

# Goniophotometry Report

1\_PHOT\_REFLEKTER-L-4300lmChip-3000K-58Deg\_2303  
www.factorylux.com



Tested Light Source - 1\_PHOT\_REFLEKTER-L-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  
 $\gamma$  (gamma)-Resolution  
Test Distance  
Input Power, Power and Displ. Factors  
Input RMS Voltage and Current  
Frequency of Input Power

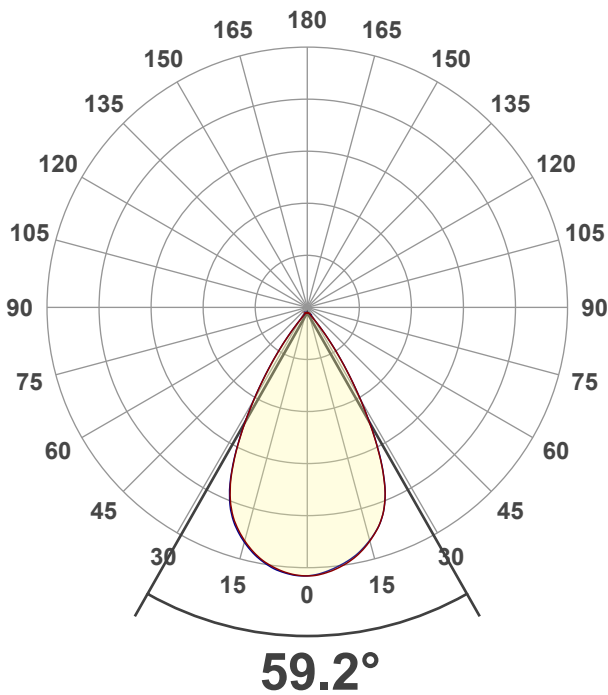
32 planes – 11.25°  
2.5°  
3.00 m  
41.3 W – PF 0.97 – DPF 0.97  
239 V – 0.179 A  
50 Hz

