

# Goniophotometry Report

1\_PHOT\_NINETY-NINE-1925lmChip-4000K-38Deg\_2303  
www.factorylux.com



Tested Light Source - 1\_PHOT\_NINETY-NINE-1925lmChip-4000K-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  
 $\gamma$  (gamma)-Resolution  
Test Distance  
Input Power, Power and Displ. Factors  
Input RMS Voltage and Current  
Frequency of Input Power

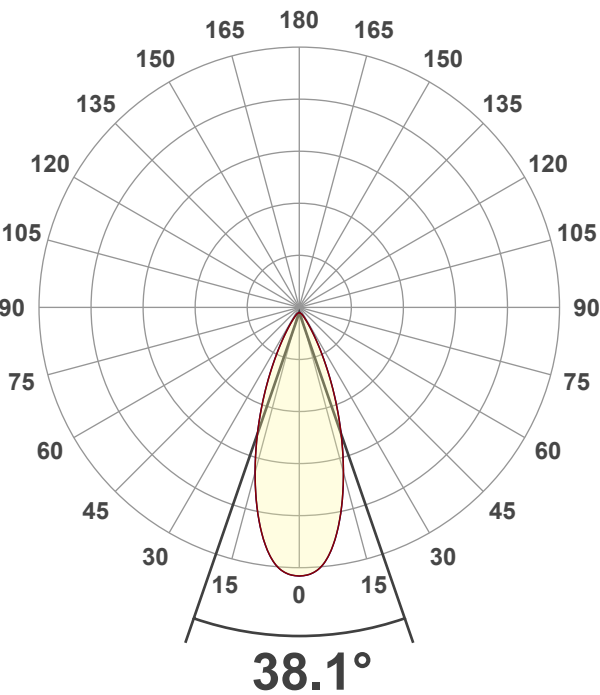
32 planes – 11.25°  
1.5°  
1.50 m  
14.5 W – PF 0.47 – DPF 0.81  
237 V – 0.131 A  
49.9 Hz

## Main Light Measurement Results

Output  
Efficiency  
Peak Intensity and Beam Angle  
Color Rendering Index

1446 lm  
99 lm/W  
2852 cd – 38.1°  
CRI 92.9

## Light Intensity Distribution



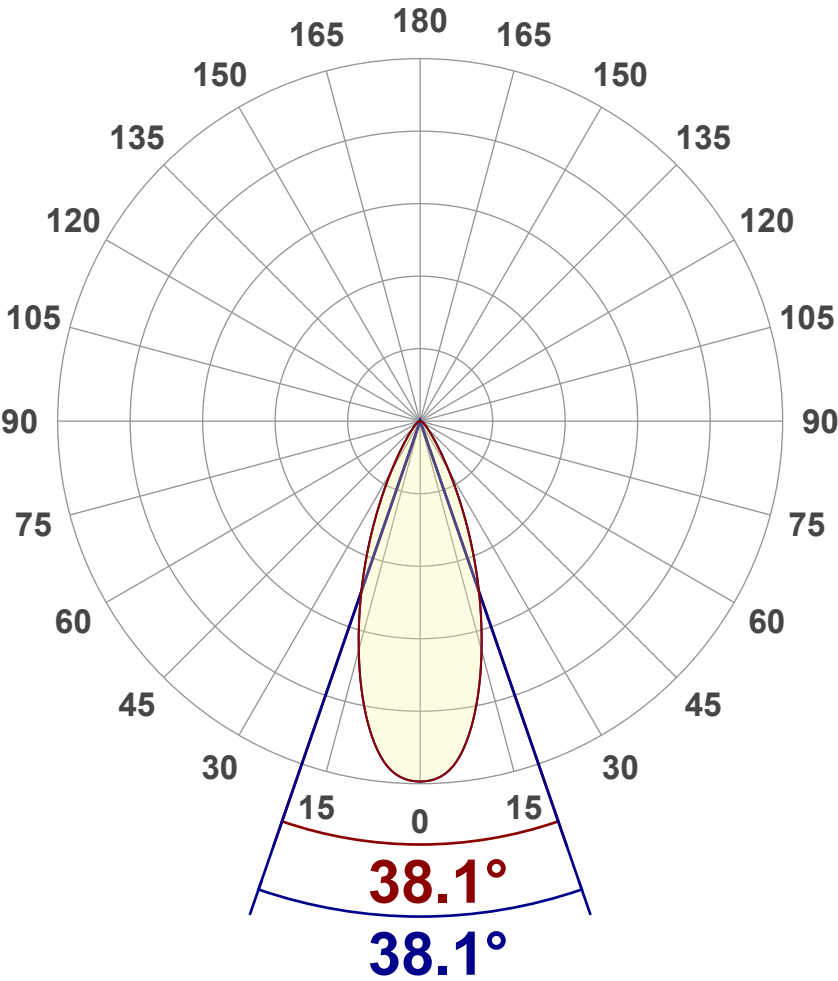
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Luminous Intensity diagram

