

Goniophotometry Report

1_PHOT_NINETY-NINE-2125lmChip-3000K-Spreader_2303
www.factorylux.com



Tested Light Source - 1_PHOT_NINETY-NINE-2125lmChip-3000K-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

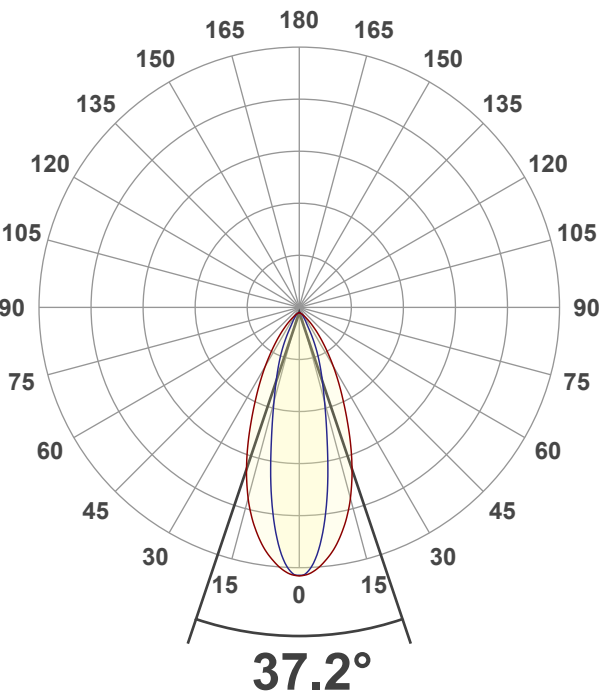
32 planes – 11.25°
1°
1.50 m
15.9 W – PF 0.98 – DPF 0.98
241 V – 0.067 A
50 Hz

Main Light Measurement Results

Output
Efficiency
Peak Intensity and Beam Angle
Color Rendering Index

1527 lm
96 lm/W
2649 cd – 37.2°
CRI 92.7

Light Intensity Distribution



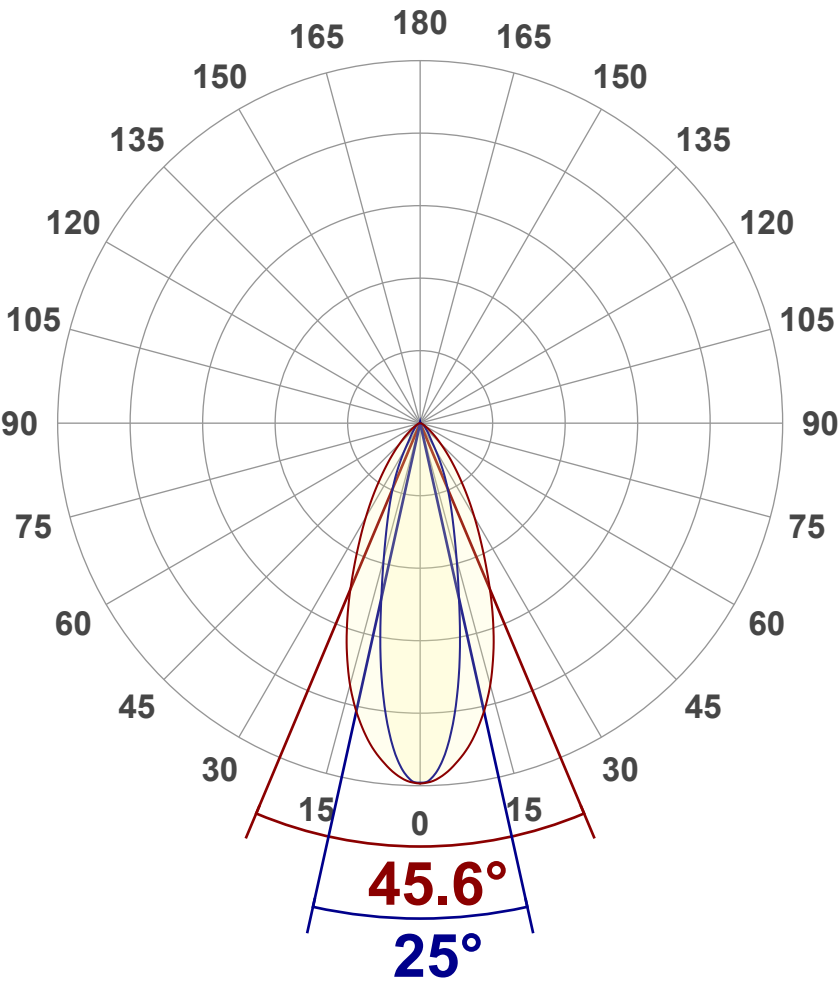
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Luminous Intensity diagram

