

Tested Light Source - 1_PHOT_NINETY-NINE-2275lmChip-3500K-21Deg-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)

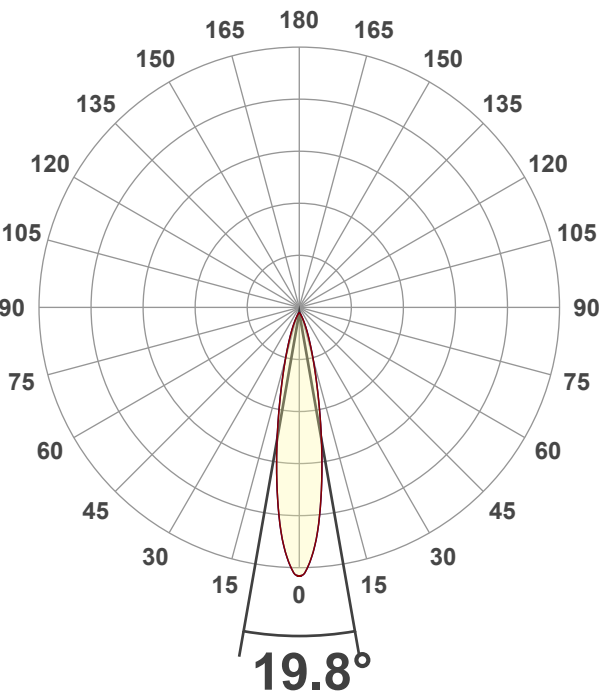
Measurement Conditions

Number of C-planes and Resolution	32 planes – 11.25°
γ (gamma)-Resolution	1°
Test Distance	1.50 m
Input Power, Power and Displ. Factors	16.0 W – PF 0.98 – DPF 0.98
Input RMS Voltage and Current	240 V – 0.068 A
Frequency of Input Power	50.1 Hz

Main Light Measurement Results

Output	1210 lm
Efficiency	76 lm/W
Peak Intensity and Beam Angle	6849 cd – 19.8°
Color Rendering Index	CRI 92.8

Light Intensity Distribution



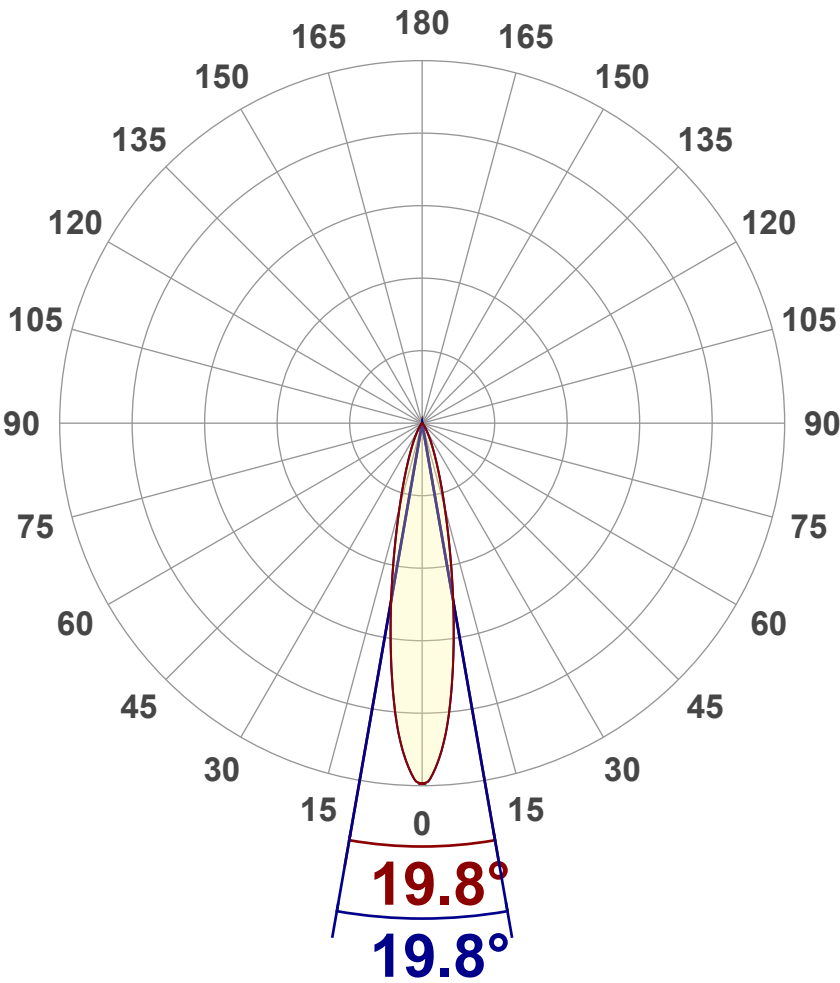
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Luminous Intensity diagram

