

Tested Light Source - 1\_PHOT\_NINETY-NINE-1750lmChip-3000K-21Deg-HoneycombLouvre\_2303

Laboratory and Equipment

Laboratory Owner and Location	Factorylux, Greenhill Mills, Hebden Bridge, HX7 5QF, UK
Goniospectrometer System and Type	BaseSpion – Type C, horizontal
Spectrometer Manufacturer and Model	Ibsen Photonics, Denmark – Freedom VIS (Custom Viso)

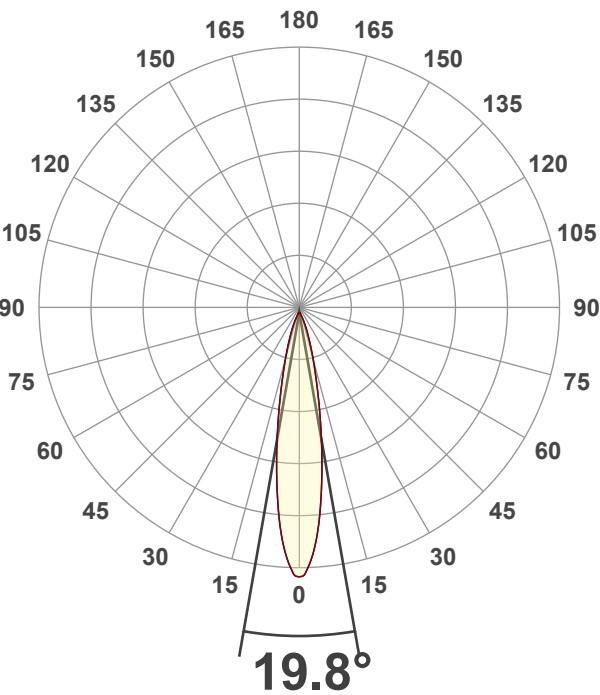
Measurement Conditions

Number of C-planes and Resolution	32 planes – 11.25°
γ (gamma)-Resolution	1°
Test Distance	1.50 m
Input Power, Power and Displ. Factors	14.6 W – PF 0.46 – DPF 0.8
Input RMS Voltage and Current	242 V – 0.131 A
Frequency of Input Power	50 Hz

Main Light Measurement Results

Output	950 lm
Efficiency	65 lm/W
Peak Intensity and Beam Angle	5377 cd – 19.8°
Color Rendering Index	CRI 93.0

