

Tested Light Source - 1\_PHOT\_NINETY-NINE-2275lmChip-3500K-38Deg-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°

1°

1.50 m

15.9 W – PF 0.98 – DPF 0.98

242 V – 0.067 A

50 Hz

Main Light Measurement Results

Output

Efficiency

Peak Intensity and Beam Angle

Color Rendering Index

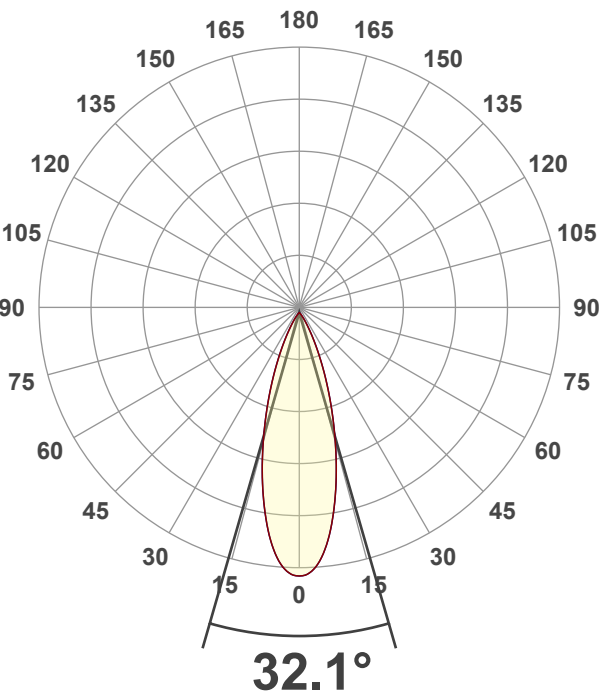
1088 lm

68 lm/W

3055 cd – 32.1°

CRI 92.7

Light Intensity Distribution



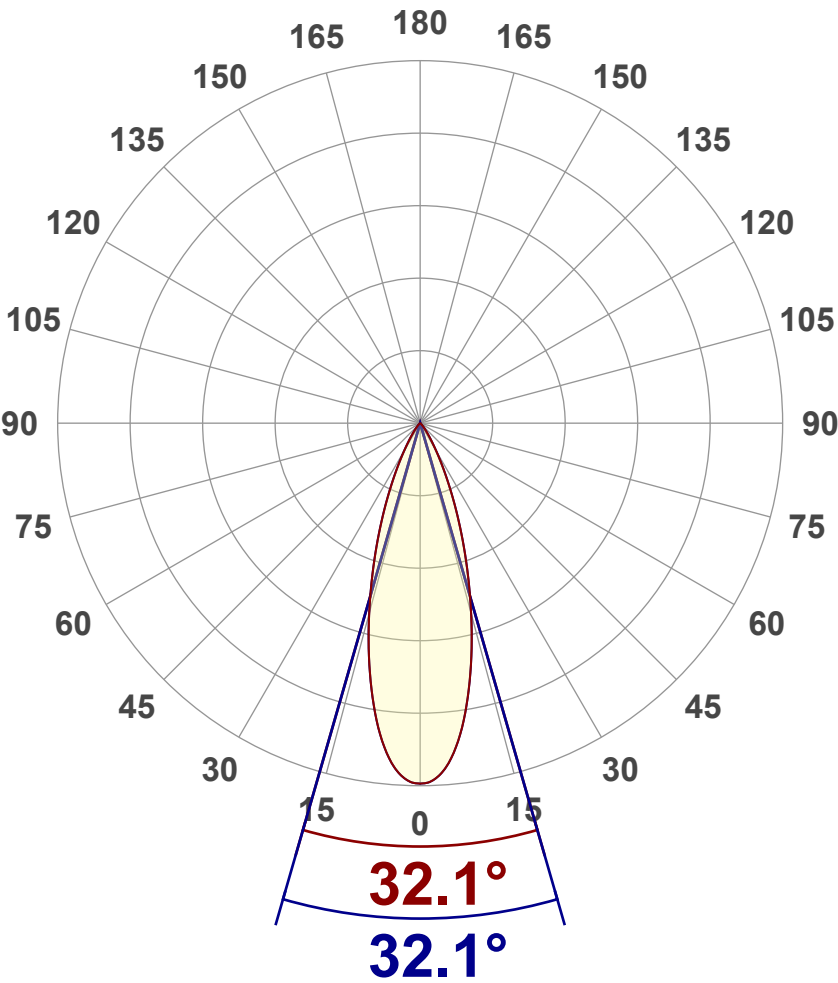
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Luminous Intensity diagram

