

# Goniophotometry Report

1\_PHOT\_REFLEKTER-L-4600lmChip-3500K-58Deg\_2303  
www.factorylux.com



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

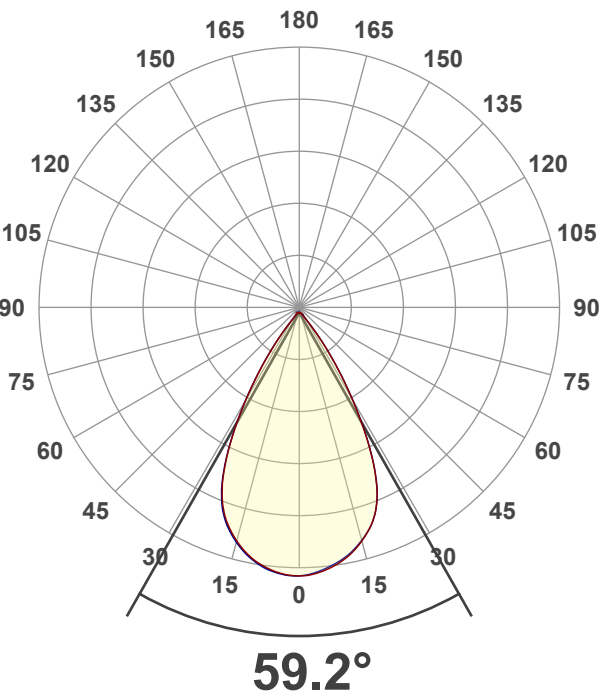
32 planes – 11.25°  
2.5°  
3.00 m  
41.3 W – PF 0.97 – DPF 0.97  
239 V – 0.179 A  
50 Hz

## Main Light Measurement Results

Output  
Efficiency  
Peak Intensity and Beam Angle  
Color Rendering Index

3917 lm  
95 lm/W  
4421 cd – 59.2°  
CRI 92.6

## Light Intensity Distribution



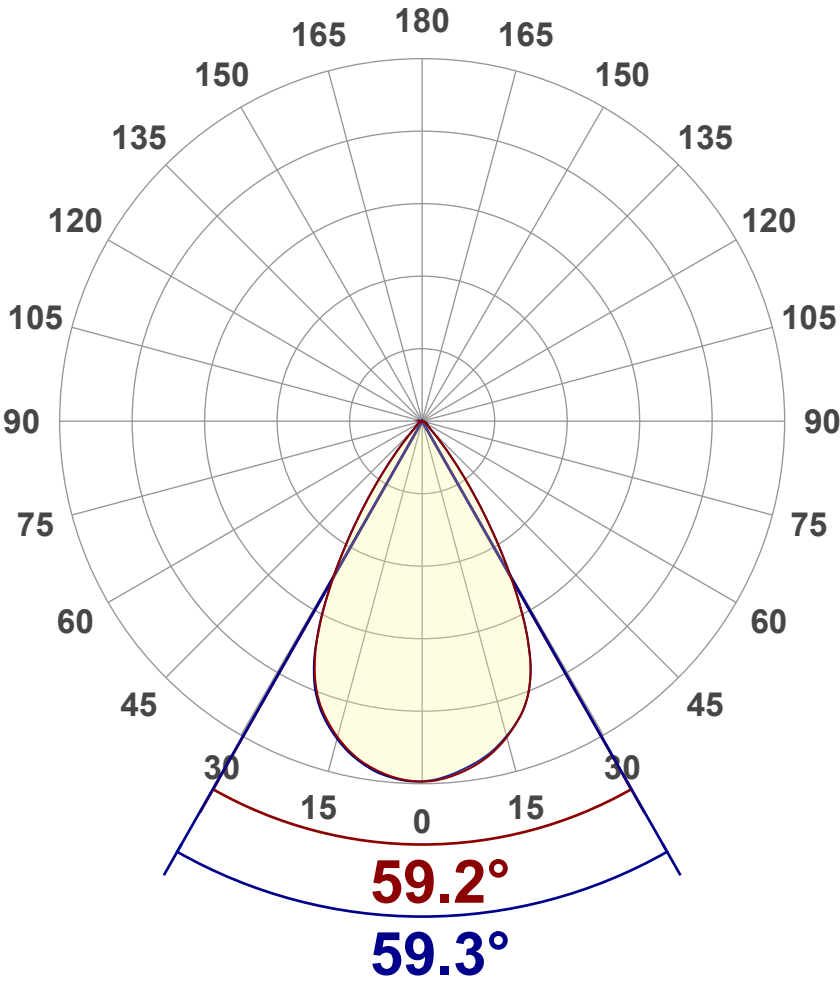
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Luminous Intensity diagram

