

# Goniophotometry Report

1\_PHOT\_NINETY-NINE-1650lmChip-2700K-58Deg\_2303  
www.factorylux.com



Tested Light Source - 1\_PHOT\_NINETY-NINE-1650lmChip-2700K-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

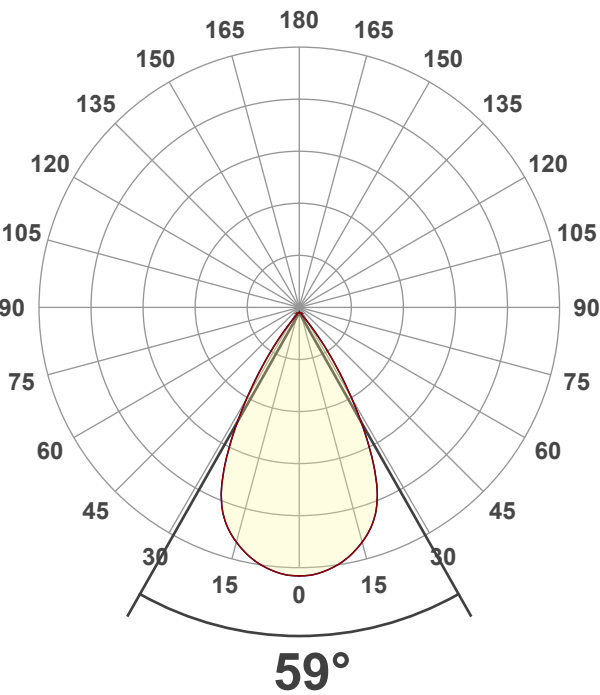
32 planes – 11.25°  
2.5°  
1.50 m  
14.6 W – PF 0.46 – DPF 0.79  
242 V – 0.130 A  
50.1 Hz

## Main Light Measurement Results

Output  
Efficiency  
Peak Intensity and Beam Angle  
Color Rendering Index

1240 lm  
85 lm/W  
1420 cd – 59°  
CRI 93.0

## Light Intensity Distribution



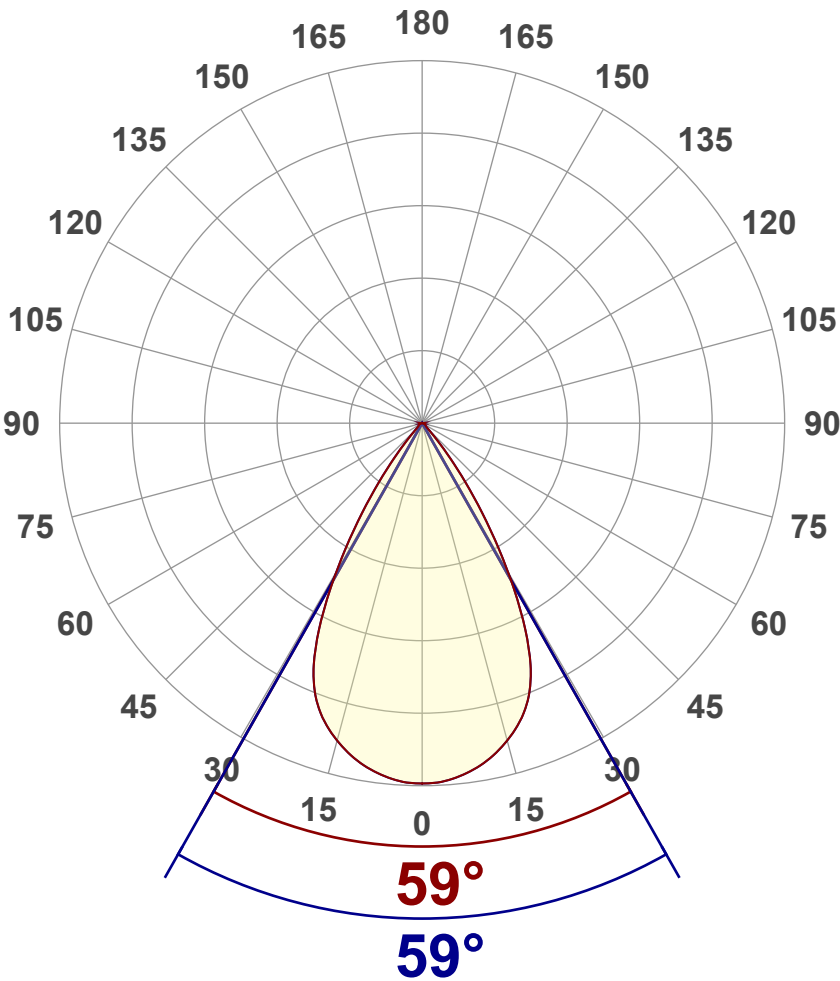
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Luminous Intensity diagram

