

Tested Light Source - 1_PHOT_REFLEKTER-L-4750lmChip-4000K-58Deg-HoneycombLouvre_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

γ (gamma)-Resolution

Test Distance

Input Power, Power and Displ. Factors

Input RMS Voltage and Current

Frequency of Input Power

32 planes – 11.25°

2°

3.00 m

41.4 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

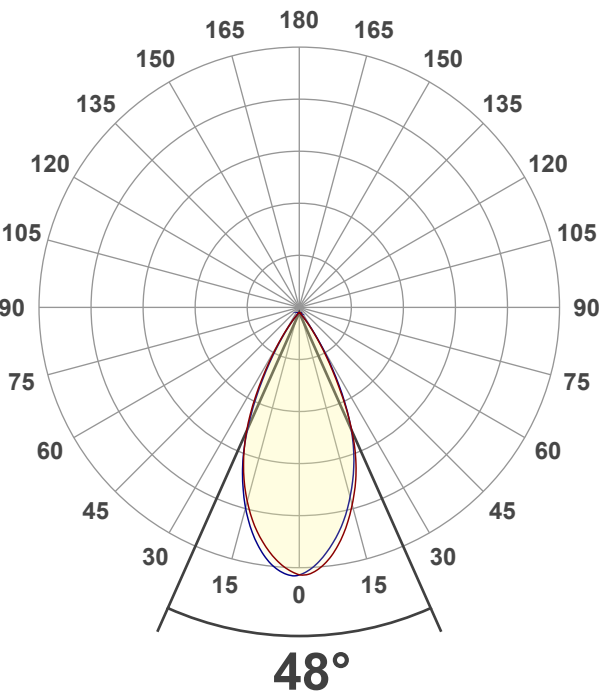
2575 lm

62 lm/W

4228 cd – 48°

CRI 92.6

Light Intensity Distribution



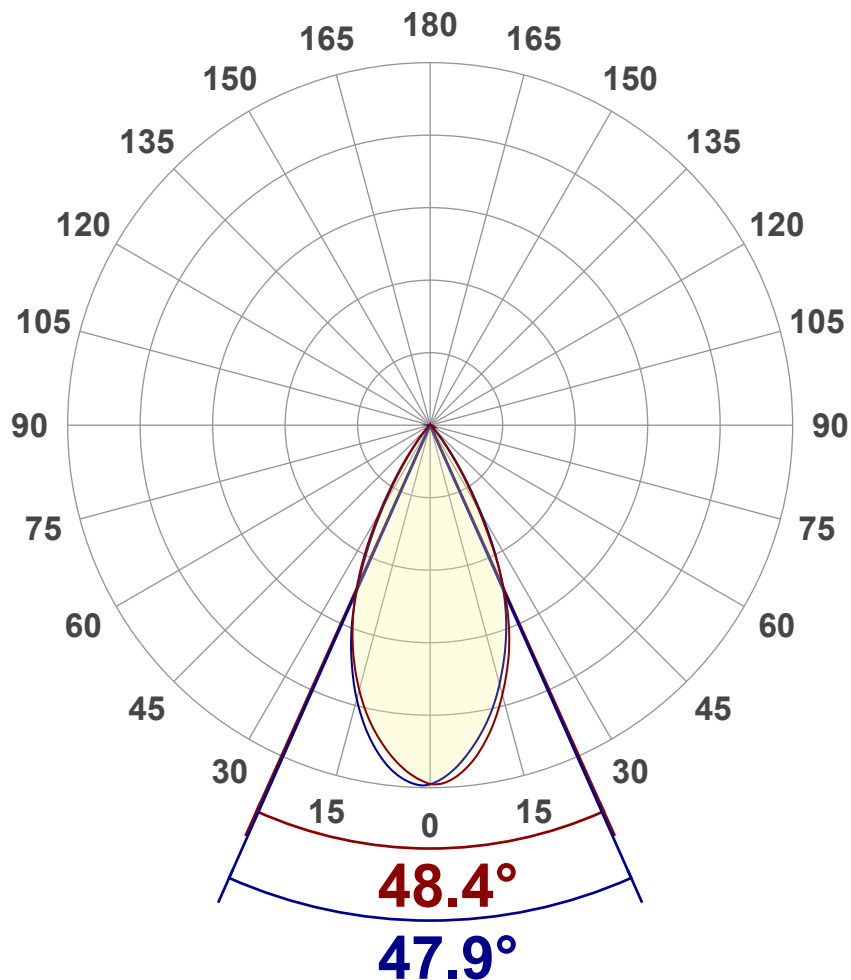
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Luminous Intensity diagram

