

# Goniophotometry Report

1\_PHOT\_REFLEKTER-L-4600lmChip-3500K-38Deg\_2303  
www.factorylux.com



Tested Light Source - 1\_PHOT\_REFLEKTER-L-4600lmChip-3500K-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

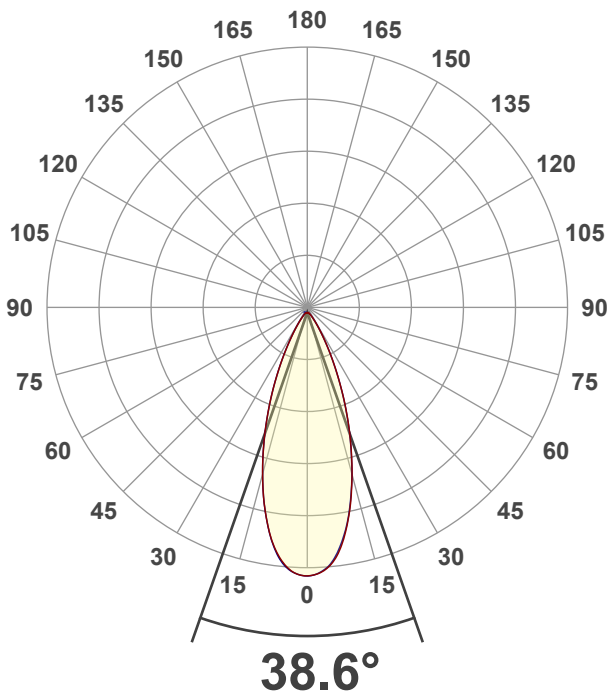
32 planes – 11.25°  
1.5°  
3.00 m  
41.3 W – PF 0.97 – DPF 0.97  
242 V – 0.177 A  
50 Hz

## Main Light Measurement Results

Output  
Efficiency  
Peak Intensity and Beam Angle  
Color Rendering Index

3873 lm  
94 lm/W  
7414 cd – 38.6°  
CRI 92.6

## Light Intensity Distribution



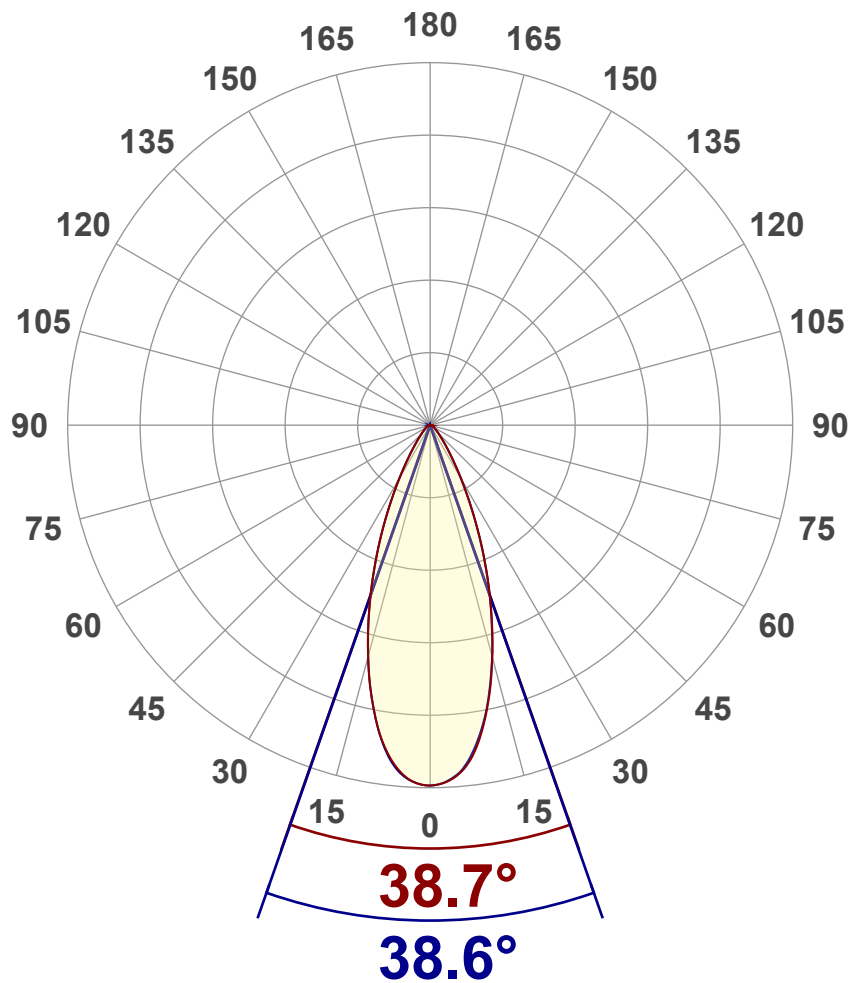
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## Luminous Intensity diagram