Unit: 0-100% of peak intensity



Main Values

Output (total Lumen)	1240 lm
Peak Intensity	1420 cd
Beam Angle (50%)	59°
Beam Angle (90%)	59°
Beam Angle (10%)	59°

Cut-off Angle

Average 2,5%	90.8°
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Field Angle

Average 10%	79.4°
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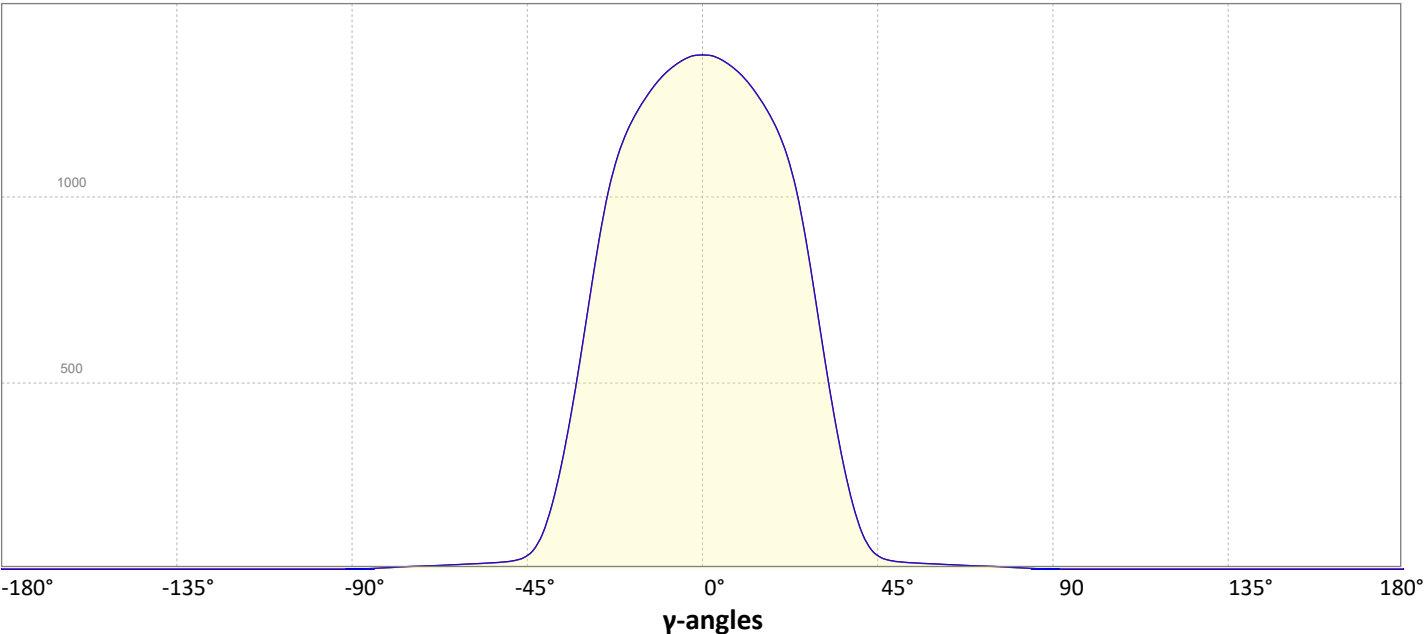
Intensity Ratio

