

Tested Light Source - 1\_PHOT\_REFLEKTER-L-4050lmChip-2700K-38Deg-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)

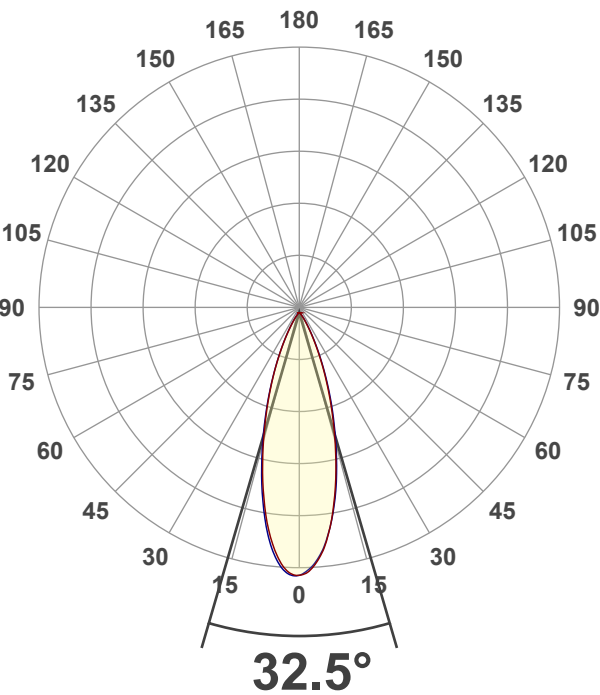
Measurement Conditions

Number of C-planes and Resolution	32 planes – 11.25°
γ (gamma)-Resolution	1.5°
Test Distance	3.00 m
Input Power, Power and Displ. Factors	41.3 W – PF 0.97 – DPF 0.97
Input RMS Voltage and Current	242 V – 0.177 A
Frequency of Input Power	50 Hz

Main Light Measurement Results

Output	2228 lm
Efficiency	54 lm/W
Peak Intensity and Beam Angle	6038 cd – 32.5°
Color Rendering Index	CRI 92.6

Light Intensity Distribution



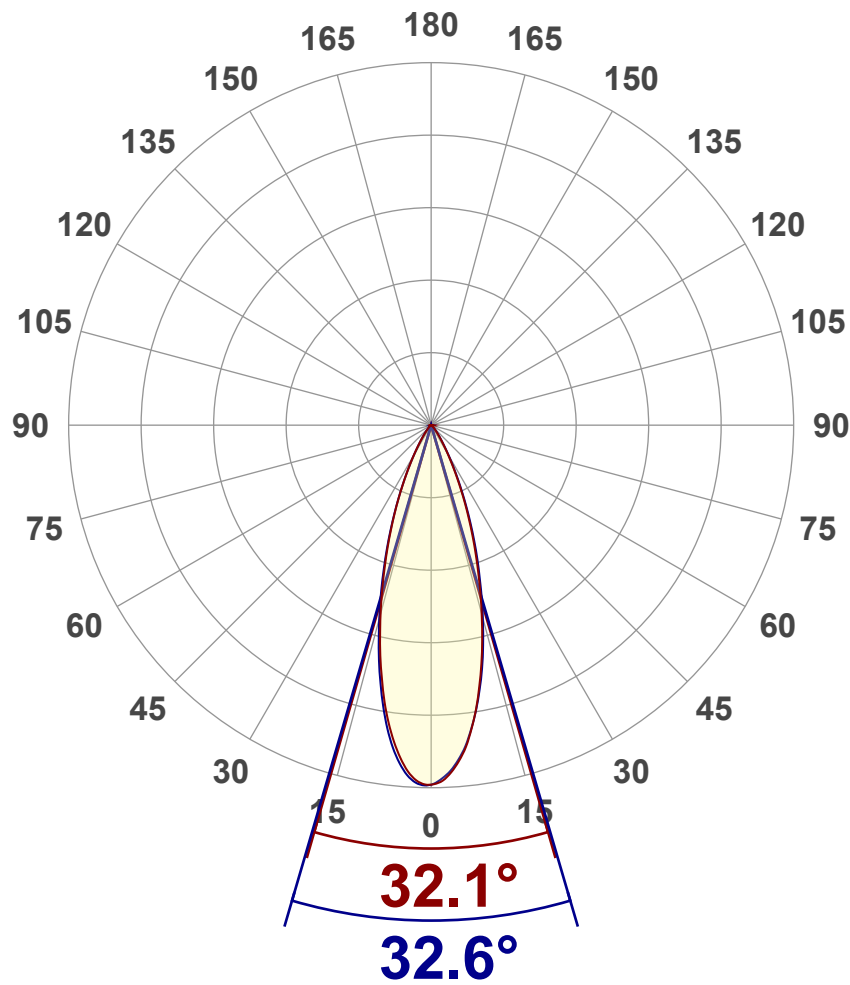
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Luminous Intensity diagram

