

Goniophotometry Report

1_PHOT_NINETY-NINE-2350lmChip-4000K-Spreader_2303
www.factorylux.com



Tested Light Source - 1_PHOT_NINETY-NINE-2350lmChip-4000K-Spreader_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

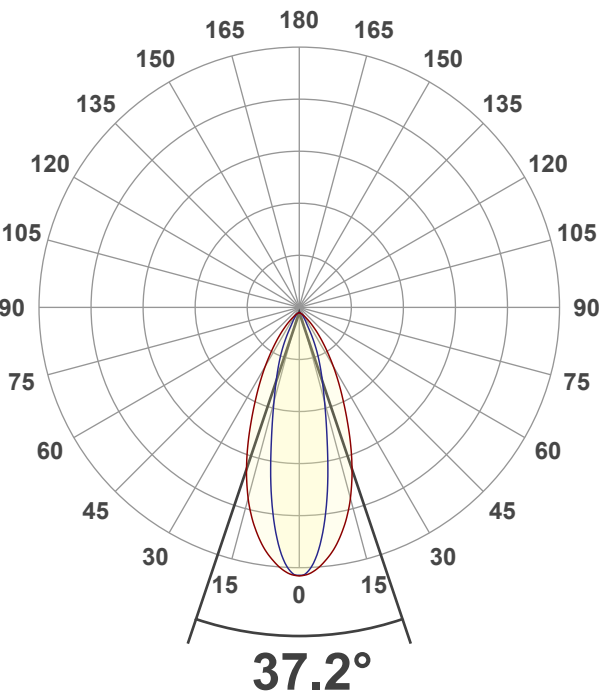
32 planes – 11.25°
1°
1.50 m
15.9 W – PF 0.98 – DPF 0.98
241 V – 0.067 A
50 Hz

Main Light Measurement Results

Output
Efficiency
Peak Intensity and Beam Angle
Color Rendering Index

1689 lm
106 lm/W
2930 cd – 37.2°
CRI 92.7

Light Intensity Distribution

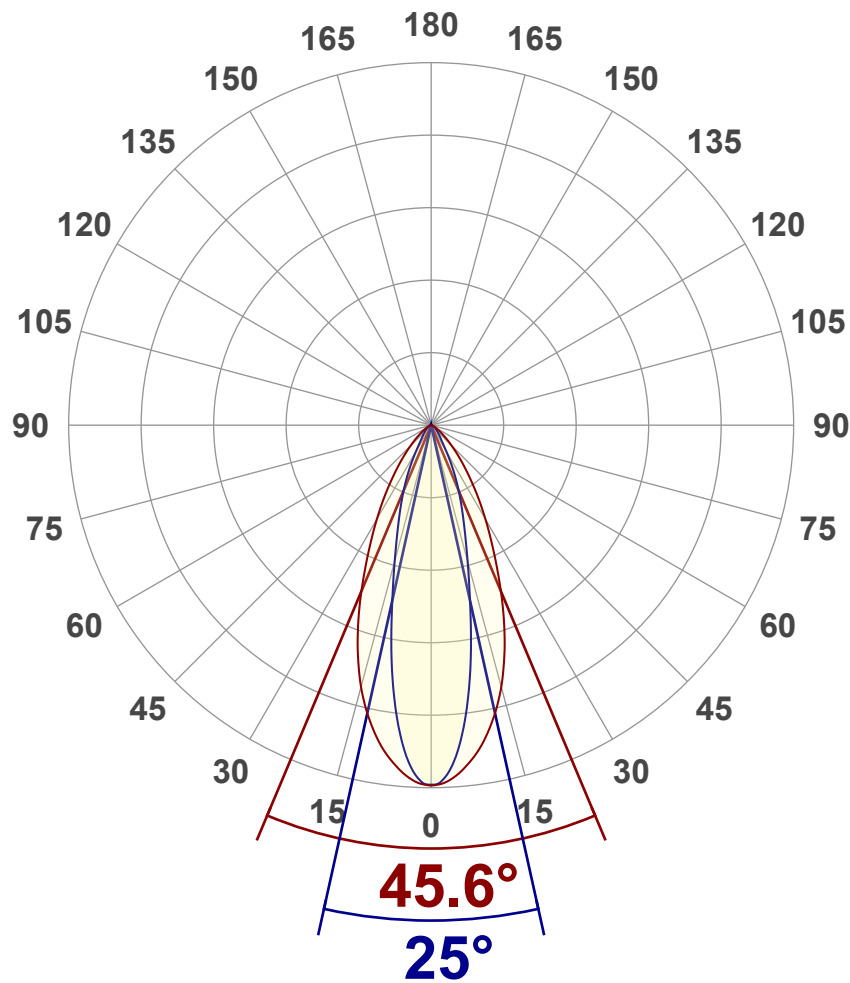


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Luminous Intensity diagram Unit: 0-100% of peak intensity



