

# Goniophotometry Report

1\_PHOT\_REFLEKTER-L-4750lmChip-4000K-38Deg\_2303  
www.factorylux.com



Tested Light Source - 1\_PHOT\_REFLEKTER-L-4750lmChip-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

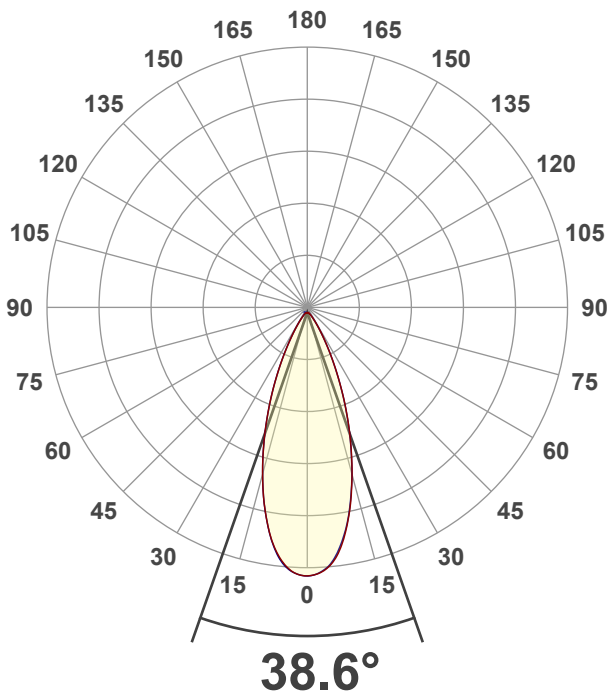
32 planes – 11.25°  
1.5°  
3.00 m  
41.3 W – PF 0.97 – DPF 0.97  
242 V – 0.177 A  
50 Hz

## Main Light Measurement Results

Output  
Efficiency  
Peak Intensity and Beam Angle  
Color Rendering Index

3999 lm  
97 lm/W  
7655 cd – 38.6°  
CRI 92.6

## Light Intensity Distribution



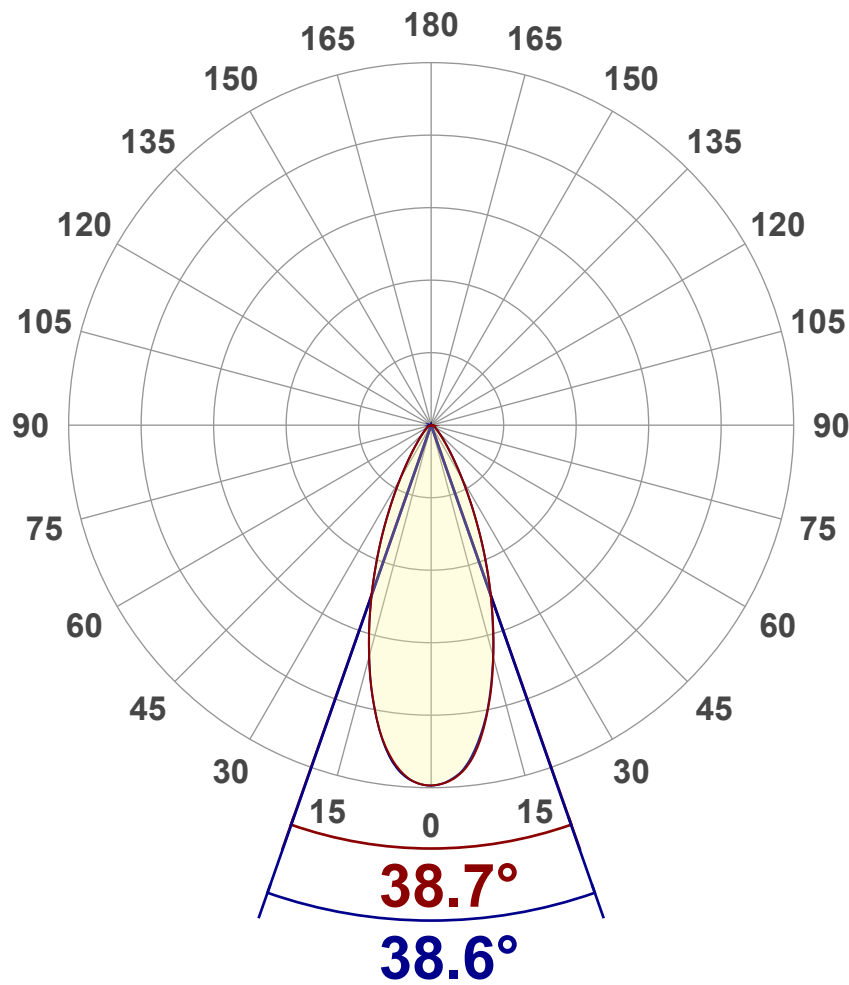
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Luminous Intensity diagram