Unit: 0-100% of peak intensity



Main Values

Output (total Lumen)	1527 lm
Peak Intensity	2649 cd
Beam Angle (50%)	37.2°
Beam Angle (90%)	25°
Beam Angle (10%)	57.3°

Cut-off Angle

Average 2,5%	100°
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Field Angle

Average 10%	72.3°
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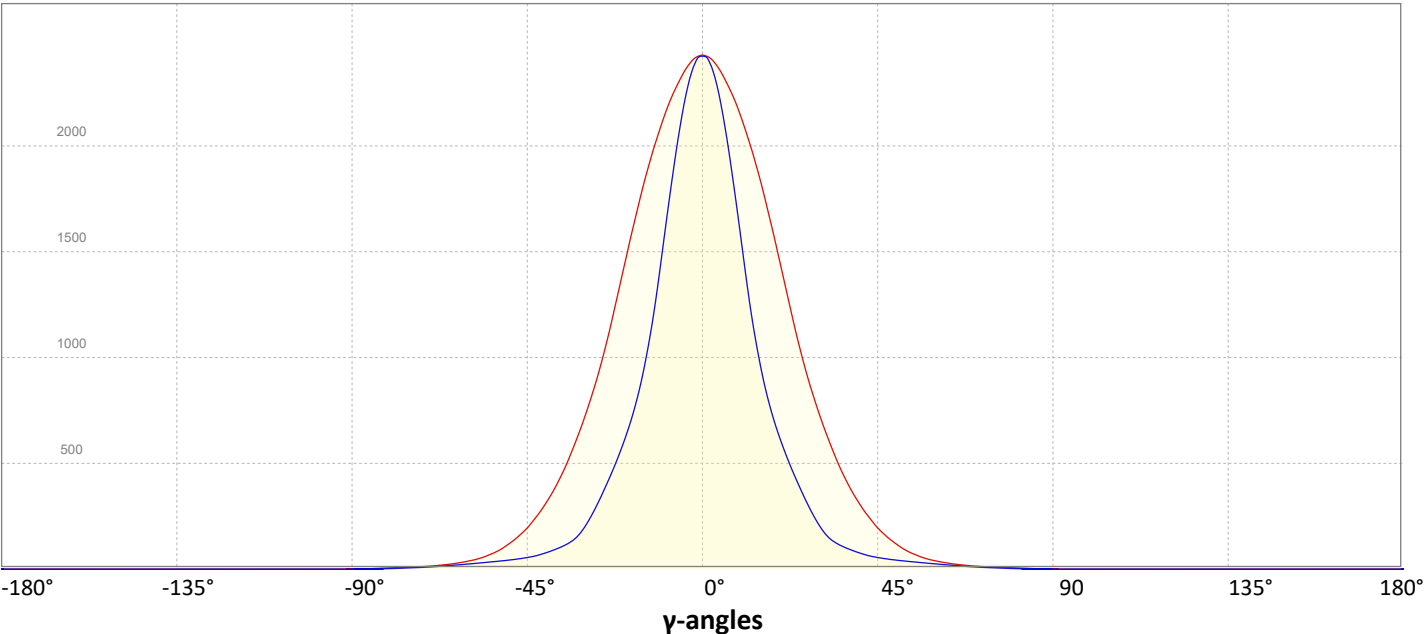
Intensity Ratio

