

Goniophotometry Report

1_PHOT_NINETY-NINE-2275lmChip-3500K-Spreader_2303
www.factorylux.com



Tested Light Source - 1_PHOT_NINETY-NINE-2275lmChip-3500K-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

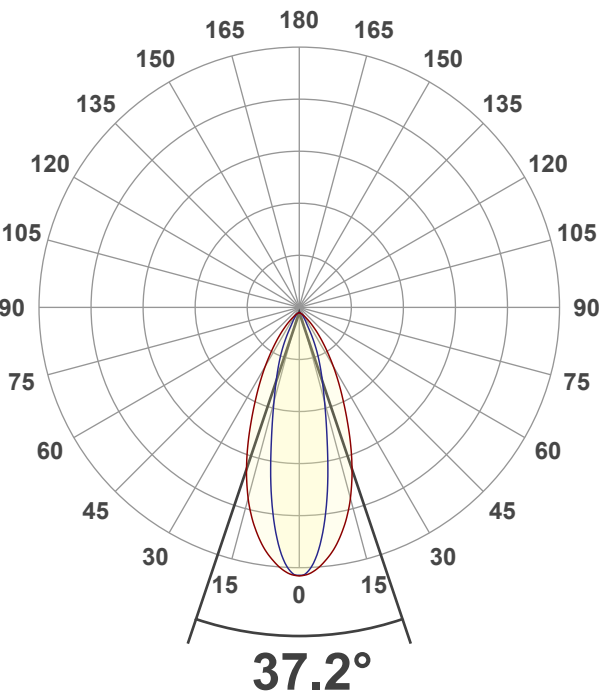
32 planes – 11.25°
1°
1.50 m
15.9 W – PF 0.98 – DPF 0.98
241 V – 0.067 A
50 Hz