Unit: 0-100% of peak intensity



Main Values

Output (total Lumen)	1210 lm
Peak Intensity	6849 cd
Beam Angle (50%)	19.8°
Beam Angle (90%)	19.8°
Beam Angle (10%)	19.8°

Cut-off Angle

Average 2,5%	61°
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Field Angle

Average 10%	42.1°
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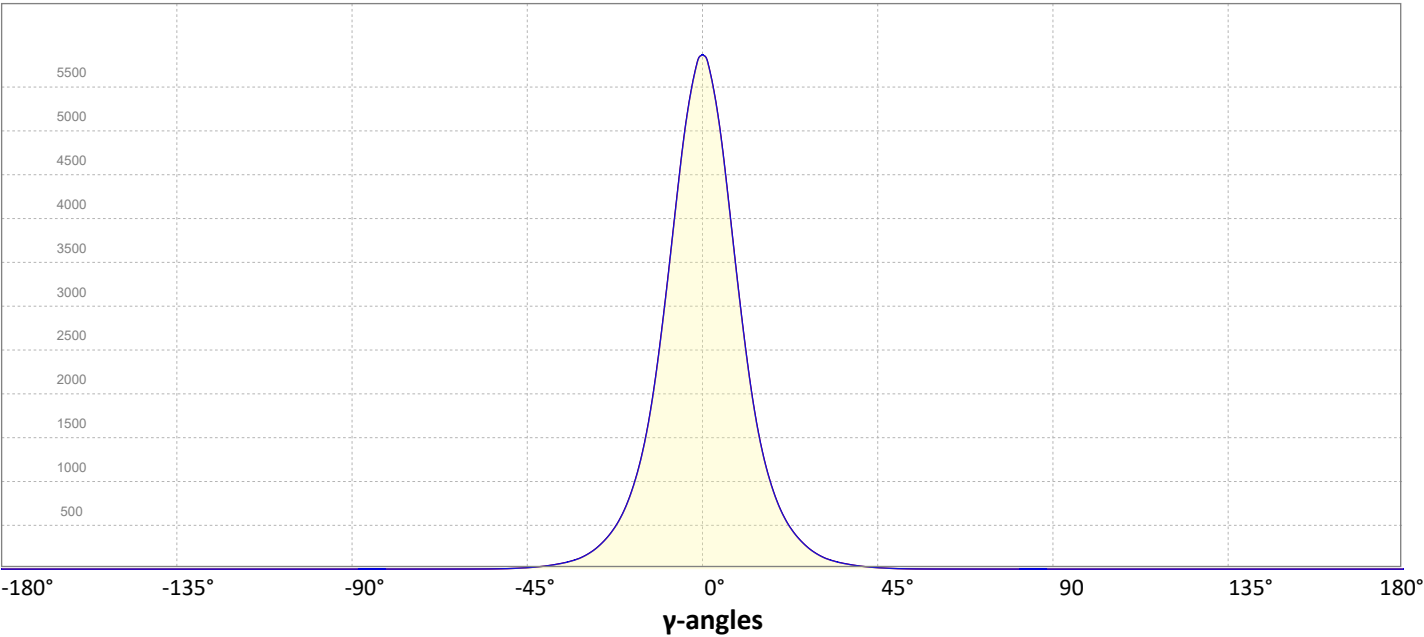
Intensity Ratio