In 120° cone	98.3%
In 90° cone	96.2%

C000-C180

C090-C270

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

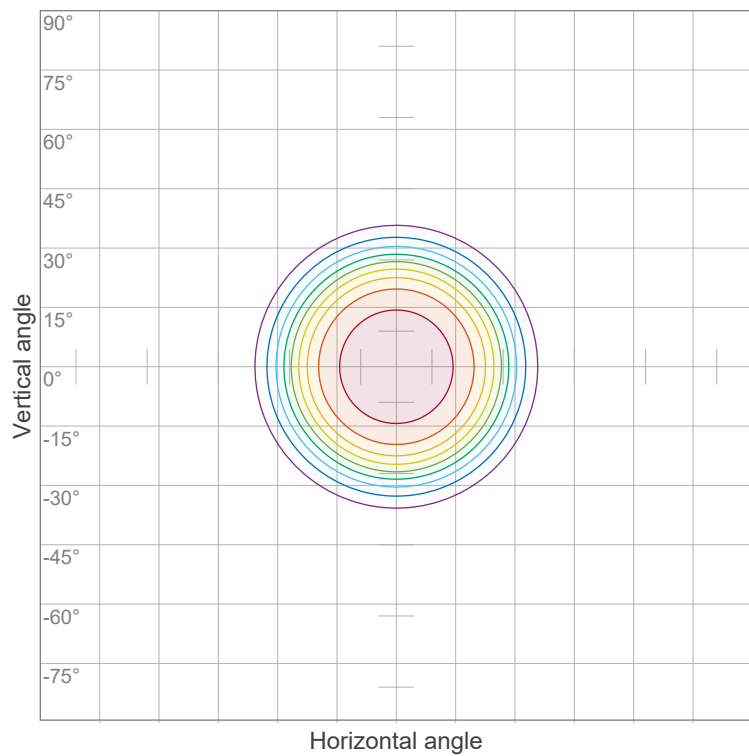


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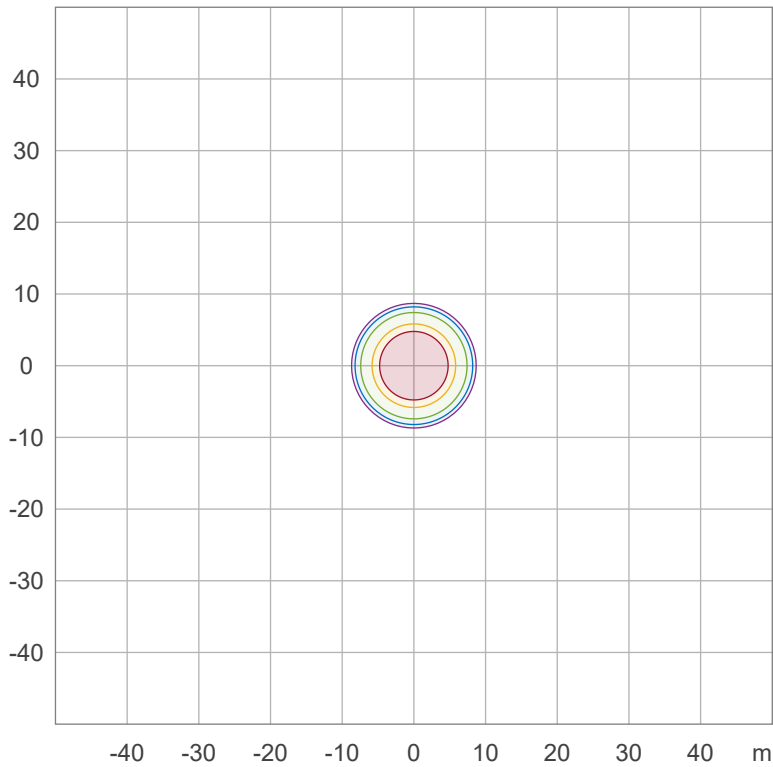
## Iso-intensity Diagram (Iso-candela)



90 %	1278.4 cd
80 %	1136.4 cd
70 %	994.3 cd
60 %	852.3 cd
50 %	710.2 cd
40 %	568.2 cd
30 %	426.1 cd
20 %	284.1 cd
10 %	142.0 cd