Unit: 0-100% of peak intensity



Main Values

Output (total Lumen)	2228 lm
Peak Intensity	6038 cd
Beam Angle (50%)	32.5°
Beam Angle (90%)	32.6°
Beam Angle (10%)	32.1°

Cut-off Angle

Average 2,5%	77.3°
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Field Angle

Average 10%	59.6°
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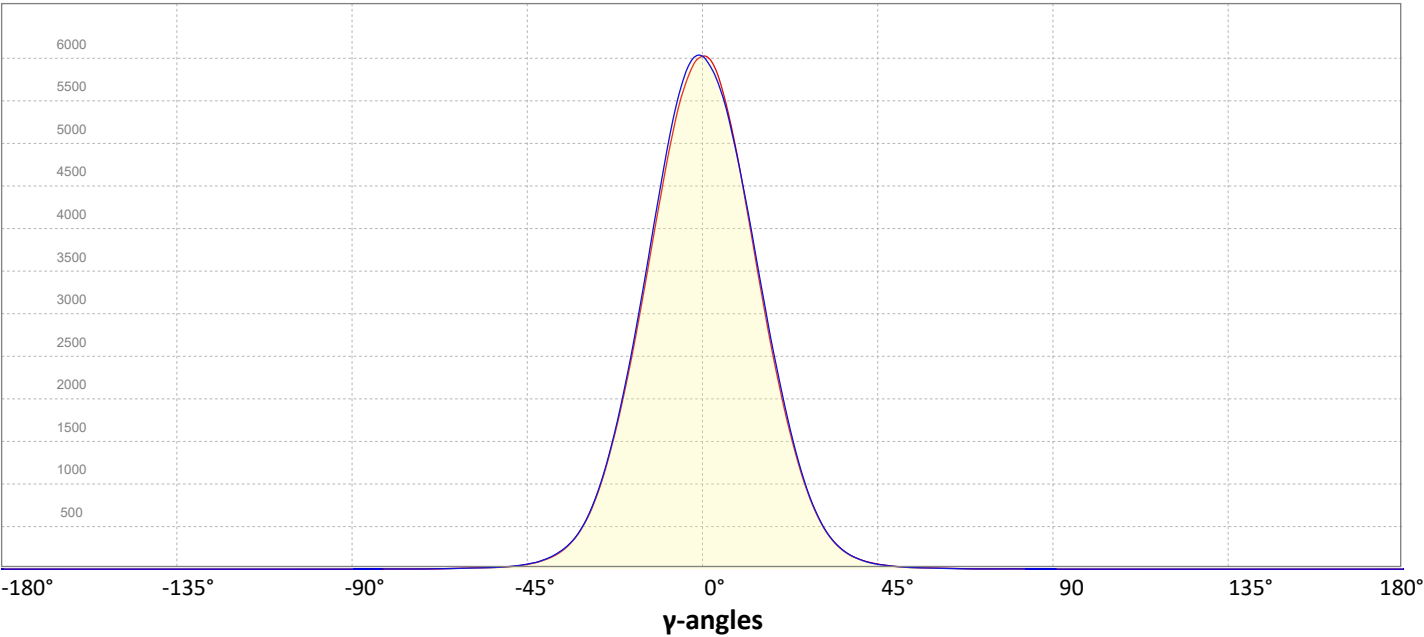
Intensity Ratio

