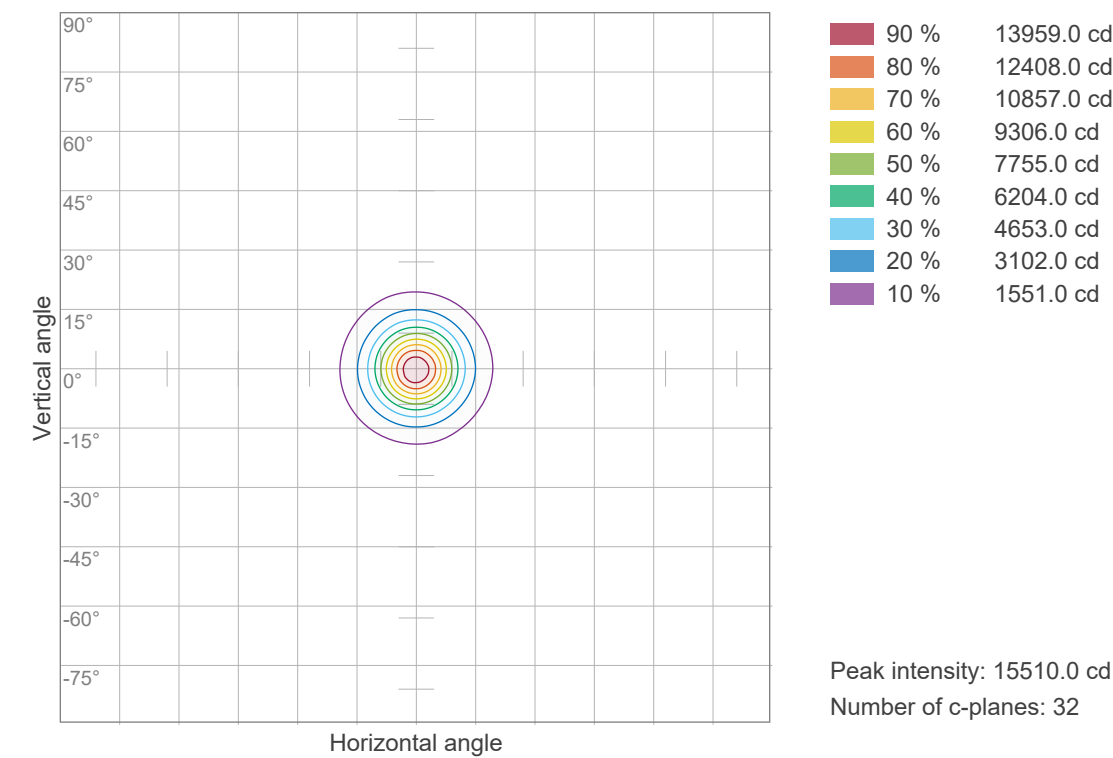
C000-C180

C090-C270

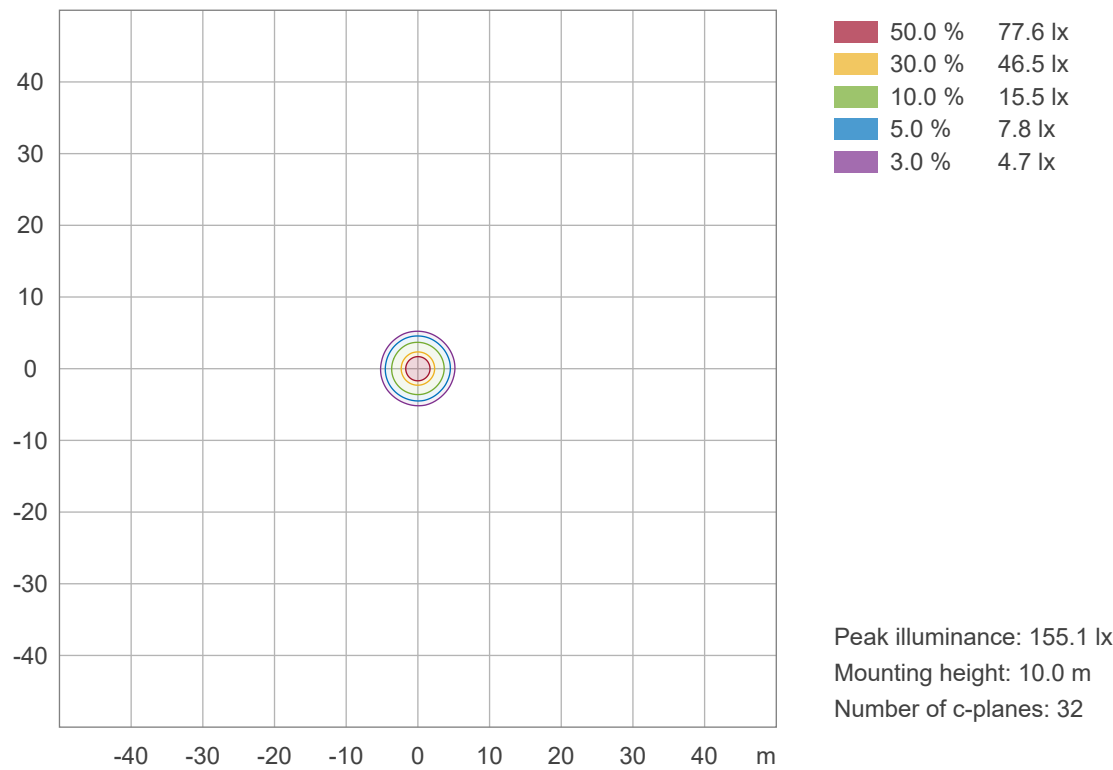
Linear distribution diagram - Intensity (candela) vs γ-angle



Iso-intensity Diagram (Iso-candela)



Iso-illuminance Diagram (Iso-lux)