Light Intensity Distribution



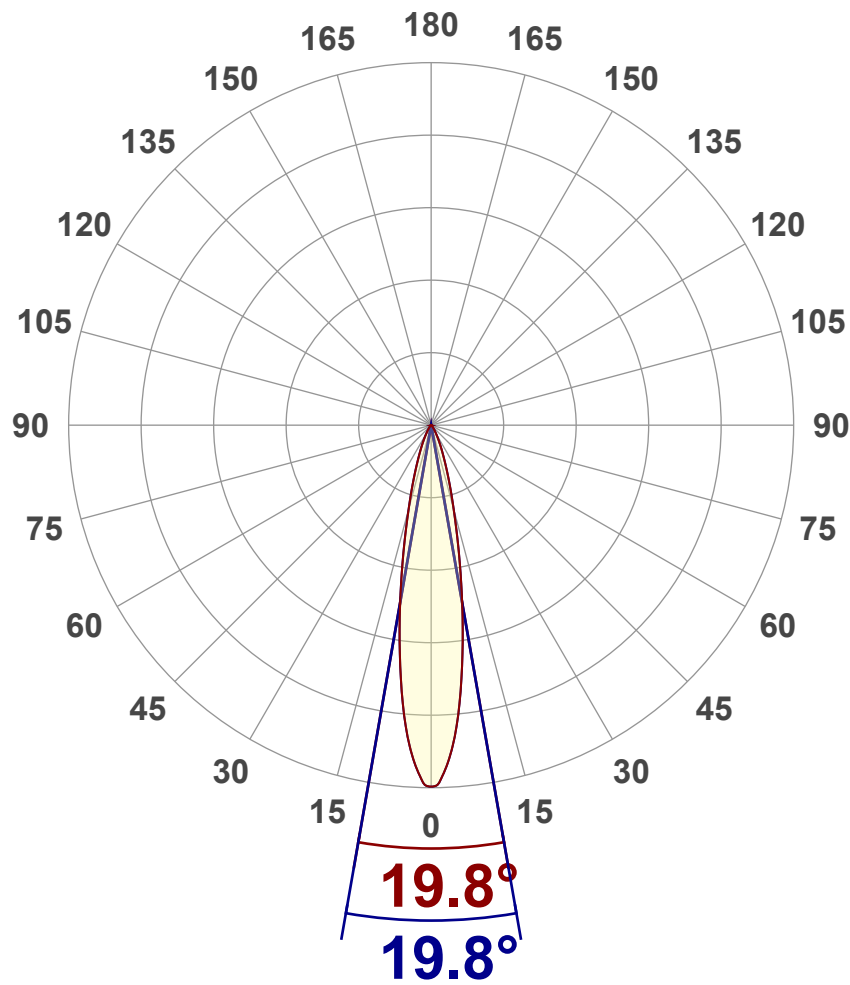
Goniophotometry Report

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Luminous Intensity diagram

Unit: 0-100% of peak intensity



Main Values

Output (total Lumen)	950 lm
Peak Intensity	5377 cd
Beam Angle (50%)	19.8°
Beam Angle (90%)	19.8°
Beam Angle (10%)	19.8°

Cut-off Angle

Average 2,5%	61°
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Field Angle

Average 10%	42.1°
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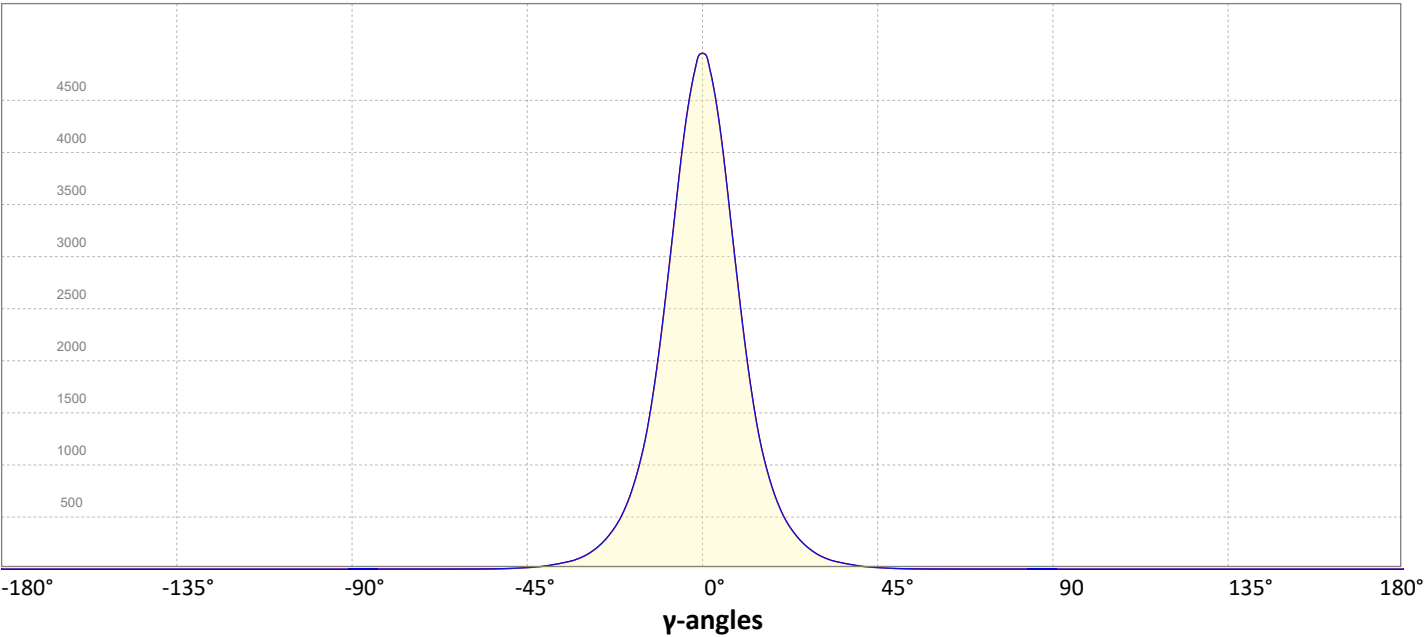
Intensity Ratio

