

Tested Light Source - 1_PHOT_SKIN+BONES-4300lmChip-3000K-38Deg-HoneycombLouve_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)

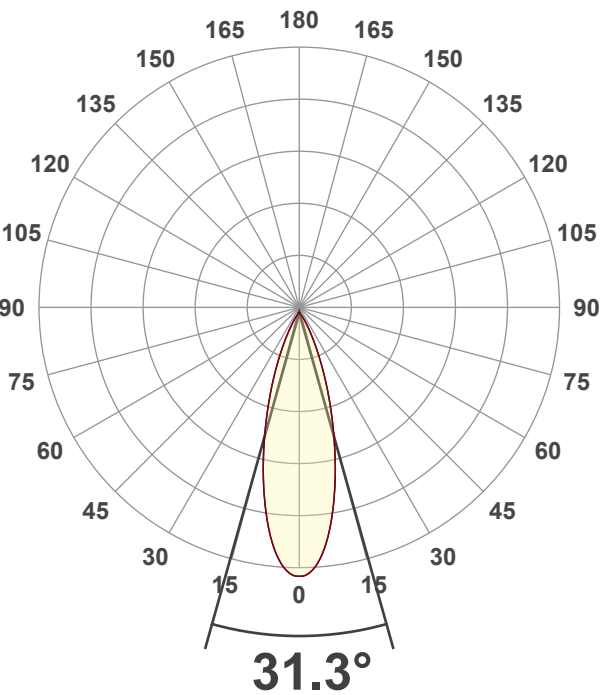
Measurement Conditions

Number of C-planes and Resolution	4 planes – 90°
γ (gamma)-Resolution	1.5°
Test Distance	1.50 m
Input Power, Power and Displ. Factors	41.5 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	2399 lm
Efficiency	58 lm/W
Peak Intensity and Beam Angle	6856 cd – 31.3°
Color Rendering Index	CRI 92.6

Light Intensity Distribution



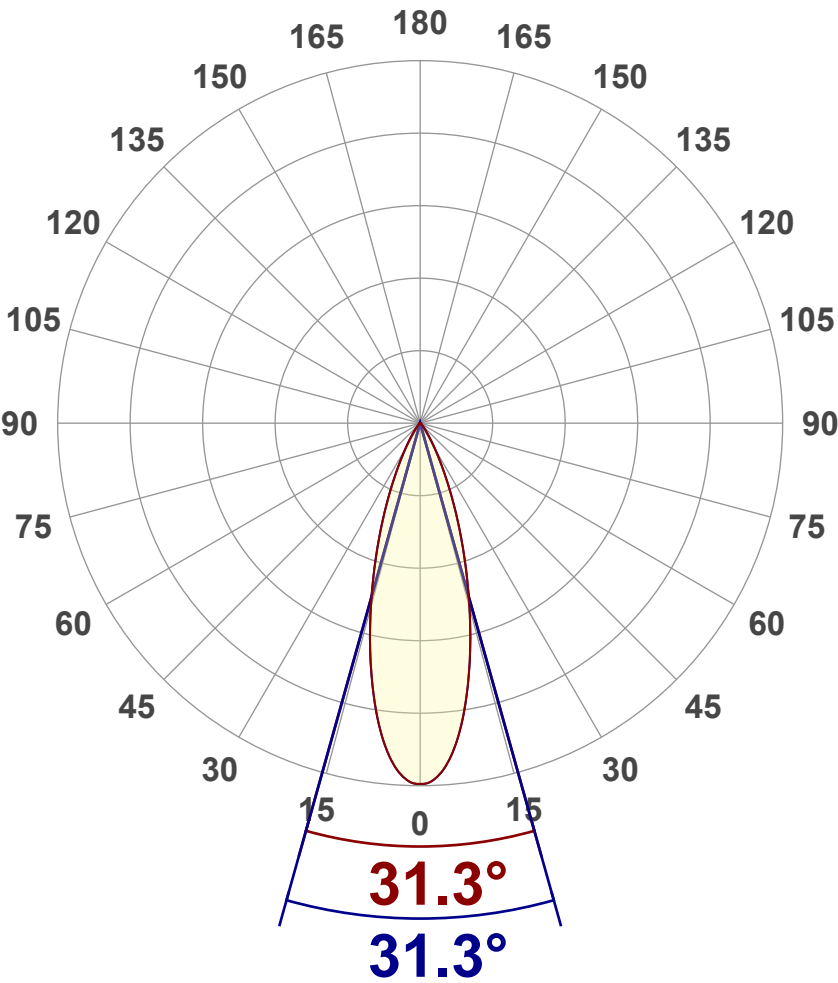
Goniophotometry Report

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Luminous Intensity diagram

Unit: 0-100% of peak intensity



Main Values

Output (total Lumen)	2399 lm
Peak Intensity	6856 cd
Beam Angle (50%)	31.3°
Beam Angle (90%)	31.3°
Beam Angle (10%)	31.3°

Cut-off Angle

Average 2,5%	74.3°
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Field Angle

