

Tested Light Source - 1_PHOT_REFLEKTER-L-4600lmChip-3500K-38Deg-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)

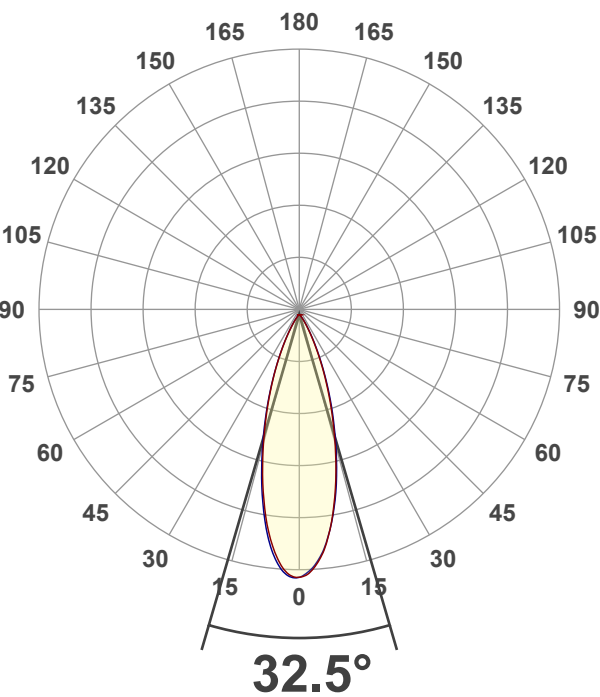
Measurement Conditions

Number of C-planes and Resolution	32 planes – 11.25°
γ (gamma)-Resolution	1.5°
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	242 V – 0.177 A
Frequency of Input Power	50 Hz

Main Light Measurement Results

Output	2531 lm
Efficiency	61 lm/W
Peak Intensity and Beam Angle	6860 cd – 32.5°
Color Rendering Index	CRI 92.6

