

Goniophotometry Report

1_PHOT_SKIN+BONES-4300lmChip-3000K-38Deg_2303
www.factorylux.com



Tested Light Source - 1_PHOT_SKIN+BONES-4300lmChip-3000K-38Deg_2303

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

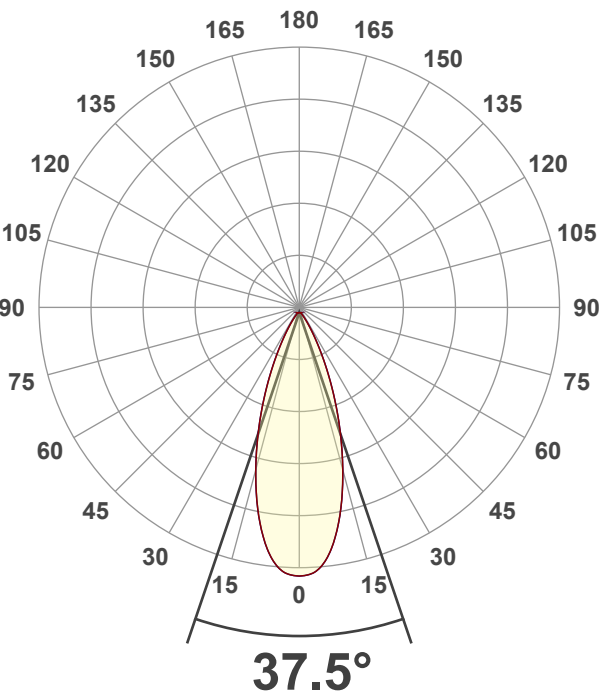
4 planes – 90°
1.5°
1.50 m
41.4 W – PF 0.97 – DPF 0.97
243 V – 0.176 A
50 Hz

Main Light Measurement Results

Output
Efficiency
Peak Intensity and Beam Angle
Color Rendering Index

3707 lm
90 lm/W
7343 cd – 37.5°
CRI 92.6

Light Intensity Distribution



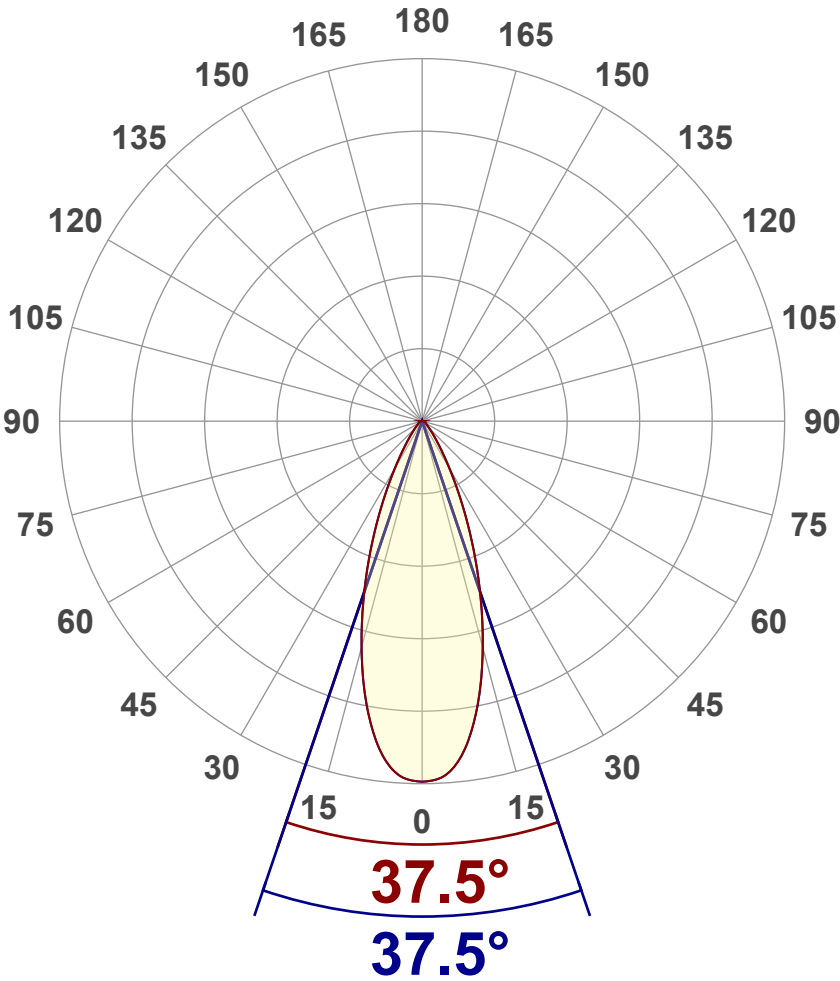
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Luminous Intensity diagram

