

Tested Light Source - 1_PHOT_SKIN+BONES-4750lmChip-4000K-Spreader-HoneycombLouve_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)

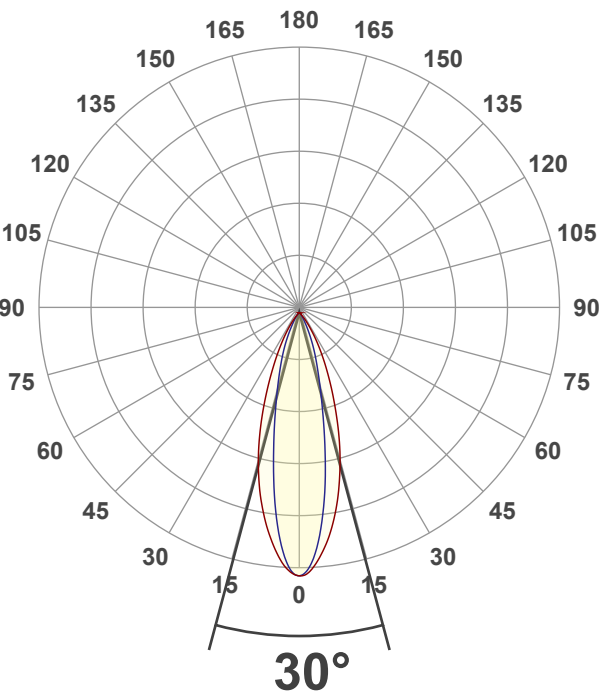
Measurement Conditions

Number of C-planes and Resolution	16 planes – 22.5°
γ (gamma)-Resolution	1°
Test Distance	1.50 m
Input Power, Power and Displ. Factors	41.4 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	2413 lm
Efficiency	58 lm/W
Peak Intensity and Beam Angle	6592 cd – 30°
Color Rendering Index	CRI 92.6