Unit: 0-100% of peak intensity



Main Values

Output (total Lumen)	1088 lm
Peak Intensity	3055 cd
Beam Angle (50%)	32.1°
Beam Angle (90%)	32.1°
Beam Angle (10%)	32.1°

Cut-off Angle

Average 2,5%	75.3°
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Field Angle

Average 10%	58.6°
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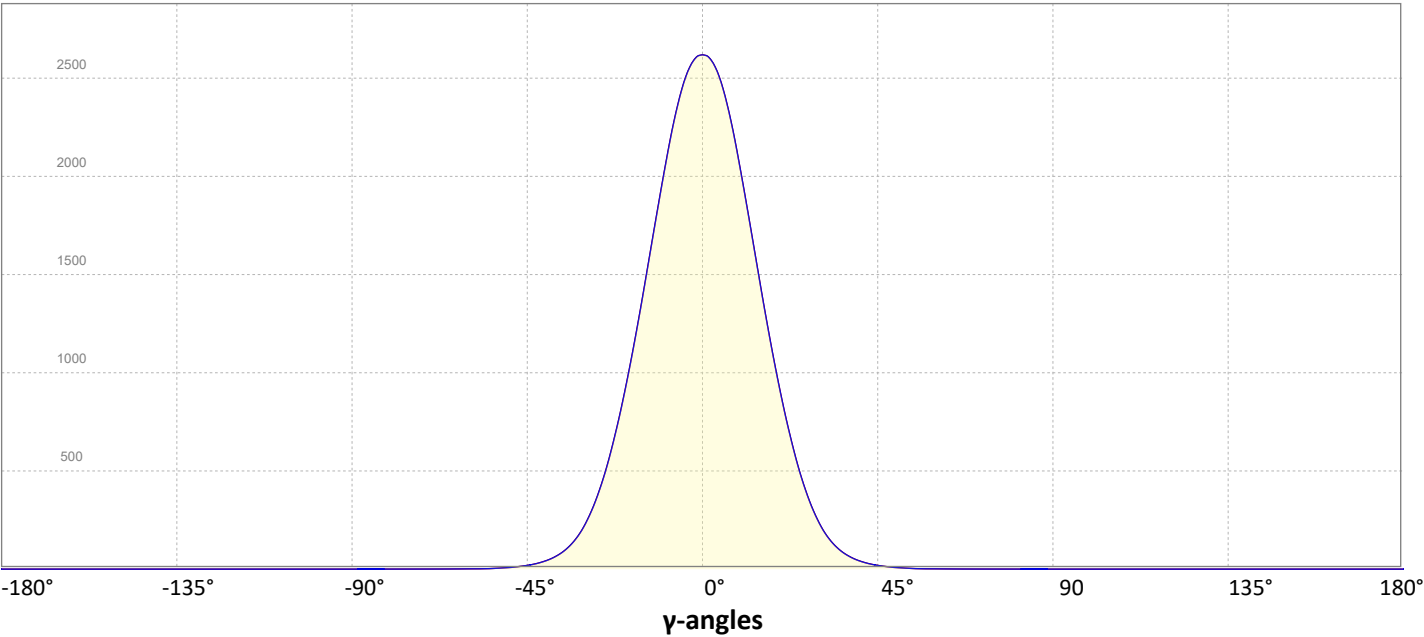
Intensity Ratio