## Main Light Measurement Results

Output  
Efficiency  
Peak Intensity and Beam Angle  
Color Rendering Index

3655 lm  
88 lm/W  
4125 cd – 59.2°  
CRI 92.6

## Light Intensity Distribution



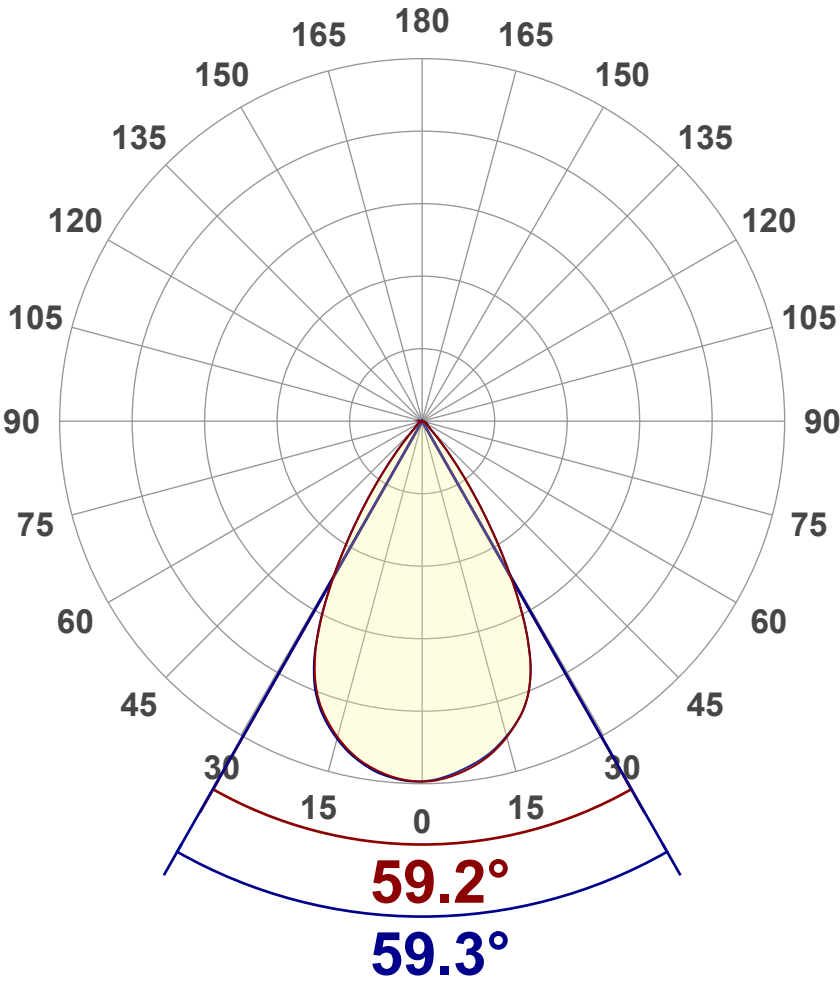
Goniophotometry Report

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Luminous Intensity diagram

Unit: 0-100% of peak intensity



Main Values

Output (total Lumen)	3655 lm
Peak Intensity	4125 cd
Beam Angle (50%)	59.2°
Beam Angle (90%)	59.3°
Beam Angle (10%)	59.2°

Cut-off Angle

Average 2,5%	97.3°
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Field Angle

Average 10%	80.9°
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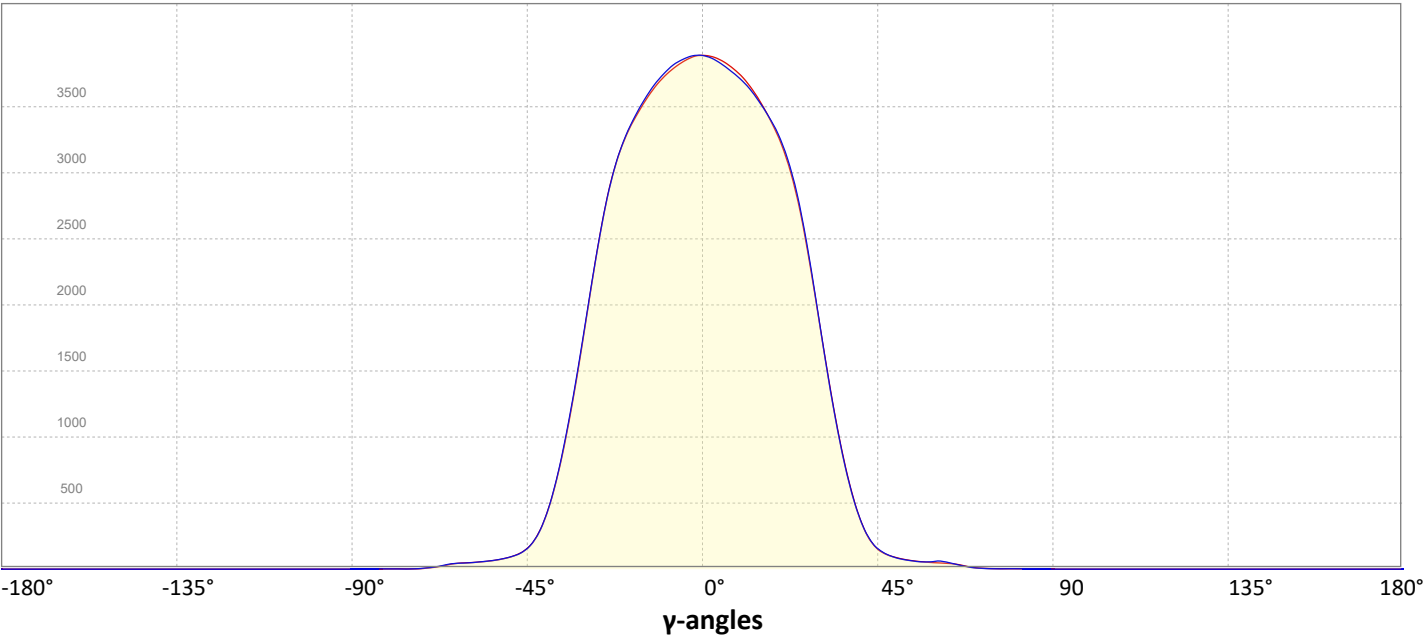
Intensity Ratio