Light Intensity Distribution



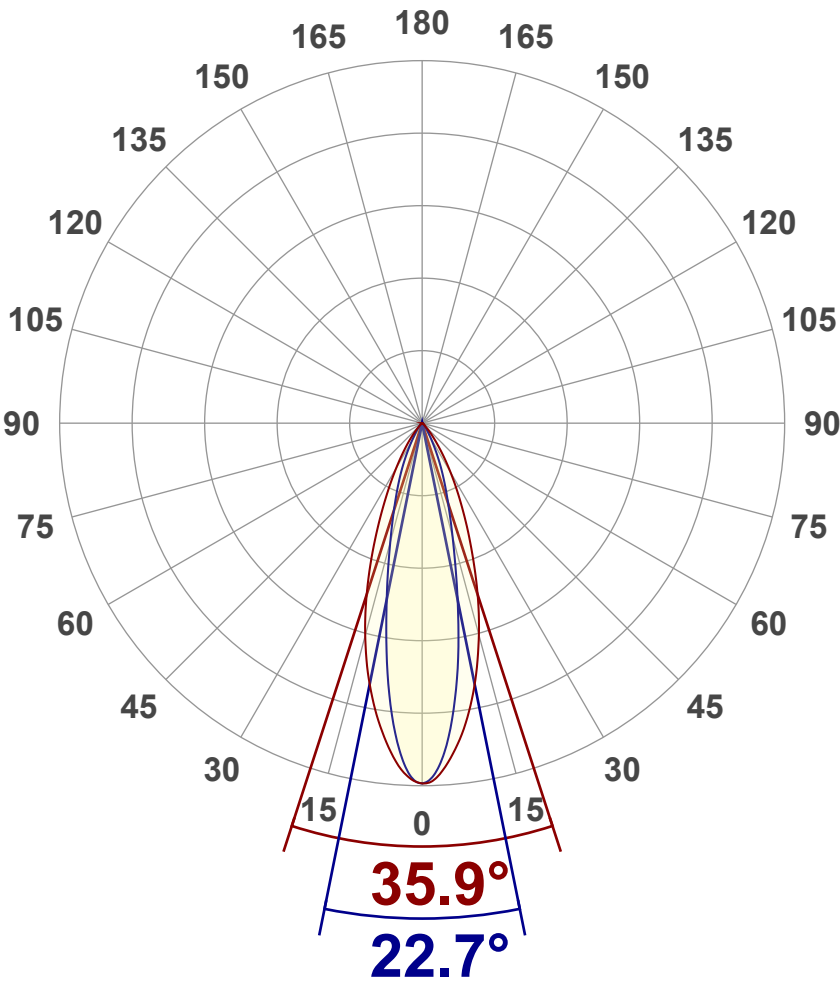
Goniophotometry Report

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Luminous Intensity diagram

Unit: 0-100% of peak intensity



Main Values

Output (total Lumen)	2413 lm
Peak Intensity	6592 cd