Average 10%	57.4°
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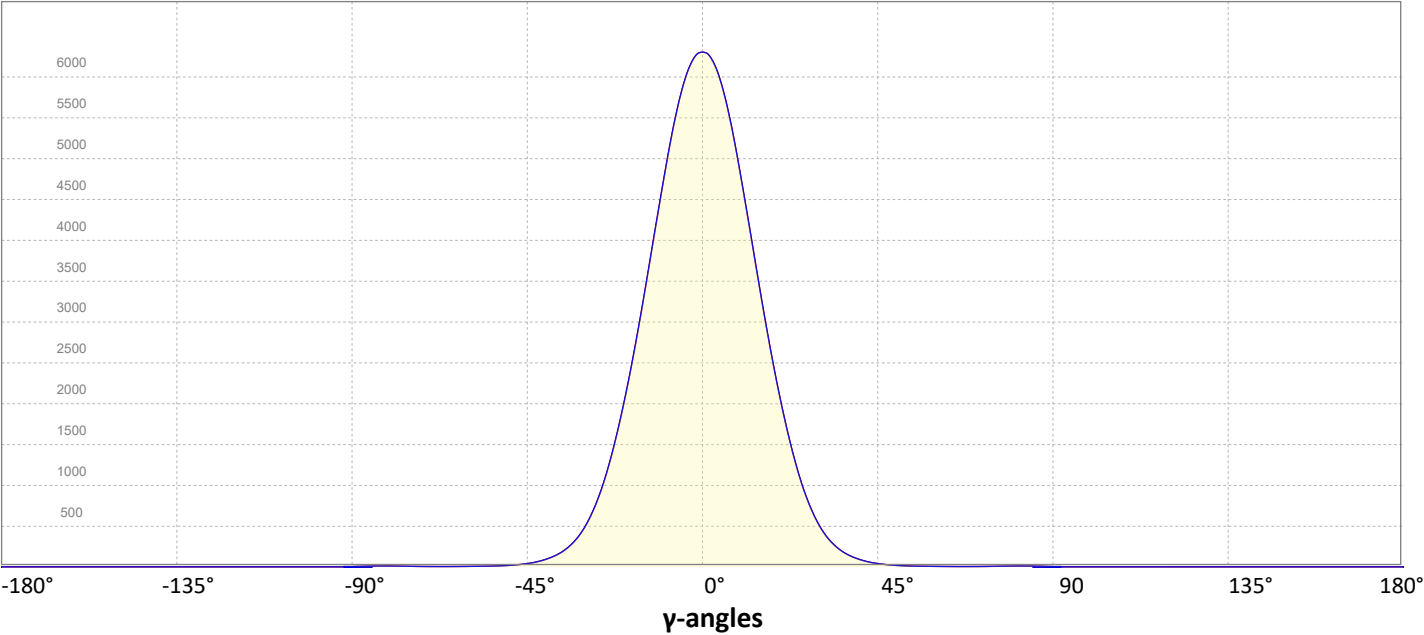
Intensity Ratio