Unit: 0-100% of peak intensity



Main Values

Output (total Lumen)	3917 lm
Peak Intensity	4421 cd
Beam Angle (50%)	59.2°
Beam Angle (90%)	59.3°
Beam Angle (10%)	59.2°

Cut-off Angle

Average 2,5%	97.3°
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Field Angle

Average 10%	80.9°
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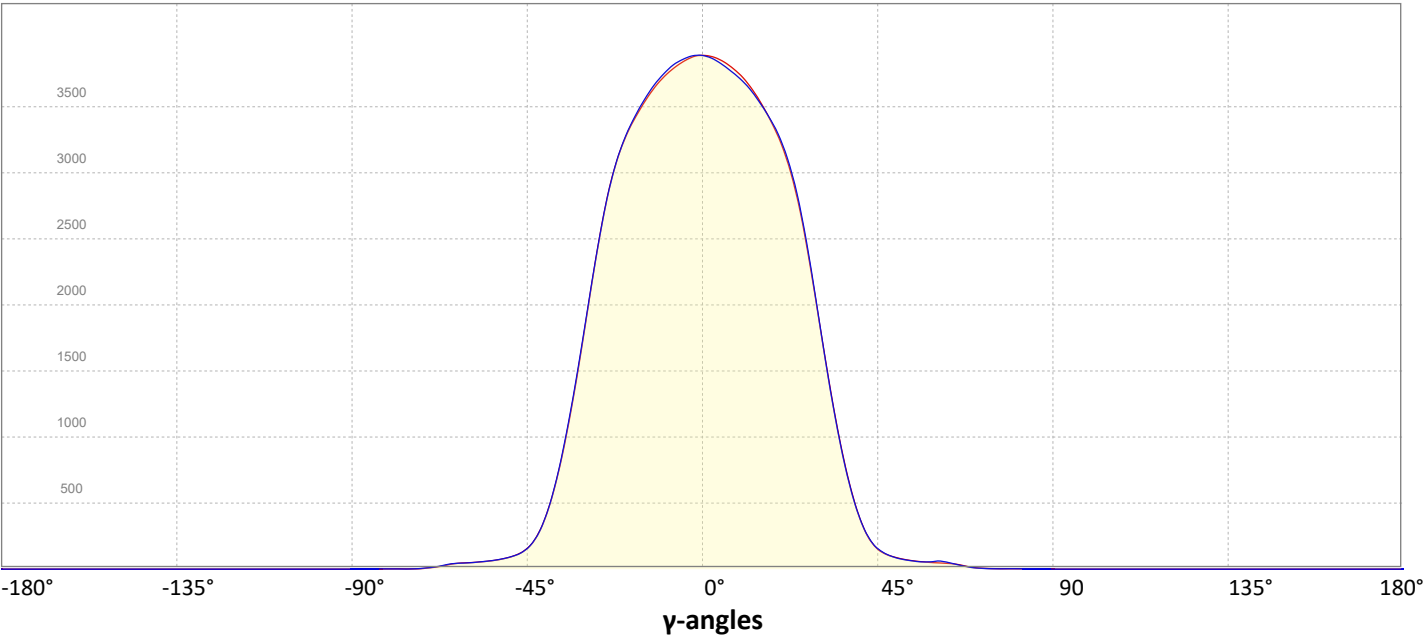
Intensity Ratio