In 120° cone	97.6%
In 90° cone	90.3%

C000-C180

C090-C270

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

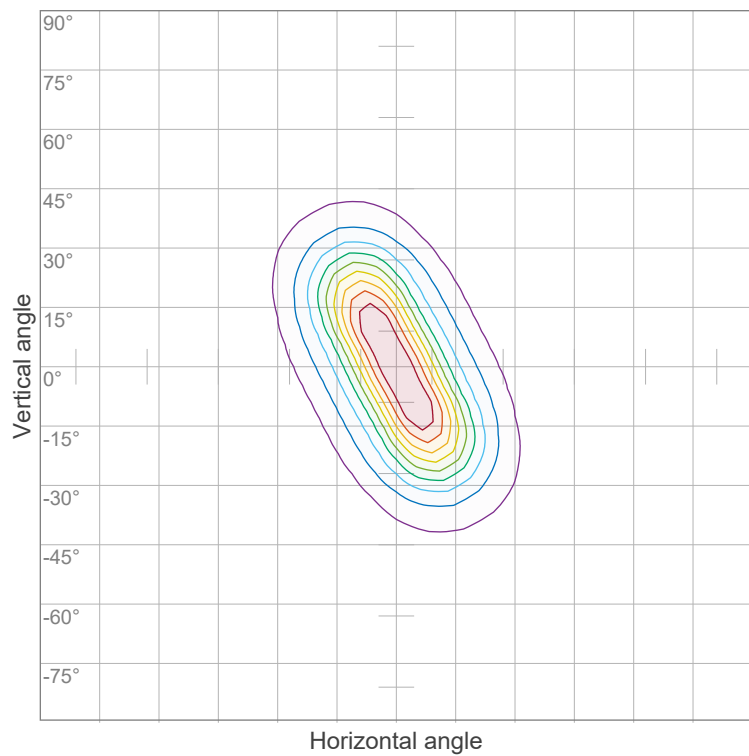


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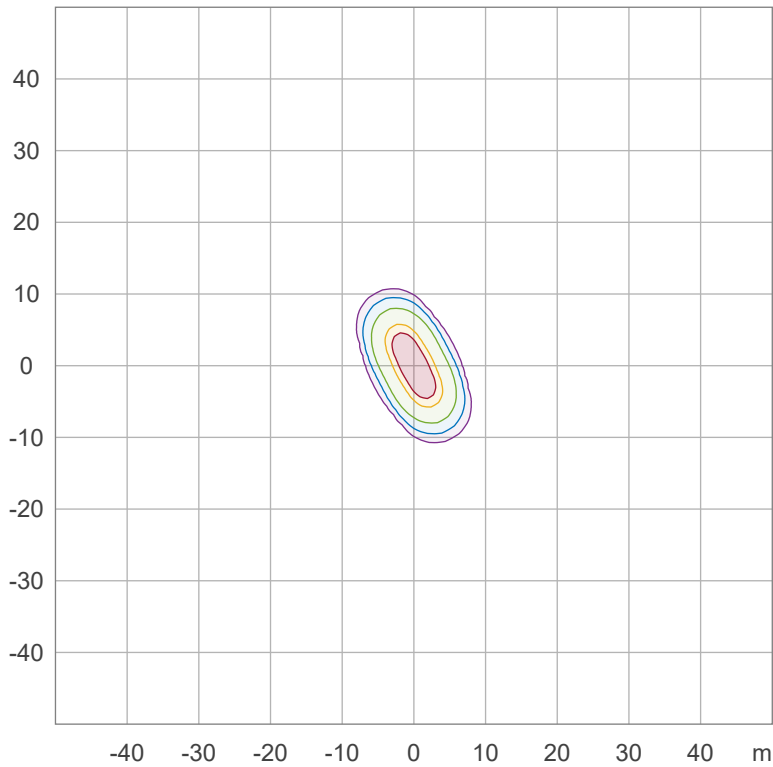
Iso-intensity Diagram (Iso-candela)