Light Intensity Distribution



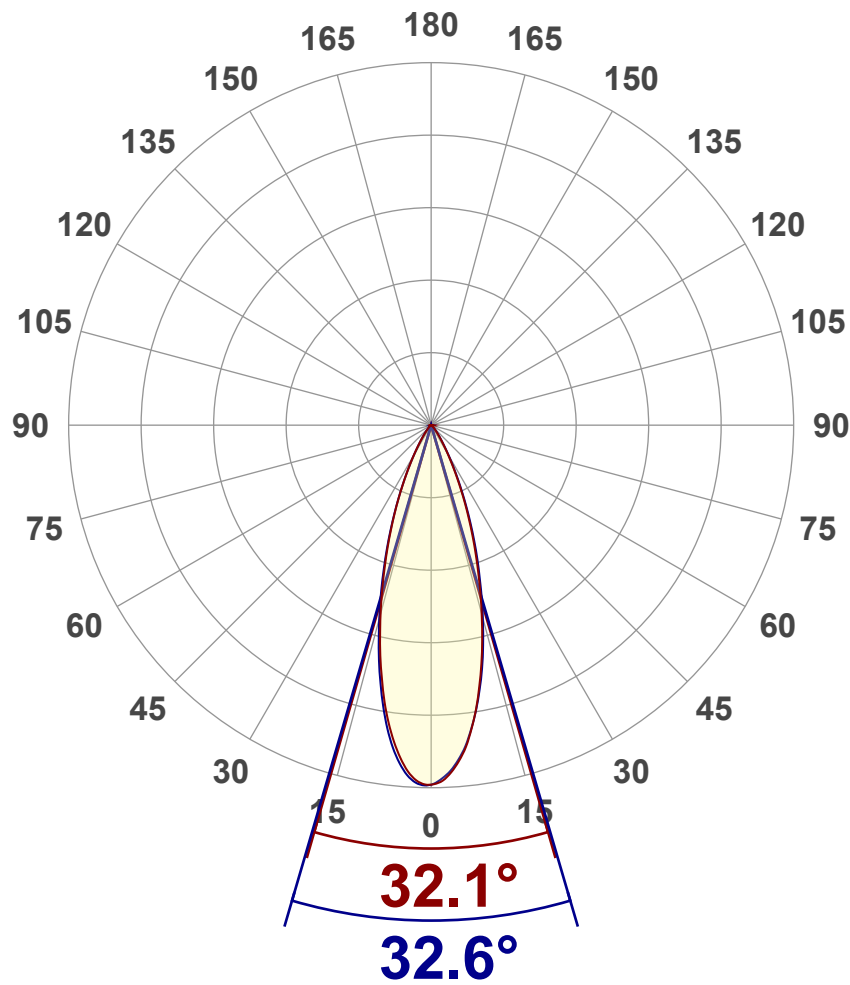
Goniophotometry Report

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Luminous Intensity diagram

Unit: 0-100% of peak intensity



Main Values

Output (total Lumen)	2531 lm
Peak Intensity	6860 cd
Beam Angle (50%)	32.5°
Beam Angle (90%)	32.6°
Beam Angle (10%)	32.1°

Cut-off Angle

Average 2,5%	77.3°
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Field Angle

Average 10%	59.6°
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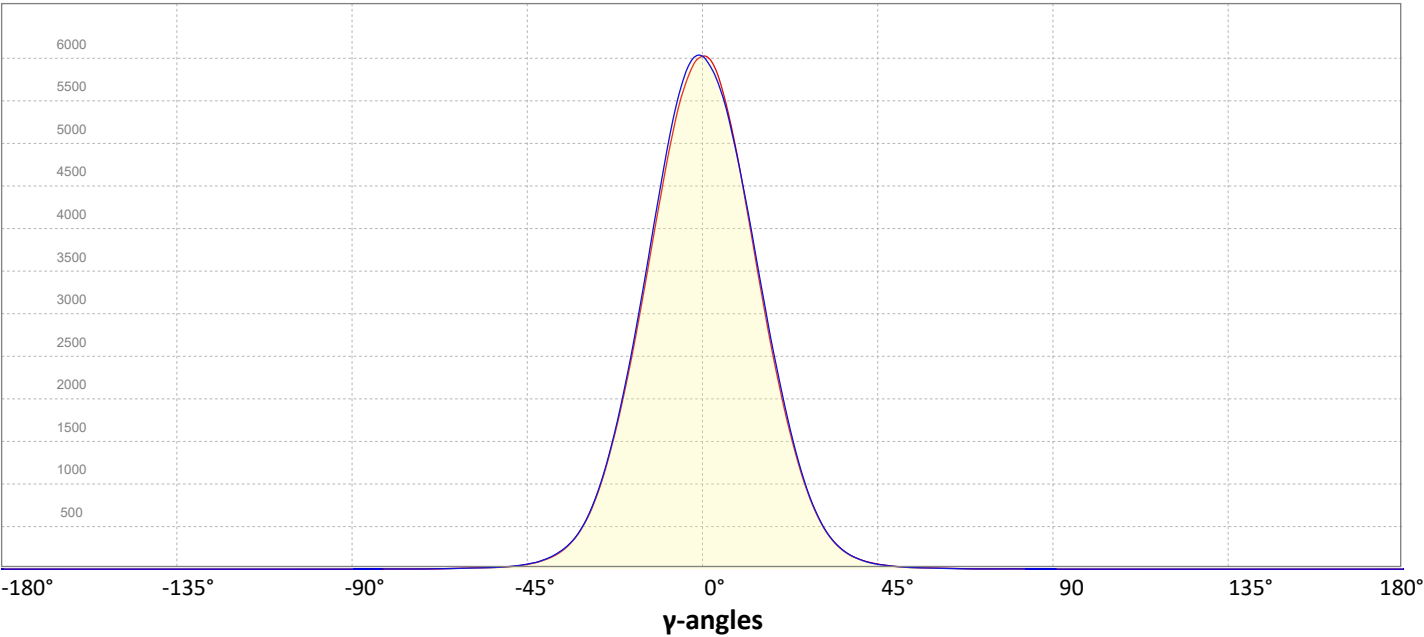
Intensity Ratio