In 120° cone	97.5%
In 90° cone	96.4%

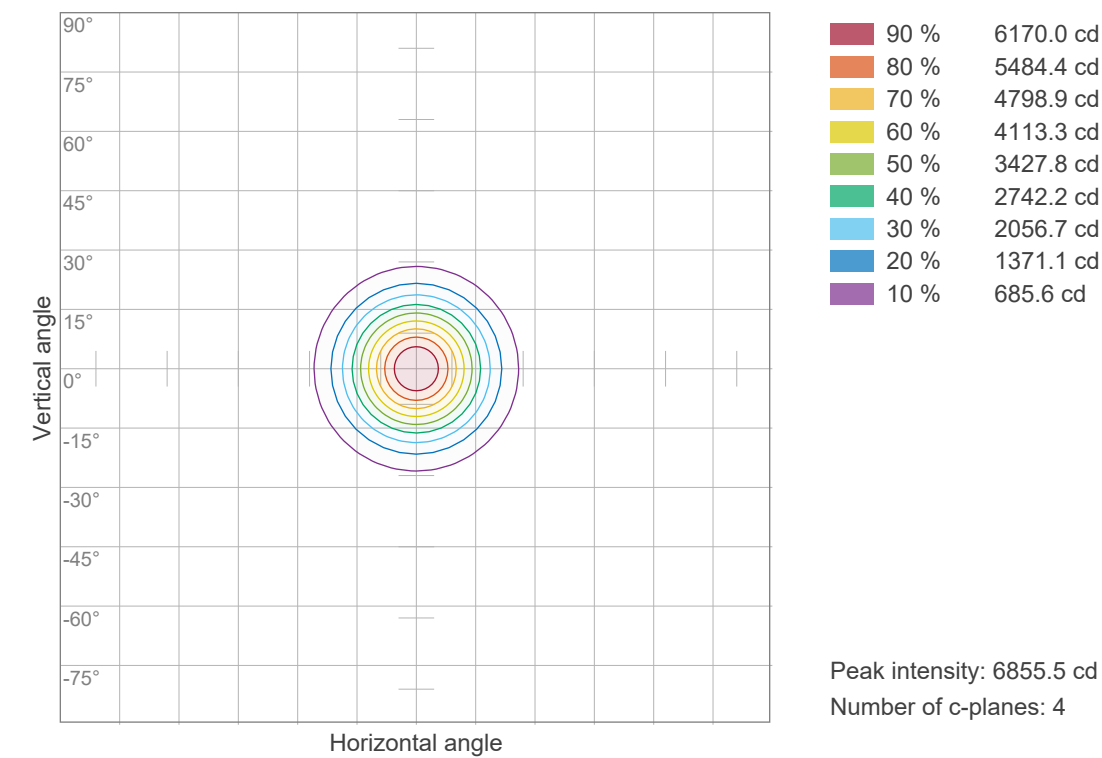
C000-C180

C090-C270

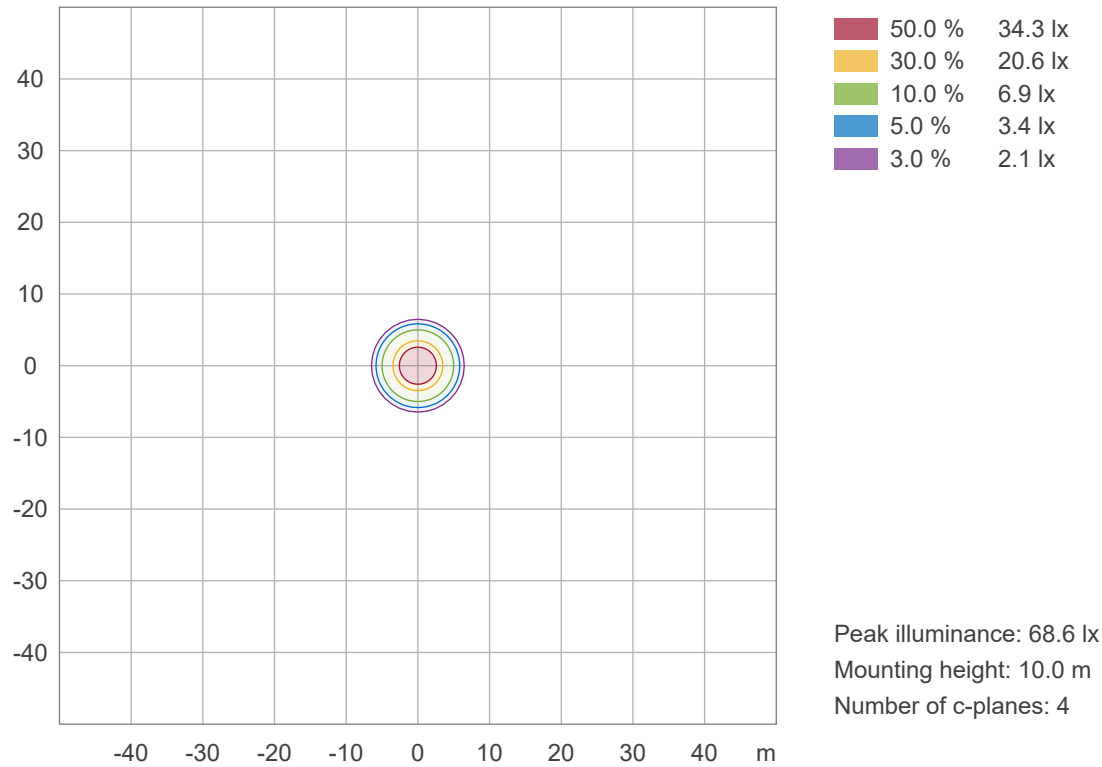
Linear distribution diagram - Intensity (candela) vs γ-angle



Iso-intensity Diagram (Iso-candela)



Iso-illuminance Diagram (Iso-lux)