Unit: 0-100% of peak intensity



Main Values

Output (total Lumen)	3707 lm
Peak Intensity	7343 cd
Beam Angle (50%)	37.5°
Beam Angle (90%)	37.5°
Beam Angle (10%)	37.5°

Cut-off Angle

Average 2,5%	92.4°
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Field Angle

Average 10%	66.6°
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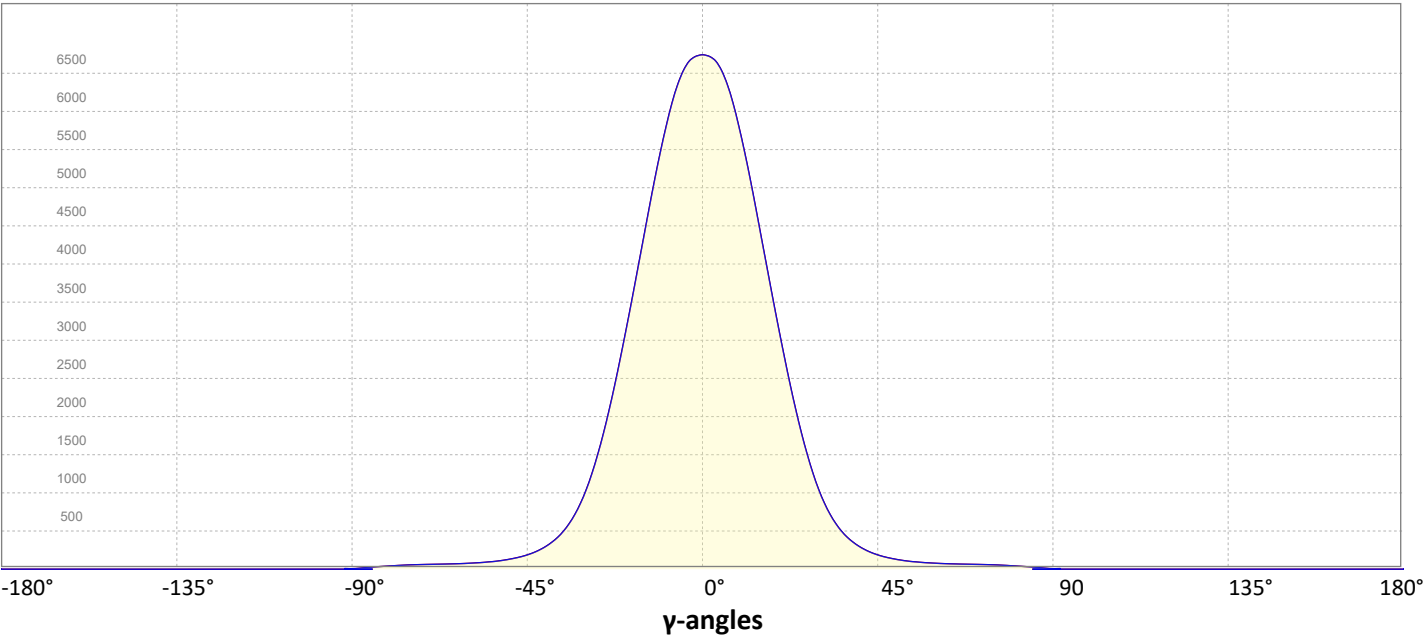
Intensity Ratio