In 120° cone	98.9%
In 90° cone	95.9%

C000-C180

C090-C270

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

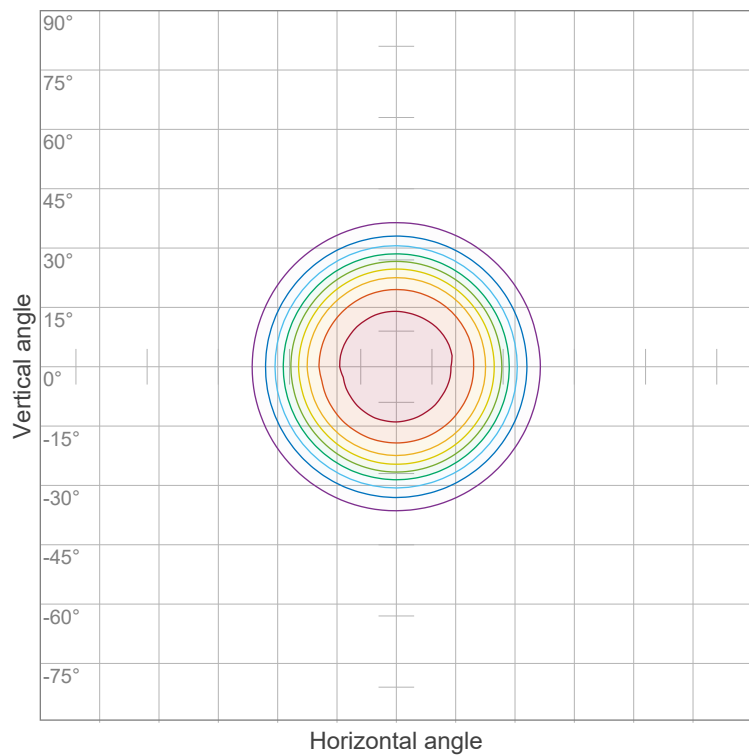


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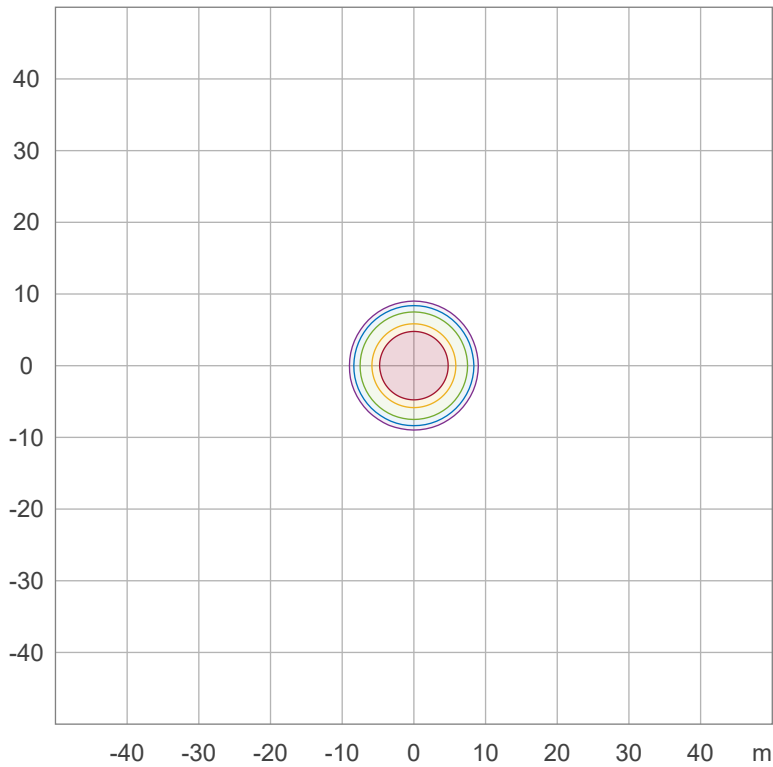
## Iso-intensity Diagram (Iso-candela)



90 %	3977.6 cd
80 %	3535.7 cd
70 %	3093.7 cd
60 %	2651.7 cd
50 %	2209.8 cd
40 %	1767.8 cd
30 %	1325.9 cd
20 %	883.9 cd
10 %	442.0 cd