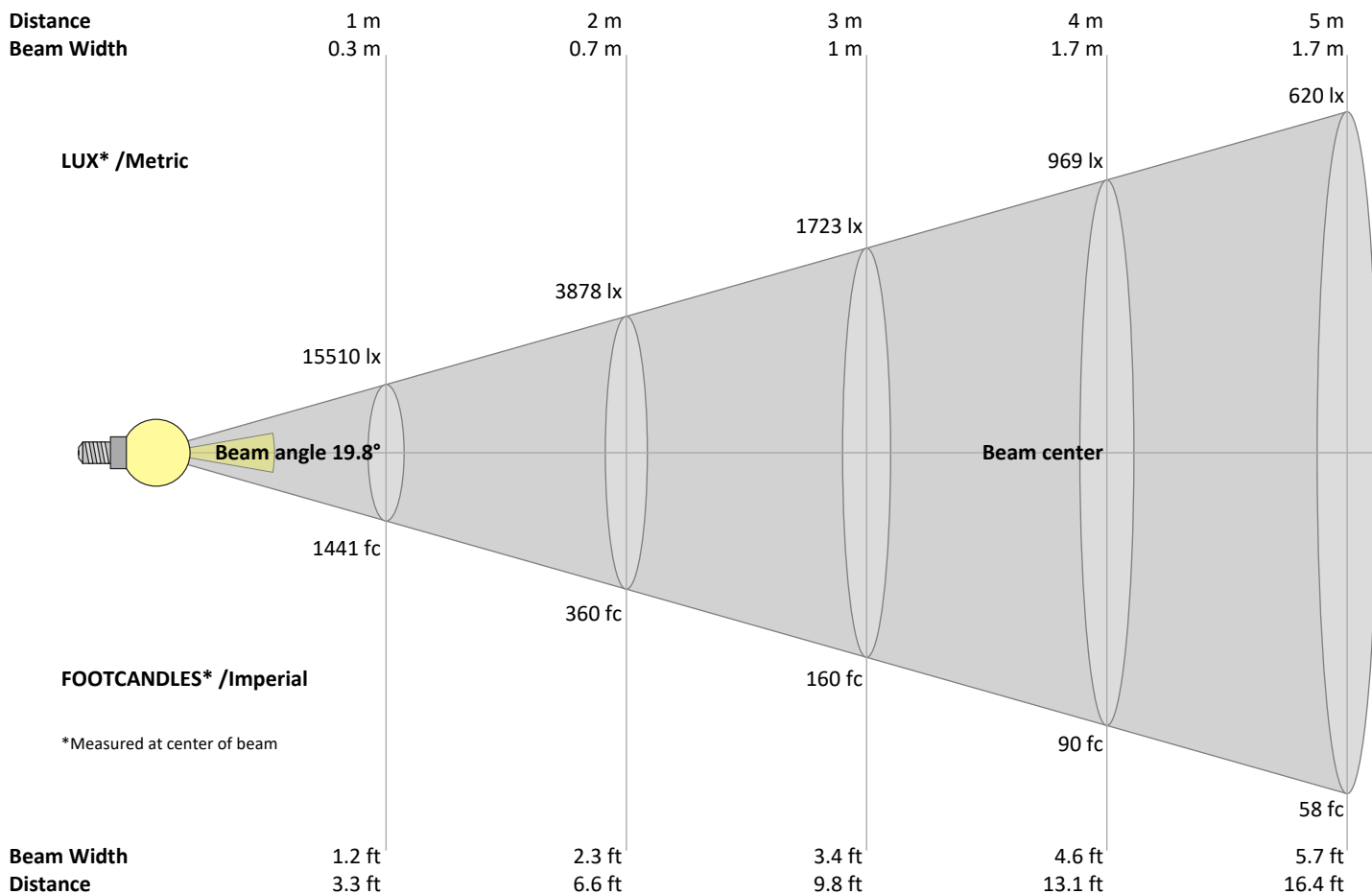


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Beam Details



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
15510	3878	1723	969	620	431	317	242	191	155	128	108	92	79	69	61	54	48	43	39	lux
1440.9	360.2	160.1	90.1	57.6	40	29.4	22.5	17.8	14.4	11.9	10	8.5	7.4	6.4	5.6	5	4.4	4	3.6	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
15.5K	14.8K	13.4K	11.6K	9.6K	7.7K	5.9K	4.5K	3.4K	2.5K	1.9K	1.5K	1.1K	0.8K	0.6K	0.5K	0.3K	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
15.5K	14.9K	13.6K	11.8K	9.7K	7.7K	5.9K	4.5K	3.4K	2.6K	1.9K	1.4K	1.1K	0.8K	0.6K	0.4K	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

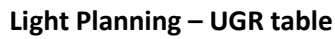
Intensities in 180° c-plane

0°	2°	4°	6°	8°	10°	12°	14°	16°	18°	20°	22°	24°	26°	28°	30°	32°	34°	36°	38°	γ
15.5K	15.1K	13.9K	12.0K	9.8K	7.6K	5.8K	4.3K	3.3K	2.4K	1.8K	1.4K	1.1K	0.8K	0.6K	0.5K	0.3K	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
15.5K	15.0K	13.7K	11.9K	9.8K	7.7K	5.9K	4.4K	3.3K	2.5K	1.9K	1.4K	1.1K	0.8K	0.6K	0.5K	0.3K	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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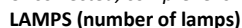
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n/a	n/a	n/a
n/a	n/a	n/a
n/a	n/a	n/a