In 120° cone	95.5%
In 90° cone	91.1%

C000-C180

C090-C270

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

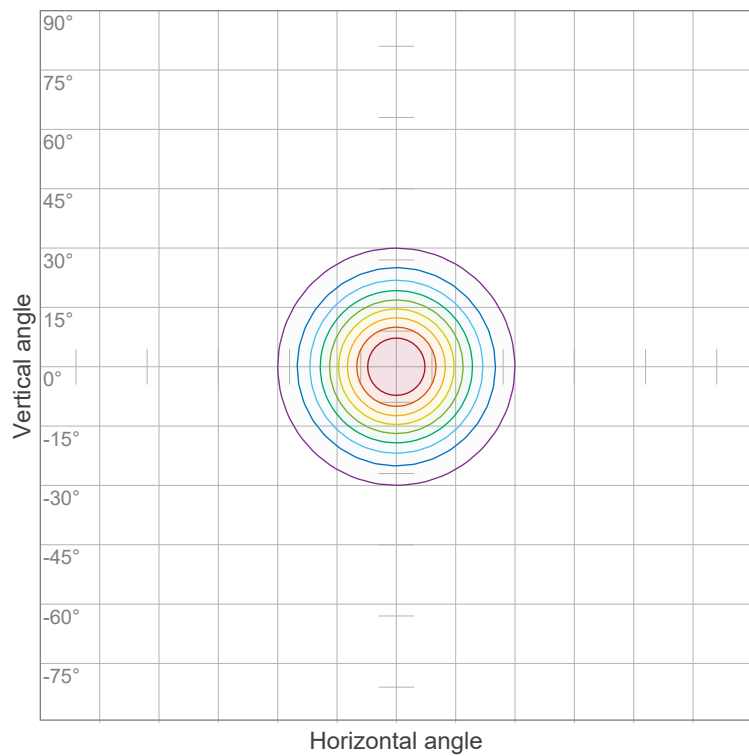


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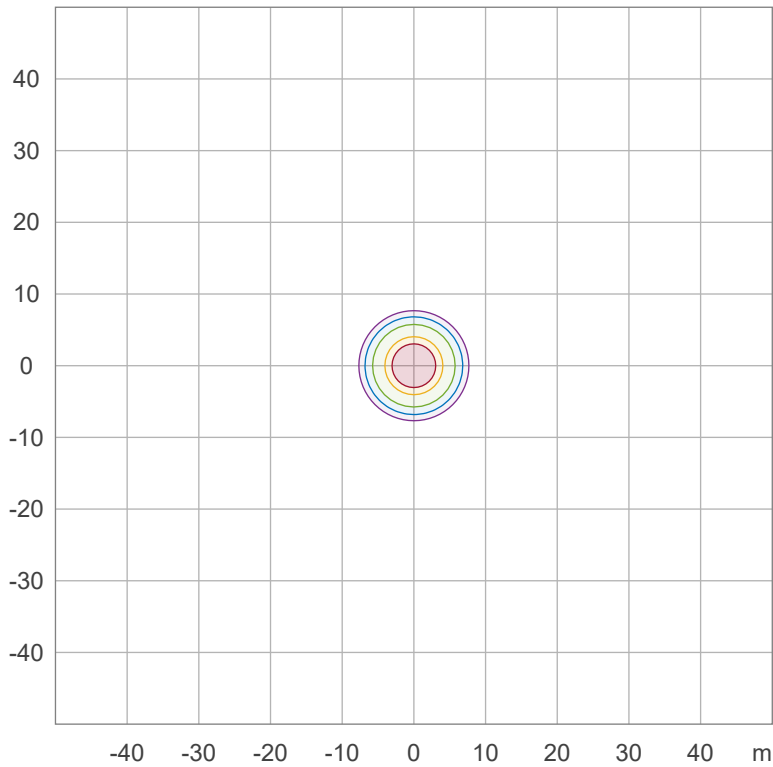
Iso-intensity Diagram (Iso-candela)



90 %	6608.5 cd
80 %	5874.2 cd
70 %	5139.9 cd
60 %	4405.7 cd
50 %	3671.4 cd
40 %	2937.1 cd
30 %	2202.8 cd
20 %	1468.6 cd
10 %	734.3 cd

Peak intensity: 7342.8 cd
Number of c-planes: 4

Iso-illuminance Diagram (Iso-lux)