Beam Angle (50%)	30°
Beam Angle (90%)	22.7°
Beam Angle (10%)	35.9°

Cut-off Angle

Average 2,5%	78.9°
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Field Angle

Average 10%	59.9°
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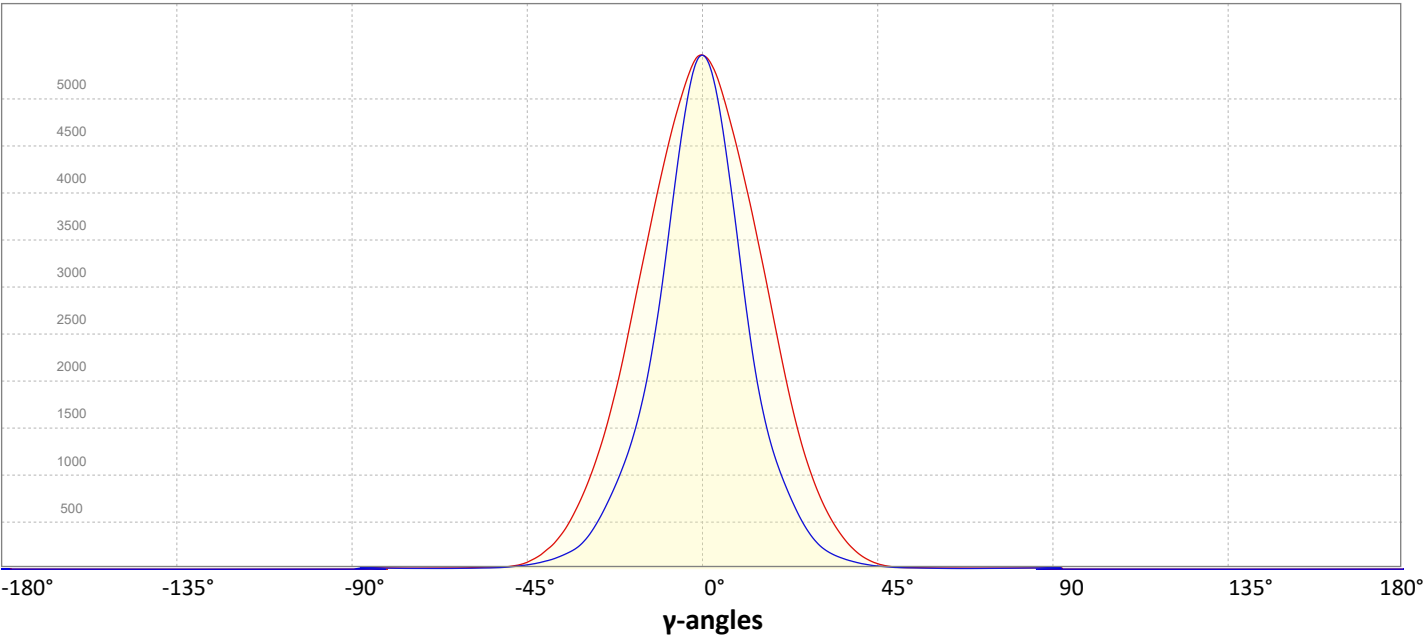
Intensity Ratio