Unit: 0-100% of peak intensity



Main Values

Output (total Lumen)	3999 lm
Peak Intensity	7655 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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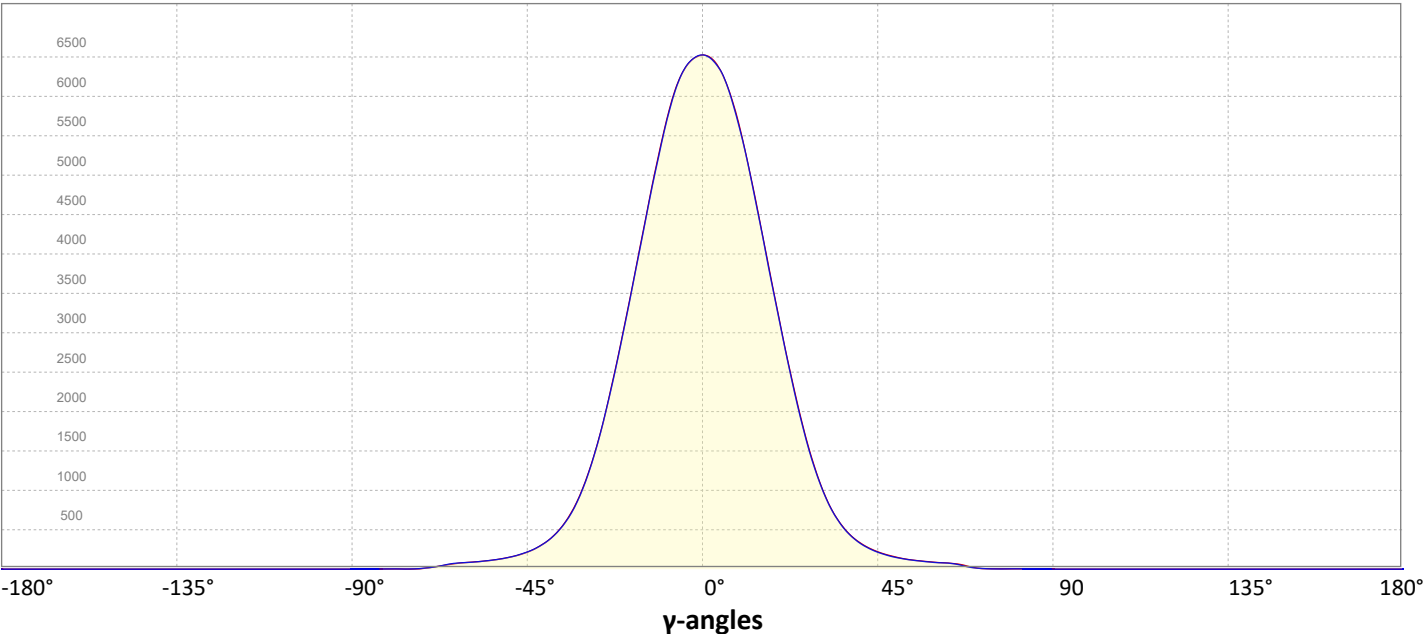
Intensity Ratio