Peak intensity: 1420.4 cd  
Number of c-planes: 32

## Iso-illuminance Diagram (Iso-lux)



50.0 %	7.1 lx
30.0 %	4.3 lx
10.0 %	1.4 lx
5.0 %	0.7 lx
3.0 %	0.4 lx

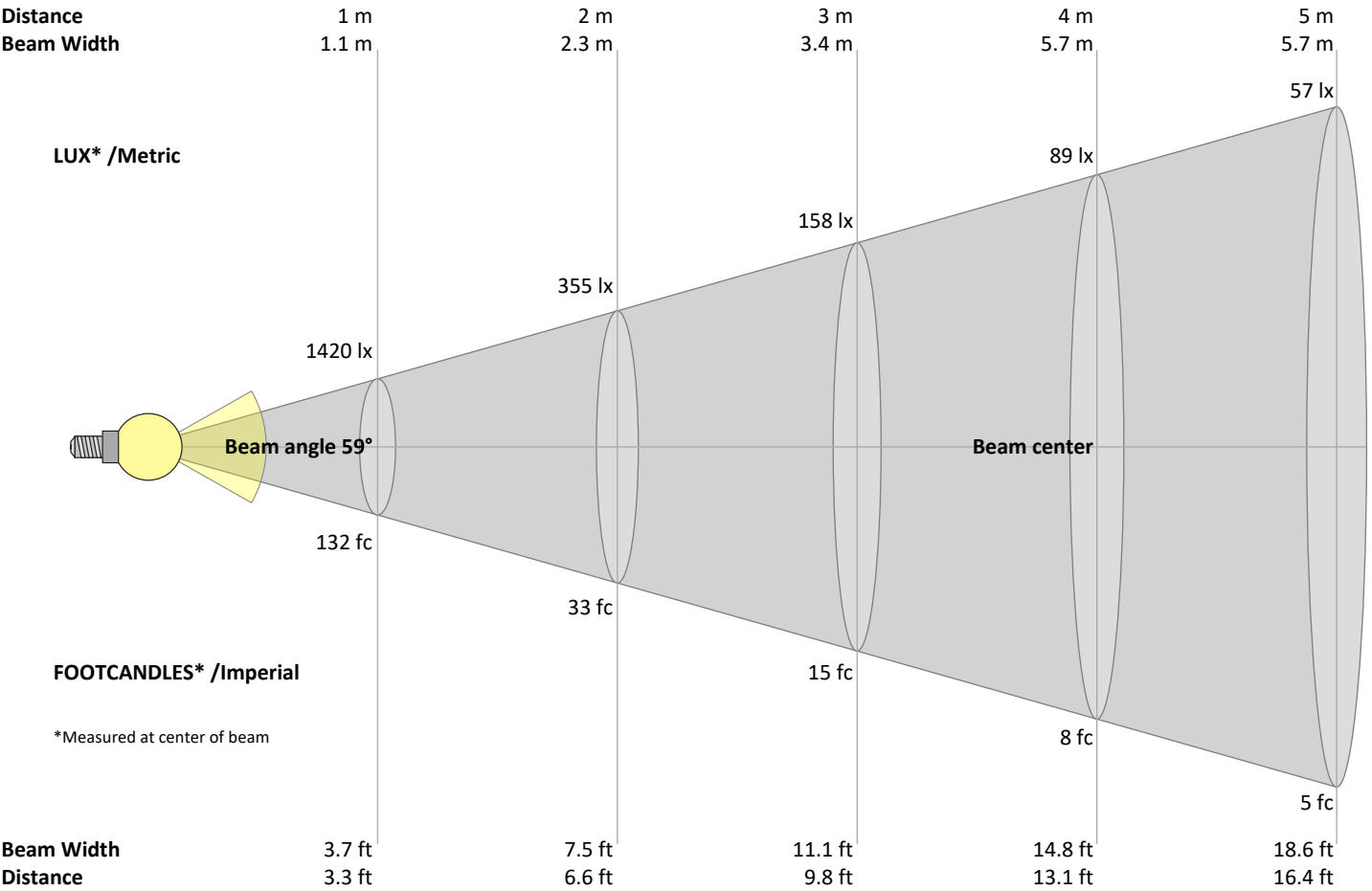
Peak illuminance: 14.2 lx  
Mounting height: 10.0 m  
Number of c-planes: 32