Main Values	
Output (total Lumen)	1689 lm
Peak Intensity	2930 cd
Beam Angle (50%)	37.2°
Beam Angle (90%)	25°
Beam Angle (10%)	57.3°

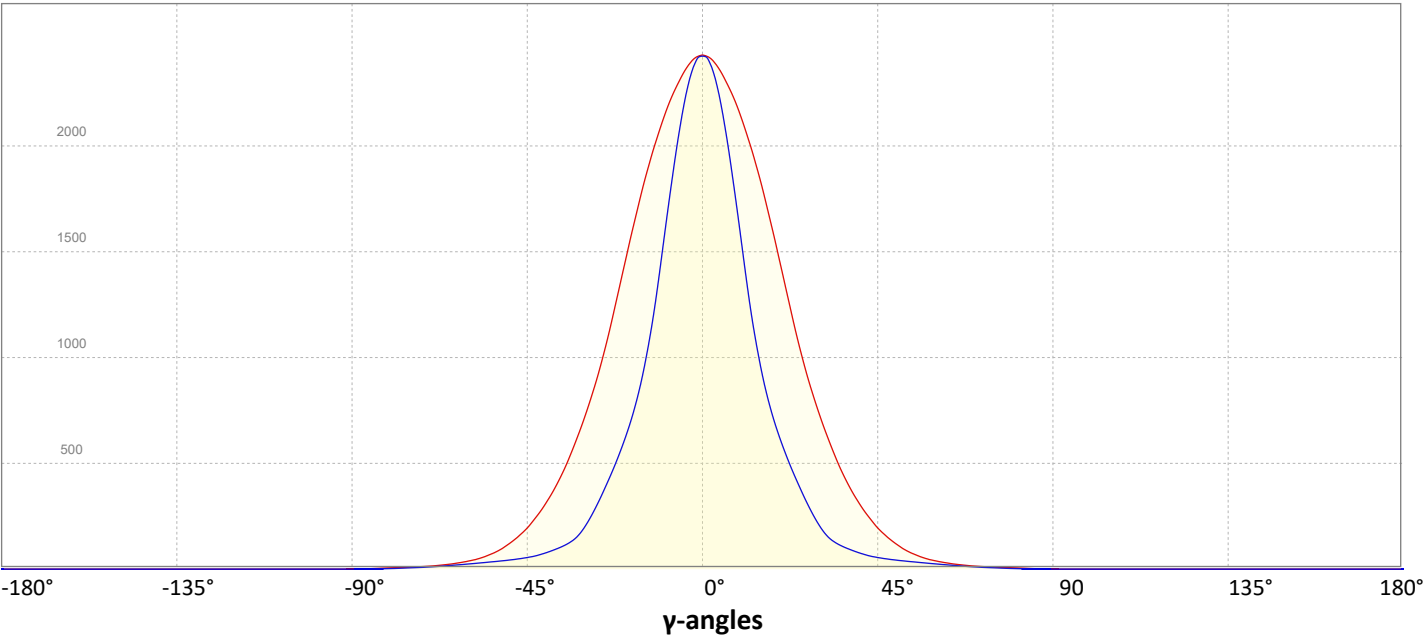
Cut-off Angle	
Average 2,5%	100°

Field Angle	
Average 10%	72.3°

Intensity Ratio	
In 120° cone	97.6%
In 90° cone	90.3%

C000-C180
C090-C270

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

