

# Goniophotometry Report

1\_PHOT\_SKIN+BONES-4050lmChip-2700K-Spreader\_2303  
www.factorylux.com



Tested Light Source - 1\_PHOT\_SKIN+BONES-4050lmChip-2700K-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  
 $\gamma$  (gamma)-Resolution  
Test Distance  
Input Power, Power and Displ. Factors  
Input RMS Voltage and Current  
Frequency of Input Power

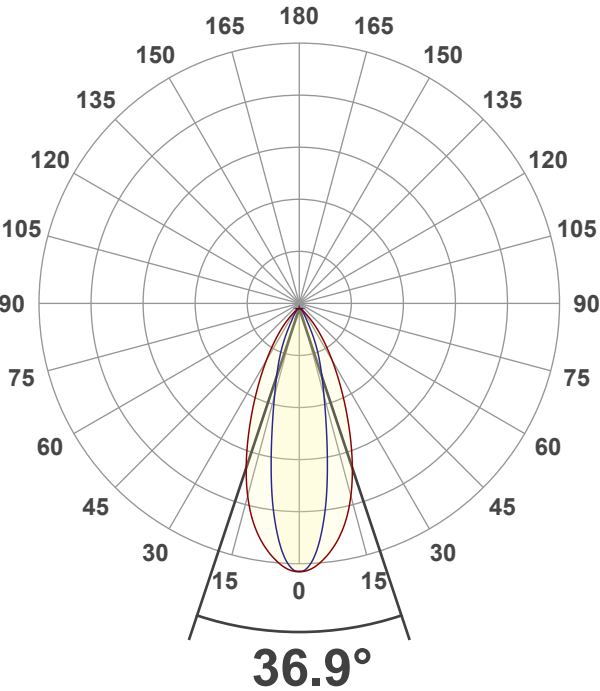
16 planes – 22.5°  
1°  
1.50 m  
41.4 W – PF 0.97 – DPF 0.97  
240 V – 0.178 A  
50.2 Hz

## Main Light Measurement Results

Output  
Efficiency  
Peak Intensity and Beam Angle  
Color Rendering Index

3462 lm  
84 lm/W  
6051 cd – 36.9°  
CRI 92.6

## Light Intensity Distribution



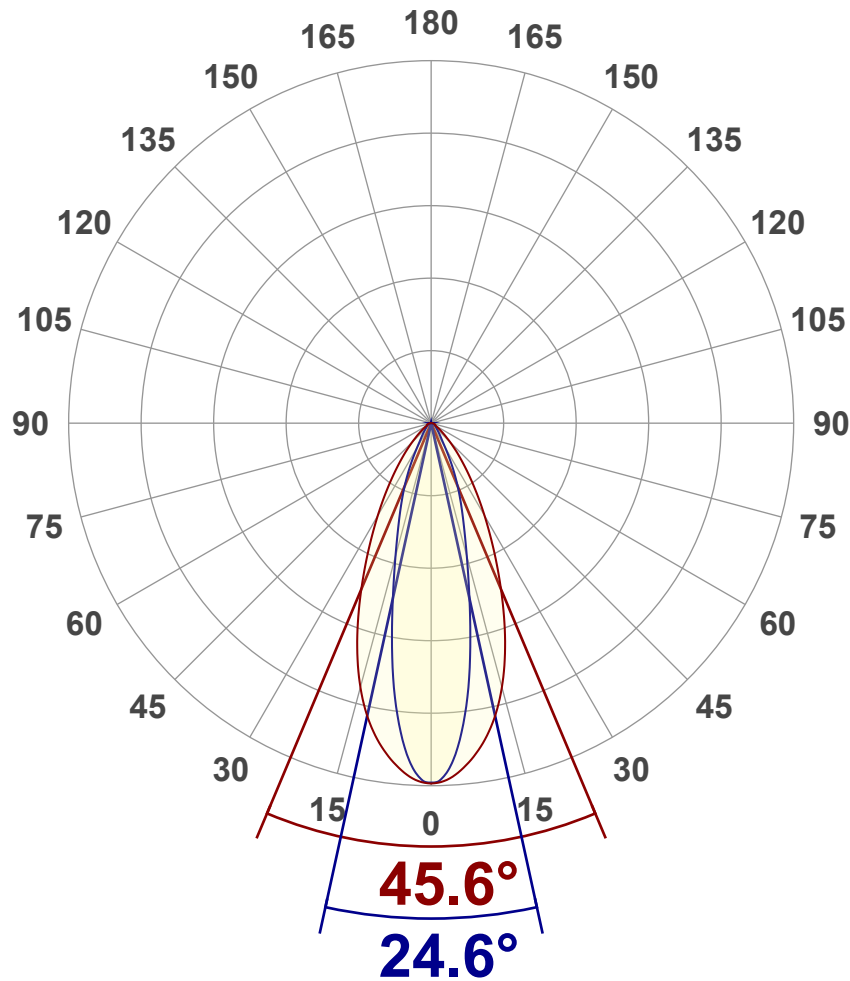
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Luminous Intensity diagram