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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
1420	355	158	89	57	39	29	22	18	14	12	10	8	7	6	6	5	4	4	4	lux
132	33	14.7	8.2	5.3	3.7	2.7	2.1	1.6	1.3	1.1	0.9	0.8	0.7	0.6	0.5	0.5	0.4	0.4	0.3	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
1420	1419	1411	1399	1384	1364	1340	1311	1277	1238	1191	1131	1051	941	813	677	541	413	301	207	cd
100%	100%	99%	99%	97%	96%	94%	92%	90%	87%	84%	80%	74%	66%	57%	48%	38%	29%	21%	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
1420	1419	1411	1399	1384	1364	1340	1311	1277	1238	1191	1131	1051	941	813	677	541	413	301	207	cd
100%	100%	99%	99%	97%	96%	94%	92%	90%	87%	84%	80%	74%	66%	57%	48%	38%	29%	21%	15%	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
1420	1419	1411	1399	1384	1364	1340	1311	1277	1238	1191	1131	1051	941	813	677	541	413	301	207	cd
100%	100%	99%	99%	97%	96%	94%	92%	90%	87%	84%	80%	74%	66%	57%	48%	38%	29%	21%	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
1420	1419	1411	1399	1384	1364	1340	1311	1277	1238	1191	1131	1051	941	813	677	541	413	301	207	cd
100%	100%	99%	99%	97%	96%	94%	92%	90%	87%	84%	80%	74%	66%	57%	48%	38%	29%	21%	15%	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											
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	19.4	20.1	19.5	20.3	20.5	19.4	20.1	19.5	20.3	20.5
	3H	19.3	20.1	19.7	20.3	20.5	19.3	20.1	19.7	20.3	20.5
	4H	19.4	20.1	19.8	20.4	20.6	19.4	20.1	19.8	20.4	20.6
	6H	19.5	20.1	19.8	20.4	20.8	19.5	20.1	19.8	20.4	20.8
	8H	19.5	20.1	19.8	20.4	20.8	19.5	20.1	19.8	20.4	20.8
	12H	19.5	20.1	19.8	20.4	20.8	19.5	20.1	19.8	20.4	20.8
4H	2H	19.1	19.9	19.5	20.1	20.3	19.1	19.9	19.5	20.1	20.3
	3H	19.3	19.9	19.7	20.2	20.7	19.3	19.9	19.7	20.2	20.7
	4H	19.4	19.9	19.8	20.3	20.9	19.4	19.9	19.8	20.3	20.9
	6H	19.5	20.1	20.0	20.4	20.8	19.5	20.1	20.0	20.4	20.8
	8H	19.5	20.0	20.0	20.4	20.8	19.5	20.0	20.0	20.4	20.8
	12H	19.5	19.9	20.0	20.3	20.8	19.5	19.9	20.0	20.3	20.8
8H	4H	19.4	19.9	19.9	20.2	20.6	19.4	19.9	19.9	20.2	20.6
	6H	19.6	19.9	20.1	20.4	20.9	19.6	19.9	20.1	20.4	20.9
	8H	19.7	20.0	20.2	20.5	21.1	19.7	20.0	20.2	20.5	21.1
	12H	19.7	19.9	20.3	20.4	21.0	19.7	19.9	20.3	20.4	21.0
12H	4H	19.3	19.7	19.8	20.1	20.6	19.3	19.7	19.8	20.1	20.6
	6H	19.6	19.9	20.1	20.4	21.0	19.6	19.9	20.1	20.4	21.0
	8H	19.7	19.9	20.3	20.4	21.0	19.7	19.9	20.3	20.4	21.0
Variations with the observer position for the luminaire spacings, S:											
S = 1.0H		4.6 / -3.6					4.6 / -3.6				
S = 1.5H		7.2 / -3.8					7.2 / -3.8				
S = 2.0H		9.1 / -4.1					9.1 / -4.1				