Unit: 0-100% of peak intensity



Main Values

Output (total Lumen)	1446 lm
Peak Intensity	2852 cd
Beam Angle (50%)	38.1°
Beam Angle (90%)	38.1°
Beam Angle (10%)	38.1°

Cut-off Angle

Average 2,5%	93.7°
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Field Angle

Average 10%	67.4°
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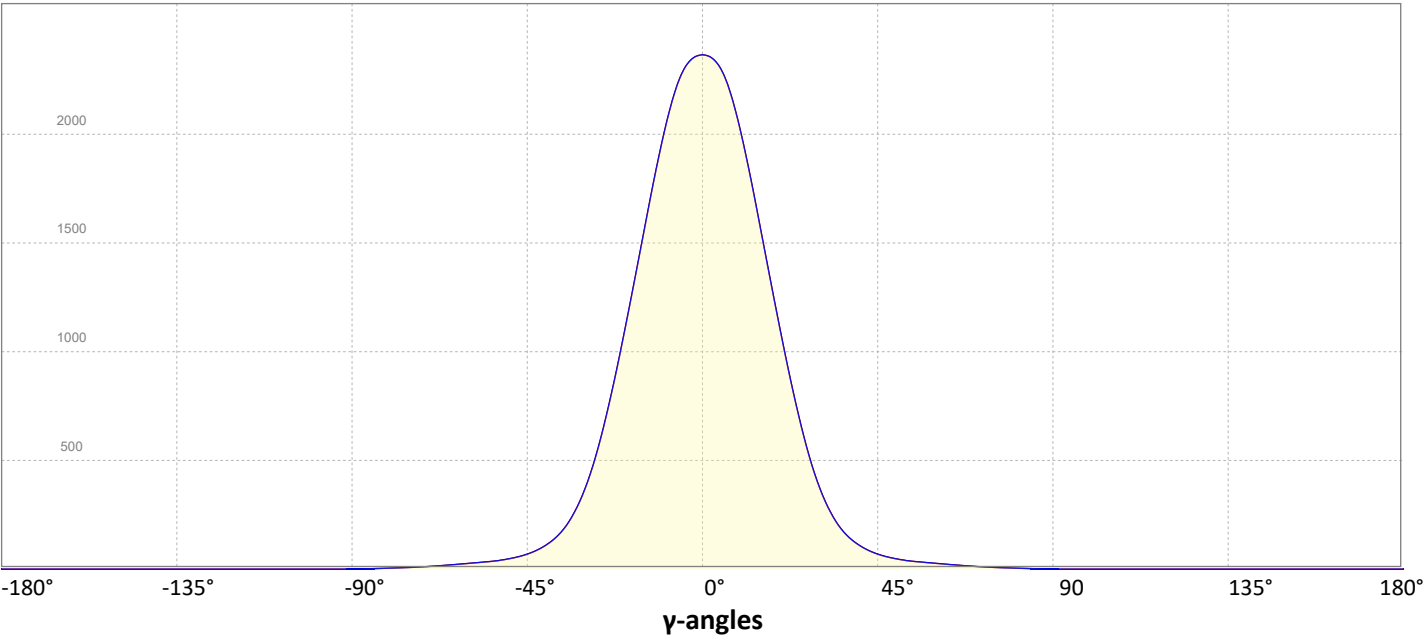
Intensity Ratio