Unit: 0-100% of peak intensity



## Main Values

Output (total Lumen)	3873 lm
Peak Intensity	7414 cd
Beam Angle (50%)	38.6°
Beam Angle (90%)	38.6°
Beam Angle (10%)	38.6°

## Cut-off Angle

Average 2,5%	97.1°
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## Field Angle

Average 10%	68.9°
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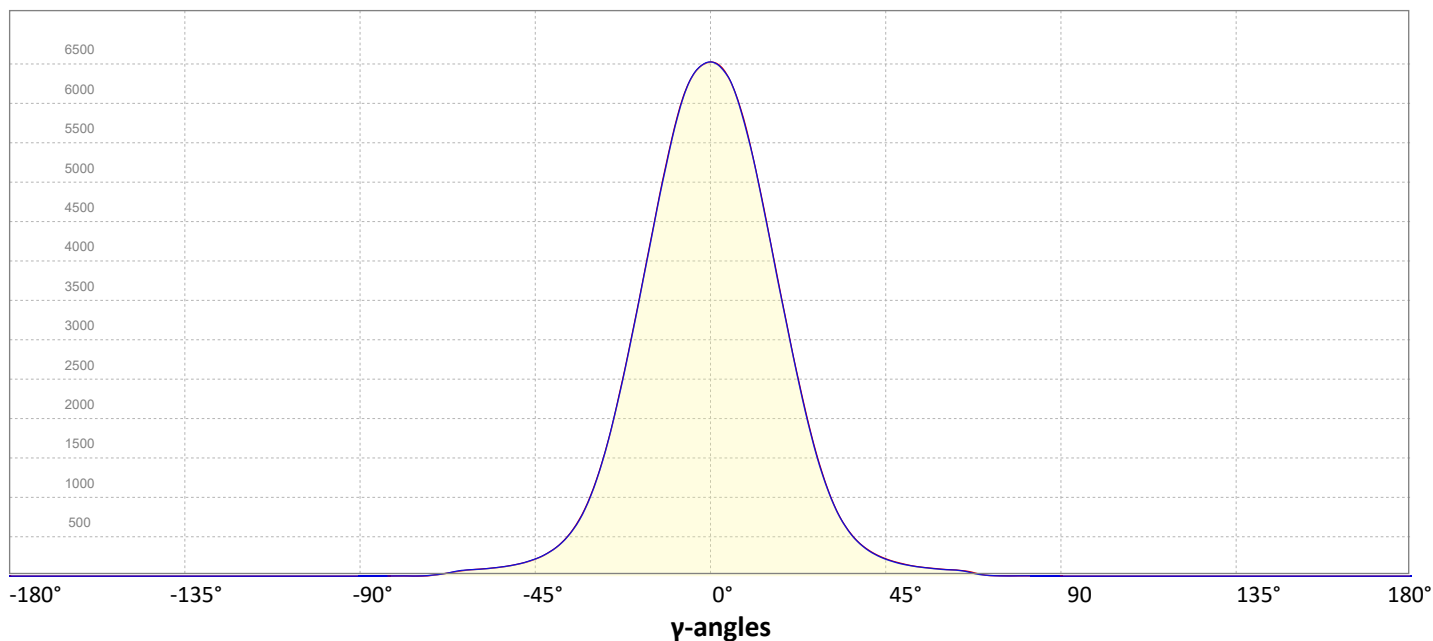
## Intensity Ratio