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	111	108	106	111	109	106	104	104	103	101	101	99	98	97	96	95	93
2	108	103	99	96	106	101	98	95	98	95	92	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	98	90	85	80	96	89	84	80	87	82	79	85	81	78	83	80	77	76
5	93	85	79	75	91	84	78	74	82	77	74	80	76	73	79	75	72	71
6	88	80	74	69	87	79	73	69	77	72	69	76	72	68	75	71	68	66
7	84	75	69	65	83	74	69	65	73	68	64	72	67	64	71	67	64	62
8	80	71	65	61	79	70	65	61	69	64	61	68	64	60	67	63	60	59
9	76	67	61	57	75	66	61	57	66	61	57	65	60	57	64	60	57	55
10	73	63	58	54	72	63	58	54	62	57	54	61	57	54	61	57	53	52

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## Zonal Lumen Summary

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Outdoor Light Planning

Lumen per Zone

Zone (γ)	Lumen	% Total
0-10°	133 lm	10.7%
10-20°	363 lm	29.3%
20-30°	445 lm	35.9%
30-40°	226 lm	18.2%
40-50°	37 lm	3.0%
50-60°	15 lm	1.2%
60-70°	11 lm	0.9%
70-80°	7 lm	0.6%
80-90°	2 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	1240 lm	100.0%

Intensity peaks

Max intensity	1420 cd
Intensity, 90°	0 cd
Intensity, 0°	1420 cd

Zonal Lumen summary

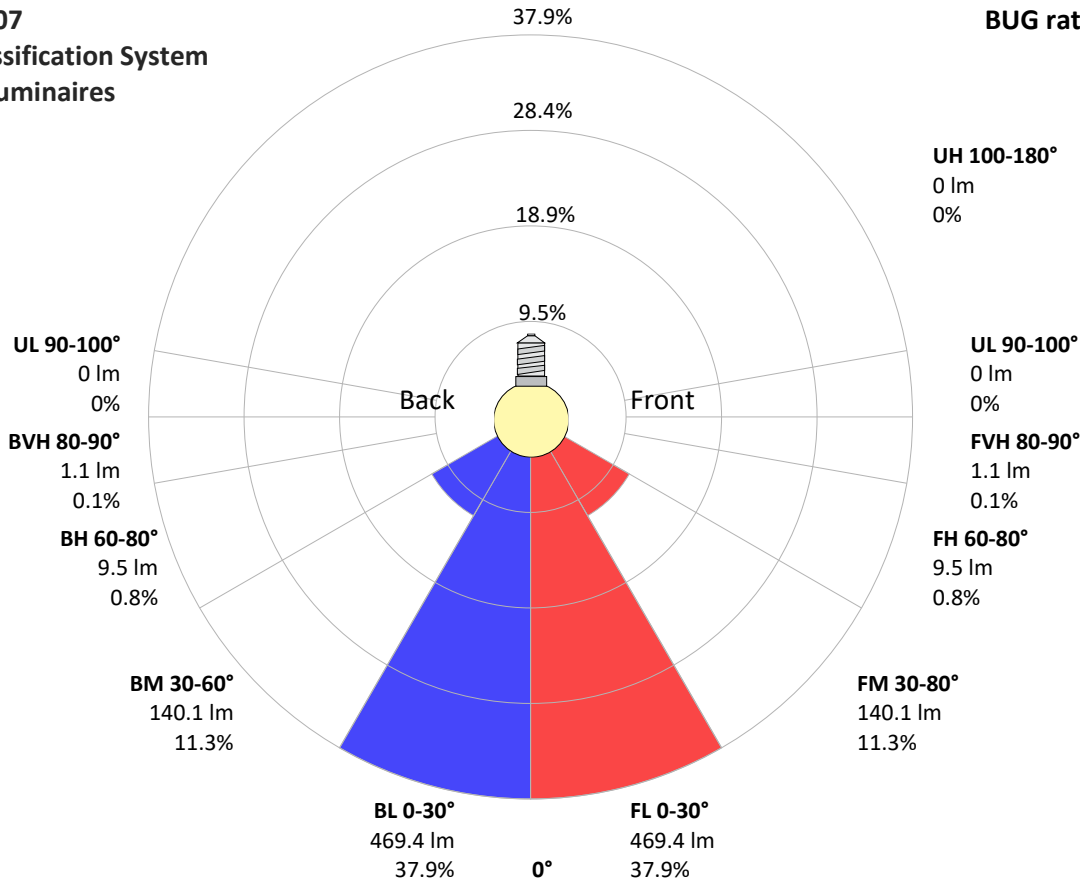
Zone (γ)	Lumen	% Total
0-30°	941 lm	75.9%
0-40°	1167 lm	94.1%
0-60°	1219 lm	98.3%
60-90°	21 lm	1.7%
70-100°	10 lm	0.8%
90-120°	0 lm	0.0%
0-90°	1240 lm	100.0%
90-180°	0 lm	0.0%
0-180°	1240 lm	100.0%