In 120° cone	99.4%
In 90° cone	98.8%

C000-C180

C090-C270

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

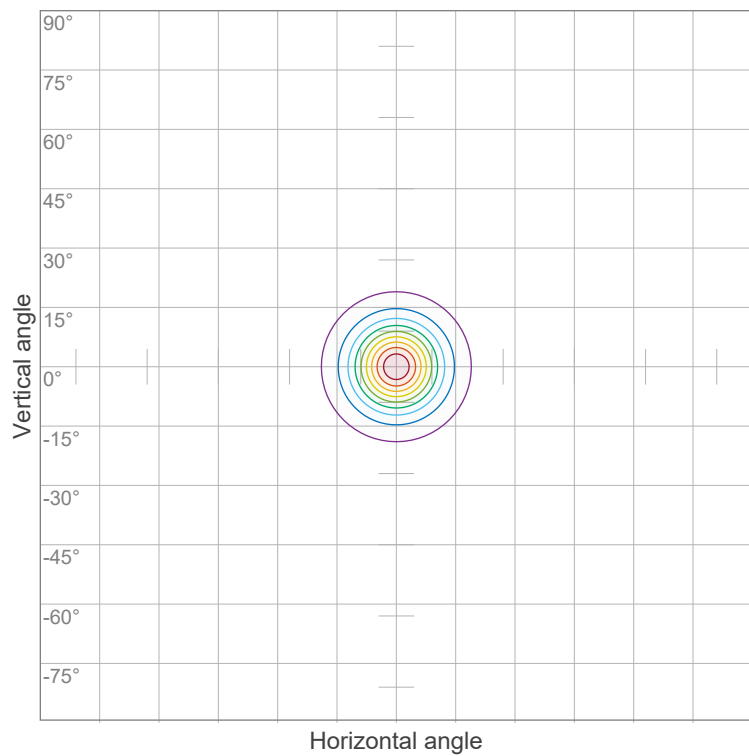


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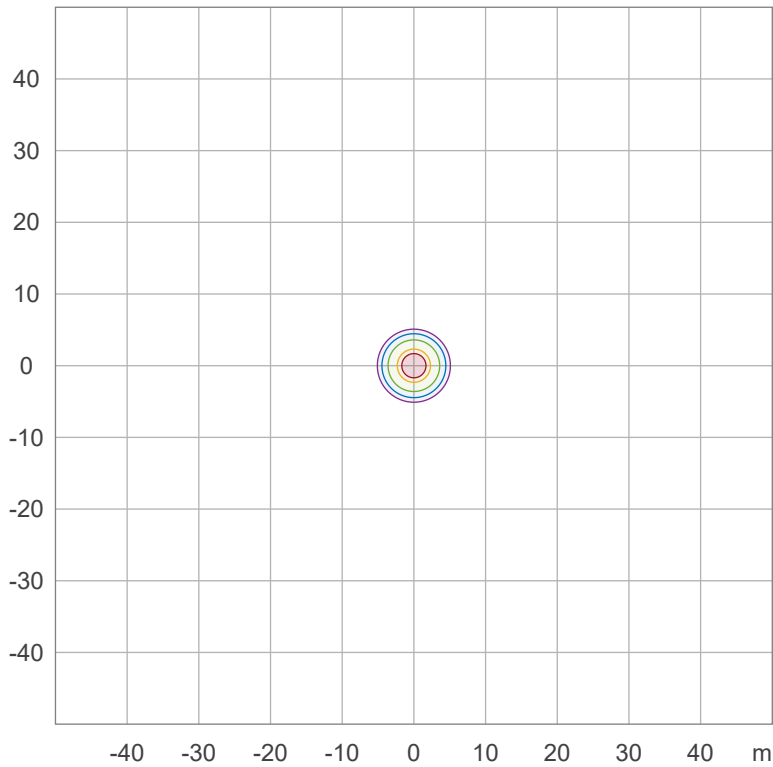
Iso-intensity Diagram (Iso-candela)