Main Light Measurement Results

Output
Efficiency
Peak Intensity and Beam Angle
Color Rendering Index

1636 lm
103 lm/W
2838 cd – 37.2°
CRI 92.7

Light Intensity Distribution

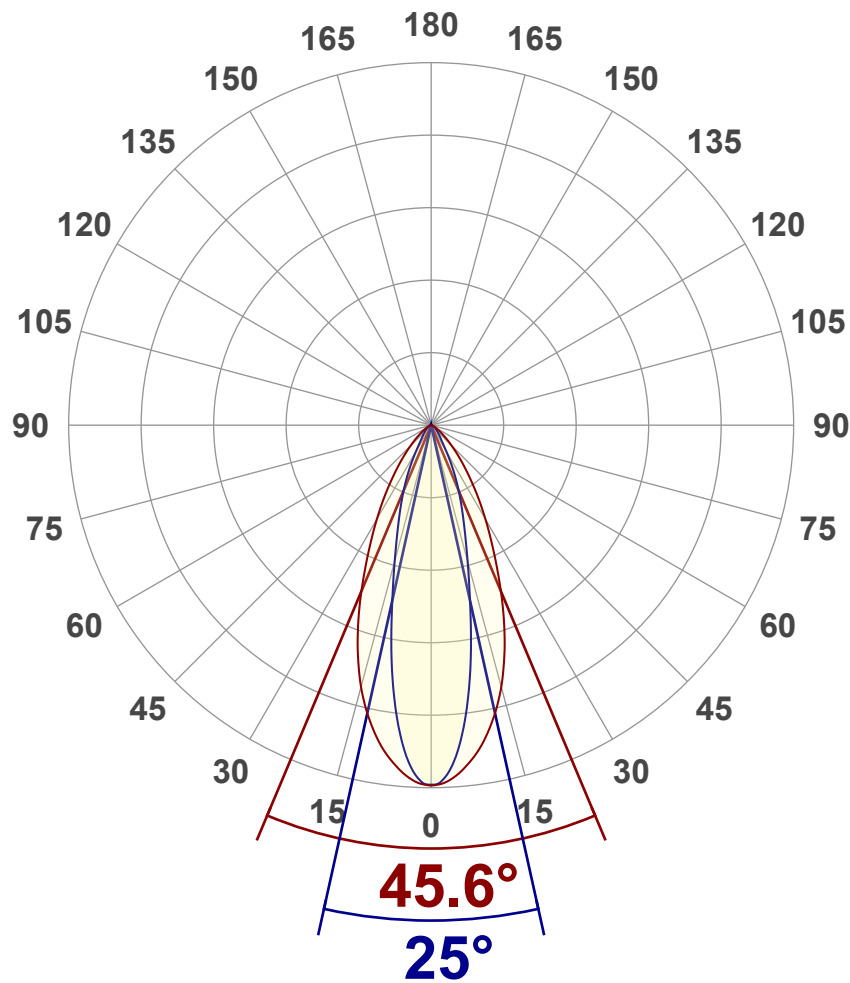


Goniophotometry Report

1_PHOT_NINETY-NINE-2275lmChip-3500K-Spreader_2303
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Luminous Intensity diagram Unit: 0-100% of peak intensity



Main Values	
Output (total Lumen)	1636 lm
Peak Intensity	2838 cd
Beam Angle (50%)	37.2°
Beam Angle (90%)	25°
Beam Angle (10%)	57.3°