In 120° cone	98.1%
In 90° cone	93.1%

C000-C180

C090-C270

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

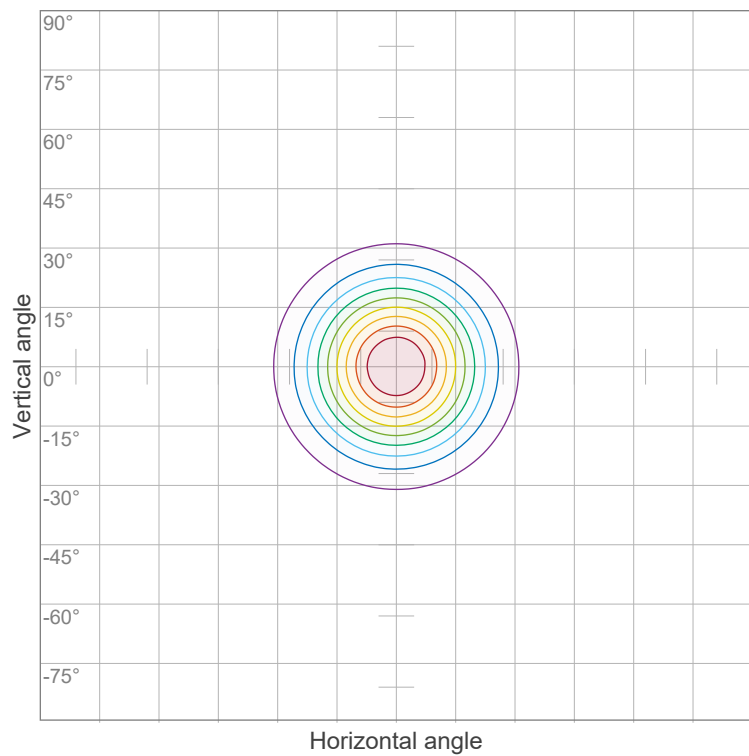


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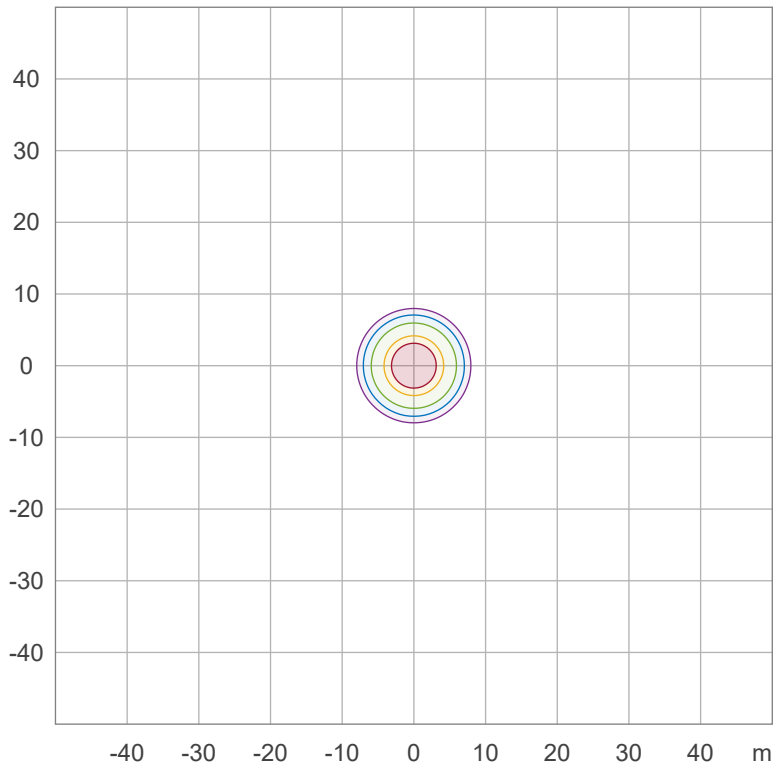
## Iso-intensity Diagram (Iso-candela)



