

Tested Light Source - 1_PHOT_SKIN+BONES-4300lmChip-3000K-21Deg-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)

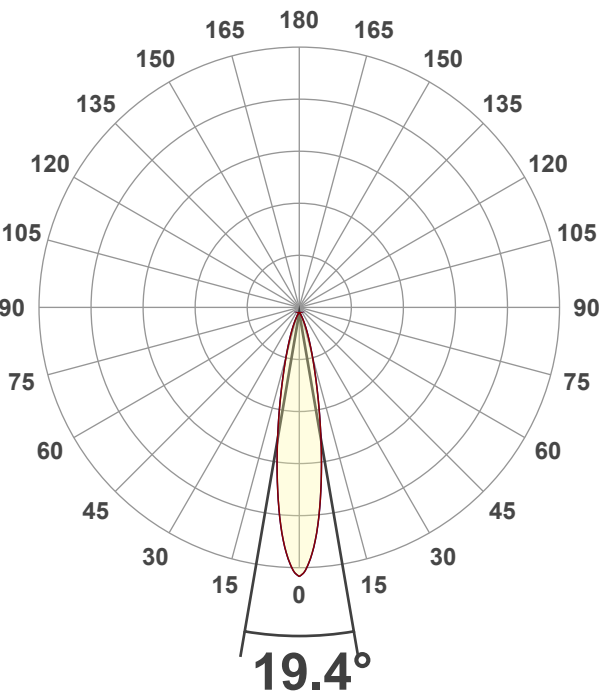
Measurement Conditions

Number of C-planes and Resolution	4 planes – 90°
γ (gamma)-Resolution	1°
Test Distance	1.50 m
Input Power, Power and Displ. Factors	41.4 W – PF 0.97 – DPF 0.97
Input RMS Voltage and Current	242 V – 0.177 A
Frequency of Input Power	50.1 Hz

Main Light Measurement Results

Output	2695 lm
Efficiency	65 lm/W
Peak Intensity and Beam Angle	15501 cd – 19.4°
Color Rendering Index	CRI 92.7

Light Intensity Distribution



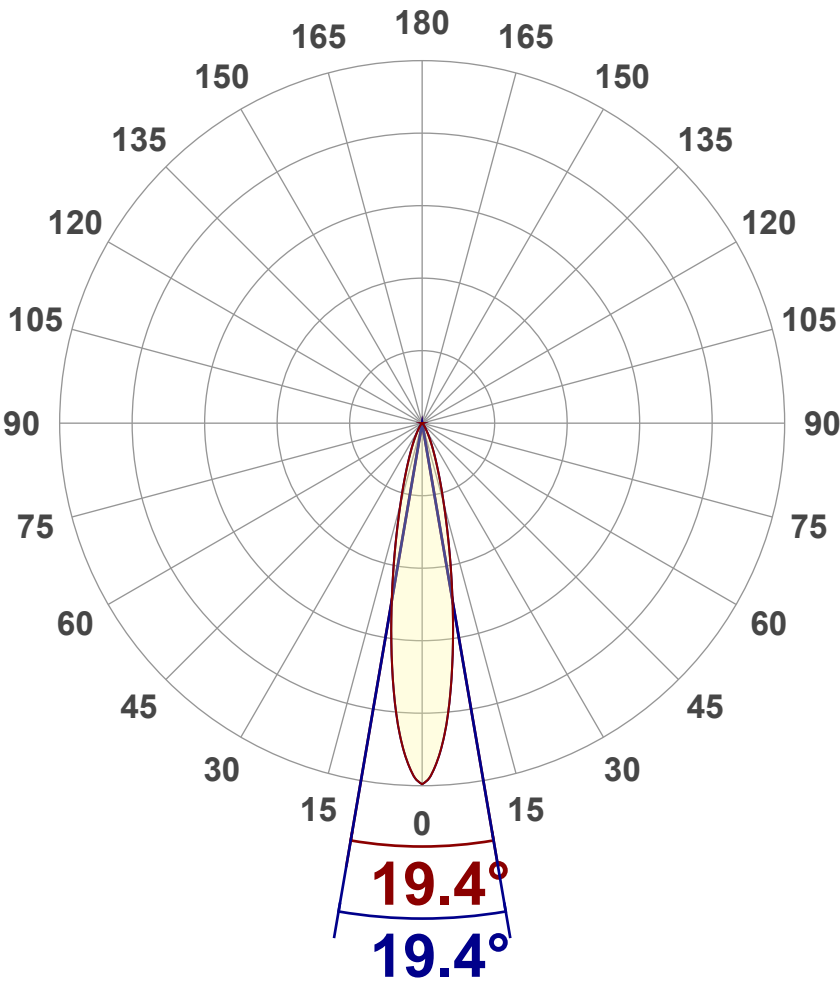
Goniophotometry Report

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Luminous Intensity diagram

Unit: 0-100% of peak intensity



Main Values

Output (total Lumen)	2695 lm
Peak Intensity	15501 cd
Beam Angle (50%)	19.4°
Beam Angle (90%)	19.4°
Beam Angle (10%)	19.4°

