

Goniophotometry Report

1_PHOT_SKIN+BONES-4300lmChip-3000K-Spreader_2303
www.factorylux.com



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

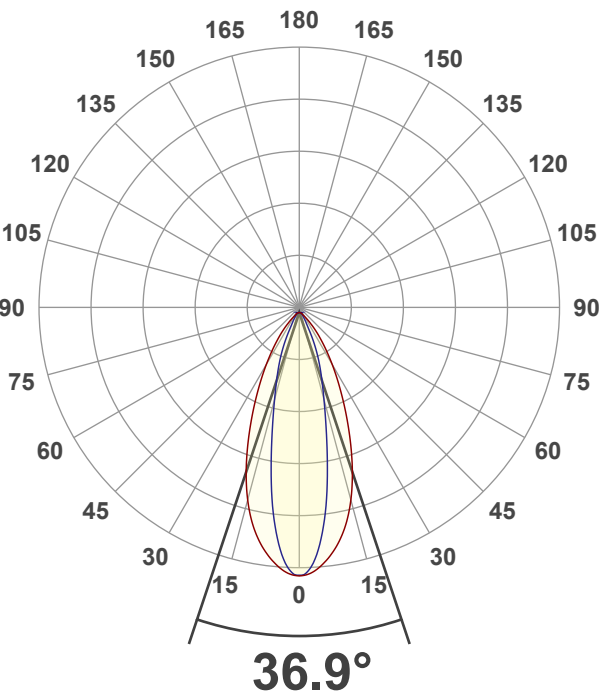
16 planes – 22.5°
1°
1.50 m
41.4 W – PF 0.97 – DPF 0.97
240 V – 0.178 A
50.2 Hz

