

Tested Light Source - 1_PHOT_REFLEKTER-L-4600lmChip-3500K-38Deg-ConcentricLouvre_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°

1.5°

3.00 m

41.3 W – PF 0.97 – DPF 0.97

238 V – 0.180 A

49.9 Hz

Main Light Measurement Results

Output

Efficiency

Peak Intensity and Beam Angle

Color Rendering Index

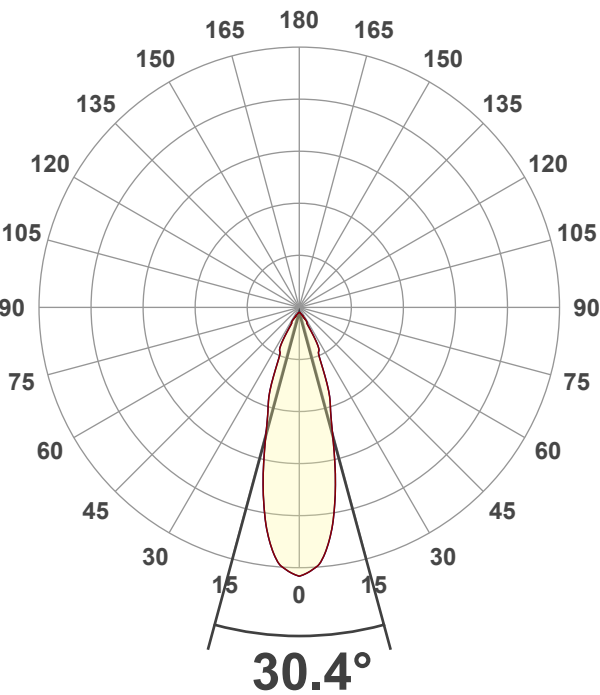
2966 lm

72 lm/W

7306 cd – 30.4°

CRI 92.6

Light Intensity Distribution



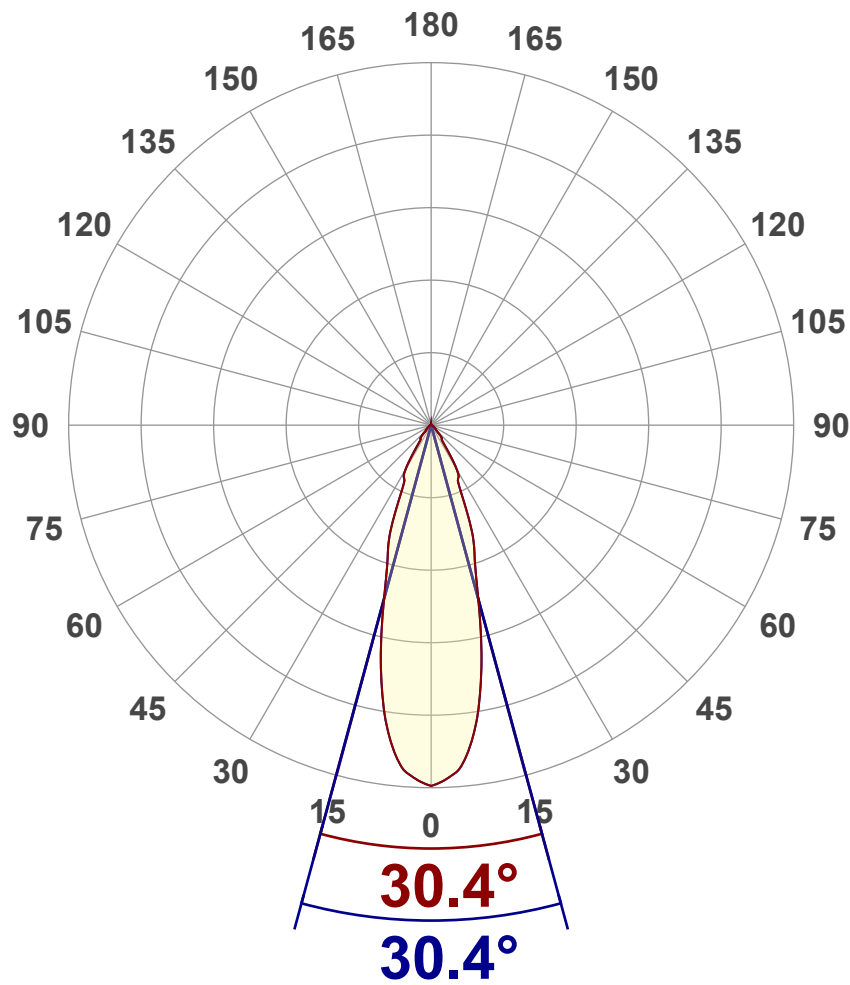
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Luminous Intensity diagram