In 120° cone	99.4%
In 90° cone	98.0%

C000-C180

C090-C270

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

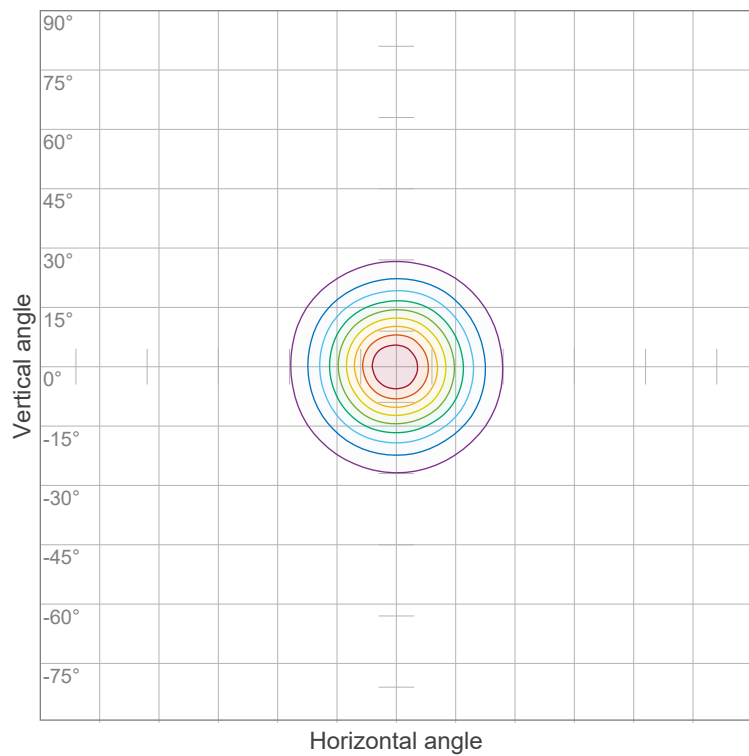


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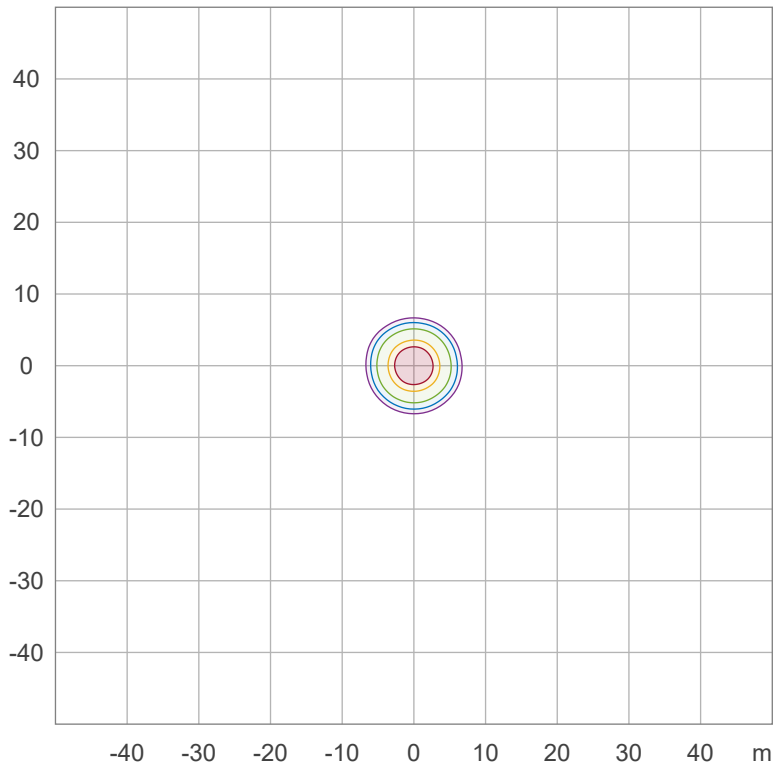
## Iso-intensity Diagram (Iso-candela)