Main Light Measurement Results

Output
Efficiency
Peak Intensity and Beam Angle
Color Rendering Index

3670 lm
89 lm/W
6414 cd – 36.9°
CRI 92.6

Light Intensity Distribution

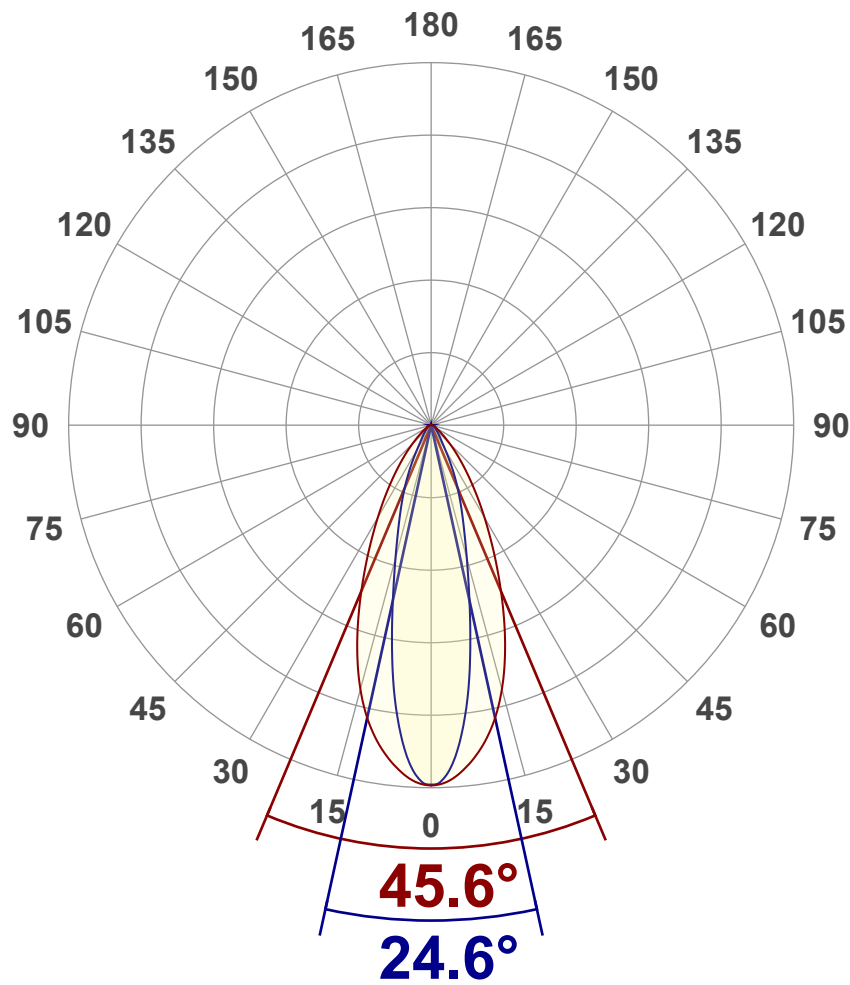


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Luminous Intensity diagram Unit: 0-100% of peak intensity



Main Values	
Output (total Lumen)	3670 lm
Peak Intensity	6414 cd
Beam Angle (50%)	36.9°
Beam Angle (90%)	24.6°
Beam Angle (10%)	45.6°