Unit: 0-100% of peak intensity



Main Values

Output (total Lumen)	3462 lm
Peak Intensity	6051 cd
Beam Angle (50%)	36.9°
Beam Angle (90%)	24.6°
Beam Angle (10%)	45.6°

Cut-off Angle

Average 2,5%	98.7°
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Field Angle

Average 10%	70.9°
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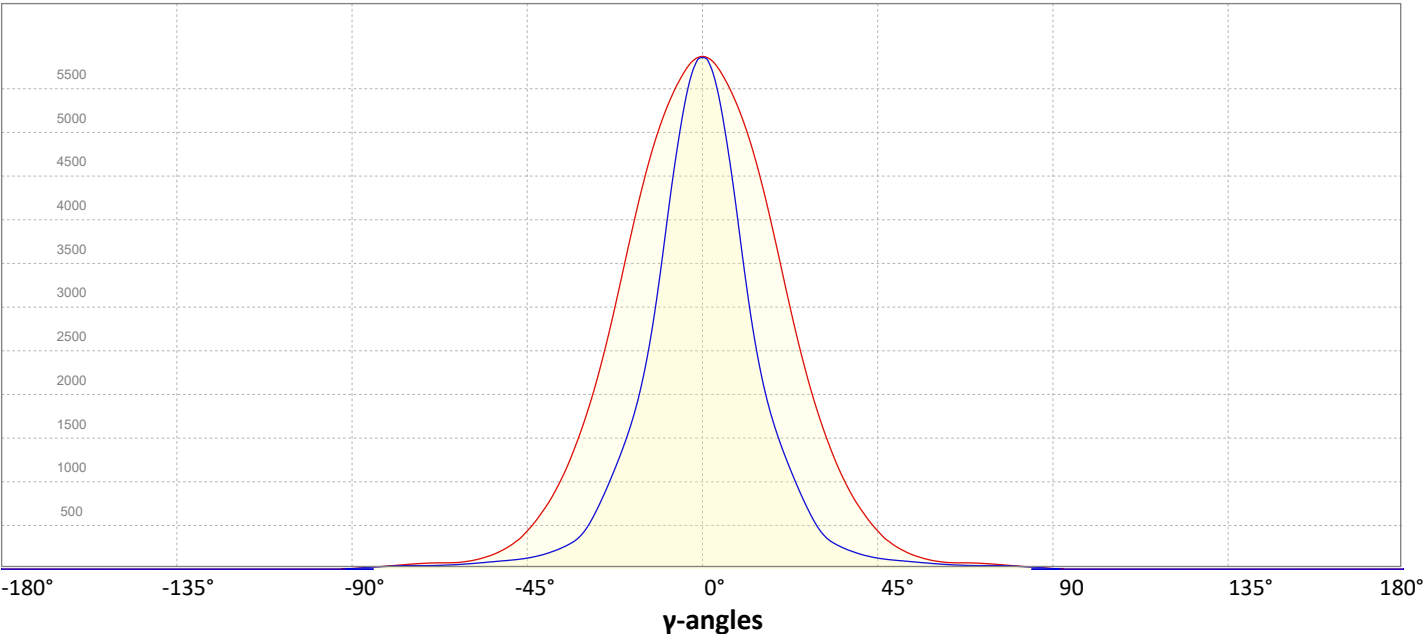
Intensity Ratio