In 120° cone	99.7%
In 90° cone	98.8%

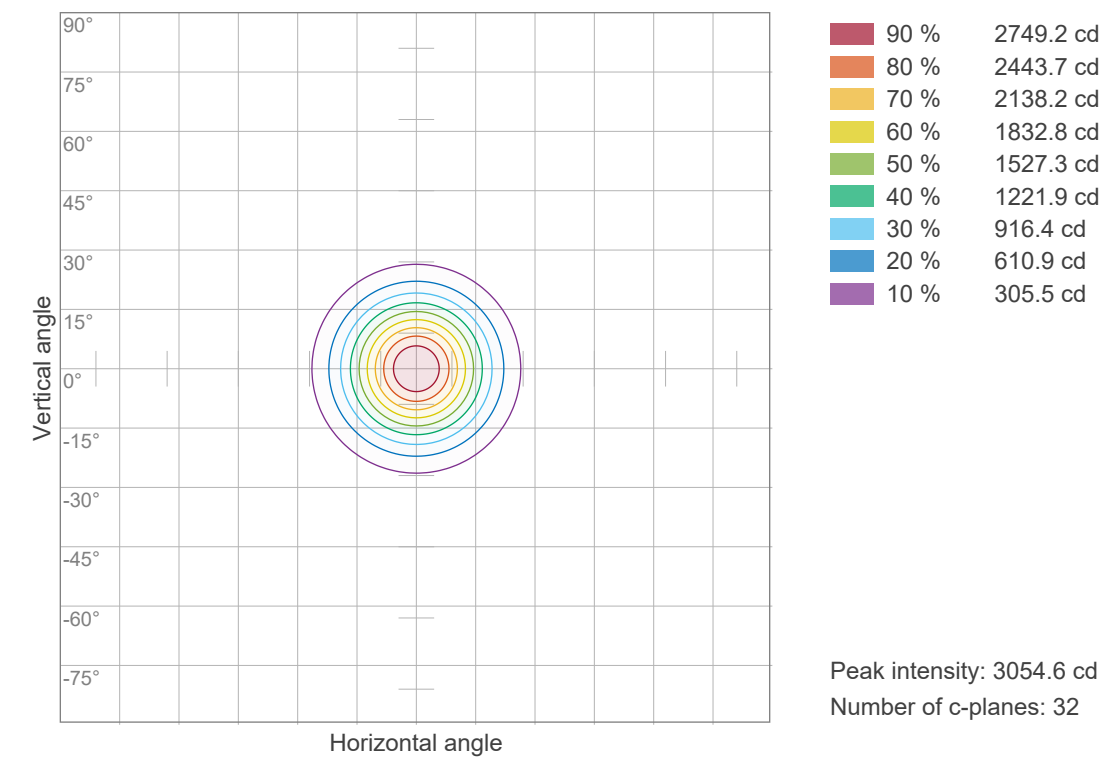
C000-C180

C090-C270

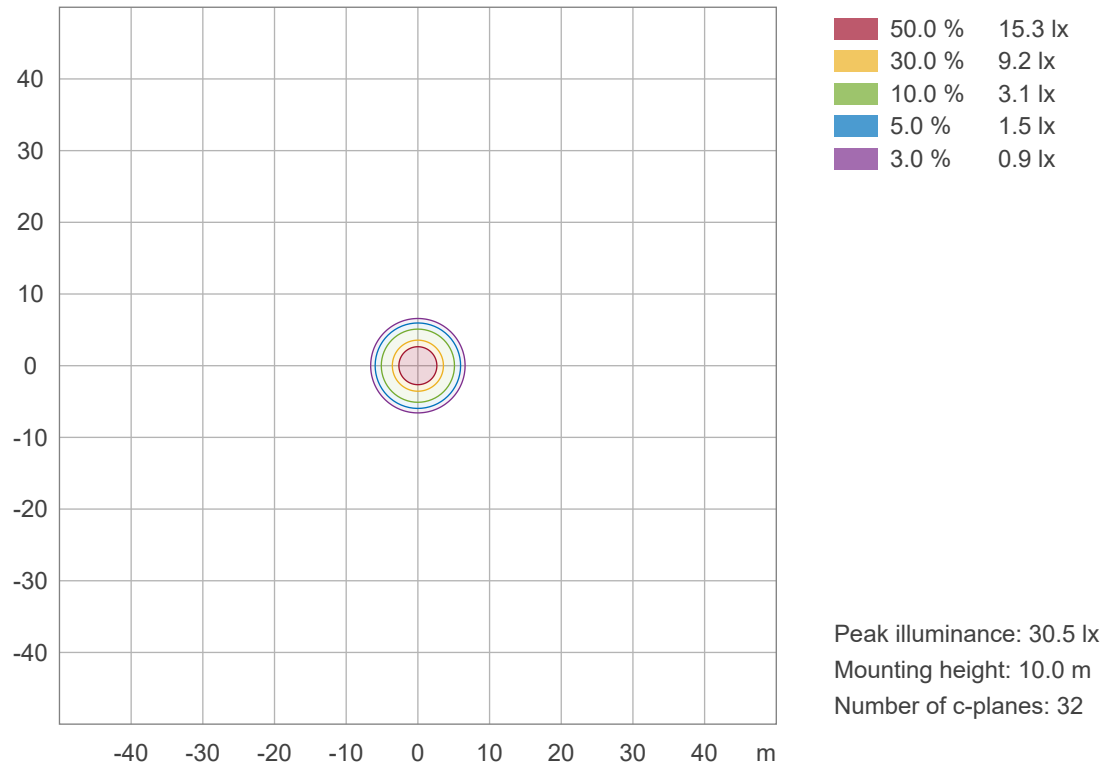
Linear distribution diagram - Intensity (candela) vs γ-angle



Iso-intensity Diagram (Iso-candela)



Iso-illuminance Diagram (Iso-lux)

