Goniophotometry Report

1_PHOT_NINETY-NINE-1750lmChip-3000K-38Deg-HoneycombLouvre_2303
www.factorylux.com

Tested Light Source - 1_PHOT_NINETY-NINE-1750lmChip-3000K-38Deg-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)

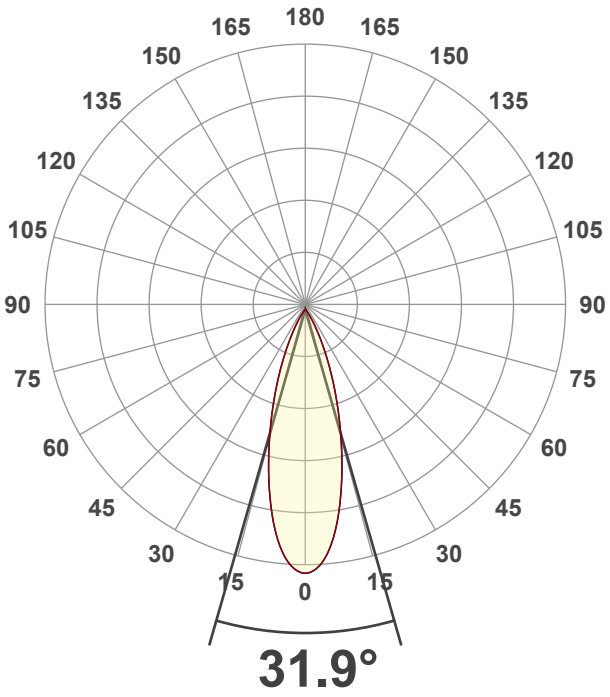
Measurement Conditions

Number of C-planes and Resolution	32 planes – 11.25°
γ (gamma)-Resolution	1.5°
Test Distance	1.50 m
Input Power, Power and Displ. Factors	14.6 W – PF 0.46 – DPF 0.8
Input RMS Voltage and Current	240 V – 0.132 A
Frequency of Input Power	50 Hz

Main Light Measurement Results

Output	852 lm
Efficiency	59 lm/W
Peak Intensity and Beam Angle	2407 cd – 31.9°
Color Rendering Index	CRI 93.0

Light Intensity Distribution



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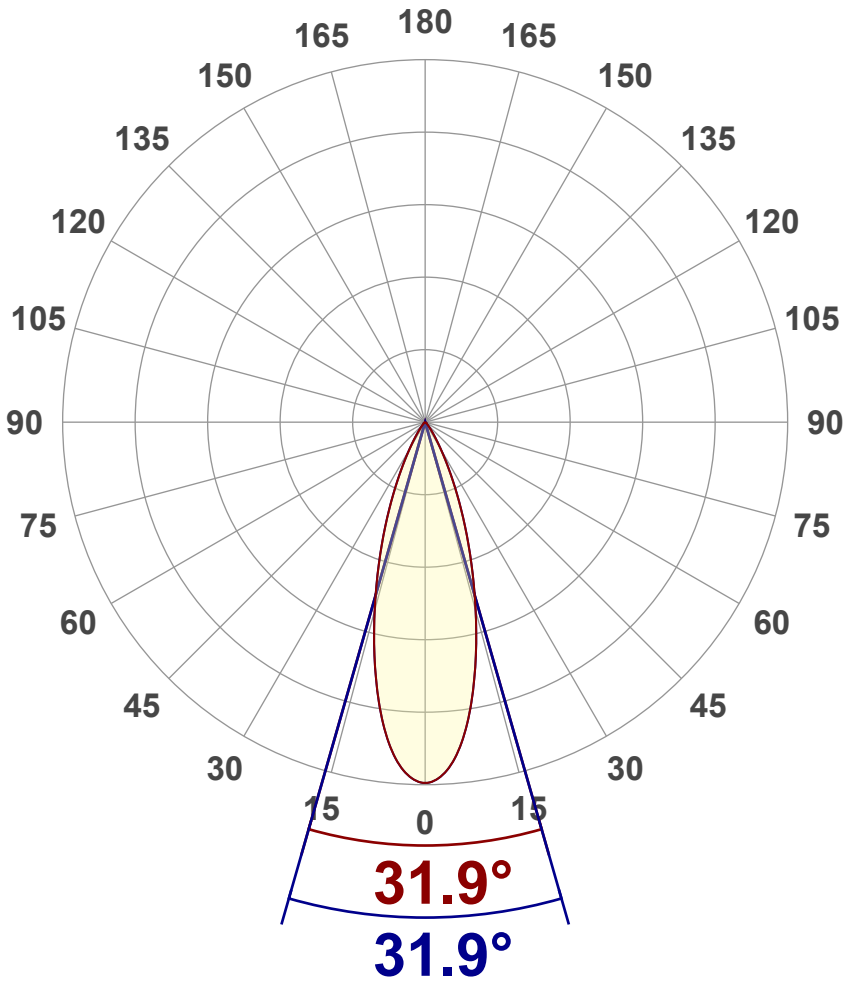
Luminous Intensity diagram

