

Goniophotometry Report

1_PHOT_SKIN+BONES-4050lmChip-2700K-38Deg_2303
www.factorylux.com



Tested Light Source - 1_PHOT_SKIN+BONES-4050lmChip-2700K-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

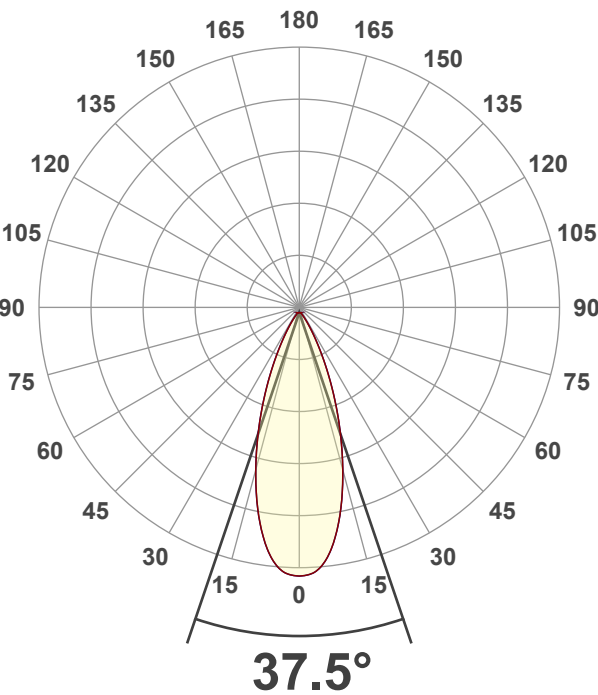
4 planes – 90°
1.5°
1.50 m
41.4 W – PF 0.97 – DPF 0.97
243 V – 0.176 A
50 Hz

