

# Goniophotometry Report

1\_PHOT\_NINETY-NINE-1650lmChip-2700K-Spreader\_2303  
www.factorylux.com



Tested Light Source - 1\_PHOT\_NINETY-NINE-1650lmChip-2700K-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  
 $\gamma$  (gamma)-Resolution  
Test Distance  
Input Power, Power and Displ. Factors  
Input RMS Voltage and Current  
Frequency of Input Power

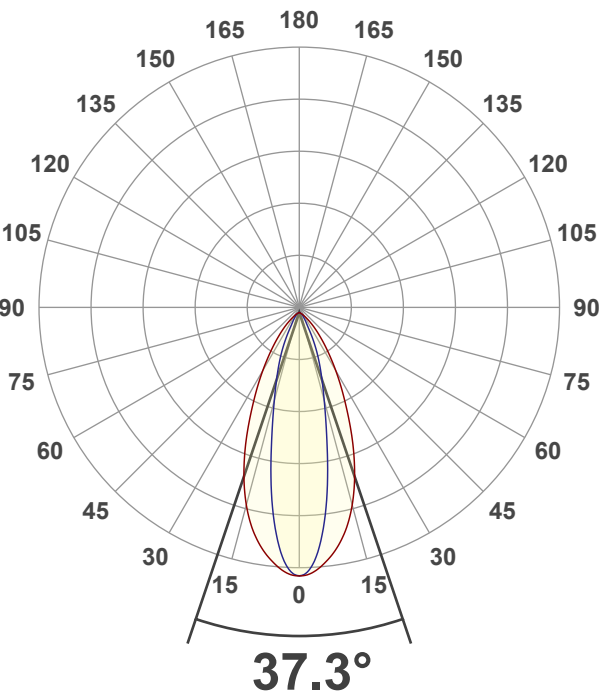
32 planes – 11.25°  
1°  
1.50 m  
14.6 W – PF 0.46 – DPF 0.78  
244 V – 0.129 A  
49.9 Hz

## Main Light Measurement Results

Output  
Efficiency  
Peak Intensity and Beam Angle  
Color Rendering Index

1229 lm  
84 lm/W  
2126 cd – 37.3°  
CRI 93.0

## Light Intensity Distribution



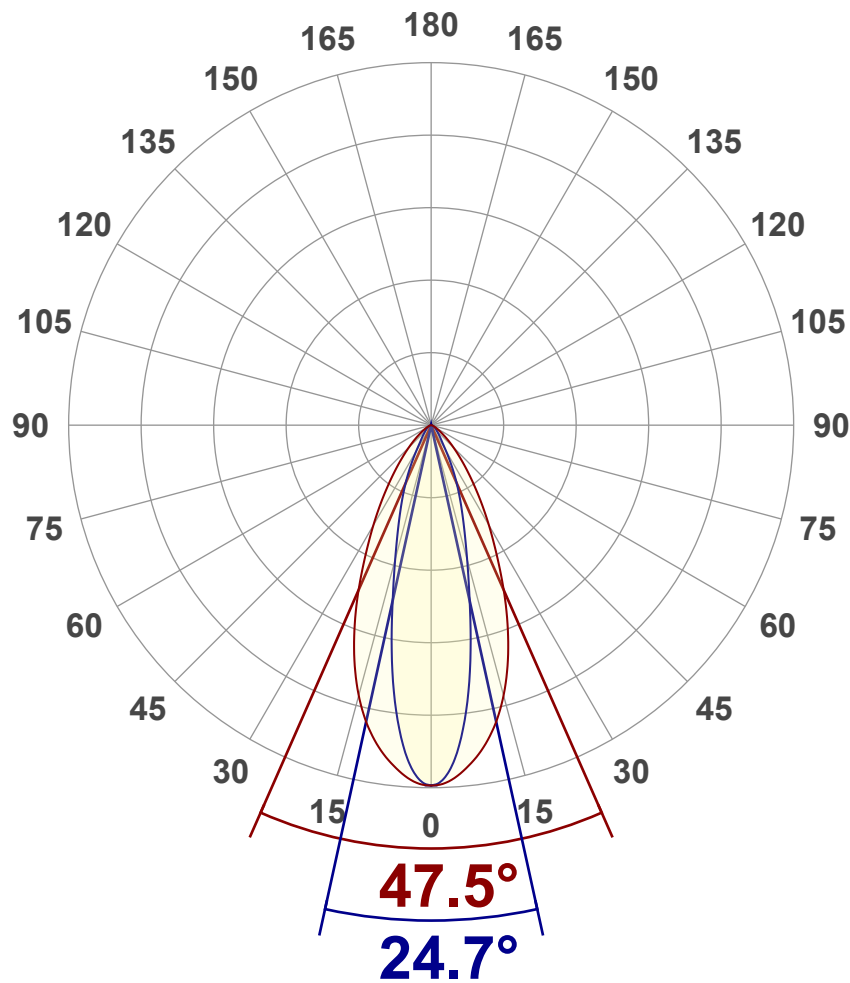
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Luminous Intensity diagram