In 120° cone	98.2%
In 90° cone	96.5%

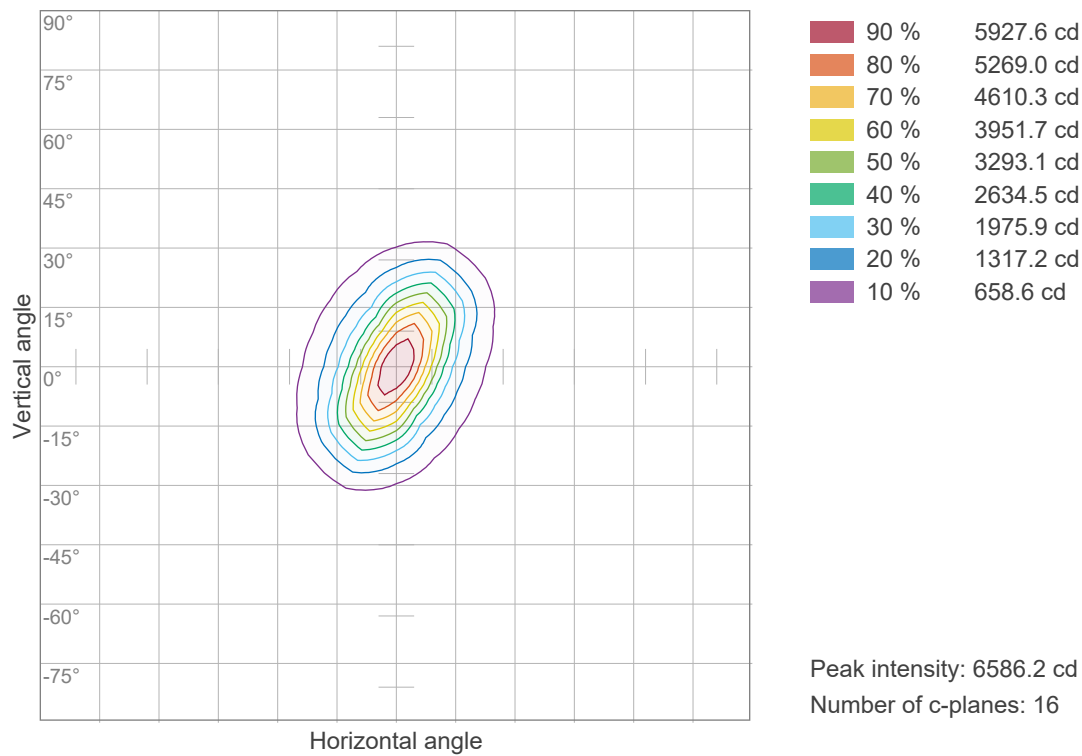
C000-C180

C090-C270

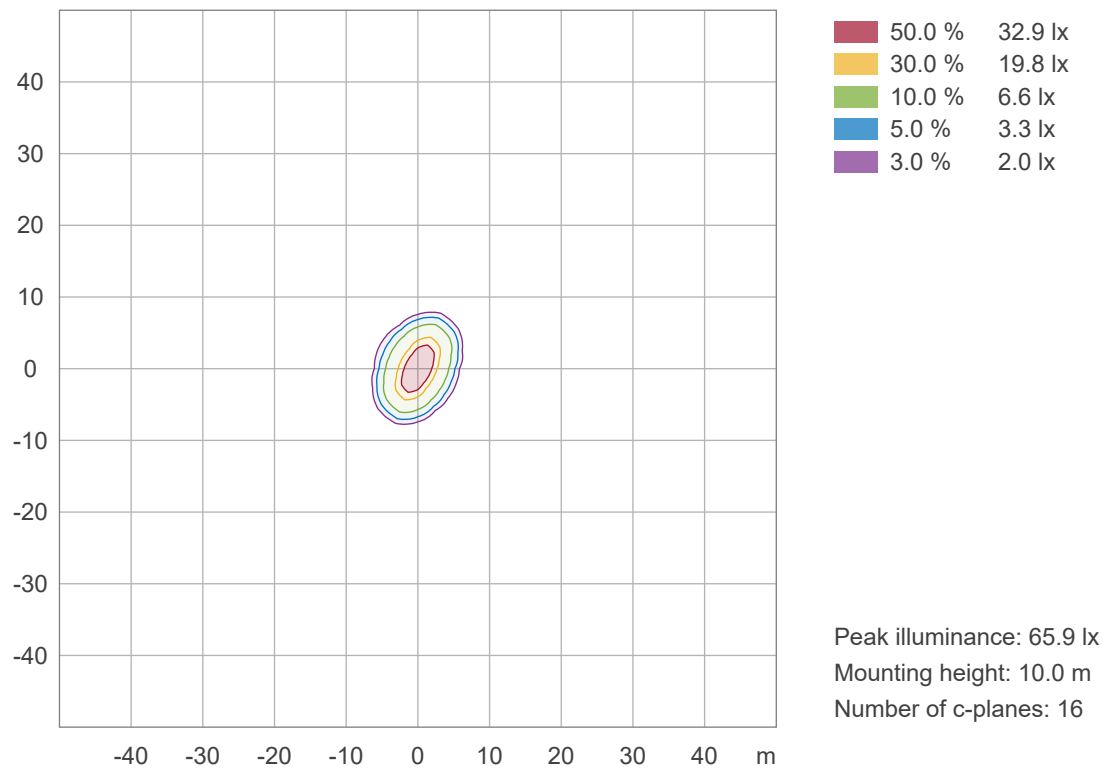
Linear distribution diagram - Intensity (candela) vs γ-angle



Iso-intensity Diagram (Iso-candela)



Iso-illuminance Diagram (Iso-lux)