90 %	5431.8 cd
80 %	4828.3 cd
70 %	4224.7 cd
60 %	3621.2 cd
50 %	3017.7 cd
40 %	2414.1 cd
30 %	1810.6 cd
20 %	1207.1 cd
10 %	603.5 cd

Peak intensity: 6035.4 cd  
Number of c-planes: 32

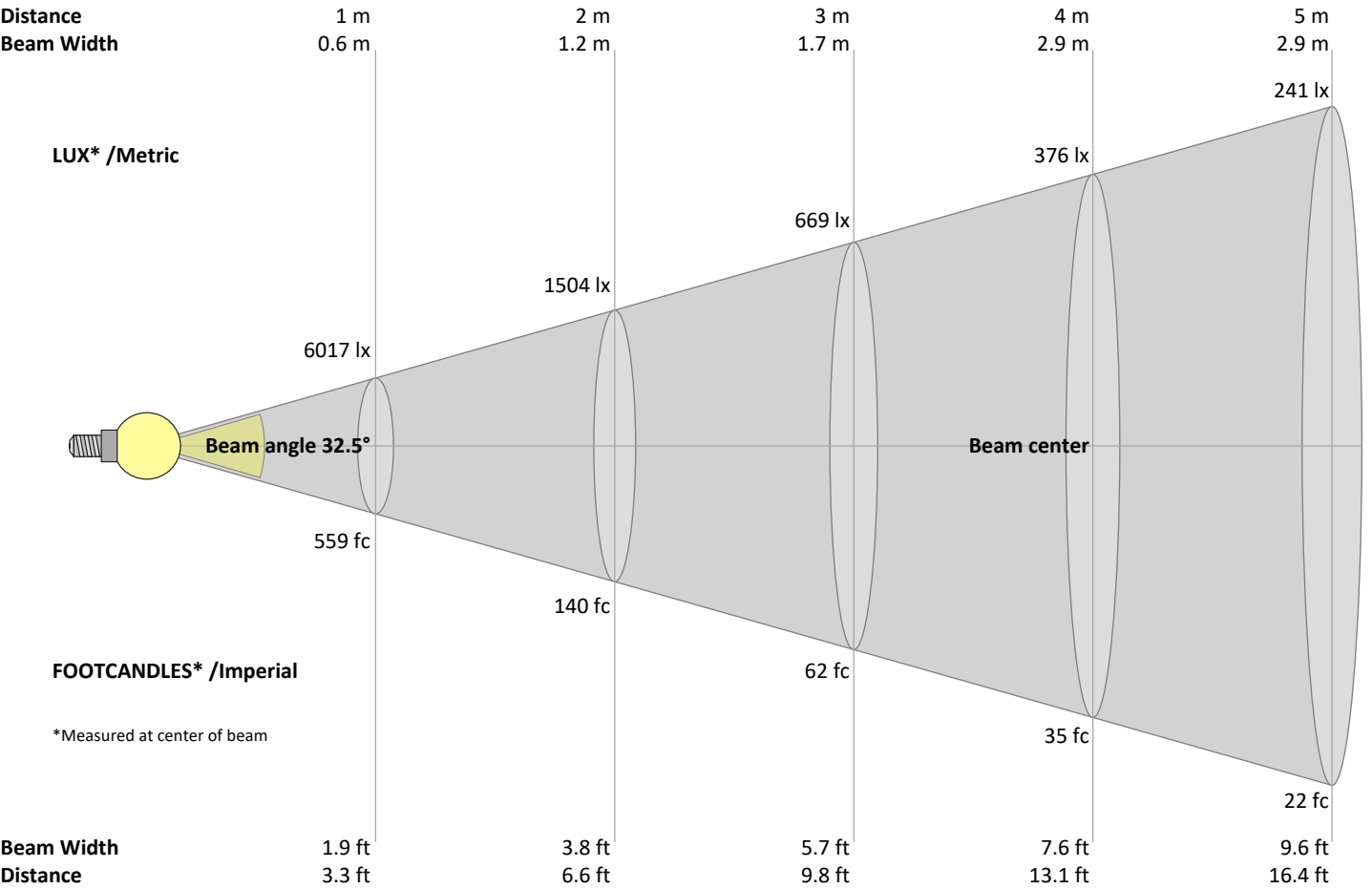
## Iso-illuminance Diagram (Iso-lux)