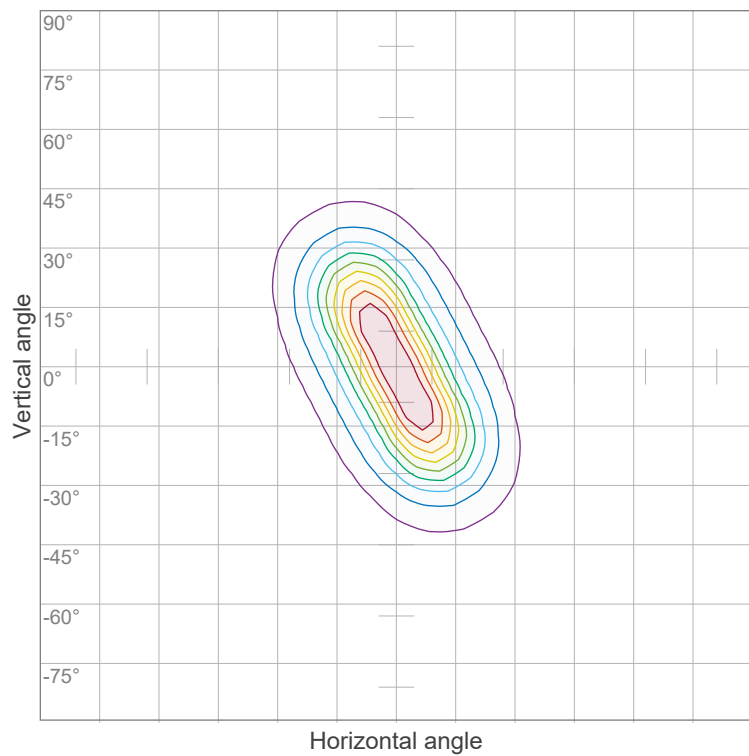


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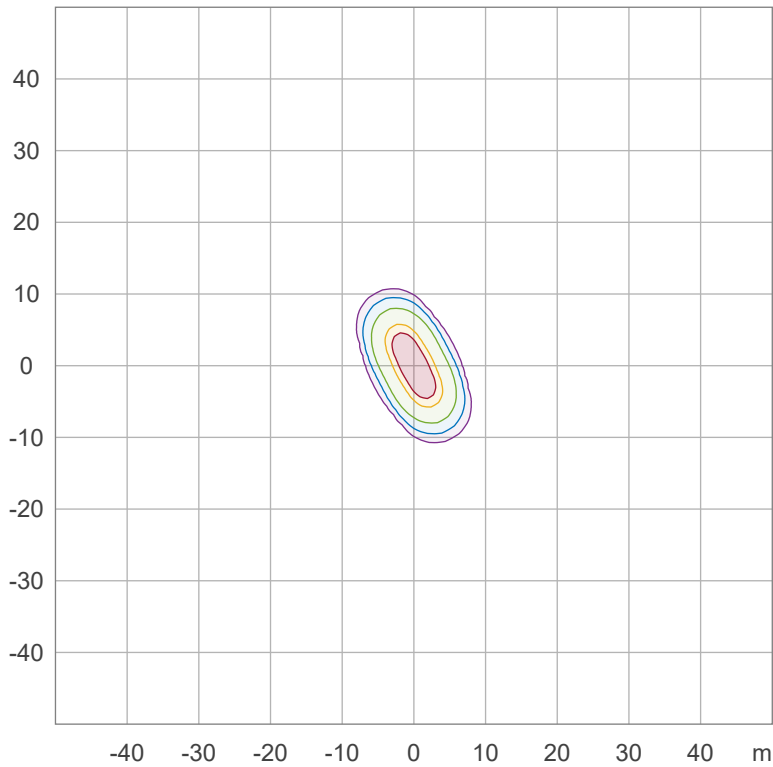
Iso-intensity Diagram (Iso-candela)



90 %	2633.9 cd
80 %	2341.2 cd
70 %	2048.6 cd
60 %	1755.9 cd
50 %	1463.3 cd
40 %	1170.6 cd
30 %	878.0 cd
20 %	585.3 cd
10 %	292.7 cd

Peak intensity: 2926.6 cd
Number of c-planes: 32

Iso-illuminance Diagram (Iso-lux)