Unit: 0-100% of peak intensity



Main Values

Output (total Lumen)	2966 lm
Peak Intensity	7306 cd
Beam Angle (50%)	30.4°
Beam Angle (90%)	30.4°
Beam Angle (10%)	30.4°

Cut-off Angle

Average 2,5%	87.5°
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Field Angle

Average 10%	64.5°
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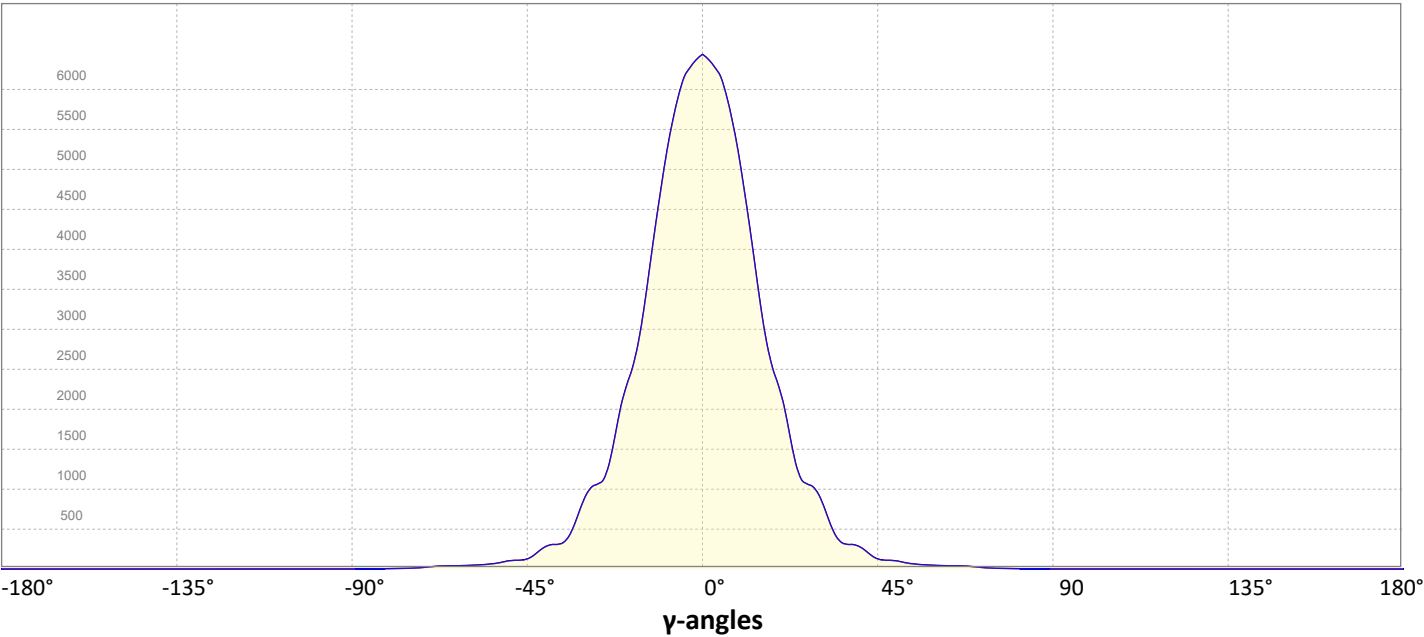
Intensity Ratio