In 120° cone	95.8%
In 90° cone	88.9%

C000-C180

C090-C270

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

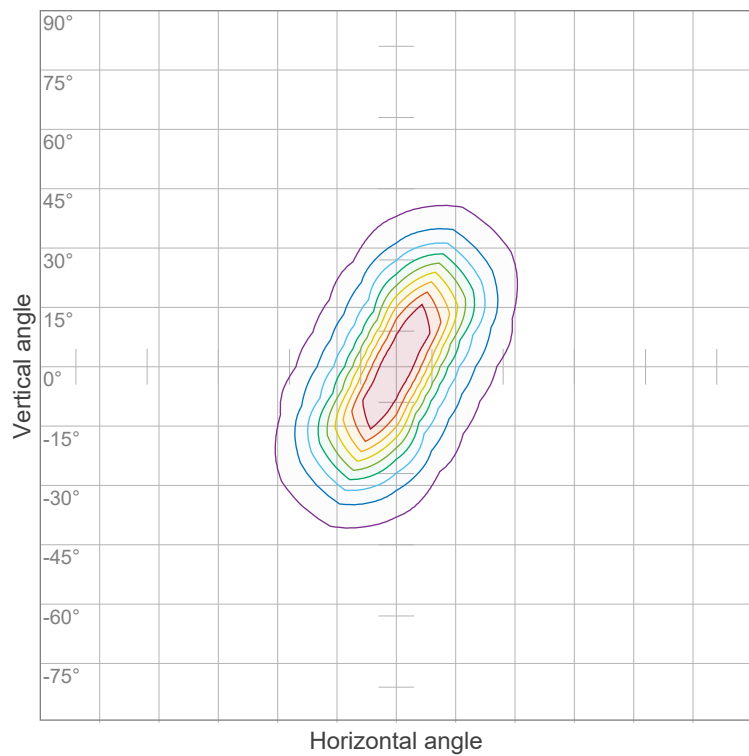


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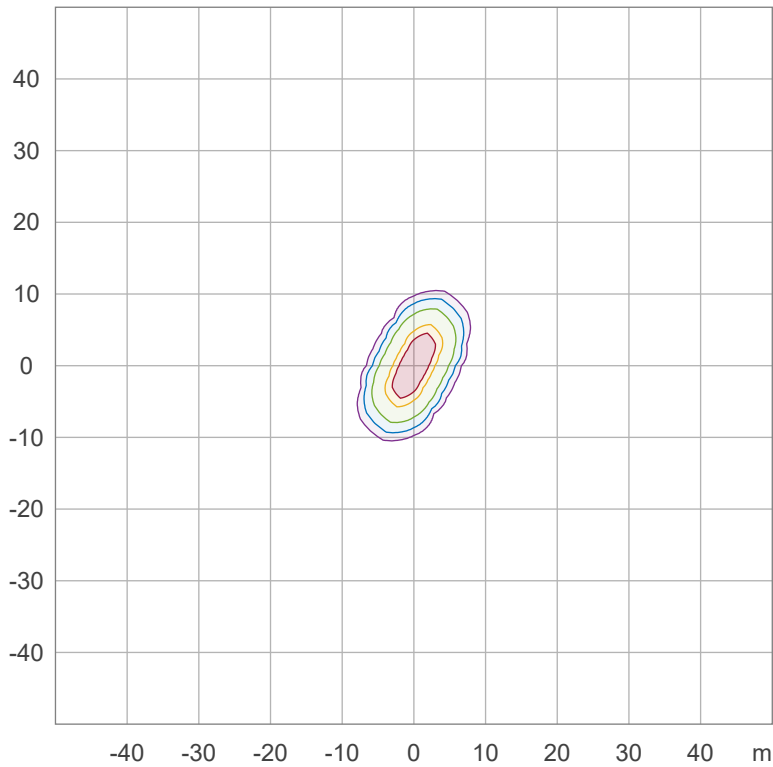
## Iso-intensity Diagram (Iso-candela)



90 %	5444.3 cd
80 %	4839.4 cd
70 %	4234.5 cd
60 %	3629.6 cd
50 %	3024.6 cd
40 %	2419.7 cd
30 %	1814.8 cd
20 %	1209.9 cd
10 %	604.9 cd