In 120° cone	99.7%
In 90° cone	98.9%

C000-C180

C090-C270

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

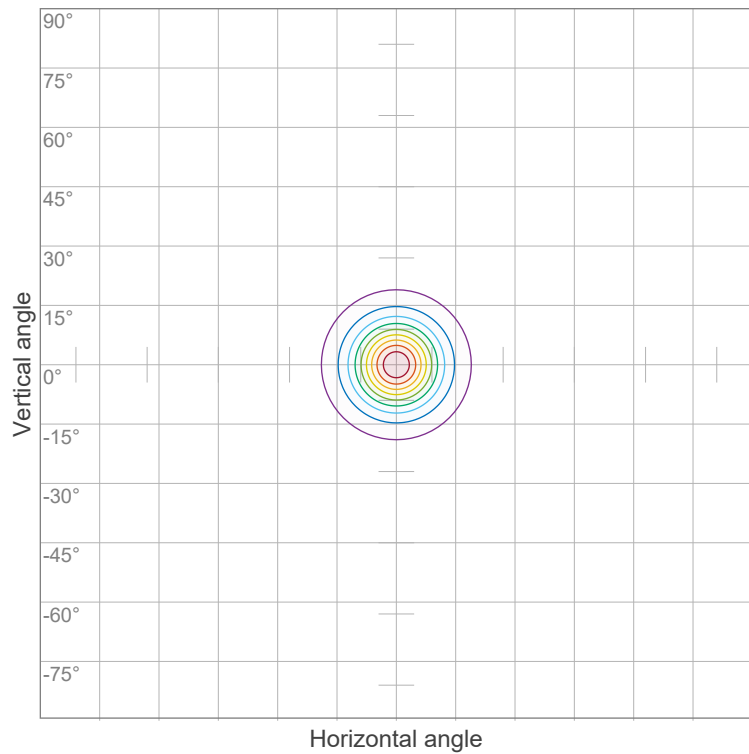


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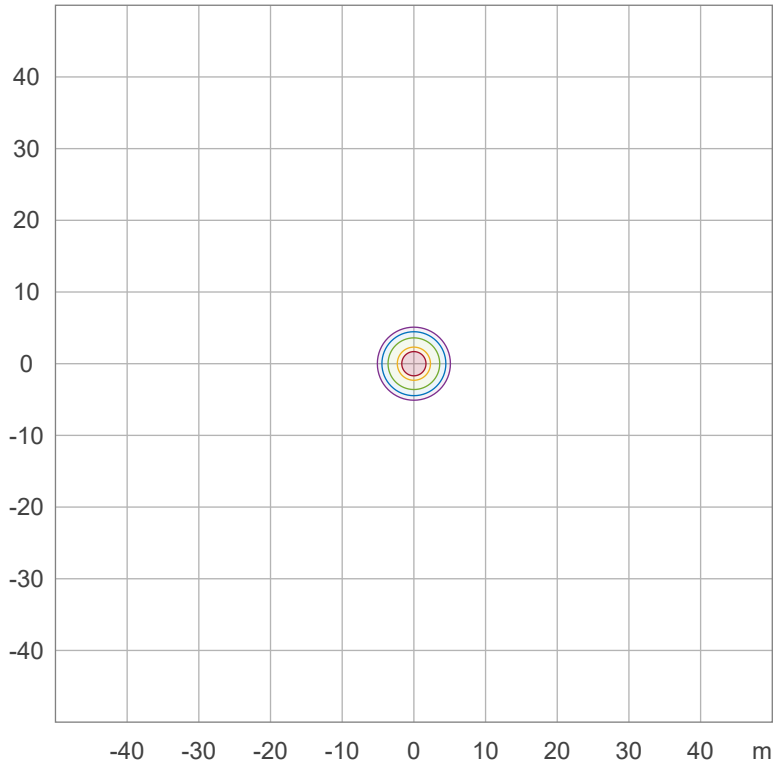
## Iso-intensity Diagram (Iso-candela)



90 %	4839.2 cd
80 %	4301.5 cd
70 %	3763.8 cd
60 %	3226.1 cd
50 %	2688.5 cd
40 %	2150.8 cd
30 %	1613.1 cd
20 %	1075.4 cd
10 %	537.7 cd