Unit: 0-100% of peak intensity



Main Values

Output (total Lumen)	1229 lm
Peak Intensity	2126 cd
Beam Angle (50%)	37.3°
Beam Angle (90%)	24.7°
Beam Angle (10%)	58.5°

Cut-off Angle

Average 2,5%	100.2°
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Field Angle

Average 10%	72.5°
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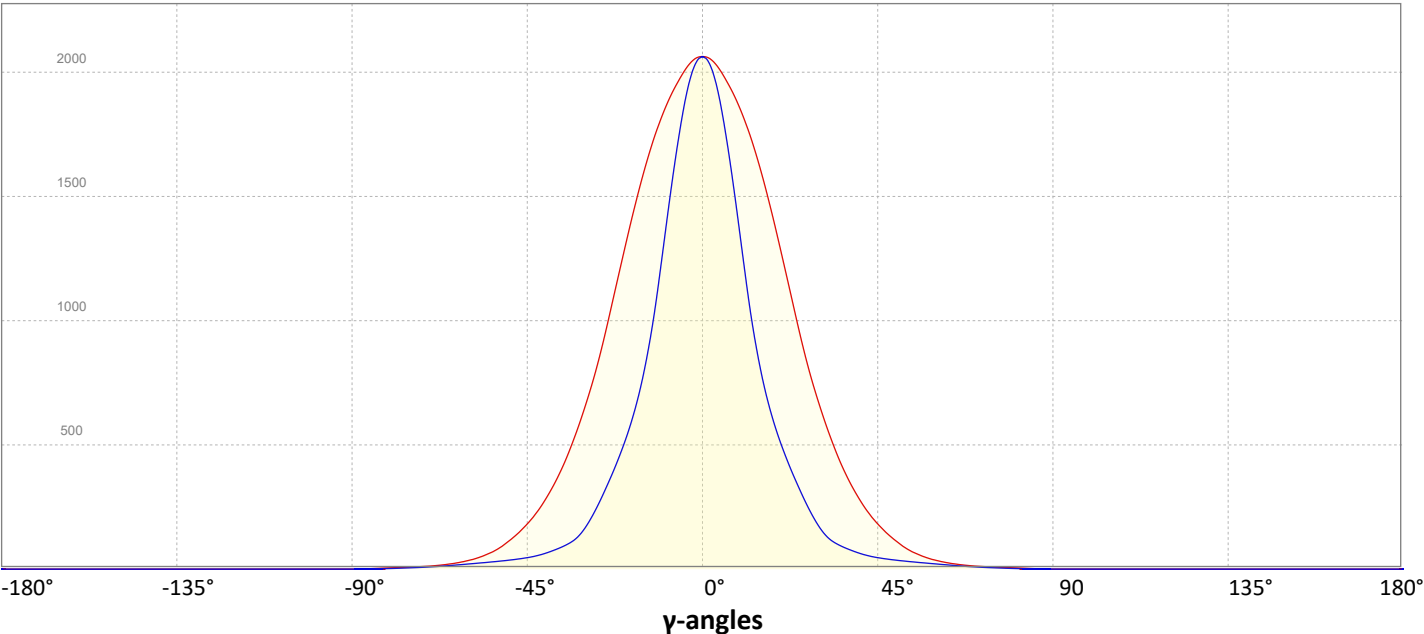
Intensity Ratio