Peak intensity: 6049.3 cd  
Number of c-planes: 16

## Iso-illuminance Diagram (Iso-lux)



50.0 %	30.1 lx
30.0 %	18.1 lx
10.0 %	6.0 lx
5.0 %	3.0 lx
3.0 %	1.8 lx

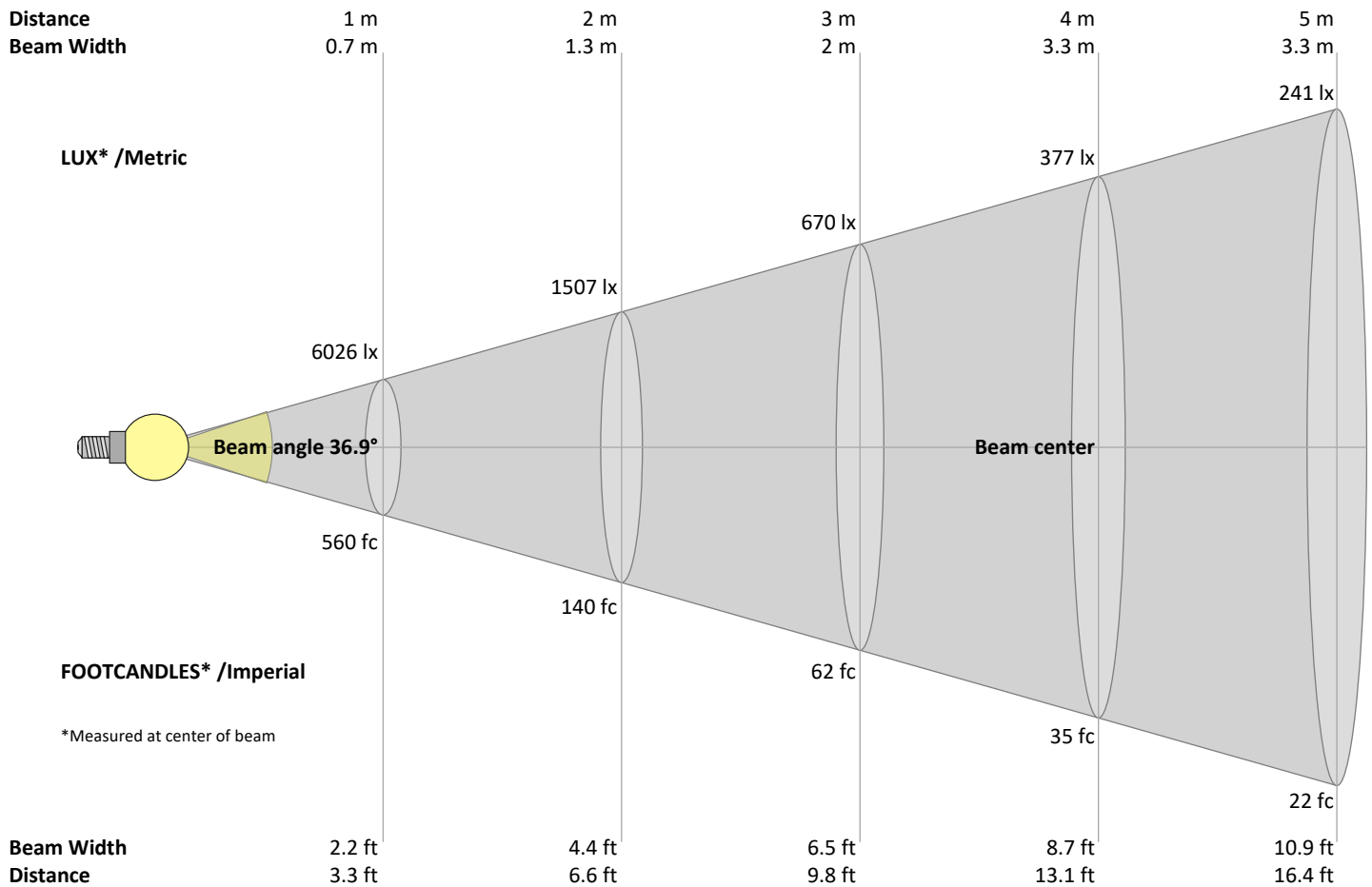
Peak illuminance: 60.3 lx  
Mounting height: 10.0 m  
Number of c-planes: 16