50.0 %	14.6 lx
30.0 %	8.8 lx
10.0 %	2.9 lx
5.0 %	1.5 lx
3.0 %	0.9 lx

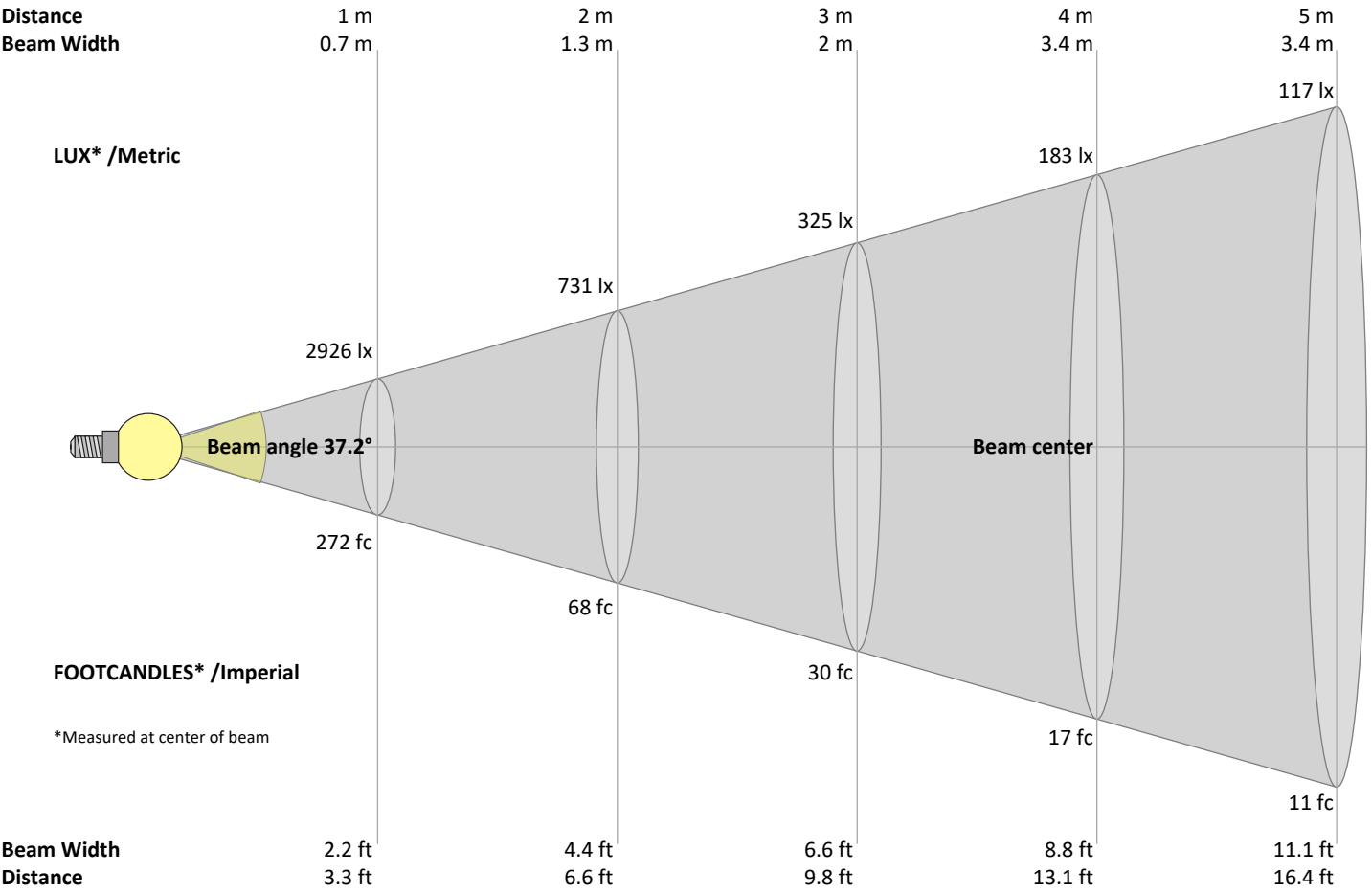
Peak illuminance: 29.3 lx
Mounting height: 10.0 m
Number of c-planes: 32

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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
2926	731	325	183	117	81	60	46	36	29	24	20	17	15	13	11	10	9	8	7	lux
271.8	68	30.2	17	10.9	7.6	5.5	4.2	3.4	2.7	2.2	1.9	1.6	1.4	1.2	1.1	0.9	0.8	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
2926	2911	2859	2780	2686	2569	2434	2283	2114	1930	1737	1541	1348	1174	1020	883	760	647	545	459	cd
100%	99%	98%	95%	92%	88%	83%	78%	72%	66%	59%	53%	46%	40%	35%	30%	26%	22%	19%	16%	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
2926	2877	2726	2487	2189	1862	1535	1263	1044	875	738	620	514	416	326	249	190	153	129	111	cd
100%	98%	93%	85%	75%	64%	52%	43%	36%	30%	25%	21%	18%	14%	11%	9%	6%	5%	4%	4%	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
2926	2911	2859	2780	2686	2569	2434	2283	2114	1930	1737	1541	1348	1174	1020	883	760	647	545	459	cd
100%	99%	98%	95%	92%	88%	83%	78%	72%	66%	59%	53%	46%	40%	35%	30%	26%	22%	19%	16%	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
2926	2877	2726	2487	2189	1862	1535	1263	1044	875	738	620	514	416	326	249	190	153	129	111	cd
100%	98%	93%	85%	75%	64%	52%	43%	36%	30%	25%	21%	18%	14%	11%	9%	6%	5%	4%	4%	of 0°val

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Uncorrected, comprehensive UGR table according to 117-1995

[illegible]

UGR data could not be calculated due to missing/wrong symmetry. Goto Edit->Photometric->Corrections and select Correct asymmetry.