In 120° cone	97.6%
In 90° cone	90.3%

C000-C180

C090-C270

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

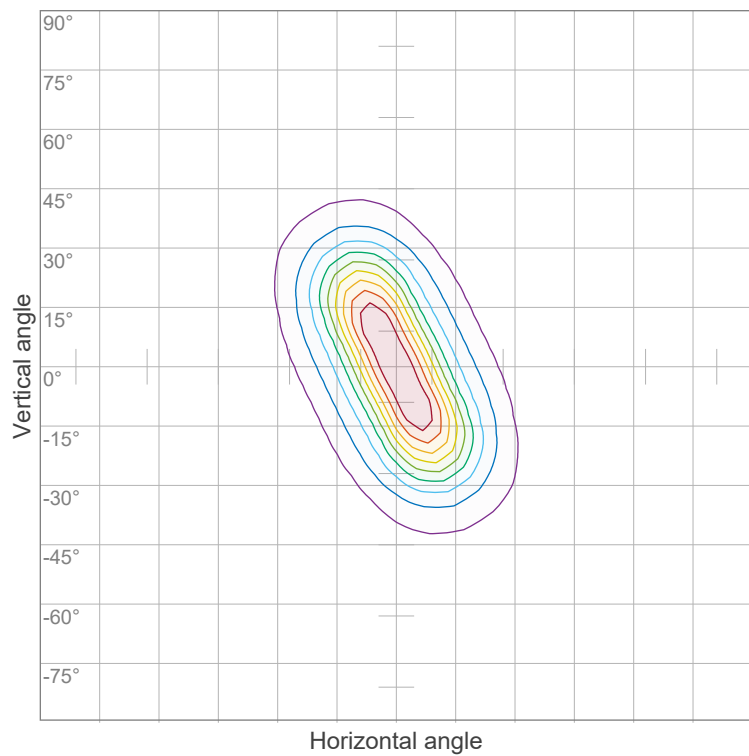


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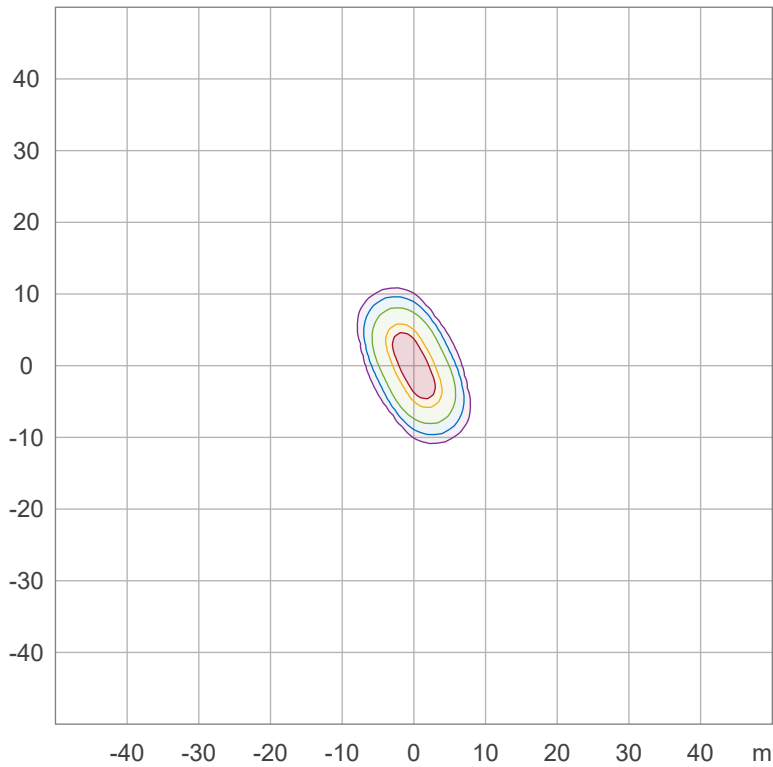
## Iso-intensity Diagram (Iso-candela)



90 %	1913.3 cd
80 %	1700.7 cd
70 %	1488.1 cd
60 %	1275.5 cd
50 %	1062.9 cd
40 %	850.4 cd
30 %	637.8 cd
20 %	425.2 cd
10 %	212.6 cd

