

Goniophotometry Report

1_PHOT_SKIN+BONES-4300lmChip-3000K-58Deg_2303
www.factorylux.com



Tested Light Source - 1_PHOT_SKIN+BONES-4300lmChip-3000K-58Deg_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

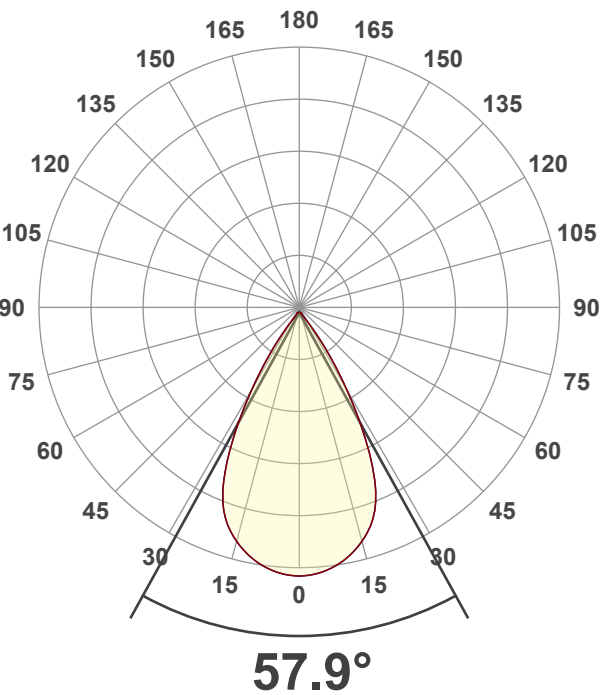
4 planes – 90°
2.5°
1.50 m
41.3 W – PF 0.97 – DPF 0.97
243 V – 0.176 A
50.1 Hz

Main Light Measurement Results

Output
Efficiency
Peak Intensity and Beam Angle
Color Rendering Index

3802 lm
92 lm/W
4303 cd – 57.9°
CRI 92.5

Light Intensity Distribution



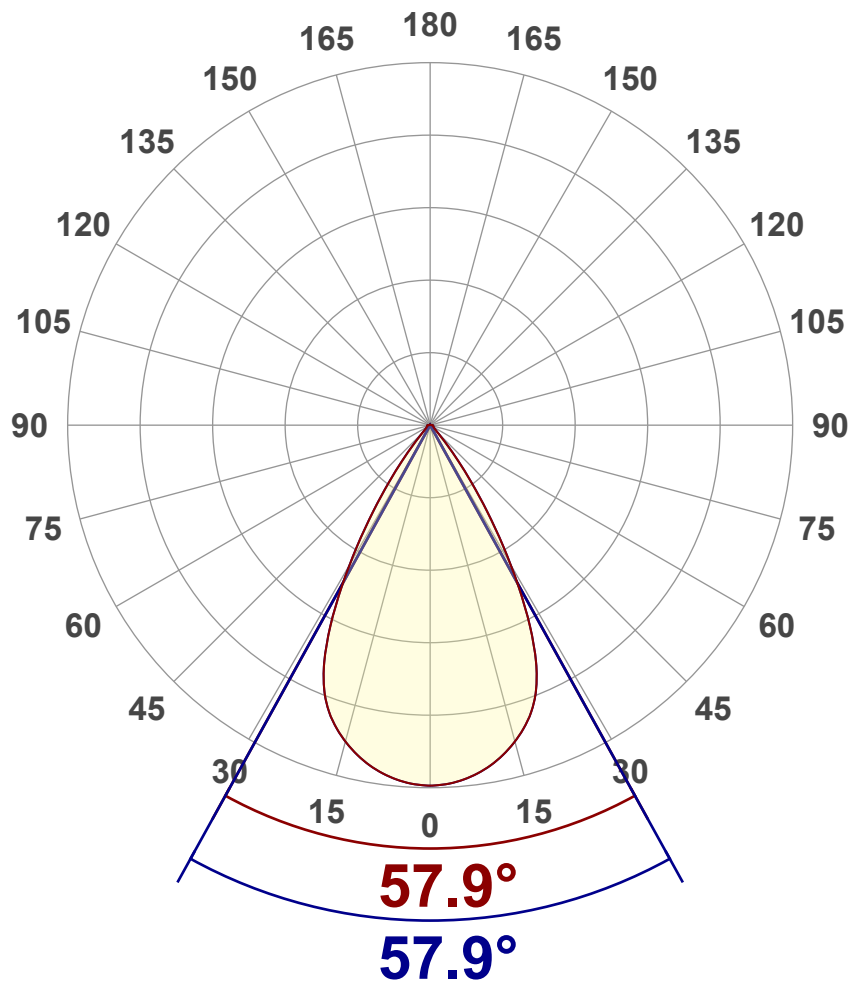
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Luminous Intensity diagram