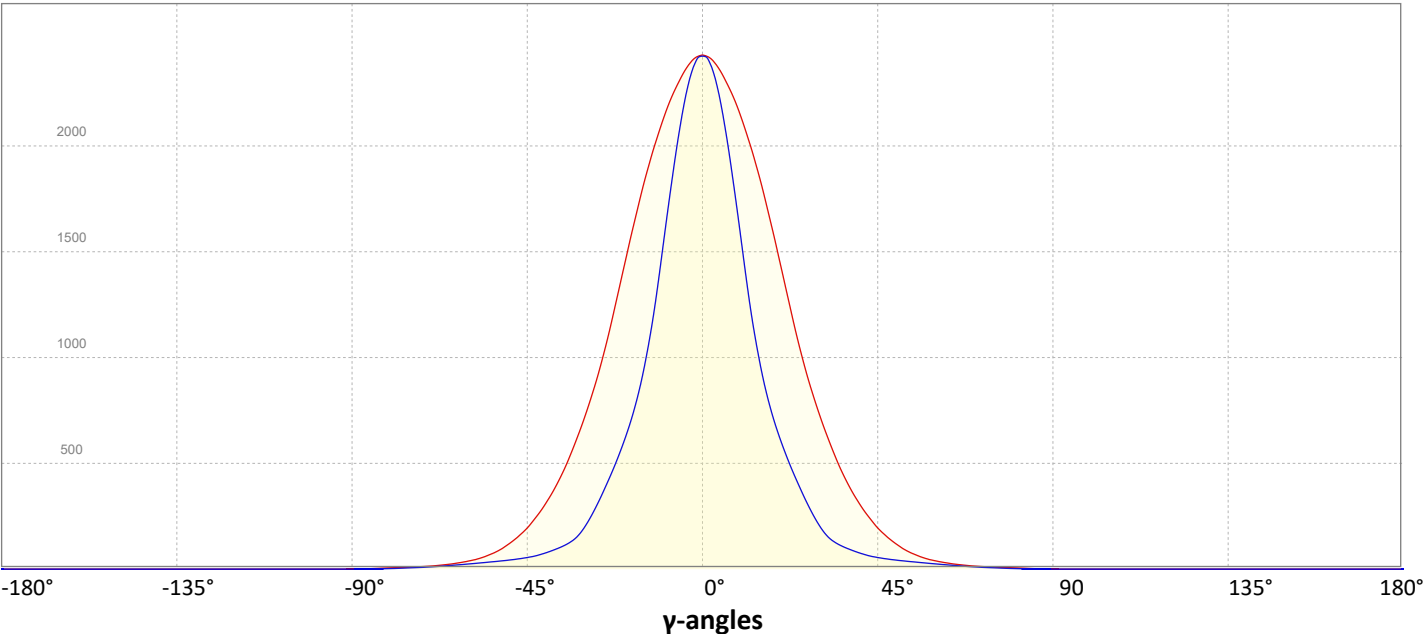
Cut-off Angle	
Average 2,5%	100°

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

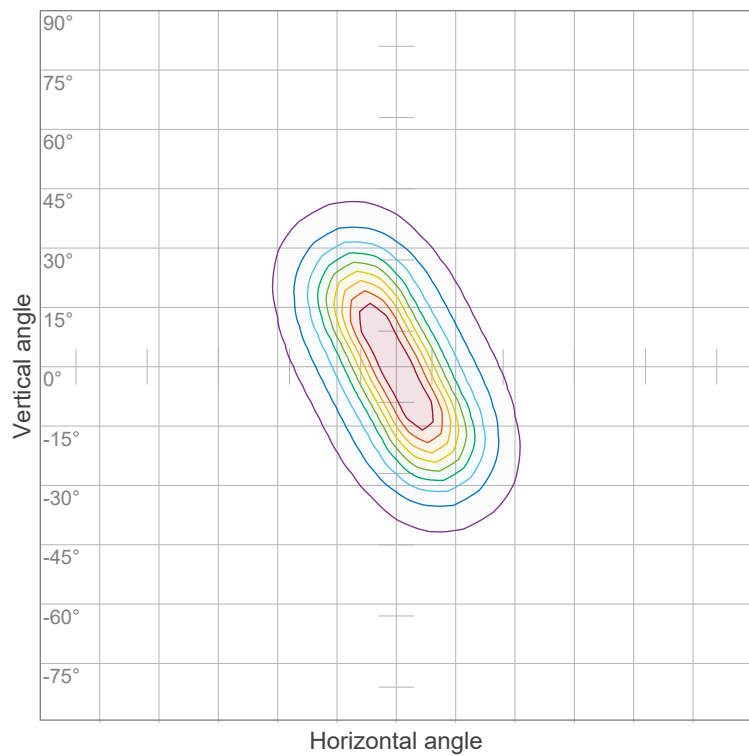


Goniophotometry Report

1_PHOT_NINETY-NINE-2275lmChip-3500K-Spreader_2303
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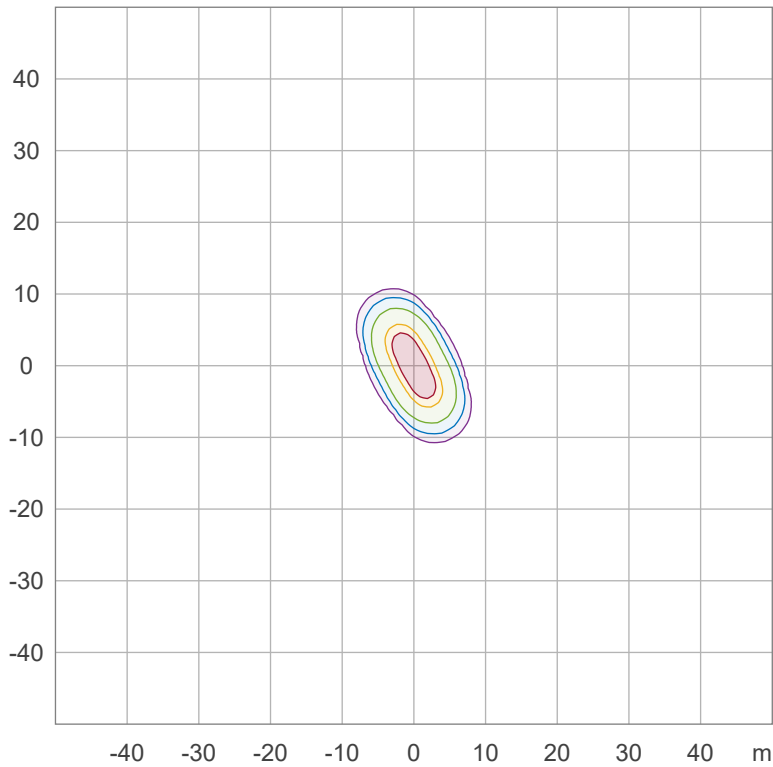
Iso-intensity Diagram (Iso-candela)



90 %	2551.3 cd
80 %	2267.8 cd
70 %	1984.3 cd
60 %	1700.8 cd
50 %	1417.4 cd
40 %	1133.9 cd
30 %	850.4 cd
20 %	566.9 cd
10 %	283.5 cd