In 120° cone	97.5%
In 90° cone	92.9%

C000-C180

C090-C270

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

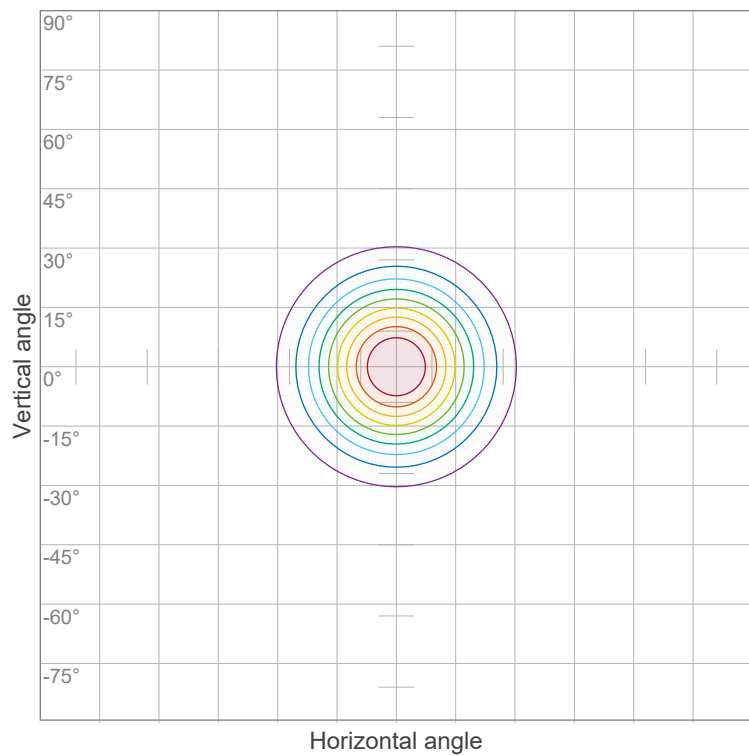


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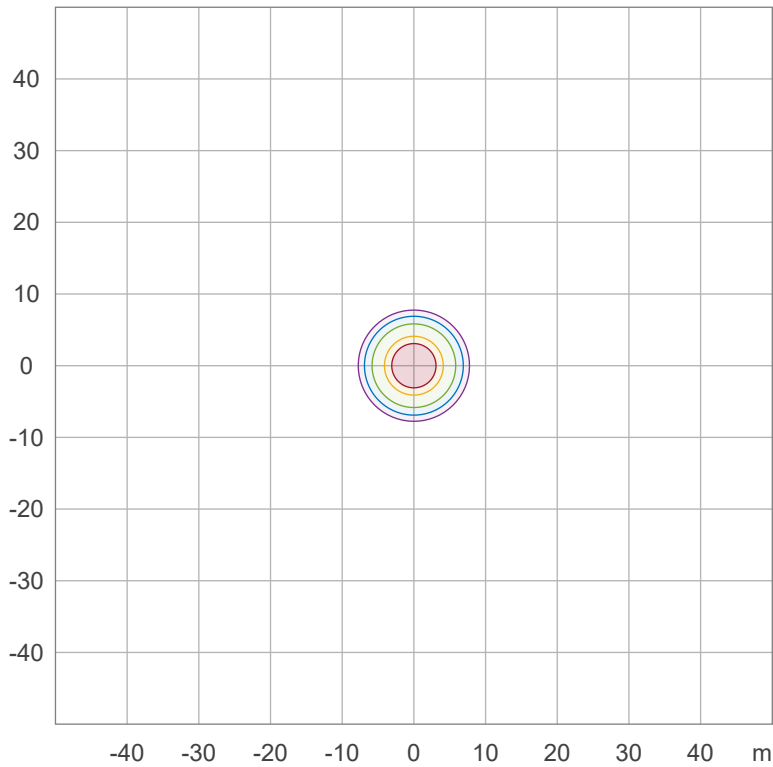
## Iso-intensity Diagram (Iso-candela)



90 %	2566.7 cd
80 %	2281.5 cd
70 %	1996.3 cd
60 %	1711.1 cd
50 %	1425.9 cd
40 %	1140.8 cd
30 %	855.6 cd
20 %	570.4 cd
10 %	285.2 cd