Unit: 0-100% of peak intensity



Main Values

Output (total Lumen)	2575 lm
Peak Intensity	4228 cd
Beam Angle (50%)	48°
Beam Angle (90%)	47.9°
Beam Angle (10%)	48.4°

Cut-off Angle

Average 2,5%	84.7°
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Field Angle

Average 10%	72.3°
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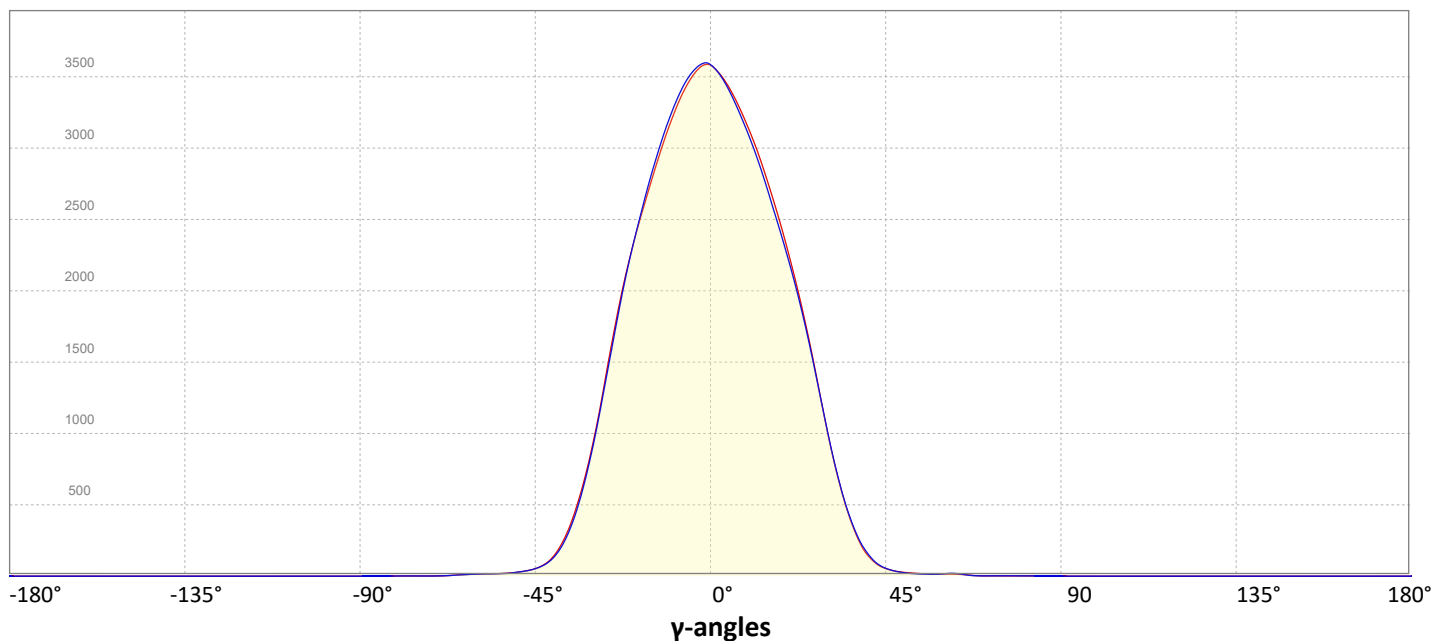
Intensity Ratio