90 %	6163.7 cd
80 %	5478.8 cd
70 %	4794.0 cd
60 %	4109.1 cd
50 %	3424.3 cd
40 %	2739.4 cd
30 %	2054.6 cd
20 %	1369.7 cd
10 %	684.9 cd

Peak intensity: 6848.5 cd
Number of c-planes: 32

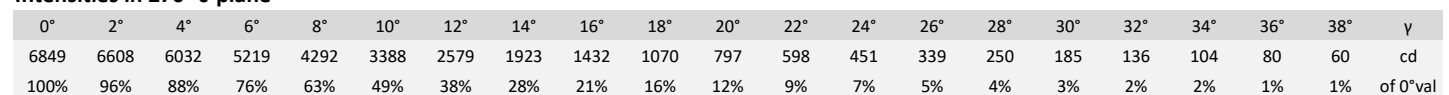
Iso-illuminance Diagram (Iso-lux)



50.0 %	34.2 lx
30.0 %	20.5 lx
10.0 %	6.8 lx
5.0 %	3.4 lx
3.0 %	2.1 lx

Peak illuminance: 68.5 lx
Mounting height: 10.0 m
Number of c-planes: 32

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Light Planning – UGR table

Uncorrected, comprehensive UGR table according to 117-1995

Reflectances											
p Ceiling		70	70	50	50	30	70	70	50	50	30
p Walls		50	30	50	30	30	50	30	50	30	30
p Floor		20	20	20	20	20	20	20	20	20	20
Room size		Viewed Crosswise					Viewed Endwise				
H = mounting height above eye level		(Viewing direction orthogonal to lamp length axis)					(Viewing direction parallel to lamp length axis)				
X	Y										
2H	2H	10.5	10.9	10.6	11.1	11.3	10.5	10.9	10.6	11.1	11.3
	3H	10.3	10.8	10.6	11.0	11.2	10.3	10.8	10.6	11.0	11.2
	4H	10.2	10.8	10.6	11.0	11.2	10.2	10.8	10.6	11.0	11.2
	6H	10.3	10.7	10.6	11.0	11.4	10.3	10.7	10.6	11.0	11.4
	8H	10.3	10.7	10.6	11.1	11.4	10.3	10.7	10.6	11.1	11.4
	12H	10.3	10.8	10.7	11.1	11.5	10.3	10.8	10.7	11.1	11.5
4H	2H	10.2	10.7	10.5	10.9	11.2	10.2	10.7	10.5	10.9	11.2
	3H	10.1	10.5	10.5	10.9	11.3	10.1	10.5	10.5	10.9	11.3
	4H	10.0	10.4	10.5	10.9	11.4	10.0	10.4	10.5	10.9	11.4
	6H	10.1	10.5	10.6	10.9	11.2	10.1	10.5	10.6	10.9	11.2
	8H	10.1	10.6	10.6	10.9	11.2	10.1	10.6	10.6	10.9	11.2
	12H	10.2	10.5	10.7	11.0	11.4	10.2	10.5	10.7	11.0	11.4
8H	4H	9.9	10.4	10.5	10.7	11.1	9.9	10.4	10.5	10.7	11.1
	6H	10.1	10.3	10.6	10.8	11.3	10.1	10.3	10.6	10.8	11.3
	8H	10.2	10.4	10.7	11.0	11.6	10.2	10.4	10.7	11.0	11.6
	12H	10.4	10.6	11.0	11.1	11.7	10.4	10.6	11.0	11.1	11.7
12H	4H	9.9	10.2	10.4	10.6	11.1	9.9	10.2	10.4	10.6	11.1
	6H	10.1	10.3	10.6	10.8	11.4	10.1	10.3	10.6	10.8	11.4
	8H	10.2	10.4	10.8	10.9	11.5	10.2	10.4	10.8	10.9	11.5

Variations with the observer position for the luminaire spacings, S:

S = 1.0H	4.2 / -4.0	4.2 / -4.0
S = 1.5H	6.7 / -4.3	6.7 / -4.3
S = 2.0H	8.6 / -4.6	8.6 / -4.6

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	115	113	111	109	113	111	109	107	107	105	104	103	102	101	99	99	98	96
2	111	107	104	102	109	106	103	101	103	100	99	100	98	96	97	96	94	93
3	108	103	99	96	106	102	98	96	99	96	94	97	94	93	95	93	91	90
4	104	99	95	92	103	98	94	91	96	93	90	94	91	89	92	90	88	87
5	101	95	91	88	100	94	90	88	93	89	87	91	88	86	90	87	85	84
6	98	92	88	85	97	91	87	84	90	86	84	89	86	83	87	85	83	82
7	95	89	85	82	94	88	84	82	87	84	81	86	83	81	85	83	80	79
8	93	86	82	79	92	86	82	79	85	81	79	84	81	79	83	80	78	77
9	90	84	80	77	90	83	79	77	83	79	77	82	79	76	81	78	76	75
10	88	81	77	75	87	81	77	75	80	77	75	80	77	74	79	76	74	73

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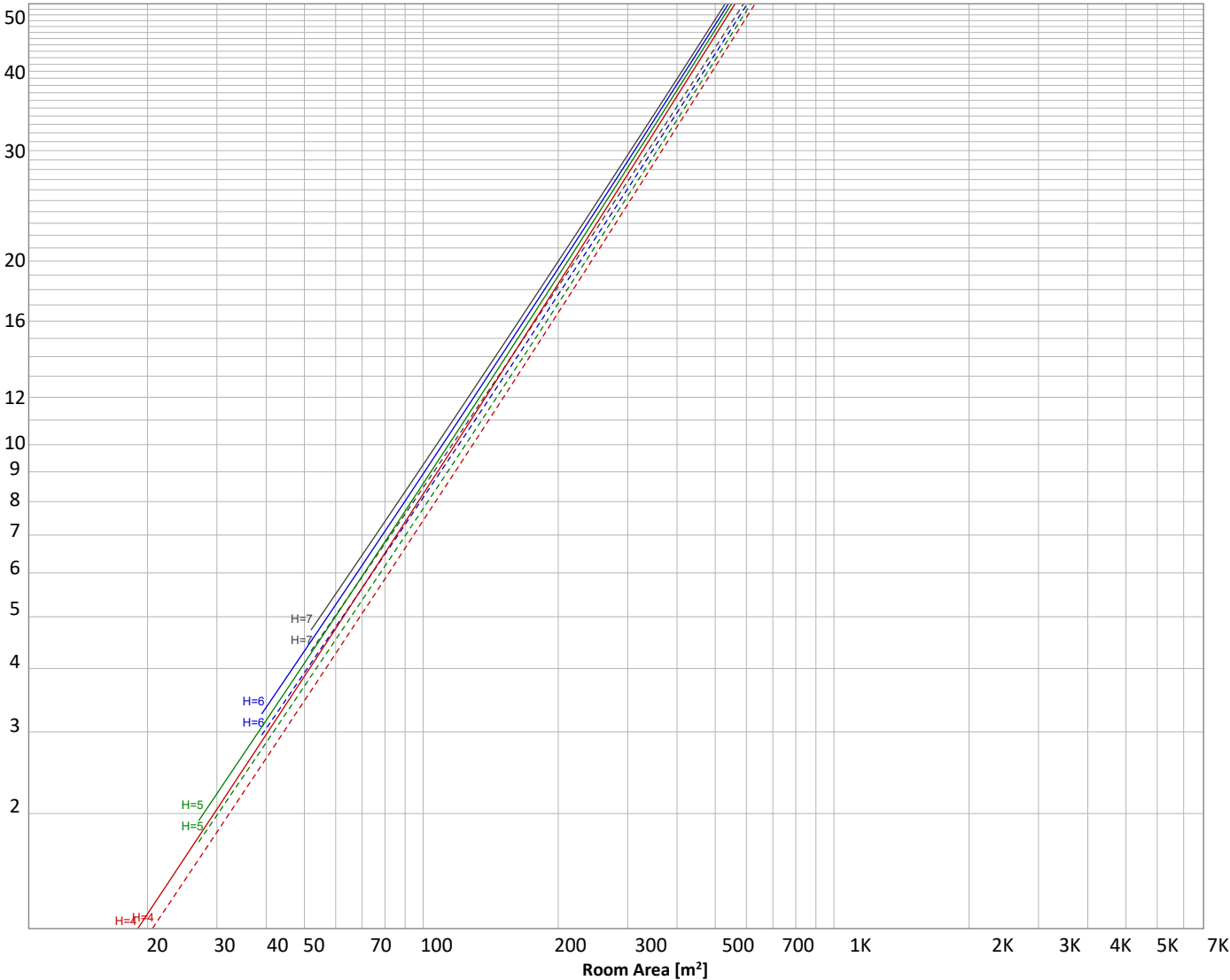
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Luminaire budgetary diagram