90 %	6669.5 cd
80 %	5928.5 cd
70 %	5187.4 cd
60 %	4446.3 cd
50 %	3705.3 cd
40 %	2964.2 cd
30 %	2223.2 cd
20 %	1482.1 cd
10 %	741.1 cd

Peak intensity: 7410.6 cd  
Number of c-planes: 32

## Iso-illuminance Diagram (Iso-lux)



50.0 %	37.0 lx
30.0 %	22.2 lx
10.0 %	7.4 lx
5.0 %	3.7 lx
3.0 %	2.2 lx

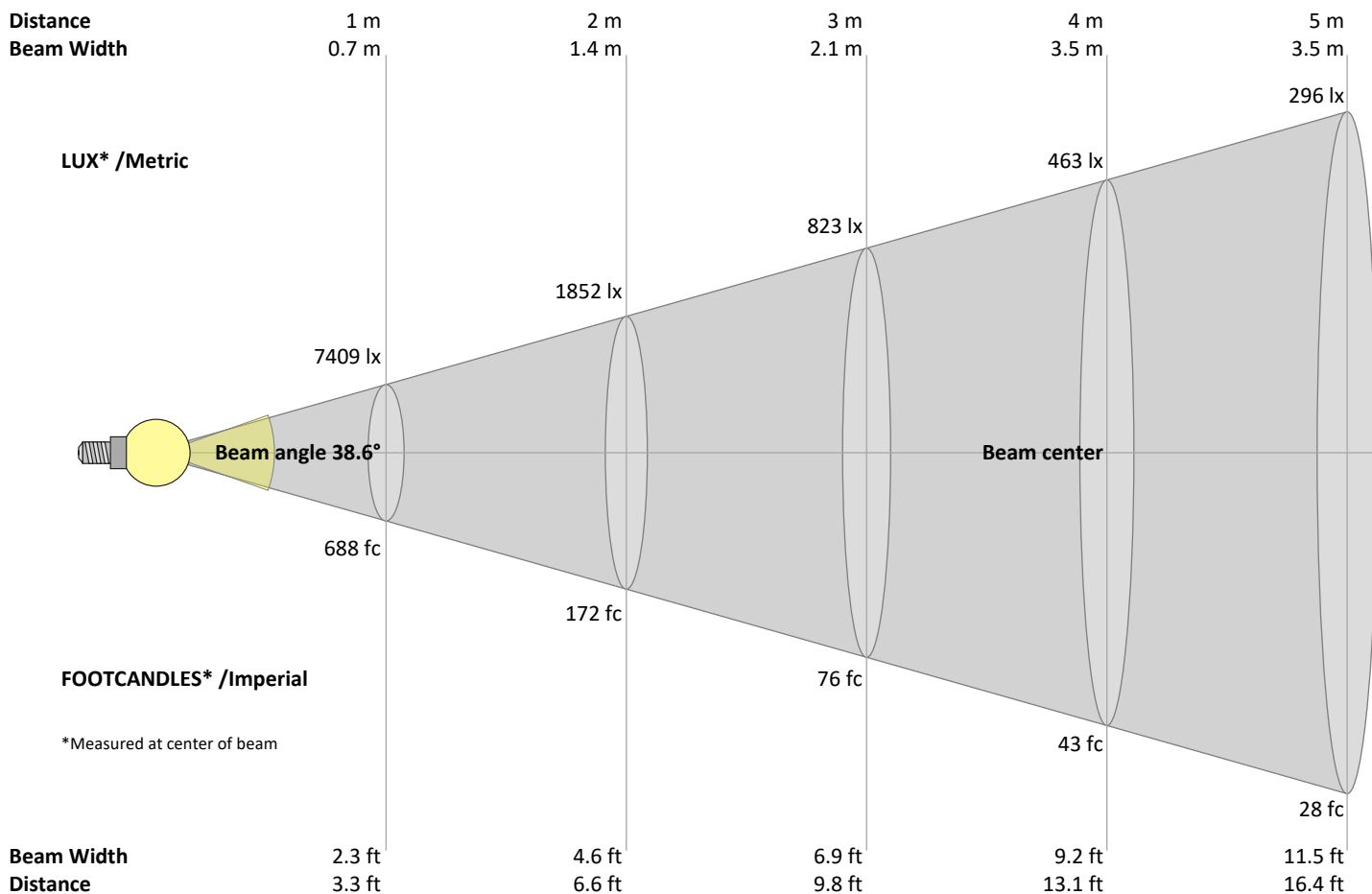
Peak illuminance: 74.1 lx  
Mounting height: 10.0 m  
Number of c-planes: 32