Peak intensity: 2834.7 cd
Number of c-planes: 32

Iso-illuminance Diagram (Iso-lux)



50.0 %	14.2 lx
30.0 %	8.5 lx
10.0 %	2.8 lx
5.0 %	1.4 lx
3.0 %	0.9 lx

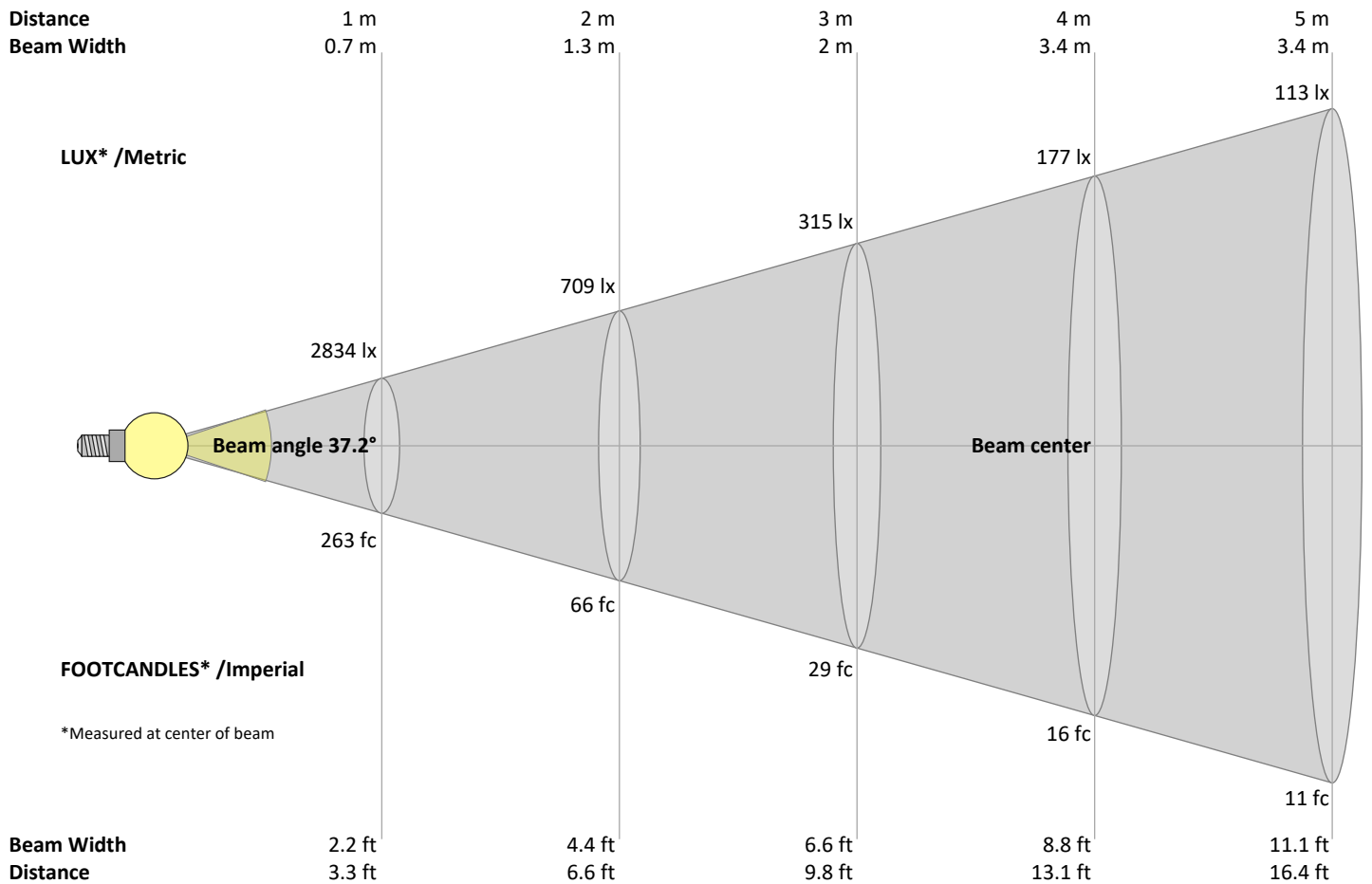
Peak illuminance: 28.3 lx
Mounting height: 10.0 m
Number of c-planes: 32