In 120° cone	98.1%
In 90° cone	93.1%

C000-C180

C090-C270

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

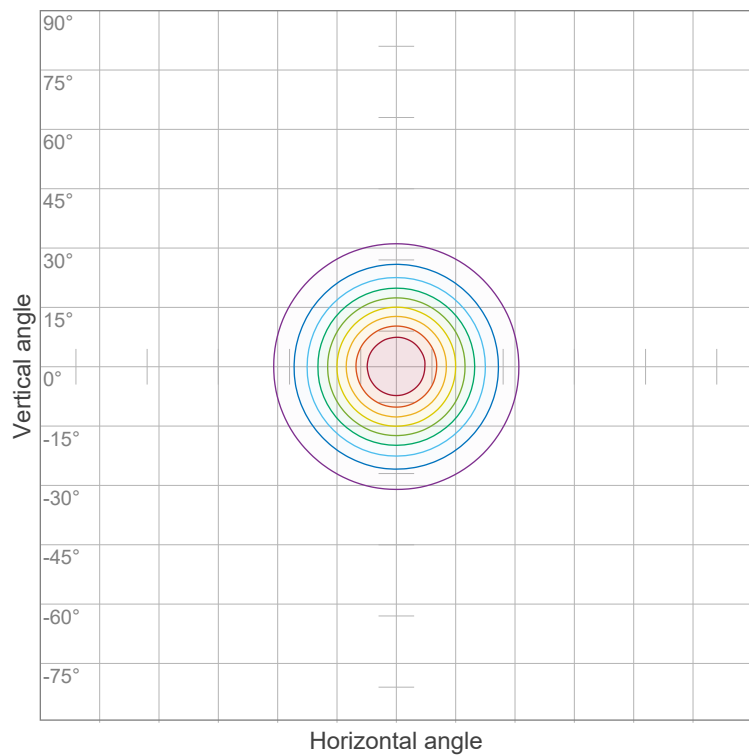


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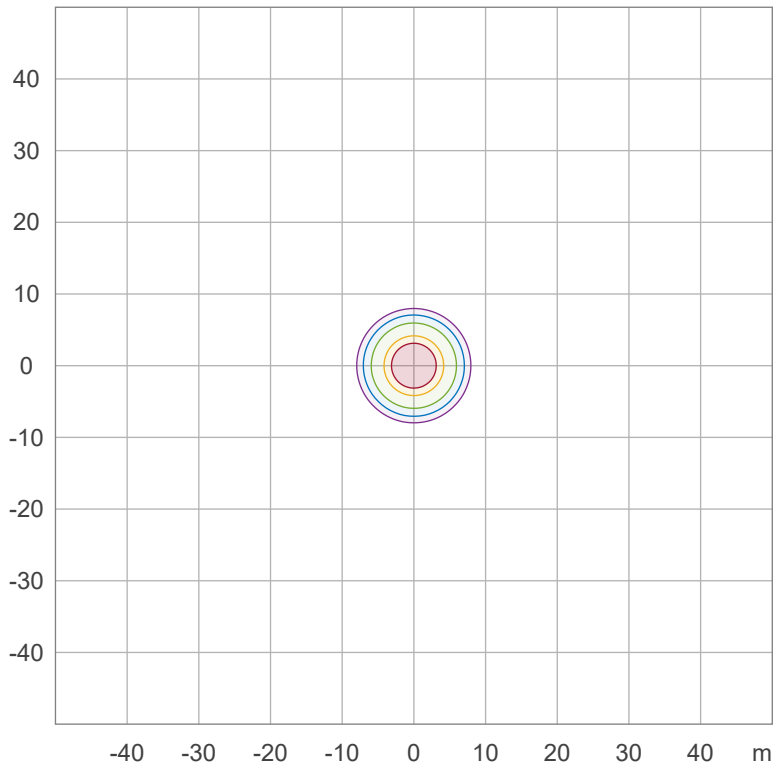
## Iso-intensity Diagram (Iso-candela)



90 %	6886.5 cd
80 %	6121.3 cd
70 %	5356.2 cd
60 %	4591.0 cd
50 %	3825.8 cd
40 %	3060.7 cd
30 %	2295.5 cd
20 %	1530.3 cd
10 %	765.2 cd