Main Light Measurement Results

Output
Efficiency
Peak Intensity and Beam Angle
Color Rendering Index

3497 lm
84 lm/W
6927 cd – 37.5°
CRI 92.6

Light Intensity Distribution

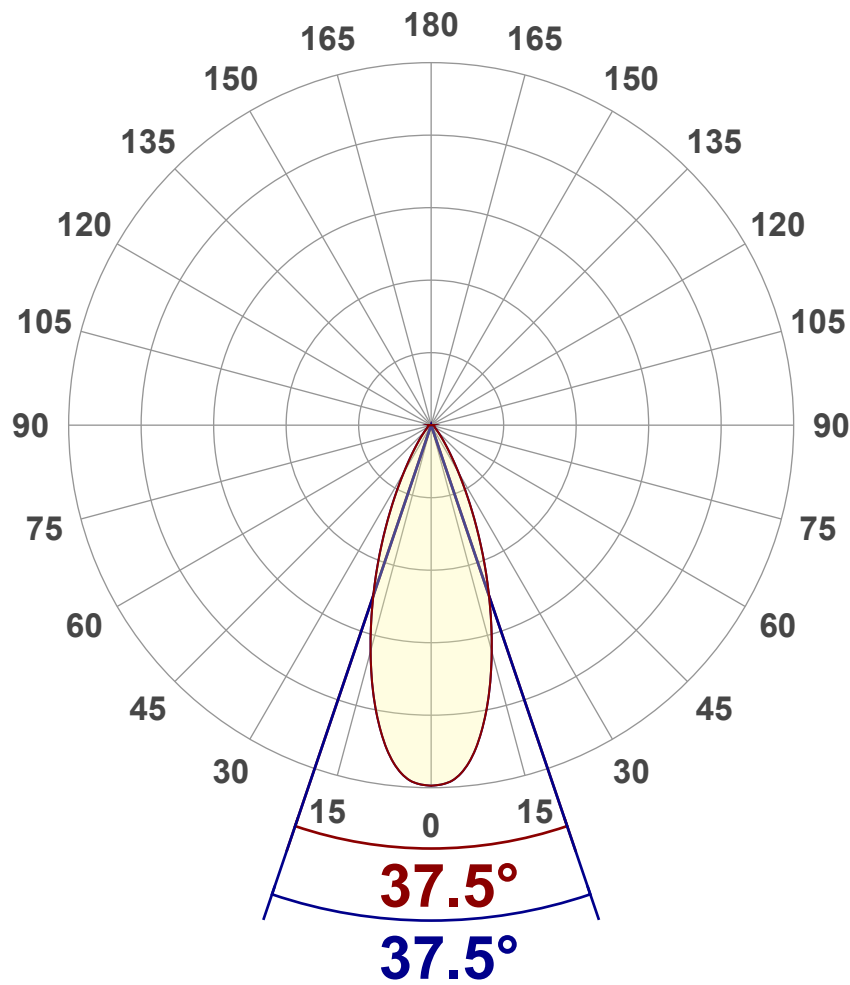


Goniophotometry Report

1_PHOT_SKIN+BONES-4050lmChip-2700K-38Deg_2303
www.factorylux.com



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



Main Values	
Output (total Lumen)	3497 lm
Peak Intensity	6927 cd
Beam Angle (50%)	37.5°
Beam Angle (90%)	37.5°
Beam Angle (10%)	37.5°