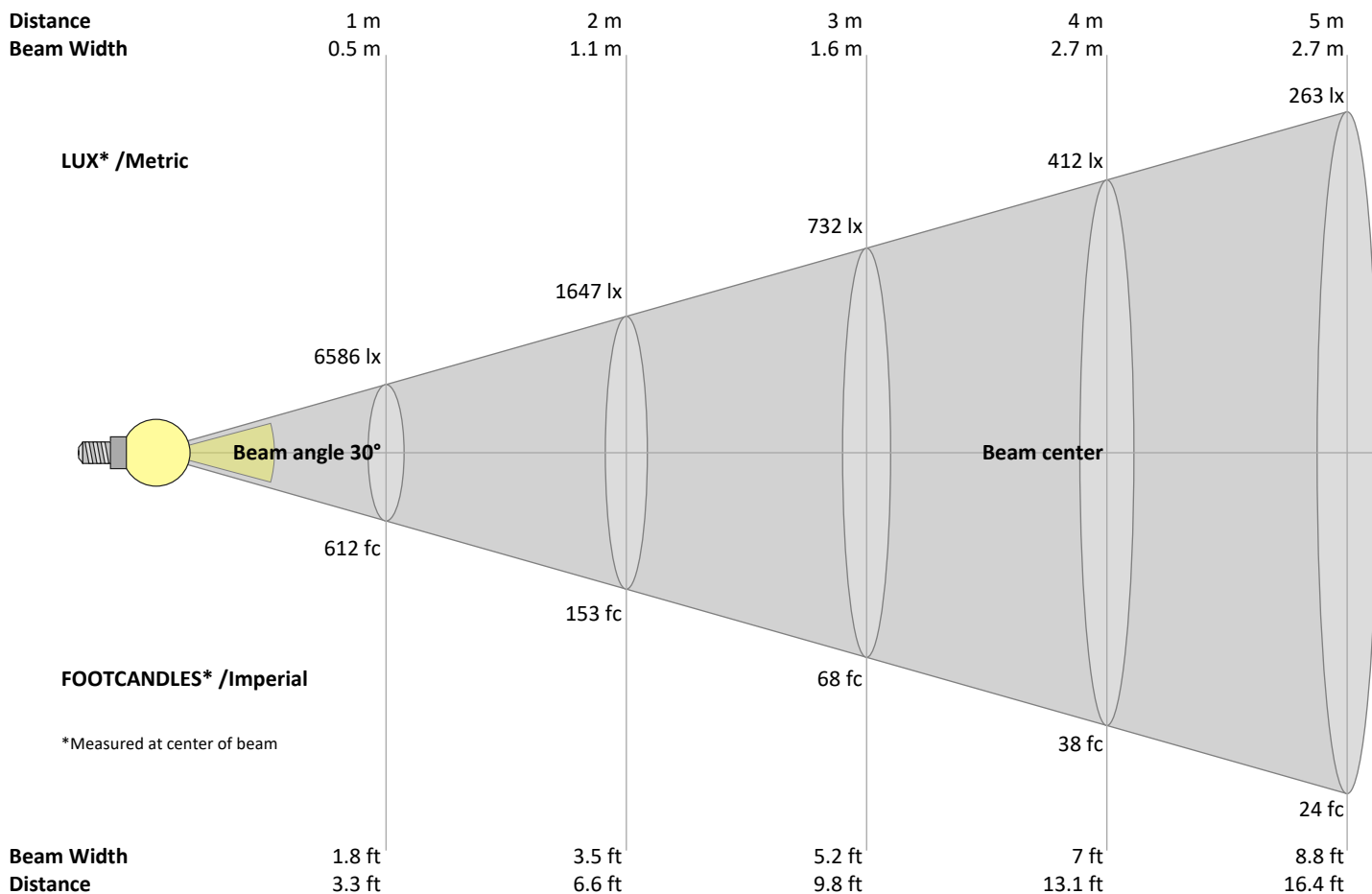


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Beam Details



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
6586	1647	732	412	263	183	134	103	81	66	54	46	39	34	29	26	23	20	18	16	lux
611.9	153	68	38.2	24.5	17	12.5	9.6	7.6	6.1	5.1	4.2	3.6	3.1	2.7	2.4	2.1	1.9	1.7	1.5	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
6586	6516	6276	5959	5595	5178	4728	4248	3771	3279	2790	2343	1948	1600	1300	1039	814	620	462	338	cd
100%	99%	95%	90%	85%	79%	72%	64%	57%	50%	42%	36%	30%	24%	20%	16%	12%	9%	7%	5%	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
6586	6426	5997	5363	4624	3824	3064	2419	1922	1537	1240	989	767	576	423	309	231	178	138	107	cd
100%	98%	91%	81%	70%	58%	47%	37%	29%	23%	19%	15%	12%	9%	6%	5%	4%	3%	2%	2%	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
6586	6494	6271	5945	5572	5165	4732	4264	3782	3279	2779	2304	1879	1513	1209	951	736	560	415	295	cd
100%	99%	95%	90%	85%	78%	72%	65%	57%	50%	42%	35%	29%	23%	18%	14%	11%	8%	6%	4%	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
6586	6441	5987	5336	4571	3782	3087	2502	2039	1669	1369	1116	893	692	520	383	285	222	175	136	cd
100%	98%	91%	81%	69%	57%	47%	38%	31%	25%	21%	17%	14%	11%	8%	6%	4%	3%	3%	2%	of 0°val

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LAMPS (number of lamps)

[illegible]

Outdoor Light Planning

Lumen per Zone

Zone (γ)	Lumen	% Total
0-10°	518 lm	21.5%
10-20°	877 lm	36.3%
20-30°	622 lm	25.8%
30-40°	261 lm	10.8%
40-50°	71 lm	2.9%
50-60°	19 lm	0.8%
60-70°	12 lm	0.5%
70-80°	14 lm	0.6%
80-90°	16 lm	0.7%
90-100°	2 lm	0.1%
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	2413 lm	100.0%