Peak intensity: 7651.7 cd  
Number of c-planes: 32

## Iso-illuminance Diagram (Iso-lux)



50.0 %	38.3 lx
30.0 %	23.0 lx
10.0 %	7.7 lx
5.0 %	3.8 lx
3.0 %	2.3 lx

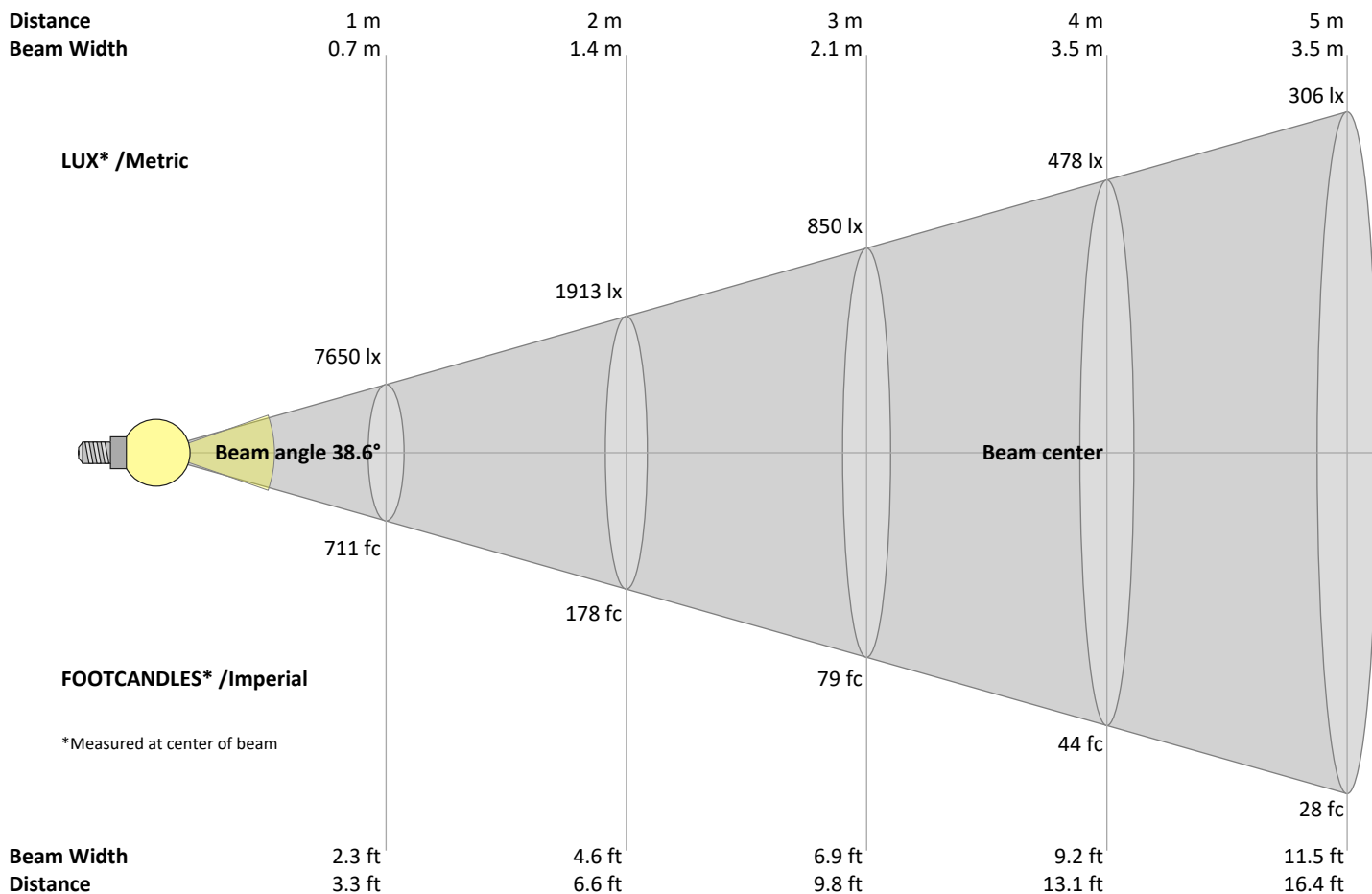
Peak illuminance: 76.5 lx  
Mounting height: 10.0 m  
Number of c-planes: 32

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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
7650	1913	850	478	306	213	156	120	94	77	63	53	45	39	34	30	26	24	21	19	lux
710.7	177.7	79	44.4	28.4	19.7	14.5	11.1	8.8	7.1	5.9	4.9	4.2	3.6	3.2	2.8	2.5	2.2	2	1.8	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
7650	7608	7498	7282	6944	6494	5967	5395	4809	4213	3639	3078	2559	2079	1666	1323	1037	815	644	512	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
7650	7607	7473	7241	6889	6448	5939	5370	4786	4195	3624	3065	2539	2065	1652	1307	1022	803	631	503	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

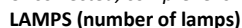
0°	2°	4°	6°	8°	10°	12°	14°	16°	18°	20°	22°	24°	26°	28°	30°	32°	34°	36°	38°	γ
7650	7616	7480	7245	6907	6464	5947	5390	4799	4210	3636	3079	2560	2084	1670	1314	1029	806	636	508	cd
100%	100%	98%	95%	90%	84%	78%	70%	63%	55%	48%	40%	33%	27%	22%	17%	13%	11%	8%	7%	of 0°val