Coefficients of Utilization

Ceiling reflectance	80			70			50			30			10			0		
Wall reflectance	70	50	30	10	70	50	30	10	50	30	10	50	30	10	50	30	10	0
Floor reflectance	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	0
RCR	(RCR: Room Cavity Ratio)			Room Values are expressed as percentage of Lumen delivered to the task surface														
0	119	119	119	119	116	116	116	116	111	111	111	106	106	106	102	102	102	100
1	115	113	111	109	113	111	109	107	107	105	104	103	102	101	100	99	98	96
2	111	107	104	102	109	106	103	101	103	100	98	100	98	96	97	96	94	93
3	107	103	99	96	106	101	98	95	99	96	94	97	94	92	94	93	91	90
4	104	98	94	91	102	97	94	91	95	92	90	94	91	89	92	90	88	87
5	101	95	91	88	99	94	90	87	92	89	86	91	88	86	89	87	85	84
6	98	91	87	84	97	91	87	84	89	86	83	88	85	83	87	84	82	81
7	95	88	84	81	94	88	84	81	87	83	81	86	83	80	85	82	80	79
8	92	86	82	79	91	85	81	78	84	81	78	83	80	78	83	80	78	77
9	90	83	79	76	89	83	79	76	82	78	76	81	78	76	81	78	75	75
10	88	81	77	74	87	81	77	74	80	76	74	79	76	74	79	76	74	73

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Zonal Lumen Summary

[illegible]

Outdoor Light Planning

Lumen per Zone

Zone (γ)	Lumen	% Total
0-10°	1049 lm	37.5%
10-20°	1088 lm	38.9%
20-30°	444 lm	15.8%
30-40°	148 lm	5.3%
40-50°	45 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	2801 lm	100.0%

Intensity peaks

Max intensity	15547 cd
Intensity, 90°	0 cd
Intensity, 0°	15510 cd

Zonal Lumen summary

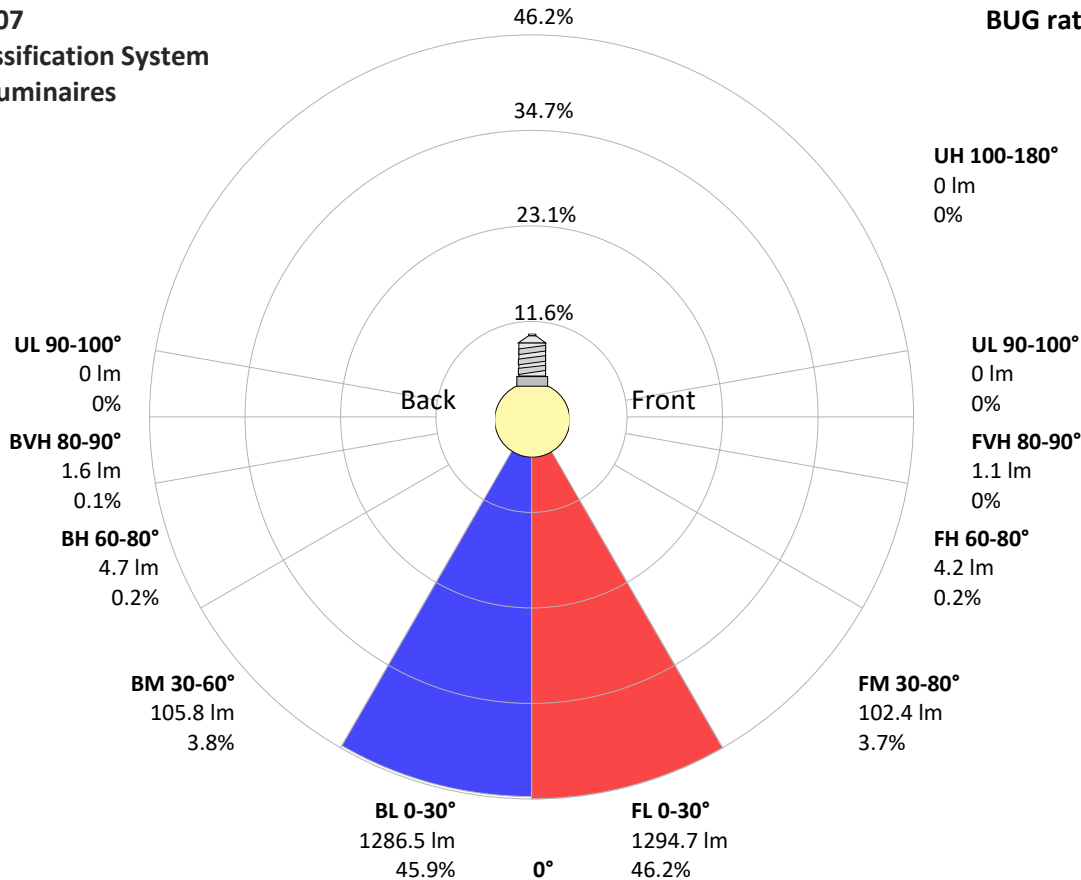
Zone (γ)	Lumen	% Total
0-30°	2582 lm	92.2%
0-40°	2730 lm	97.5%
0-60°	2789 lm	99.6%
60-90°	12 lm	0.4%
70-100°	6 lm	0.2%
90-120°	0 lm	0.0%
0-90°	2801 lm	100.0%
90-180°	0 lm	0.0%
0-180°	2801 lm	100.0%