In 120° cone	99.5%
In 90° cone	98.1%

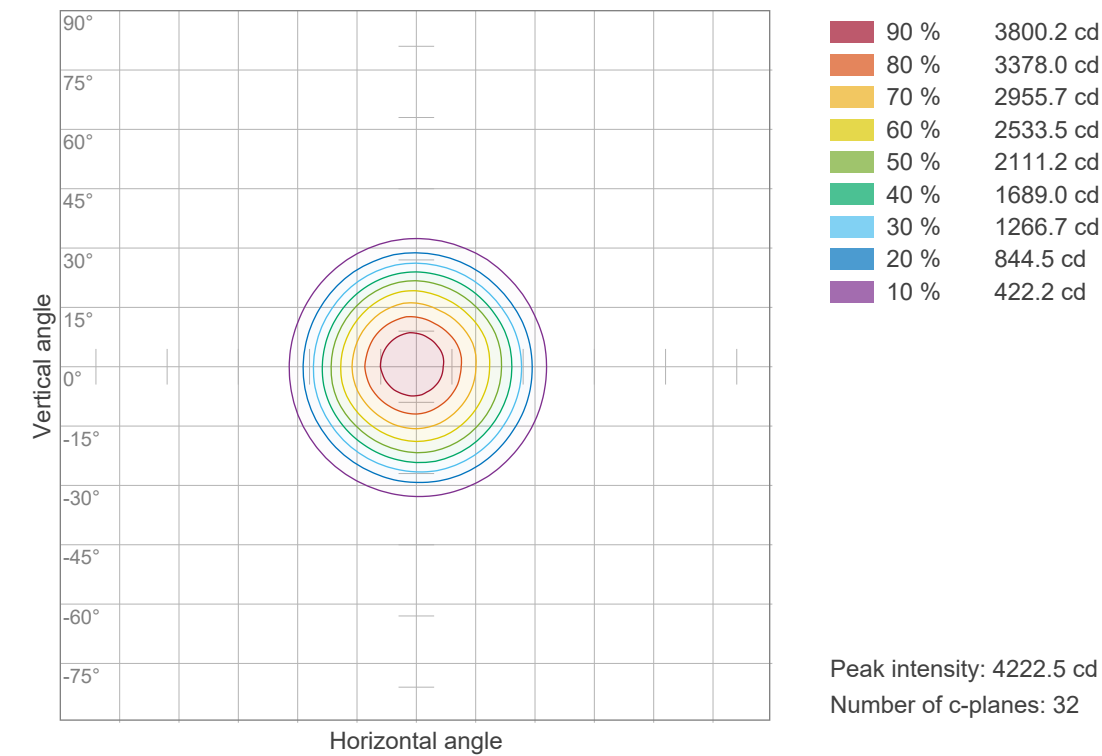
C000-C180

C090-C270

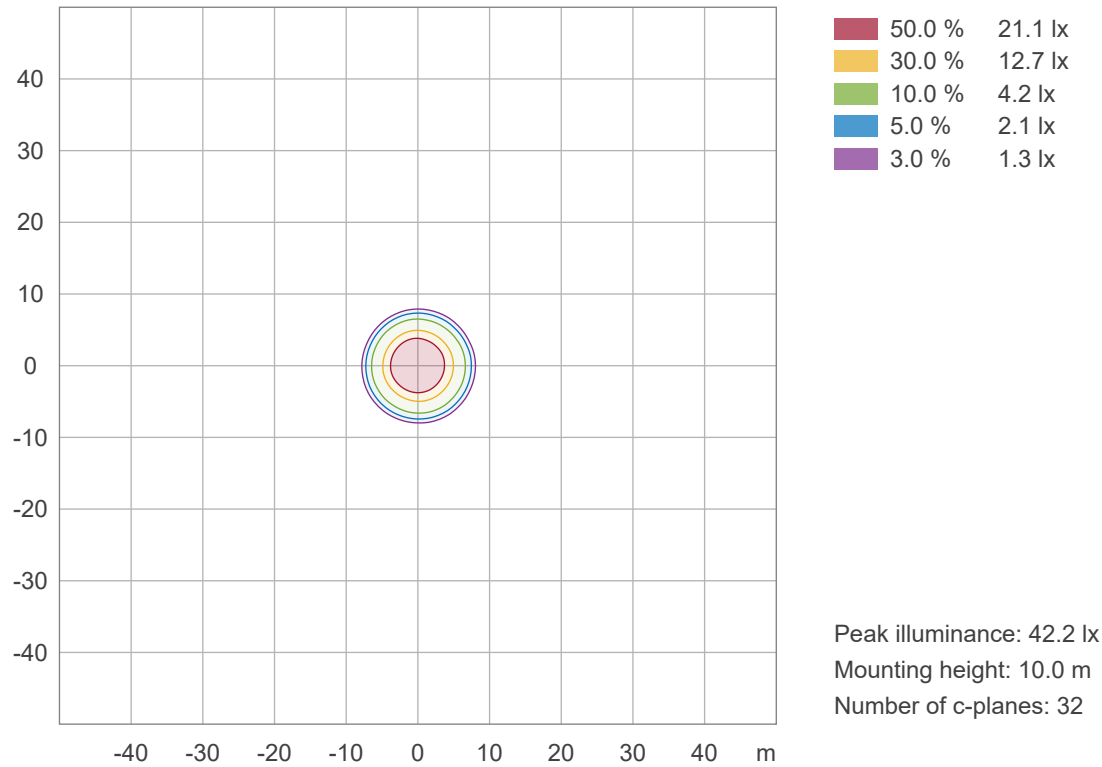
Linear distribution diagram - Intensity (candela) vs γ-angle