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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
6026	1507	670	377	241	167	123	94	74	60	50	42	36	31	27	24	21	19	17	15	lux
559.9	140	62.2	35	22.4	15.6	11.4	8.7	6.9	5.6	4.6	3.9	3.3	2.9	2.5	2.2	1.9	1.7	1.6	1.4	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
6026	5999	5898	5743	5555	5331	5063	4750	4394	4004	3595	3181	2783	2418	2084	1789	1526	1290	1083	903	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
6026	5921	5598	5092	4474	3776	3108	2545	2101	1757	1479	1238	1015	808	621	468	363	299	253	216	cd
100%	98%	93%	84%	74%	63%	52%	42%	35%	29%	25%	21%	17%	13%	10%	8%	6%	5%	4%	4%	of 0°val

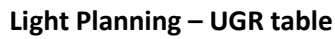
### Intensities in 180° c-plane

0°	2°	4°	6°	8°	10°	12°	14°	16°	18°	20°	22°	24°	26°	28°	30°	32°	34°	36°	38°	γ
6026	5999	5898	5743	5555	5331	5063	4750	4394	4004	3595	3181	2783	2418	2084	1789	1526	1290	1083	903	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
6026	5921	5598	5092	4474	3776	3108	2545	2101	1757	1479	1238	1015	808	621	468	363	299	253	216	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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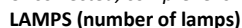
*Uncorrected, comprehensive UGR table according to 117-1995*

[illegible]

### 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°	501 lm	14.5%
10-20°	982 lm	28.4%
20-30°	895 lm	25.9%
30-40°	544 lm	15.7%
40-50°	267 lm	7.7%
50-60°	127 lm	3.7%
60-70°	68 lm	2.0%
70-80°	51 lm	1.5%
80-90°	25 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	3462 lm	100.0%

Intensity peaks

Max intensity	6051 cd
Intensity, 90°	7 cd
Intensity, 0°	6026 cd

Zonal Lumen summary

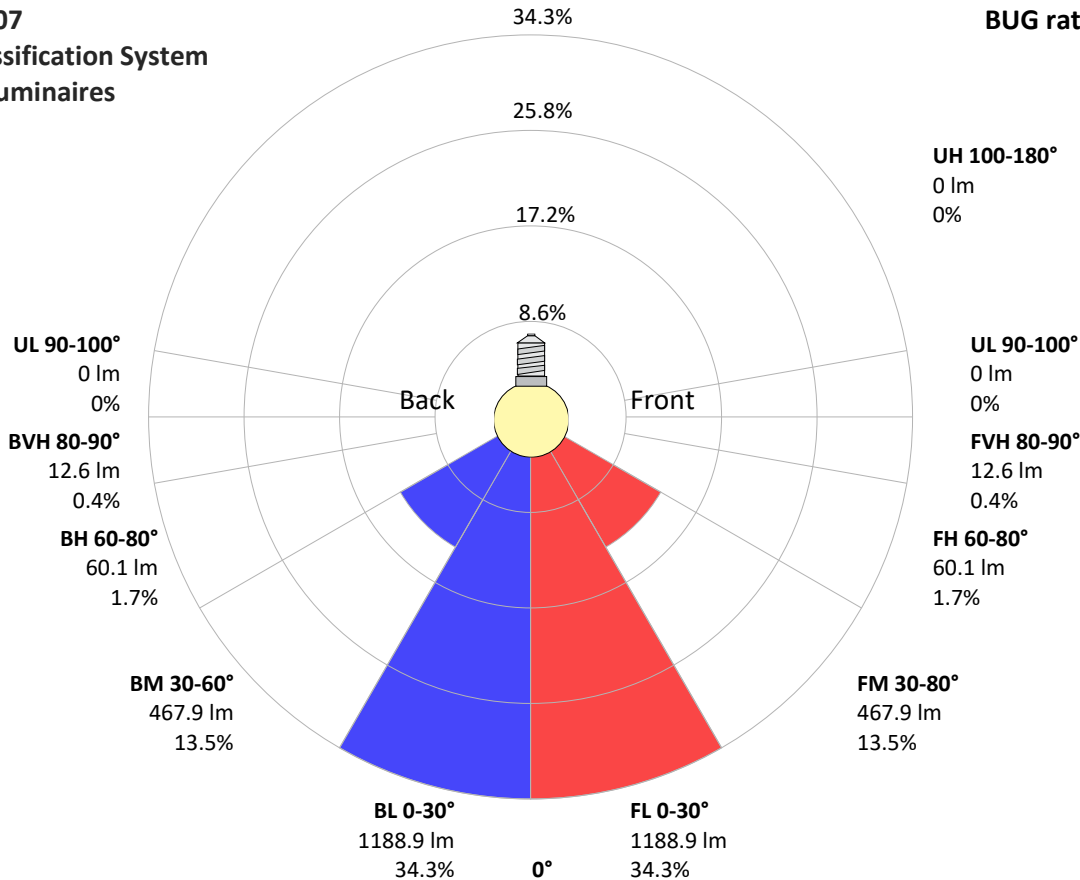
Zone (γ)	Lumen	% Total
0-30°	2379 lm	68.7%
0-40°	2922 lm	84.4%
0-60°	3316 lm	95.8%
60-90°	144 lm	4.2%
70-100°	78 lm	2.2%
90-120°	2 lm	0.0%
0-90°	3460 lm	100.0%
90-180°	2 lm	0.0%
0-180°	3462 lm	100.0%