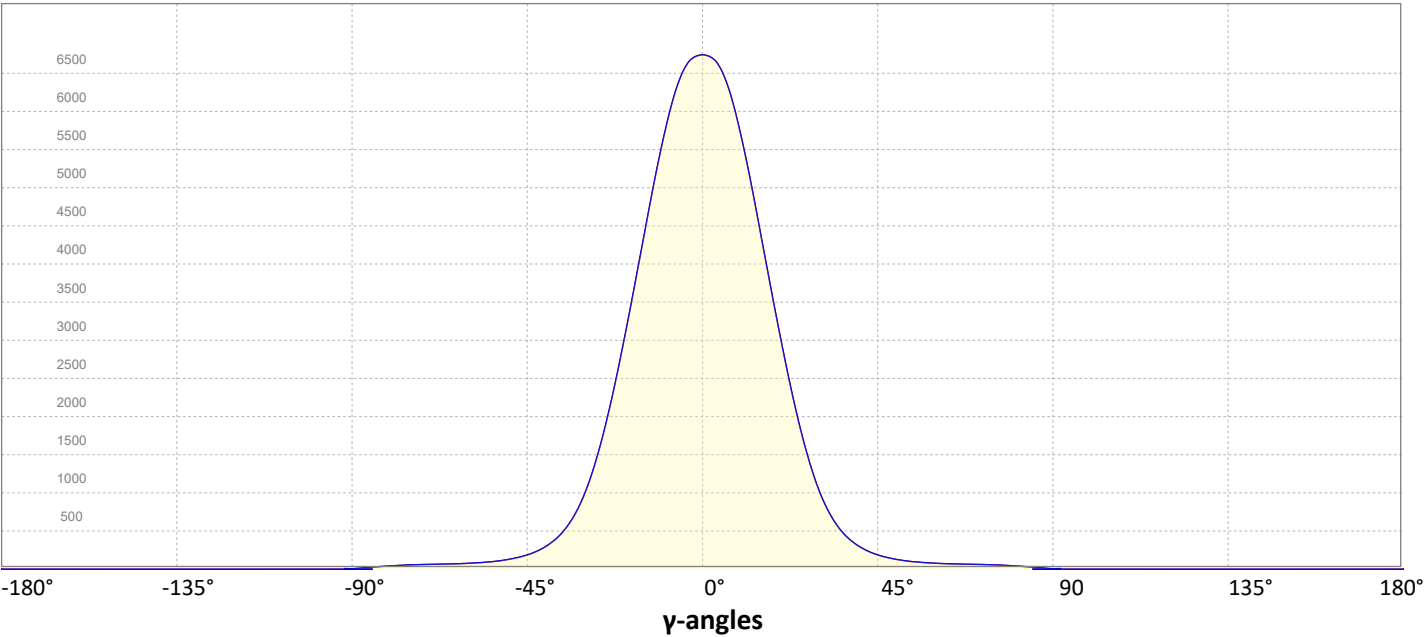
Cut-off Angle	
Average 2,5%	92.4°

Field Angle	
Average 10%	66.6°

Intensity Ratio	
In 120° cone	95.5%
In 90° cone	91.1%

C000-C180
C090-C270

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

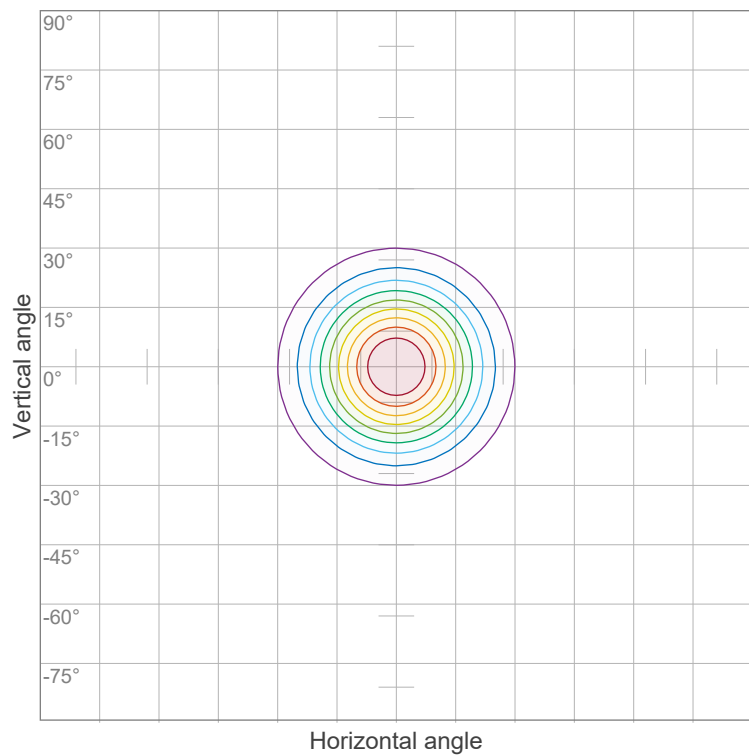


Goniophotometry Report

1_PHOT_SKIN+BONES-4050lmChip-2700K-38Deg_2303
www.factorylux.com



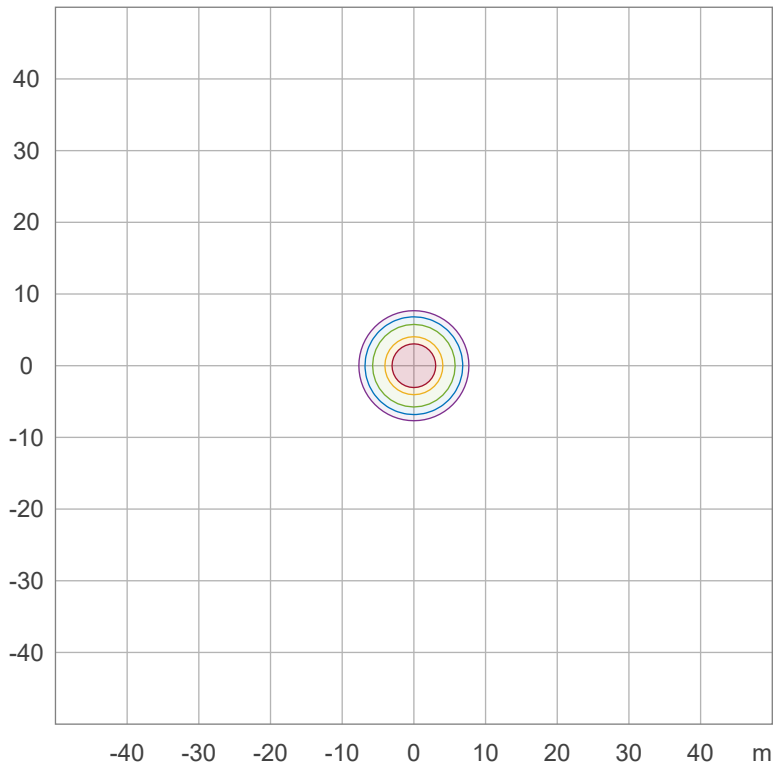
Iso-intensity Diagram (Iso-candela)