Peak intensity: 4419.6 cd  
Number of c-planes: 32

## Iso-illuminance Diagram (Iso-lux)



50.0 %	22.1 lx
30.0 %	13.3 lx
10.0 %	4.4 lx
5.0 %	2.2 lx
3.0 %	1.3 lx

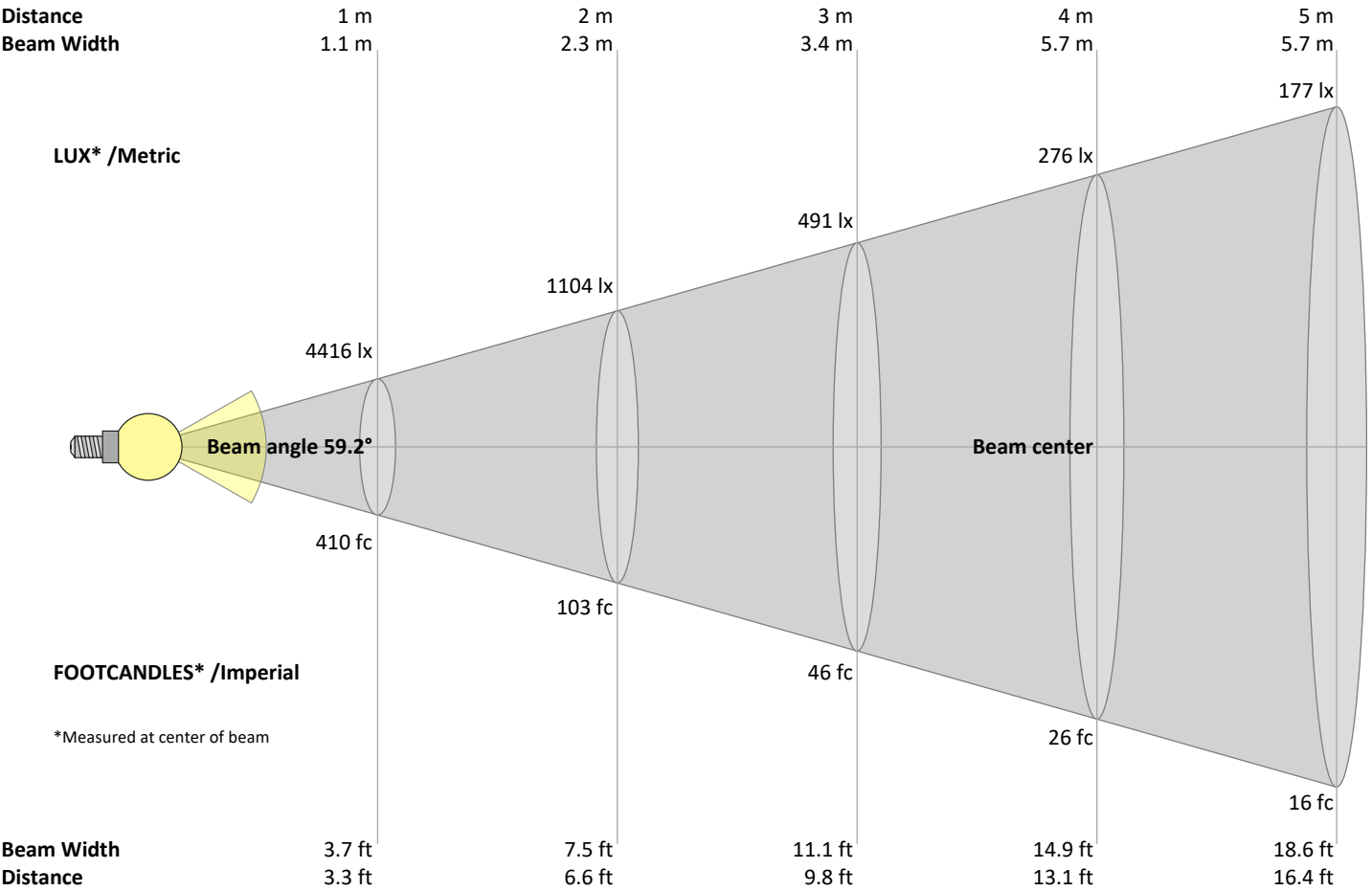
Peak illuminance: 44.2 lx  
Mounting height: 10.0 m  
Number of c-planes: 32