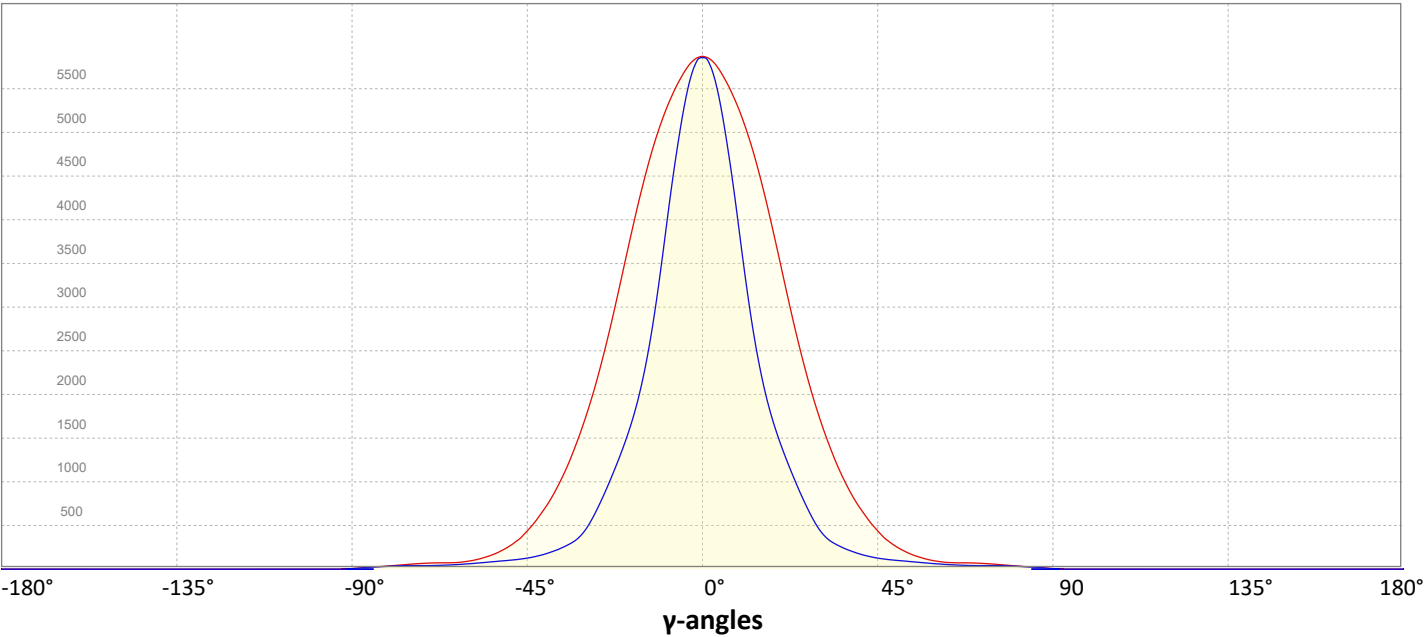
Cut-off Angle	
Average 2,5%	98.7°

Field Angle	
Average 10%	70.9°

Intensity Ratio	
In 120° cone	95.8%
In 90° cone	88.9%

C000-C180
C090-C270

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

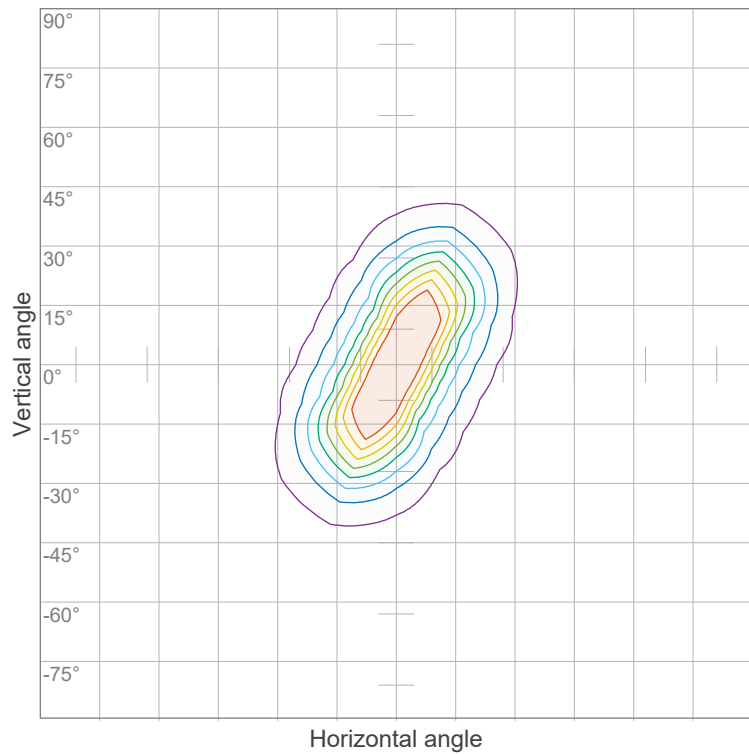


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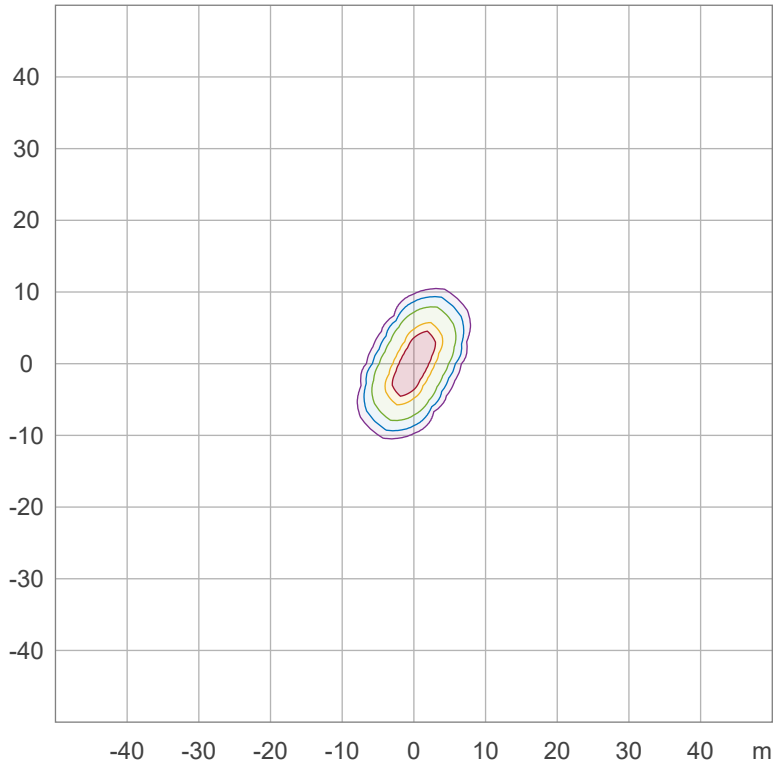
Iso-intensity Diagram (Iso-candela)



90 %	5771.4 cd
80 %	5130.2 cd
70 %	4488.9 cd
60 %	3847.6 cd
50 %	3206.4 cd
40 %	2565.1 cd
30 %	1923.8 cd
20 %	1282.5 cd
10 %	641.3 cd

Peak intensity: 6412.7 cd
Number of c-planes: 16

Iso-illuminance Diagram (Iso-lux)