BUG rating

	Lumen	% Total
<b>Forward light</b>		
Low(0-30°)	1189 lm	34.3%
Medium(30-60°)	468 lm	13.5%
High(60-80°)	60 lm	1.7%
Very high(80-90°)	13 lm	0.4%
<b>Back light</b>		
Low(0-30°)	1189 lm	34.3%
Medium(30-60°)	468 lm	13.5%
High(60-80°)	60 lm	1.7%
Very high(80-90°)	13 lm	0.4%
<b>Uplight</b>		
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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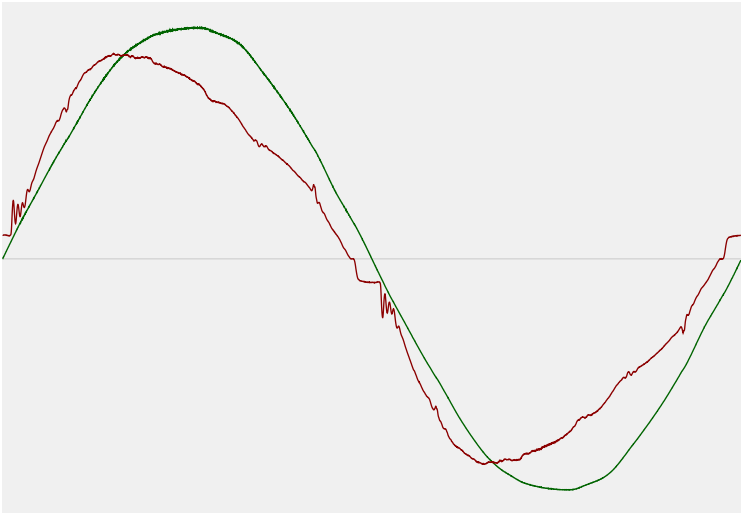


## Power Details

### 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 = $V_{RMS} * I_{RMS}$	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%

### Input Power Curve



### Efficiency

Radiated power efficiency	30.3%
Lumen efficiency	84 lm/W



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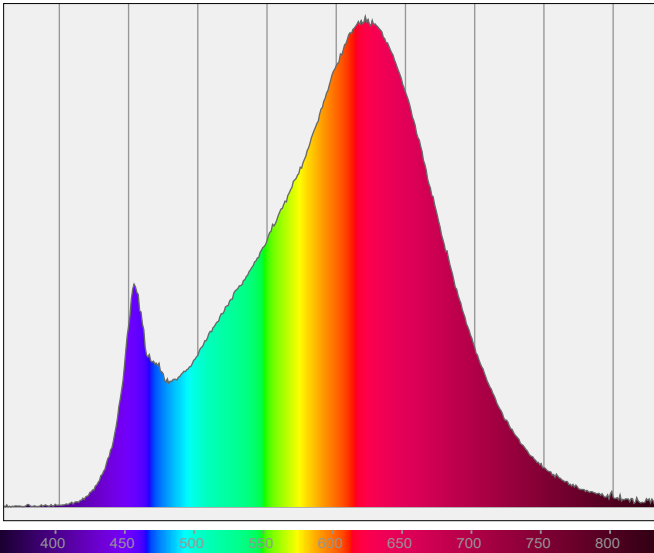
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## Color Measurements