In 120° cone	99.4%
In 90° cone	98.0%

C000-C180

C090-C270

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

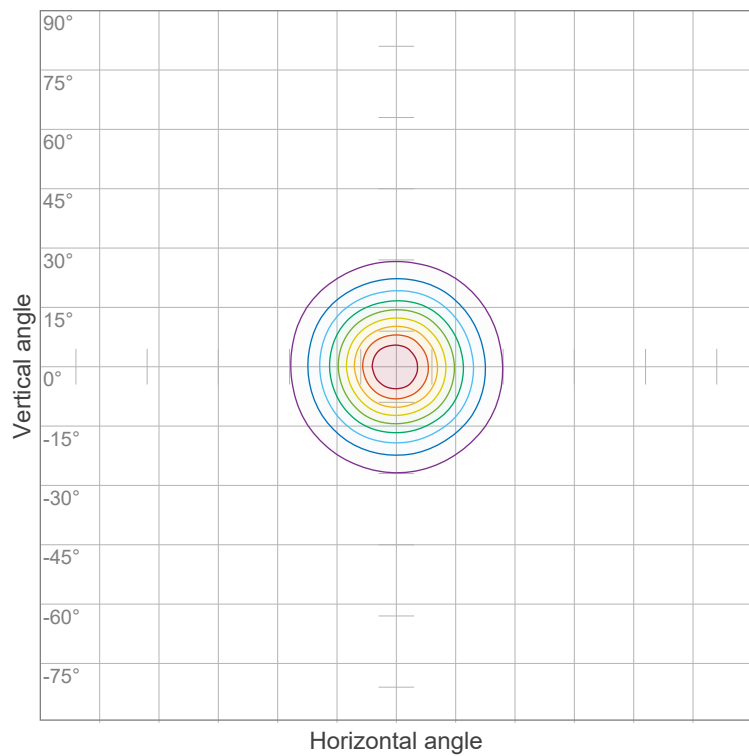


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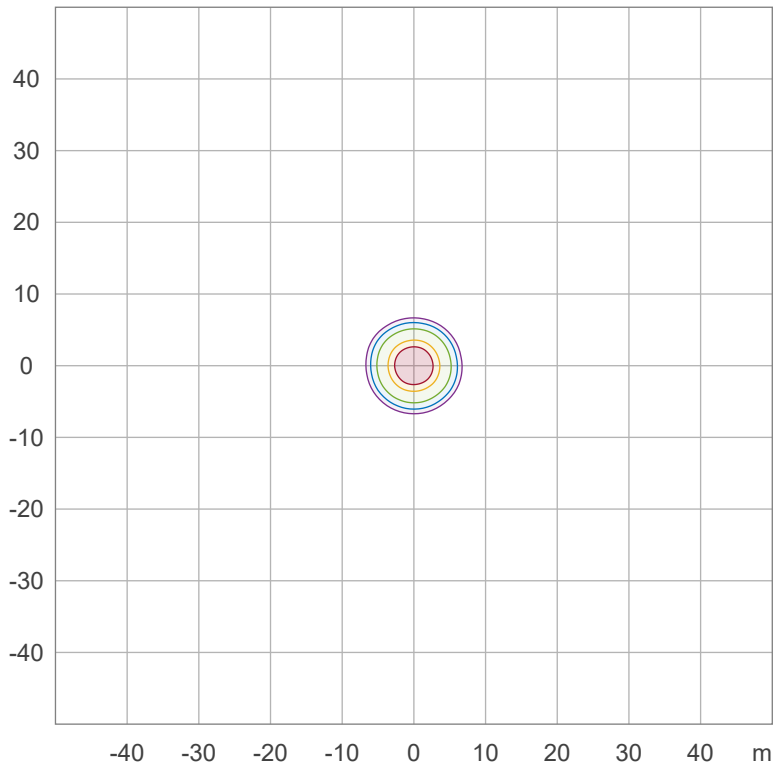
Iso-intensity Diagram (Iso-candela)