In 120° cone	98.9%
In 90° cone	95.9%

C000-C180

C090-C270

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

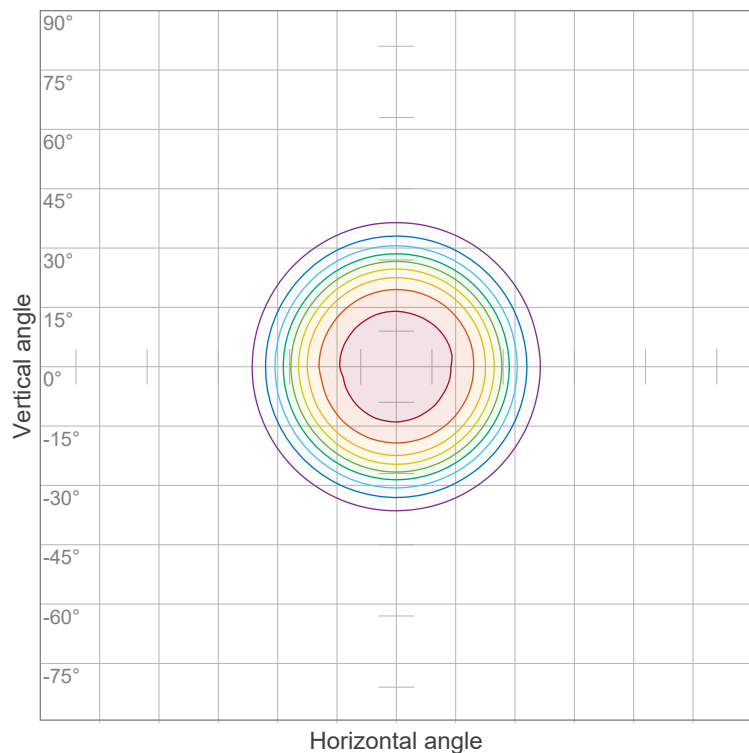


# Goniophotometry Report

1\_PHOT\_REFLEKTER-L-4300lmChip-3000K-58Deg\_2303  
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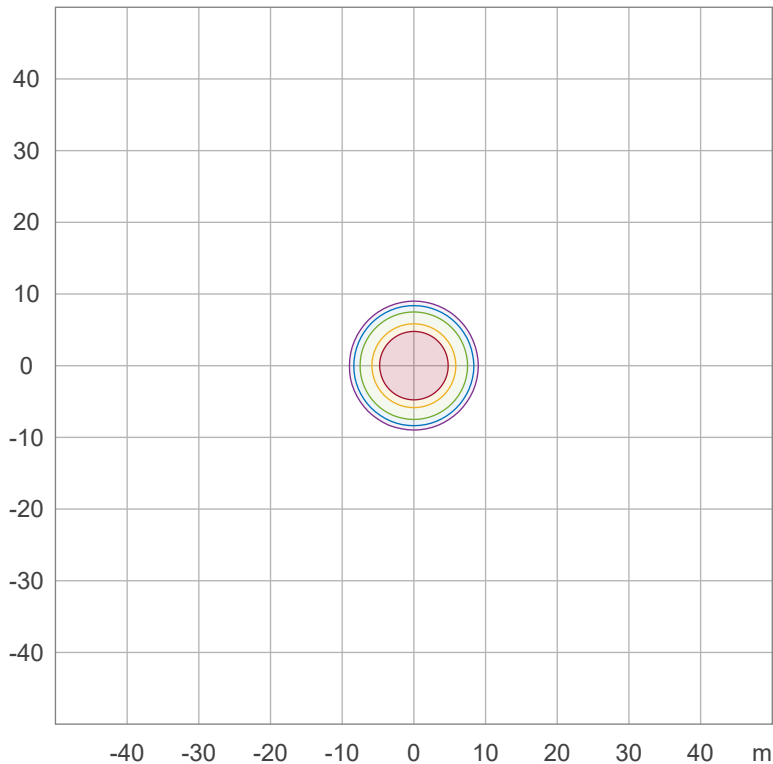
## Iso-intensity Diagram (Iso-candela)