50.0 %	30.2 lx
30.0 %	18.1 lx
10.0 %	6.0 lx
5.0 %	3.0 lx
3.0 %	1.8 lx

Peak illuminance: 60.3 lx  
Mounting height: 10.0 m  
Number of c-planes: 32

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
6017	1504	669	376	241	167	123	94	74	60	50	42	36	31	27	24	21	19	17	15	lux
559	139.7	62.1	34.9	22.4	15.5	11.4	8.7	6.9	5.6	4.6	3.9	3.3	2.9	2.5	2.2	1.9	1.7	1.5	1.4	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
6017	5947	5738	5448	5037	4562	4057	3532	3019	2532	2089	1681	1328	1014	761	563	408	299	217	159	cd
100%	99%	95%	91%	84%	76%	67%	59%	50%	42%	35%	28%	22%	17%	13%	9%	7%	5%	4%	3%	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
6017	5902	5703	5422	5031	4593	4117	3602	3096	2604	2160	1744	1376	1058	797	590	428	313	227	165	cd
100%	98%	95%	90%	84%	76%	68%	60%	51%	43%	36%	29%	23%	18%	13%	10%	7%	5%	4%	3%	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
6017	5974	5791	5467	5065	4587	4068	3534	3019	2530	2092	1693	1340	1037	783	583	426	306	223	162	cd
100%	99%	96%	91%	84%	76%	68%	59%	50%	42%	35%	28%	22%	17%	13%	10%	7%	5%	4%	3%	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
6017	6009	5867	5574	5181	4694	4170	3625	3098	2592	2132	1714	1345	1033	775	569	416	304	226	167	cd
100%	100%	98%	93%	86%	78%	69%	60%	51%	43%	35%	28%	22%	17%	13%	9%	7%	5%	4%	3%	of 0°val

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### Light Planning – UGR table

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

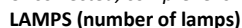
[illegible]

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

### 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	112	110	108	112	110	108	106	106	104	103	102	101	100	99	98	97	95
2	110	106	102	99	108	104	101	98	101	98	96	98	96	94	95	94	92	91
3	106	100	96	93	104	99	95	92	96	93	91	94	91	89	92	90	88	86
4	101	95	91	87	100	94	90	87	92	89	86	90	87	85	88	86	84	82
5	98	91	86	82	96	90	85	82	88	84	81	87	83	81	85	82	80	79
6	94	87	82	78	93	86	81	78	85	81	78	83	80	77	82	79	77	75
7	91	83	78	75	89	82	78	75	81	77	74	80	77	74	79	76	73	72
8	87	80	75	71	86	79	75	71	78	74	71	77	73	71	76	73	70	69
9	84	77	72	68	83	76	72	68	75	71	68	74	71	68	74	70	68	67
10	82	74	69	66	81	73	69	66	73	68	66	72	68	65	71	68	65	64