Intensity peaks

Max intensity	6592 cd
Intensity, 90°	0 cd
Intensity, 0°	6586 cd

Zonal Lumen summary

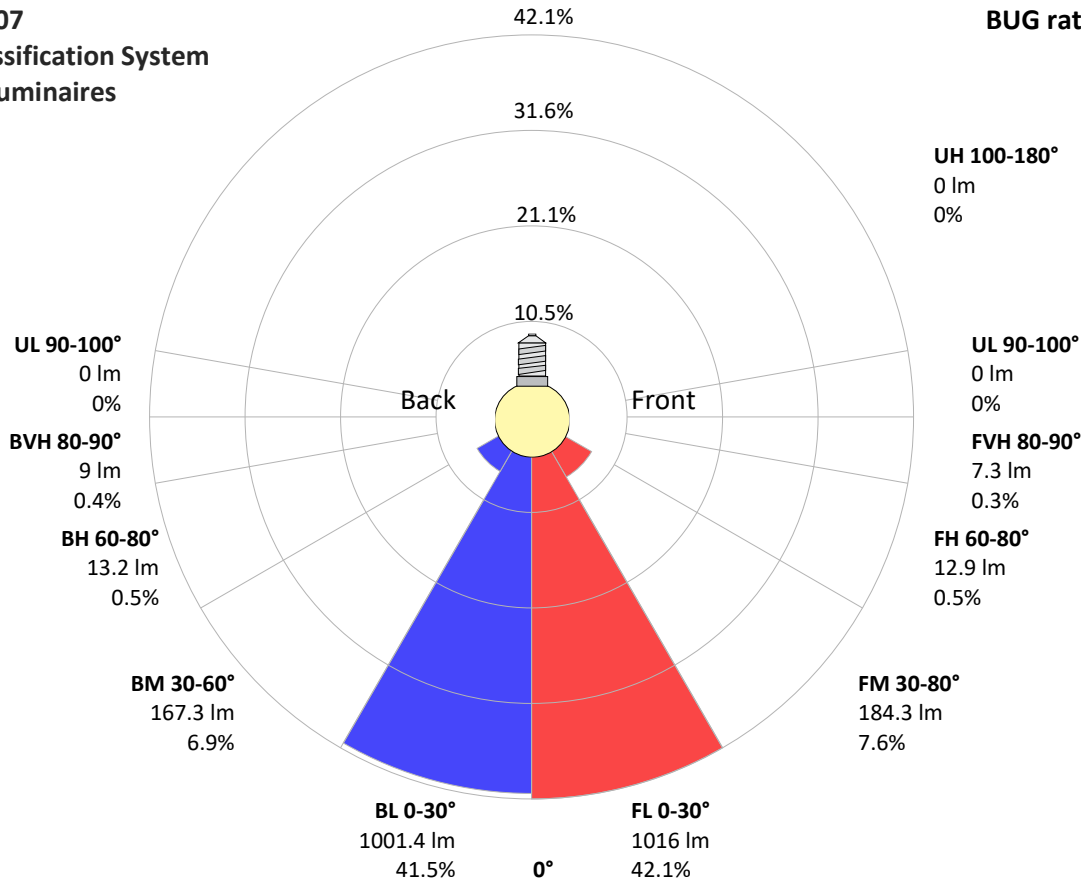
Zone (γ)	Lumen	% Total
0-30°	2017 lm	83.6%
0-40°	2279 lm	94.4%
0-60°	2369 lm	98.2%
60-90°	42 lm	1.8%
70-100°	32 lm	1.3%
90-120°	2 lm	0.1%
0-90°	2411 lm	99.9%
90-180°	2 lm	0.1%
0-180°	2413 lm	100.0%