Unit: 0-100% of peak intensity



Main Values

Output (total Lumen)	3802 lm
Peak Intensity	4303 cd
Beam Angle (50%)	57.9°
Beam Angle (90%)	57.9°
Beam Angle (10%)	57.9°

Cut-off Angle

Average 2,5%	93.7°
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Field Angle

Average 10%	78.7°
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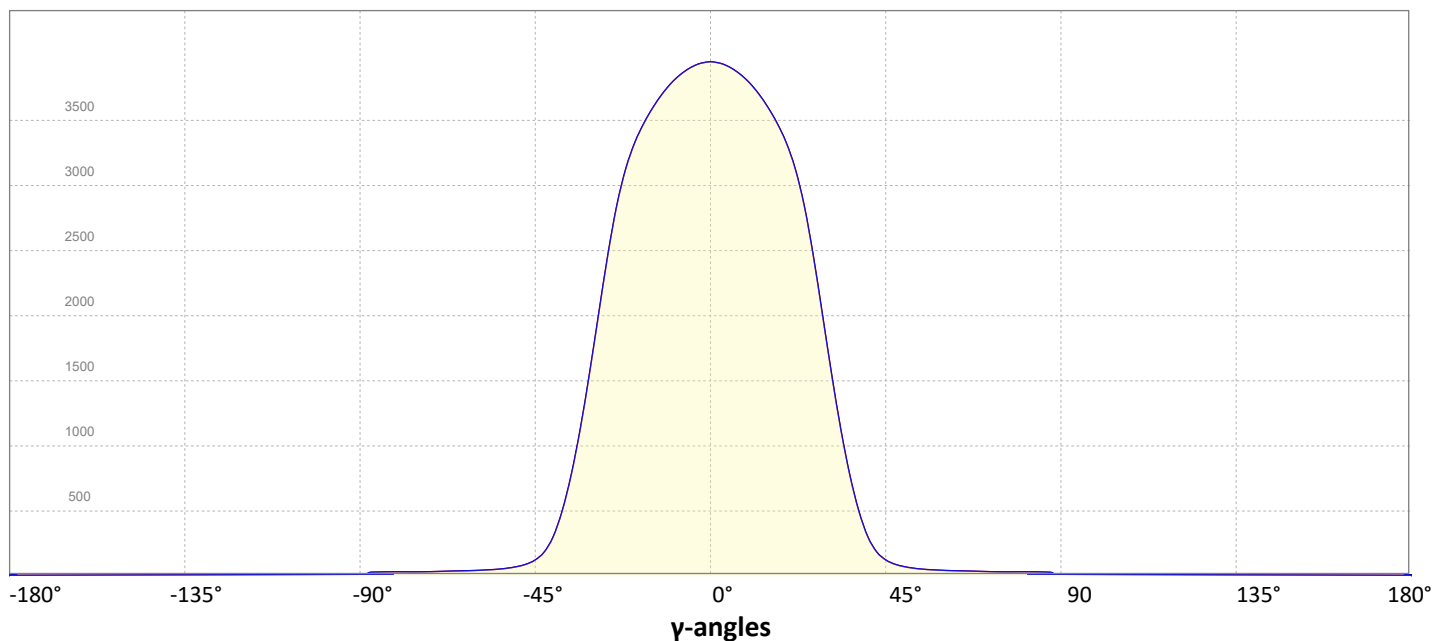
Intensity Ratio