90 %	6171.3 cd
80 %	5485.6 cd
70 %	4799.9 cd
60 %	4114.2 cd
50 %	3428.5 cd
40 %	2742.8 cd
30 %	2057.1 cd
20 %	1371.4 cd
10 %	685.7 cd

Peak intensity: 6857.0 cd
Number of c-planes: 32

Iso-illuminance Diagram (Iso-lux)



50.0 %	34.3 lx
30.0 %	20.6 lx
10.0 %	6.9 lx
5.0 %	3.4 lx
3.0 %	2.1 lx

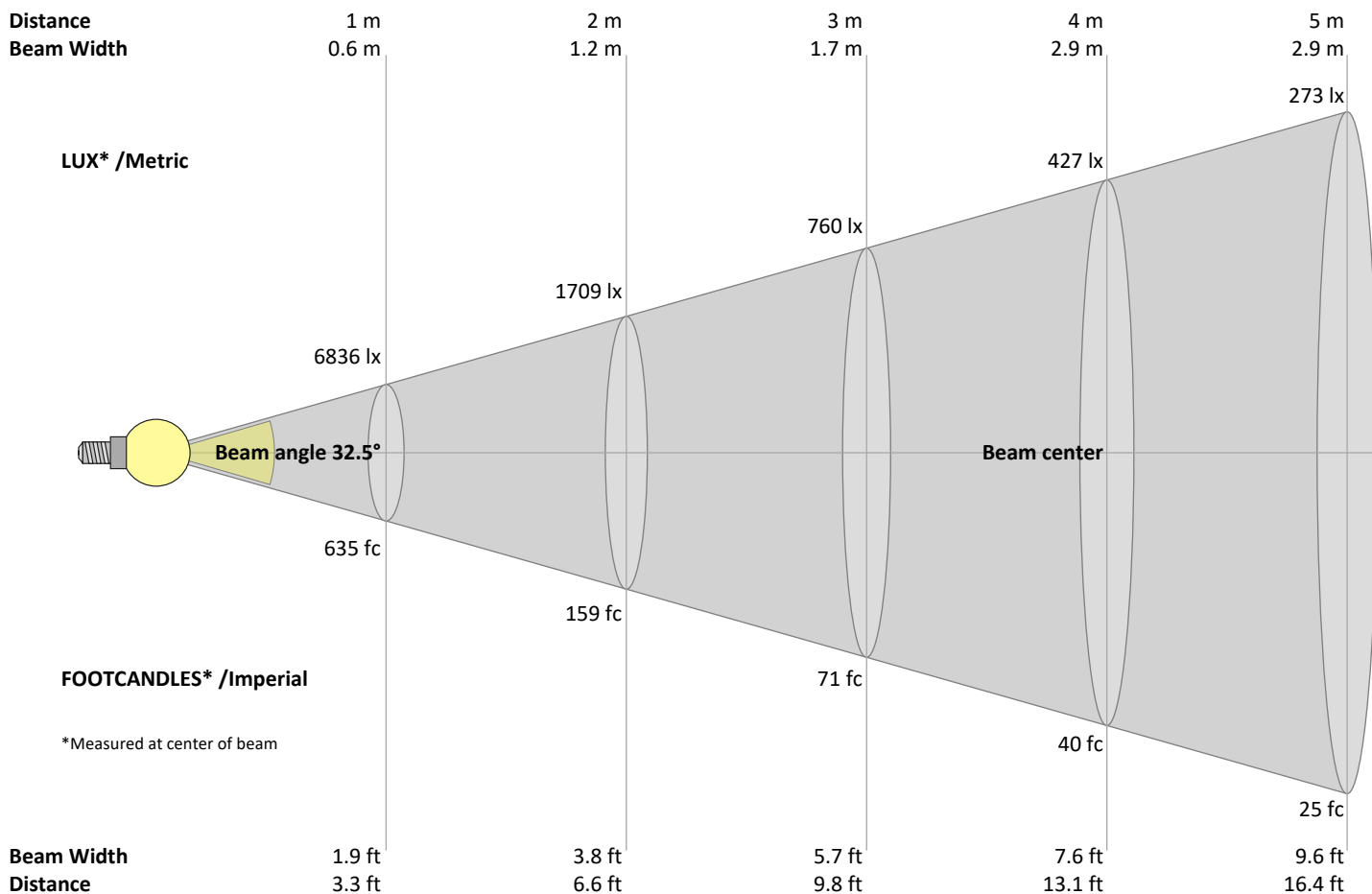
Peak illuminance: 68.5 lx
Mounting height: 10.0 m
Number of c-planes: 32