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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
7409	1852	823	463	296	206	151	116	91	74	61	51	44	38	33	29	26	23	21	19	lux
688.3	172.1	76.5	43	27.5	19.1	14	10.8	8.5	6.9	5.7	4.8	4.1	3.5	3.1	2.7	2.4	2.1	1.9	1.7	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
7409	7368	7261	7053	6725	6289	5779	5225	4657	4081	3524	2981	2479	2013	1614	1281	1005	789	624	496	cd
100%	99%	98%	95%	91%	85%	78%	71%	63%	55%	48%	40%	33%	27%	22%	17%	14%	11%	8%	7%	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
7409	7368	7237	7013	6672	6245	5752	5201	4635	4063	3509	2968	2459	2000	1600	1265	989	778	611	487	cd
100%	99%	98%	95%	90%	84%	78%	70%	63%	55%	47%	40%	33%	27%	22%	17%	13%	10%	8%	7%	of 0°val

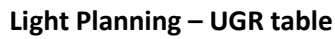
## Intensities in 180° c-plane

0°	2°	4°	6°	8°	10°	12°	14°	16°	18°	20°	22°	24°	26°	28°	30°	32°	34°	36°	38°	γ
7409	7376	7245	7017	6689	6261	5759	5221	4648	4077	3522	2982	2479	2018	1617	1272	997	781	616	492	cd
100%	100%	98%	95%	90%	84%	78%	70%	63%	55%	48%	40%	33%	27%	22%	17%	13%	11%	8%	7%	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
7409	7373	7265	7046	6709	6271	5757	5211	4637	4070	3510	2971	2472	2009	1611	1272	994	780	619	492	cd
100%	100%	98%	95%	91%	85%	78%	70%	63%	55%	47%	40%	33%	27%	22%	17%	13%	11%	8%	7%	of 0°val

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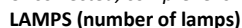
*Uncorrected, comprehensive UGR table according to 117-1995*

[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	114	111	109	106	111	109	107	105	105	103	102	101	100	99	98	97	96	94
2	108	104	100	97	106	102	98	96	99	96	93	96	93	91	93	91	90	88
3	103	97	92	89	101	96	92	88	93	90	87	91	88	85	89	86	84	82
4	99	91	86	82	97	90	85	82	88	84	81	86	83	80	84	81	79	77
5	94	86	81	77	93	85	80	76	84	79	76	82	78	75	80	77	74	73
6	90	82	76	72	89	81	76	72	79	75	71	78	74	71	77	73	70	69
7	86	78	72	68	85	77	72	68	76	71	67	74	70	67	73	70	67	65
8	83	74	68	64	81	73	68	64	72	67	64	71	67	64	70	66	63	62
9	79	70	65	61	78	70	65	61	69	64	61	68	64	61	67	63	60	59
10	76	67	62	58	75	67	62	58	66	61	58	65	61	58	65	61	58	57