In 120° cone	97.3%
In 90° cone	93.3%

C000-C180

C090-C270

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

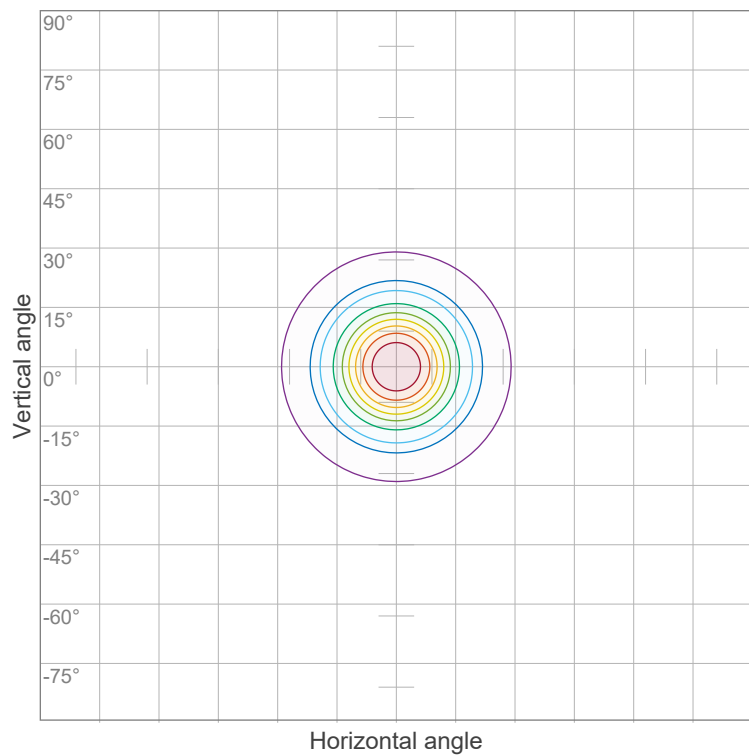


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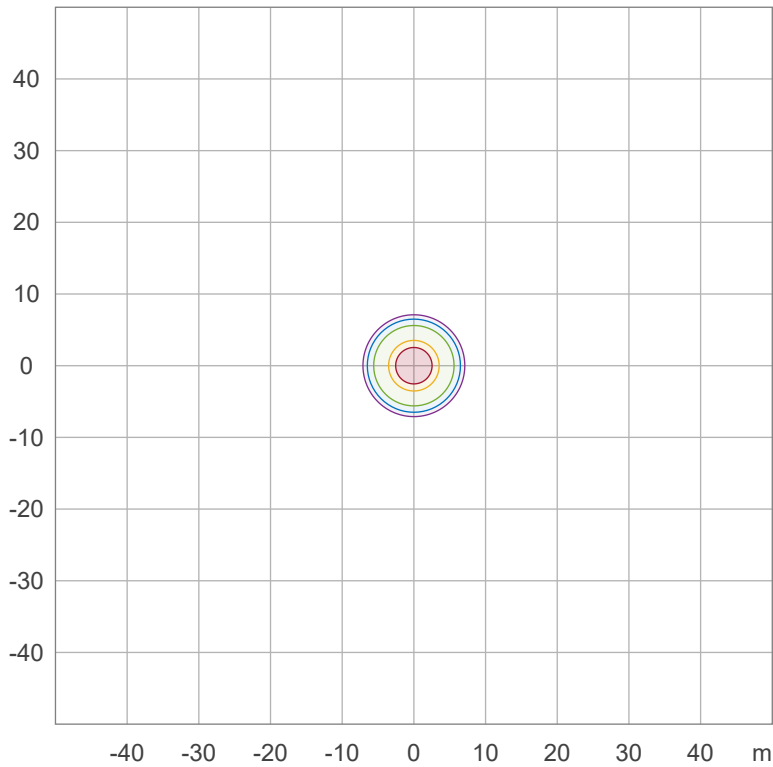
Iso-intensity Diagram (Iso-candela)