Unit: 0-100% of peak intensity



Main Values

Output (total Lumen)	852 lm
Peak Intensity	2407 cd
Beam Angle (50%)	31.9°
Beam Angle (90%)	31.9°
Beam Angle (10%)	31.9°

Cut-off Angle

Average 2,5%	75°

Field Angle

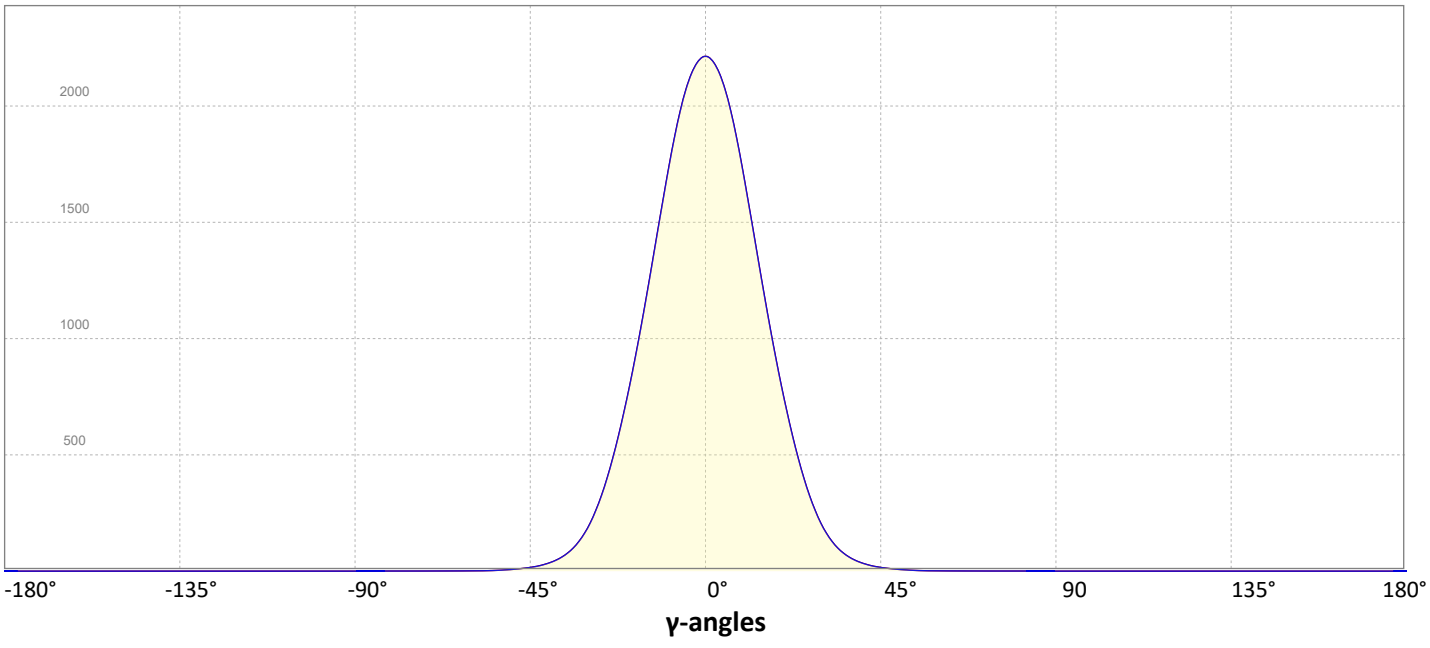
Average 10%	58.5°

Intensity Ratio

In 120° cone	99.6%
In 90° cone	98.7%

C000-C180
C090-C270

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