BUG rating

	Lumen	% Total
<b>Forward light</b>		
Low(0-30°)	469 lm	37.9%
Medium(30-60°)	140 lm	11.3%
High(60-80°)	9 lm	0.8%
Very high(80-90°)	1 lm	0.1%
<b>Back light</b>		
Low(0-30°)	469 lm	37.9%
Medium(30-60°)	140 lm	11.3%
High(60-80°)	9 lm	0.8%
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 B1 U1 G0



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## Power Details

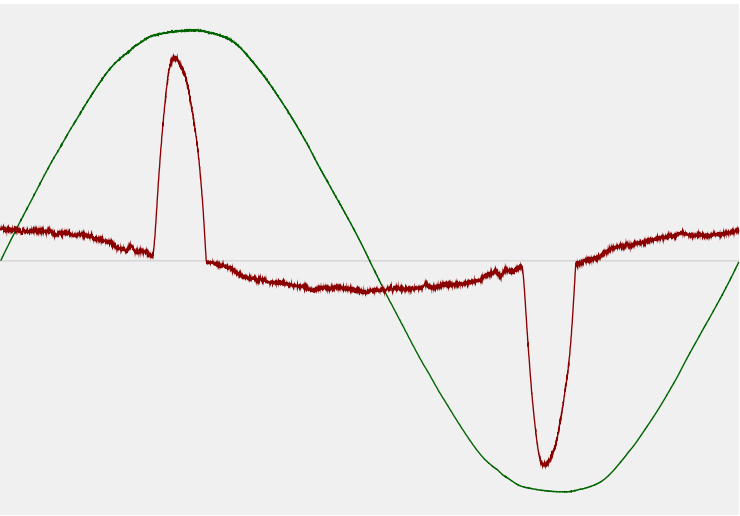
### Input Power

Power feed to light source	14.6 W
Frequency of input power	50.1 Hz
RMS Input voltage feed, $V_{RMS}$	242 V
RMS Input current feed, $I_{RMS}$	0.130 A
Volt-Ampere or apparent power = $V_{RMS} * I_{RMS}$	31.59 VA
Displacement factor of AC power feed	0.79
Power factor of AC current feed	0.46
Total harmonic distortion of the current	136.22%
Total harmonic distortion of the voltage	1.27%

### Efficiency

Radiated power efficiency	31.1%
<div><div></div></div>	
Lumen efficiency	85 lm/W
<div><div></div></div>	

### Input Power Curve





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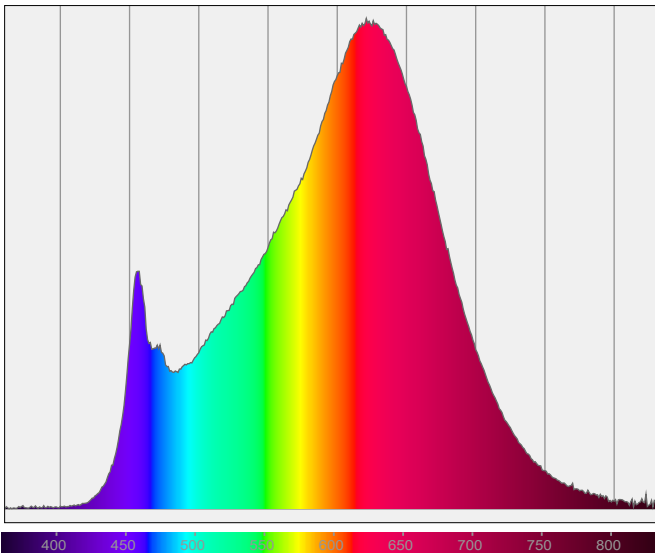
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## Color Measurements