90 %	6575.6 cd
80 %	5845.0 cd
70 %	5114.4 cd
60 %	4383.7 cd
50 %	3653.1 cd
40 %	2922.5 cd
30 %	2191.9 cd
20 %	1461.2 cd
10 %	730.6 cd

Peak intensity: 7306.2 cd
Number of c-planes: 32

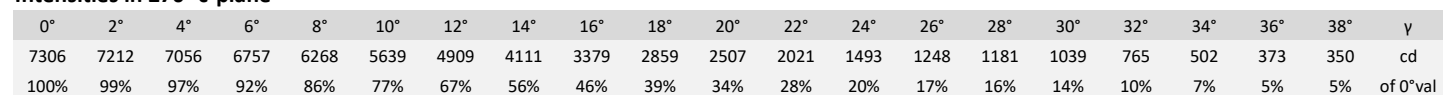
Iso-illuminance Diagram (Iso-lux)



50.0 %	36.5 lx
30.0 %	21.9 lx
10.0 %	7.3 lx
5.0 %	3.7 lx
3.0 %	2.2 lx

Peak illuminance: 73.1 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											
H = mounting height above eye level											
X	Y	Viewed Crosswise (Viewing direction orthogonal to lamp length axis)					Viewed Endwise (Viewing direction parallel to lamp length axis)				
2H	2H	20.5	21.1	20.6	21.3	21.5	20.5	21.1	20.6	21.3	21.5
	3H	20.8	21.5	21.1	21.7	21.9	20.8	21.5	21.1	21.7	21.9
	4H	20.8	21.5	21.2	21.7	21.9	20.8	21.5	21.2	21.7	21.9
	6H	20.9	21.4	21.2	21.7	22.1	20.9	21.4	21.2	21.7	22.1
	8H	20.8	21.4	21.2	21.7	22.1	20.8	21.4	21.2	21.7	22.1
	12H	20.8	21.3	21.1	21.7	22.1	20.8	21.3	21.1	21.7	22.1
4H	2H	20.4	21.1	20.8	21.4	21.6	20.4	21.1	20.8	21.4	21.6
	3H	21.0	21.6	21.4	21.9	22.3	21.0	21.6	21.4	21.9	22.3
	4H	21.0	21.5	21.4	21.9	22.5	21.0	21.5	21.4	21.9	22.5
	6H	21.0	21.6	21.5	21.9	22.3	21.0	21.6	21.5	21.9	22.3
	8H	21.0	21.5	21.5	21.9	22.2	21.0	21.5	21.5	21.9	22.2
	12H	21.0	21.4	21.5	21.8	22.2	21.0	21.4	21.5	21.8	22.2
8H	4H	21.0	21.5	21.5	21.8	22.2	21.0	21.5	21.5	21.8	22.2
	6H	21.0	21.4	21.5	21.8	22.4	21.0	21.4	21.5	21.8	22.4
	8H	21.1	21.4	21.6	21.9	22.5	21.1	21.4	21.6	21.9	22.5
	12H	21.1	21.3	21.7	21.8	22.4	21.1	21.3	21.7	21.8	22.4
12H	4H	20.9	21.3	21.4	21.7	22.2	20.9	21.3	21.4	21.7	22.2
	6H	21.1	21.3	21.6	21.8	22.5	21.1	21.3	21.6	21.8	22.5
	8H	21.1	21.3	21.6	21.8	22.4	21.1	21.3	21.6	21.8	22.4