In 120° cone	94.8%
In 90° cone	92.4%

C000-C180

C090-C270

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

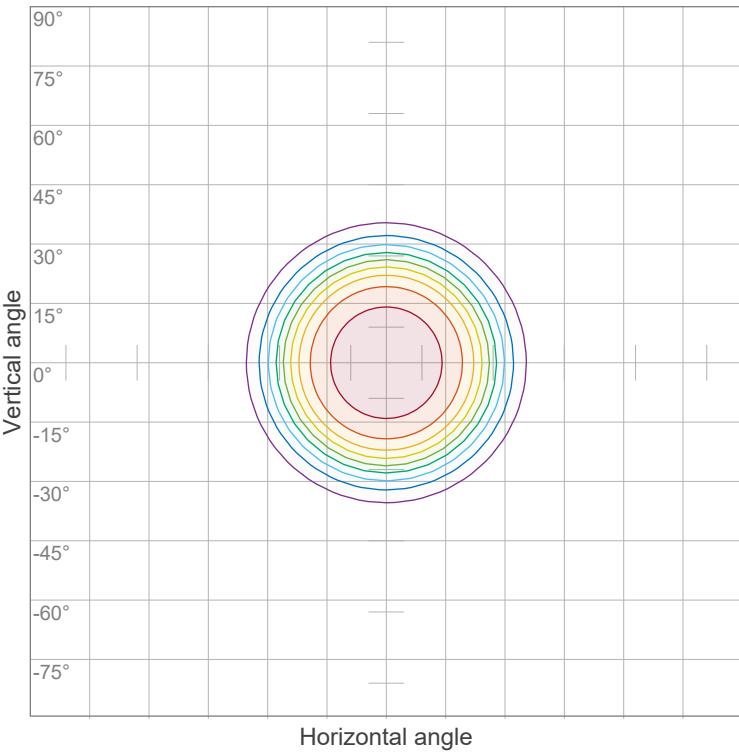


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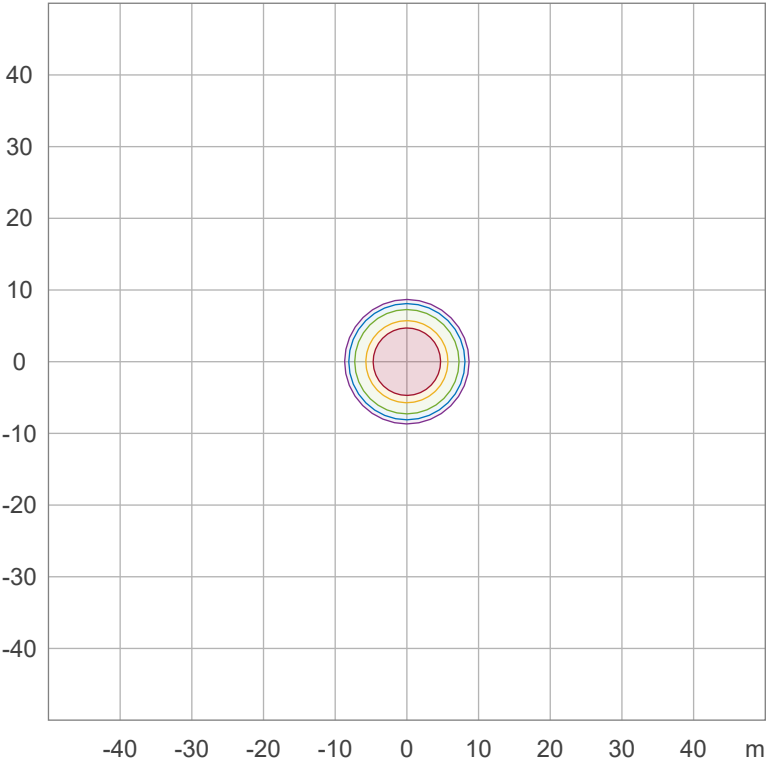
Iso-intensity Diagram (Iso-candela)



90 %	3872.5 cd
80 %	3442.2 cd
70 %	3011.9 cd
60 %	2581.7 cd
50 %	2151.4 cd
40 %	1721.1 cd
30 %	1290.8 cd
20 %	860.6 cd
10 %	430.3 cd

Peak intensity: 4302.8 cd
Number of c-planes: 4

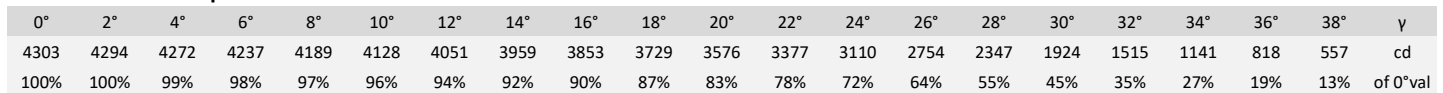
Iso-illuminance Diagram (Iso-lux)