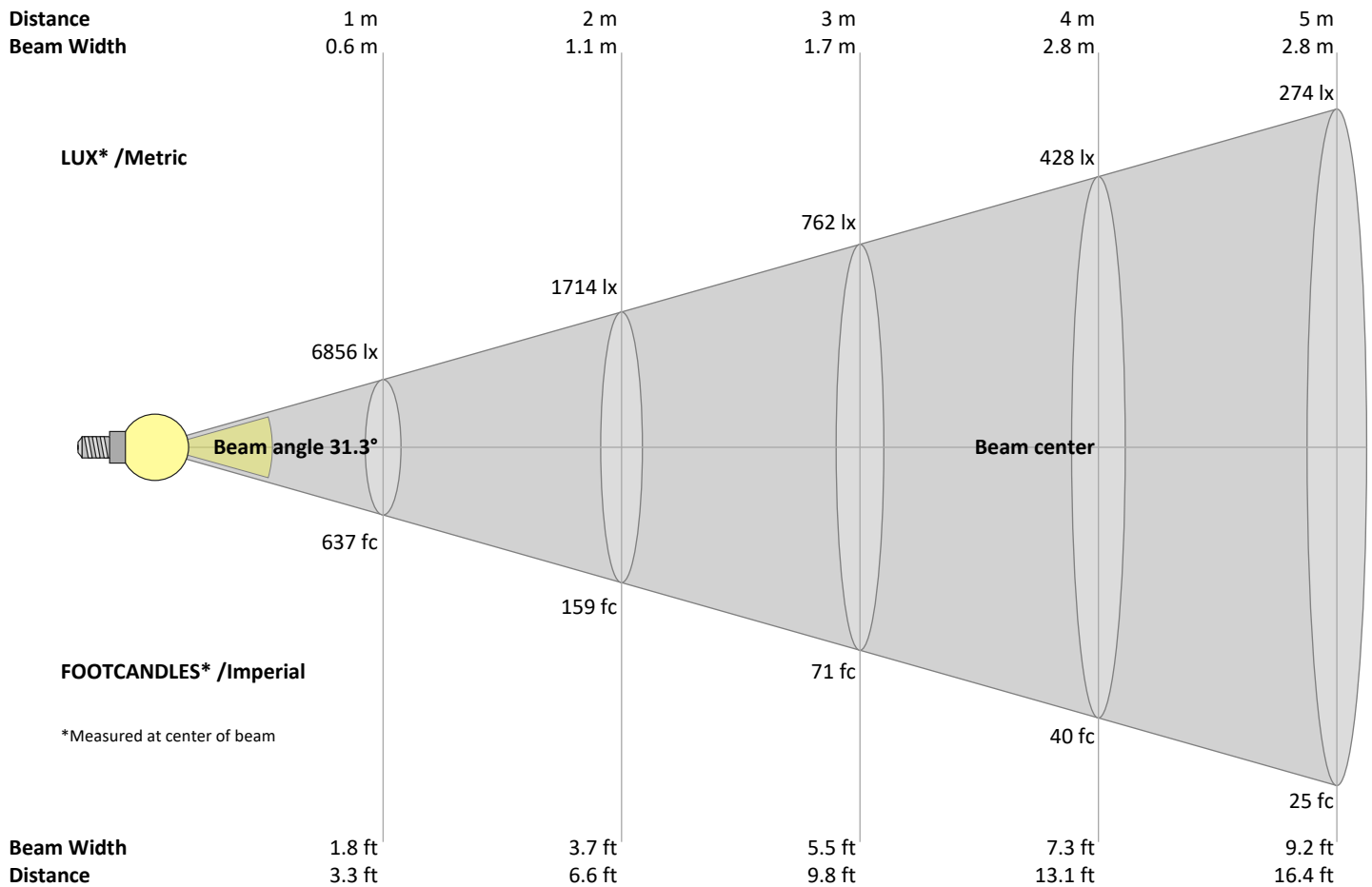


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Beam Details



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
6856	1714	762	428	274	190	140	107	85	69	57	48	41	35	30	27	24	21	19	17	lux
636.9	159.2	70.8	39.8	25.5	17.7	13	10	7.9	6.4	5.3	4.4	3.8	3.2	2.8	2.5	2.2	2	1.8	1.6	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
6856	6794	6580	6210	5730	5158	4551	3930	3325	2755	2237	1776	1371	1037	766	558	402	288	208	150	cd
100%	99%	96%	91%	84%	75%	66%	57%	48%	40%	33%	26%	20%	15%	11%	8%	6%	4%	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
6856	6794	6580	6210	5730	5158	4551	3930	3325	2755	2237	1776	1371	1037	766	558	402	288	208	150	cd
100%	99%	96%	91%	84%	75%	66%	57%	48%	40%	33%	26%	20%	15%	11%	8%	6%	4%	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
6856	6794	6580	6210	5730	5158	4551	3930	3325	2755	2237	1776	1371	1037	766	558	402	288	208	150	cd
100%	99%	96%	91%	84%	75%	66%	57%	48%	40%	33%	26%	20%	15%	11%	8%	6%	4%	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
6856	6794	6580	6210	5730	5158	4551	3930	3325	2755	2237	1776	1371	1037	766	558	402	288	208	150	cd
100%	99%	96%	91%	84%	75%	66%	57%	48%	40%	33%	26%	20%	15%	11%	8%	6%	4%	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	14.8	15.3	14.9	15.5	15.7	14.8	15.3	14.9	15.5	15.7
	3H	14.7	15.3	15.0	15.5	15.7	14.7	15.3	15.0	15.5	15.7
	4H	14.9	15.5	15.3	15.7	16.0	14.9	15.5	15.3	15.7	16.0
	6H	15.6	16.1	15.9	16.4	16.8	15.6	16.1	15.9	16.4	16.8
	8H	16.1	16.6	16.4	16.9	17.3	16.1	16.6	16.4	16.9	17.3
	12H	16.6	17.1	17.0	17.5	17.9	16.6	17.1	17.0	17.5	17.9
4H	2H	14.5	15.1	14.9	15.3	15.5	14.5	15.1	14.9	15.3	15.5
	3H	14.7	15.2	15.0	15.5	15.9	14.7	15.2	15.0	15.5	15.9
	4H	15.1	15.5	15.5	15.9	16.4	15.1	15.5	15.5	15.9	16.4
	6H	16.1	16.6	16.6	16.9	17.3	16.1	16.6	16.6	16.9	17.3
	8H	16.8	17.3	17.3	17.6	18.0	16.8	17.3	17.3	17.6	18.0
	12H	17.5	17.9	18.0	18.3	18.7	17.5	17.9	18.0	18.3	18.7
8H	4H	15.3	15.7	15.8	16.1	16.4	15.3	15.7	15.8	16.1	16.4
	6H	16.7	17.0	17.2	17.4	18.0	16.7	17.0	17.2	17.4	18.0
	8H	17.7	17.9	18.2	18.5	19.1	17.7	17.9	18.2	18.5	19.1
	12H	18.6	18.8	19.2	19.3	19.9	18.6	18.8	19.2	19.3	19.9
12H	4H	15.4	15.7	15.9	16.1	16.6	15.4	15.7	15.9	16.1	16.6
	6H	17.0	17.2	17.5	17.7	18.3	17.0	17.2	17.5	17.7	18.3
	8H	18.0	18.2	18.6	18.7	19.3	18.0	18.2	18.6	18.7	19.3
Variations with the observer position for the luminaire spacings, S:											
S = 1.0H		1.9 / -0.7					1.9 / -0.7				
S = 1.5H		3.7 / -0.8					3.7 / -0.8				
S = 2.0H		5.2 / -0.9					5.2 / -0.9				