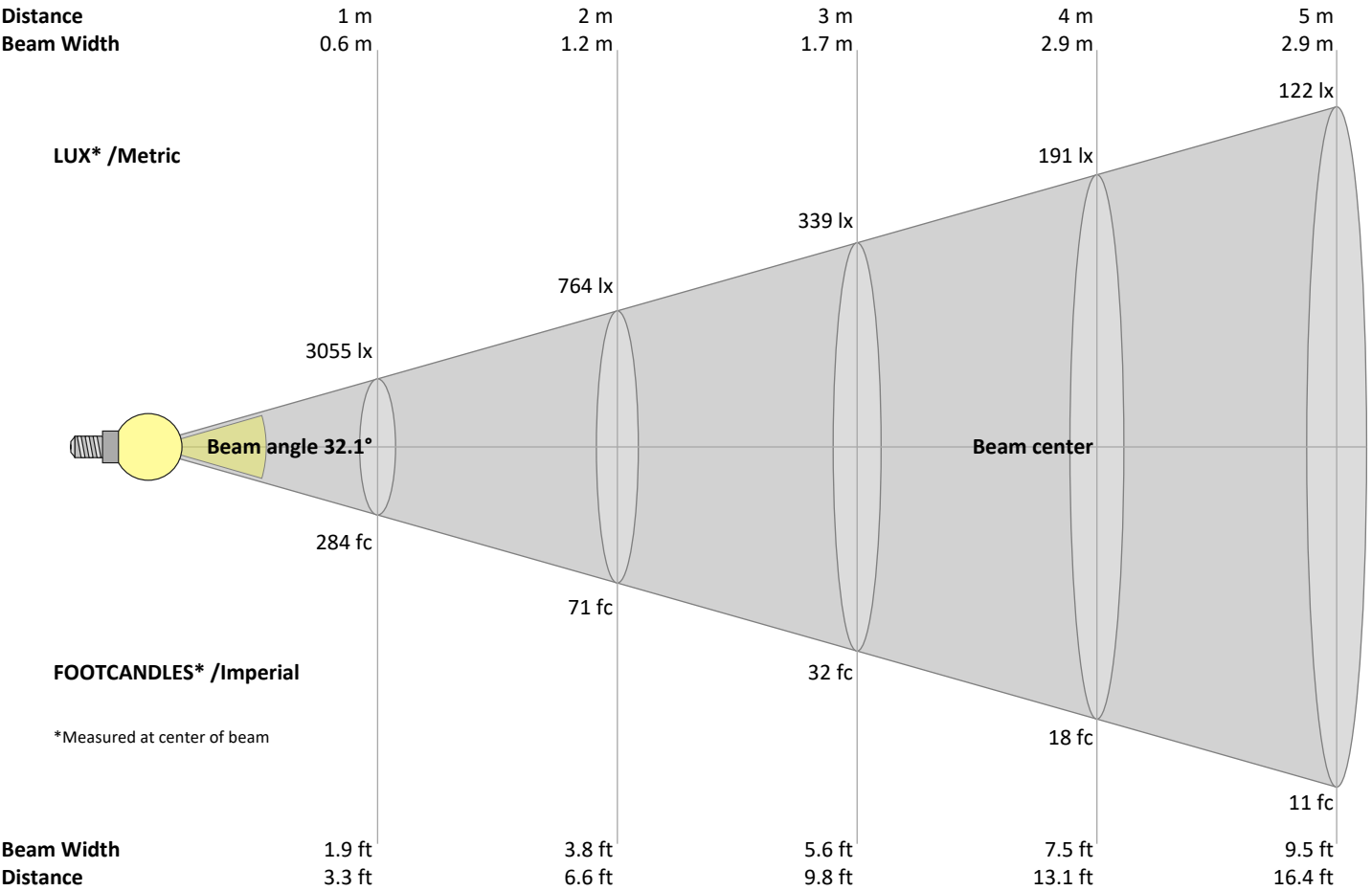


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Beam Details



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
3055	764	339	191	122	85	62	48	38	31	25	21	18	16	14	12	11	9	8	8	lux
283.8	70.9	31.5	17.7	11.4	7.9	5.8	4.4	3.5	2.8	2.3	2	1.7	1.4	1.3	1.1	1	0.9	0.8	0.7	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
3055	3029	2942	2790	2584	2339	2075	1805	1537	1284	1052	842	658	502	375	274	197	141	101	72	cd
100%	99%	96%	91%	85%	77%	68%	59%	50%	42%	34%	28%	22%	16%	12%	9%	6%	5%	3%	2%	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
3055	3029	2942	2790	2584	2339	2075	1805	1537	1284	1052	842	658	502	375	274	197	141	101	72	cd
100%	99%	96%	91%	85%	77%	68%	59%	50%	42%	34%	28%	22%	16%	12%	9%	6%	5%	3%	2%	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
3055	3029	2942	2790	2584	2339	2075	1805	1537	1284	1052	842	658	502	375	274	197	141	101	72	cd
100%	99%	96%	91%	85%	77%	68%	59%	50%	42%	34%	28%	22%	16%	12%	9%	6%	5%	3%	2%	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
3055	3029	2942	2790	2584	2339	2075	1805	1537	1284	1052	842	658	502	375	274	197	141	101	72	cd
100%	99%	96%	91%	85%	77%	68%	59%	50%	42%	34%	28%	22%	16%	12%	9%	6%	5%	3%	2%	of 0°val