90 %	6234.1 cd
80 %	5541.4 cd
70 %	4848.8 cd
60 %	4156.1 cd
50 %	3463.4 cd
40 %	2770.7 cd
30 %	2078.0 cd
20 %	1385.4 cd
10 %	692.7 cd

Peak intensity: 6926.8 cd
Number of c-planes: 4

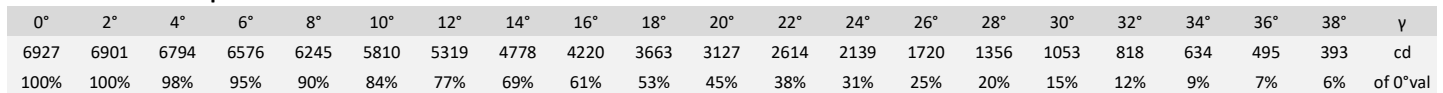
Iso-illuminance Diagram (Iso-lux)



50.0 %	34.6 lx
30.0 %	20.8 lx
10.0 %	6.9 lx
5.0 %	3.5 lx
3.0 %	2.1 lx

Peak illuminance: 69.3 lx
Mounting height: 10.0 m
Number of c-planes: 4

1_PHOT_SKIN+BONES-4050lmChip-2700K-38Deg_2303
www.factorylux.com



Goniophotometry Report

1_PHOT_SKIN+BONES-4050lmChip-2700K-38Deg_2303
www.factorylux.com



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	21.2	21.8	21.3	22.0	22.2	21.2	21.8	21.3	22.0	22.2
	3H	22.0	22.7	22.4	23.0	23.1	22.0	22.7	22.4	23.0	23.1
	4H	22.6	23.4	23.0	23.6	23.8	22.6	23.4	23.0	23.6	23.8
	6H	23.3	24.0	23.6	24.2	24.6	23.3	24.0	23.6	24.2	24.6
	8H	23.6	24.2	23.9	24.5	24.9	23.6	24.2	23.9	24.5	24.9
	12H	23.8	24.3	24.1	24.7	25.1	23.8	24.3	24.1	24.7	25.1
4H	2H	21.3	22.0	21.7	22.3	22.5	21.3	22.0	21.7	22.3	22.5
	3H	22.6	23.2	23.0	23.6	24.0	22.6	23.2	23.0	23.6	24.0
	4H	23.4	23.9	23.8	24.4	24.9	23.4	23.9	23.8	24.4	24.9
	6H	24.2	24.8	24.7	25.1	25.5	24.2	24.8	24.7	25.1	25.5
	8H	24.6	25.1	25.1	25.4	25.8	24.6	25.1	25.1	25.4	25.8
	12H	24.8	25.2	25.3	25.6	26.1	24.8	25.2	25.3	25.6	26.1
8H	4H	23.8	24.3	24.3	24.6	25.0	23.8	24.3	24.3	24.6	25.0
	6H	24.8	25.1	25.3	25.6	26.1	24.8	25.1	25.3	25.6	26.1
	8H	25.3	25.5	25.8	26.1	26.7	25.3	25.5	25.8	26.1	26.7
	12H	25.6	25.8	26.2	26.3	26.9	25.6	25.8	26.2	26.3	26.9
12H	4H	23.8	24.2	24.3	24.6	25.1	23.8	24.2	24.3	24.6	25.1
	6H	24.9	25.2	25.4	25.7	26.4	24.9	25.2	25.4	25.7	26.4
	8H	25.4	25.6	26.0	26.1	26.7	25.4	25.6	26.0	26.1	26.7

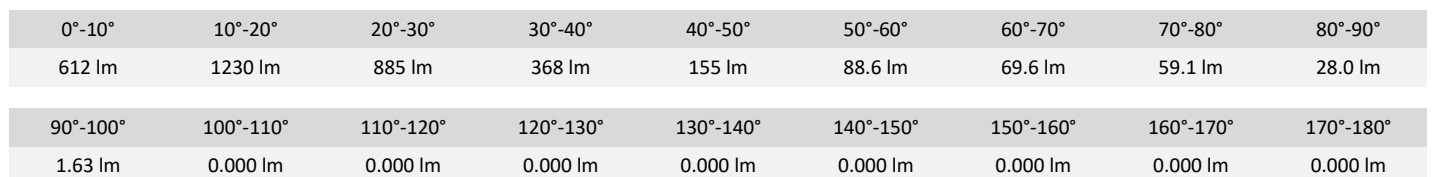
Variations with the observer position for the luminaire spacings, S:

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

1_PHOT_SKIN+BONES-4050lmChip-2700K-38Deg_2303
www.factorylux.com



Goniophotometry Report

1_PHOT_SKIN+BONES-4050lmChip-2700K-38Deg_2303
www.factorylux.com



Outdoor Light Planning

Lumen per Zone

Zone (γ)	Lumen	% Total
0-10°	612 lm	17.5%
10-20°	1230 lm	35.2%
20-30°	885 lm	25.3%
30-40°	368 lm	10.5%
40-50°	155 lm	4.4%
50-60°	89 lm	2.5%
60-70°	70 lm	2.0%
70-80°	59 lm	1.7%
80-90°	28 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	3497 lm	100.0%

Intensity peaks

Max intensity	6927 cd
Intensity, 90°	8 cd
Intensity, 0°	6927 cd

Zonal Lumen summary

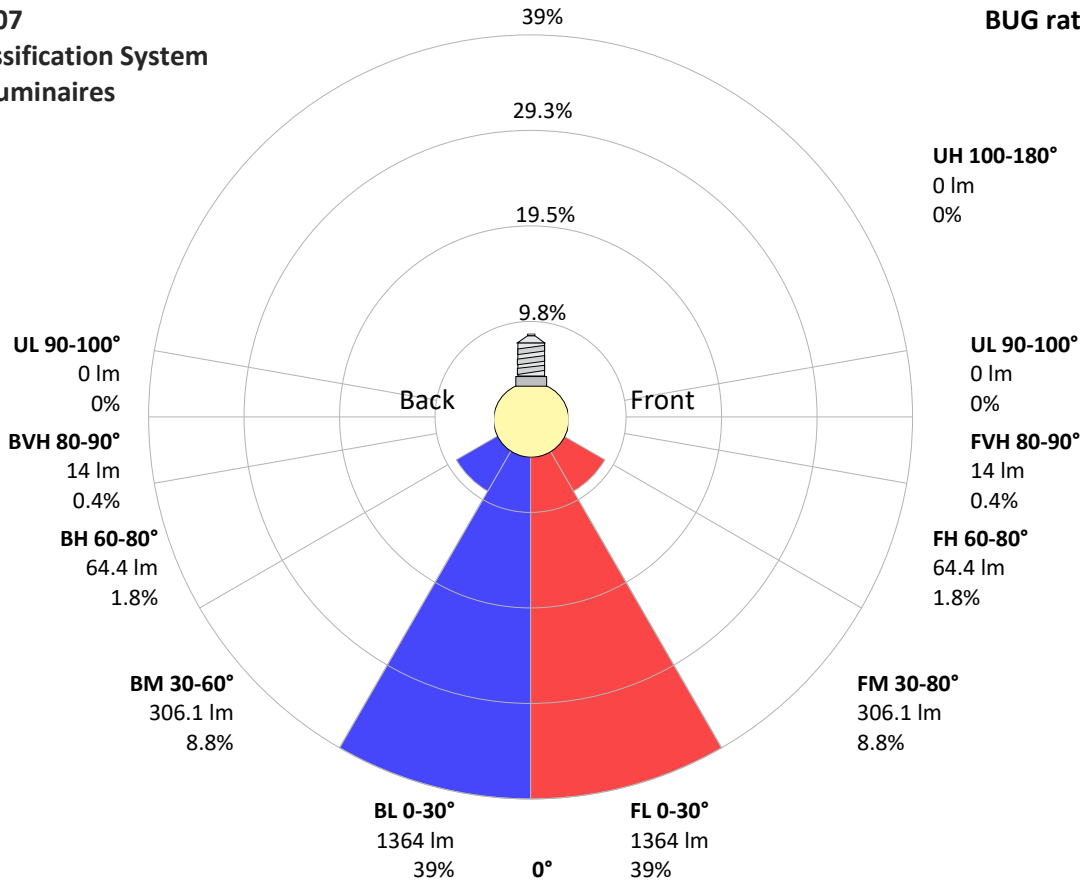
Zone (γ)	Lumen	% Total
0-30°	2727 lm	78.0%
0-40°	3095 lm	88.5%
0-60°	3339 lm	95.5%
60-90°	157 lm	4.5%
70-100°	89 lm	2.5%
90-120°	2 lm	0.0%
0-90°	3495 lm	100.0%
90-180°	2 lm	0.0%
0-180°	3497 lm	100.0%