50.0 %	21.5 lx
30.0 %	12.9 lx
10.0 %	4.3 lx
5.0 %	2.2 lx
3.0 %	1.3 lx

Peak illuminance: 43.0 lx
Mounting height: 10.0 m
Number of c-planes: 4

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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											
H = mounting height above eye level		Viewed Crosswise					Viewed Endwise				
X	Y	(Viewing direction orthogonal to lamp length axis)					(Viewing direction parallel to lamp length axis)				
2H	2H	22.4	23.0	22.5	23.3	23.4	22.4	23.0	22.5	23.3	23.4
	3H	22.4	23.2	22.7	23.4	23.5	22.4	23.2	22.7	23.4	23.5
	4H	22.5	23.3	22.9	23.5	23.8	22.5	23.3	22.9	23.5	23.8
	6H	22.9	23.6	23.2	23.9	24.2	22.9	23.6	23.2	23.9	24.2
	8H	23.2	23.8	23.5	24.1	24.5	23.2	23.8	23.5	24.1	24.5
	12H	23.4	24.0	23.8	24.4	24.8	23.4	24.0	23.8	24.4	24.8
4H	2H	22.1	22.9	22.5	23.1	23.3	22.1	22.9	22.5	23.1	23.3
	3H	22.5	23.1	22.8	23.4	23.8	22.5	23.1	22.8	23.4	23.8
	4H	22.7	23.3	23.1	23.7	24.2	22.7	23.3	23.1	23.7	24.2
	6H	23.2	23.8	23.7	24.2	24.5	23.2	23.8	23.7	24.2	24.5
	8H	23.6	24.1	24.1	24.5	24.8	23.6	24.1	24.1	24.5	24.8
	12H	24.0	24.4	24.5	24.9	25.3	24.0	24.4	24.5	24.9	25.3
8H	4H	22.8	23.4	23.3	23.7	24.1	22.8	23.4	23.3	23.7	24.1
	6H	23.6	24.0	24.1	24.4	25.0	23.6	24.0	24.1	24.4	25.0
	8H	24.2	24.5	24.7	25.0	25.6	24.2	24.5	24.7	25.0	25.6
	12H	24.8	25.0	25.4	25.5	26.1	24.8	25.0	25.4	25.5	26.1
12H	4H	22.8	23.3	23.3	23.7	24.1	22.8	23.3	23.3	23.7	24.1
	6H	23.7	24.0	24.3	24.6	25.2	23.7	24.0	24.3	24.6	25.2
	8H	24.3	24.6	24.9	25.1	25.7	24.3	24.6	24.9	25.1	25.7
Variations with the observer position for the luminaire spacings, S:											
S = 1.0H		2.7 / -1.2					2.7 / -1.2				
S = 1.5H		4.9 / -1.2					4.9 / -1.2				
S = 2.0H		6.6 / -1.4					6.6 / -1.4				

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	110	110	105	105	105	100	100	100	98	
1	112	110	107	104	110	107	105	103	103	101	99	99	97	96	95	94	93	91
2	107	102	97	94	104	100	96	93	96	93	90	93	90	88	90	88	86	84
3	101	95	90	86	99	93	89	85	90	86	83	88	84	82	85	82	80	78
4	96	89	83	79	94	87	82	78	85	81	77	83	79	76	81	77	75	73
5	92	83	77	73	90	82	77	72	80	75	72	78	74	71	76	73	70	68
6	87	78	72	68	85	77	72	68	76	71	67	74	70	66	72	69	66	64
7	83	74	68	63	81	73	67	63	71	66	63	70	66	62	69	65	62	60
8	79	70	64	60	78	69	63	59	68	63	59	66	62	59	65	61	58	57
9	75	66	60	56	74	65	60	56	64	59	56	63	58	55	62	58	55	54
10	72	62	57	53	71	62	56	53	61	56	52	60	55	52	59	55	52	51