50.0 %	36.7 lx
30.0 %	22.0 lx
10.0 %	7.3 lx
5.0 %	3.7 lx
3.0 %	2.2 lx

Peak illuminance: 73.4 lx
Mounting height: 10.0 m
Number of c-planes: 4

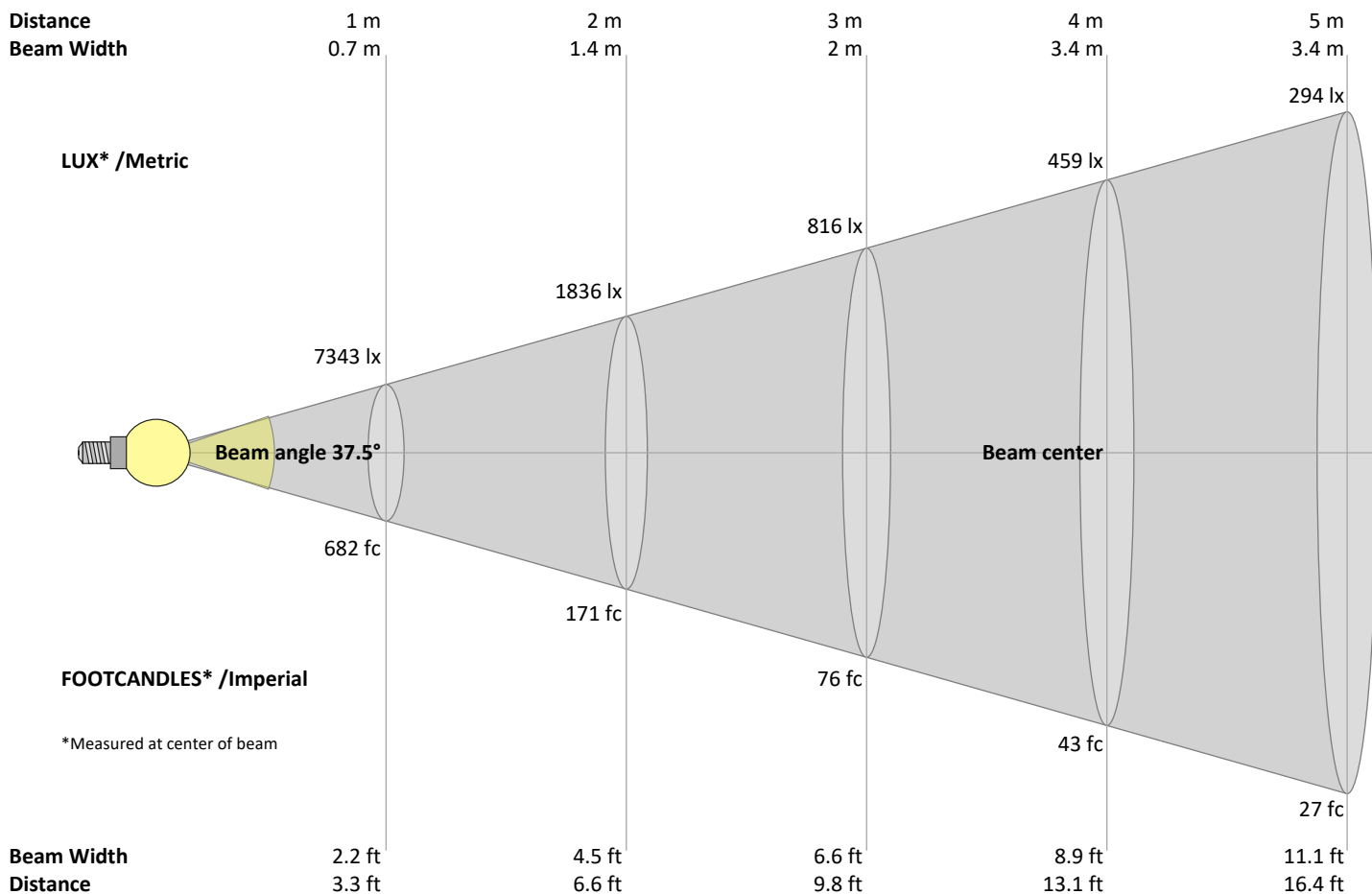
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Beam Details



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
7343	1836	816	459	294	204	150	115	91	73	61	51	43	37	33	29	25	23	20	18	lux
682.2	170.5	75.8	42.6	27.3	18.9	13.9	10.7	8.4	6.8	5.6	4.7	4	3.5	3	2.7	2.4	2.1	1.9	1.7	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
7343	7316	7202	6971	6620	6159	5638	5065	4473	3883	3315	2771	2268	1823	1437	1116	867	672	525	417	cd
100%	100%	98%	95%	90%	84%	77%	69%	61%	53%	45%	38%	31%	25%	20%	15%	12%	9%	7%	6%	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
7343	7316	7202	6971	6620	6159	5638	5065	4473	3883	3315	2771	2268	1823	1437	1116	867	672	525	417	cd
100%	100%	98%	95%	90%	84%	77%	69%	61%	53%	45%	38%	31%	25%	20%	15%	12%	9%	7%	6%	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
7343	7316	7202	6971	6620	6159	5638	5065	4473	3883	3315	2771	2268	1823	1437	1116	867	672	525	417	cd
100%	100%	98%	95%	90%	84%	77%	69%	61%	53%	45%	38%	31%	25%	20%	15%	12%	9%	7%	6%	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
7343	7316	7202	6971	6620	6159	5638	5065	4473	3883	3315	2771	2268	1823	1437	1116	867	672	525	417	cd
100%	100%	98%	95%	90%	84%	77%	69%	61%	53%	45%	38%	31%	25%	20%	15%	12%	9%	7%	6%	of 0°val