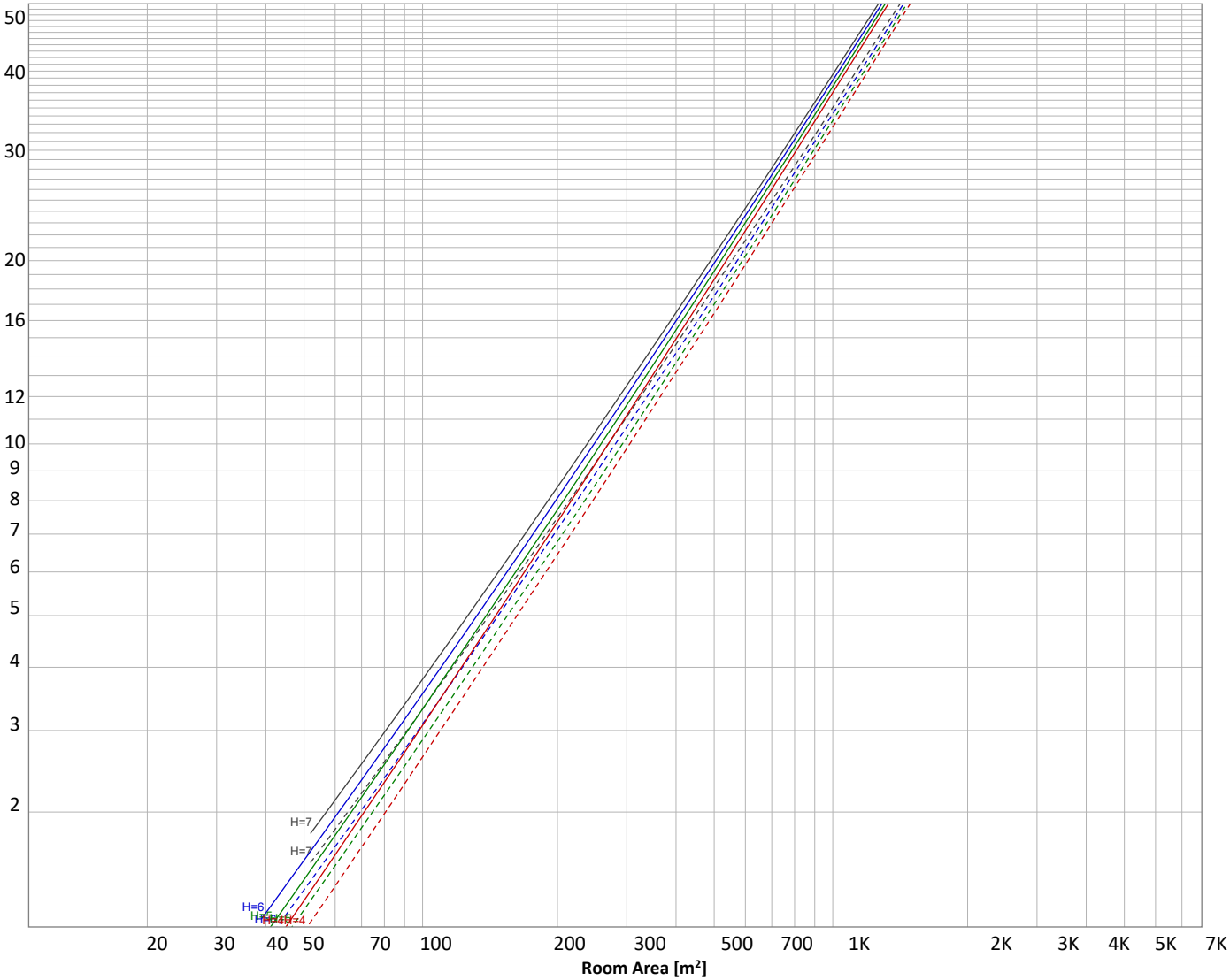
Variations with the observer position for the luminaire spacings, S:

S = 1.0H	2.8 / -1.9	2.8 / -1.9
S = 1.5H	5.0 / -2.6	5.0 / -2.6
S = 2.0H	6.7 / -2.6	6.7 / -2.6

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	114	111	109	107	111	109	107	105	105	103	102	101	100	98	98	96	96	94
2	109	104	100	97	106	102	99	96	99	96	94	96	94	92	93	91	90	88
3	104	98	93	89	102	96	92	89	94	90	87	91	88	86	89	87	85	83
4	99	92	87	83	97	91	86	83	89	85	82	87	84	81	85	82	80	78
5	95	87	82	78	93	86	82	78	85	80	77	83	79	76	81	78	76	74
6	91	83	78	74	90	82	77	74	81	76	73	79	75	72	78	75	72	71
7	87	79	74	70	86	78	73	70	77	73	69	76	72	69	75	71	69	67
8	84	76	70	67	83	75	70	66	74	69	66	73	69	66	72	68	66	64
9	81	72	67	64	80	72	67	63	71	66	63	70	66	63	69	65	63	62
10	78	69	64	61	77	69	64	61	68	64	61	67	63	60	67	63	60	59