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	101	101	101	99
1	114	111	109	107	111	109	107	105	105	103	102	101	100	99	98	97	96	94
2	109	105	102	99	107	103	100	98	100	98	95	97	95	93	94	93	91	89
3	105	100	96	92	103	98	94	91	96	92	90	93	91	88	91	89	87	85
4	101	95	90	87	99	94	90	86	92	88	85	90	87	84	88	85	83	82
5	97	91	86	82	96	90	85	82	88	84	81	86	83	80	85	82	80	78
6	94	87	82	78	93	86	81	78	84	80	77	83	79	77	82	79	76	75
7	91	83	78	75	89	82	78	75	81	77	74	80	76	74	79	76	73	72
8	87	80	75	72	86	79	75	71	78	74	71	77	73	71	76	73	70	69
9	85	77	72	69	84	76	72	69	75	71	68	75	71	68	74	70	68	67
10	82	74	69	66	81	74	69	66	73	69	66	72	68	66	71	68	65	64

Goniophotometry Report

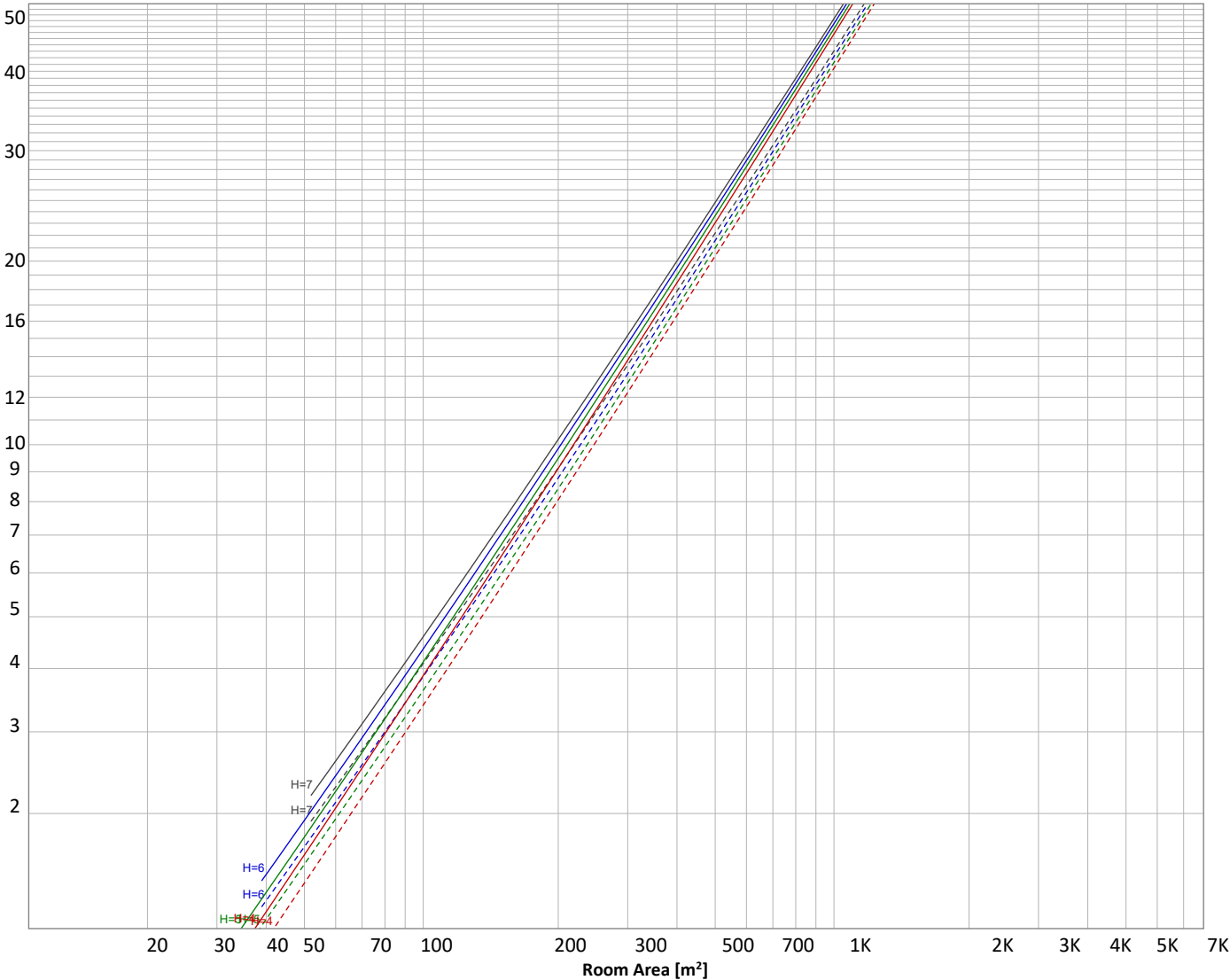
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Luminaire budgetary diagram