50.0 %	32.0 lx
30.0 %	19.2 lx
10.0 %	6.4 lx
5.0 %	3.2 lx
3.0 %	1.9 lx

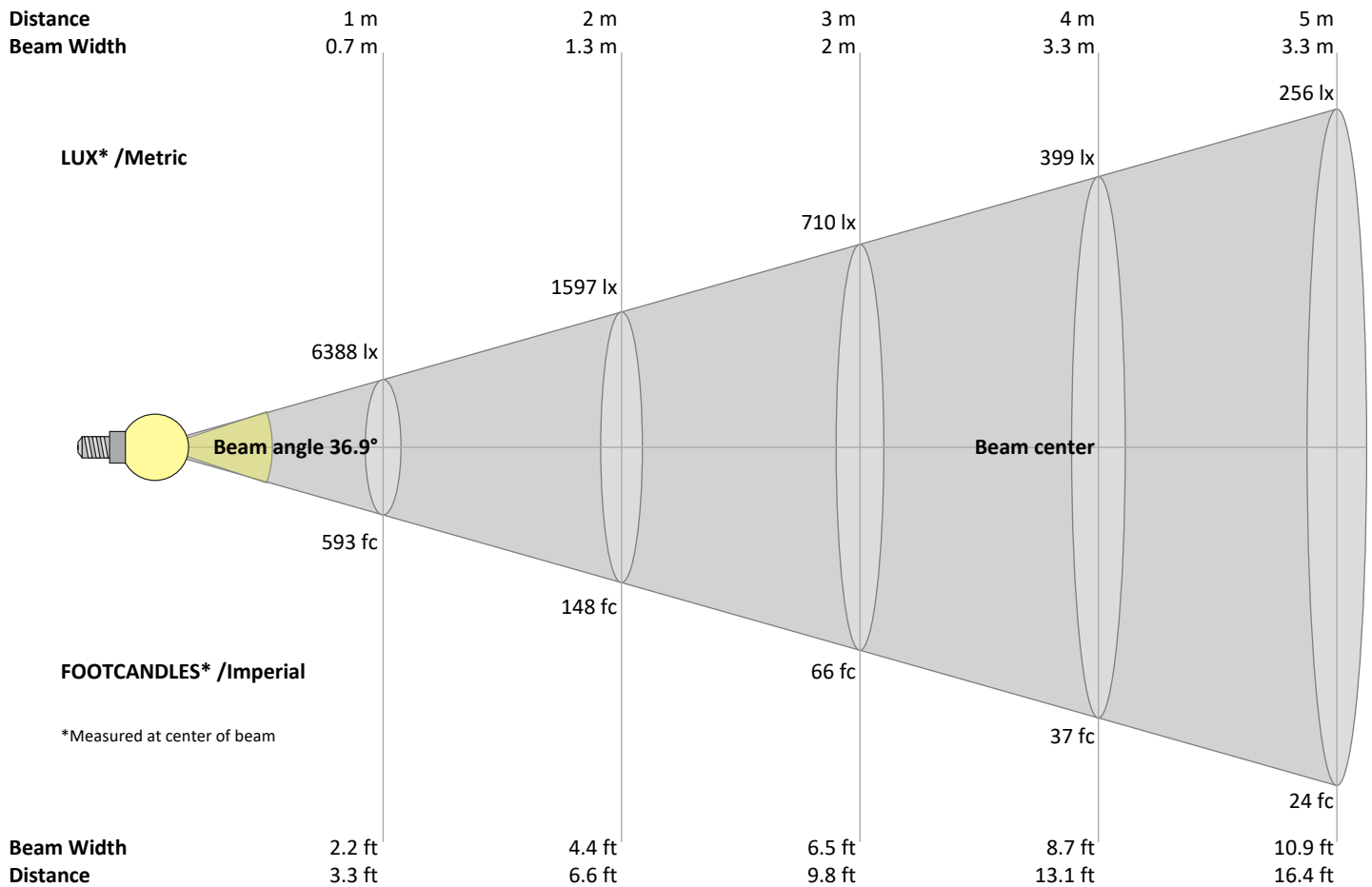
Peak illuminance: 63.9 lx
Mounting height: 10.0 m
Number of c-planes: 16