Luminaire budgetary diagram
Uncorrected, comprehensive UGR table according to 117-1995
LAMPS (number of lamps)



Conditions		ρ(%)			
H = Room height	Flux = 2966 lm	Line type	Ceiling reflectance	Wall reflectance	Floor reflectance
H _{down} = Lamp distance from ceiling =	0.00 m	-----	70	50	30
H _{work} = Work area height from floor =	0.00 m	—————	50	30	20
E _{work} = Average lux on work area =	100 lx				

Zonal Lumen Summary

0°-10°	10°-20°	20°-30°	30°-40°	40°-50°	50°-60°	60°-70°	70°-80°	80°-90°
621 lm	1043 lm	692 lm	325 lm	138 lm	67.9 lm	46.5 lm	15.8 lm	5.22 lm
90°-100°	100°-110°	110°-120°	120°-130°	130°-140°	140°-150°	150°-160°	160°-170°	170°-180°
2.25 lm	2.19 lm	2.05 lm	1.85 lm	1.35 lm	0.947 lm	0.698 lm	0.427 lm	0.144 lm

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Outdoor Light Planning

Lumen per Zone

Zone (γ)	Lumen	% Total
0-10°	621 lm	20.9%
10-20°	1043 lm	35.2%
20-30°	692 lm	23.3%
30-40°	325 lm	10.9%
40-50°	138 lm	4.6%
50-60°	68 lm	2.3%
60-70°	46 lm	1.6%
70-80°	16 lm	0.5%
80-90°	5 lm	0.2%
90-100°	2 lm	0.1%
100-110°	2 lm	0.1%
110-120°	2 lm	0.1%
120-130°	2 lm	0.1%
130-140°	1 lm	0.0%
140-150°	1 lm	0.0%
150-160°	1 lm	0.0%
160-170°	0 lm	0.0%
170-180°	0 lm	0.0%
Total	2966 lm	100.0%

Zonal Lumen summary

Zone (γ)	Lumen	% Total
0-30°	2356 lm	79.4%
0-40°	2681 lm	90.4%
0-60°	2887 lm	97.3%
60-90°	68 lm	2.3%
70-100°	23 lm	0.8%
90-120°	6 lm	0.2%
0-90°	2954 lm	99.6%
90-180°	12 lm	0.4%
0-180°	2966 lm	100.0%