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## Zonal Lumen Summary

[illegible]

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## Outdoor Light Planning

### Lumen per Zone

Zone (γ)	Lumen	% Total
0-10°	655 lm	16.9%
10-20°	1351 lm	34.9%
20-30°	1028 lm	26.5%
30-40°	454 lm	11.7%
40-50°	197 lm	5.1%
50-60°	112 lm	2.9%
60-70°	65 lm	1.7%
70-80°	7 lm	0.2%
80-90°	3 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	3873 lm	100.0%

### Intensity peaks

Max intensity	7414 cd
Intensity, 90°	0 cd
Intensity, 0°	7409 cd

### Zonal Lumen summary

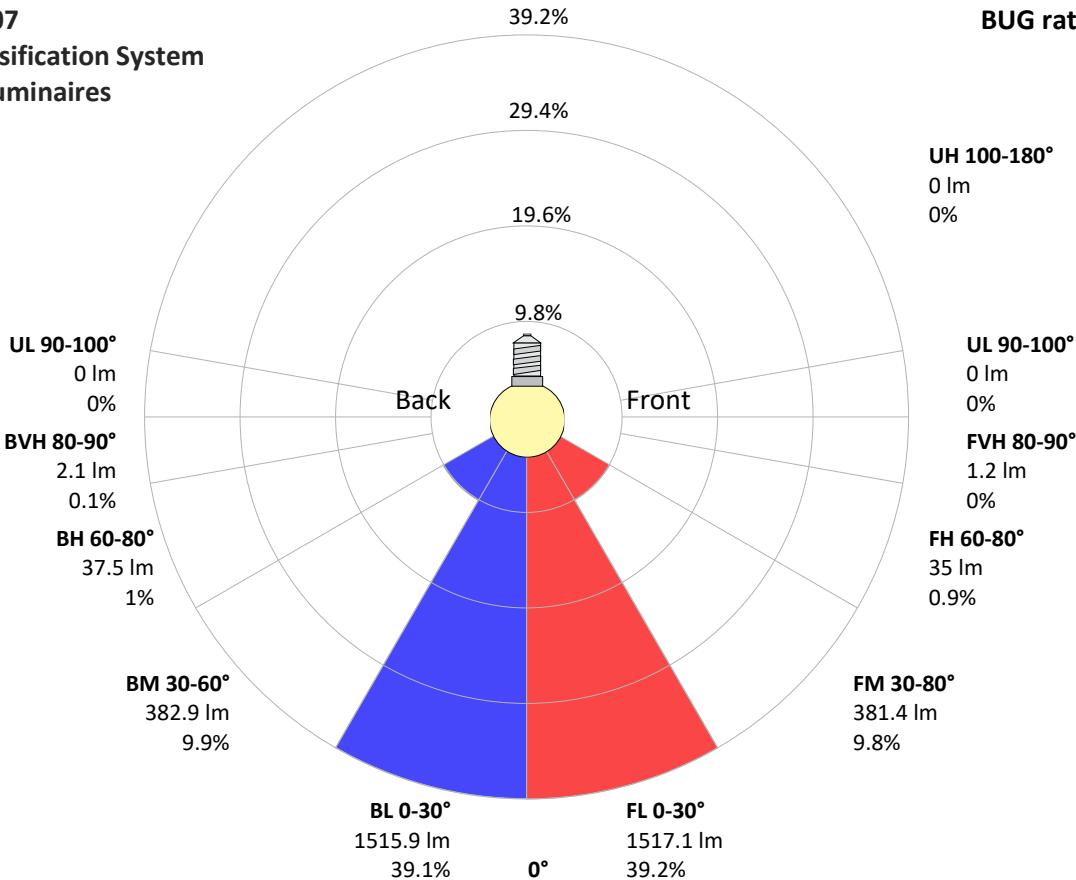
Zone (γ)	Lumen	% Total
0-30°	3034 lm	78.3%
0-40°	3488 lm	90.1%
0-60°	3797 lm	98.1%
60-90°	75 lm	1.9%
70-100°	10 lm	0.3%
90-120°	0 lm	0.0%
0-90°	3873 lm	100.0%
90-180°	0 lm	0.0%
0-180°	3873 lm	100.0%