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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
4416	1104	491	276	177	123	90	69	55	44	36	31	26	23	20	17	15	14	12	11	lux
410.2	102.6	45.6	25.6	16.4	11.4	8.4	6.4	5.1	4.1	3.4	2.8	2.4	2.1	1.8	1.6	1.4	1.3	1.1	1	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
4416	4409	4381	4340	4289	4227	4152	4062	3954	3834	3688	3502	3261	2931	2539	2121	1708	1324	981	706	cd
100%	100%	99%	98%	97%	96%	94%	92%	90%	87%	84%	79%	74%	66%	57%	48%	39%	30%	22%	16%	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
4416	4397	4361	4315	4263	4204	4134	4044	3943	3829	3690	3509	3261	2934	2549	2131	1710	1320	986	707	cd
100%	100%	99%	98%	97%	95%	94%	92%	89%	87%	84%	79%	74%	66%	58%	48%	39%	30%	22%	16%	of 0°val

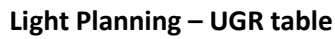
Intensities in 180° c-plane

0°	2°	4°	6°	8°	10°	12°	14°	16°	18°	20°	22°	24°	26°	28°	30°	32°	34°	36°	38°	γ
4416	4408	4386	4350	4301	4238	4157	4060	3948	3821	3672	3476	3224	2909	2534	2125	1715	1335	998	711	cd
100%	100%	99%	99%	97%	96%	94%	92%	89%	87%	83%	79%	73%	66%	57%	48%	39%	30%	23%	16%	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
4416	4414	4396	4365	4320	4257	4179	4083	3972	3846	3699	3510	3251	2924	2544	2133	1718	1340	1001	715	cd