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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
6388	1597	710	399	256	177	130	100	79	64	53	44	38	33	28	25	22	20	18	16	lux
593.5	148.4	65.9	37.1	23.7	16.5	12.1	9.3	7.3	5.9	4.9	4.1	3.5	3	2.6	2.3	2.1	1.8	1.6	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
6388	6359	6252	6088	5889	5651	5368	5035	4658	4245	3811	3372	2951	2563	2209	1897	1617	1367	1148	958	cd
100%	100%	98%	95%	92%	88%	84%	79%	73%	66%	60%	53%	46%	40%	35%	30%	25%	21%	18%	15%	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
6388	6277	5935	5398	4743	4003	3295	2698	2227	1862	1568	1312	1076	856	659	496	385	317	269	229	cd
100%	98%	93%	84%	74%	63%	52%	42%	35%	29%	25%	21%	17%	13%	10%	8%	6%	5%	4%	4%	of 0°val

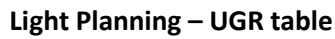
Intensities in 180° c-plane

0°	2°	4°	6°	8°	10°	12°	14°	16°	18°	20°	22°	24°	26°	28°	30°	32°	34°	36°	38°	γ
6388	6359	6252	6088	5889	5651	5368	5035	4658	4245	3811	3372	2951	2563	2209	1897	1617	1367	1148	958	cd
100%	100%	98%	95%	92%	88%	84%	79%	73%	66%	60%	53%	46%	40%	35%	30%	25%	21%	18%	15%	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
6388	6277	5935	5398	4743	4003	3295	2698	2227	1862	1568	1312	1076	856	659	496	385	317	269	229	cd
100%	98%	93%	84%	74%	63%	52%	42%	35%	29%	25%	21%	17%	13%	10%	8%	6%	5%	4%	4%	of 0°val

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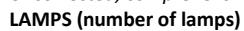
Uncorrected, comprehensive UGR table according to 117-1995

Reflectances											
	ρ Ceiling	70	70	50	50	30	70	70	50	50	30
	ρ Walls	50	30	50	30	30	50	30	50	30	30
	ρ Floor	20	20	20	20	20	20	20	20	20	20
Room size											
H = mounting height above eye level											
X	Y	Viewed Crosswise (Viewing direction orthogonal to lamp length axis)					Viewed Endwise (Viewing direction parallel to lamp length axis)				
	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Variations with the observer position for the luminaire spacings, S:											
	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	113	110	107	105	110	108	105	103	104	102	100	100	98	97	96	95	94	92
2	107	102	97	94	105	100	96	93	97	93	90	94	91	89	91	89	87	85
3	101	94	89	85	99	93	88	84	90	86	83	88	84	82	86	83	80	79
4	96	88	82	78	94	87	82	77	85	80	77	83	79	76	81	77	75	73
5	91	83	77	72	90	82	76	72	80	75	71	78	74	70	77	73	70	68
6	87	78	71	67	85	77	71	67	75	70	66	74	69	66	73	69	65	64
7	83	73	67	63	81	72	67	63	71	66	62	70	65	62	69	65	62	60
8	79	69	63	59	78	69	63	59	68	62	59	66	62	58	65	61	58	57
9	75	66	60	56	74	65	59	56	64	59	55	63	59	55	62	58	55	54
10	72	62	57	53	71	62	56	53	61	56	52	60	56	52	60	55	52	51

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Zonal Lumen Summary

[illegible]

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Outdoor Light Planning

Lumen per Zone

Zone (γ)	Lumen	% Total
0-10°	531 lm	14.5%
10-20°	1041 lm	28.4%
20-30°	949 lm	25.9%
30-40°	576 lm	15.7%
40-50°	283 lm	7.7%
50-60°	134 lm	3.7%
60-70°	72 lm	2.0%
70-80°	54 lm	1.5%
80-90°	27 lm	0.7%
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	3670 lm	100.0%