90 %	2381.3 cd
80 %	2116.7 cd
70 %	1852.1 cd
60 %	1587.5 cd
50 %	1322.9 cd
40 %	1058.3 cd
30 %	793.8 cd
20 %	529.2 cd
10 %	264.6 cd

Peak intensity: 2645.9 cd
Number of c-planes: 32

Iso-illuminance Diagram (Iso-lux)



50.0 %	13.2 lx
30.0 %	7.9 lx
10.0 %	2.6 lx
5.0 %	1.3 lx
3.0 %	0.8 lx

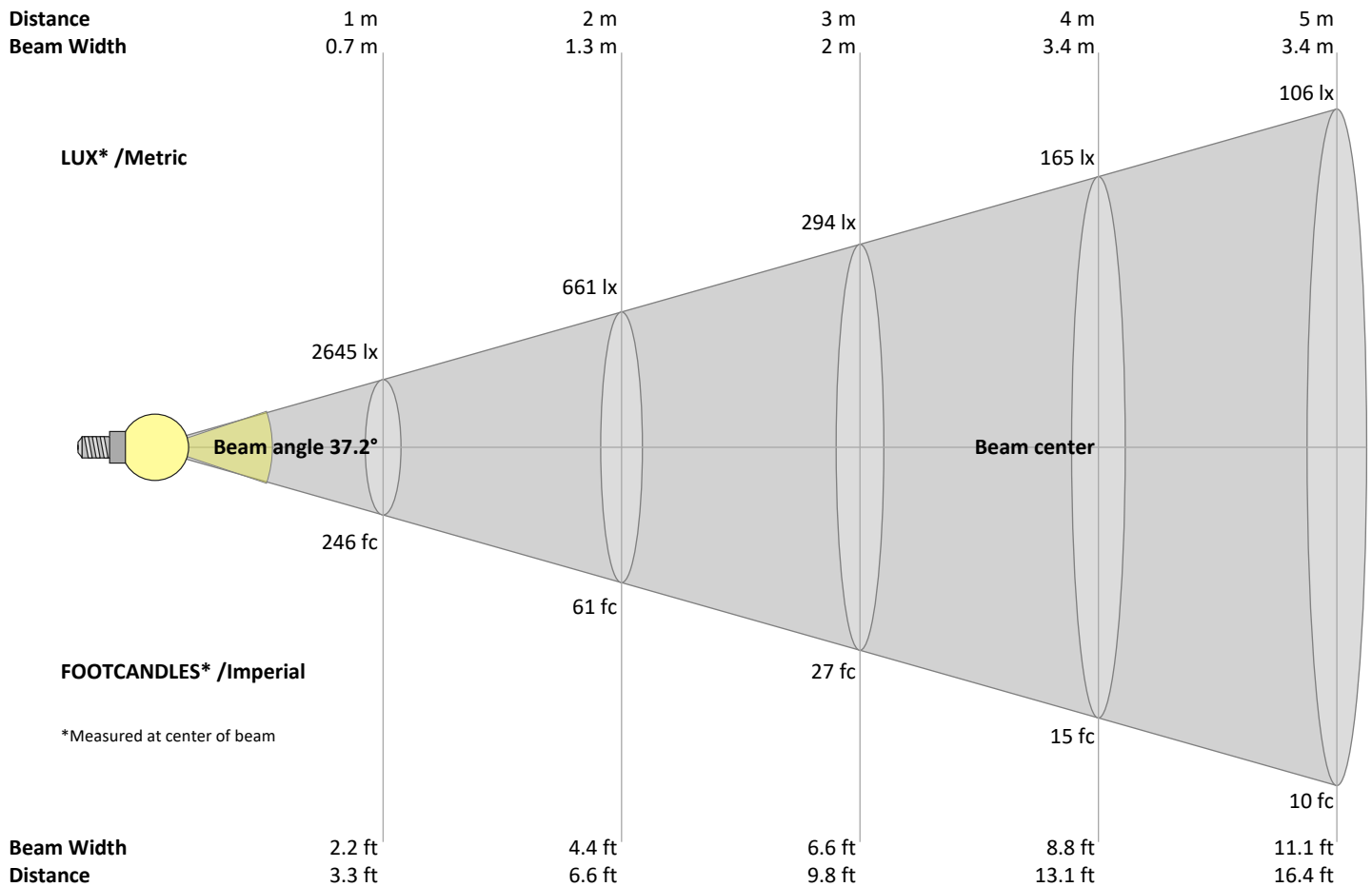
Peak illuminance: 26.5 lx
Mounting height: 10.0 m
Number of c-planes: 32