Uncorrected, comprehensive UGR table according to 117-1995

LAMPS (number of lamps)



Conditions

H = Room height	Flux = 2399 lm	ρ(%)		
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
				20

Zonal Lumen Summary

0°-10°	10°-20°	20°-30°	30°-40°	40°-50°	50°-60°	60°-70°	70°-80°	80°-90°
571 lm	989 lm	560 lm	166 lm	40.5 lm	12.7 lm	8.67 lm	11.7 lm	13.7 lm
90°-100°	100°-110°	110°-120°	120°-130°	130°-140°	140°-150°	150°-160°	160°-170°	170°-180°
5.08 lm	4.14 lm	3.89 lm	3.51 lm	3.03 lm	2.46 lm	1.81 lm	1.11 lm	0.374 lm

Outdoor Light Planning

Lumen per Zone

Zone (γ)	Lumen	% Total
0-10°	571 lm	23.8%
10-20°	989 lm	41.2%
20-30°	560 lm	23.4%
30-40°	166 lm	6.9%
40-50°	41 lm	1.7%
50-60°	13 lm	0.5%
60-70°	9 lm	0.4%
70-80°	12 lm	0.5%
80-90°	14 lm	0.6%
90-100°	5 lm	0.2%
100-110°	4 lm	0.2%
110-120°	4 lm	0.2%
120-130°	4 lm	0.1%
130-140°	3 lm	0.1%
140-150°	2 lm	0.1%
150-160°	2 lm	0.1%
160-170°	1 lm	0.0%
170-180°	0 lm	0.0%
Total	2399 lm	100.0%

Intensity peaks

Max intensity	6856 cd
Intensity, 90°	8 cd
Intensity, 0°	6856 cd

Zonal Lumen summary

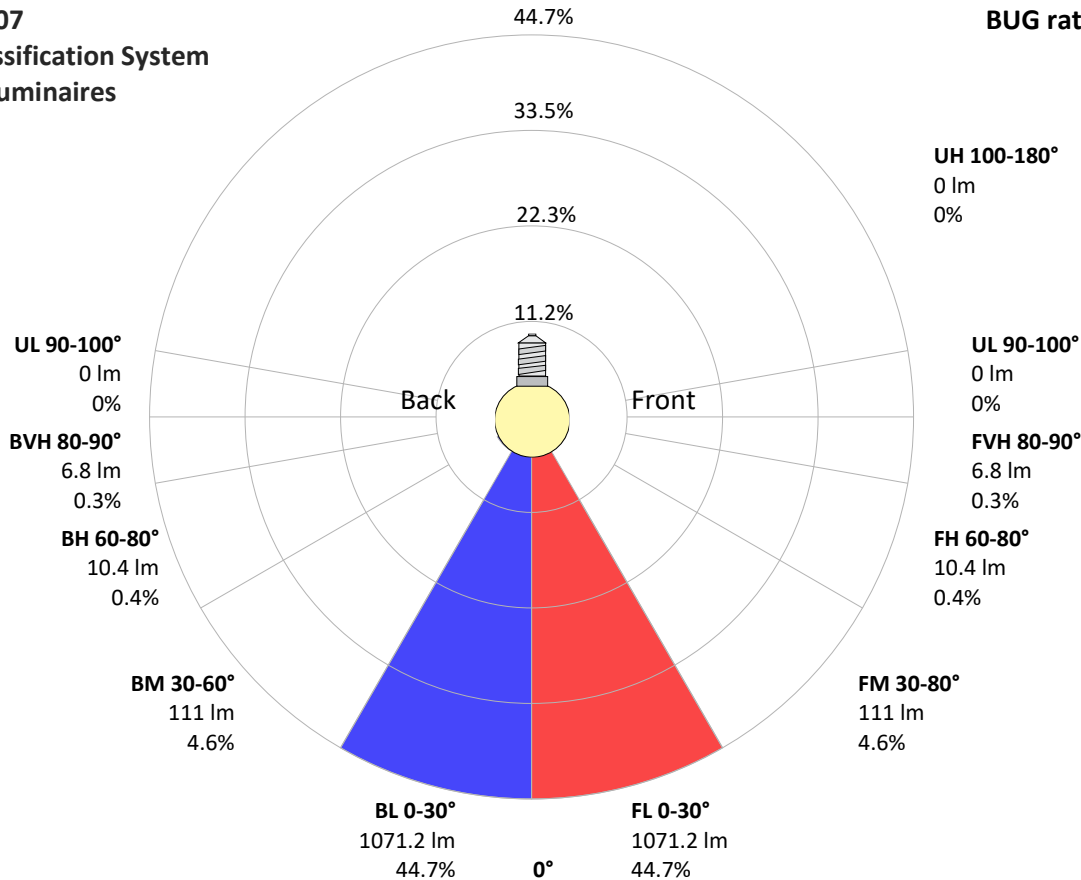
Zone (γ)	Lumen	% Total
0-30°	2120 lm	88.4%
0-40°	2286 lm	95.3%
0-60°	2339 lm	97.5%
60-90°	34 lm	1.4%
70-100°	30 lm	1.3%
90-120°	13 lm	0.5%
0-90°	2374 lm	98.9%
90-180°	25 lm	1.1%
0-180°	2399 lm	100.0%