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Light Planning – UGR table

Uncorrected, comprehensive UGR table according to 117-1995

Reflectances											
	p Ceiling	70	70	50	50	30	70	70	50	50	30
	p Walls	50	30	50	30	30	50	30	50	30	30
	p Floor	20	20	20	20	20	20	20	20	20	20
Room size		Viewed Crosswise					Viewed Endwise				
H = mounting height above eye level		(Viewing direction orthogonal to lamp length axis)					(Viewing direction parallel to lamp length axis)				
X	Y										
2H	2H	21.4	22.0	21.5	22.2	22.4	21.4	22.0	21.5	22.2	22.4
	3H	22.2	22.9	22.6	23.2	23.3	22.2	22.9	22.6	23.2	23.3
	4H	22.8	23.6	23.2	23.8	24.0	22.8	23.6	23.2	23.8	24.0
	6H	23.6	24.2	23.8	24.4	24.8	23.6	24.2	23.8	24.4	24.8
	8H	23.8	24.4	24.1	24.7	25.1	23.8	24.4	24.1	24.7	25.1
	12H	24.0	24.5	24.3	24.9	25.3	24.0	24.5	24.3	24.9	25.3
4H	2H	21.5	22.2	21.9	22.5	22.7	21.5	22.2	21.9	22.5	22.7
	3H	22.8	23.4	23.2	23.8	24.2	22.8	23.4	23.2	23.8	24.2
	4H	23.6	24.1	24.0	24.6	25.1	23.6	24.1	24.0	24.6	25.1
	6H	24.4	25.0	24.9	25.3	25.7	24.4	25.0	24.9	25.3	25.7
	8H	24.8	25.3	25.3	25.6	26.0	24.8	25.3	25.3	25.6	26.0
	12H	25.0	25.4	25.5	25.8	26.3	25.0	25.4	25.5	25.8	26.3
8H	4H	24.0	24.5	24.5	24.8	25.2	24.0	24.5	24.5	24.8	25.2
	6H	25.0	25.3	25.5	25.8	26.3	25.0	25.3	25.5	25.8	26.3
	8H	25.5	25.7	26.0	26.3	26.9	25.5	25.7	26.0	26.3	26.9
	12H	25.8	26.0	26.4	26.5	27.2	25.8	26.0	26.4	26.5	27.2
12H	4H	24.0	24.4	24.5	24.8	25.3	24.0	24.4	24.5	24.8	25.3
	6H	25.1	25.4	25.6	25.9	26.6	25.1	25.4	25.6	25.9	26.6
	8H	25.6	25.8	26.2	26.3	26.9	25.6	25.8	26.2	26.3	26.9

Variations with the observer position for the luminaire spacings, S:

S = 1.0H	0.9 / -0.4	0.9 / -0.4
S = 1.5H	2.0 / -0.5	2.0 / -0.5
S = 2.0H	3.2 / -0.7	3.2 / -0.7

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	113	110	108	105	111	108	106	104	104	102	100	100	99	97	97	96	95	93
2	108	103	99	95	105	101	97	94	98	95	92	95	92	90	92	90	88	87
3	103	96	91	87	101	95	90	87	92	88	85	90	87	84	88	85	83	81
4	98	91	85	81	96	89	84	81	87	83	80	85	82	79	83	80	78	76
5	94	86	80	76	92	85	79	75	83	78	75	81	77	74	80	76	73	72
6	89	81	75	71	88	80	75	71	79	74	71	77	73	70	76	72	70	68
7	86	77	71	67	84	76	71	67	75	70	67	74	70	67	73	69	66	65
8	82	73	68	64	81	73	68	64	72	67	64	71	66	63	70	66	63	62
9	79	70	65	61	78	70	64	61	69	64	61	68	63	60	67	63	60	59
10	76	67	62	58	75	67	61	58	66	61	58	65	61	58	64	60	58	56

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LAMPS (number of lamps)

[illegible]

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Outdoor Light Planning

Lumen per Zone

Zone (°)	Lumen	% Total
0-10°	649 lm	17.5%
10-20°	1304 lm	35.2%
20-30°	938 lm	25.3%
30-40°	390 lm	10.5%
40-50°	164 lm	4.4%
50-60°	94 lm	2.5%
60-70°	74 lm	2.0%
70-80°	63 lm	1.7%
80-90°	30 lm	0.8%
90-100°	2 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	3707 lm	100.0%