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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
2645	661	294	165	106	73	54	41	33	26	22	18	16	13	12	10	9	8	7	7	lux
245.8	61.4	27.3	15.4	9.8	6.8	5	3.8	3	2.5	2	1.7	1.5	1.3	1.1	1	0.9	0.8	0.7	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
2645	2632	2585	2513	2428	2323	2200	2064	1911	1745	1571	1393	1219	1061	922	798	687	585	493	415	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
2645	2601	2465	2248	1979	1684	1388	1141	944	791	667	560	465	376	295	225	172	139	117	100	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
2645	2632	2585	2513	2428	2323	2200	2064	1911	1745	1571	1393	1219	1061	922	798	687	585	493	415	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
2645	2601	2465	2248	1979	1684	1388	1141	944	791	667	560	465	376	295	225	172	139	117	100	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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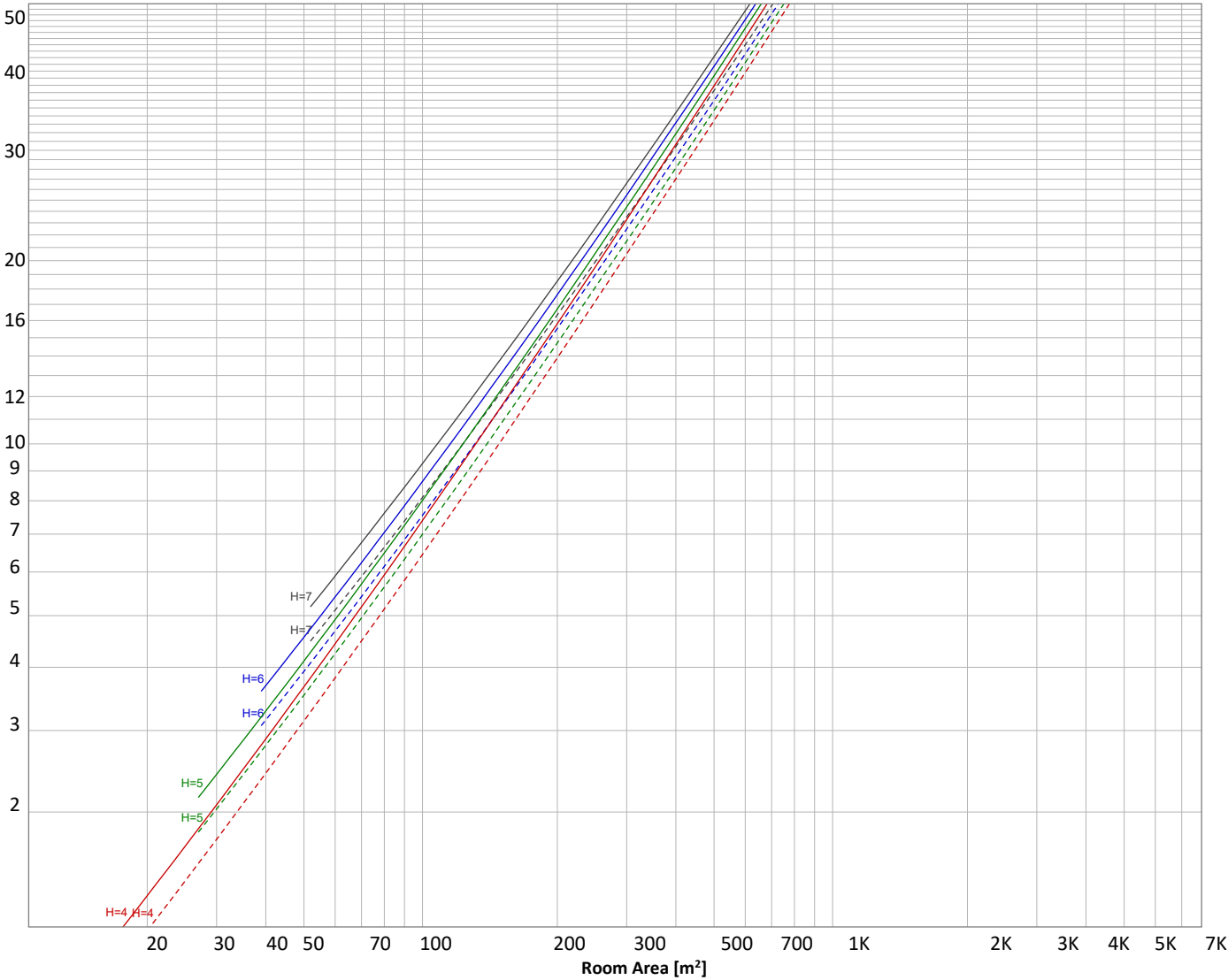
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Luminaire budgetary diagram