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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
2834	709	315	177	113	79	58	44	35	28	23	20	17	14	13	11	10	9	8	7	lux
263.3	65.8	29.3	16.5	10.5	7.3	5.4	4.1	3.3	2.6	2.2	1.8	1.6	1.3	1.2	1	0.9	0.8	0.7	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
2834	2820	2769	2693	2601	2488	2357	2212	2048	1870	1683	1493	1306	1137	988	855	736	626	528	444	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
2834	2787	2641	2409	2121	1804	1487	1223	1011	847	715	600	498	403	316	241	184	149	125	107	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
2834	2820	2769	2693	2601	2488	2357	2212	2048	1870	1683	1493	1306	1137	988	855	736	626	528	444	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
2834	2787	2641	2409	2121	1804	1487	1223	1011	847	715	600	498	403	316	241	184	149	125	107	cd
100%	98%	93%	85%	75%	64%	52%	43%	36%	30%	25%	21%	18%	14%	11%	9%	6%	5%	4%	4%	of 0°val

Goniophotometry Report

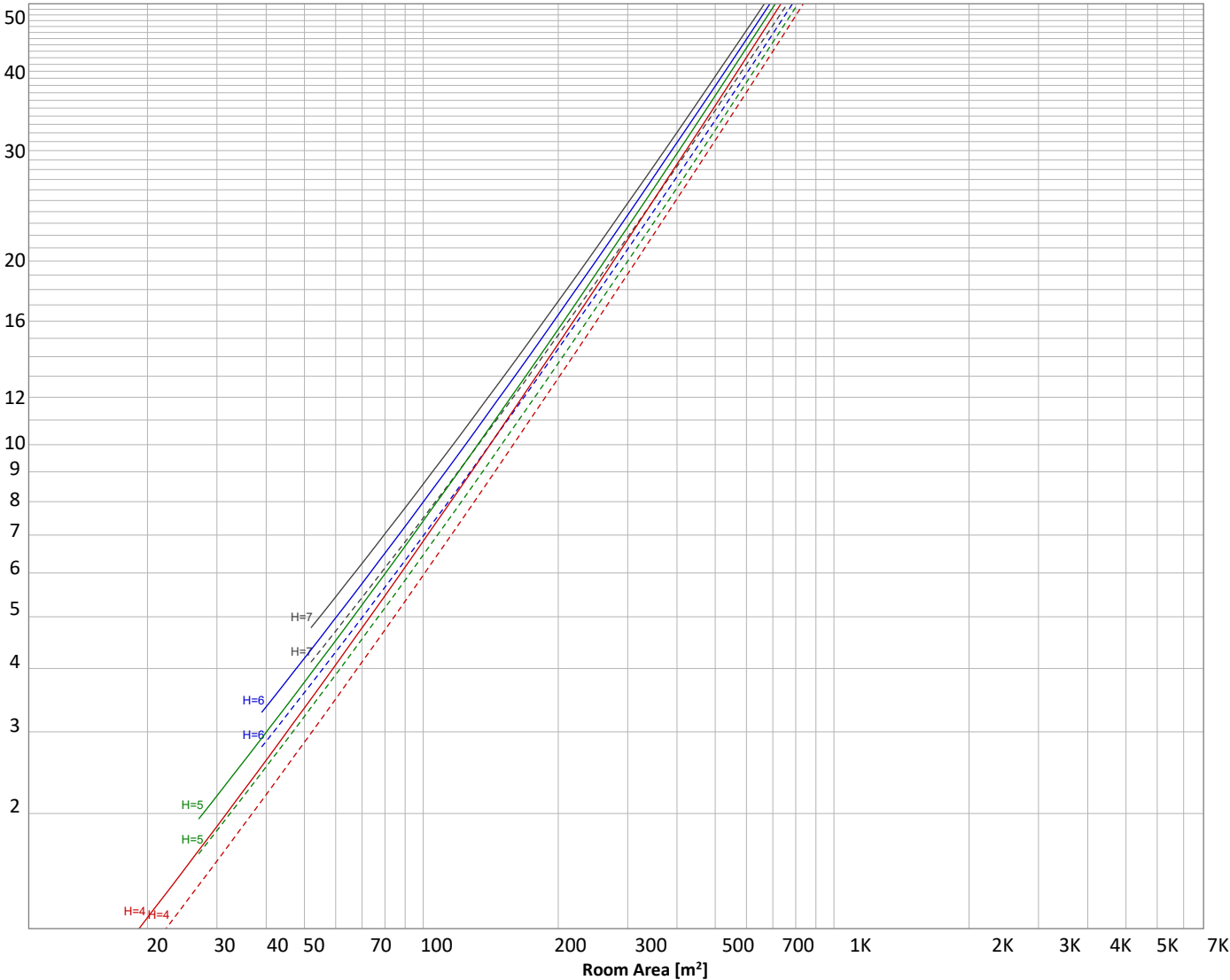
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Luminaire budgetary diagram