100%	100%	100%	99%	98%	96%	95%	92%	90%	87%	84%	79%	74%	66%	58%	48%	39%	30%	23%	16%	of 0°val

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[illegible]

n/a	n/a	n/a
n/a	n/a	n/a
n/a	n/a	n/a

UGR data could not be calculated due to missing/wrong symmetry. Goto Edit->Photometric->Corrections and select Correct asymmetry.

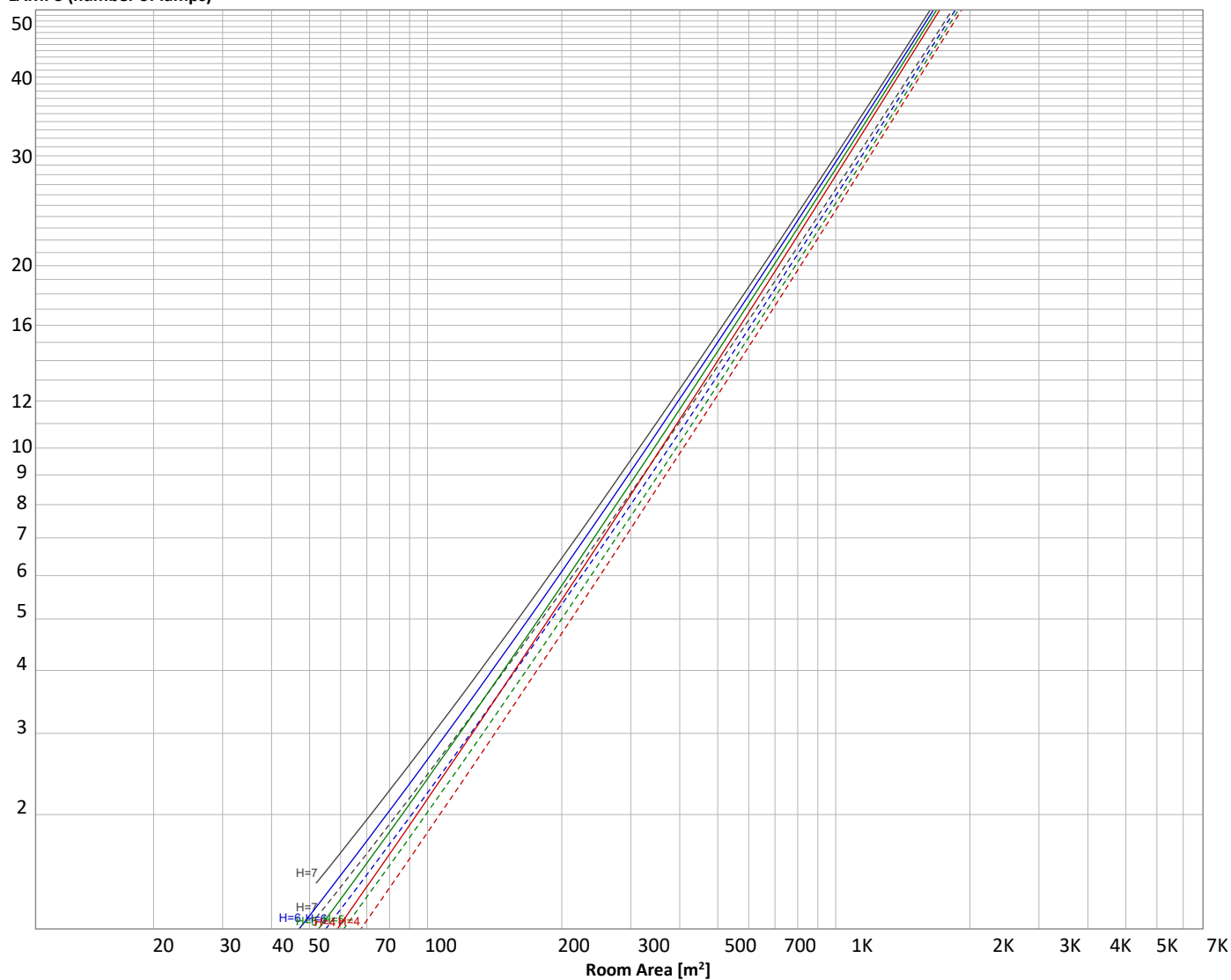
Ceiling reflectance	80			70			50			30			10			0		
Wall reflectance	70	50	30	10	70	50	30	10	50	30	10	50	30	10	50	30	10	0
Floor reflectance	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	0
RCR	(RCR: Room Cavity Ratio)			Room Values are expressed as percentage of Lumen delivered to the task surface														
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	106	104	105	103	101	101	99	98	97	96	95	94
2	108	103	99	96	106	101	98	95	98	95	93	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	97	90	84	80	96	89	84	80	87	82	79	85	81	78	83	80	77	76
5	93	84	79	74	91	83	78	74	82	77	73	80	76	73	78	75	72	71
6	88	79	73	69	87	78	73	69	77	72	68	76	71	68	74	70	67	66
7	84	75	69	64	82	74	68	64	73	68	64	71	67	64	70	66	63	62
8	80	70	64	60	79	70	64	60	69	64	60	68	63	60	67	63	59	58
9	76	66	61	57	75	66	60	57	65	60	56	64	60	56	63	59	56	55
10	73	63	57	53	72	63	57	53	62	57	53	61	56	53	60	56	53	52