BUG rating

	Lumen	% Total
Forward light		
Low(0-30°)	1295 lm	46.2%
Medium(30-60°)	102 lm	3.7%
High(60-80°)	4 lm	0.2%
Very high(80-90°)	1 lm	0.0%
Back light		
Low(0-30°)	1287 lm	45.9%
Medium(30-60°)	106 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

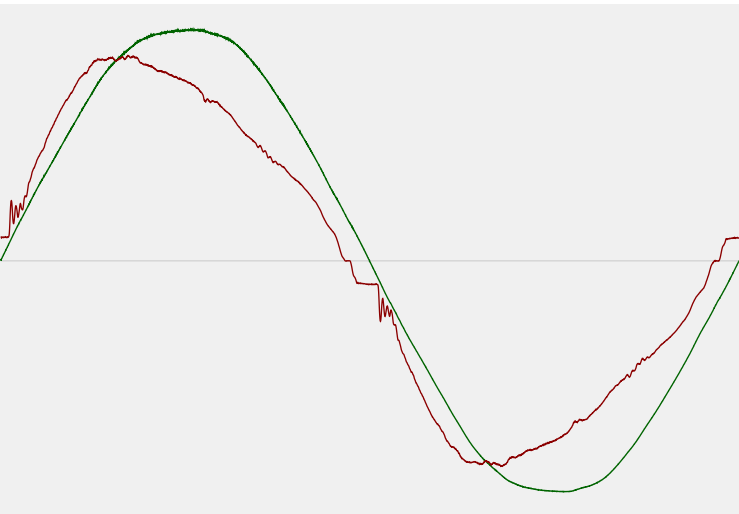
Input Power

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%

Efficiency

Radiated power efficiency	24.6%
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Lumen efficiency	68 lm/W
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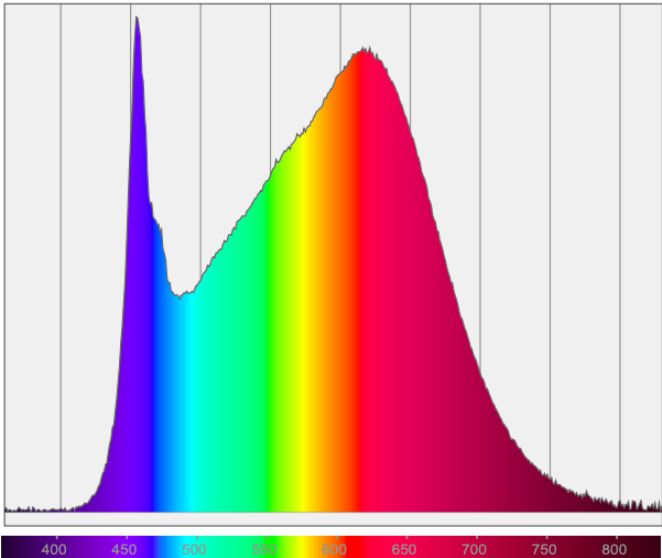
Input Power Curve