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## Zonal Lumen Summary

[illegible]

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## Outdoor Light Planning

### Lumen per Zone

Zone (°)	Lumen	% Total
0-10°	506 lm	22.7%
10-20°	909 lm	40.8%
20-30°	557 lm	25.0%
30-40°	179 lm	8.0%
40-50°	48 lm	2.2%
50-60°	16 lm	0.7%
60-70°	7 lm	0.3%
70-80°	3 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%
<b>Total</b>	<b>2228 lm</b>	<b>100.0%</b>

### Intensity peaks

Max intensity	6038 cd
Intensity, 90°	0 cd
Intensity, 0°	6017 cd

### Zonal Lumen summary

Zone (°)	Lumen	% Total
0-30°	1972 lm	88.5%
0-40°	2151 lm	96.6%
0-60°	2215 lm	99.4%
60-90°	12 lm	0.6%
70-100°	5 lm	0.2%
90-120°	0 lm	0.0%
0-90°	2228 lm	100.0%
90-180°	0 lm	0.0%
0-180°	2228 lm	100.0%

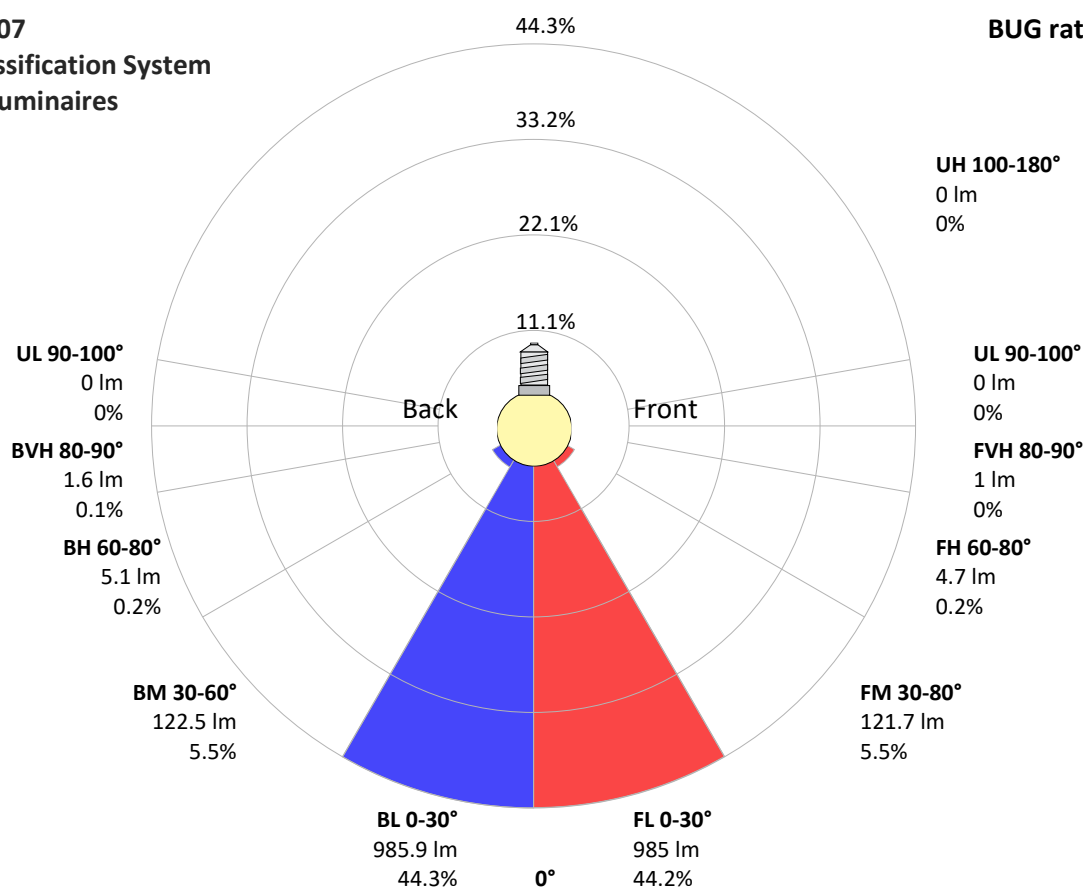
### BUG rating

	Lumen	% Total