Peak intensity: 5376.9 cd  
Number of c-planes: 32

## Iso-illuminance Diagram (Iso-lux)



50.0 %	26.9 lx
30.0 %	16.1 lx
10.0 %	5.4 lx
5.0 %	2.7 lx
3.0 %	1.6 lx

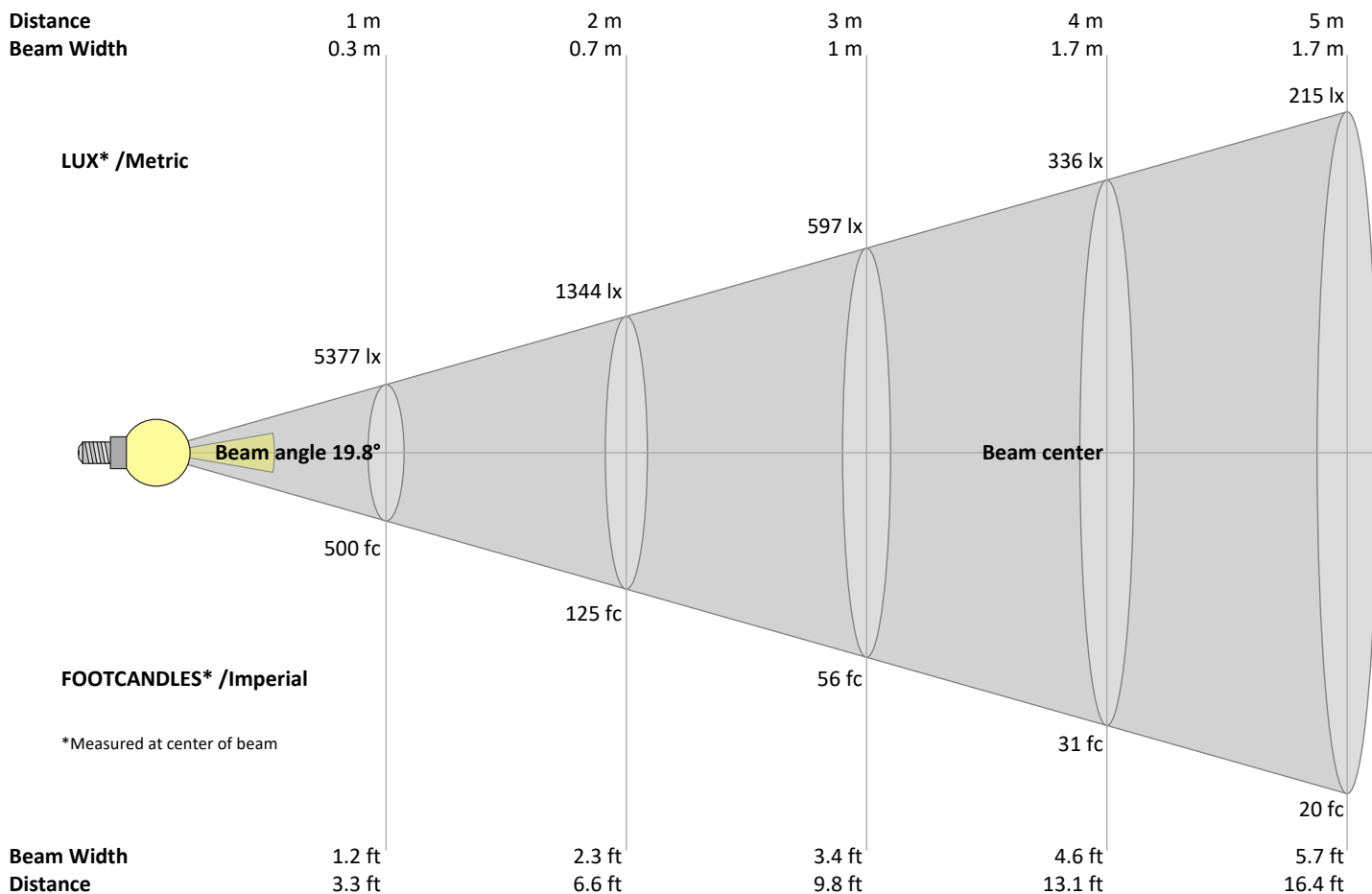
Peak illuminance: 53.8 lx  
Mounting height: 10.0 m  
Number of c-planes: 32