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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	12.8	13.2	12.8	13.4	13.6	12.8	13.2	12.8	13.4	13.6
	3H	12.4	13.1	12.8	13.3	13.4	12.4	13.1	12.8	13.3	13.4
	4H	12.4	13.0	12.8	13.2	13.4	12.4	13.0	12.8	13.2	13.4
	6H	12.4	12.9	12.7	13.2	13.5	12.4	12.9	12.7	13.2	13.5
	8H	12.3	12.8	12.7	13.1	13.5	12.3	12.8	12.7	13.1	13.5
	12H	12.3	12.8	12.6	13.1	13.5	12.3	12.8	12.6	13.1	13.5
4H	2H	12.4	13.0	12.8	13.2	13.4	12.4	13.0	12.8	13.2	13.4
	3H	12.3	12.7	12.6	13.1	13.5	12.3	12.7	12.6	13.1	13.5
	4H	12.1	12.6	12.5	13.0	13.5	12.1	12.6	12.5	13.0	13.5
	6H	12.1	12.6	12.6	12.9	13.2	12.1	12.6	12.6	12.9	13.2
	8H	12.0	12.5	12.5	12.8	13.2	12.0	12.5	12.5	12.8	13.2
	12H	12.0	12.3	12.5	12.7	13.2	12.0	12.3	12.5	12.7	13.2
8H	4H	12.0	12.4	12.5	12.8	13.1	12.0	12.4	12.5	12.8	13.1
	6H	12.0	12.2	12.5	12.7	13.2	12.0	12.2	12.5	12.7	13.2
	8H	12.0	12.2	12.5	12.7	13.3	12.0	12.2	12.5	12.7	13.3
	12H	11.9	12.1	12.5	12.6	13.2	11.9	12.1	12.5	12.6	13.2
12H	4H	11.9	12.3	12.4	12.7	13.1	11.9	12.3	12.4	12.7	13.1
	6H	12.0	12.2	12.5	12.7	13.3	12.0	12.2	12.5	12.7	13.3
	8H	11.9	12.1	12.5	12.6	13.2	11.9	12.1	12.5	12.6	13.2

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

S = 1.0H	5.5 / -9.8	5.5 / -9.8
S = 1.5H	8.2 / -10.7	8.2 / -10.7
S = 2.0H	10.1 / -11.2	10.1 / -11.2

## 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	105	103	102	101	100	99	98	97	95
2	110	106	103	100	108	104	101	99	101	99	97	98	96	95	96	94	93	91
3	106	101	97	93	104	99	96	93	97	94	91	95	92	90	92	90	88	87
4	102	96	91	88	100	95	91	88	93	89	87	91	88	86	89	87	85	83
5	98	92	87	83	97	91	86	83	89	85	82	87	84	82	86	83	81	80
6	95	88	83	79	93	87	82	79	85	82	79	84	81	78	83	80	78	76
7	91	84	79	76	90	83	79	76	82	78	75	81	78	75	80	77	75	73
8	88	81	76	73	87	80	76	73	79	75	72	78	75	72	77	74	72	71
9	85	78	73	70	84	77	73	70	76	72	69	76	72	69	75	71	69	68
10	82	75	70	67	82	74	70	67	74	70	67	73	69	67	72	69	66	65