Peak intensity: 2851.9 cd  
Number of c-planes: 32

## Iso-illuminance Diagram (Iso-lux)



50.0 %	14.3 lx
30.0 %	8.6 lx
10.0 %	2.9 lx
5.0 %	1.4 lx
3.0 %	0.9 lx

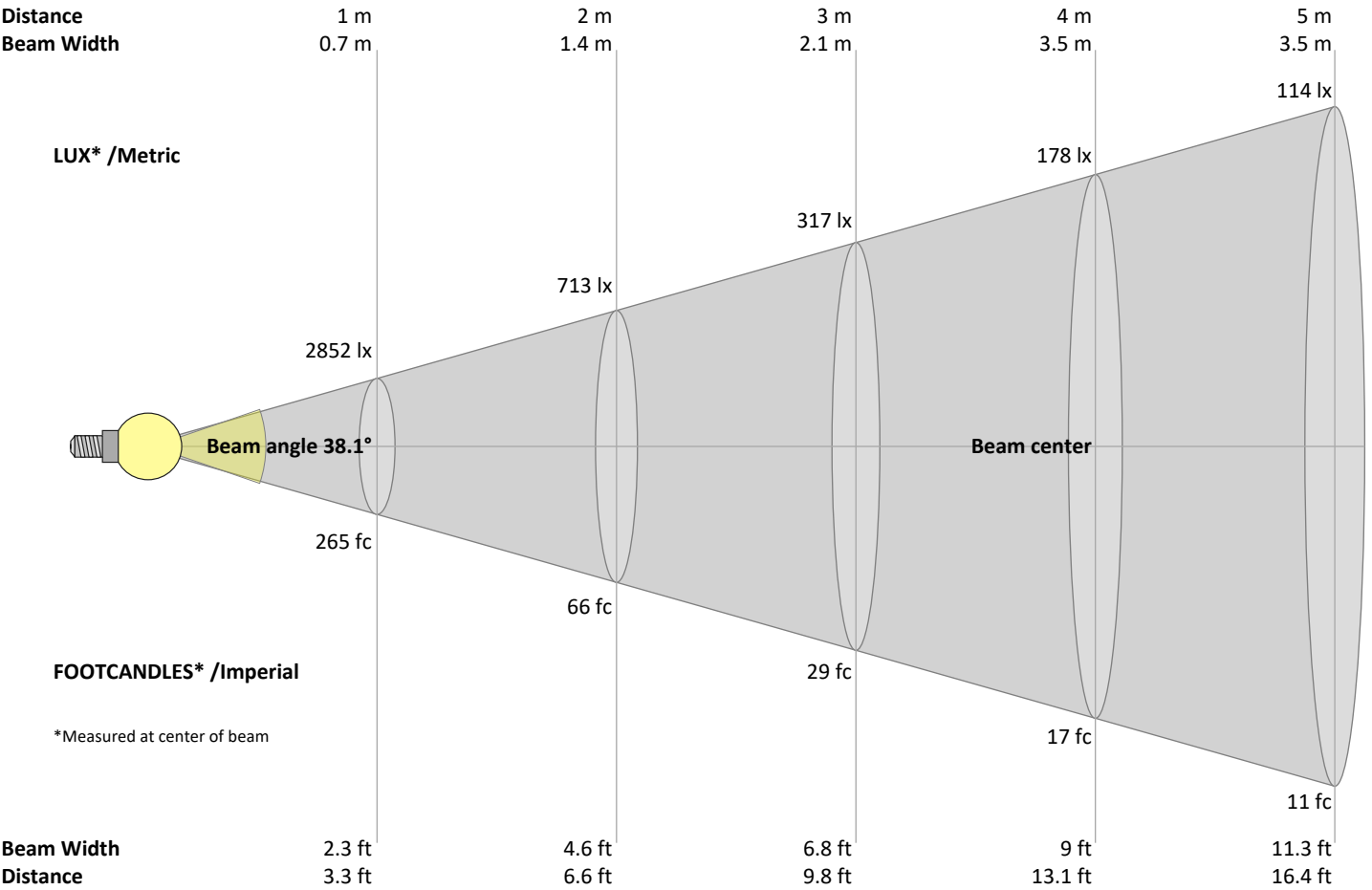
Peak illuminance: 28.5 lx  
Mounting height: 10.0 m  
Number of c-planes: 32

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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
2852	713	317	178	114	79	58	45	35	29	24	20	17	15	13	11	10	9	8	7	lux
264.9	66.2	29.4	16.6	10.6	7.4	5.4	4.1	3.3	2.6	2.2	1.8	1.6	1.4	1.2	1	0.9	0.8	0.7	0.7	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
2852	2839	2797	2713	2578	2407	2207	1990	1764	1541	1322	1111	917	738	585	456	355	274	214	169	cd
100%	100%	98%	95%	90%	84%	77%	70%	62%	54%	46%	39%	32%	26%	21%	16%	12%	10%	7%	6%	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
2852	2839	2797	2713	2578	2407	2207	1990	1764	1541	1322	1111	917	738	585	456	355	274	214	169	cd
100%	100%	98%	95%	90%	84%	77%	70%	62%	54%	46%	39%	32%	26%	21%	16%	12%	10%	7%	6%	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
2852	2839	2797	2713	2578	2407	2207	1990	1764	1541	1322	1111	917	738	585	456	355	274	214	169	cd
100%	100%	98%	95%	90%	84%	77%	70%	62%	54%	46%	39%	32%	26%	21%	16%	12%	10%	7%	6%	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
2852	2839	2797	2713	2578	2407	2207	1990	1764	1541	1322	1111	917	738	585	456	355	274	214	169	cd
100%	100%	98%	95%	90%	84%	77%	70%	62%	54%	46%	39%	32%	26%	21%	16%	12%	10%	7%	6%	of 0°val