Intensity peaks

Max intensity	6414 cd
Intensity, 90°	8 cd
Intensity, 0°	6388 cd

Zonal Lumen summary

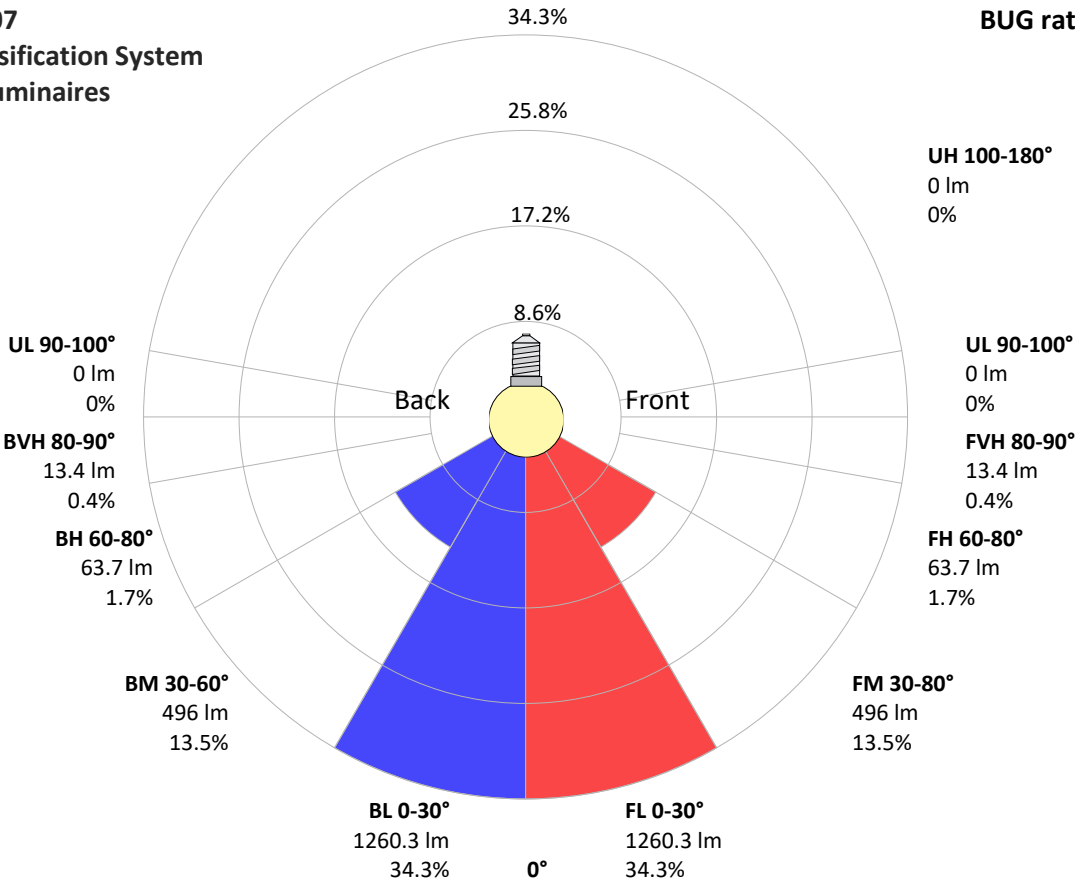
Zone (γ)	Lumen	% Total
0-30°	2522 lm	68.7%
0-40°	3098 lm	84.4%
0-60°	3515 lm	95.8%
60-90°	153 lm	4.2%
70-100°	82 lm	2.2%
90-120°	2 lm	0.0%
0-90°	3668 lm	100.0%
90-180°	2 lm	0.0%
0-180°	3670 lm	100.0%

BUG rating

	Lumen	% Total
Forward light		
Low(0-30°)	1260 lm	34.3%
Medium(30-60°)	496 lm	13.5%
High(60-80°)	64 lm	1.7%
Very high(80-90°)	13 lm	0.4%
Back light		
Low(0-30°)	1260 lm	34.3%
Medium(30-60°)	496 lm	13.5%
High(60-80°)	64 lm	1.7%
Very high(80-90°)	13 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