90 %	3711.6 cd
80 %	3299.2 cd
70 %	2886.8 cd
60 %	2474.4 cd
50 %	2062.0 cd
40 %	1649.6 cd
30 %	1237.2 cd
20 %	824.8 cd
10 %	412.4 cd

Peak intensity: 4124.0 cd  
Number of c-planes: 32

## Iso-illuminance Diagram (Iso-lux)



50.0 %	20.6 lx
30.0 %	12.4 lx
10.0 %	4.1 lx
5.0 %	2.1 lx
3.0 %	1.2 lx

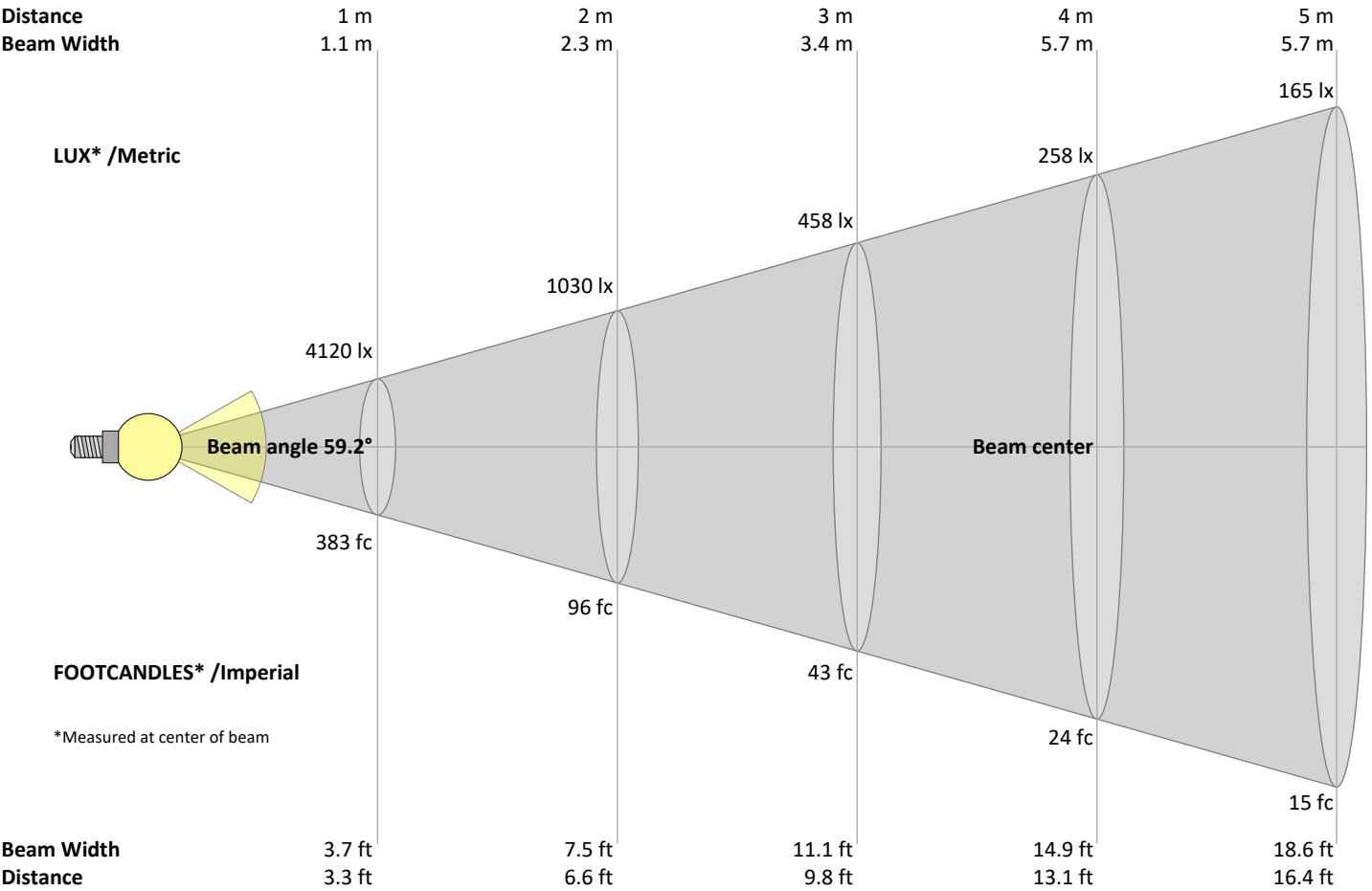
Peak illuminance: 41.2 lx  
Mounting height: 10.0 m  
Number of c-planes: 32