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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
5377	1344	597	336	215	149	110	84	66	54	44	37	32	27	24	21	19	17	15	13	lux
499.5	124.9	55.5	31.2	20	13.9	10.2	7.8	6.2	5	4.1	3.5	3	2.5	2.2	2	1.7	1.5	1.4	1.2	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
5377	5205	4750	4107	3369	2658	2025	1508	1127	842	627	470	355	265	197	145	108	82	66	50	cd
100%	97%	88%	76%	63%	49%	38%	28%	21%	16%	12%	9%	7%	5%	4%	3%	2%	2%	1%	1%	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
5377	5205	4750	4107	3369	2658	2025	1508	1127	842	627	470	355	265	197	145	108	82	66	50	cd
100%	97%	88%	76%	63%	49%	38%	28%	21%	16%	12%	9%	7%	5%	4%	3%	2%	2%	1%	1%	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
5377	5205	4750	4107	3369	2658	2025	1508	1127	842	627	470	355	265	197	145	108	82	66	50	cd
100%	97%	88%	76%	63%	49%	38%	28%	21%	16%	12%	9%	7%	5%	4%	3%	2%	2%	1%	1%	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
5377	5205	4750	4107	3369	2658	2025	1508	1127	842	627	470	355	265	197	145	108	82	66	50	cd
100%	97%	88%	76%	63%	49%	38%	28%	21%	16%	12%	9%	7%	5%	4%	3%	2%	2%	1%	1%	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	9.9	10.3	10.0	10.5	10.7	9.9	10.3	10.0	10.5	10.7
	3H	9.6	10.2	10.0	10.4	10.5	9.6	10.2	10.0	10.4	10.5
	4H	9.6	10.1	10.0	10.4	10.6	9.6	10.1	10.0	10.4	10.6
	6H	9.7	10.1	10.0	10.4	10.8	9.7	10.1	10.0	10.4	10.8
	8H	9.7	10.1	10.0	10.4	10.8	9.7	10.1	10.0	10.4	10.8
	12H	9.7	10.2	10.1	10.5	10.9	9.7	10.2	10.1	10.5	10.9
4H	2H	9.5	10.1	9.9	10.3	10.5	9.5	10.1	9.9	10.3	10.5
	3H	9.5	9.9	9.8	10.2	10.7	9.5	9.9	9.8	10.2	10.7
	4H	9.4	9.8	9.8	10.2	10.7	9.4	9.8	9.8	10.2	10.7
	6H	9.5	9.9	10.0	10.2	10.6	9.5	9.9	10.0	10.2	10.6
	8H	9.5	10.0	10.1	10.3	10.7	9.5	10.0	10.1	10.3	10.7
	12H	9.7	10.0	10.2	10.4	10.9	9.7	10.0	10.2	10.4	10.9
8H	4H	9.3	9.7	9.8	10.1	10.4	9.3	9.7	9.8	10.1	10.4
	6H	9.5	9.7	10.0	10.2	10.7	9.5	9.7	10.0	10.2	10.7
	8H	9.7	9.9	10.2	10.4	11.0	9.7	9.9	10.2	10.4	11.0
	12H	9.9	10.1	10.5	10.6	11.2	9.9	10.1	10.5	10.6	11.2
12H	4H	9.3	9.6	9.8	10.0	10.4	9.3	9.6	9.8	10.0	10.4
	6H	9.5	9.7	10.0	10.2	10.9	9.5	9.7	10.0	10.2	10.9
	8H	9.7	9.9	10.3	10.4	11.0	9.7	9.9	10.3	10.4	11.0

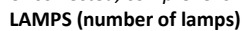
### Variations with the observer position for the luminaire spacings, S:

S = 1.0H	4.0 / -3.6	4.0 / -3.6
S = 1.5H	6.4 / -3.9	6.4 / -3.9
S = 2.0H	8.4 / -4.1	8.4 / -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	115	113	111	109	113	111	109	107	107	105	104	103	102	101	100	99	98	97
2	111	108	104	102	109	106	103	101	103	101	99	100	98	97	97	96	95	93
3	108	103	99	96	106	102	98	96	99	96	94	97	95	93	95	93	91	90
4	104	99	95	92	103	98	94	91	96	93	90	94	91	89	92	90	88	87
5	101	95	91	88	100	94	91	88	93	89	87	91	88	86	90	87	86	84
6	98	92	88	85	97	91	87	85	90	87	84	89	86	83	88	85	83	82
7	95	89	85	82	94	88	84	82	87	84	81	86	83	81	85	83	81	80
8	93	86	82	79	92	86	82	79	85	81	79	84	81	79	83	80	78	77
9	90	84	80	77	90	83	80	77	83	79	77	82	79	76	81	78	76	75
10	88	82	78	75	87	81	77	75	80	77	75	80	77	74	79	76	74	73

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## Zonal Lumen Summary

[illegible]