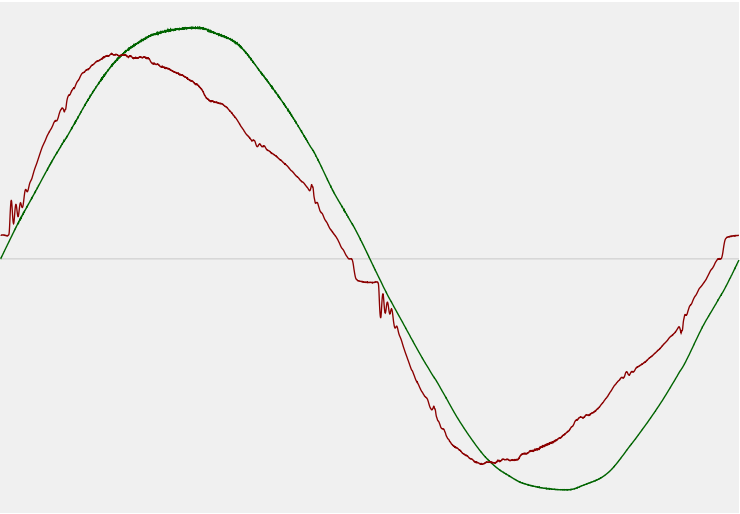
Input Power

Power feed to light source	41.4 W
Frequency of input power	50.2 Hz
RMS Input voltage feed, V_{RMS}	240 V
RMS Input current feed, I_{RMS}	0.178 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	10.82%
Total harmonic distortion of the voltage	1.2%

Efficiency

Radiated power efficiency	32.1%
<div><div></div></div>	
Lumen efficiency	89 lm/W
<div><div></div></div>	

Input Power Curve



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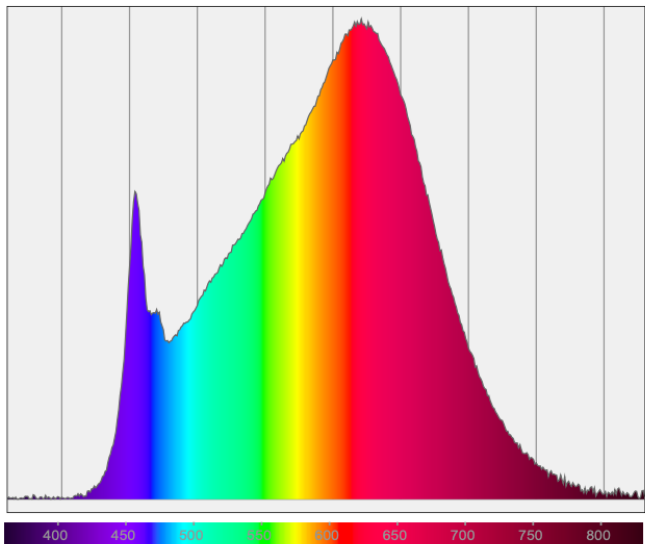
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Color Measurements

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

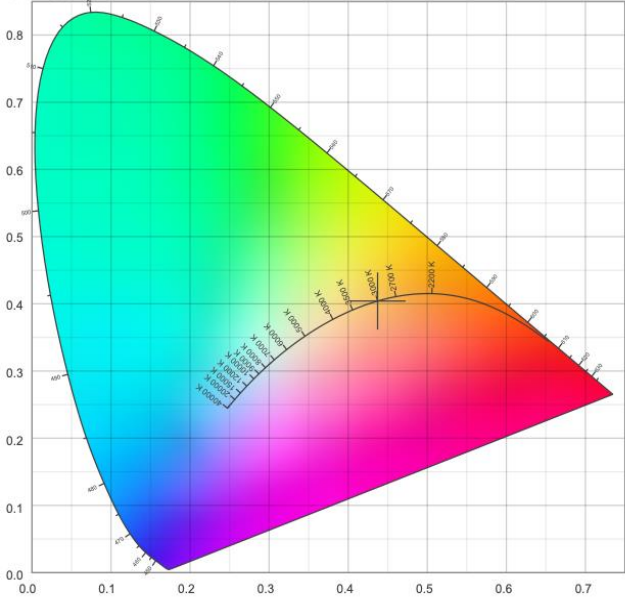
Correlated Color Temperature	CCT = 3000 K	Color coordinates CIE 1931	(x;y) = (0.437;0.404)
Color Rendering Index	CRI 94.1	Color coordinate CIEs 1960	(u;v) = (0.251;0.348)
Color Rendering Index, R9 (red component)	R9 = 68.6	Color deviation from BBL	Duv = ±0.0003
Color Rendering TM30-18	R _f 91.0 — R _g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