Iso-intensity Diagram (Iso-candela)



Iso-illuminance Diagram (Iso-lux)

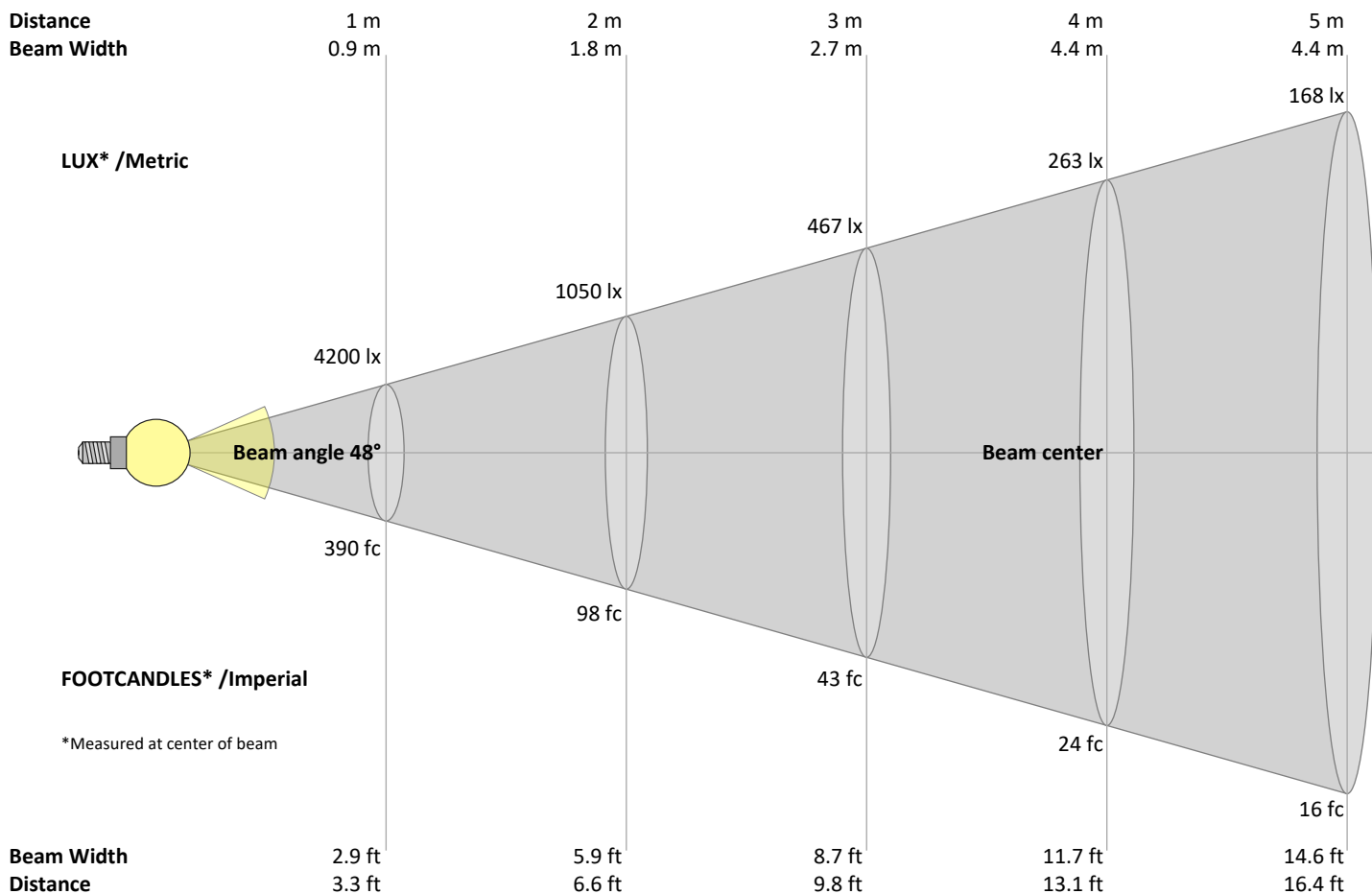


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Beam Details



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
4200	1050	467	263	168	117	86	66	52	42	35	29	25	21	19	16	15	13	12	11	lux
390.2	97.5	43.4	24.4	15.6	10.8	8	6.1	4.8	3.9	3.2	2.7	2.3	2	1.7	1.5	1.4	1.2	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
4200	4198	4138	4039	3909	3750	3571	3372	3161	2942	2706	2441	2137	1800	1445	1123	844	612	422	280	cd
100%	100%	99%	96%	93%	89%	85%	80%	75%	70%	64%	58%	51%	43%	34%	27%	20%	15%	10%	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
4200	4137	4038	3911	3766	3608	3435	3243	3033	2823	2601	2364	2102	1815	1507	1199	915	670	471	315	cd
100%	98%	96%	93%	90%	86%	82%	77%	72%	67%	62%	56%	50%	43%	36%	29%	22%	16%	11%	8%	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
4200	4142	4056	3944	3810	3661	3495	3308	3106	2890	2656	2406	2132	1835	1512	1193	907	662	461	303	cd
100%	99%	97%	94%	91%	87%	83%	79%	74%	69%	63%	57%	51%	44%	36%	28%	22%	16%	11%	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