### BUG rating

	Lumen	% Total
<b>Forward light</b>		
Low(0-30°)	1517 lm	39.2%
Medium(30-60°)	381 lm	9.8%
High(60-80°)	35 lm	0.9%
Very high(80-90°)	1 lm	0.0%
<b>Back light</b>		
Low(0-30°)	1516 lm	39.1%
Medium(30-60°)	383 lm	9.9%
High(60-80°)	37 lm	1.0%
Very high(80-90°)	2 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 B3 U1 G0



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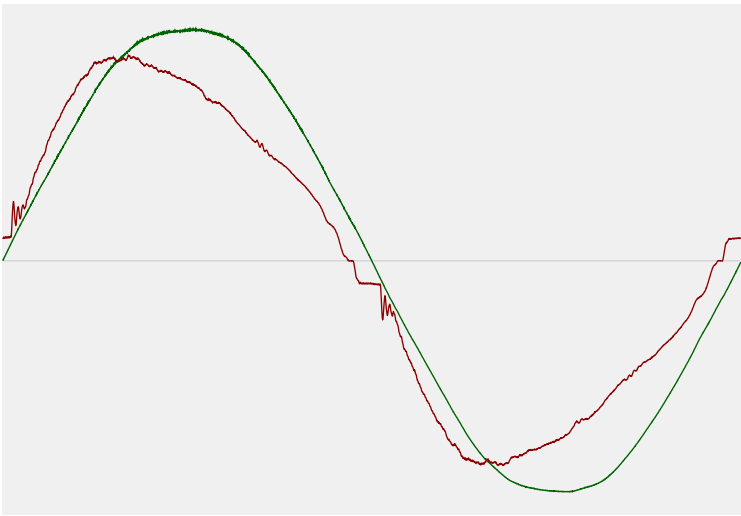


## Power Details

### Input Power

Power feed to light source	41.3 W
Frequency of input power	50 Hz
RMS Input voltage feed, $V_{RMS}$	242 V
RMS Input current feed, $I_{RMS}$	0.177 A
Volt-Ampere or apparent power = $V_{RMS} \cdot I_{RMS}$	42.78 VA
Displacement factor of AC power feed	0.97
Power factor of AC current feed	0.97
Total harmonic distortion of the current	11.22%
Total harmonic distortion of the voltage	1.42%

### Input Power Curve



### Efficiency

Radiated power efficiency	33.9%
<div><div></div></div>	
Lumen efficiency	94 lm/W
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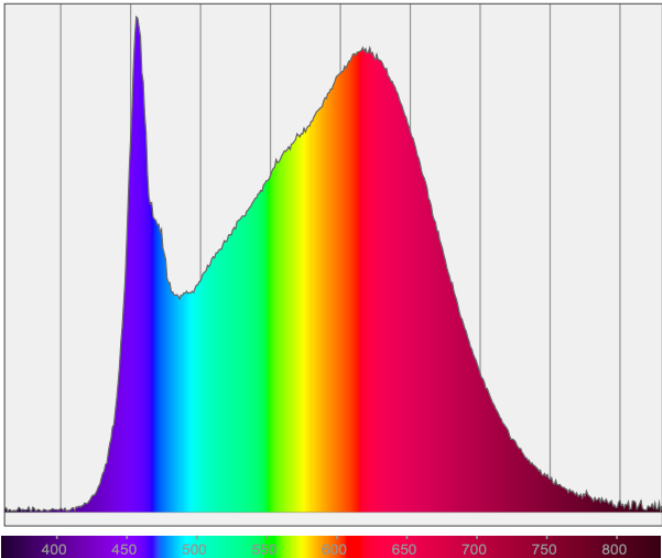
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## Color Measurements