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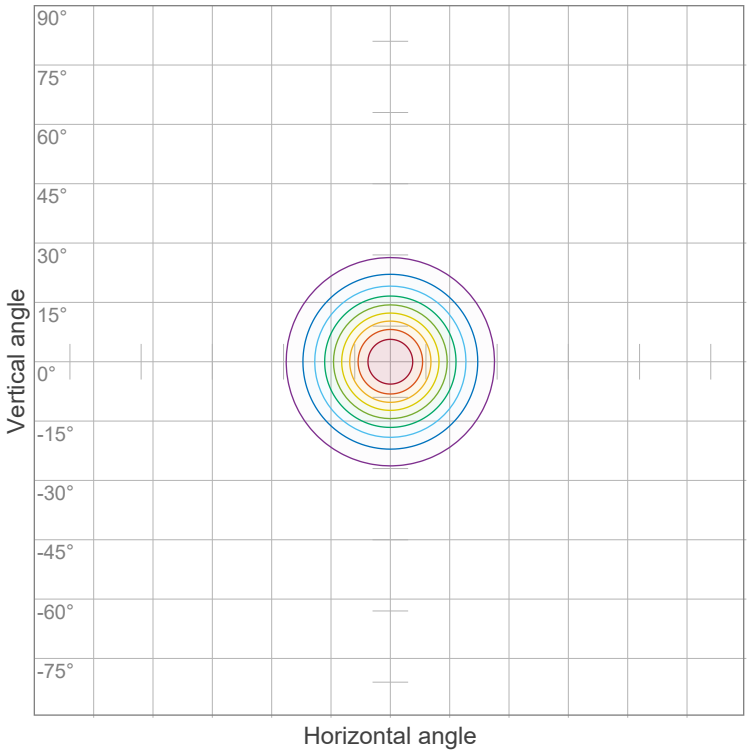
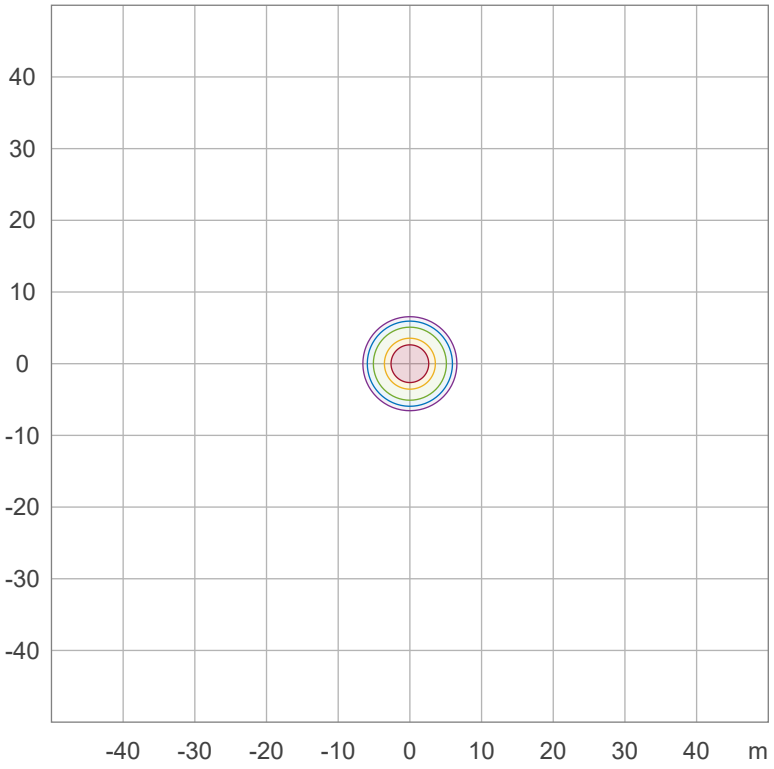
Iso-intensity Diagram (Iso-candela)



90 %	2166.1 cd
80 %	1925.4 cd
70 %	1684.8 cd
60 %	1444.1 cd
50 %	1203.4 cd
40 %	962.7 cd
30 %	722.0 cd
20 %	481.4 cd
10 %	240.7 cd

Peak intensity: 2406.8 cd
Number of c-planes: 32

Iso-illuminance Diagram (Iso-lux)