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	113	110	108	105	111	108	106	104	104	102	101	100	99	98	97	96	95	93
2	107	102	98	95	105	101	97	94	97	94	92	94	92	90	92	90	88	86
3	102	95	90	86	100	94	89	85	91	87	84	89	85	83	86	84	81	80
4	97	89	83	79	95	88	82	78	86	81	77	84	80	77	82	78	76	74
5	92	83	77	73	90	82	77	73	81	76	72	79	75	71	77	74	71	69
6	87	78	72	68	86	77	72	68	76	71	67	75	70	67	73	69	66	65
7	83	74	68	63	82	73	67	63	72	67	63	71	66	63	69	65	62	61
8	79	70	64	60	78	69	63	59	68	63	59	67	62	59	66	62	59	57
9	76	66	60	56	75	66	60	56	65	59	56	64	59	56	63	59	56	54
10	72	63	57	53	71	62	57	53	61	56	53	61	56	53	60	56	53	51

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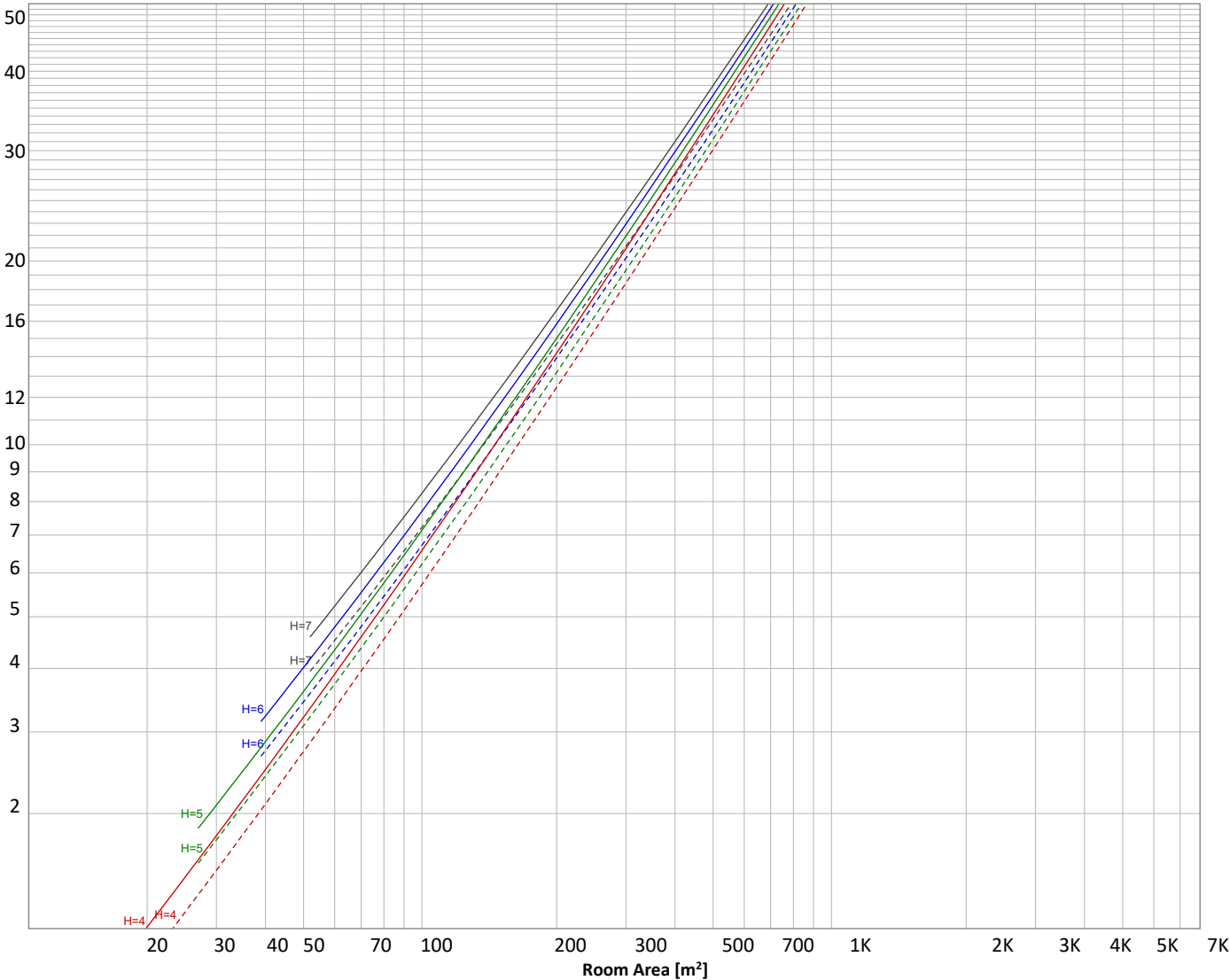
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Luminaire budgetary diagram

Uncorrected, comprehensive UGR table according to 117-1995

LAMPS (number of lamps)



Conditions

H = Room height	Flux = 1689 lm	p(%)		
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°
244 lm	482 lm	444 lm	276 lm	137 lm	65.1 lm	27.7 lm	10.2 lm	2.43 lm
90°-100°	100°-110°	110°-120°	120°-130°	130°-140°	140°-150°	150°-160°	160°-170°	170°-180°
0.166 lm	0.152 lm	0.143 lm	0.129 lm	0.047 lm	0.000 lm	0.000 lm	0.000 lm	0.000 lm