Cut-off Angle

Average 2,5%	60.2°
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Field Angle

Average 10%	41.5°
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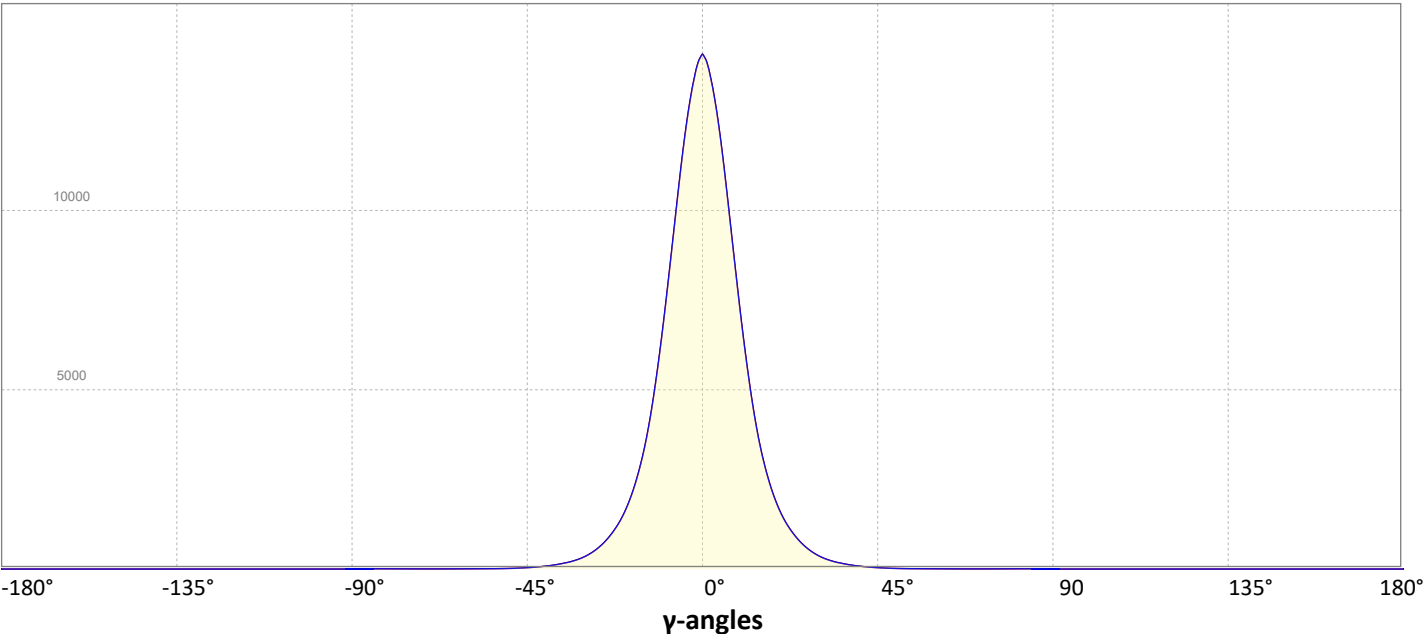
Intensity Ratio