4200	4210	4165	4081	3961	3809	3632	3430	3210	2964	2706	2422	2100	1760	1421	1099	819	584	398	261	cd
100%	100%	99%	97%	94%	91%	86%	82%	76%	71%	64%	58%	50%	42%	34%	26%	19%	14%	9%	6%	of 0°val

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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	107	112	109	107	105	105	104	102	102	100	99	98	97	96	94
2	109	104	101	98	107	103	99	97	100	97	94	97	94	92	94	92	91	89
3	104	98	94	90	102	97	93	89	94	91	88	92	89	87	90	87	85	84
4	100	93	88	84	98	92	87	83	89	85	82	87	84	81	86	83	80	79
5	95	88	82	78	94	87	82	78	85	81	77	83	80	77	82	79	76	75
6	91	83	78	74	90	82	77	73	81	76	73	79	75	72	78	75	72	71
7	87	79	73	69	86	78	73	69	77	72	69	76	72	69	75	71	68	67
8	83	75	69	66	82	74	69	66	73	69	65	72	68	65	71	68	65	63
9	80	71	66	62	79	71	66	62	70	65	62	69	65	62	68	64	62	60
10	77	68	63	59	76	68	62	59	67	62	59	66	62	59	65	61	59	57

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[illegible]

Outdoor Light Planning

Lumen per Zone

Zone (γ)	Lumen	% Total
0-10°	376 lm	14.6%
10-20°	894 lm	34.7%
20-30°	872 lm	33.8%
30-40°	346 lm	13.4%
40-50°	57 lm	2.2%
50-60°	18 lm	0.7%
60-70°	9 lm	0.4%
70-80°	2 lm	0.1%
80-90°	2 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	2575 lm	100.0%