BUG rating

	Lumen	% Total
Forward light		
Low(0-30°)	1016 lm	42.1%
Medium(30-60°)	184 lm	7.6%
High(60-80°)	13 lm	0.5%
Very high(80-90°)	7 lm	0.3%
Back light		
Low(0-30°)	1001 lm	41.5%
Medium(30-60°)	167 lm	6.9%
High(60-80°)	13 lm	0.5%
Very high(80-90°)	9 lm	0.4%
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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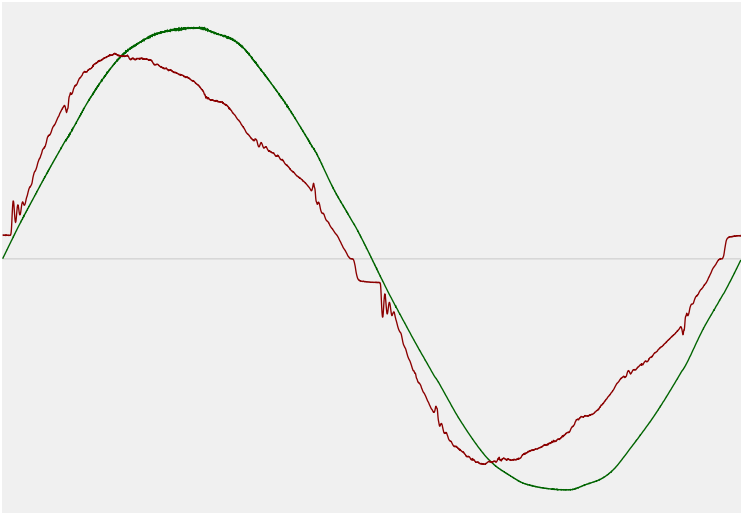


Power Details

Input Power

Power feed to light source	41.4 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 = $V_{RMS} * I_{RMS}$	42.82 VA
Displacement factor of AC power feed	0.97
Power factor of AC current feed	0.97
Total harmonic distortion of the current	11.06%
Total harmonic distortion of the voltage	1.26%

Input Power Curve



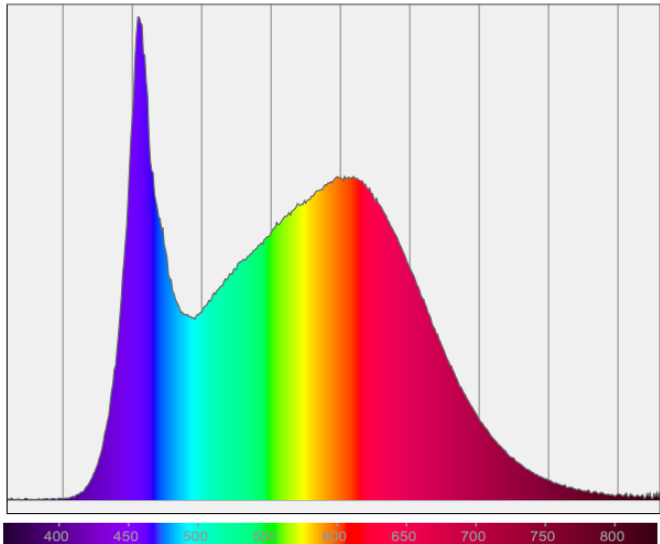
Efficiency

Radiated power efficiency	21.1%
Lumen efficiency	58 lm/W

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

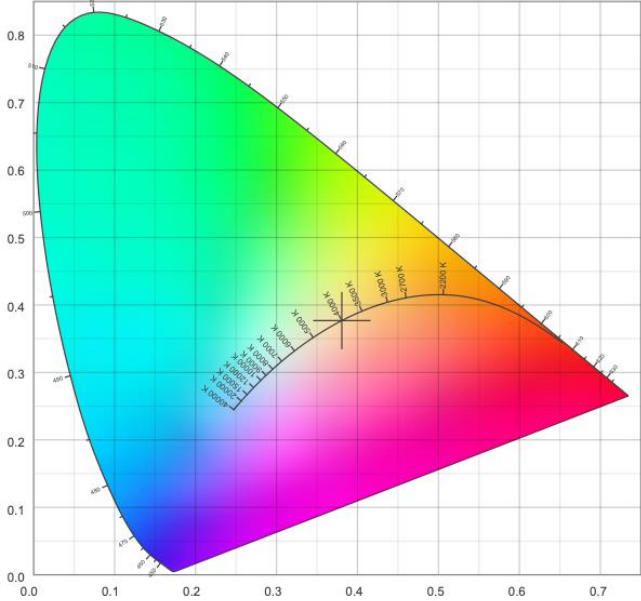
Correlated Color Temperature	CCT = 4000 K	Color coordinates CIE 1931	(x;y) = (0.381;0.377)
Color Rendering Index	CRI 92.6	Color coordinate CIEs 1960	(u;v) = (0.225;0.334)
Color Rendering Index, R9 (red component)	R9 = 72.2	Color deviation from BBL	Duv = ±0.0003
Color Rendering TM30-18	R _f 88.9 – R _g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