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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
4120	1030	458	258	165	114	84	64	51	41	34	29	24	21	18	16	14	13	11	10	lux
382.8	95.7	42.5	23.9	15.3	10.6	7.8	6	4.7	3.8	3.2	2.7	2.3	2	1.7	1.5	1.3	1.2	1.1	1	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
4120	4114	4088	4049	4002	3944	3875	3790	3689	3577	3441	3268	3043	2735	2369	1979	1594	1235	916	658	cd
100%	100%	99%	98%	97%	96%	94%	92%	90%	87%	84%	79%	74%	66%	57%	48%	39%	30%	22%	16%	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
4120	4103	4069	4027	3978	3923	3858	3774	3680	3573	3443	3274	3043	2738	2378	1988	1596	1232	920	659	cd
100%	100%	99%	98%	97%	95%	94%	92%	89%	87%	84%	79%	74%	66%	58%	48%	39%	30%	22%	16%	of 0°val

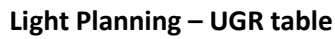
Intensities in 180° c-plane

0°	2°	4°	6°	8°	10°	12°	14°	16°	18°	20°	22°	24°	26°	28°	30°	32°	34°	36°	38°	γ
4120	4113	4092	4059	4013	3955	3879	3789	3684	3565	3427	3243	3008	2714	2365	1982	1600	1246	931	664	cd
100%	100%	99%	99%	97%	96%	94%	92%	89%	87%	83%	79%	73%	66%	57%	48%	39%	30%	23%	16%	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
4120	4119	4102	4073	4031	3972	3899	3810	3706	3589	3452	3275	3034	2729	2374	1991	1603	1250	934	667	cd
100%	100%	100%	99%	98%	96%	95%	92%	90%	87%	84%	79%	74%	66%	58%	48%	39%	30%	23%	16%	of 0°val

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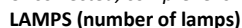
*Uncorrected, comprehensive UGR table according to 117-1995*

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
	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	114	111	108	106	111	109	106	104	105	103	101	101	99	98	97	96	95	94
2	108	103	99	96	106	101	98	95	98	95	93	95	93	91	92	90	89	87
3	103	96	91	87	101	95	90	87	92	88	85	90	87	84	88	85	83	81
4	97	90	84	80	96	89	84	80	87	82	79	85	81	78	83	80	77	76
5	93	84	79	74	91	83	78	74	82	77	73	80	76	73	78	75	72	71
6	88	79	73	69	87	78	73	69	77	72	68	76	71	68	74	70	67	66
7	84	75	69	64	82	74	68	64	73	68	64	71	67	64	70	66	63	62
8	80	70	64	60	79	70	64	60	69	64	60	68	63	60	67	63	59	58
9	76	66	61	57	75	66	60	57	65	60	56	64	60	56	63	59	56	55
10	73	63	57	53	72	63	57	53	62	57	53	61	56	53	60	56	53	52

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## Zonal Lumen Summary

[illegible]