50.0 %	12.0 lx
30.0 %	7.2 lx
10.0 %	2.4 lx
5.0 %	1.2 lx
3.0 %	0.7 lx

Peak illuminance: 24.1 lx
Mounting height: 10.0 m
Number of c-planes: 32

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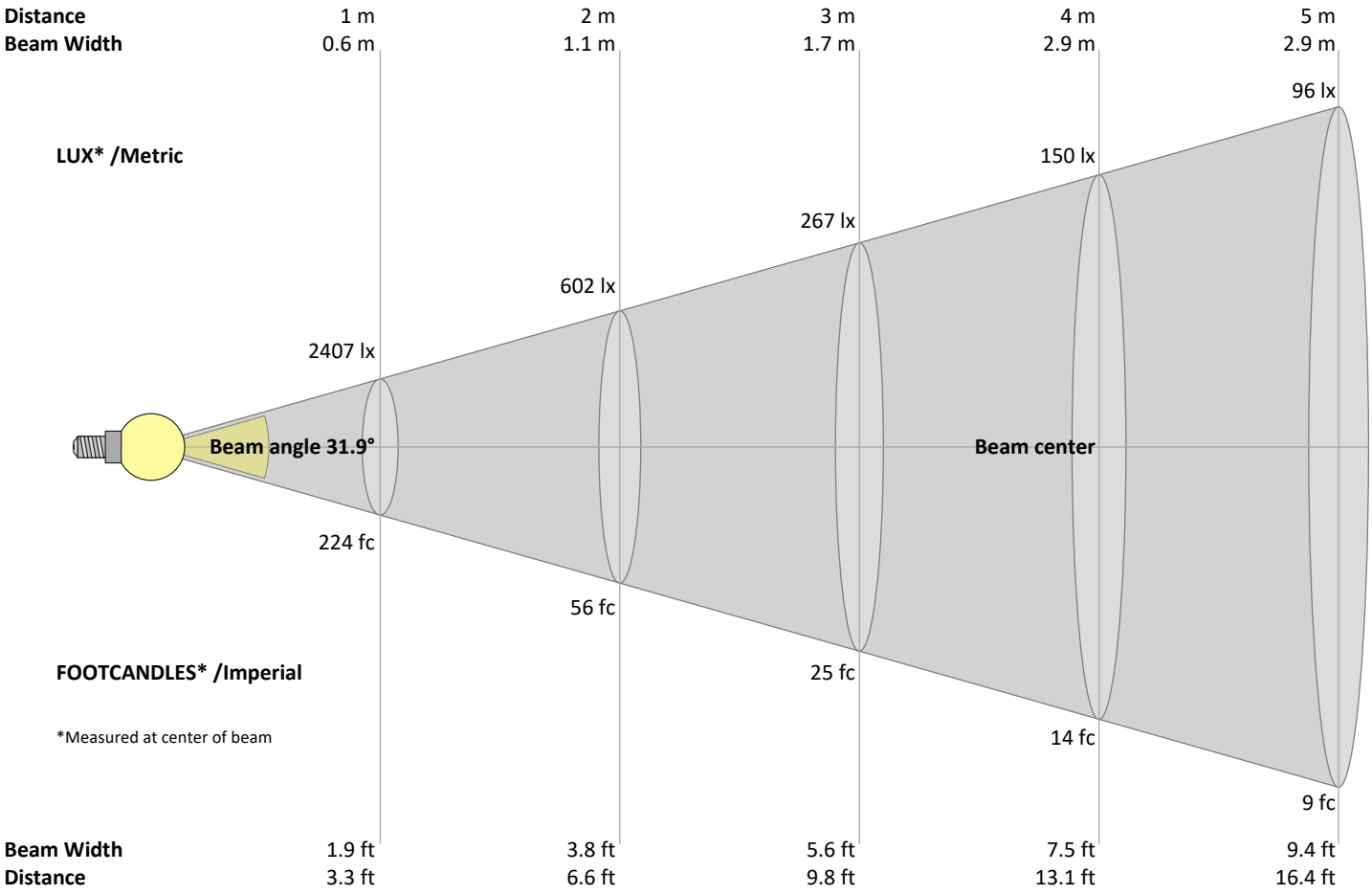
Beam Details



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
2407	602	267	150	96	67	49	38	30	24	20	17	14	12	11	9	8	7	7	6	lux
223.6	55.9	24.8	14	8.9	6.2	4.6	3.5	2.8	2.2	1.8	1.6	1.3	1.1	1	0.9	0.8	0.7	0.6	0.6	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
2407	2383	2308	2188	2027	1831	1622	1408	1200	1004	824	661	517	394	292	212	153	108	77	55	cd
100%	99%	96%	91%	84%	76%	67%	59%	50%	42%	34%	27%	21%	16%	12%	9%	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
2407	2383	2308	2188	2027	1831	1622	1408	1200	1004	824	661	517	394	292	212	153	108	77	55	cd
100%	99%	96%	91%	84%	76%	67%	59%	50%	42%	34%	27%	21%	16%	12%	9%	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
2407	2383	2308	2188	2027	1831	1622	1408	1200	1004	824	661	517	394	292	212	153	108	77	55	cd
100%	99%	96%	91%	84%	76%	67%	59%	50%	42%	34%	27%	21%	16%	12%	9%	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
2407	2383	2308	2188	2027	1831	1622	1408	1200	1004	824	661	517	394	292	212	153	108	77	55	cd
100%	99%	96%	91%	84%	76%	67%	59%	50%	42%	34%	27%	21%	16%	12%	9%	6%	4%	3%	2%	of 0°val