In 120° cone	98.2%
In 90° cone	97.3%

C000-C180

C090-C270

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

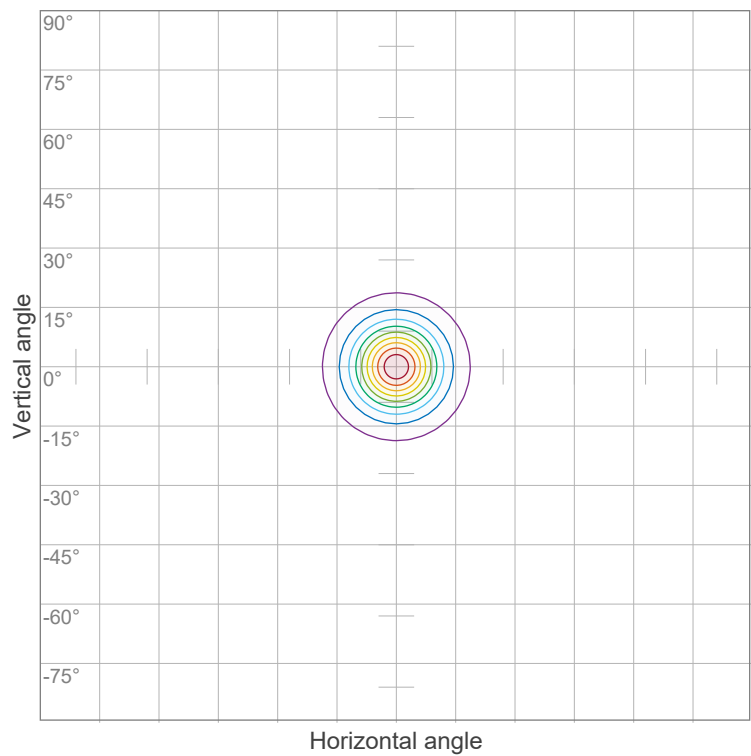


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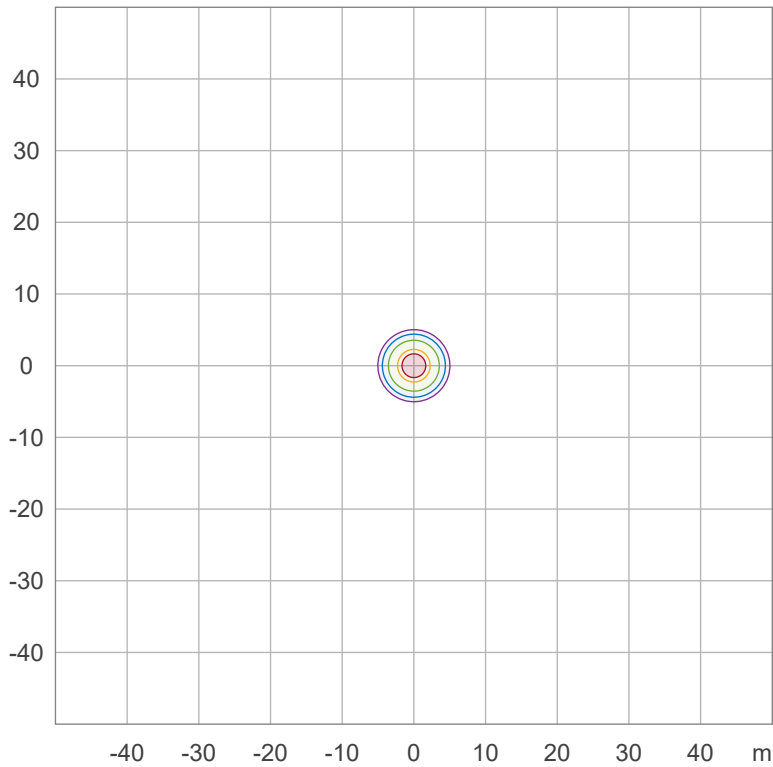
Iso-intensity Diagram (Iso-candela)



90 %	13951.1 cd
80 %	12401.0 cd
70 %	10850.8 cd
60 %	9300.7 cd
50 %	7750.6 cd
40 %	6200.5 cd
30 %	4650.4 cd
20 %	3100.2 cd
10 %	1550.1 cd

Peak intensity: 15501.2 cd
Number of c-planes: 4

Iso-illuminance Diagram (Iso-lux)



50.0 %	77.5 lx
30.0 %	46.5 lx
10.0 %	15.5 lx
5.0 %	7.8 lx
3.0 %	4.7 lx

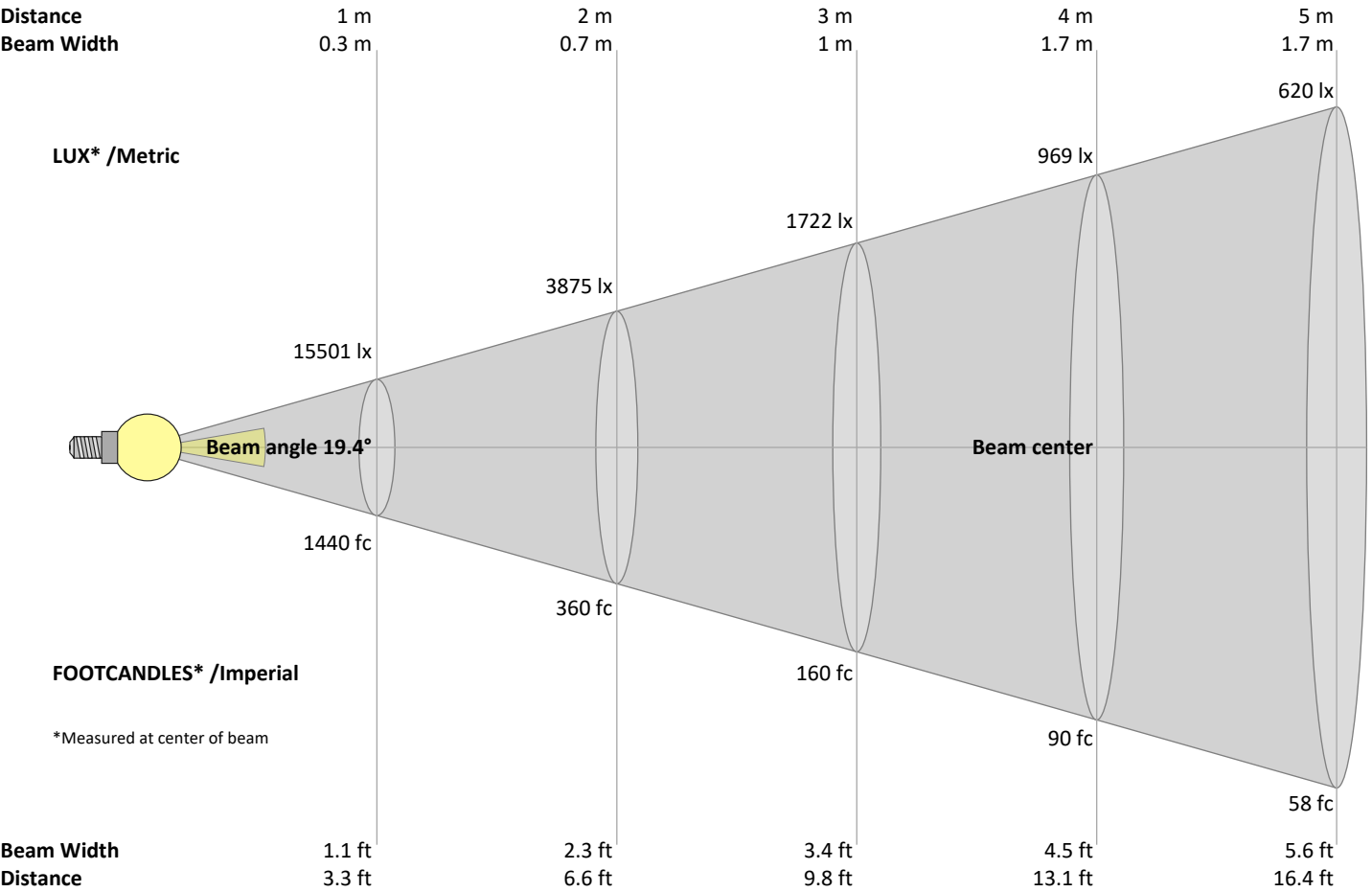
Peak illuminance: 155.0 lx
Mounting height: 10.0 m
Number of c-planes: 4