Uncorrected, comprehensive UGR table according to 117-1995

LAMPS (number of lamps)



Conditions

H = Room height	Flux = 1527 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°
220 lm	435 lm	402 lm	250 lm	124 lm	58.9 lm	25.0 lm	9.26 lm	2.19 lm
90°-100°	100°-110°	110°-120°	120°-130°	130°-140°	140°-150°	150°-160°	160°-170°	170°-180°
0.150 lm	0.138 lm	0.129 lm	0.117 lm	0.043 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°	220 lm	14.4%
10-20°	435 lm	28.5%
20-30°	402 lm	26.3%
30-40°	250 lm	16.3%
40-50°	124 lm	8.1%
50-60°	59 lm	3.9%
60-70°	25 lm	1.6%
70-80°	9 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	1527 lm	100.0%

Intensity peaks

Max intensity	2649 cd
Intensity, 90°	0 cd
Intensity, 0°	2645 cd

Zonal Lumen summary

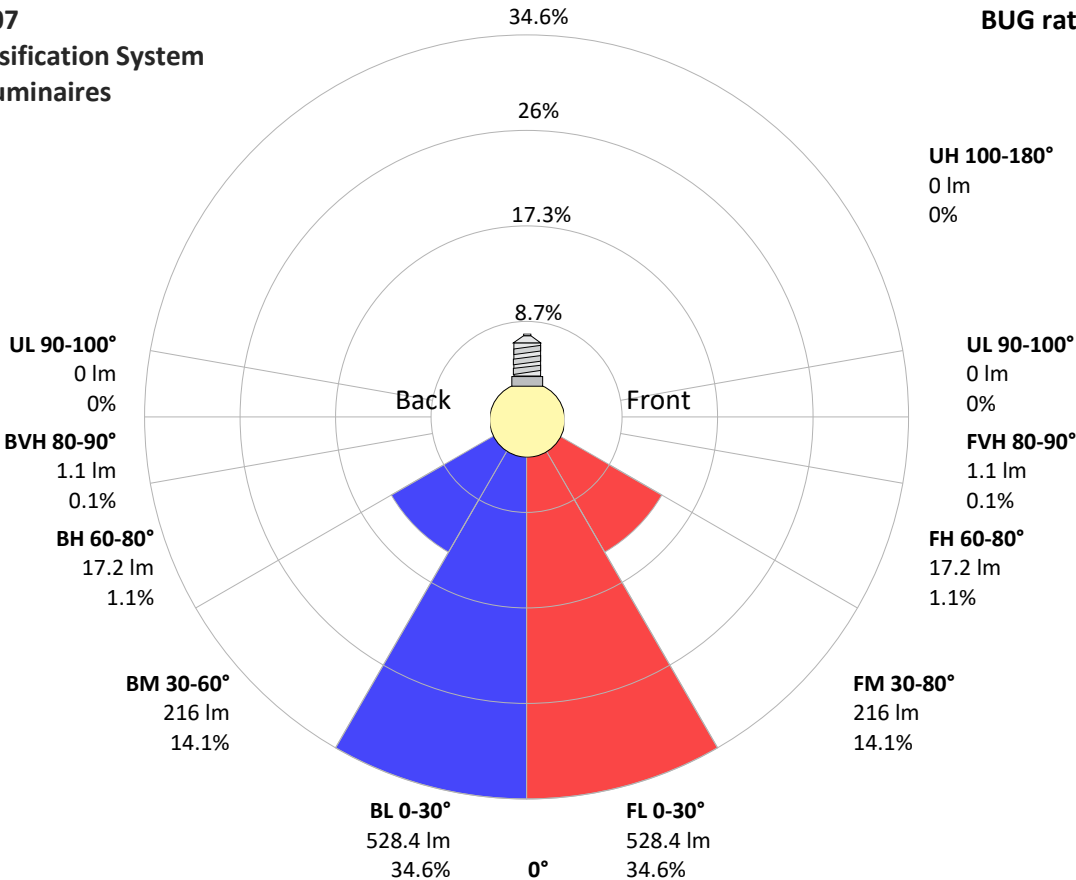