<b>Forward light</b>		
Low(0-30°)	985 lm	44.2%
Medium(30-60°)	122 lm	5.5%
High(60-80°)	5 lm	0.2%
Very high(80-90°)	1 lm	0.0%
<b>Back light</b>		
Low(0-30°)	986 lm	44.3%
Medium(30-60°)	122 lm	5.5%
High(60-80°)	5 lm	0.2%
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 B2 U1 G0



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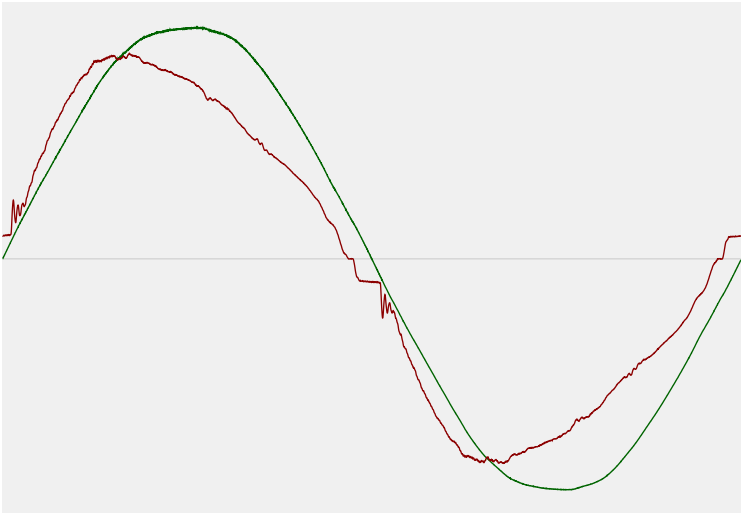


## Power Details

### 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 = $V_{RMS} \cdot I_{RMS}$	42.75 VA
Displacement factor of AC power feed	0.97
Power factor of AC current feed	0.97
Total harmonic distortion of the current	11.13%
Total harmonic distortion of the voltage	1.35%

### Input Power Curve



### Efficiency

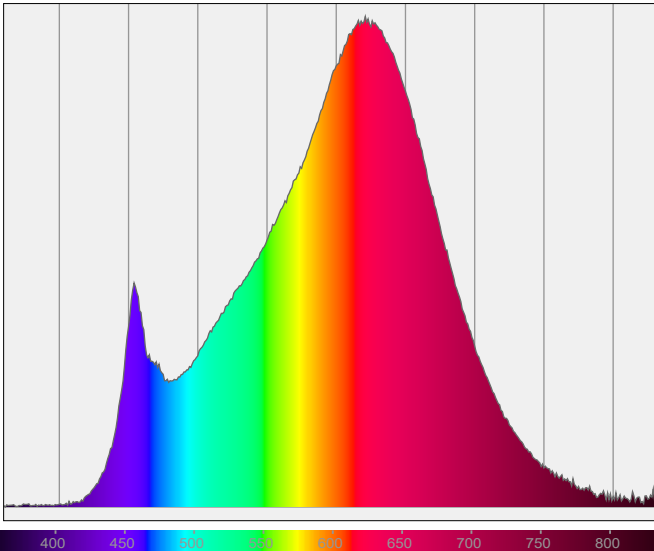
Radiated power efficiency	19.6%
Lumen efficiency	54 lm/W