BUG rating

	Lumen	% Total
Forward light		
Low(0-30°)	1071 lm	44.7%
Medium(30-60°)	111 lm	4.6%
High(60-80°)	10 lm	0.4%
Very high(80-90°)	7 lm	0.3%
Back light		
Low(0-30°)	1071 lm	44.7%
Medium(30-60°)	111 lm	4.6%
High(60-80°)	10 lm	0.4%
Very high(80-90°)	7 lm	0.3%
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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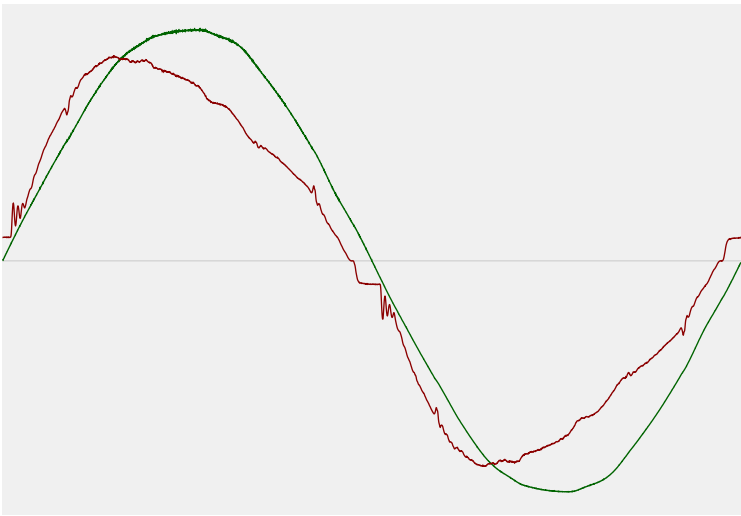


Power Details

Input Power

Power feed to light source	41.5 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 = $V_{RMS} \cdot I_{RMS}$	42.92 VA
Displacement factor of AC power feed	0.97
Power factor of AC current feed	0.97
Total harmonic distortion of the current	11.01%
Total harmonic distortion of the voltage	1.23%

Input Power Curve



Efficiency

Radiated power efficiency	20.9%
Lumen efficiency	58 lm/W

Goniophotometry Report

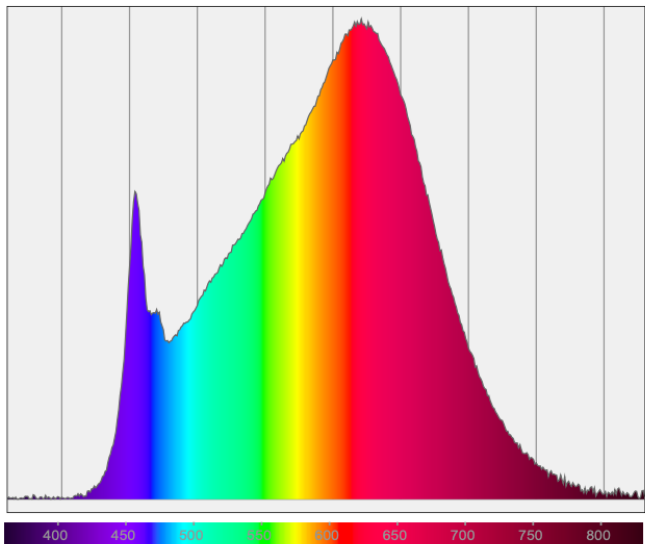
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Color Measurements

Correlated Color Temperature	CCT = 3000 K
Color Rendering TM30-18	R _f 91.0 — R _g 97.7
Color Shift, CIE duv	Duv ±0.0003

Spectral distribution



Color details

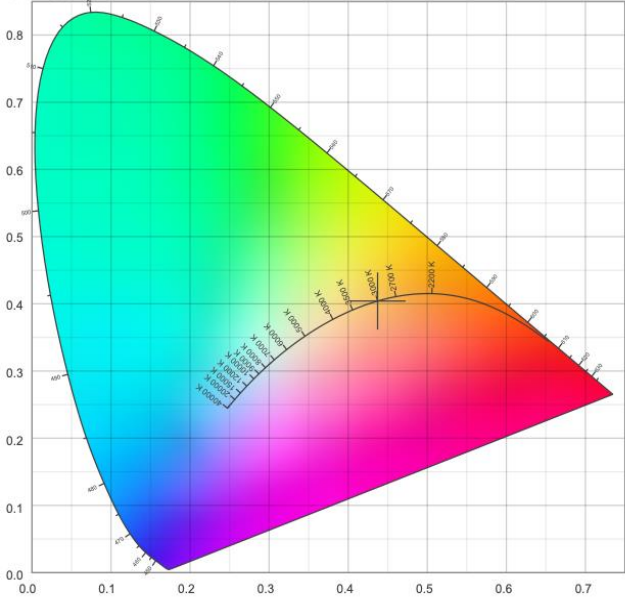
Correlated Color Temperature	CCT = 3000 K	Color coordinates CIE 1931	(x;y) = (0.437;0.404)
Color Rendering Index	CRI 94.1	Color coordinate CIEs 1960	(u;v) = (0.251;0.348)
Color Rendering Index, R9 (red component)	R9 = 68.6	Color deviation from BBL	Duv = ±0.0003
Color Rendering TM30-18	R _f 91.0 — R _g 97.7	Color coordinate CIEs 1976 (CIELUV)	(u';v') = (0.251;0.251)
Color Quality Scale	CQS = 91.8		