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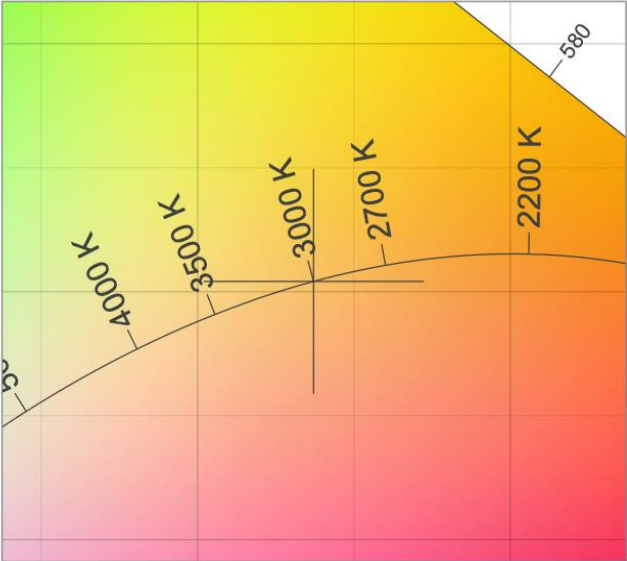
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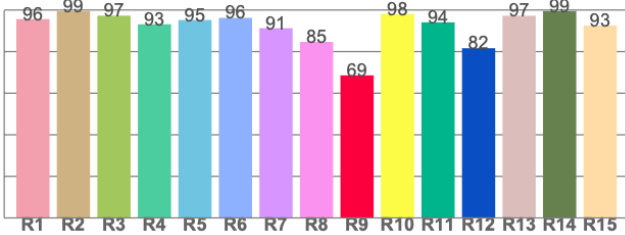
CIE 1931



CIE 1931 – zoomed on Planckian locus



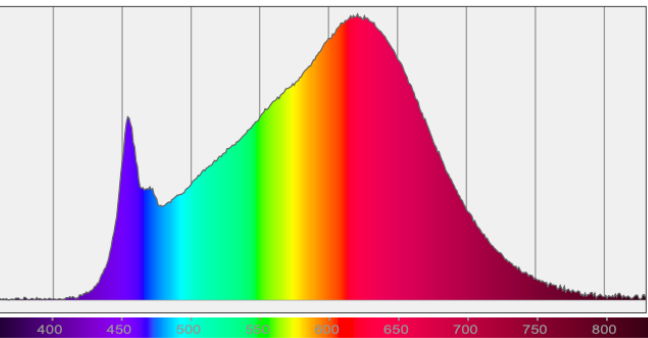
Color Rendering Index per reference color (CIE 1995)



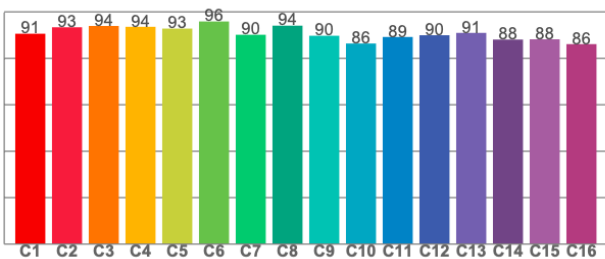
CRI R values, only R1-R8 are used to calculate final CRI value

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%



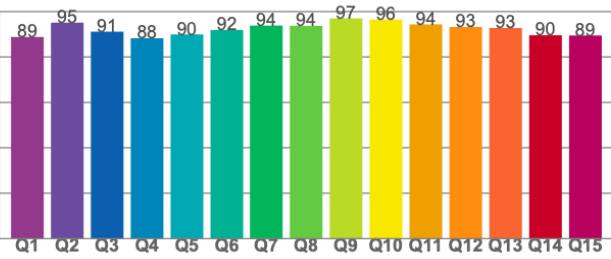
TM30-18 Rf-values per hue bin



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