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## Outdoor Light Planning

### Lumen per Zone

Zone (γ)	Lumen	% Total
0-10°	385 lm	10.5%
10-20°	1049 lm	28.7%
20-30°	1287 lm	35.2%
30-40°	684 lm	18.7%
40-50°	150 lm	4.1%
50-60°	59 lm	1.6%
60-70°	35 lm	0.9%
70-80°	5 lm	0.1%
80-90°	2 lm	0.1%
90-100°	0 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	3655 lm	100.0%

### Intensity peaks

Max intensity	4125 cd
Intensity, 90°	0 cd
Intensity, 0°	4120 cd

### Zonal Lumen summary

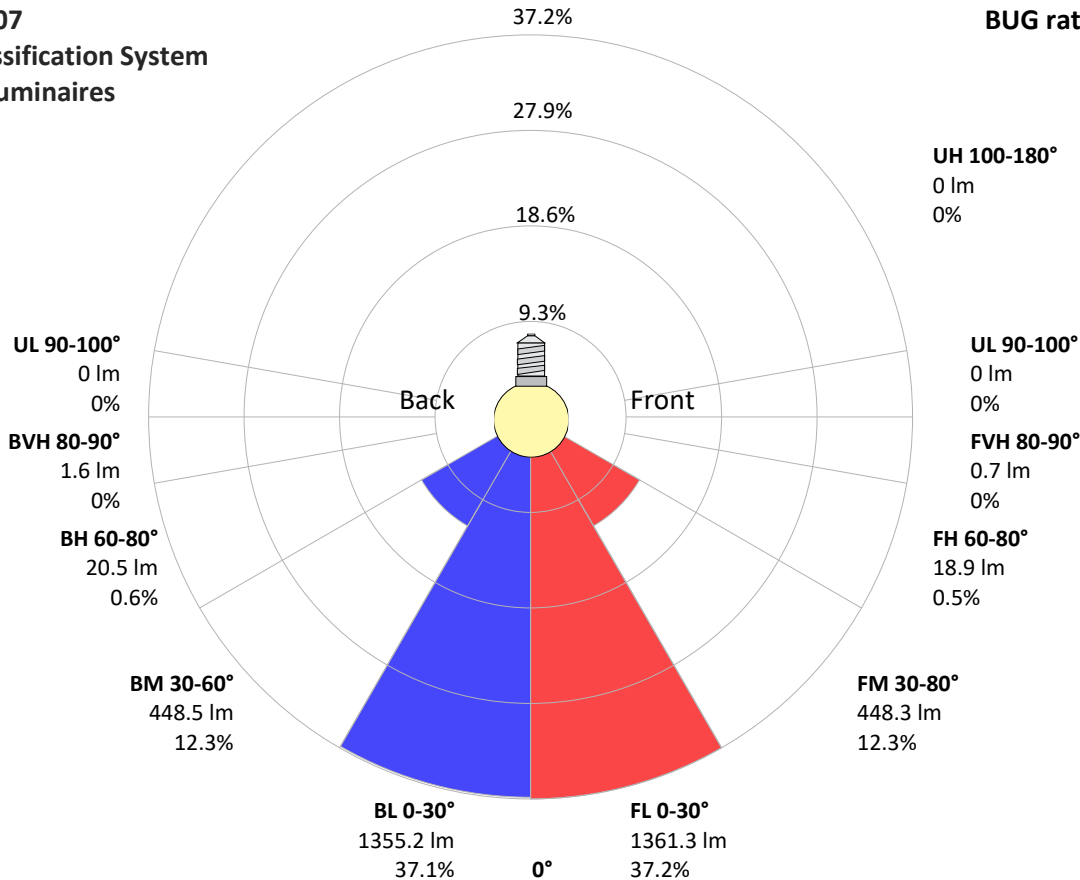
Zone (γ)	Lumen	% Total
0-30°	2720 lm	74.4%
0-40°	3404 lm	93.1%
0-60°	3613 lm	98.9%
60-90°	42 lm	1.1%
70-100°	7 lm	0.2%
90-120°	0 lm	0.0%
0-90°	3655 lm	100.0%
90-180°	0 lm	0.0%
0-180°	3655 lm	100.0%