Goniophotometry Report

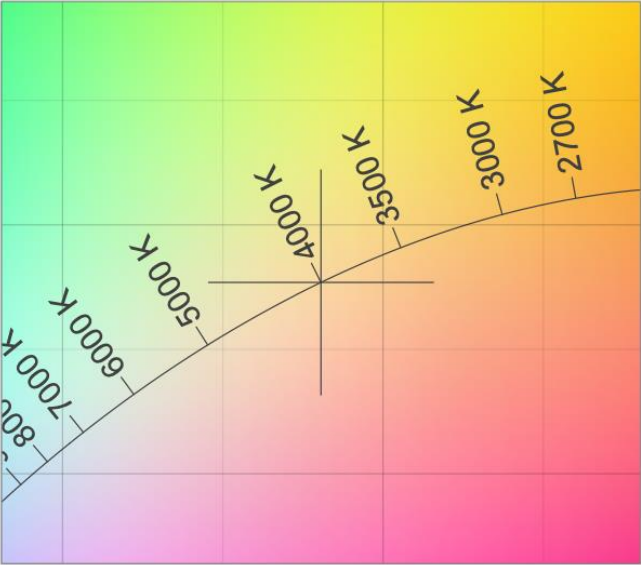
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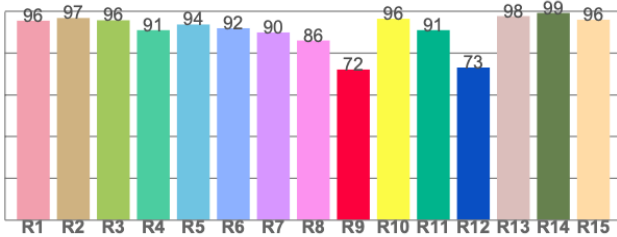
CIE 1931



CIE 1931 – zoomed on Planckian locus



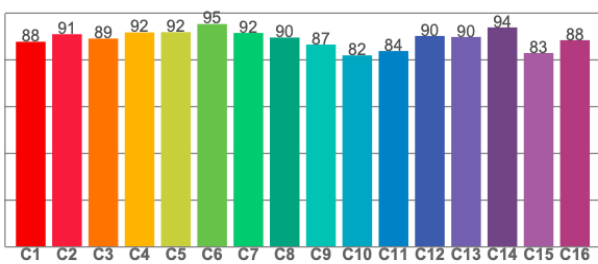
Color Rendering Index per reference color (CIE 1995)



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

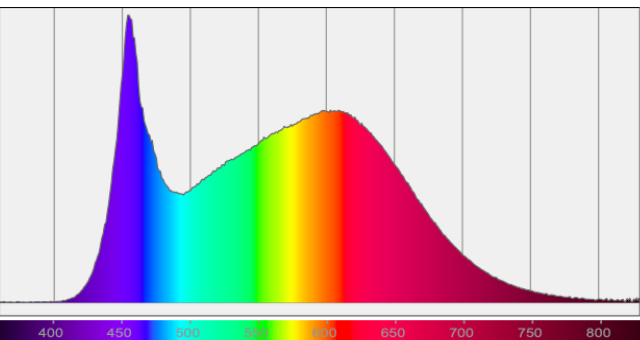
TM30-18 Rf-values per hue bin



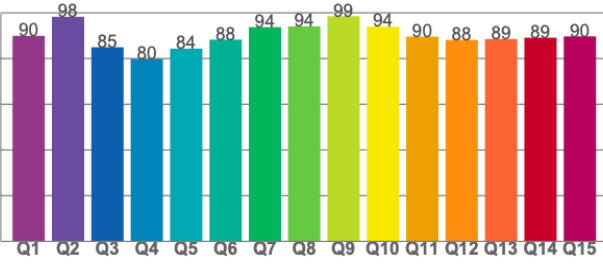
TM30 C values, 16 binned values out of total of 99 C values

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