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Uncorrected, comprehensive UGR table according to 117-1995

**LAMPS (number of lamps)**



### Conditions

H = Room height	Flux = 3917 lm			p(%)	
H <sub>down</sub> = Lamp distance from ceiling =	0.00 m	Line type	Ceiling reflectance	Wall reflectance	Floor reflectance
H <sub>work</sub> = Work area height from floor =	0.00 m	-----	70	50	30
E <sub>work</sub> = Average lux on work area =	100 lx	=====	50	30	20

## Zonal Lumen Summary

[illegible]

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Outdoor Light Planning

Lumen per Zone

Zone (γ)	Lumen	% Total
0-10°	412 lm	10.5%
10-20°	1124 lm	28.7%
20-30°	1379 lm	35.2%
30-40°	733 lm	18.7%
40-50°	161 lm	4.1%
50-60°	63 lm	1.6%
60-70°	37 lm	0.9%
70-80°	5 lm	0.1%
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	3917 lm	100.0%

Intensity peaks

Max intensity	4421 cd
Intensity, 90°	0 cd
Intensity, 0°	4416 cd

Zonal Lumen summary

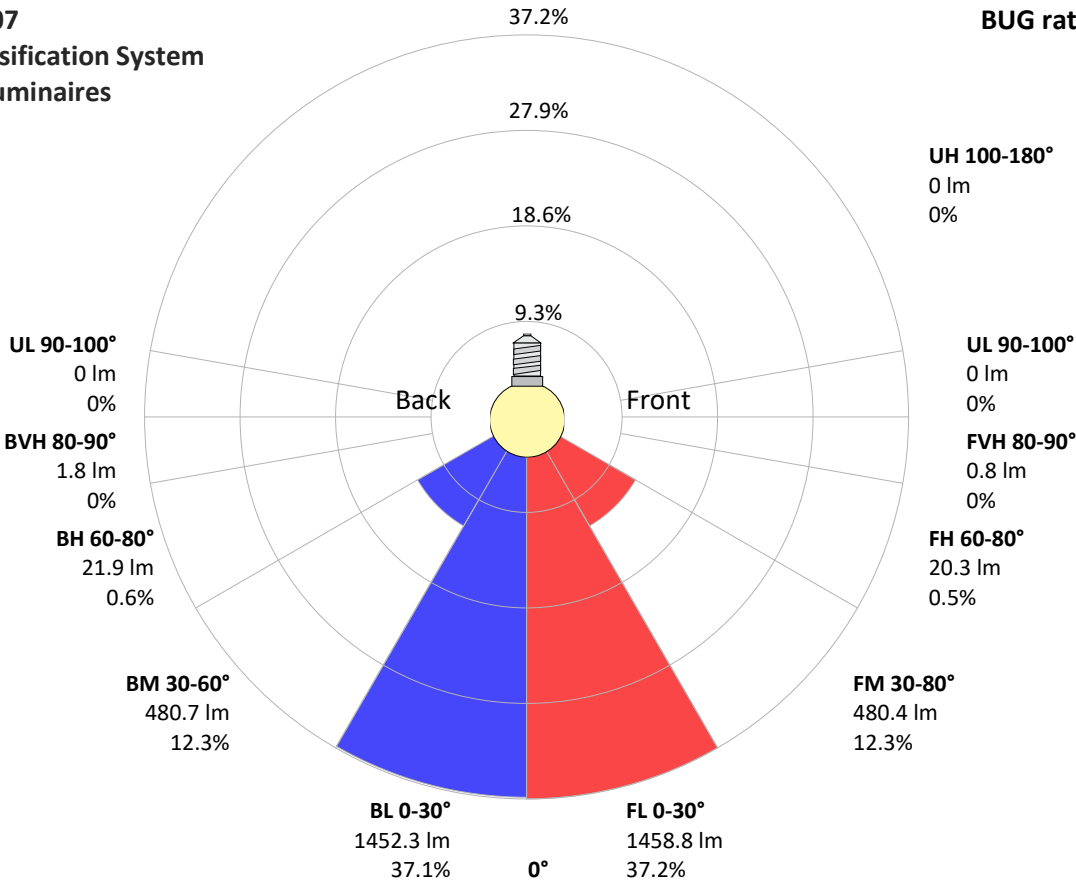
Zone (γ)	Lumen	% Total
0-30°	2915 lm	74.4%
0-40°	3648 lm	93.1%
0-60°	3872 lm	98.9%
60-90°	45 lm	1.1%
70-100°	8 lm	0.2%
90-120°	0 lm	0.0%
0-90°	3917 lm	100.0%
90-180°	0 lm	0.0%
0-180°	3917 lm	100.0%

BUG rating

	Lumen	% Total
<b>Forward light</b>		
Low(0-30°)	1459 lm	37.2%
Medium(30-60°)	480 lm	12.3%
High(60-80°)	20 lm	0.5%
Very high(80-90°)	1 lm	0.0%
<b>Back light</b>		
Low(0-30°)	1452 lm	37.1%
Medium(30-60°)	481 lm	12.3%
High(60-80°)	22 lm	0.6%
Very high(80-90°)	2 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 B3 U1 G0