### BUG rating

	Lumen	% Total
<b>Forward light</b>		
Low(0-30°)	1361 lm	37.2%
Medium(30-60°)	448 lm	12.3%
High(60-80°)	19 lm	0.5%
Very high(80-90°)	1 lm	0.0%
<b>Back light</b>		
Low(0-30°)	1355 lm	37.1%
Medium(30-60°)	449 lm	12.3%
High(60-80°)	20 lm	0.6%
Very high(80-90°)	2 lm	0.0%
<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 G0



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## Power Details

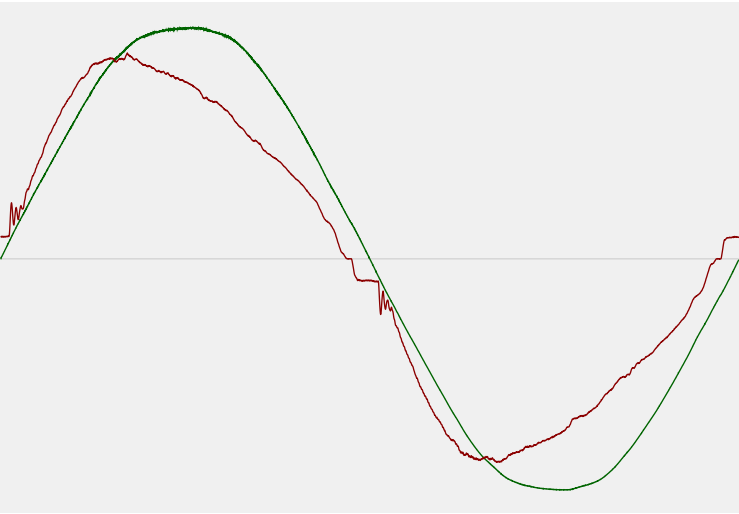
### Input Power

Power feed to light source	41.3 W
Frequency of input power	50 Hz
RMS Input voltage feed, $V_{RMS}$	239 V
RMS Input current feed, $I_{RMS}$	0.179 A
Volt-Ampere or apparent power = $V_{RMS} \cdot I_{RMS}$	42.69 VA
Displacement factor of AC power feed	0.97
Power factor of AC current feed	0.97
Total harmonic distortion of the current	11.15%
Total harmonic distortion of the voltage	1.49%

### Efficiency

Radiated power efficiency	32.1%
<div><div></div></div>	
Lumen efficiency	88 lm/W
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### Input Power Curve





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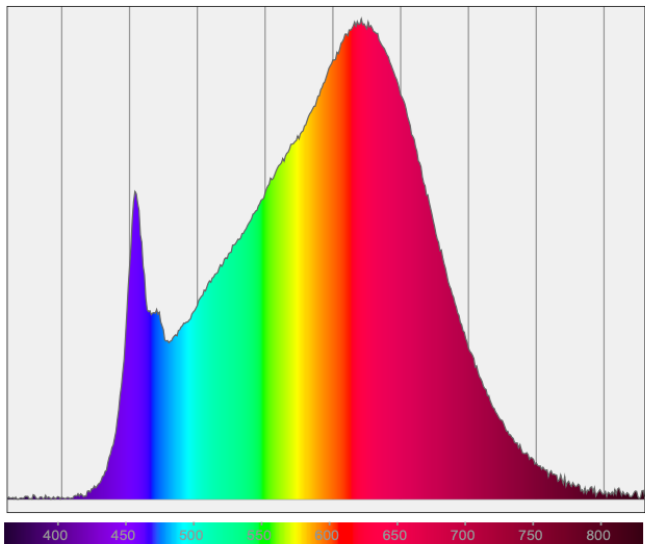
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## Color Measurements

Correlated Color Temperature	CCT = 3000 K
Color Rendering TM30-18	R <sub>f</sub> 91.0 — R <sub>g</sub> 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 <sub>f</sub> 91.0 — R <sub>g</sub> 97.7	Color coordinate CIEs 1976 (CIELUV)	(u';v') = (0.251;0.251)
Color Quality Scale	CQS = 91.8		