Zone (γ)	Lumen	% Total
0-30°	1057 lm	69.2%
0-40°	1307 lm	85.6%
0-60°	1490 lm	97.6%
60-90°	36 lm	2.4%
70-100°	12 lm	0.8%
90-120°	0 lm	0.0%
0-90°	1526 lm	100.0%
90-180°	1 lm	0.0%
0-180°	1527 lm	100.0%

BUG rating

	Lumen	% Total
Forward light		
Low(0-30°)	528 lm	34.6%
Medium(30-60°)	216 lm	14.1%
High(60-80°)	17 lm	1.1%
Very high(80-90°)	1 lm	0.1%
Back light		
Low(0-30°)	528 lm	34.6%
Medium(30-60°)	216 lm	14.1%
High(60-80°)	17 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

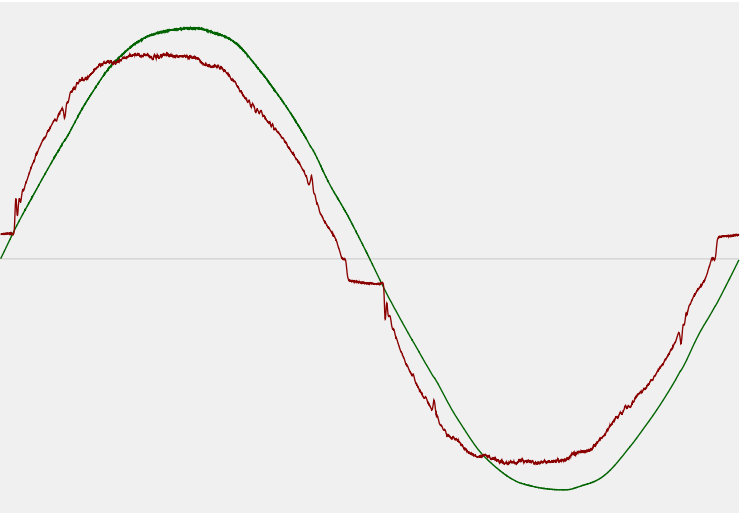
Input Power

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%

Efficiency

Radiated power efficiency	35.2%
<div><div></div></div>	
Lumen efficiency	96 lm/W
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Input Power Curve