BUG rating

	Lumen	% Total
Forward light		
Low(0-30°)	1364 lm	39.0%
Medium(30-60°)	306 lm	8.8%
High(60-80°)	64 lm	1.8%
Very high(80-90°)	14 lm	0.4%
Back light		
Low(0-30°)	1364 lm	39.0%
Medium(30-60°)	306 lm	8.8%
High(60-80°)	64 lm	1.8%
Very high(80-90°)	14 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



Goniophotometry Report

1_PHOT_SKIN+BONES-4050lmChip-2700K-38Deg_2303
www.factorylux.com



Power Details

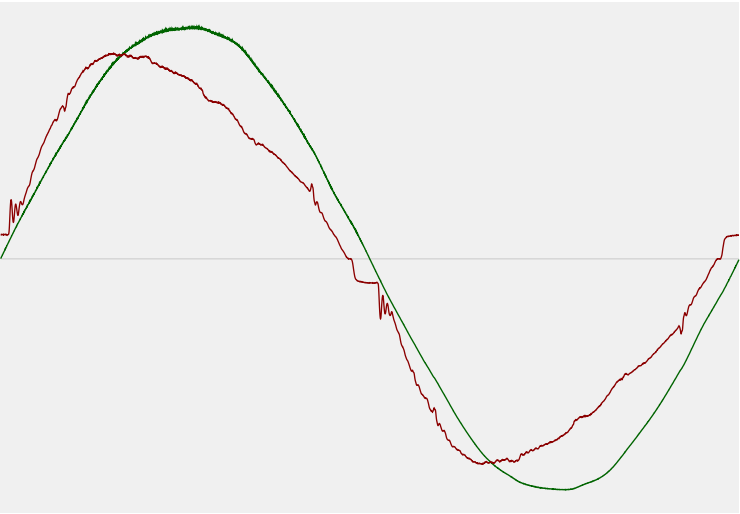
Input Power

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 = $V_{RMS} \cdot I_{RMS}$	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%

Efficiency

Radiated power efficiency	30.6%
<div><div></div></div>	
Lumen efficiency	84 lm/W
<div><div></div></div>	

Input Power Curve



Goniophotometry Report

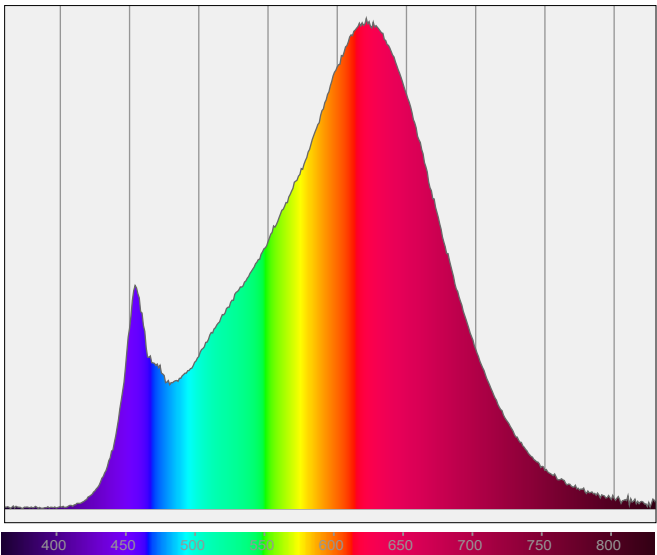
1_PHOT_SKIN+BONES-4050lmChip-2700K-38Deg_2303
www.factorylux.com



Color Measurements

Correlated Color Temperature	CCT = 2700 K
Color Rendering TM30-18	R _f 91.5 — R _g 99.5
Color Shift, CIE duv	Duv ±0.0003