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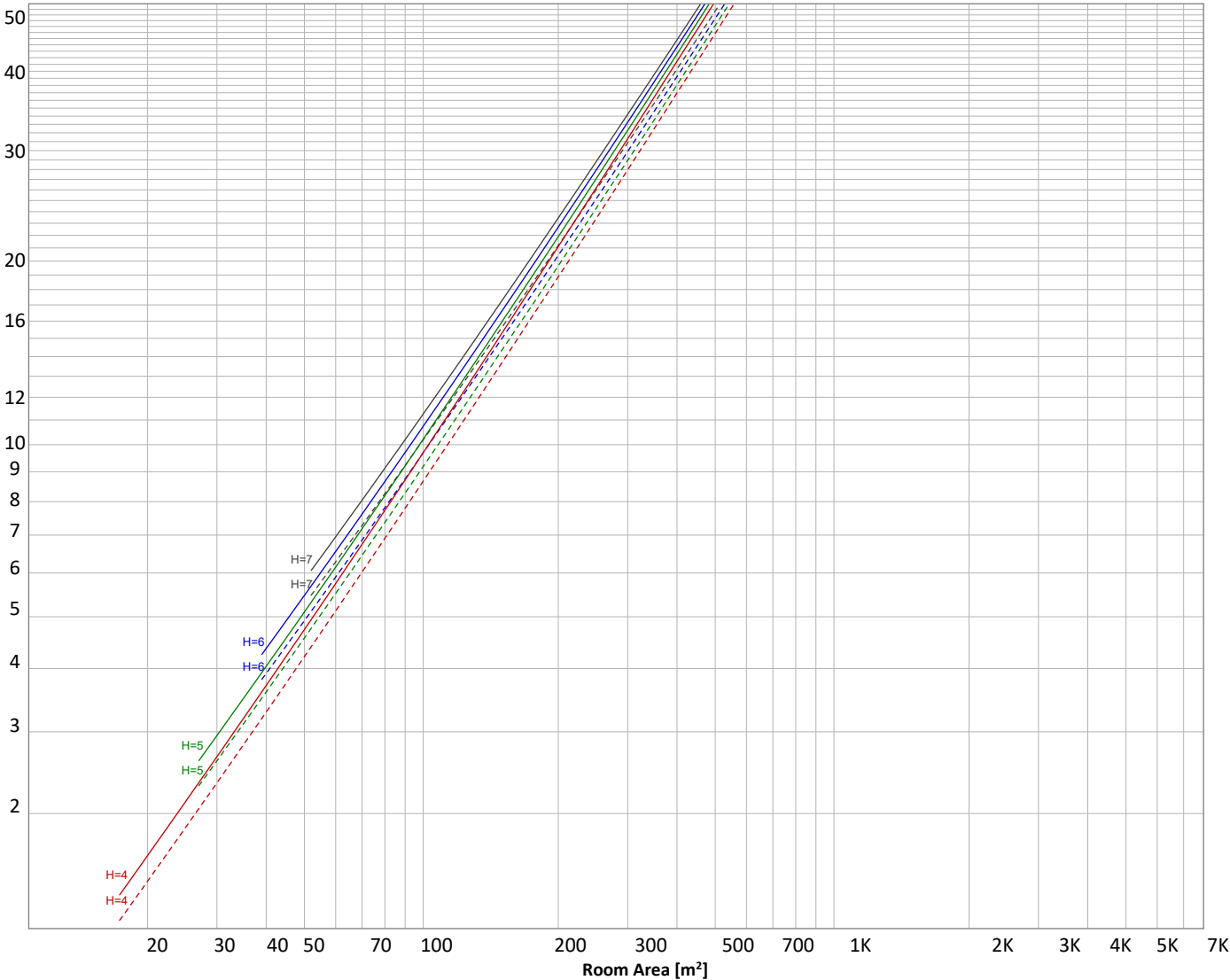
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Luminaire budgetary diagram

Uncorrected, comprehensive UGR table according to 117-1995

LAMPS (number of lamps)



Conditions

H = Room height	Flux = 1088 lm	ρ(%)		
H <sub>down</sub> = Lamp distance from ceiling =	0.00 m	Line type	Ceiling reflectance	Wall reflectance
H <sub>work</sub> = Work area height from floor =	0.00 m	-----	70	50
E <sub>work</sub> = Average lux on work area =	100 lx	—————	50	30
				Floor reflectance
				20

Zonal Lumen Summary

0°-10°	10°-20°	20°-30°	30°-40°	40°-50°	50°-60°	60°-70°	70°-80°	80°-90°
257 lm	456 lm	269 lm	80.7 lm	18.8 lm	3.69 lm	1.09 lm	0.584 lm	0.360 lm
90°-100°	100°-110°	110°-120°	120°-130°	130°-140°	140°-150°	150°-160°	160°-170°	170°-180°
0.194 lm	0.188 lm	0.177 lm	0.160 lm	0.138 lm	0.112 lm	0.082 lm	0.050 lm	0.017 lm

Outdoor Light Planning

Lumen per Zone		
Zone (γ)	Lumen	% Total
0-10°	257 lm	23.6%
10-20°	456 lm	41.9%
20-30°	269 lm	24.7%
30-40°	81 lm	7.4%
40-50°	19 lm	1.7%
50-60°	4 lm	0.3%
60-70°	1 lm	0.1%
70-80°	1 lm	0.1%
80-90°	0 lm	0.0%
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	1088 lm	100.0%