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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
15501	3875	1722	969	620	431	316	242	191	155	128	108	92	79	69	61	54	48	43	39	lux
1440.1	360	160	90	57.6	40	29.4	22.5	17.8	14.4	11.9	10	8.5	7.3	6.4	5.6	5	4.4	4	3.6	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
15.5K	14.9K	13.5K	11.6K	9.5K	7.5K	5.7K	4.2K	3.1K	2.3K	1.7K	1.3K	1.0K	0.7K	0.5K	0.4K	0.3K	0.2K	0.2K	0.1K	cd
100%	96%	87%	75%	61%	48%	37%	27%	20%	15%	11%	8%	6%	5%	3%	3%	2%	1%	1%	1%	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
15.5K	14.9K	13.5K	11.6K	9.5K	7.5K	5.7K	4.2K	3.1K	2.3K	1.7K	1.3K	1.0K	0.7K	0.5K	0.4K	0.3K	0.2K	0.2K	0.1K	cd
100%	96%	87%	75%	61%	48%	37%	27%	20%	15%	11%	8%	6%	5%	3%	3%	2%	1%	1%	1%	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
15.5K	14.9K	13.5K	11.6K	9.5K	7.5K	5.7K	4.2K	3.1K	2.3K	1.7K	1.3K	1.0K	0.7K	0.5K	0.4K	0.3K	0.2K	0.2K	0.1K	cd
100%	96%	87%	75%	61%	48%	37%	27%	20%	15%	11%	8%	6%	5%	3%	3%	2%	1%	1%	1%	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
15.5K	14.9K	13.5K	11.6K	9.5K	7.5K	5.7K	4.2K	3.1K	2.3K	1.7K	1.3K	1.0K	0.7K	0.5K	0.4K	0.3K	0.2K	0.2K	0.1K	cd
100%	96%	87%	75%	61%	48%	37%	27%	20%	15%	11%	8%	6%	5%	3%	3%	2%	1%	1%	1%	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											
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	13.0	13.4	13.0	13.6	13.7	13.0	13.4	13.0	13.6	13.7
	3H	12.9	13.5	13.2	13.6	13.8	12.9	13.5	13.2	13.6	13.8
	4H	13.1	13.6	13.5	13.9	14.1	13.1	13.6	13.5	13.9	14.1
	6H	13.6	14.1	13.9	14.4	14.7	13.6	14.1	13.9	14.4	14.7
	8H	14.0	14.5	14.4	14.8	15.2	14.0	14.5	14.4	14.8	15.2
	12H	14.6	15.0	14.9	15.4	15.8	14.6	15.0	14.9	15.4	15.8
4H	2H	12.7	13.2	13.1	13.5	13.7	12.7	13.2	13.1	13.5	13.7
	3H	12.9	13.4	13.3	13.7	14.1	12.9	13.4	13.3	13.7	14.1
	4H	13.2	13.6	13.6	14.0	14.6	13.2	13.6	13.6	14.0	14.6
	6H	14.0	14.5	14.5	14.8	15.2	14.0	14.5	14.5	14.8	15.2
	8H	14.6	15.1	15.2	15.4	15.8	14.6	15.1	15.2	15.4	15.8
	12H	15.4	15.7	15.9	16.1	16.6	15.4	15.7	15.9	16.1	16.6
8H	4H	13.4	13.8	13.9	14.1	14.5	13.4	13.8	13.9	14.1	14.5
	6H	14.5	14.8	15.0	15.3	15.8	14.5	14.8	15.0	15.3	15.8
	8H	15.4	15.6	15.9	16.2	16.8	15.4	15.6	15.9	16.2	16.8
	12H	16.5	16.6	17.1	17.2	17.8	16.5	16.6	17.1	17.2	17.8
12H	4H	13.4	13.7	13.9	14.1	14.6	13.4	13.7	13.9	14.1	14.6
	6H	14.8	15.0	15.3	15.5	16.1	14.8	15.0	15.3	15.5	16.1
	8H	15.7	15.9	16.3	16.4	17.0	15.7	15.9	16.3	16.4	17.0