### 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
7650	7613	7502	7275	6928	6475	5944	5380	4788	4202	3624	3068	2552	2074	1663	1314	1026	806	639	508	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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## Zonal Lumen Summary

[illegible]

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## Outdoor Light Planning

### Lumen per Zone

Zone (γ)	Lumen	% Total
0-10°	676 lm	16.9%
10-20°	1395 lm	34.9%
20-30°	1061 lm	26.5%
30-40°	469 lm	11.7%
40-50°	204 lm	5.1%
50-60°	115 lm	2.9%
60-70°	67 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	3999 lm	100.0%

### Intensity peaks

Max intensity	7655 cd
Intensity, 90°	0 cd
Intensity, 0°	7650 cd

### Zonal Lumen summary

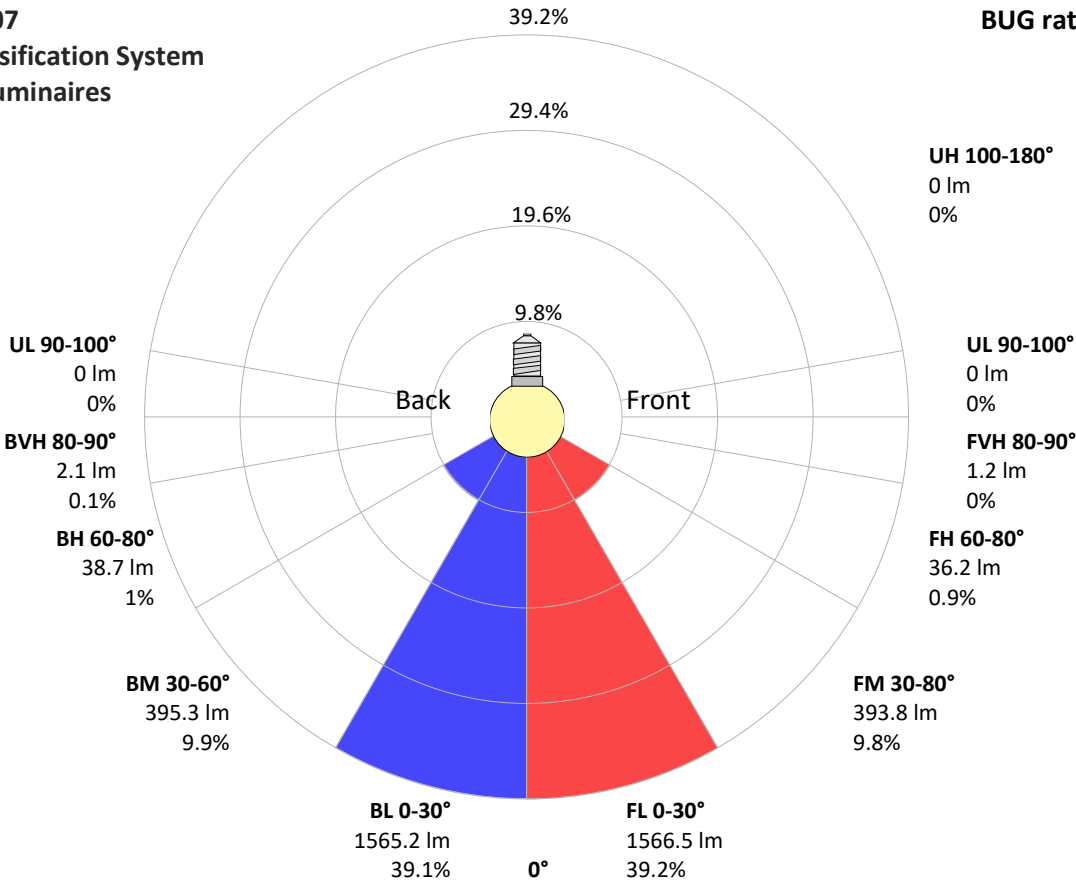
Zone (γ)	Lumen	% Total
0-30°	3133 lm	78.3%
0-40°	3602 lm	90.1%
0-60°	3921 lm	98.1%
60-90°	78 lm	1.9%
70-100°	11 lm	0.3%
90-120°	0 lm	0.0%
0-90°	3999 lm	100.0%
90-180°	0 lm	0.0%
0-180°	3999 lm	100.0%