Intensity peaks

Max intensity	4228 cd
Intensity, 90°	0 cd
Intensity, 0°	4200 cd

Zonal Lumen summary

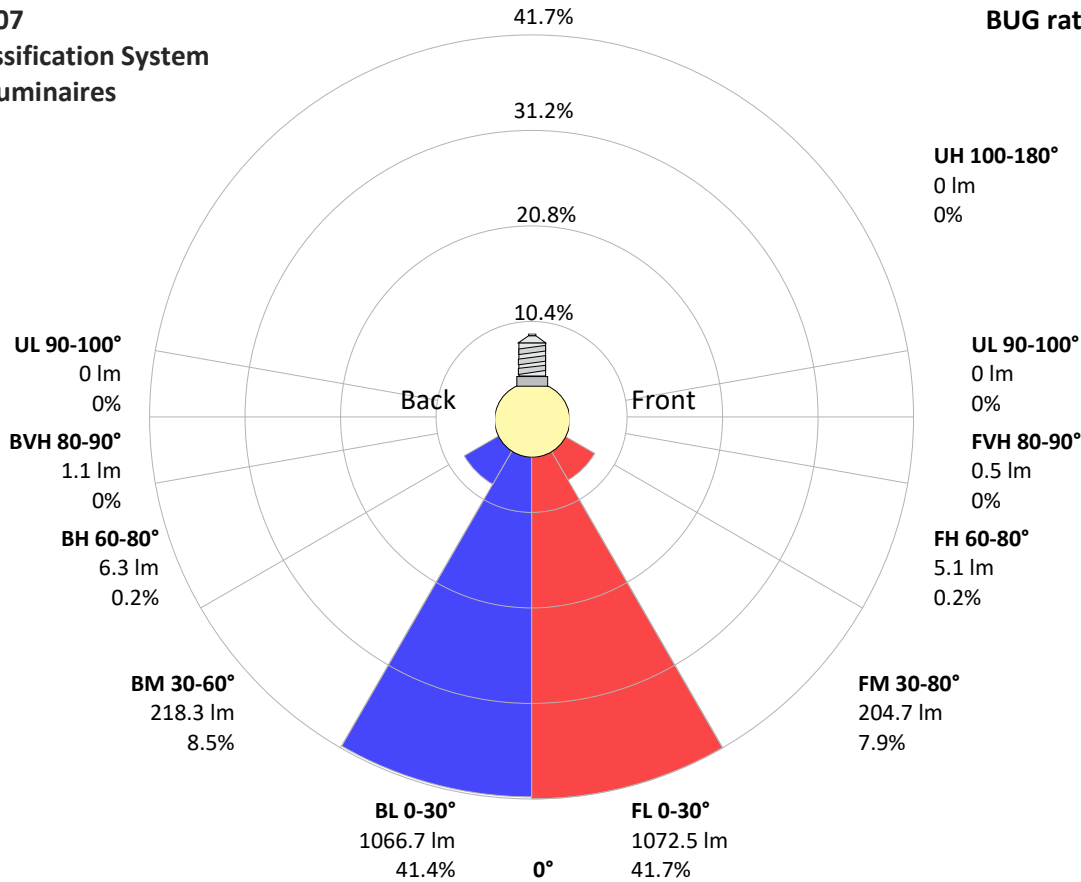
Zone (γ)	Lumen	% Total
0-30°	2141 lm	83.1%
0-40°	2487 lm	96.6%
0-60°	2562 lm	99.5%
60-90°	13 lm	0.5%
70-100°	4 lm	0.1%
90-120°	0 lm	0.0%
0-90°	2575 lm	100.0%
90-180°	0 lm	0.0%
0-180°	2575 lm	100.0%

BUG rating

	Lumen	% Total
Forward light		
Low(0-30°)	1073 lm	41.7%
Medium(30-60°)	205 lm	7.9%
High(60-80°)	5 lm	0.2%
Very high(80-90°)	1 lm	0.0%
Back light		
Low(0-30°)	1067 lm	41.4%
Medium(30-60°)	218 lm	8.5%
High(60-80°)	6 lm	0.2%
Very high(80-90°)	1 lm	0.0%
Uplight		
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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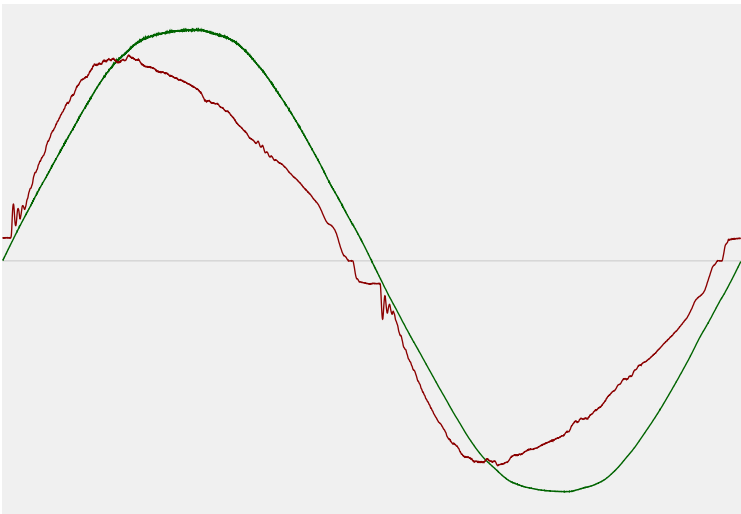