Uncorrected, comprehensive UGR table according to 117-1995

LAMPS (number of lamps)



Conditions

H = Room height	Flux = 1636 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
				30
				20

Zonal Lumen Summary

0°-10°	10°-20°	20°-30°	30°-40°	40°-50°	50°-60°	60°-70°	70°-80°	80°-90°
236 lm	466 lm	430 lm	267 lm	133 lm	63.1 lm	26.8 lm	9.92 lm	2.35 lm
90°-100°	100°-110°	110°-120°	120°-130°	130°-140°	140°-150°	150°-160°	160°-170°	170°-180°
0.160 lm	0.148 lm	0.139 lm	0.125 lm	0.046 lm	0.000 lm	0.000 lm	0.000 lm	0.000 lm

Goniophotometry Report

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Outdoor Light Planning

Lumen per Zone

Zone (γ)	Lumen	% Total
0-10°	236 lm	14.4%
10-20°	466 lm	28.5%
20-30°	430 lm	26.3%
30-40°	267 lm	16.3%
40-50°	133 lm	8.1%
50-60°	63 lm	3.9%
60-70°	27 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	1636 lm	100.0%

Intensity peaks

Max intensity	2838 cd
Intensity, 90°	0 cd
Intensity, 0°	2834 cd

Zonal Lumen summary

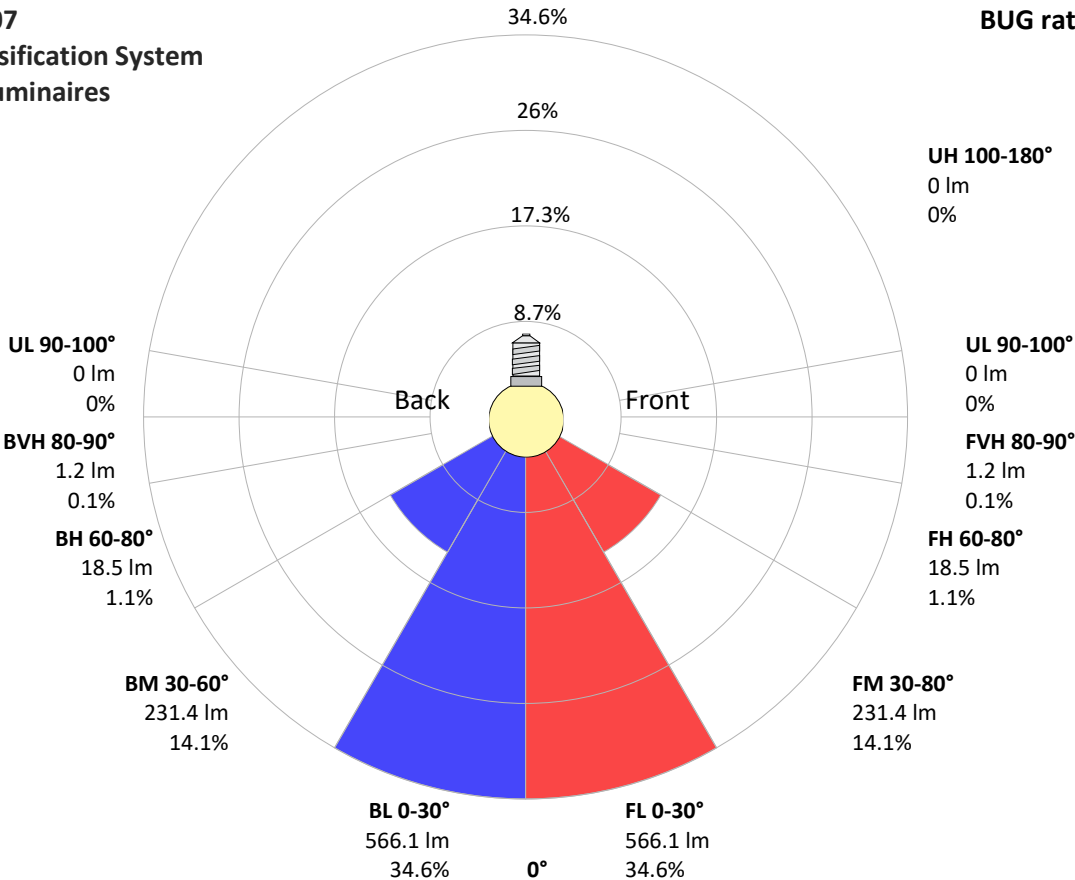
Zone (γ)	Lumen	% Total
0-30°	1133 lm	69.2%
0-40°	1400 lm	85.6%
0-60°	1596 lm	97.6%
60-90°	39 lm	2.4%
70-100°	12 lm	0.8%
90-120°	0 lm	0.0%
0-90°	1635 lm	100.0%
90-180°	1 lm	0.0%
0-180°	1636 lm	100.0%