Correlated Color Temperature	CCT = 2700 K
Color Rendering TM30-18	R <sub>f</sub> 91.5 — R <sub>g</sub> 99.6
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 = 61.3	Color deviation from BBL	Duv = ±0.0003
Color Rendering TM30-18	R <sub>f</sub> 91.5 — R <sub>g</sub> 99.6	Color coordinate CIEs 1976 (CIELUV)	(u';v') = (0.263;0.263)
Color Quality Scale	CQS = 89.9		

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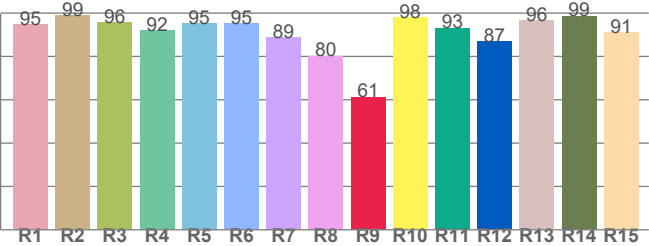
CIE 1931



CIE 1931 – zoomed on Planckian locus



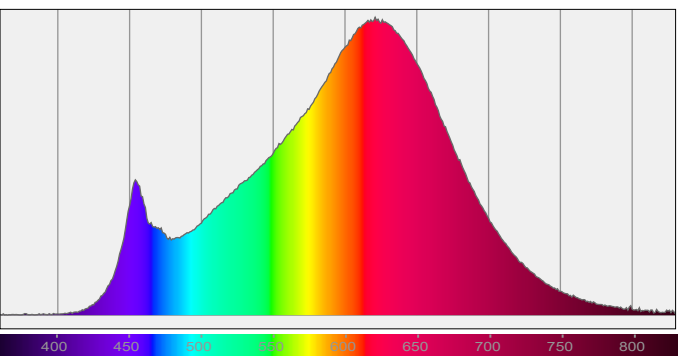
Color Rendering Index per reference color (CIE 1995)



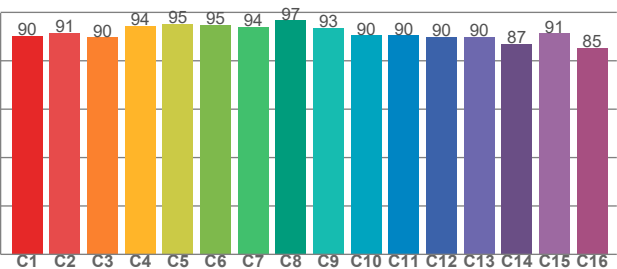
CRI R values, only R1-R8 are used to calculate final CRI value

R1	R2	R3	R4	R5	R6	R7	R8	R9	R10	R11	R12	R13	R14	R15
94.6	98.8	95.6	92.2	95.1	95.3	88.6	80.3	61.3	98.0	93.2	86.9	96.5	98.7	90.9

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



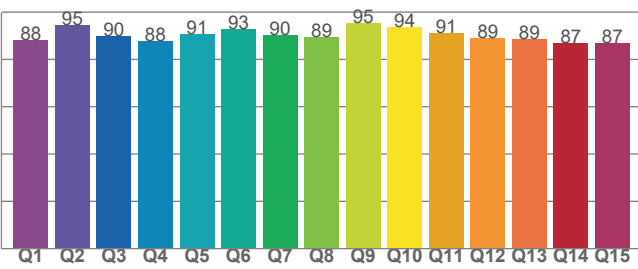
TM30-18 Rf-values per hue bin



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	89.6	94.4	95.3	94.9	93.8	96.6	93.4	90.5	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	89.3	95.3	93.7	90.9	88.9	88.6	86.9	87.0