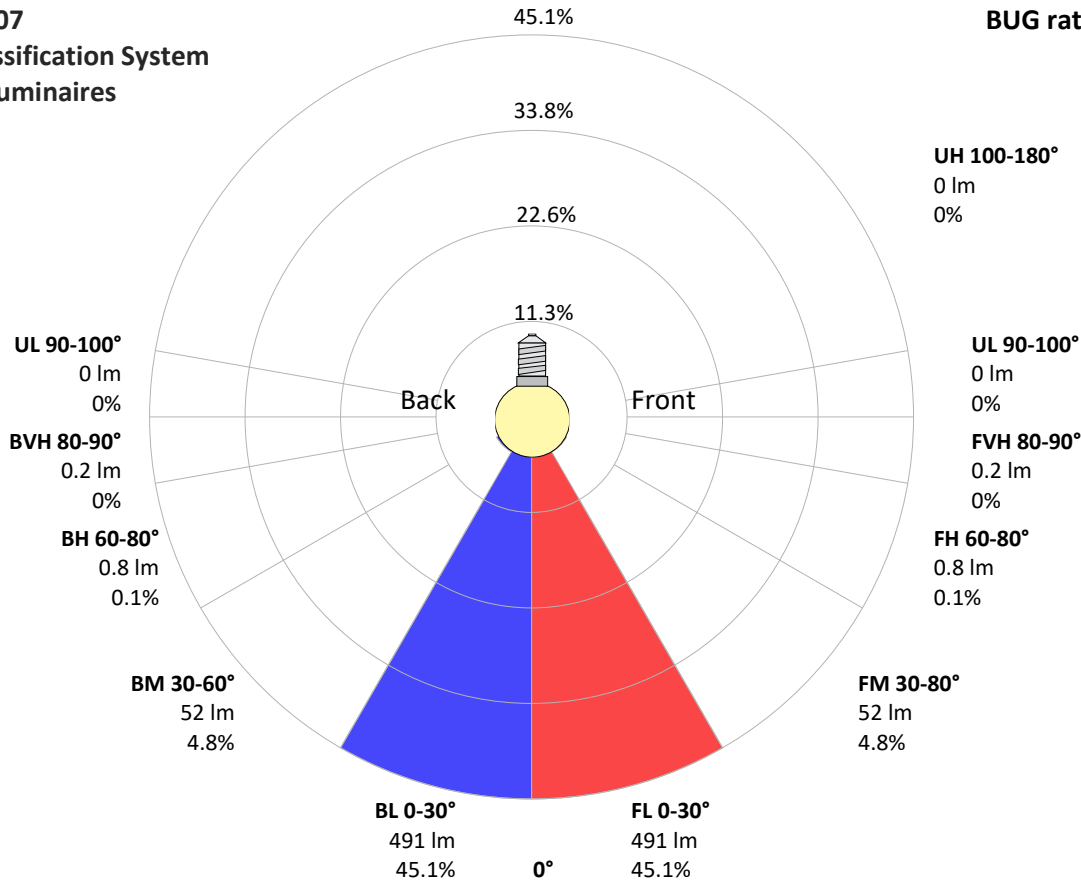
Intensity peaks	
Max intensity	3055 cd
Intensity, 90°	0 cd
Intensity, 0°	3055 cd

Zonal Lumen summary		
Zone (γ)	Lumen	% Total
0-30°	982 lm	90.2%
0-40°	1062 lm	97.6%
0-60°	1085 lm	99.7%
60-90°	2 lm	0.2%
70-100°	1 lm	0.1%
90-120°	1 lm	0.1%
0-90°	1087 lm	99.9%
90-180°	1 lm	0.1%
0-180°	1088 lm	100.0%

BUG rating		
	Lumen	% Total
Forward light		
Low(0-30°)	491 lm	45.1%
Medium(30-60°)	52 lm	4.8%
High(60-80°)	1 lm	0.1%
Very high(80-90°)	0 lm	0.0%
Back light		
Low(0-30°)	491 lm	45.1%
Medium(30-60°)	52 lm	4.8%
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 B1 U1 G0