Color Measurements

Correlated Color Temperature	CCT = 3500 K
Color Rendering TM30-18	R _f 90.2 — R _g 98.1
Color Shift, CIE duv	Duv ±0.0003

Spectral distribution



Color details

Correlated Color Temperature	CCT = 3500 K	Color coordinates CIE 1931	(x;y) = (0.406;0.391)
Color Rendering Index	CRI 94.0	Color coordinate CIEs 1960	(u;v) = (0.236;0.341)
Color Rendering Index, R9 (red component)	R9 = 77.7	Color deviation from BBL	Duv = ±0.0003
Color Rendering TM30-18	R _f 90.2 — R _g 98.1	Color coordinate CIEs 1976 (CIELUV)	(u';v') = (0.236;0.236)
Color Quality Scale	CQS = 92.3		

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CIE 1931



CIE 1931 – zoomed on Planckian locus



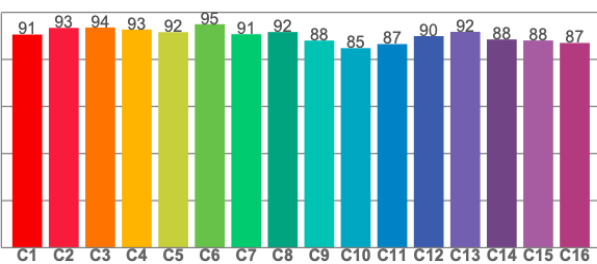
Color Rendering Index per reference color (CIE 1995)



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
97.3	97.2	95.9	93.4	95.9	93.5	90.9	87.9	77.7	96.6	94.1	77.1	98.8	99.0	96.4

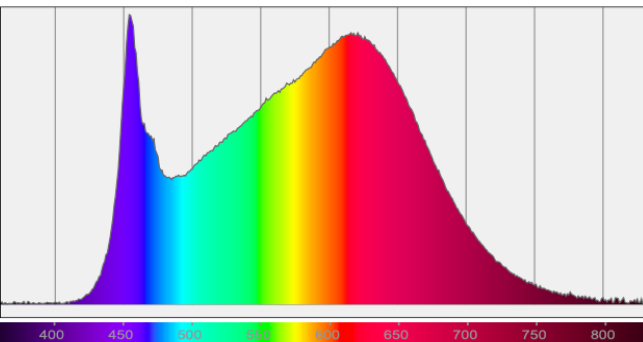
TM30-18 Rf-values per hue bin



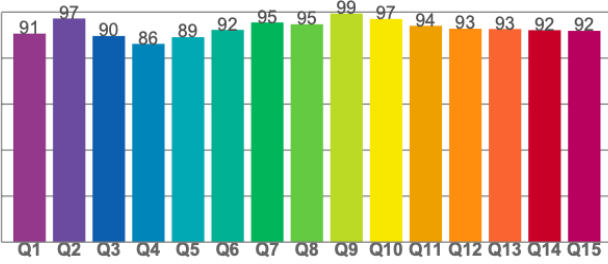
TM30 C values, 16 binned values out of total of 99 C values

C1	C2	C3	C4	C5	C6	C7	C8	C9	C10	C11	C12	C13	C14	C15	C16
90.6	93.4	93.6	92.7	91.6	95.0	90.7	91.6	88.0	84.8	86.5	89.9	91.7	88.5	88.1	87.0

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
90.6	97.2	89.6	86.2	89.1	92.3	95.5	94.7	99.4	97.0	94.0	92.8	92.6	92.1	91.8