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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		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	18.9	19.5	19.0	19.7	19.9	18.9	19.5	19.0	19.7	19.9
	3H	19.2	19.9	19.6	20.1	20.3	19.2	19.9	19.6	20.1	20.3
	4H	19.4	20.1	19.8	20.3	20.5	19.4	20.1	19.8	20.3	20.5
	6H	19.5	20.1	19.8	20.4	20.8	19.5	20.1	19.8	20.4	20.8
	8H	19.6	20.1	19.9	20.4	20.8	19.6	20.1	19.9	20.4	20.8
	12H	19.6	20.1	19.9	20.5	20.9	19.6	20.1	19.9	20.5	20.9
4H	2H	18.9	19.6	19.3	19.9	20.1	18.9	19.6	19.3	19.9	20.1
	3H	19.6	20.1	19.9	20.5	20.9	19.6	20.1	19.9	20.5	20.9
	4H	19.7	20.2	20.1	20.7	21.2	19.7	20.2	20.1	20.7	21.2
	6H	19.9	20.5	20.4	20.8	21.1	19.9	20.5	20.4	20.8	21.1
	8H	20.0	20.5	20.5	20.8	21.2	20.0	20.5	20.5	20.8	21.2
	12H	20.0	20.4	20.5	20.8	21.2	20.0	20.4	20.5	20.8	21.2
8H	4H	19.8	20.3	20.3	20.6	21.0	19.8	20.3	20.3	20.6	21.0
	6H	20.0	20.4	20.5	20.8	21.4	20.0	20.4	20.5	20.8	21.4
	8H	20.2	20.5	20.7	21.0	21.6	20.2	20.5	20.7	21.0	21.6
	12H	20.3	20.5	20.9	21.0	21.6	20.3	20.5	20.9	21.0	21.6
12H	4H	19.7	20.1	20.2	20.5	21.0	19.7	20.1	20.2	20.5	21.0
	6H	20.1	20.3	20.6	20.9	21.5	20.1	20.3	20.6	20.9	21.5
	8H	20.2	20.4	20.8	20.9	21.5	20.2	20.4	20.8	20.9	21.5

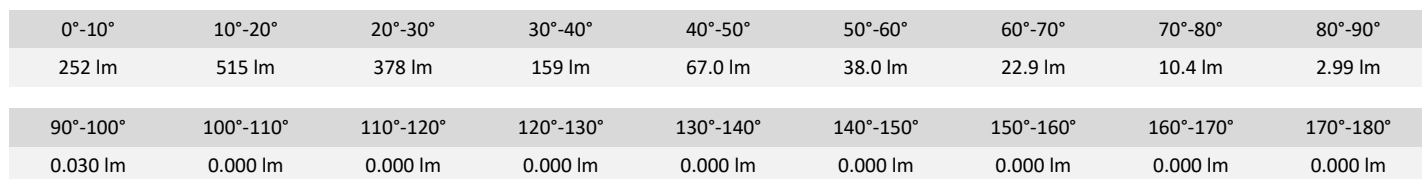
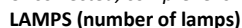
### Variations with the observer position for the luminaire spacings, S:

S = 1.0H	2.0 / -1.2	2.0 / -1.2
S = 1.5H	3.8 / -1.6	3.8 / -1.6
S = 2.0H	5.4 / -2.2	5.4 / -2.2

## 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	107	105	105	103	101	101	100	98	98	97	96	94
2	108	104	100	96	106	102	98	95	99	96	93	96	93	91	93	91	89	88
3	103	97	92	89	101	96	91	88	93	90	87	91	88	85	89	86	84	82
4	99	92	86	82	97	90	86	82	88	84	81	86	83	80	84	81	79	78
5	94	86	81	77	93	86	80	77	84	79	76	82	78	75	81	77	75	73
6	90	82	76	72	89	81	76	72	80	75	72	78	74	71	77	74	71	69
7	86	78	72	68	85	77	72	68	76	71	68	75	71	68	74	70	67	66
8	83	74	69	65	82	74	68	65	73	68	64	72	67	64	71	67	64	63
9	80	71	65	62	79	70	65	62	69	65	61	69	64	61	68	64	61	60
10	77	68	62	59	76	67	62	59	66	62	59	66	61	58	65	61	58	57

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## Outdoor Light Planning

### Lumen per Zone

Zone (°)	Lumen	% Total
0-10°	252 lm	17.4%
10-20°	515 lm	35.6%
20-30°	378 lm	26.2%
30-40°	159 lm	11.0%
40-50°	67 lm	4.6%
50-60°	38 lm	2.6%
60-70°	23 lm	1.6%
70-80°	10 lm	0.7%
80-90°	3 lm	0.2%
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	1446 lm	100.0%