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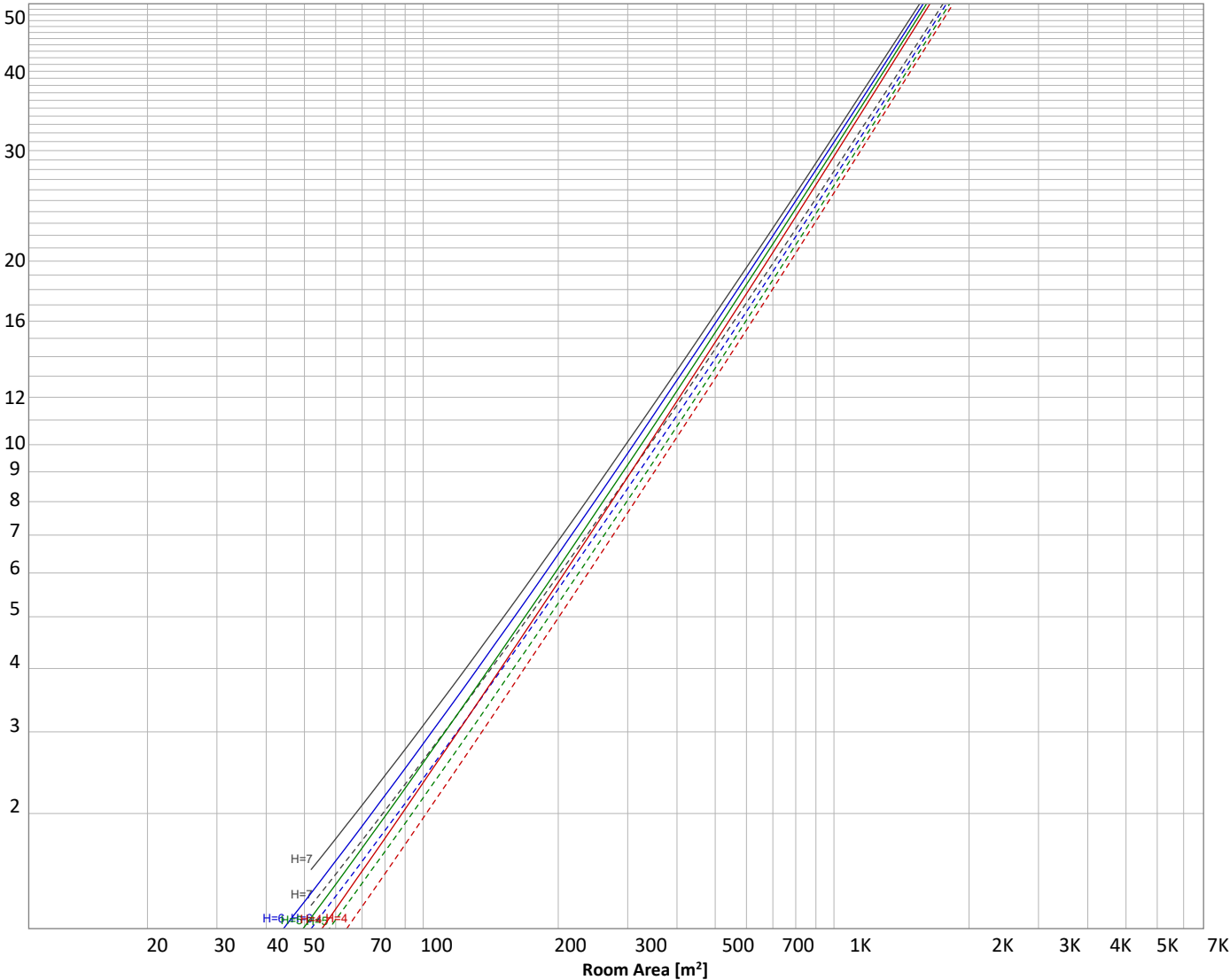
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Luminaire budgetary diagram

Uncorrected, comprehensive UGR table according to 117-1995

LAMPS (number of lamps)



Conditions

H = Room height	Flux = 3802 lm	$\rho(\%)$		
H _{down} = Lamp distance from ceiling =	0.00 m	Line type	Ceiling reflectance	Wall reflectance
H _{work} = Work area height from floor =	0.00 m	-----	70	50
E _{work} = Average lux on work area =	100 lx	-----	50	30
				Floor reflectance
				20

Zonal Lumen Summary

0°-10°	10°-20°	20°-30°	30°-40°	40°-50°	50°-60°	60°-70°	70°-80°	80°-90°
402 lm	1095 lm	1310 lm	621 lm	124 lm	52.9 lm	43.3 lm	38.8 lm	33.5 lm
90°-100°	100°-110°	110°-120°	120°-130°	130°-140°	140°-150°	150°-160°	160°-170°	170°-180°
16.8 lm	16.3 lm	15.3 lm	13.8 lm	7.78 lm	4.72 lm	3.48 lm	2.13 lm	0.717 lm