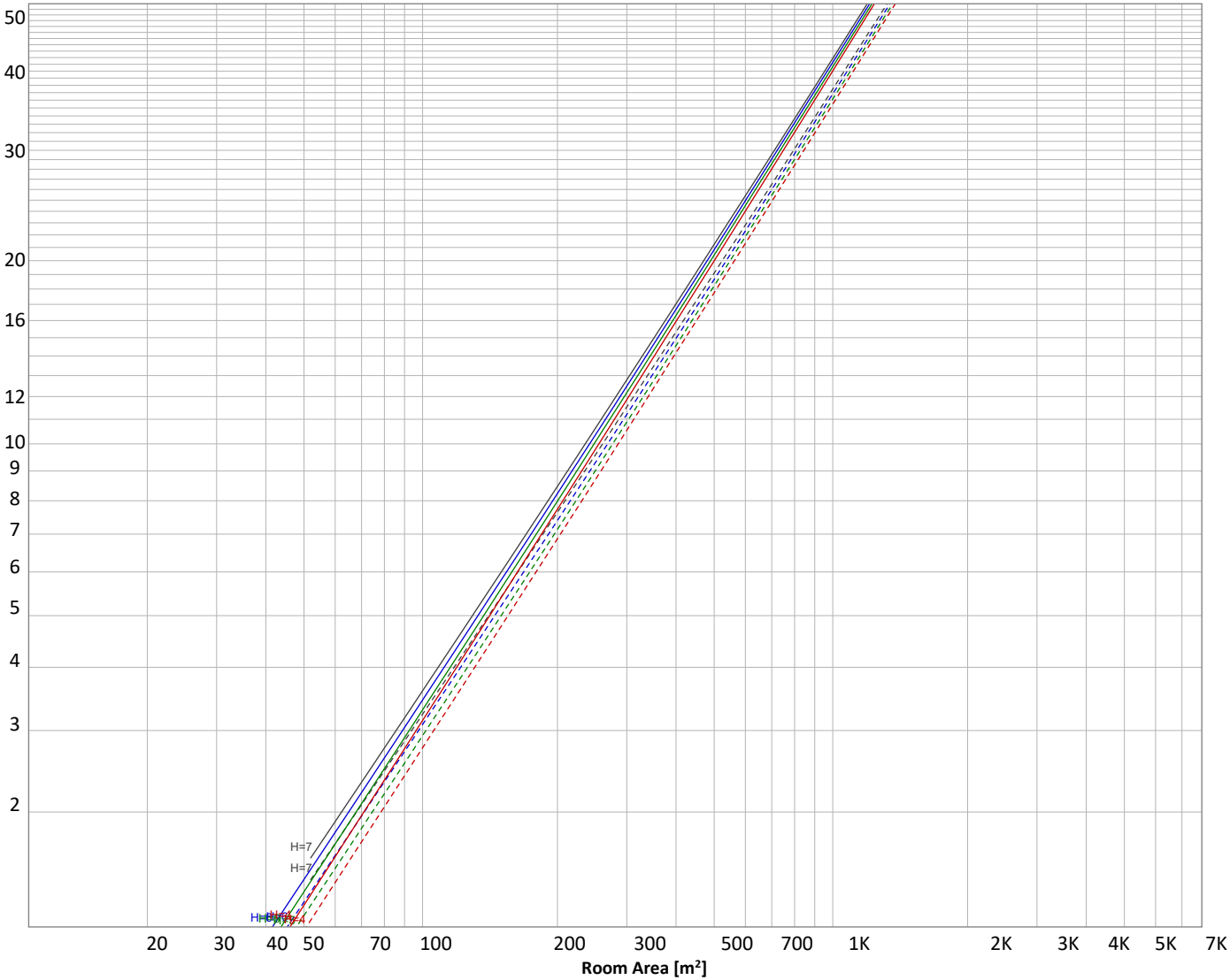
Variations with the observer position for the luminaire spacings, S:

S = 1.0H	1.7 / -0.7	1.7 / -0.7
S = 1.5H	3.4 / -0.8	3.4 / -0.8
S = 2.0H	4.9 / -0.9	4.9 / -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	115	112	110	109	112	110	108	107	106	105	103	102	101	100	99	98	97	95
2	111	107	104	101	109	105	102	100	102	100	98	99	97	96	96	95	93	92
3	107	102	98	96	105	101	97	95	98	95	93	96	94	92	94	92	90	89
4	104	98	94	91	102	97	93	90	95	92	89	93	90	88	91	89	87	86
5	101	94	90	87	99	94	90	87	92	89	86	90	87	85	89	86	84	83
6	98	91	87	84	96	90	87	84	89	86	83	88	85	82	87	84	82	81
7	95	88	84	81	94	88	84	81	86	83	80	85	82	80	84	82	80	78
8	92	86	81	79	91	85	81	78	84	81	78	83	80	78	82	79	77	76
9	90	83	79	76	89	83	79	76	82	78	76	81	78	76	80	77	75	74
10	88	81	77	74	87	80	77	74	80	76	74	79	76	74	78	76	73	72

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



Conditions		p(%)			
H = Room height	Flux = 2695 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°
1031 lm	1034 lm	403 lm	129 lm	37.0 lm	13.0 lm	8.49 lm	8.81 lm	10.1 lm
90°-100°	100°-110°	110°-120°	120°-130°	130°-140°	140°-150°	150°-160°	160°-170°	170°-180°
4.09 lm	3.40 lm	3.19 lm	2.88 lm	2.49 lm	2.02 lm	1.49 lm	0.911 lm	0.307 lm

Outdoor Light Planning

Lumen per Zone

Zone (γ)	Lumen	% Total
0-10°	1031 lm	38.3%
10-20°	1034 lm	38.4%
20-30°	403 lm	14.9%
30-40°	129 lm	4.8%
40-50°	37 lm	1.4%
50-60°	13 lm	0.5%
60-70°	8 lm	0.3%
70-80°	9 lm	0.3%
80-90°	10 lm	0.4%
90-100°	4 lm	0.2%
100-110°	3 lm	0.1%
110-120°	3 lm	0.1%
120-130°	3 lm	0.1%
130-140°	2 lm	0.1%
140-150°	2 lm	0.1%
150-160°	1 lm	0.1%
160-170°	1 lm	0.0%
170-180°	0 lm	0.0%
Total	2695 lm	100.0%

Intensity peaks

Max intensity	15501 cd
Intensity, 90°	6 cd
Intensity, 0°	15501 cd

Zonal Lumen summary

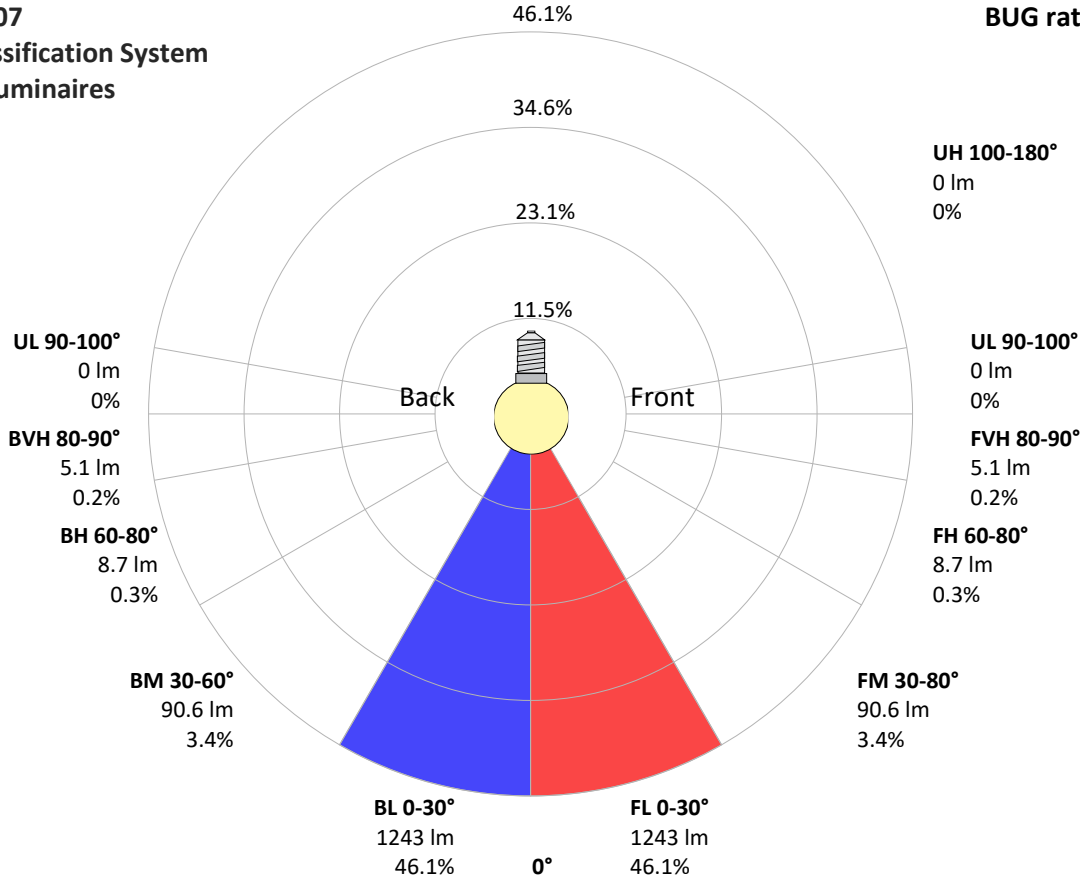
Zone (γ)	Lumen	% Total
0-30°	2468 lm	91.6%
0-40°	2597 lm	96.4%
0-60°	2647 lm	98.2%
60-90°	27 lm	1.0%
70-100°	23 lm	0.9%
90-120°	11 lm	0.4%
0-90°	2674 lm	99.2%
90-180°	21 lm	0.8%
0-180°	2695 lm	100.0%