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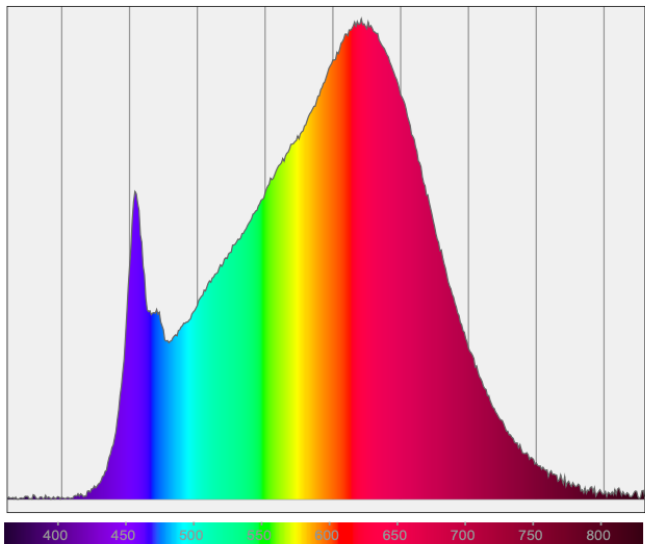
Color Measurements

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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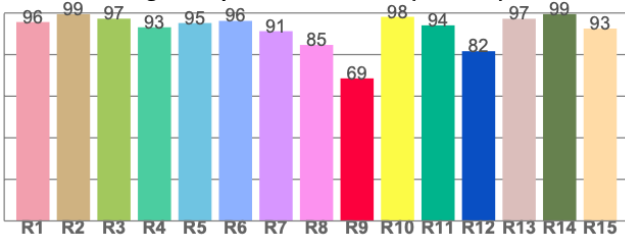
CIE 1931



CIE 1931 – zoomed on Planckian locus



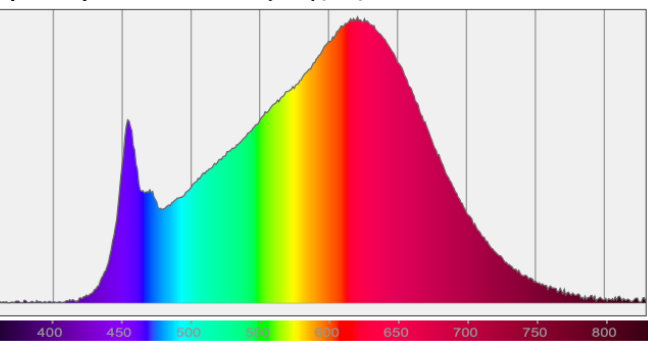
Color Rendering Index per reference color (CIE 1995)



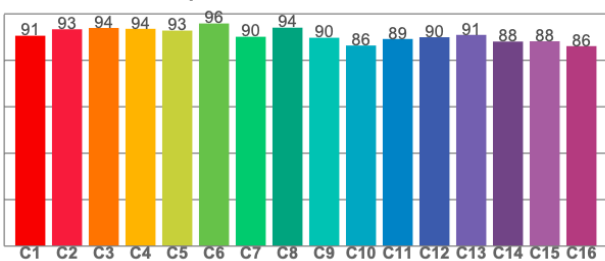
CRI R values, only R1-R8 are used to calculate final CRI value

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%



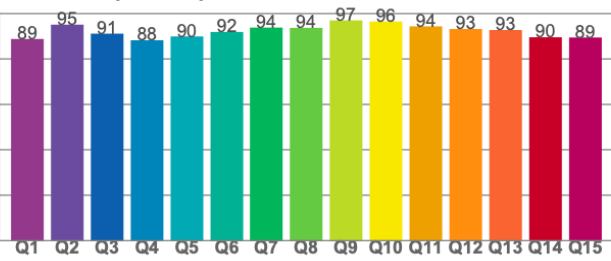
TM30-18 Rf-values per hue bin



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