Correlated Color Temperature	CCT = 2700 K
Color Rendering TM30-18	R <sub>f</sub> 91.4 — R <sub>g</sub> 99.0
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 93.0	Color coordinate CIEs 1960	(u;v) = (0.263;0.352)
Color Rendering Index, R9 (red component)	R9 = 68.1	Color deviation from BBL	Duv = ±0.0003
Color Rendering TM30-18	R <sub>f</sub> 91.4 — R <sub>g</sub> 99.0	Color coordinate CIEs 1976 (CIELUV)	(u';v') = (0.263;0.263)
Color Quality Scale	CQS = 90.9		

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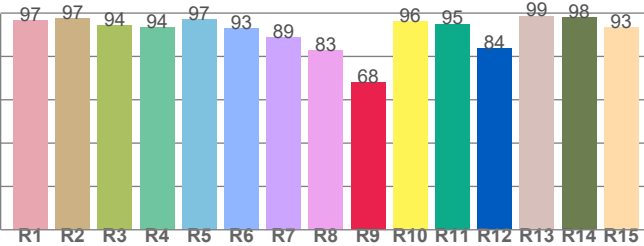
CIE 1931



CIE 1931 – zoomed on Planckian locus



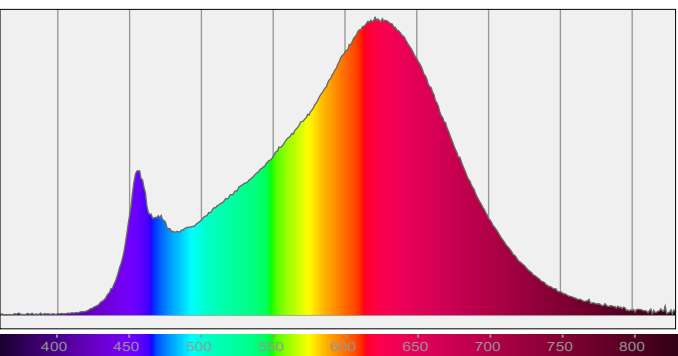
Color Rendering Index per reference color (CIE 1995)



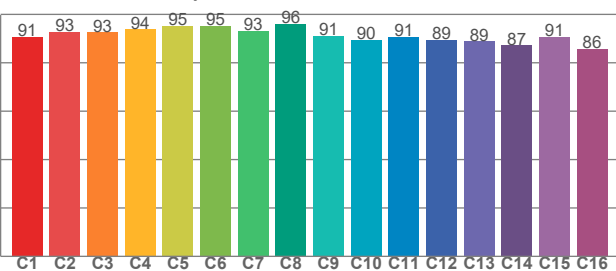
CRI R values, only R1-R8 are used to calculate final CRI value

R1	R2	R3	R4	R5	R6	R7	R8	R9	R10	R11	R12	R13	R14	R15
96.8	97.5	94.2	93.6	97.2	93.0	88.7	82.8	68.1	96.3	95.1	83.8	98.7	97.9	93.5

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



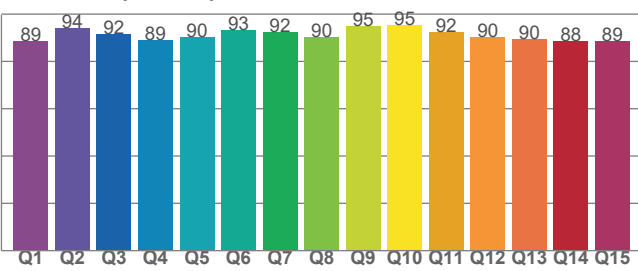
TM30-18 Rf-values per hue bin



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	92.7	92.5	93.7	95.1	95.1	93.2	95.9	91.1	89.5	90.6	89.5	88.8	87.1	90.8	85.6

Color Quality Scale by reference color



CQS Q values

Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10	Q11	Q12	Q13	Q14	Q15
88.7	93.9	91.6	88.8	90.3	93.3	92.3	90.4	94.8	95.3	92.4	90.2	89.5	88.5	88.5