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Light Planning – UGR table

Uncorrected, comprehensive UGR table according to 117-1995

Reflectances											
ρ Ceiling		70	70	50	50	30	70	70	50	50	30
ρ Walls		50	30	50	30	30	50	30	50	30	30
ρ Floor		20	20	20	20	20	20	20	20	20	20
Room size H = mounting height above eye level		**Viewed Crosswise** (Viewing direction orthogonal to lamp length axis)					**Viewed Endwise** (Viewing direction parallel to lamp length axis)				
X	**Y**										
2H	2H	11.9	12.3	11.9	12.5	12.7	11.9	12.3	11.9	12.5	12.7
	3H	11.5	12.2	11.9	12.4	12.5	11.5	12.2	11.9	12.4	12.5
	4H	11.5	12.1	11.9	12.3	12.5	11.5	12.1	11.9	12.3	12.5
	6H	11.5	12.0	11.8	12.3	12.6	11.5	12.0	11.8	12.3	12.6
	8H	11.5	12.0	11.8	12.3	12.7	11.5	12.0	11.8	12.3	12.7
	12H	11.5	11.9	11.8	12.3	12.7	11.5	11.9	11.8	12.3	12.7
4H	2H	11.5	12.1	11.9	12.3	12.5	11.5	12.1	11.9	12.3	12.5
	3H	11.4	11.8	11.7	12.2	12.6	11.4	11.8	11.7	12.2	12.6
	4H	11.3	11.7	11.7	12.1	12.6	11.3	11.7	11.7	12.1	12.6
	6H	11.2	11.7	11.7	12.0	12.4	11.2	11.7	11.7	12.0	12.4
	8H	11.2	11.6	11.7	12.0	12.3	11.2	11.6	11.7	12.0	12.3
	12H	11.2	11.5	11.7	11.9	12.4	11.2	11.5	11.7	11.9	12.4
8H	4H	11.1	11.6	11.6	11.9	12.3	11.1	11.6	11.6	11.9	12.3
	6H	11.1	11.4	11.6	11.9	12.4	11.1	11.4	11.6	11.9	12.4
	8H	11.2	11.4	11.7	11.9	12.5	11.2	11.4	11.7	11.9	12.5
	12H	11.2	11.4	11.8	11.9	12.5	11.2	11.4	11.8	11.9	12.5
12H	4H	11.1	11.4	11.6	11.8	12.3	11.1	11.4	11.6	11.8	12.3
	6H	11.1	11.4	11.6	11.9	12.5	11.1	11.4	11.6	11.9	12.5
	8H	11.1	11.3	11.7	11.8	12.4	11.1	11.3	11.7	11.8	12.4

Variations with the observer position for the luminaire spacings, S:		
S = 1.0H	5.3 / -6.8	5.3 / -6.8
S = 1.5H	7.9 / -7.3	7.9 / -7.3
S = 2.0H	9.9 / -7.6	9.9 / -7.6

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	112	110	108	112	110	108	106	106	104	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	94	92	90	92	90	88	87
4	102	96	91	88	100	95	91	87	93	89	86	91	88	85	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	74	73
8	88	81	76	73	87	80	76	72	79	75	72	78	75	72	77	74	72	70
9	85	78	73	70	84	77	73	70	76	72	69	75	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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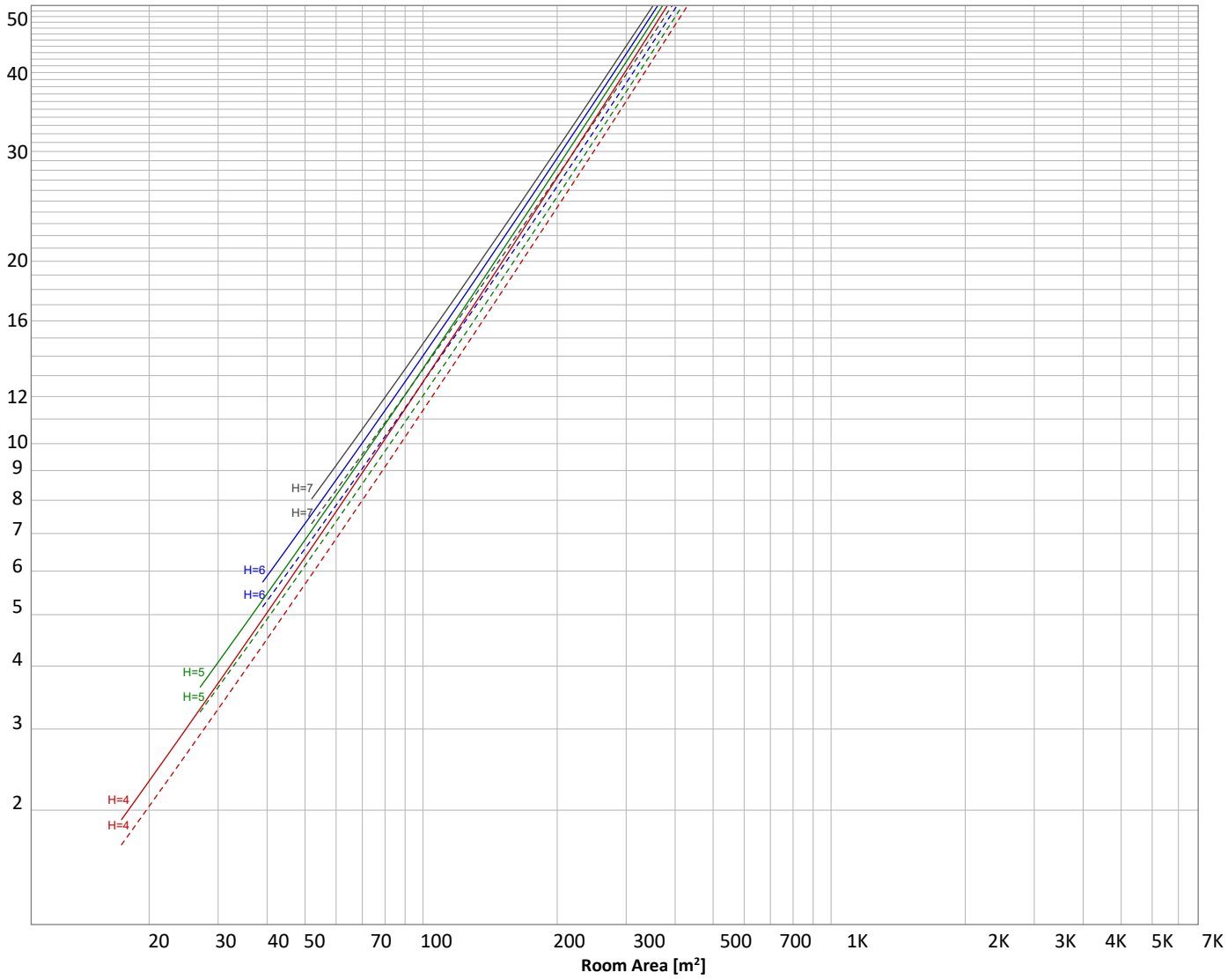
Luminaire budgetary diagram