BUG rating

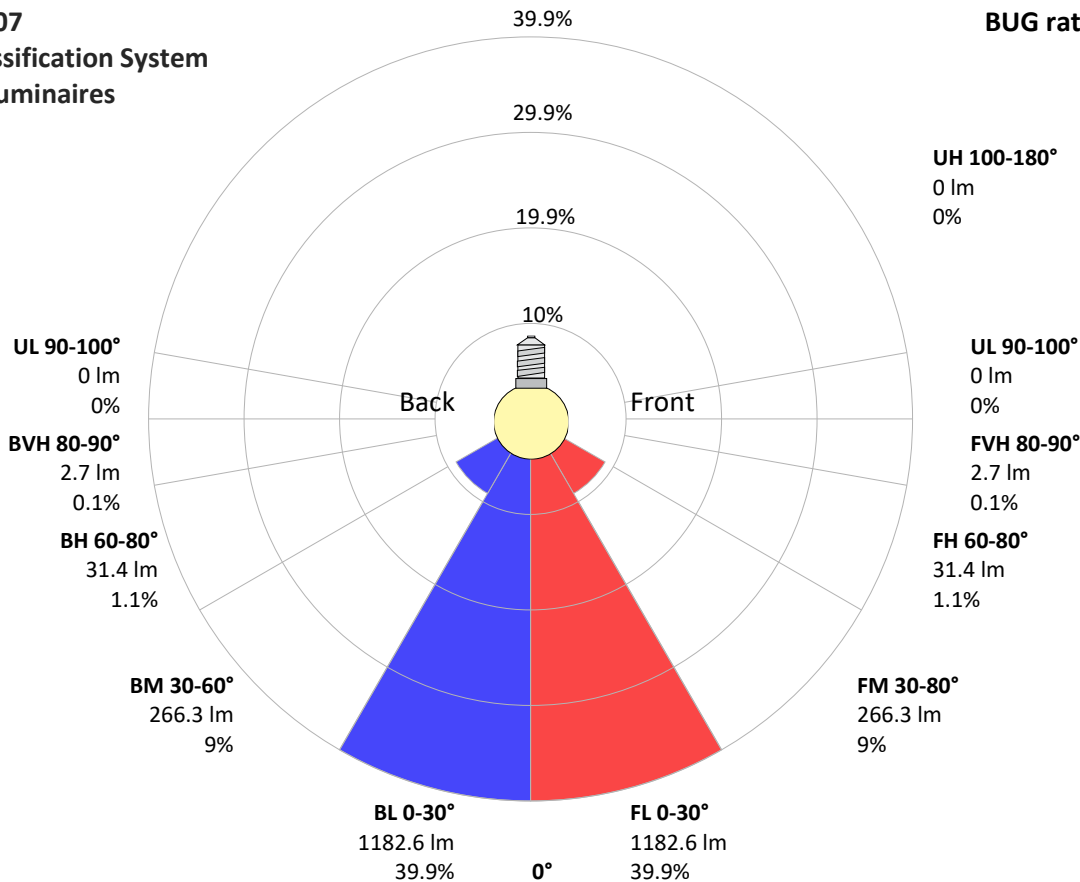
	Lumen	% Total
Forward light		
Low(0-30°)	1183 lm	39.9%
Medium(30-60°)	266 lm	9.0%
High(60-80°)	31 lm	1.1%
Very high(80-90°)	3 lm	0.1%
Back light		
Low(0-30°)	1183 lm	39.9%
Medium(30-60°)	266 lm	9.0%
High(60-80°)	31 lm	1.1%
Very high(80-90°)	3 lm	0.1%
Uplight		
Low(90-100°)	0 lm	0.0%
High(100-180°)	0 lm	0.0%

Intensity peaks

Max intensity	7306 cd
Intensity, 90°	2 cd
Intensity, 0°	7306 cd

IESNA TM-15-07
Luminaire Classification System
For Outdoor Luminaires

BUG rating B3 U1 G0



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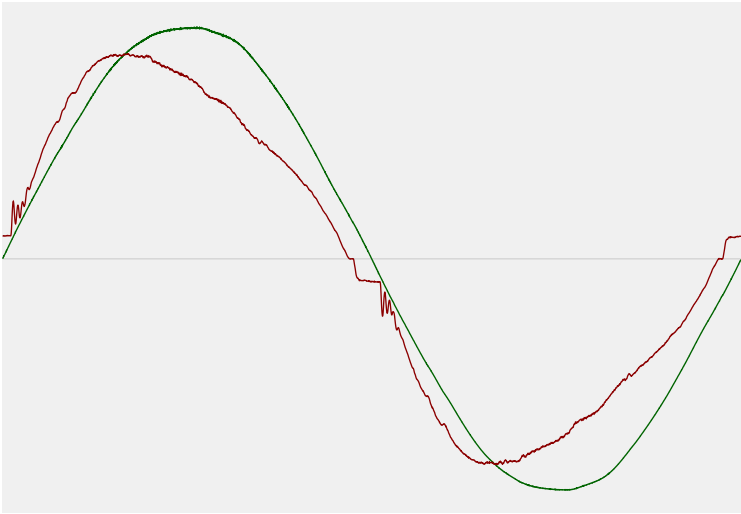