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Outdoor Light Planning

Lumen per Zone

Zone (γ)	Lumen	% Total
0-10°	244 lm	14.4%
10-20°	482 lm	28.5%
20-30°	444 lm	26.3%
30-40°	276 lm	16.3%
40-50°	137 lm	8.1%
50-60°	65 lm	3.9%
60-70°	28 lm	1.6%
70-80°	10 lm	0.6%
80-90°	2 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	1689 lm	100.0%

Intensity peaks

Max intensity	2930 cd
Intensity, 90°	0 cd
Intensity, 0°	2926 cd

Zonal Lumen summary

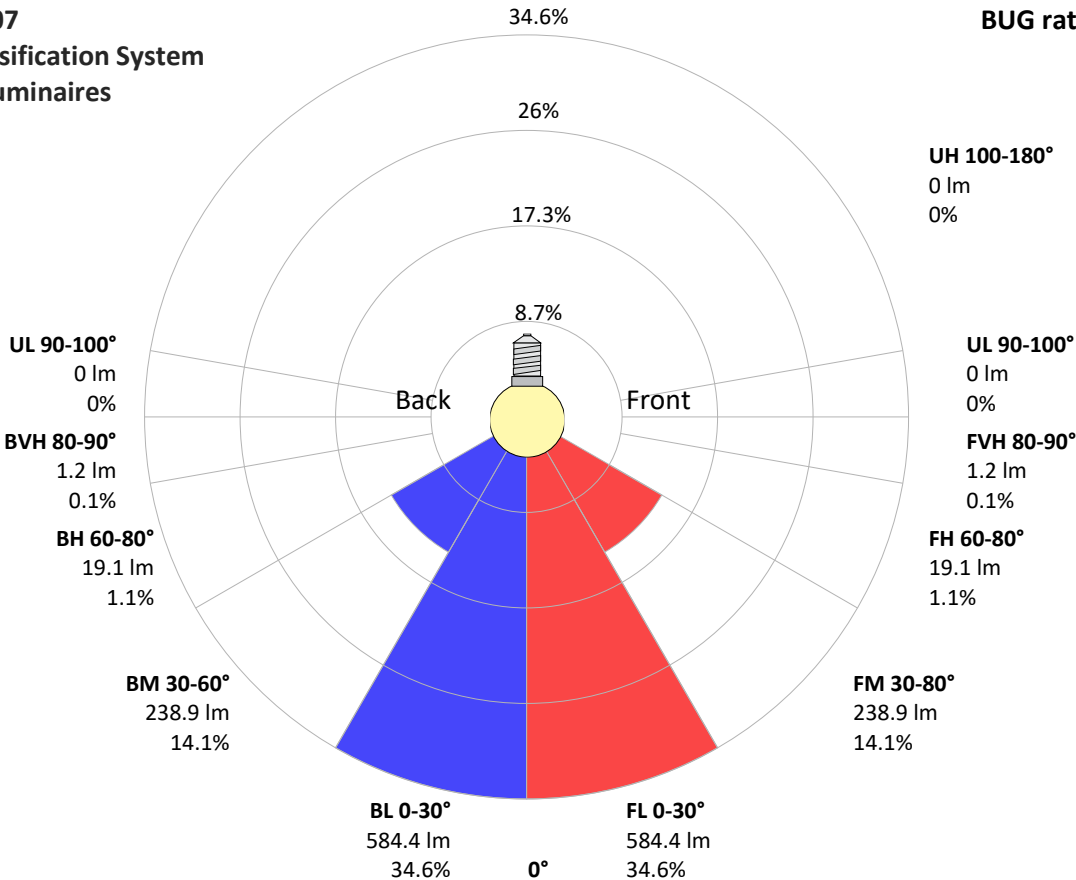
Zone (γ)	Lumen	% Total
0-30°	1170 lm	69.2%
0-40°	1446 lm	85.6%
0-60°	1648 lm	97.6%
60-90°	40 lm	2.4%
70-100°	13 lm	0.8%
90-120°	0 lm	0.0%
0-90°	1688 lm	100.0%
90-180°	1 lm	0.0%
0-180°	1689 lm	100.0%

BUG rating

	Lumen	% Total
Forward light		
Low(0-30°)	584 lm	34.6%
Medium(30-60°)	239 lm	14.1%
High(60-80°)	19 lm	1.1%
Very high(80-90°)	1 lm	0.1%
Back light		
Low(0-30°)	584 lm	34.6%
Medium(30-60°)	239 lm	14.1%
High(60-80°)	19 lm	1.1%
Very high(80-90°)	1 lm	0.1%
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 B2 U1 G0