Color Measurements

Correlated Color Temperature	CCT = 2700 K
Color Rendering TM30-18	R <sub>f</sub> 91.5 — R <sub>g</sub> 99.6
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 92.6	Color coordinate CIEs 1960	(u;v) = (0.263;0.352)
Color Rendering Index, R9 (red component)	R9 = 61.6	Color deviation from BBL	Duv = ±0.0003
Color Rendering TM30-18	R <sub>f</sub> 91.5 — R <sub>g</sub> 99.6	Color coordinate CIEs 1976 (CIELUV)	(u';v') = (0.263;0.263)
Color Quality Scale	CQS = 89.9		

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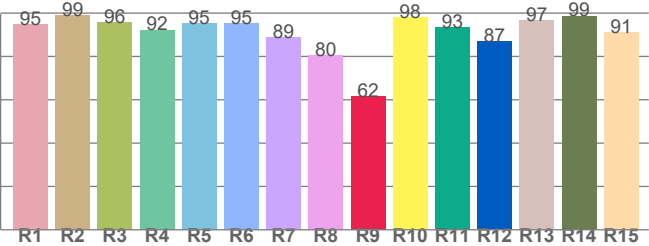
CIE 1931



CIE 1931 – zoomed on Planckian locus



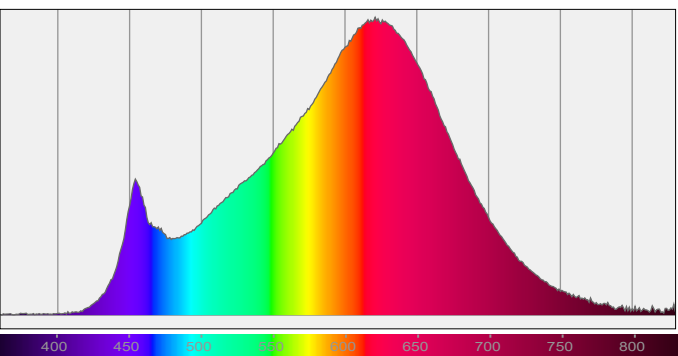
Color Rendering Index per reference color (CIE 1995)



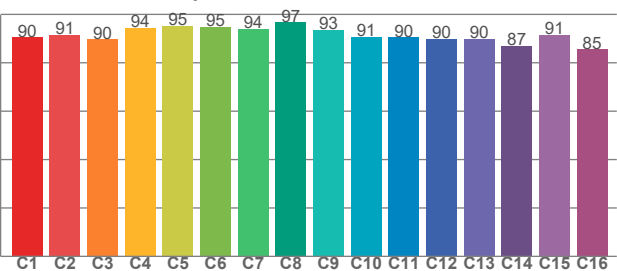
CRI R values, only R1-R8 are used to calculate final CRI value

R1	R2	R3	R4	R5	R6	R7	R8	R9	R10	R11	R12	R13	R14	R15
94.7	98.8	95.6	92.2	95.2	95.3	88.7	80.4	61.6	98.0	93.2	87.0	96.5	98.7	91.0

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



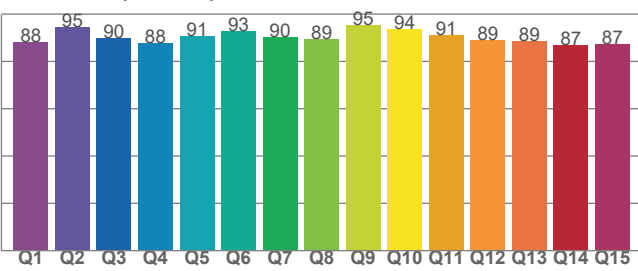
TM30-18 Rf-values per hue bin



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
90.4	91.5	89.6	94.4	95.3	94.9	93.9	96.7	93.5	90.6	90.5	89.7	89.7	87.0	91.4	85.5

Color Quality Scale by reference color



CQS Q values

Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10	Q11	Q12	Q13	Q14	Q15
88.1	94.6	89.7	87.8	90.8	92.9	90.1	89.3	95.3	93.7	90.9	89.0	88.6	87.0	87.1