Uncorrected, comprehensive UGR table according to 117-1995

LAMPS (number of lamps)



Conditions

H = Room height	Flux = 1210 lm	$\rho(\%)$		
H _{down} = Lamp distance from ceiling =	0.00 m	Line type	Ceiling reflectance	Wall reflectance
H _{work} = Work area height from floor =	0.00 m	-----	70	50
E _{work} = Average lux on work area =	100 lx	-----	50	30
				Floor reflectance
				30
				20

Zonal Lumen Summary

0°-10°	10°-20°	20°-30°	30°-40°	40°-50°	50°-60°	60°-70°	70°-80°	80°-90°
463 lm	473 lm	187 lm	60.5 lm	16.5 lm	2.95 lm	1.42 lm	1.17 lm	0.911 lm
90°-100°	100°-110°	110°-120°	120°-130°	130°-140°	140°-150°	150°-160°	160°-170°	170°-180°
0.566 lm	0.549 lm	0.515 lm	0.465 lm	0.402 lm	0.326 lm	0.240 lm	0.147 lm	0.050 lm

Outdoor Light Planning

Lumen per Zone

Zone (γ)	Lumen	% Total
0-10°	463 lm	38.3%
10-20°	473 lm	39.1%
20-30°	187 lm	15.5%
30-40°	60 lm	5.0%
40-50°	16 lm	1.4%
50-60°	3 lm	0.2%
60-70°	1 lm	0.1%
70-80°	1 lm	0.1%
80-90°	1 lm	0.1%
90-100°	1 lm	0.0%
100-110°	1 lm	0.0%
110-120°	1 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	1210 lm	100.0%