Uncorrected, comprehensive UGR table according to 117-1995

LAMPS (number of lamps)



Conditions

H = Room height	Flux = 852 lm
H_{down} = Lamp distance from ceiling =	0.00 m
H_{work} = Work area height from floor =	0.00 m
E_{work} = Average lux on work area =	100 lx

	ρ(%)		
Line type	Ceiling reflectance	Wall reflectance	Floor reflectance
----------	70	50	30
————	50	30	20

Zonal Lumen Summary

0°-10°	10°-20°	20°-30°	30°-40°	40°-50°	50°-60°	60°-70°	70°-80°	80°-90°
202 lm	356 lm	211 lm	62.2 lm	14.8 lm	3.10 lm	0.993 lm	0.661 lm	0.567 lm

90°-100°	100°-110°	110°-120°	120°-130°	130°-140°	140°-150°	150°-160°	160°-170°	170°-180°
0.244 lm	0.237 lm	0.222 lm	0.201 lm	0.134 lm	0.092 lm	0.068 lm	0.041 lm	0.014 lm

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Outdoor Light Planning

Lumen per Zone

Zone (γ)	Lumen	% Total
0-10°	202 lm	23.7%
10-20°	356 lm	41.8%
20-30°	211 lm	24.7%
30-40°	62 lm	7.3%
40-50°	15 lm	1.7%
50-60°	3 lm	0.4%
60-70°	1 lm	0.1%
70-80°	1 lm	0.1%
80-90°	1 lm	0.1%
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	852 lm	100.0%

Zonal Lumen summary

Zone (γ)	Lumen	% Total
0-30°	768 lm	90.2%
0-40°	831 lm	97.5%
0-60°	849 lm	99.6%
60-90°	2 lm	0.3%
70-100°	1 lm	0.2%
90-120°	1 lm	0.1%
0-90°	851 lm	99.9%
90-180°	1 lm	0.1%
0-180°	852 lm	100.0%

Intensity peaks

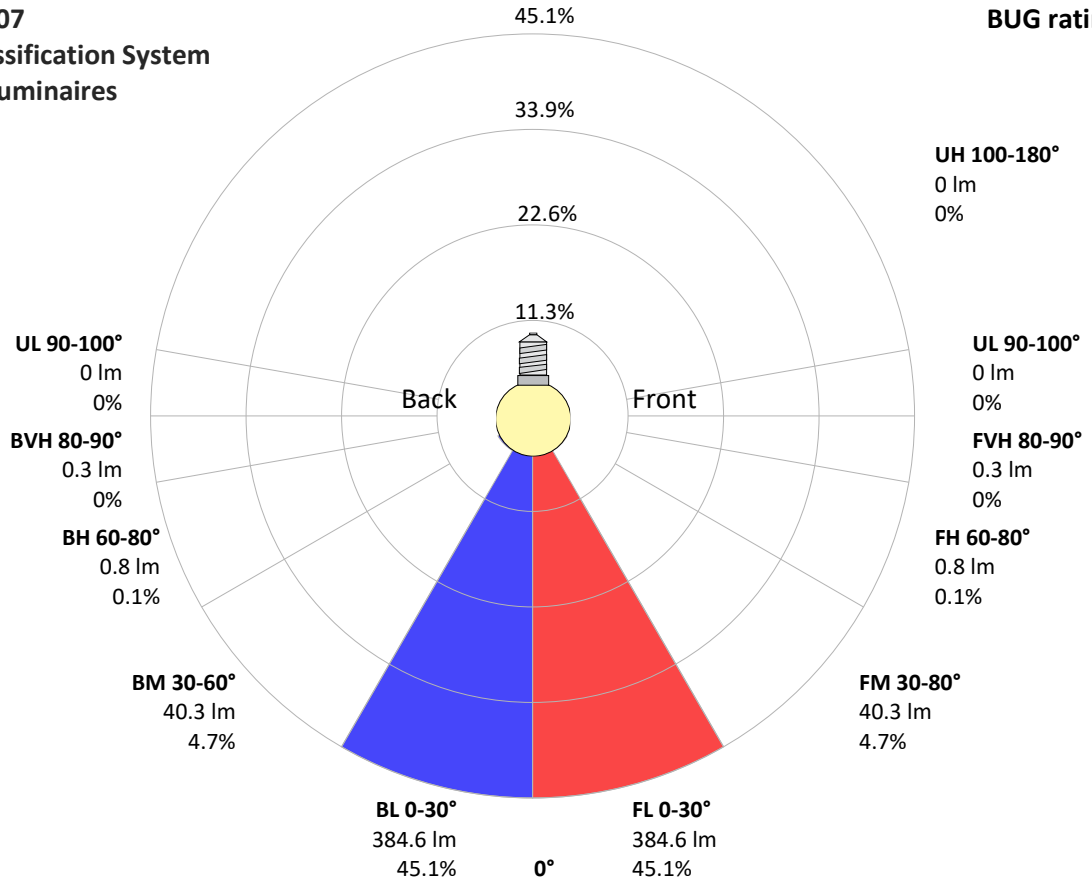
Max intensity	2407 cd
Intensity, 90°	0 cd
Intensity, 0°	2407 cd