Correlated Color Temperature	CCT = 3500 K
Color Rendering TM30-18	R <sub>f</sub> 90.2 – R <sub>g</sub> 98.1
Color Shift, CIE duv	Duv ±0.0003

## Spectral distribution



## Color details

Correlated Color Temperature	CCT = 3500 K	Color coordinates CIE 1931	(x;y) = (0.406;0.391)
Color Rendering Index	CRI 94.0	Color coordinate CIEs 1960	(u;v) = (0.236;0.341)
Color Rendering Index, R9 (red component)	R9 = 77.7	Color deviation from BBL	Duv = ±0.0003
Color Rendering TM30-18	R <sub>f</sub> 90.2 – R <sub>g</sub> 98.1	Color coordinate CIEs 1976 (CIELUV)	(u';v') = (0.236;0.236)
Color Quality Scale	CQS = 92.3		

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CIE 1931



CIE 1931 – zoomed on Planckian locus



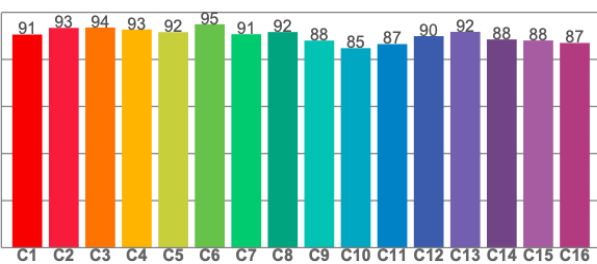
Color Rendering Index per reference color (CIE 1995)



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
97.3	97.2	95.9	93.4	95.9	93.5	90.9	87.9	77.7	96.6	94.1	77.1	98.8	99.0	96.4

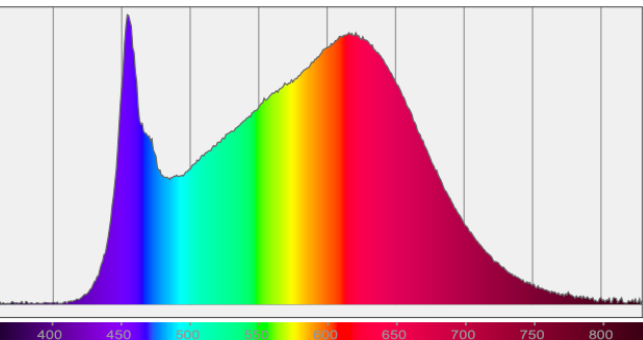
TM30-18 Rf-values per hue bin



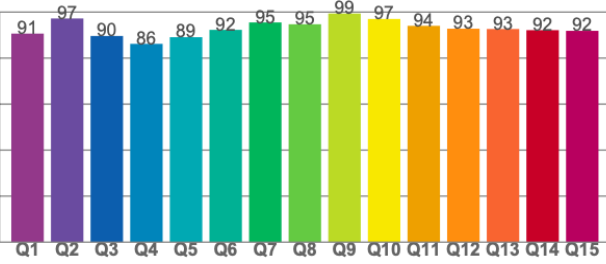
TM30 C values, 16 binned values out of total of 99 C values

C1	C2	C3	C4	C5	C6	C7	C8	C9	C10	C11	C12	C13	C14	C15	C16
90.6	93.4	93.6	92.7	91.6	95.0	90.7	91.6	88.0	84.8	86.5	89.9	91.7	88.5	88.1	87.0

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
90.6	97.2	89.6	86.2	89.1	92.3	95.5	94.7	99.4	97.0	94.0	92.8	92.6	92.1	91.8