Intensity peaks

Max intensity	6849 cd
Intensity, 90°	1 cd
Intensity, 0°	6849 cd

Zonal Lumen summary

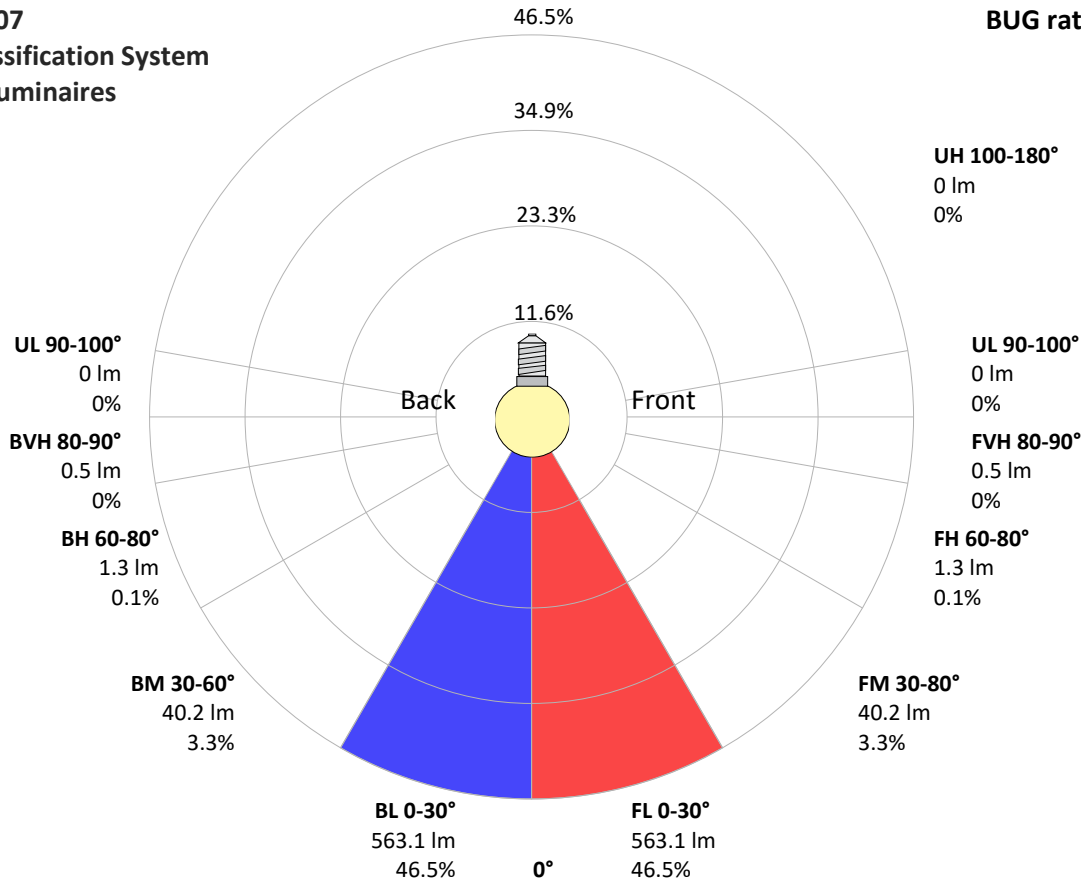
Zone (γ)	Lumen	% Total
0-30°	1123 lm	92.8%
0-40°	1184 lm	97.8%
0-60°	1203 lm	99.4%
60-90°	3 lm	0.3%
70-100°	3 lm	0.2%
90-120°	2 lm	0.1%
0-90°	1207 lm	99.7%
90-180°	3 lm	0.3%
0-180°	1210 lm	100.0%

BUG rating

	Lumen	% Total
Forward light		
Low(0-30°)	563 lm	46.5%
Medium(30-60°)	40 lm	3.3%
High(60-80°)	1 lm	0.1%
Very high(80-90°)	0 lm	0.0%
Back light		
Low(0-30°)	563 lm	46.5%
Medium(30-60°)	40 lm	3.3%
High(60-80°)	1 lm	0.1%
Very high(80-90°)	0 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 B2 U1 G0



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Power Details

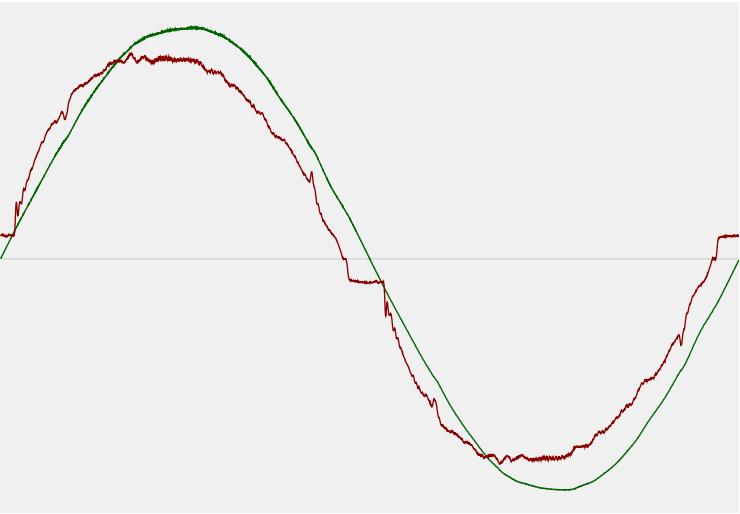
Input Power

Power feed to light source	16.0 W
Frequency of input power	50.1 Hz
RMS Input voltage feed, V_{RMS}	240 V
RMS Input current feed, I_{RMS}	0.068 A
Volt-Ampere or apparent power = $V_{RMS} \cdot I_{RMS}$	16.3 VA
Displacement factor of AC power feed	0.98
Power factor of AC current feed	0.98
Total harmonic distortion of the current	6.37%
Total harmonic distortion of the voltage	0.99%