BUG rating

	Lumen	% Total
Forward light		
Low(0-30°)	385 lm	45.1%
Medium(30-60°)	40 lm	4.7%
High(60-80°)	1 lm	0.1%
Very high(80-90°)	0 lm	0.0%
Back light		
Low(0-30°)	385 lm	45.1%
Medium(30-60°)	40 lm	4.7%
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

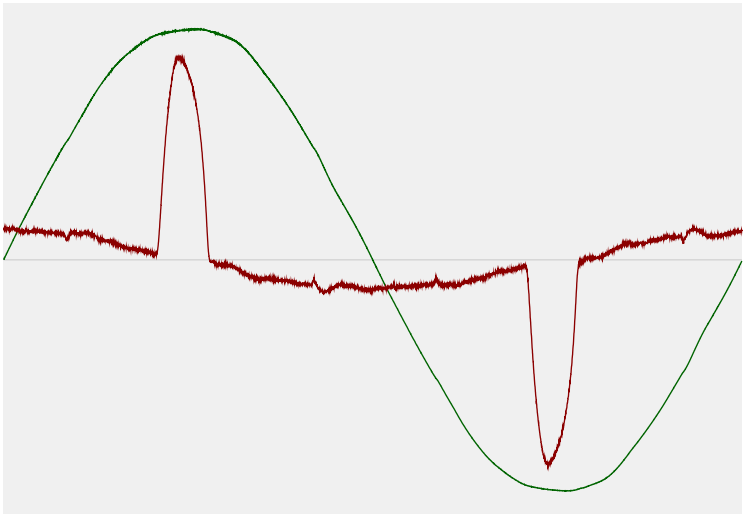
Power feed to light source	14.6 W
Frequency of input power	50 Hz
RMS Input voltage feed, V_{RMS}	240 V
RMS Input current feed, I_{RMS}	0.132 A
Volt-Ampere or apparent power = V_{RMS}*I_{RMS}	31.74 VA
Displacement factor of AC power feed	0.8
Power factor of AC current feed	0.46
Total harmonic distortion of the current	139.71%
Total harmonic distortion of the voltage	1.19%

Efficiency

Radiated power efficiency 21.4%

Lumen efficiency 59 lm/W

Input Power Curve



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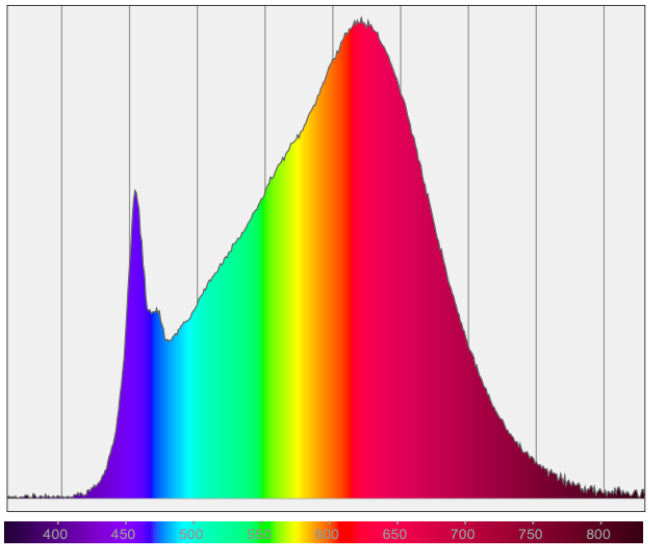
Color Measurements