BUG rating

	Lumen	% Total
Forward light		
Low(0-30°)	566 lm	34.6%
Medium(30-60°)	231 lm	14.1%
High(60-80°)	18 lm	1.1%
Very high(80-90°)	1 lm	0.1%
Back light		
Low(0-30°)	566 lm	34.6%
Medium(30-60°)	231 lm	14.1%
High(60-80°)	18 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

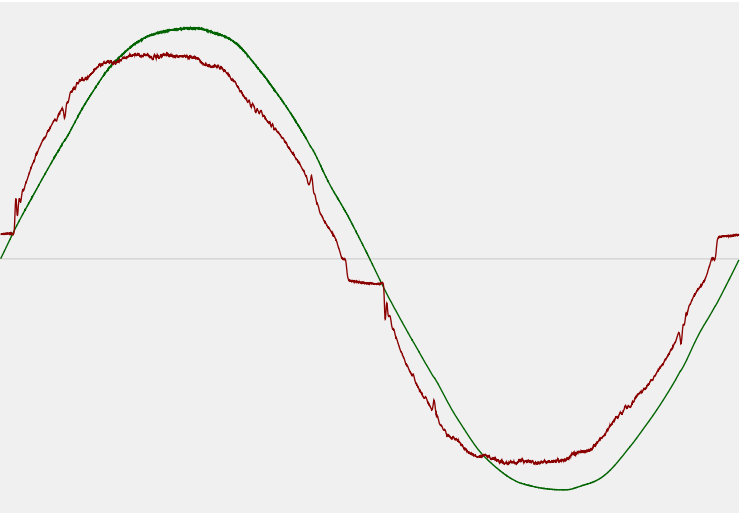
Input Power

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	37.7%
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Lumen efficiency	103 lm/W
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Input Power Curve



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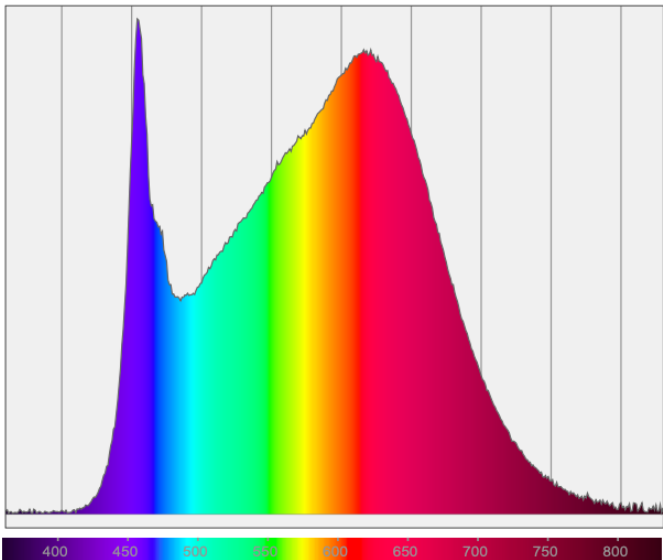
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Color Measurements