### BUG rating

	Lumen	% Total
<b>Forward light</b>		
Low(0-30°)	1566 lm	39.2%
Medium(30-60°)	394 lm	9.8%
High(60-80°)	36 lm	0.9%
Very high(80-90°)	1 lm	0.0%
<b>Back light</b>		
Low(0-30°)	1565 lm	39.1%
Medium(30-60°)	395 lm	9.9%
High(60-80°)	39 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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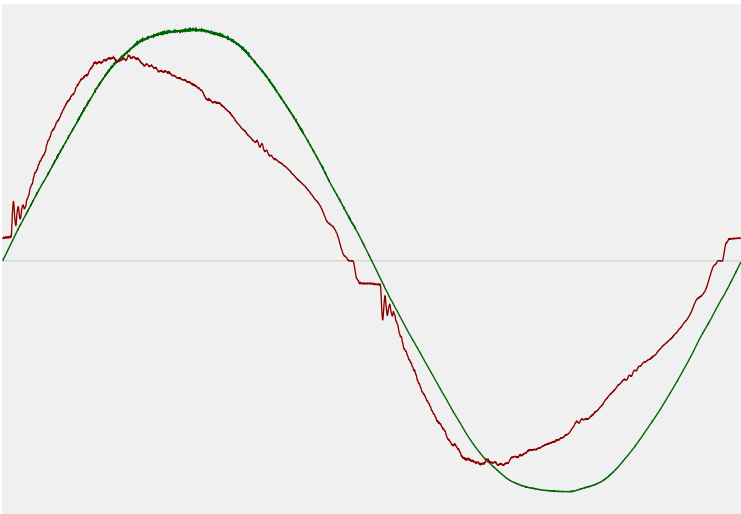


## Power Details

### 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	35.0%
Lumen efficiency	97 lm/W



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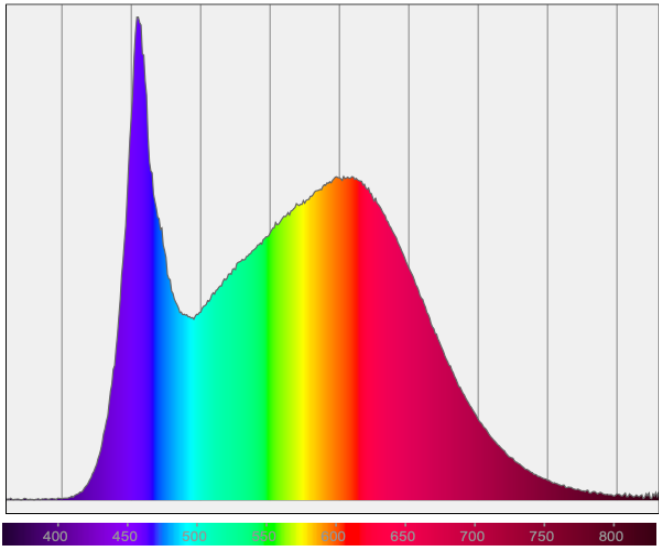
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## Color Measurements