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Outdoor Light Planning

Lumen per Zone

Zone (γ)	Lumen	% Total
0-10°	402 lm	10.6%
10-20°	1095 lm	28.8%
20-30°	1310 lm	34.4%
30-40°	621 lm	16.3%
40-50°	124 lm	3.3%
50-60°	53 lm	1.4%
60-70°	43 lm	1.1%
70-80°	39 lm	1.0%
80-90°	33 lm	0.9%
90-100°	17 lm	0.4%
100-110°	16 lm	0.4%
110-120°	15 lm	0.4%
120-130°	14 lm	0.4%
130-140°	8 lm	0.2%
140-150°	5 lm	0.1%
150-160°	3 lm	0.1%
160-170°	2 lm	0.1%
170-180°	1 lm	0.0%
Total	3802 lm	100.0%

Intensity peaks

Max intensity	4303 cd
Intensity, 90°	15 cd
Intensity, 0°	4303 cd

Zonal Lumen summary

Zone (γ)	Lumen	% Total
0-30°	2807 lm	73.8%
0-40°	3428 lm	90.2%
0-60°	3605 lm	94.8%
60-90°	116 lm	3.0%
70-100°	89 lm	2.3%
90-120°	48 lm	1.3%
0-90°	3721 lm	97.9%
90-180°	81 lm	2.1%
0-180°	3802 lm	100.0%

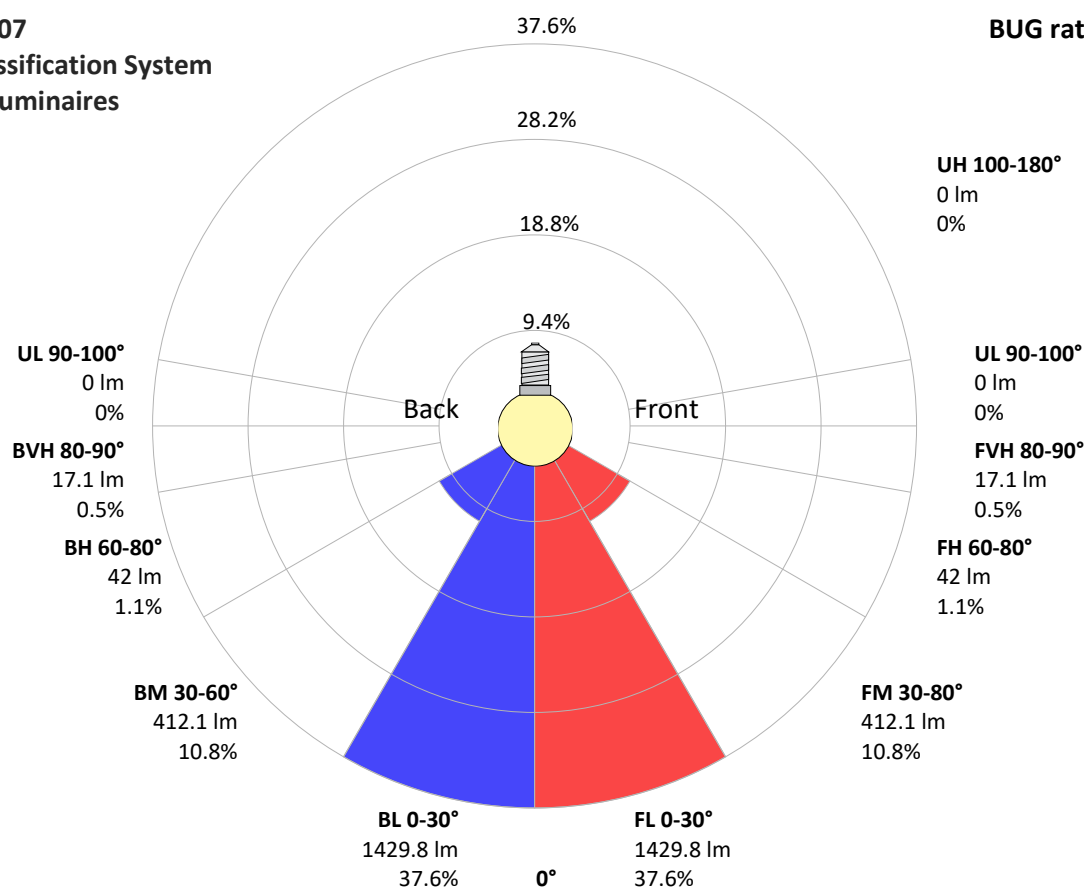
BUG rating

	Lumen	% Total
Forward light		
Low(0-30°)	1430 lm	37.6%
Medium(30-60°)	412 lm	10.8%
High(60-80°)	42 lm	1.1%
Very high(80-90°)	17 lm	0.5%
Back light		
Low(0-30°)	1430 lm	37.6%
Medium(30-60°)	412 lm	10.8%
High(60-80°)	42 lm	1.1%
Very high(80-90°)	17 lm	0.5%
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