Power Details

Input Power

Power feed to light source	41.4 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 = $V_{RMS} \cdot I_{RMS}$	42.82 VA
Displacement factor of AC power feed	0.97
Power factor of AC current feed	0.97
Total harmonic distortion of the current	11.2%
Total harmonic distortion of the voltage	1.53%

Input Power Curve



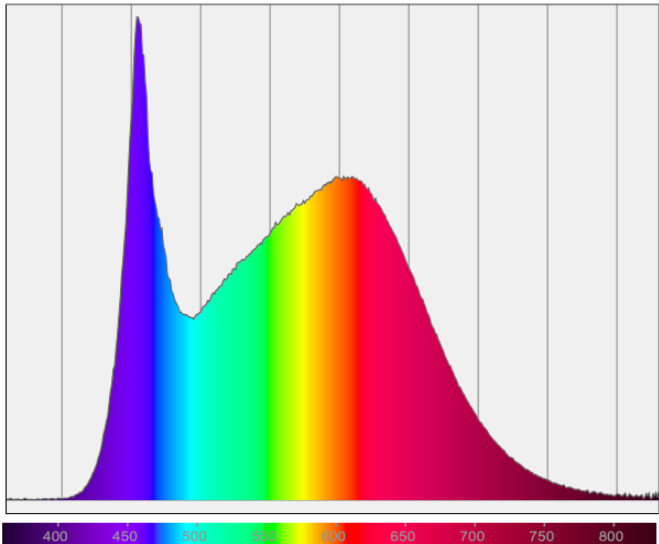
Efficiency

Radiated power efficiency	22.5%
Lumen efficiency	62 lm/W

Color Measurements

Correlated Color Temperature	CCT = 4000 K
Color Rendering TM30-18	R _f 88.9 – R _g 98.5
Color Shift, CIE duv	Duv ±0.0003

Spectral distribution



Color details

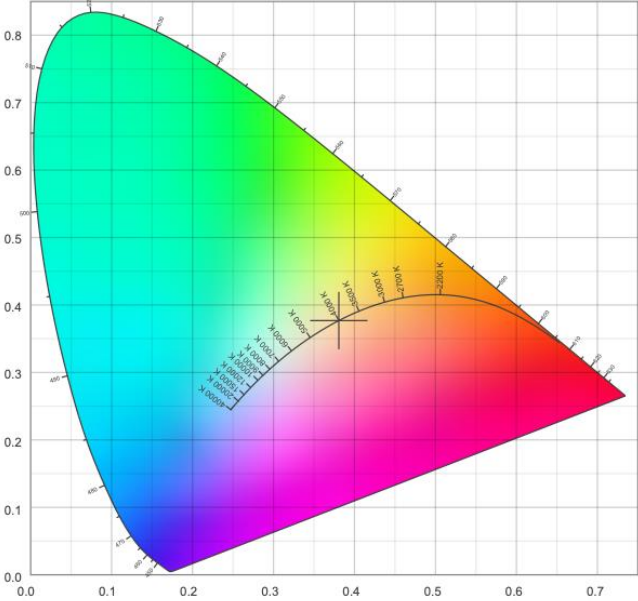
Correlated Color Temperature	CCT = 4000 K	Color coordinates CIE 1931	(x;y) = (0.381;0.377)
Color Rendering Index	CRI 92.6	Color coordinate CIEs 1960	(u;v) = (0.225;0.334)
Color Rendering Index, R9 (red component)	R9 = 72.2	Color deviation from BBL	Duv = ±0.0003
Color Rendering TM30-18	R _f 88.9 – R _g 98.5	Color coordinate CIEs 1976 (CIELUV)	(u';v') = (0.225;0.225)
Color Quality Scale	CQS = 88.9		