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

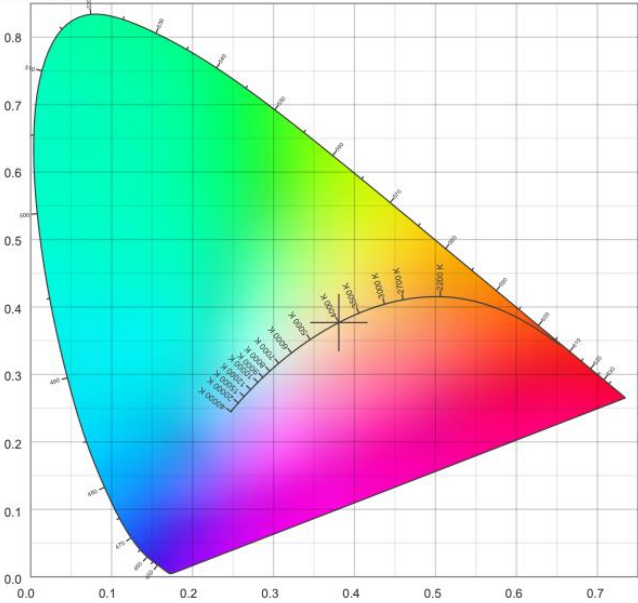
Correlated Color Temperature	CCT = 4000 K	Color coordinates CIE 1931	(x;y) = (0.381;0.377)
Color Rendering Index	CRI 92.6	Color coordinate CIEs 1960	(u;v) = (0.225;0.334)
Color Rendering Index, R9 (red component)	R9 = 72.2	Color deviation from BBL	Duv = ±0.0003
Color Rendering TM30-18	R <sub>f</sub>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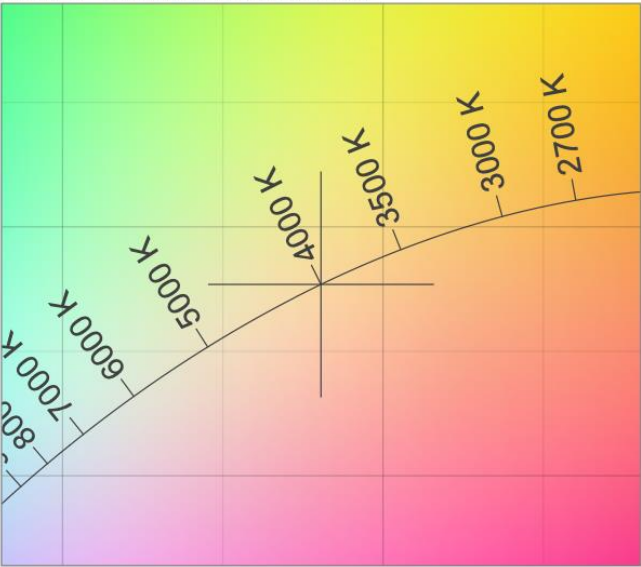
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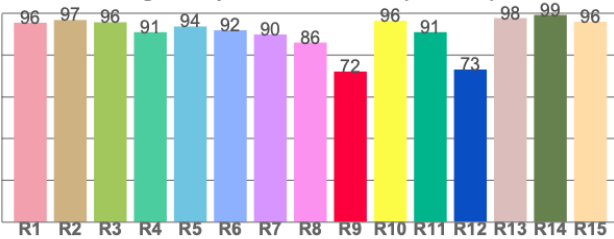
CIE 1931



CIE 1931 – zoomed on Planckian locus



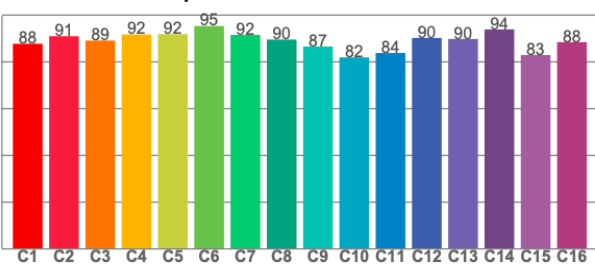
Color Rendering Index per reference color (CIE 1995)



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

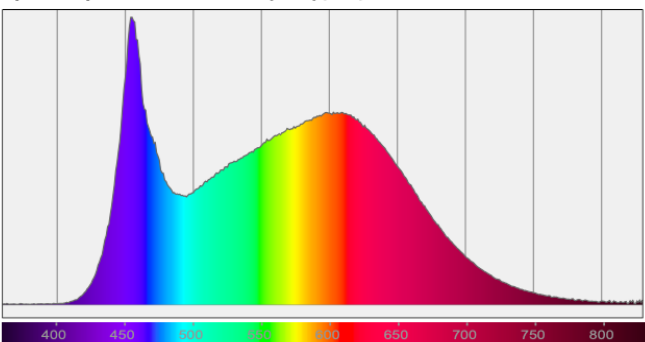
TM30-18 Rf-values per hue bin



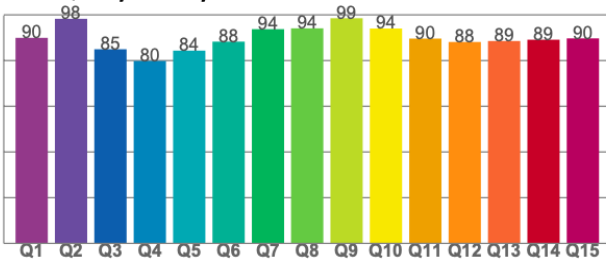
TM30 C values, 16 binned values out of total of 99 C values

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