BUG rating

	Lumen	% Total
Forward light		
Low(0-30°)	1243 lm	46.1%
Medium(30-60°)	91 lm	3.4%
High(60-80°)	9 lm	0.3%
Very high(80-90°)	5 lm	0.2%
Back light		
Low(0-30°)	1243 lm	46.1%
Medium(30-60°)	91 lm	3.4%
High(60-80°)	9 lm	0.3%
Very high(80-90°)	5 lm	0.2%
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

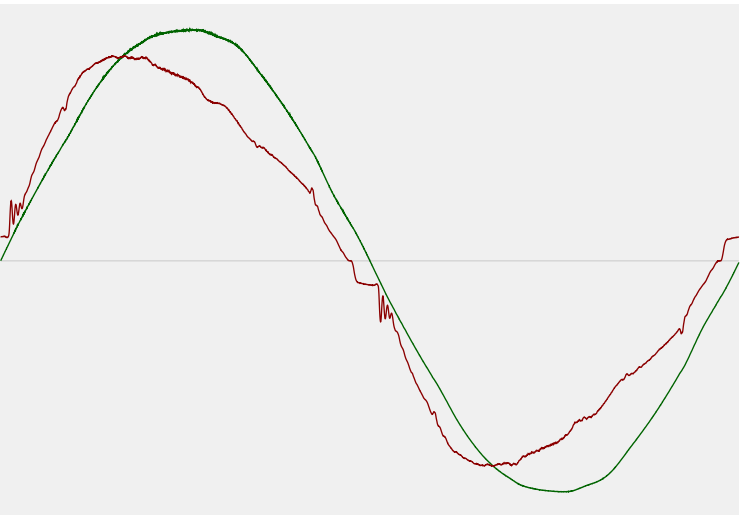
Input Power

Power feed to light source	41.4 W
Frequency of input power	50.1 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	10.78%
Total harmonic distortion of the voltage	1.22%

Efficiency

Radiated power efficiency	23.6%
<div><div></div></div>	
Lumen efficiency	65 lm/W
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Input Power Curve



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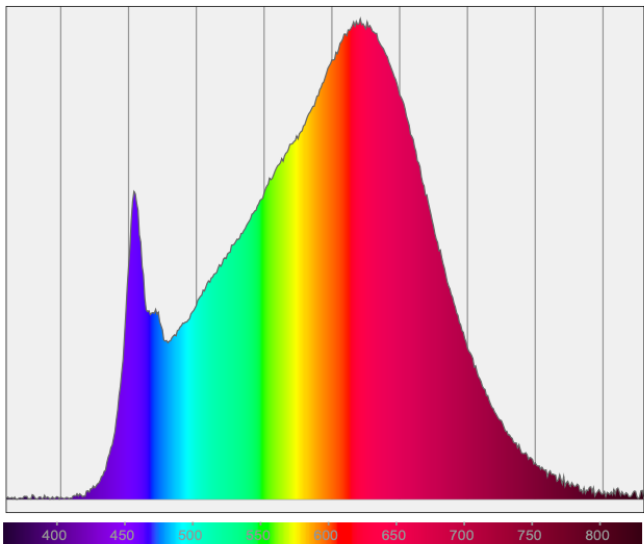
Color Measurements