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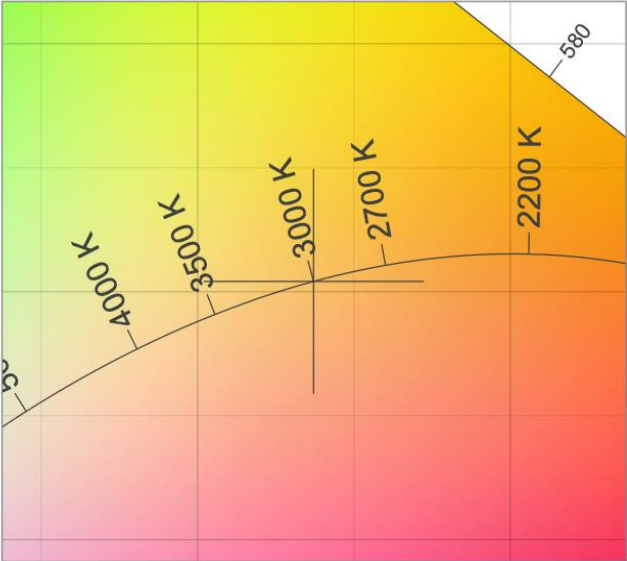
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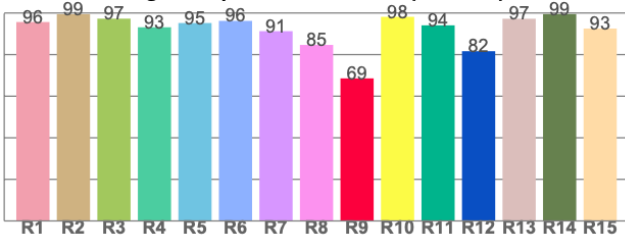
CIE 1931



CIE 1931 – zoomed on Planckian locus



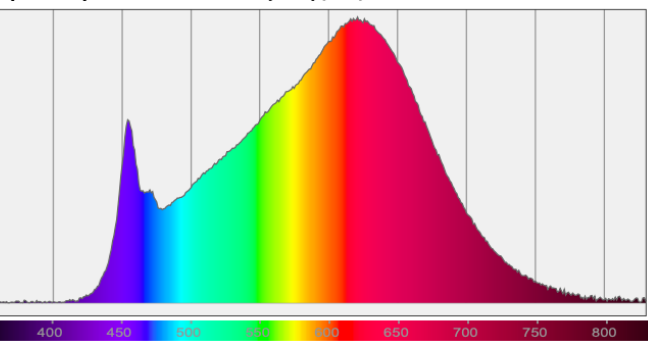
Color Rendering Index per reference color (CIE 1995)



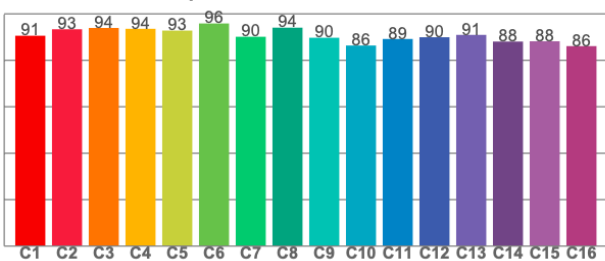
CRI R values, only R1-R8 are used to calculate final CRI value

R1	R2	R3	R4	R5	R6	R7	R8	R9	R10	R11	R12	R13	R14	R15
95.7	99.5	97.3	93.1	95.2	96.2	91.3	84.6	68.6	98.2	94.1	81.6	97.2	99.5	92.5

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



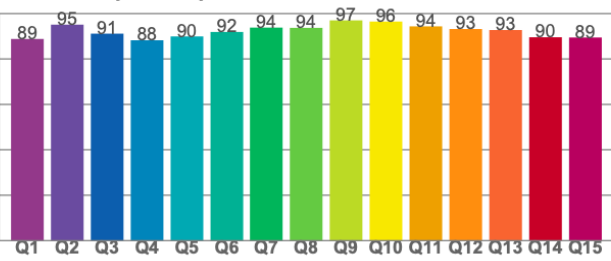
TM30-18 Rf-values per hue bin



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
90.6	93.4	93.9	93.6	92.8	95.9	90.1	94.0	89.7	86.4	89.2	89.9	90.9	88.1	88.2	86.1

Color Quality Scale by reference color



CQS Q values

Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10	Q11	Q12	Q13	Q14	Q15
88.8	95.1	91.2	88.2	89.9	91.9	93.8	93.7	97.0	96.5	94.4	93.2	92.8	89.6	89.5