Correlated Color Temperature CCT = 3500 K
Color Rendering TM30-18 R_f 90.2 — R_g 98.1
Color Shift, CIE duv Duv ±0.0003

Spectral distribution



Color details

Correlated Color Temperature	CCT = 3500 K	Color coordinates CIE 1931	(x;y) = (0.406;0.391)
Color Rendering Index	CRI 94.0	Color coordinate CIEs 1960	(u;v) = (0.236;0.341)
Color Rendering Index, R9 (red component)	R9 = 77.7	Color deviation from BBL	Duv = ±0.0003
Color Rendering TM30-18	R _f 90.2 — R _g 98.1	Color coordinate CIEs 1976 (CIELUV)	(u';v') = (0.236;0.236)
Color Quality Scale	CQS = 92.3		

Goniophotometry Report

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CIE 1931



CIE 1931 – zoomed on Planckian locus



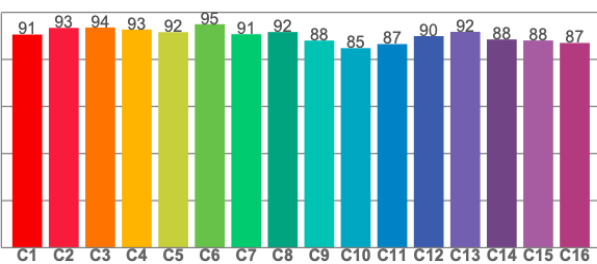
Color Rendering Index per reference color (CIE 1995)



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
97.3	97.2	95.9	93.4	95.9	93.5	90.9	87.9	77.7	96.6	94.1	77.1	98.8	99.0	96.4

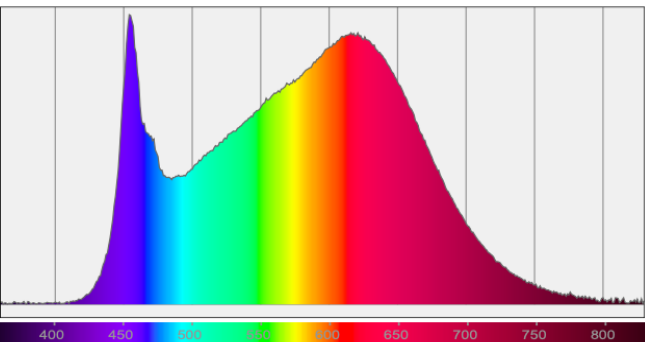
TM30-18 Rf-values per hue bin



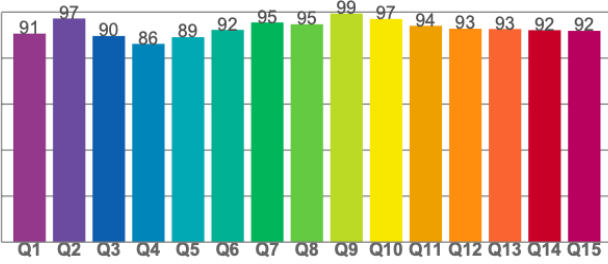
TM30 C values, 16 binned values out of total of 99 C values

C1	C2	C3	C4	C5	C6	C7	C8	C9	C10	C11	C12	C13	C14	C15	C16
90.6	93.4	93.6	92.7	91.6	95.0	90.7	91.6	88.0	84.8	86.5	89.9	91.7	88.5	88.1	87.0

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
90.6	97.2	89.6	86.2	89.1	92.3	95.5	94.7	99.4	97.0	94.0	92.8	92.6	92.1	91.8