Power Details

Input Power

Power feed to light source	41.3 W
Frequency of input power	49.9 Hz
RMS Input voltage feed, V_{RMS}	238 V
RMS Input current feed, I_{RMS}	0.180 A
Volt-Ampere or apparent power = $V_{RMS} \cdot I_{RMS}$	42.68 VA
Displacement factor of AC power feed	0.97
Power factor of AC current feed	0.97
Total harmonic distortion of the current	10.62%
Total harmonic distortion of the voltage	1.11%

Input Power Curve



Efficiency

Radiated power efficiency	26.0%
Lumen efficiency	72 lm/W

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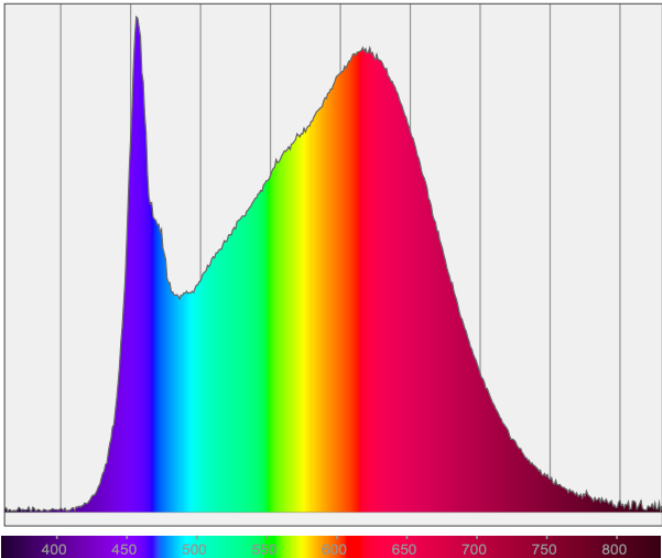
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Color Measurements

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



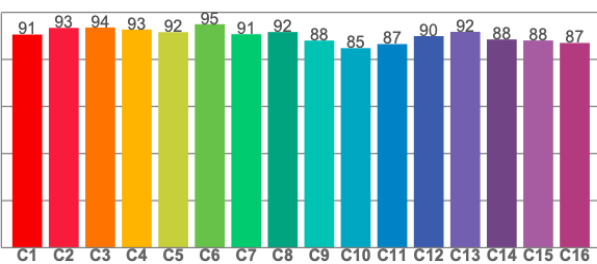
Color Rendering Index per reference color (CIE 1995)



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

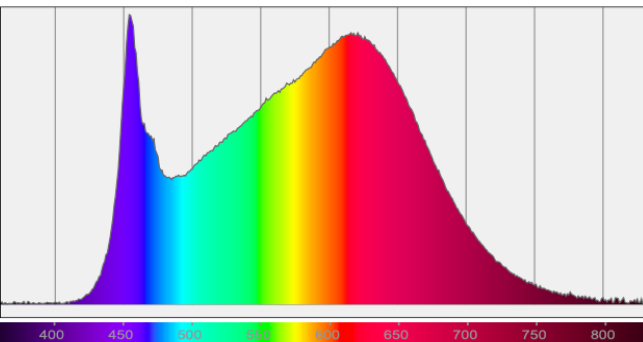
TM30-18 Rf-values per hue bin



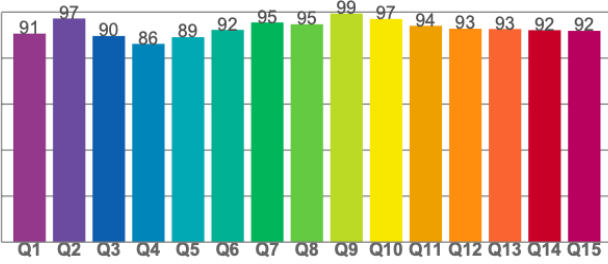
TM30 C values, 16 binned values out of total of 99 C values

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