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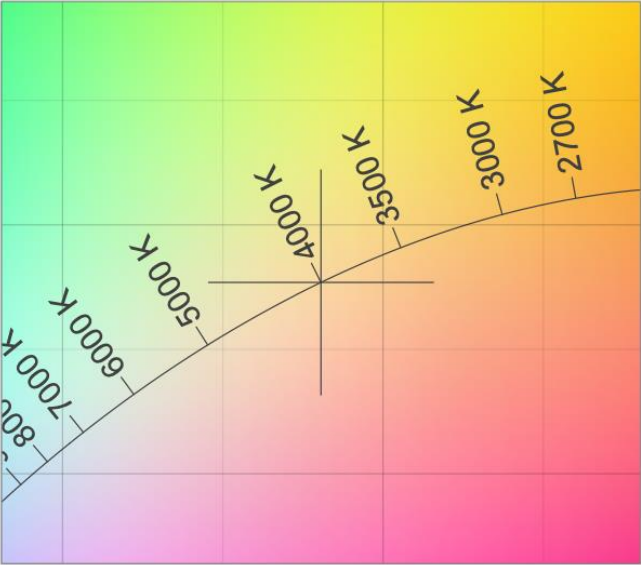
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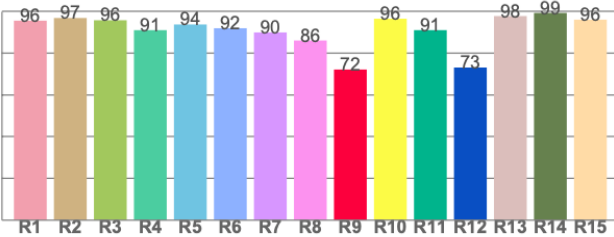
CIE 1931



CIE 1931 – zoomed on Planckian locus



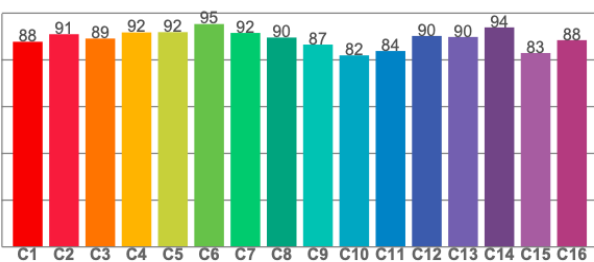
Color Rendering Index per reference color (CIE 1995)



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

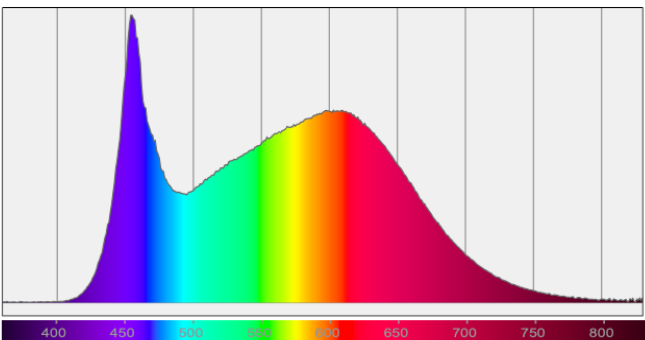
TM30-18 Rf-values per hue bin



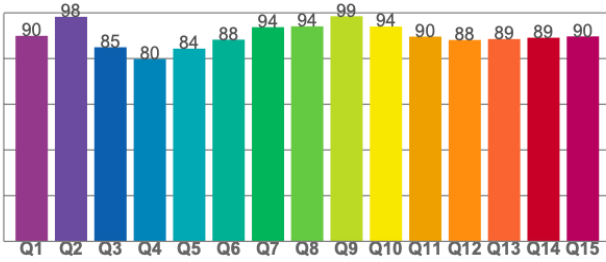
TM30 C values, 16 binned values out of total of 99 C values

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