### Intensity peaks

Max intensity	2852 cd
Intensity, 90°	0 cd
Intensity, 0°	2852 cd

### Zonal Lumen summary

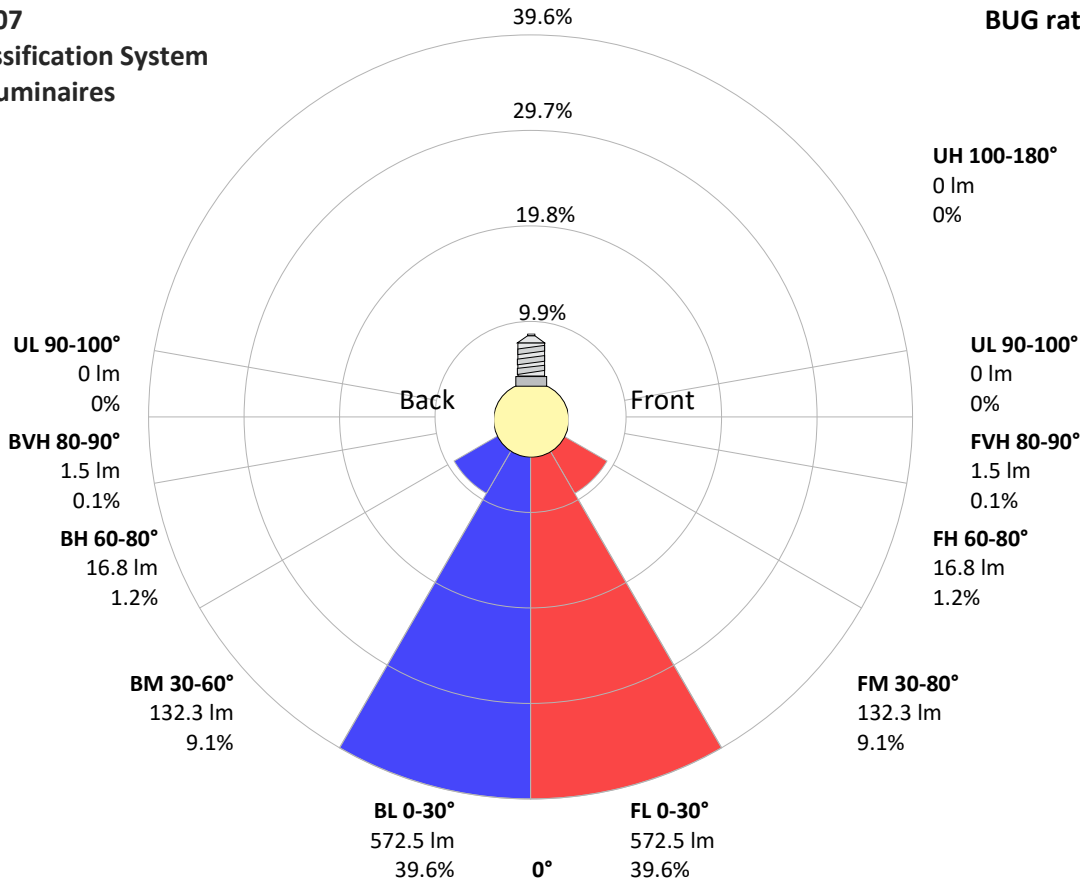
Zone (°)	Lumen	% Total
0-30°	1145 lm	79.2%
0-40°	1305 lm	90.2%
0-60°	1410 lm	97.5%
60-90°	36 lm	2.5%
70-100°	13 lm	0.9%
90-120°	0 lm	0.0%
0-90°	1446 lm	100.0%
90-180°	0 lm	0.0%
0-180°	1446 lm	100.0%

### BUG rating

	Lumen	% Total
<b>Forward light</b>		
Low(0-30°)	572 lm	39.6%
Medium(30-60°)	132 lm	9.1%
High(60-80°)	17 lm	1.2%
Very high(80-90°)	1 lm	0.1%
<b>Back light</b>		
Low(0-30°)	572 lm	39.6%
Medium(30-60°)	132 lm	9.1%
High(60-80°)	17 lm	1.2%
Very high(80-90°)	1 lm	0.1%
<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 B2 U1 G0