Intensity peaks

Max intensity	7343 cd
Intensity, 90°	8 cd
Intensity, 0°	7343 cd

Zonal Lumen summary

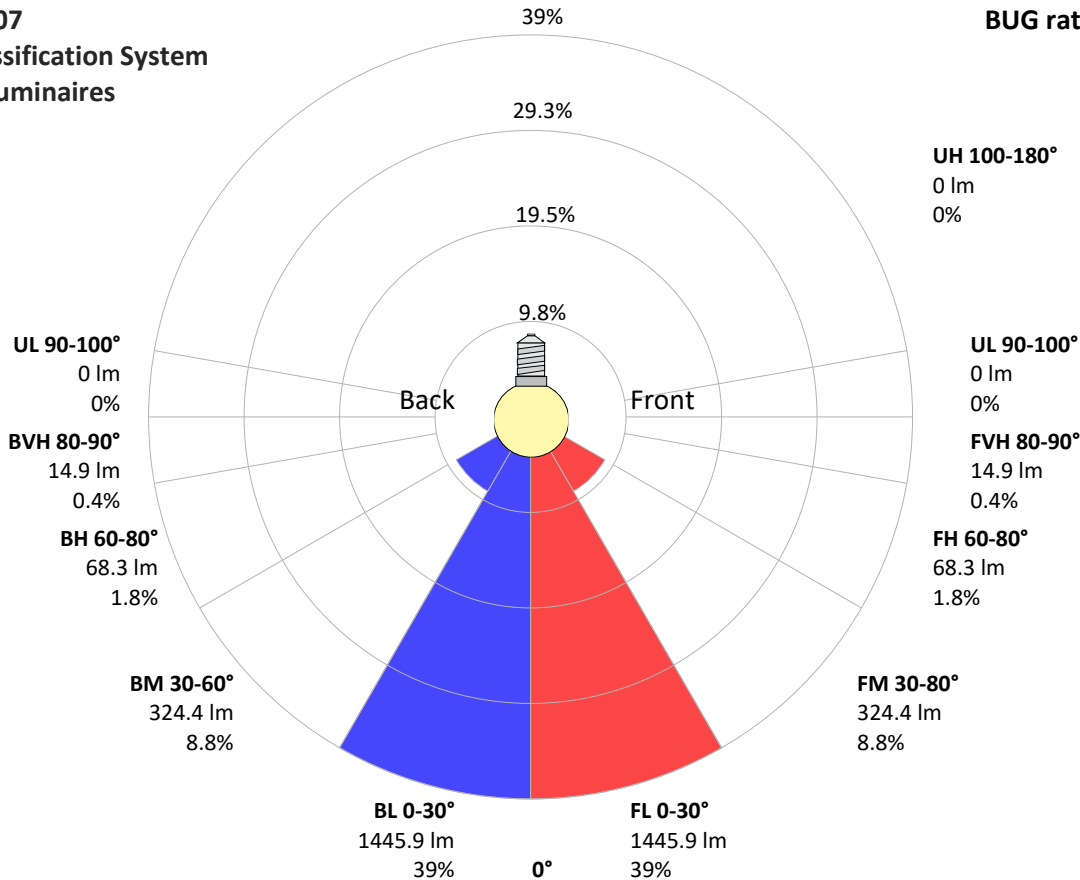
Zone (°)	Lumen	% Total
0-30°	2891 lm	78.0%
0-40°	3281 lm	88.5%
0-60°	3539 lm	95.5%
60-90°	166 lm	4.5%
70-100°	94 lm	2.5%
90-120°	2 lm	0.0%
0-90°	3705 lm	100.0%
90-180°	2 lm	0.0%
0-180°	3707 lm	100.0%

BUG rating

	Lumen	% Total
Forward light		
Low(0-30°)	1446 lm	39.0%
Medium(30-60°)	324 lm	8.8%
High(60-80°)	68 lm	1.8%
Very high(80-90°)	15 lm	0.4%
Back light		
Low(0-30°)	1446 lm	39.0%
Medium(30-60°)	324 lm	8.8%
High(60-80°)	68 lm	1.8%
Very high(80-90°)	15 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 G1



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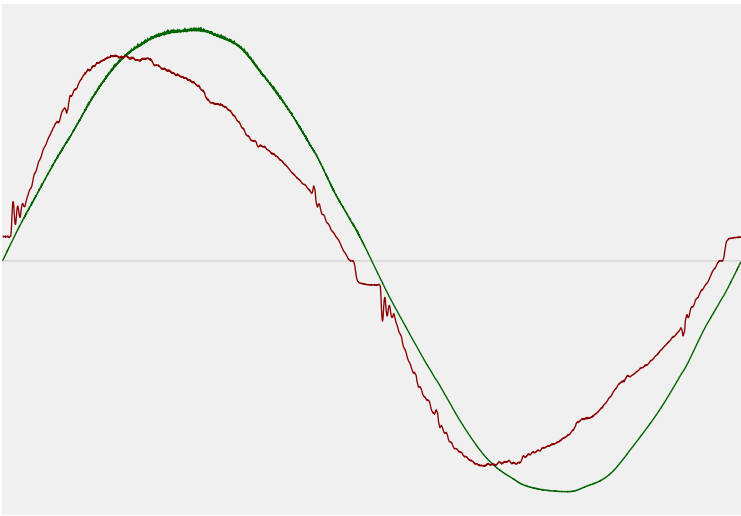