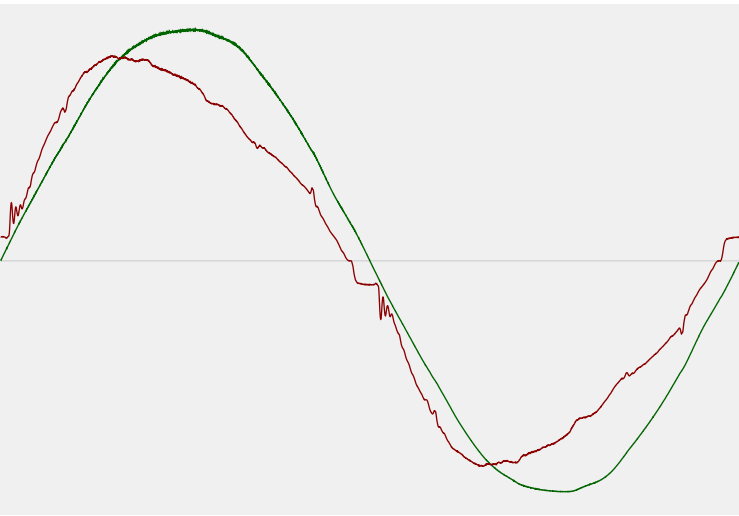
Input Power

Power feed to light source	41.3 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 = $V_{RMS} \cdot I_{RMS}$	42.75 VA
Displacement factor of AC power feed	0.97
Power factor of AC current feed	0.97
Total harmonic distortion of the current	10.86%
Total harmonic distortion of the voltage	1.23%

Efficiency

Radiated power efficiency	33.3%
Lumen efficiency	92 lm/W

Input Power Curve



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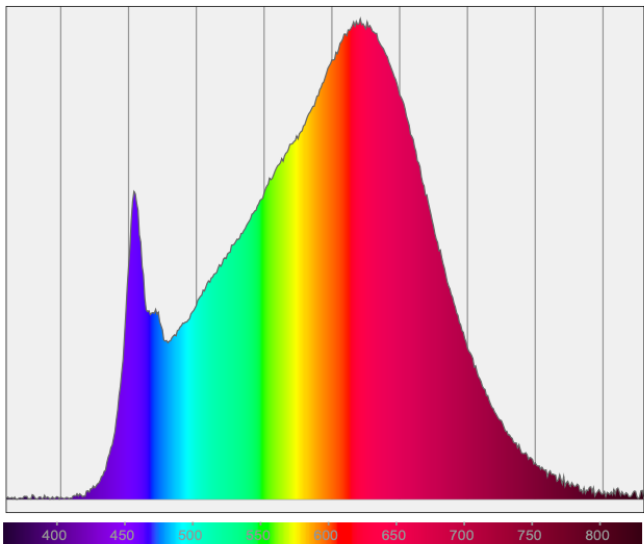
Color Measurements

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

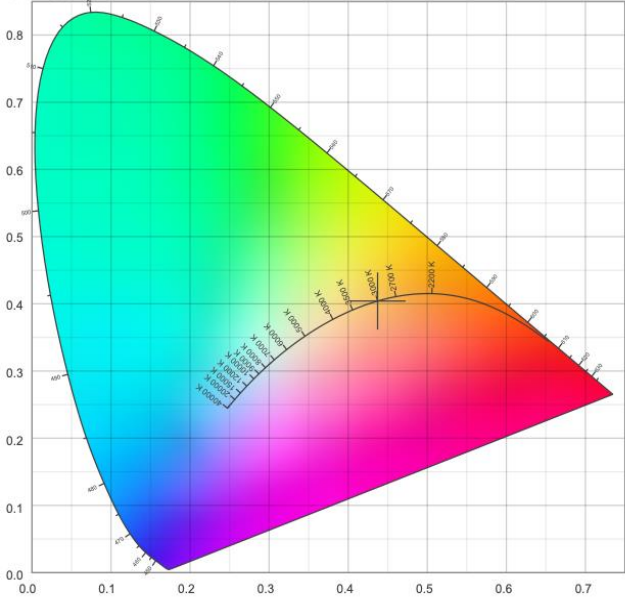
Correlated Color Temperature	CCT = 3000 K	Color coordinates CIE 1931	(x;y) = (0.437;0.404)
Color Rendering Index	CRI 94.1	Color coordinate CIEs 1960	(u;v) = (0.251;0.348)
Color Rendering Index, R9 (red component)	R9 = 68.6	Color deviation from BBL	Duv = ±0.0003
Color Rendering TM30-18	R _f 91.0 — R _g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