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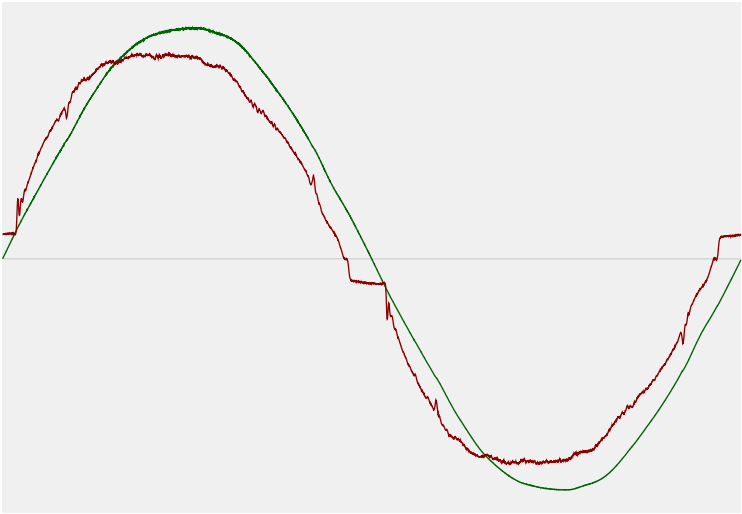


Power Details

Input Power

Power feed to light source	15.9 W
Frequency of input power	50 Hz
RMS Input voltage feed, V_{RMS}	241 V
RMS Input current feed, I_{RMS}	0.067 A
Volt-Ampere or apparent power = $V_{RMS} * I_{RMS}$	16.17 VA
Displacement factor of AC power feed	0.98
Power factor of AC current feed	0.98
Total harmonic distortion of the current	6.22%
Total harmonic distortion of the voltage	1.22%

Input Power Curve



Efficiency

Radiated power efficiency	38.9%
<div><div></div></div>	
Lumen efficiency	106 lm/W
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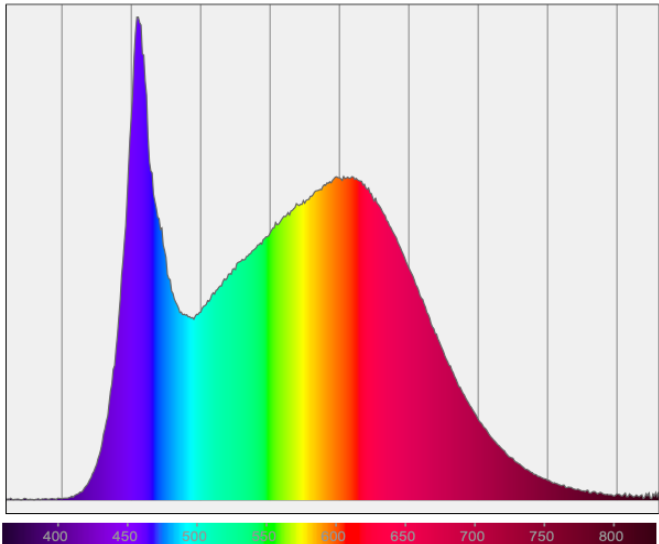
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Color Measurements

Correlated Color Temperature	CCT = 4000 K
Color Rendering TM30-18	R _f 88.9 – R _g 98.5
Color Shift, CIE duv	Duv ±0.0003

Spectral distribution



Color details

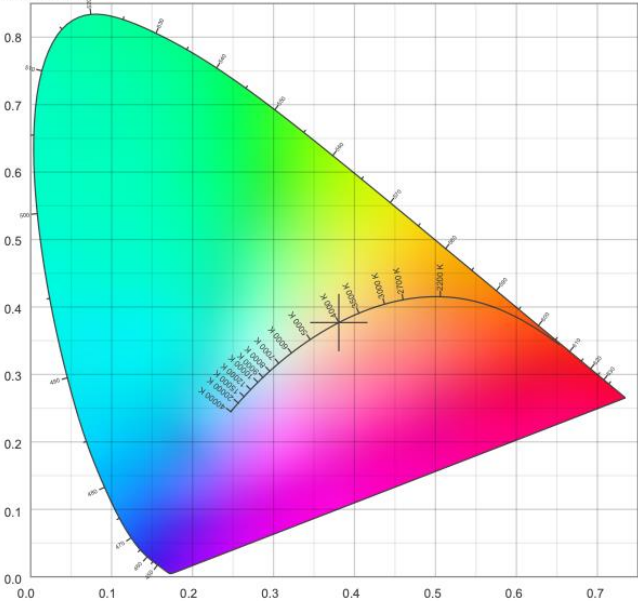
Correlated Color Temperature	CCT = 4000 K	Color coordinates CIE 1931	(x;y) = (0.381;0.377)
Color Rendering Index	CRI 92.6	Color coordinate CIEs 1960	(u;v) = (0.225;0.334)
Color Rendering Index, R9 (red component)	R9 = 72.2	Color deviation from BBL	Duv = ±0.0003
Color Rendering TM30-18	R _f 88.9 – R _g 98.5	Color coordinate CIEs 1976 (CIELUV)	(u';v') = (0.225;0.225)
Color Quality Scale	CQS = 88.9		