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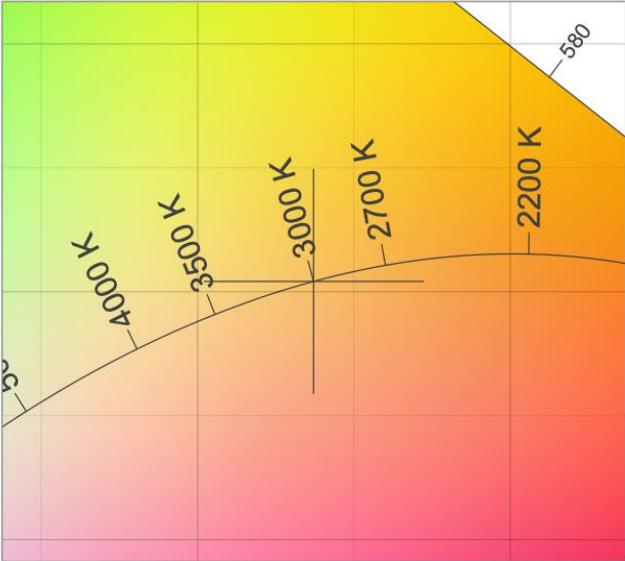
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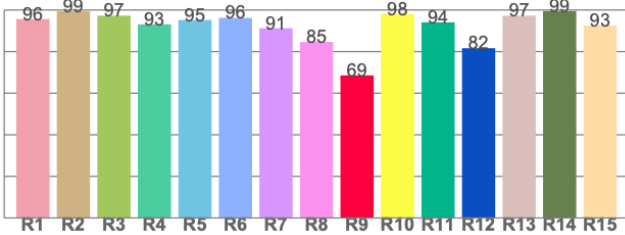
CIE 1931



CIE 1931 – zoomed on Planckian locus



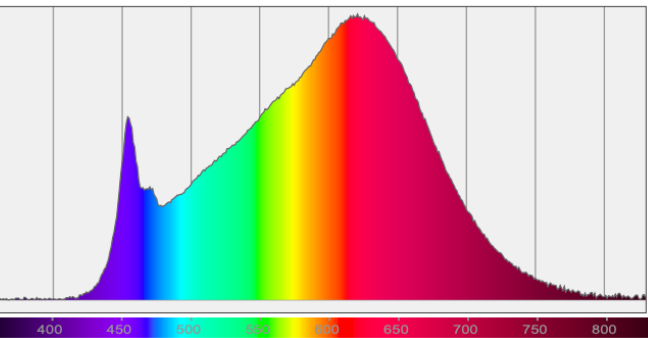
Color Rendering Index per reference color (CIE 1995)



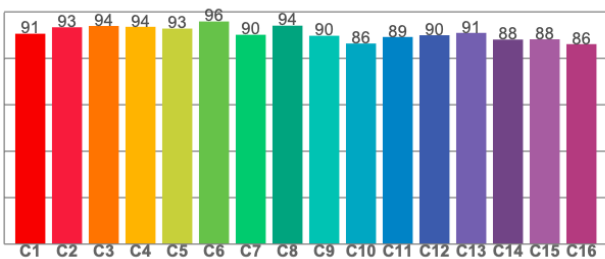
CRI R values, only R1-R8 are used to calculate final CRI value

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%



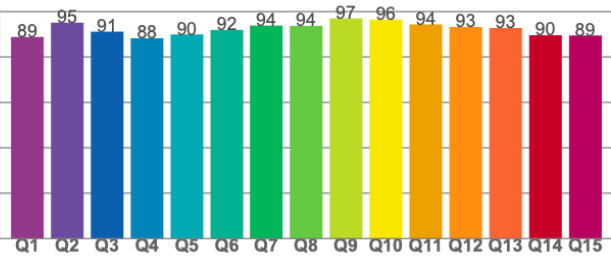
TM30-18 Rf-values per hue bin



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