Outdoor Light Planning

Lumen per Zone

Zone (γ)	Lumen	% Total
0-10°	364 lm	38.3%
10-20°	372 lm	39.1%
20-30°	147 lm	15.5%
30-40°	48 lm	5.1%
40-50°	14 lm	1.4%
50-60°	3 lm	0.3%
60-70°	1 lm	0.1%
70-80°	1 lm	0.1%
80-90°	1 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	950 lm	100.0%

Intensity peaks

Max intensity	5377 cd
Intensity, 90°	0 cd
Intensity, 0°	5377 cd

Zonal Lumen summary

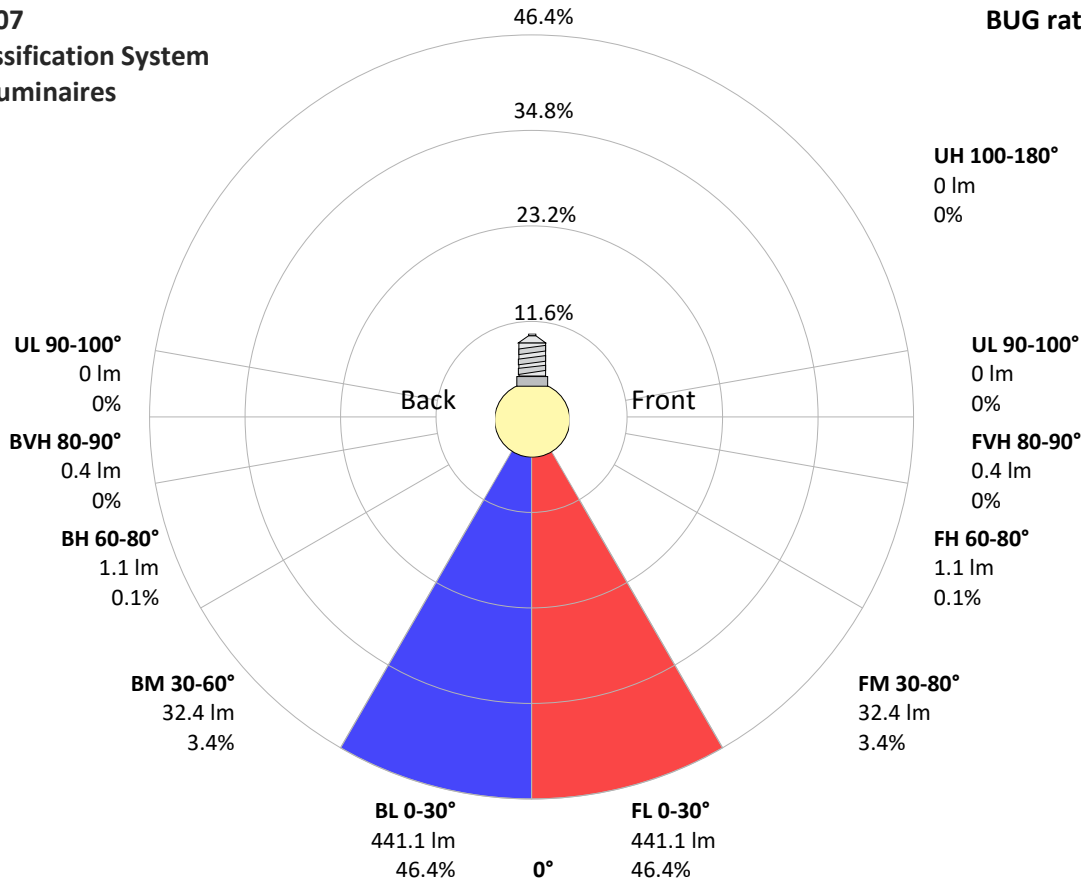
Zone (γ)	Lumen	% Total
0-30°	883 lm	92.9%
0-40°	931 lm	98.0%
0-60°	947 lm	99.7%
60-90°	3 lm	0.3%
70-100°	2 lm	0.2%
90-120°	0 lm	0.0%
0-90°	950 lm	100.0%
90-180°	0 lm	0.0%
0-180°	950 lm	100.0%

BUG rating

	Lumen	% Total
<b>Forward light</b>		
Low(0-30°)	441 lm	46.4%
Medium(30-60°)	32 lm	3.4%
High(60-80°)	1 lm	0.1%
Very high(80-90°)	0 lm	0.0%
<b>Back light</b>		
Low(0-30°)	441 lm	46.4%
Medium(30-60°)	32 lm	3.4%
High(60-80°)	1 lm	0.1%
Very high(80-90°)	0 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 B1 U1 G0