Power Details

Input Power

Power feed to light source	41.4 W
Frequency of input power	50 Hz
RMS Input voltage feed, V_{RMS}	243 V
RMS Input current feed, I_{RMS}	0.176 A
Volt-Ampere or apparent power = $V_{RMS} * I_{RMS}$	42.84 VA
Displacement factor of AC power feed	0.97
Power factor of AC current feed	0.97
Total harmonic distortion of the current	10.87%
Total harmonic distortion of the voltage	1.14%

Input Power Curve



Efficiency

Radiated power efficiency	32.4%
<div><div></div></div>	
Lumen efficiency	90 lm/W
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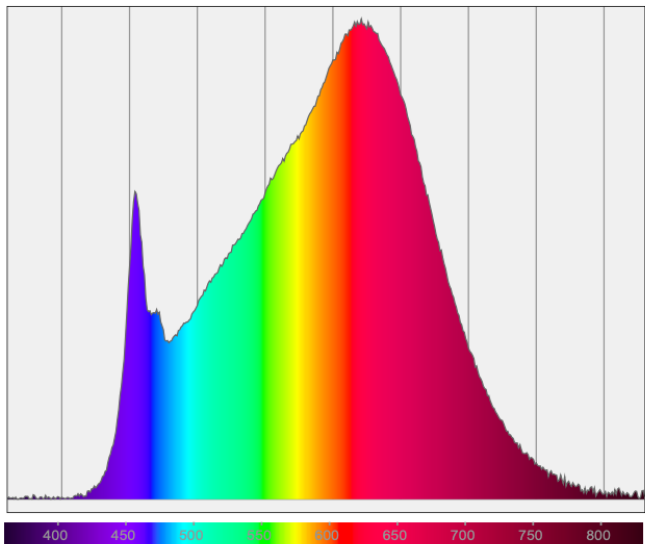
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Color Measurements

Correlated Color Temperature	CCT = 3000 K
Color Rendering TM30-18	R _f 91.0 — R _g 97.7
Color Shift, CIE duv	Duv ±0.0003

Spectral distribution



Color details

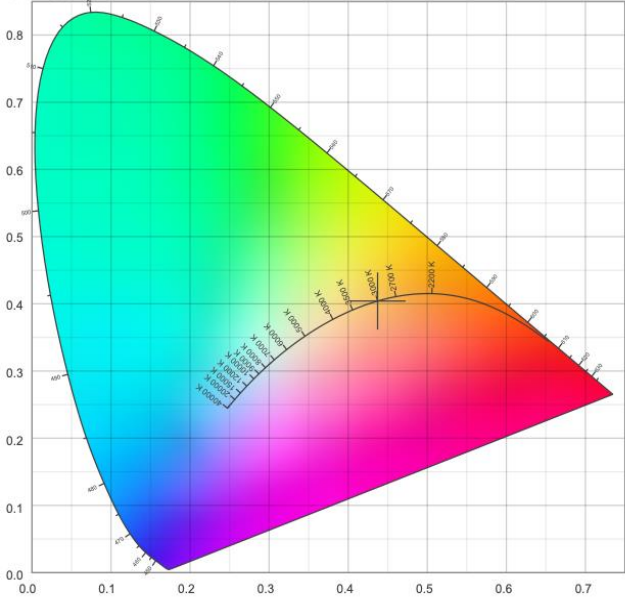
Correlated Color Temperature	CCT = 3000 K	Color coordinates CIE 1931	(x;y) = (0.437;0.404)
Color Rendering Index	CRI 94.1	Color coordinate CIEs 1960	(u;v) = (0.251;0.348)
Color Rendering Index, R9 (red component)	R9 = 68.6	Color deviation from BBL	Duv = ±0.0003
Color Rendering TM30-18	R _f 91.0 — R _g 97.7	Color coordinate CIEs 1976 (CIELUV)	(u';v') = (0.251;0.251)
Color Quality Scale	CQS = 91.8		