Spectral distribution



Color details

Correlated Color Temperature	CCT = 2700 K	Color coordinates CIE 1931	(x;y) = (0.460;0.411)
Color Rendering Index	CRI 92.6	Color coordinate CIEs 1960	(u;v) = (0.263;0.352)
Color Rendering Index, R9 (red component)	R9 = 61.2	Color deviation from BBL	Duv = ±0.0003
Color Rendering TM30-18	R _f 91.5 — R _g 99.5	Color coordinate CIEs 1976 (CIELUV)	(u';v') = (0.263;0.263)
Color Quality Scale	CQS = 89.9		

Goniophotometry Report

1_PHOT_SKIN+BONES-4050lmChip-2700K-38Deg_2303
www.factorylux.com



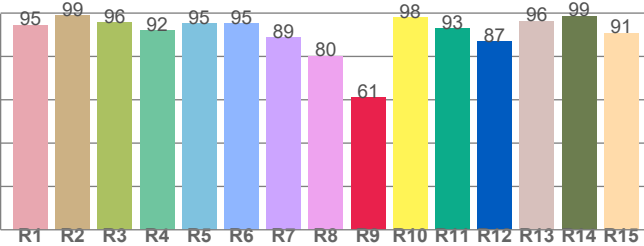
CIE 1931



CIE 1931 – zoomed on Planckian locus



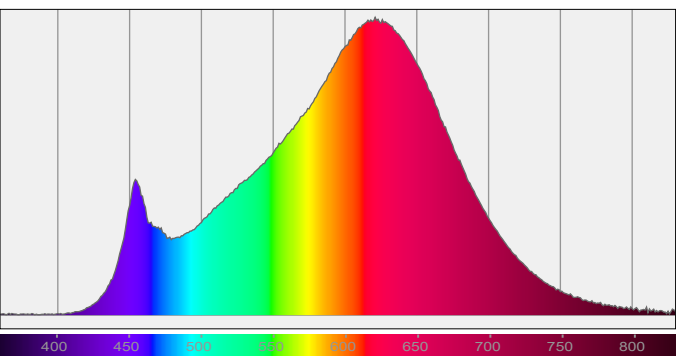
Color Rendering Index per reference color (CIE 1995)



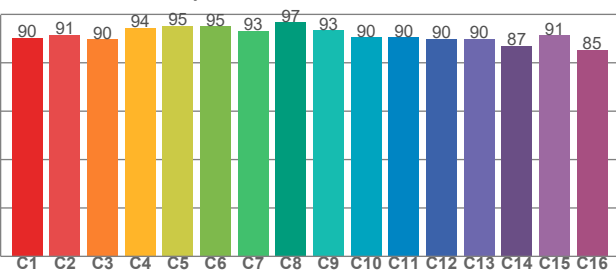
CRI R values, only R1-R8 are used to calculate final CRI value

R1	R2	R3	R4	R5	R6	R7	R8	R9	R10	R11	R12	R13	R14	R15
94.6	98.8	95.6	92.1	95.1	95.4	88.6	80.2	61.2	98.0	93.1	86.9	96.4	98.7	90.9

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



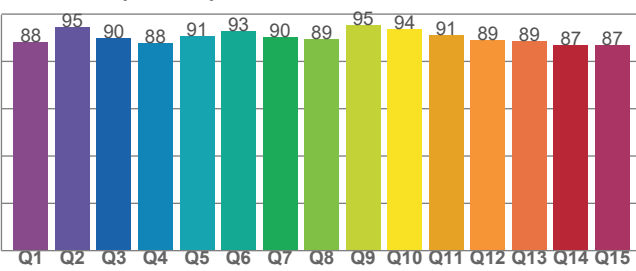
TM30-18 Rf-values per hue bin



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
90.3	91.4	89.7	94.4	95.3	95.0	93.1	96.6	93.3	90.4	90.4	89.7	89.7	86.9	91.3	85.4

Color Quality Scale by reference color



CQS Q values

Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10	Q11	Q12	Q13	Q14	Q15
88.0	94.5	89.7	87.7	90.7	92.8	90.1	89.4	95.3	93.7	91.0	89.0	88.6	86.9	87.0