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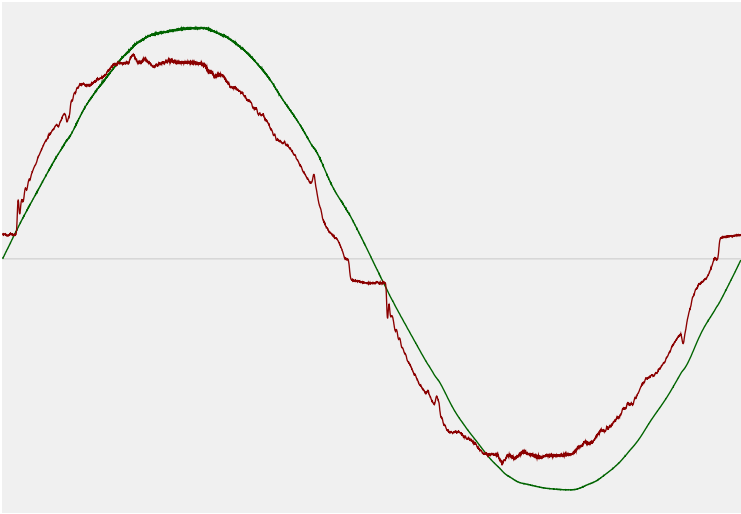


## Power Details

### Input Power

Power feed to light source	15.9 W
Frequency of input power	50 Hz
RMS Input voltage feed, $V_{RMS}$	242 V
RMS Input current feed, $I_{RMS}$	0.067 A
Volt-Ampere or apparent power = $V_{RMS} * I_{RMS}$	16.19 VA
Displacement factor of AC power feed	0.98
Power factor of AC current feed	0.98
Total harmonic distortion of the current	6.26%
Total harmonic distortion of the voltage	1.1%

### Input Power Curve



### Efficiency

Radiated power efficiency	25.1%
Lumen efficiency	68 lm/W



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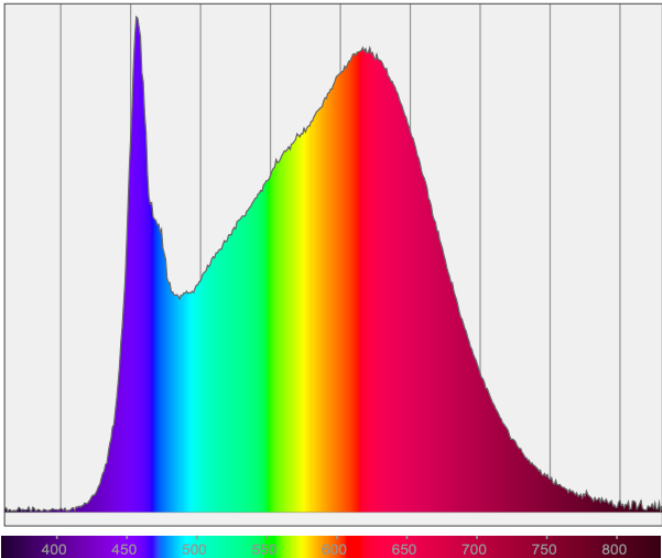
## Color Measurements

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



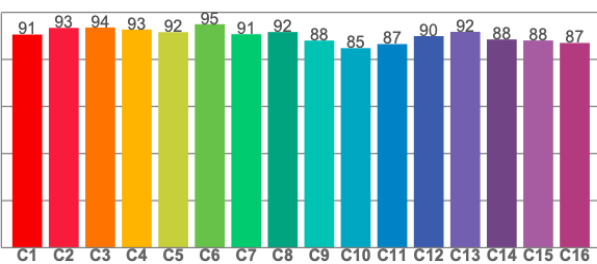
Color Rendering Index per reference color (CIE 1995)



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

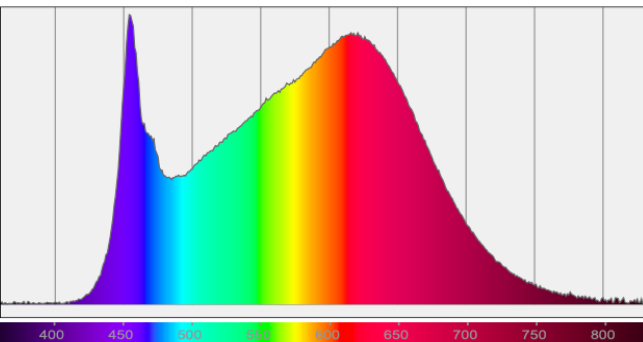
TM30-18 Rf-values per hue bin



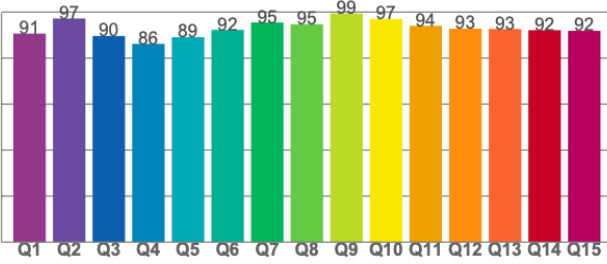
TM30 C values, 16 binned values out of total of 99 C values

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