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

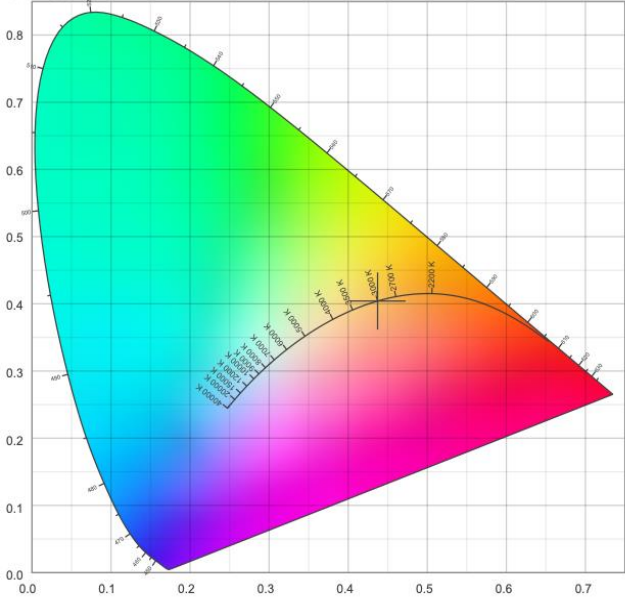
Correlated Color Temperature	CCT = 3000 K	Color coordinates CIE 1931	(x;y) = (0.437;0.404)
Color Rendering Index	CRI 94.1	Color coordinate CIEs 1960	(u;v) = (0.251;0.348)
Color Rendering Index, R9 (red component)	R9 = 68.6	Color deviation from BBL	Duv = ±0.0003
Color Rendering TM30-18	R _f 91.0 — R _g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

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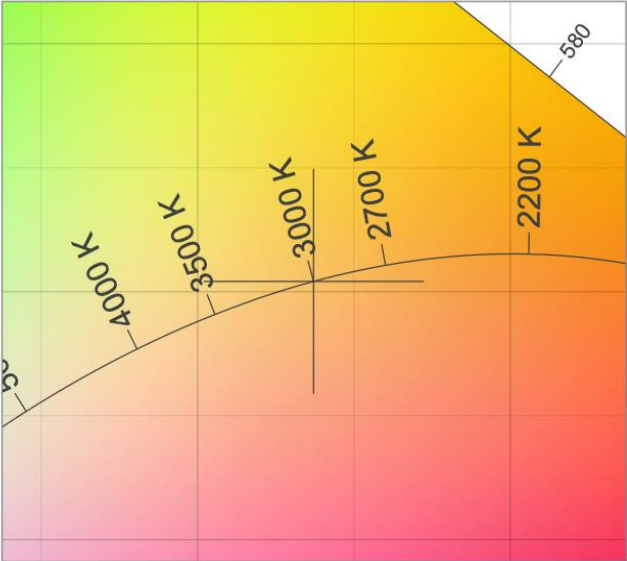
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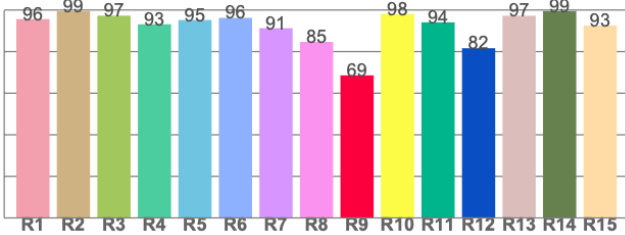
CIE 1931



CIE 1931 – zoomed on Planckian locus



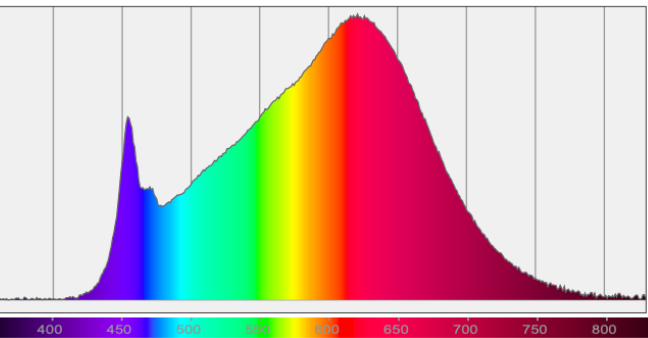
Color Rendering Index per reference color (CIE 1995)



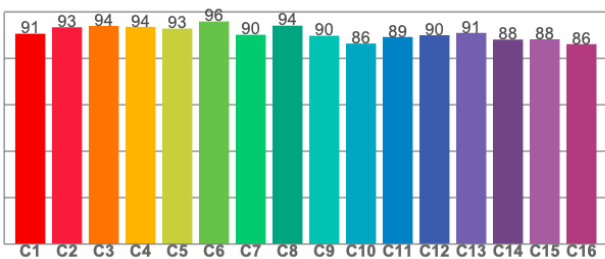
CRI R values, only R1-R8 are used to calculate final CRI value

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%



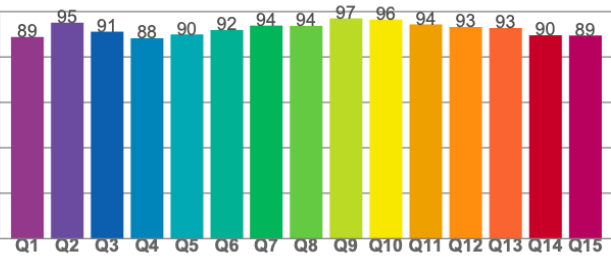
TM30-18 Rf-values per hue bin



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