# Goniophotometry Report

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## Power Details

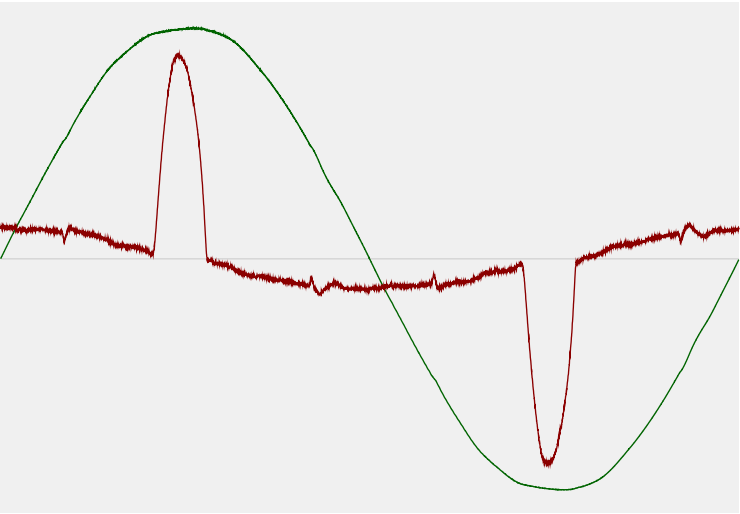
### Input Power

Power feed to light source	14.6 W
Frequency of input power	50 Hz
RMS Input voltage feed, $V_{RMS}$	242 V
RMS Input current feed, $I_{RMS}$	0.131 A
Volt-Ampere or apparent power = $V_{RMS} * I_{RMS}$	31.58 VA
Displacement factor of AC power feed	0.8
Power factor of AC current feed	0.46
Total harmonic distortion of the current	137.46%
Total harmonic distortion of the voltage	1.12%

### Efficiency

Radiated power efficiency	23.9%
<div><div></div></div>	
Lumen efficiency	65 lm/W
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### Input Power Curve



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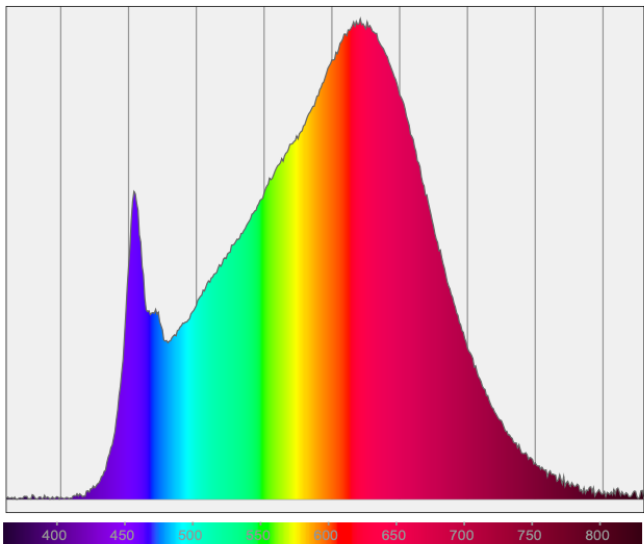
## Color Measurements