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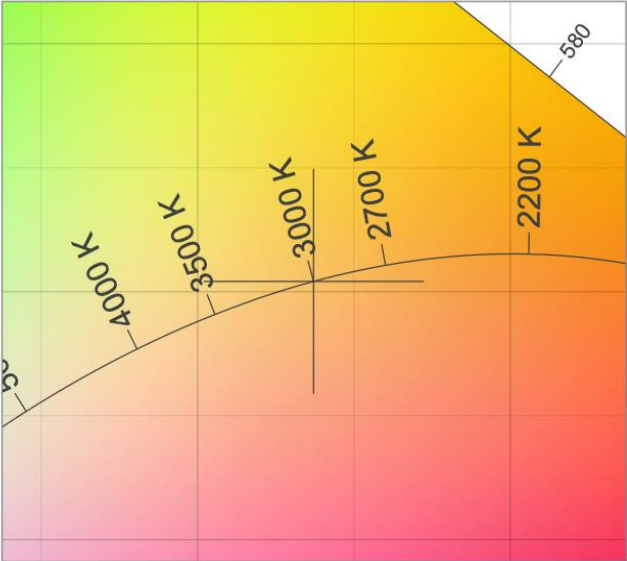
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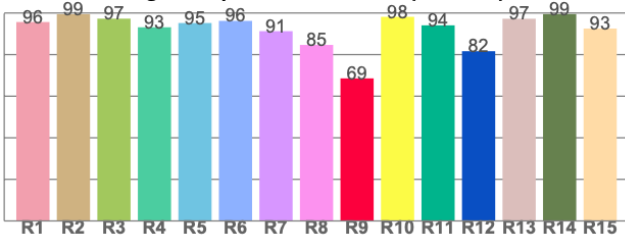
CIE 1931



CIE 1931 – zoomed on Planckian locus



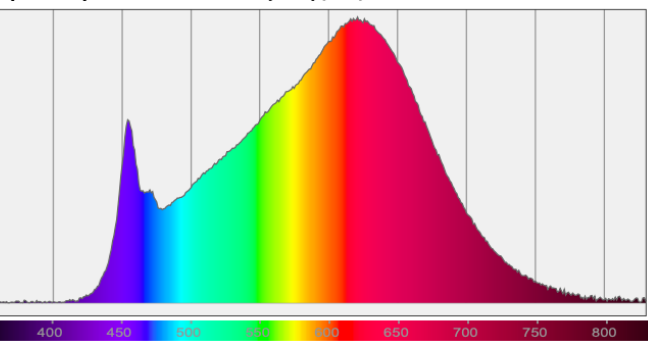
Color Rendering Index per reference color (CIE 1995)



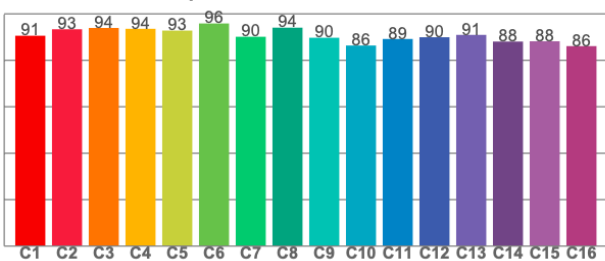
CRI R values, only R1-R8 are used to calculate final CRI value

R1	R2	R3	R4	R5	R6	R7	R8	R9	R10	R11	R12	R13	R14	R15
95.7	99.5	97.3	93.1	95.2	96.2	91.3	84.6	68.6	98.2	94.1	81.6	97.2	99.5	92.5

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



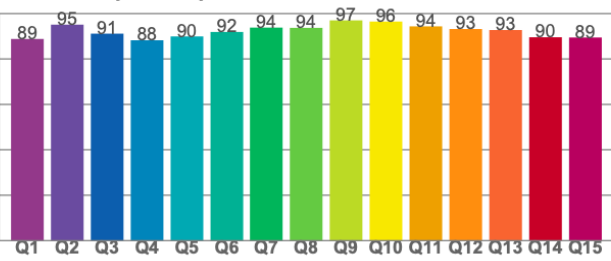
TM30-18 Rf-values per hue bin



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	93.9	93.6	92.8	95.9	90.1	94.0	89.7	86.4	89.2	89.9	90.9	88.1	88.2	86.1

Color Quality Scale by reference color



CQS Q values

Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10	Q11	Q12	Q13	Q14	Q15
88.8	95.1	91.2	88.2	89.9	91.9	93.8	93.7	97.0	96.5	94.4	93.2	92.8	89.6	89.5