Efficiency

Radiated power efficiency	27.7%
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Lumen efficiency	76 lm/W
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Input Power Curve



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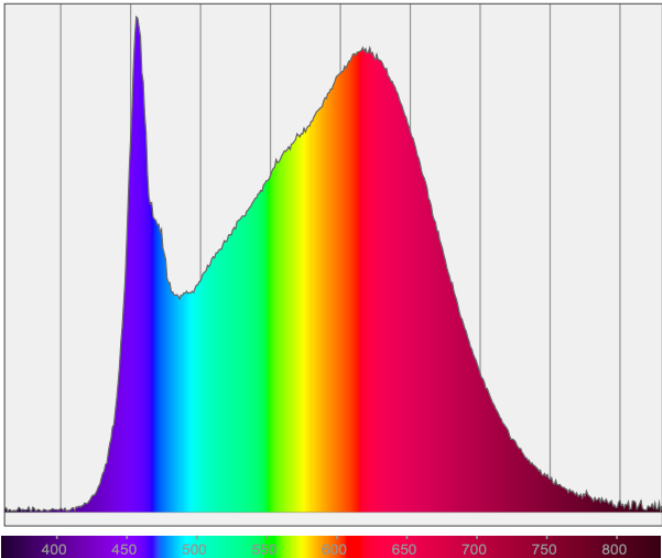
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Color Measurements

Correlated Color Temperature CCT = 3500 K
Color Rendering TM30-18 R_f 90.2 — R_g 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 _f 90.2 — R _g 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



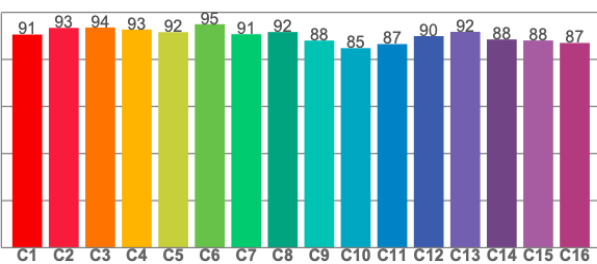
Color Rendering Index per reference color (CIE 1995)



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

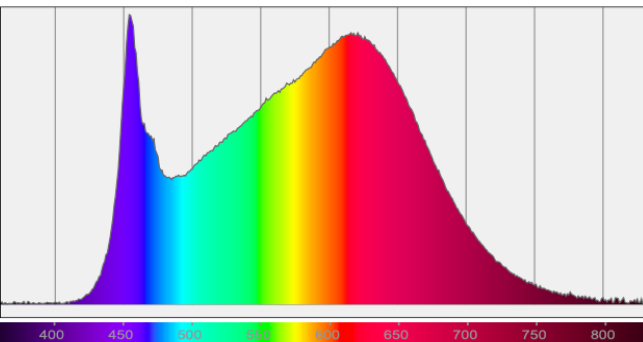
TM30-18 Rf-values per hue bin



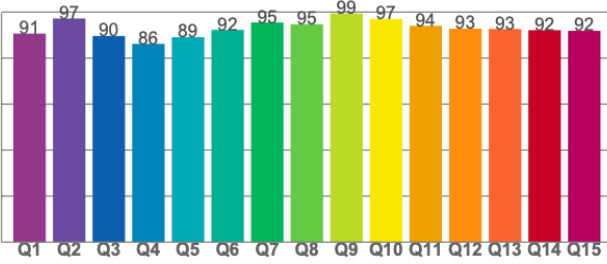
TM30 C values, 16 binned values out of total of 99 C values

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