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## Power Details

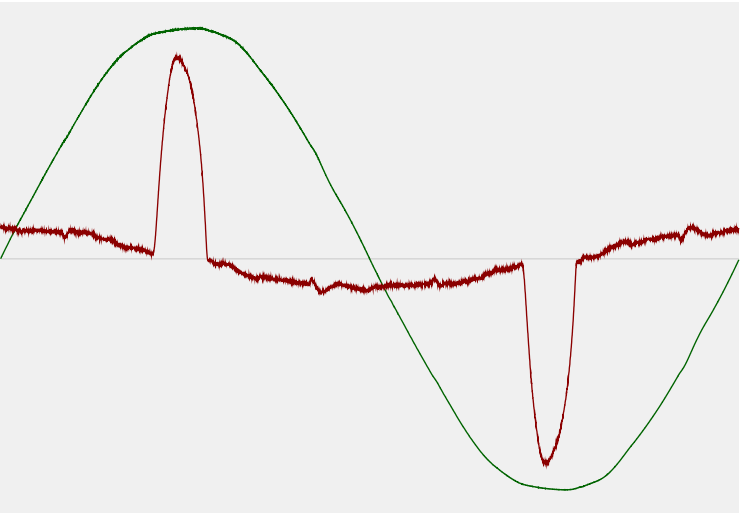
### Input Power

Power feed to light source	14.5 W
Frequency of input power	49.9 Hz
RMS Input voltage feed, $V_{RMS}$	237 V
RMS Input current feed, $I_{RMS}$	0.131 A
Volt-Ampere or apparent power = $V_{RMS} * I_{RMS}$	31.16 VA
Displacement factor of AC power feed	0.81
Power factor of AC current feed	0.47
Total harmonic distortion of the current	137.47%
Total harmonic distortion of the voltage	1.22%

### Efficiency

Radiated power efficiency	36.4%
<div><div></div></div>	
Lumen efficiency	99 lm/W
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### Input Power Curve





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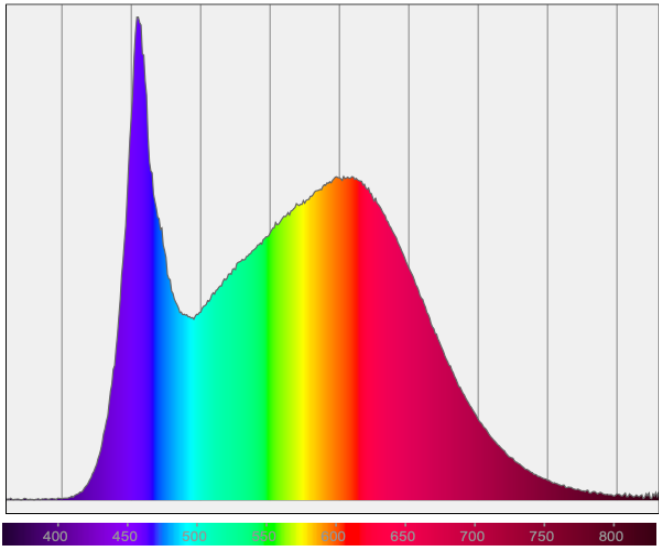
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## Color Measurements

Correlated Color Temperature	CCT = 4000 K
Color Rendering TM30-18	R <sub>f</sub> 88.9 – R <sub>g</sub> 98.5
Color Shift, CIE duv	Duv ±0.0003

## Spectral distribution



## Color details

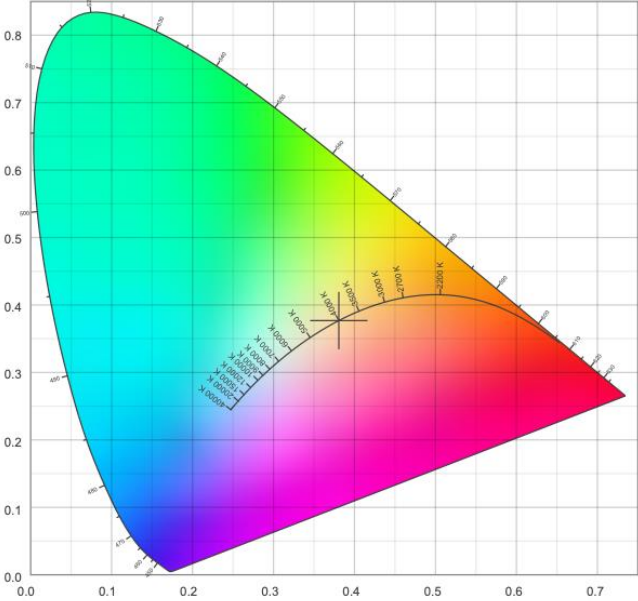
Correlated Color Temperature	CCT = 4000 K	Color coordinates CIE 1931	(x;y) = (0.381;0.377)
Color Rendering Index	CRI 92.6	Color coordinate CIEs 1960	(u;v) = (0.225;0.334)
Color Rendering Index, R9 (red component)	R9 = 72.2	Color deviation from BBL	Duv = ±0.0003
Color Rendering TM30-18	R <sub>f</sub> 88.9 – R <sub>g</sub> 98.5	Color coordinate CIEs 1976 (CIELUV)	(u';v') = (0.225;0.225)
Color Quality Scale	CQS = 88.9		