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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
6836	1709	760	427	273	190	140	107	84	68	56	47	40	35	30	27	24	21	19	17	lux
635.1	158.8	70.6	39.7	25.4	17.6	13	9.9	7.8	6.4	5.2	4.4	3.8	3.2	2.8	2.5	2.2	2	1.8	1.6	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
6836	6757	6520	6190	5723	5183	4610	4013	3430	2877	2373	1910	1508	1153	865	640	464	340	246	180	cd
100%	99%	95%	91%	84%	76%	67%	59%	50%	42%	35%	28%	22%	17%	13%	9%	7%	5%	4%	3%	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
6836	6706	6479	6160	5716	5218	4678	4092	3518	2958	2454	1981	1564	1202	906	671	486	356	257	187	cd
100%	98%	95%	90%	84%	76%	68%	60%	51%	43%	36%	29%	23%	18%	13%	10%	7%	5%	4%	3%	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
6836	6787	6579	6211	5755	5211	4621	4015	3431	2875	2376	1923	1523	1178	889	663	484	348	253	184	cd
100%	99%	96%	91%	84%	76%	68%	59%	50%	42%	35%	28%	22%	17%	13%	10%	7%	5%	4%	3%	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
6836	6827	6666	6333	5886	5333	4738	4118	3520	2945	2422	1947	1528	1174	881	647	473	345	257	190	cd
100%	100%	98%	93%	86%	78%	69%	60%	51%	43%	35%	28%	22%	17%	13%	9%	7%	5%	4%	3%	of 0°val

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LAMPS (number of lamps)

[illegible]

Outdoor Light Planning

Lumen per Zone

Zone (γ)	Lumen	% Total
0-10°	574 lm	22.7%
10-20°	1033 lm	40.8%
20-30°	633 lm	25.0%
30-40°	204 lm	8.0%
40-50°	55 lm	2.2%
50-60°	18 lm	0.7%
60-70°	8 lm	0.3%
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	2531 lm	100.0%