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## Power Details

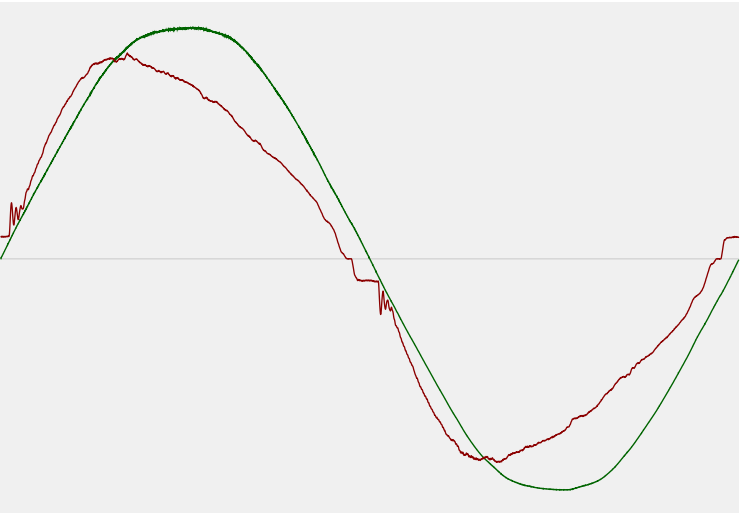
### Input Power

Power feed to light source	41.3 W
Frequency of input power	50 Hz
RMS Input voltage feed, $V_{RMS}$	239 V
RMS Input current feed, $I_{RMS}$	0.179 A
Volt-Ampere or apparent power = $V_{RMS} \cdot I_{RMS}$	42.69 VA
Displacement factor of AC power feed	0.97
Power factor of AC current feed	0.97
Total harmonic distortion of the current	11.15%
Total harmonic distortion of the voltage	1.49%

### Efficiency

Radiated power efficiency	34.4%
<div><div></div></div>	
Lumen efficiency	95 lm/W
<div><div></div></div>	

### Input Power Curve





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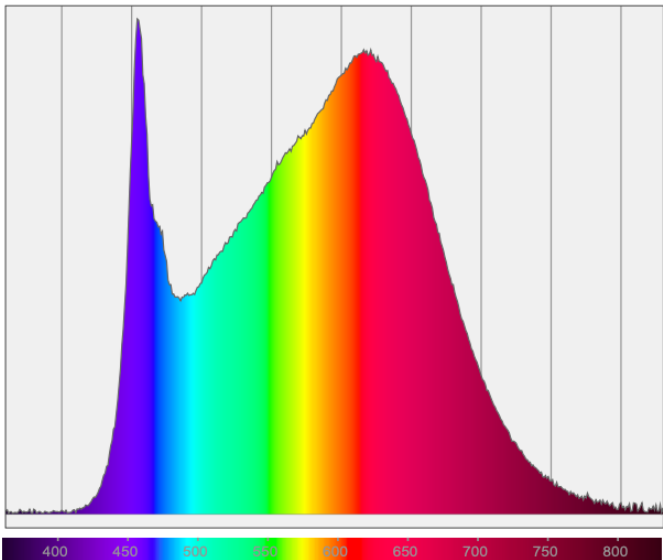
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## Color Measurements

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



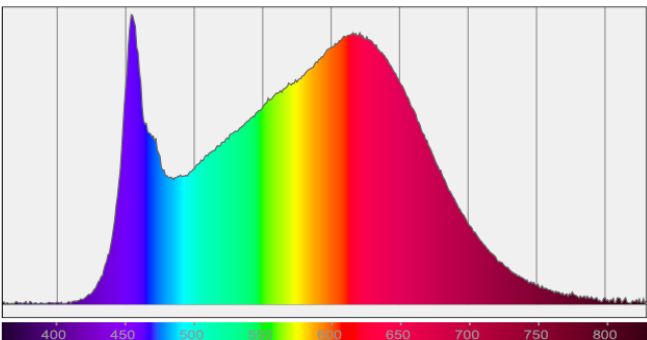
Color Rendering Index per reference color (CIE 1995)



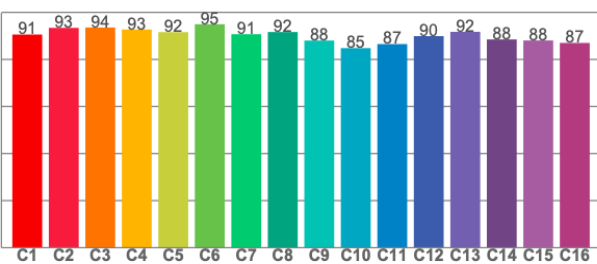
CRI R values, only R1-R8 are used to calculate final CRI value

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

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



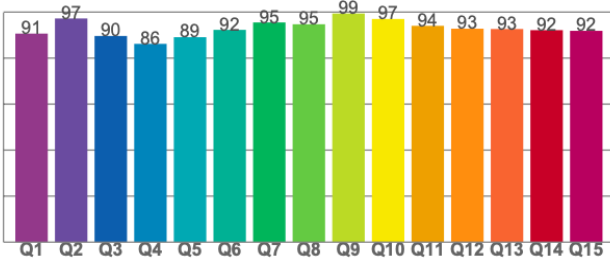
TM30-18 Rf-values per hue bin



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	93.6	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

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