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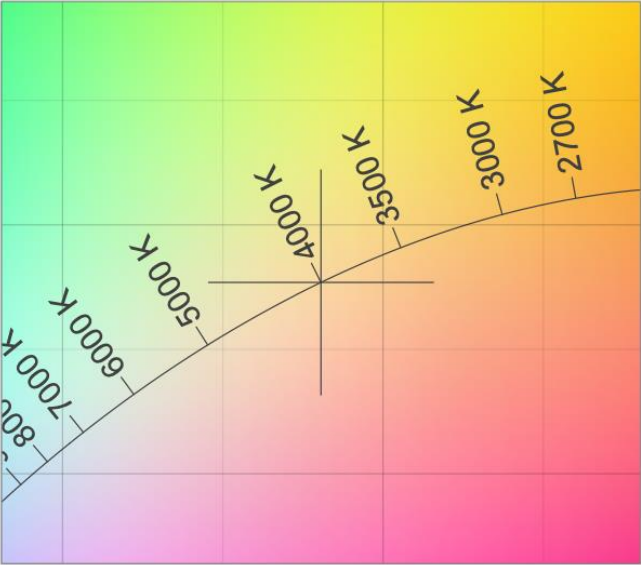
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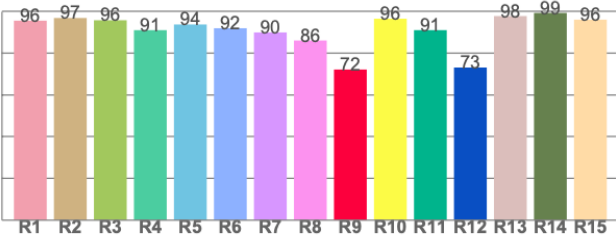
CIE 1931



CIE 1931 – zoomed on Planckian locus



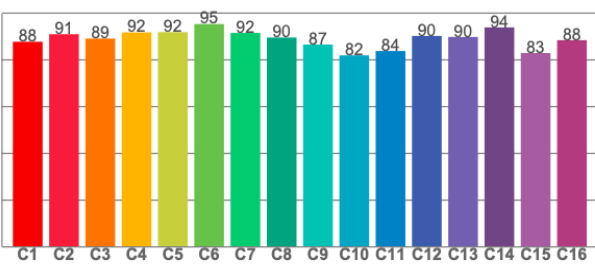
Color Rendering Index per reference color (CIE 1995)



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
95.5	96.8	95.7	91.0	93.7	91.9	89.9	86.0	72.2	96.4	91.0	73.1	97.7	99.2	96.0

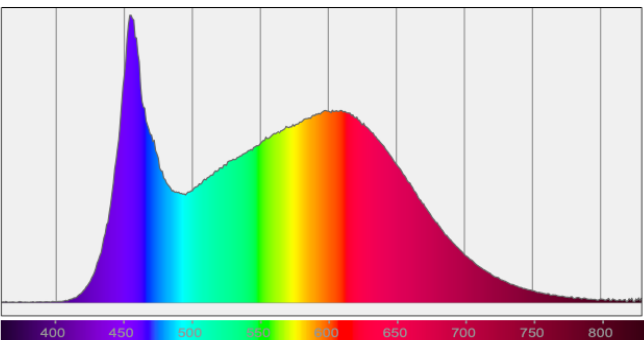
TM30-18 Rf-values per hue bin



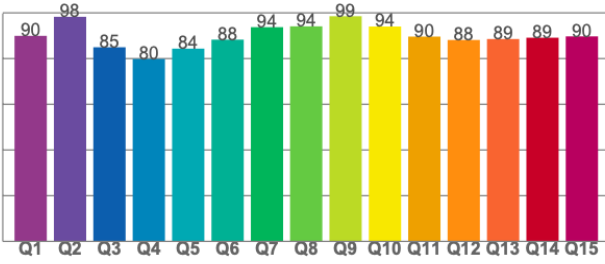
TM30 C values, 16 binned values out of total of 99 C values

C1	C2	C3	C4	C5	C6	C7	C8	C9	C10	C11	C12	C13	C14	C15	C16
87.8	91.0	89.1	91.7	91.9	95.3	91.5	89.6	86.6	81.9	83.8	90.3	89.8	93.9	83.0	88.4

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



Color Quality Scale by reference color



CQS Q values

Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10	Q11	Q12	Q13	Q14	Q15
89.9	98.3	84.9	79.8	84.3	88.3	93.7	94.1	98.5	94.0	89.6	88.1	88.6	89.1	89.7