Intensity peaks

Max intensity	6860 cd
Intensity, 90°	0 cd
Intensity, 0°	6836 cd

Zonal Lumen summary

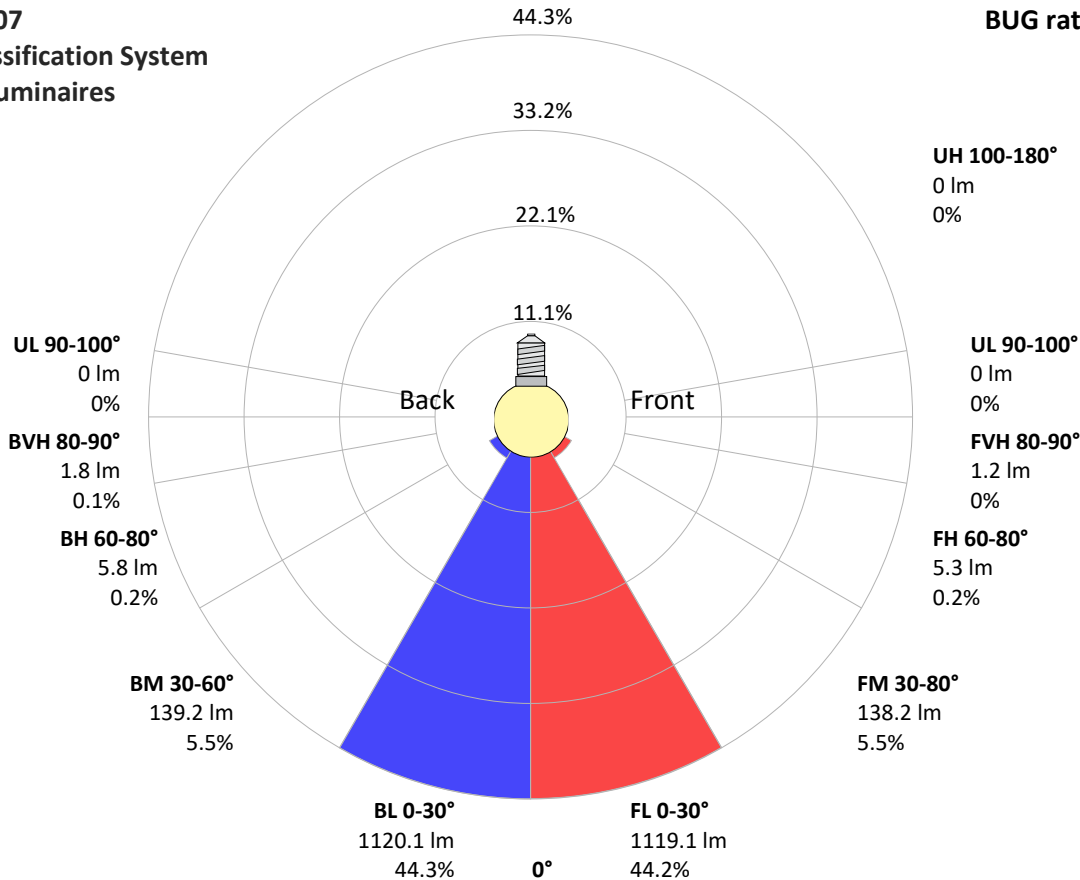
Zone (γ)	Lumen	% Total
0-30°	2240 lm	88.5%
0-40°	2444 lm	96.6%
0-60°	2517 lm	99.4%
60-90°	14 lm	0.6%
70-100°	6 lm	0.2%
90-120°	0 lm	0.0%
0-90°	2531 lm	100.0%
90-180°	0 lm	0.0%
0-180°	2531 lm	100.0%

BUG rating

	Lumen	% Total
Forward light		
Low(0-30°)	1119 lm	44.2%
Medium(30-60°)	138 lm	5.5%
High(60-80°)	5 lm	0.2%
Very high(80-90°)	1 lm	0.0%
Back light		
Low(0-30°)	1120 lm	44.3%
Medium(30-60°)	139 lm	5.5%
High(60-80°)	6 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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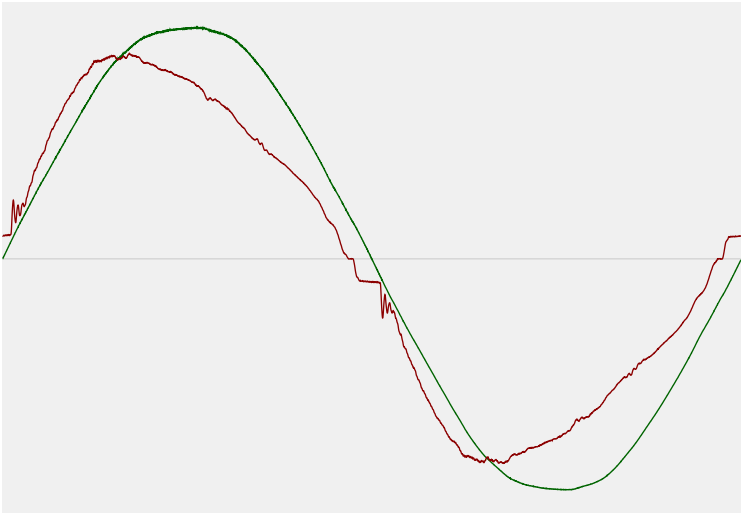