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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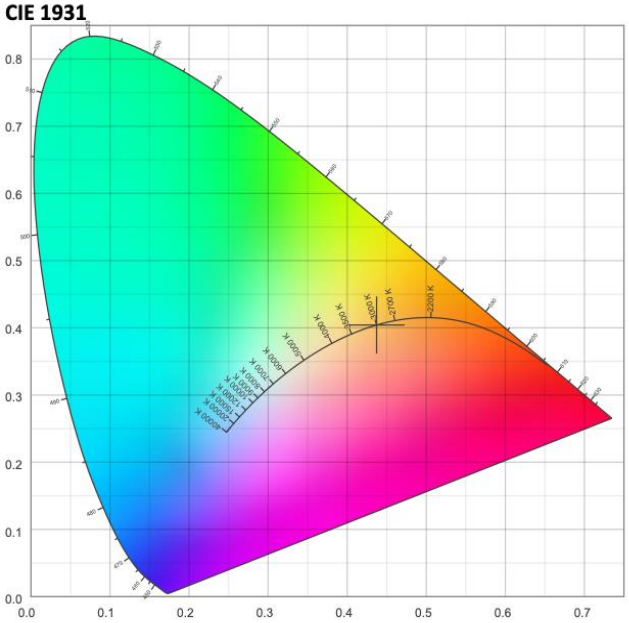
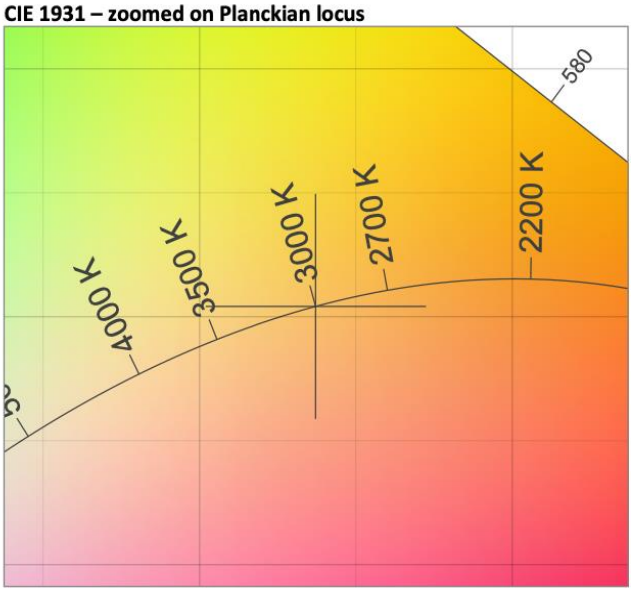
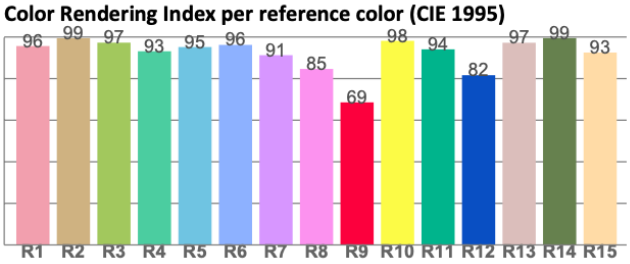
CIE 1931



CIE 1931 – zoomed on Planckian locus



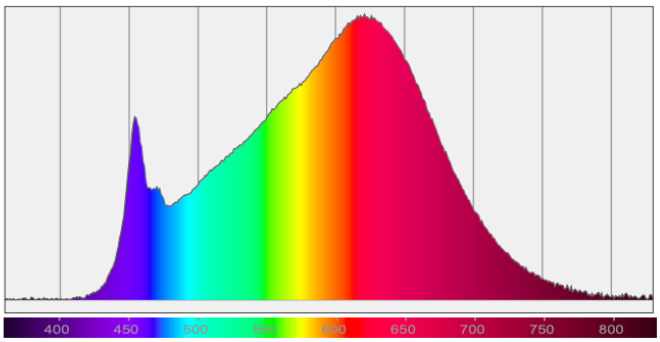
Color Rendering Index per reference color (CIE 1995)



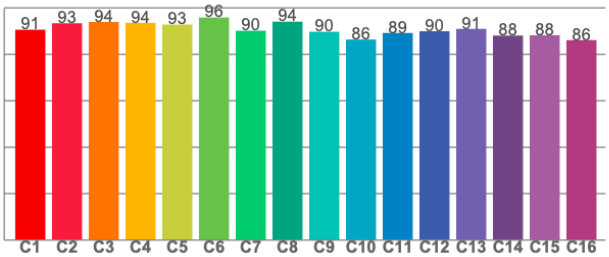
CRI R values, only R1-R8 are used to calculate final CRI value

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%



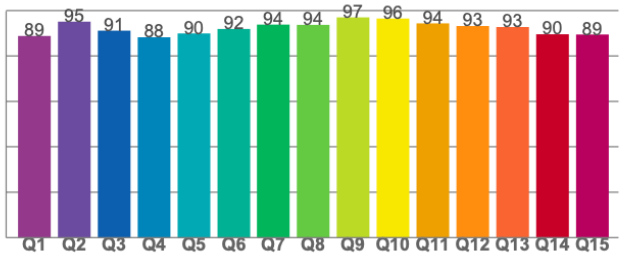
TM30-18 Rf-values per hue bin



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