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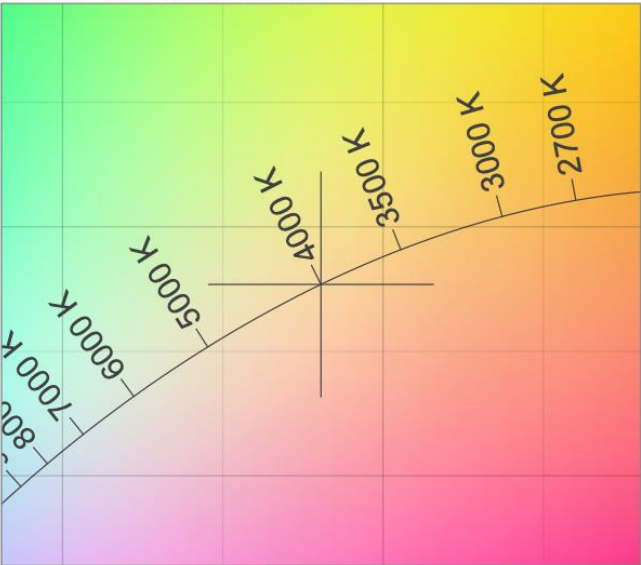
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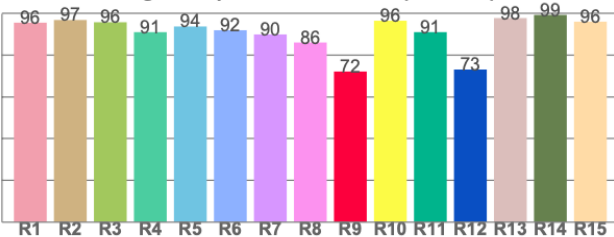
CIE 1931



CIE 1931 – zoomed on Planckian locus



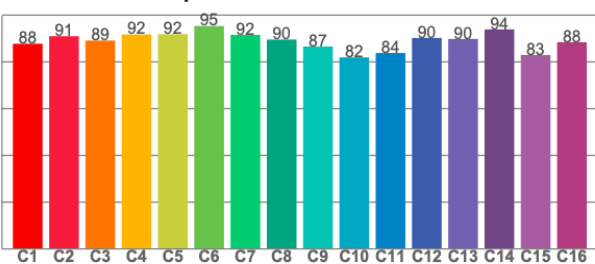
Color Rendering Index per reference color (CIE 1995)



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
95.5	96.8	95.7	91.0	93.7	91.9	89.9	86.0	72.2	96.4	91.0	73.1	97.7	99.2	96.0

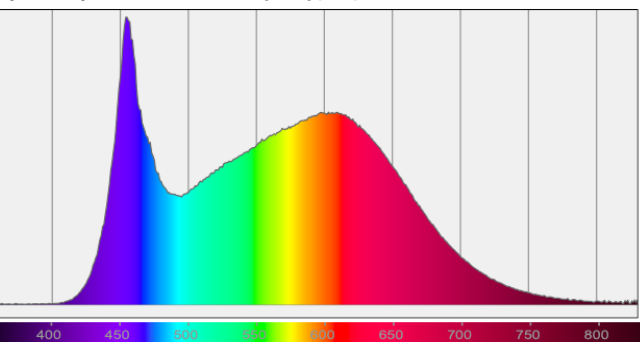
TM30-18 Rf-values per hue bin



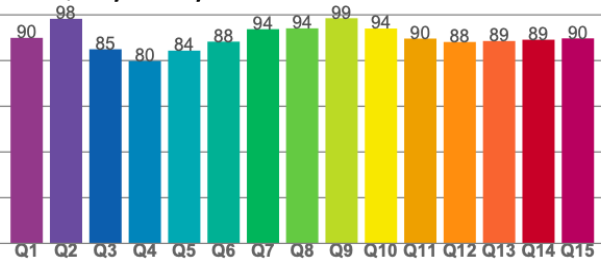
TM30 C values, 16 binned values out of total of 99 C values

C1	C2	C3	C4	C5	C6	C7	C8	C9	C10	C11	C12	C13	C14	C15	C16
87.8	91.0	89.1	91.7	91.9	95.3	91.5	89.6	86.6	81.9	83.8	90.3	89.8	93.9	83.0	88.4

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
89.9	98.3	84.9	79.8	84.3	88.3	93.7	94.1	98.5	94.0	89.6	88.1	88.6	89.1	89.7