Power Details

Input Power

Power feed to light source	41.3 W
Frequency of input power	50 Hz
RMS Input voltage feed, V_{RMS}	242 V
RMS Input current feed, I_{RMS}	0.177 A
Volt-Ampere or apparent power = $V_{RMS} \cdot I_{RMS}$	42.75 VA
Displacement factor of AC power feed	0.97
Power factor of AC current feed	0.97
Total harmonic distortion of the current	11.13%
Total harmonic distortion of the voltage	1.35%

Input Power Curve



Efficiency

Radiated power efficiency	22.2%
Lumen efficiency	61 lm/W

Goniophotometry Report

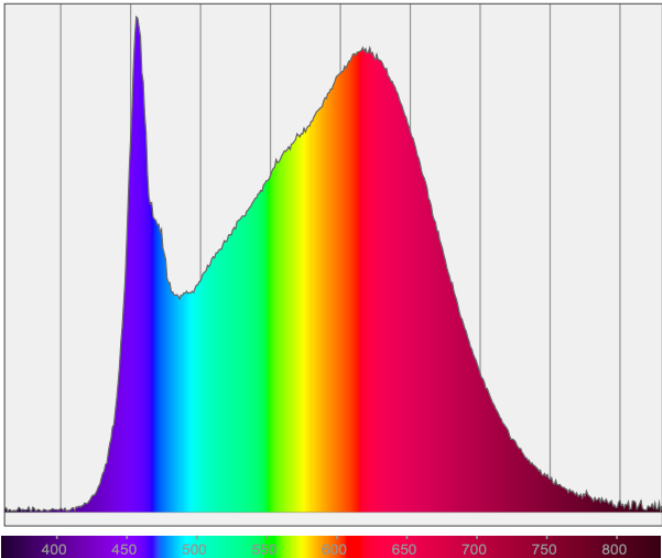
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Color Measurements

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



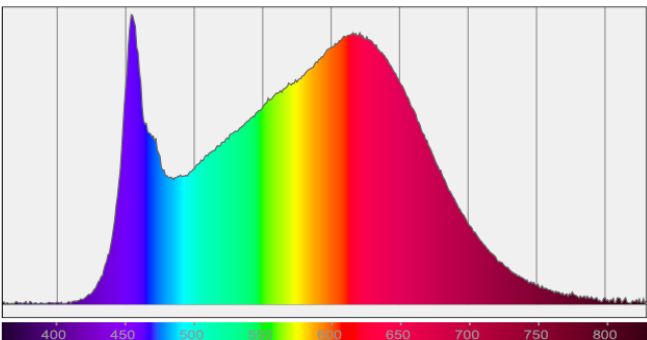
Color Rendering Index per reference color (CIE 1995)



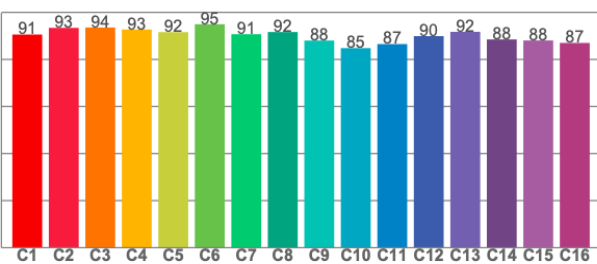
CRI R values, only R1-R8 are used to calculate final CRI value

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

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



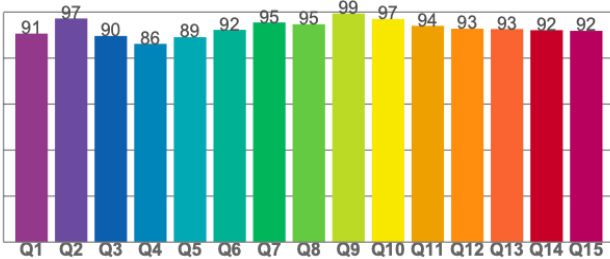
TM30-18 Rf-values per hue bin



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
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

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