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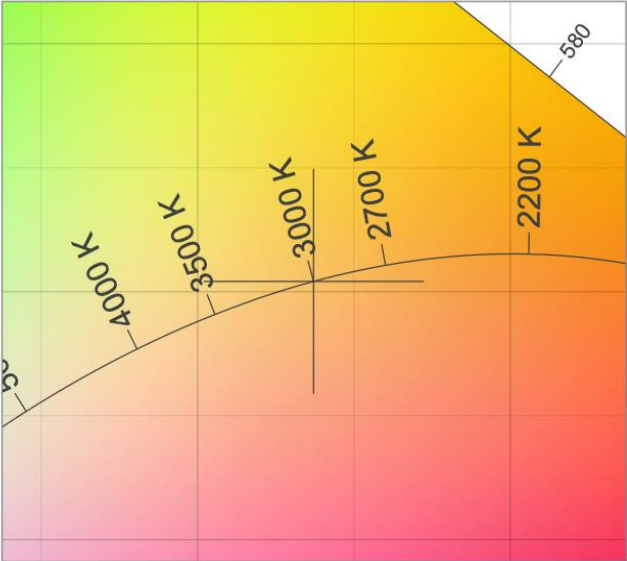
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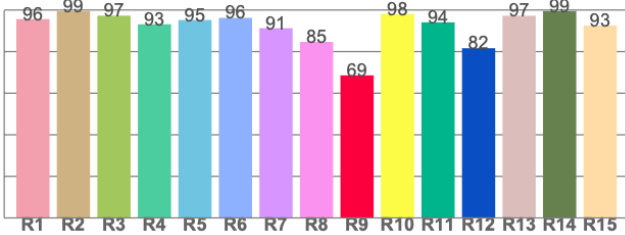
CIE 1931



CIE 1931 – zoomed on Planckian locus



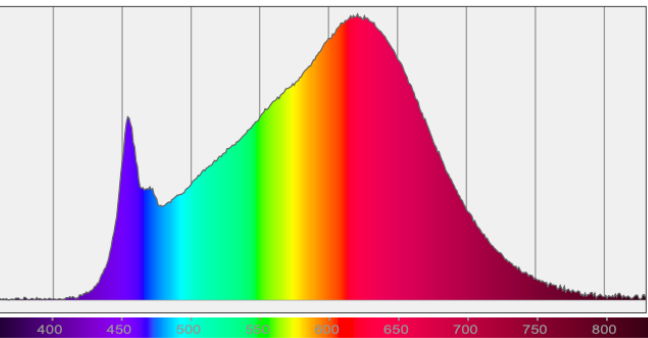
Color Rendering Index per reference color (CIE 1995)



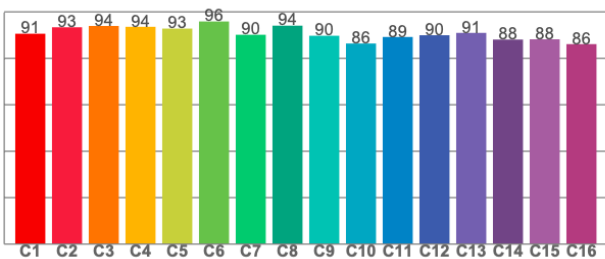
CRI R values, only R1-R8 are used to calculate final CRI value

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%



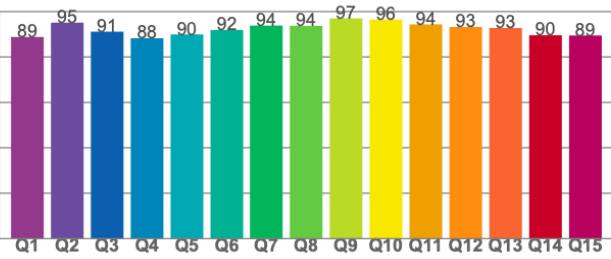
TM30-18 Rf-values per hue bin



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