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

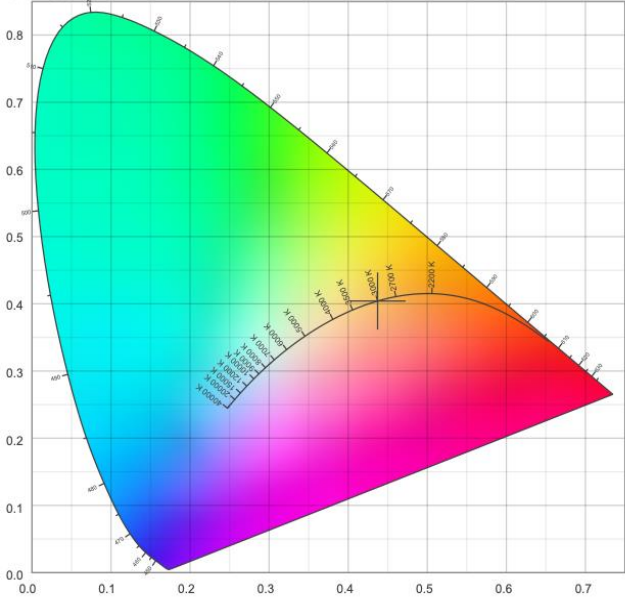
Correlated Color Temperature	CCT = 3000 K	Color coordinates CIE 1931	(x;y) = (0.437;0.404)
Color Rendering Index	CRI 94.1	Color coordinate CIEs 1960	(u;v) = (0.251;0.348)
Color Rendering Index, R9 (red component)	R9 = 68.6	Color deviation from BBL	Duv = ±0.0003
Color Rendering TM30-18	R <sub>f</sub> 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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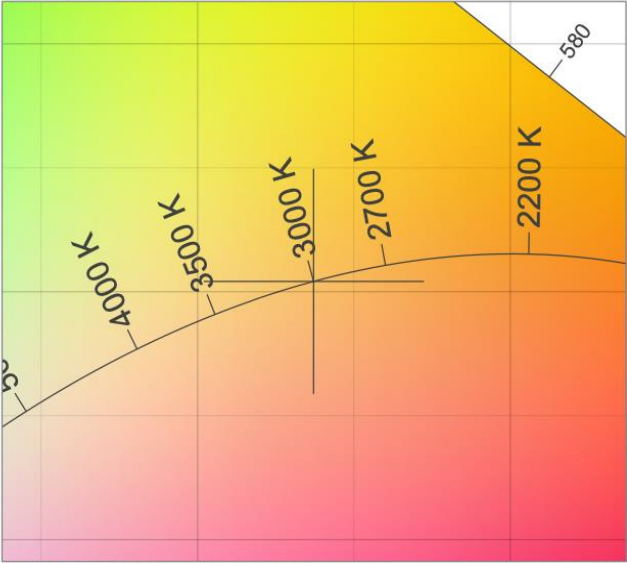
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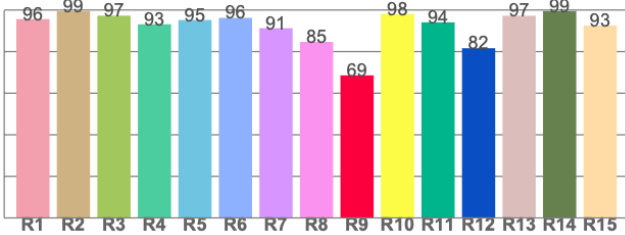
CIE 1931



CIE 1931 – zoomed on Planckian locus



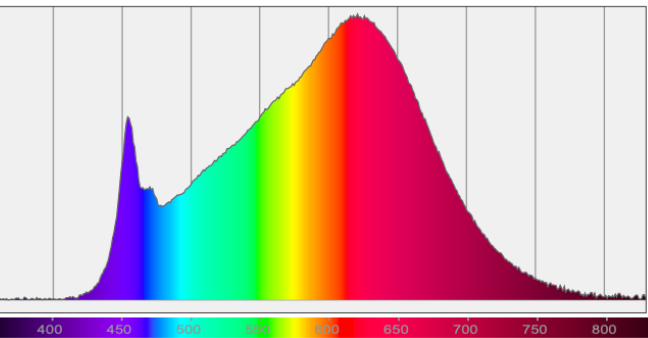
Color Rendering Index per reference color (CIE 1995)



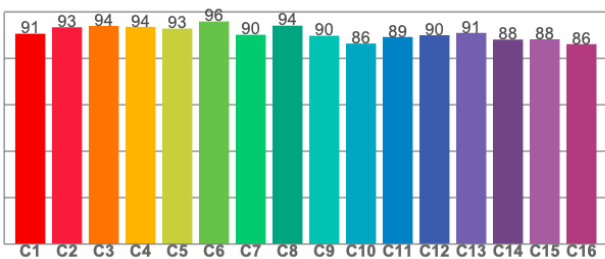
CRI R values, only R1-R8 are used to calculate final CRI value

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%



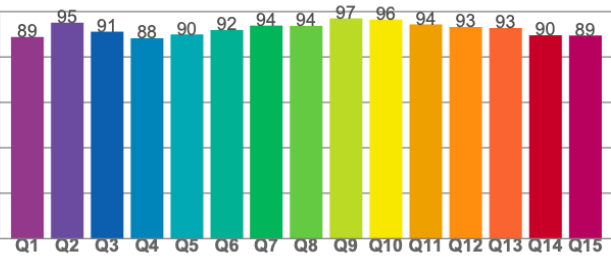
TM30-18 Rf-values per hue bin



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