Peak intensity: 2125.9 cd  
Number of c-planes: 32

## Iso-illuminance Diagram (Iso-lux)



50.0 %	10.6 lx
30.0 %	6.4 lx
10.0 %	2.1 lx
5.0 %	1.1 lx
3.0 %	0.6 lx

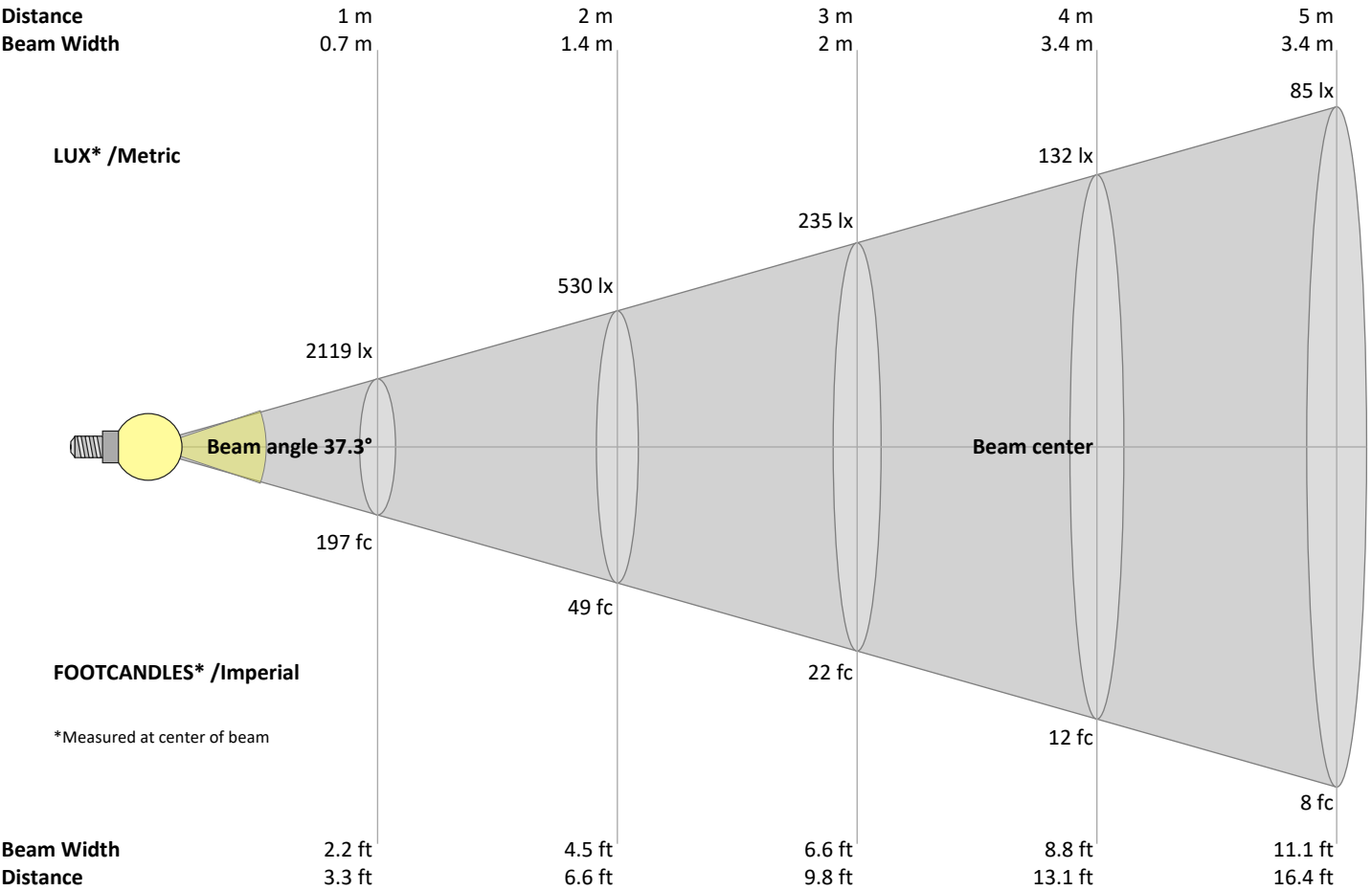
Peak illuminance: 21.2 lx  
Mounting height: 10.0 m  
Number of c-planes: 32

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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
2119	530	235	132	85	59	43	33	26	21	18	15	13	11	9	8	7	7	6	5	lux
196.9	49.2	21.9	12.3	7.9	5.5	4	3.1	2.4	2	1.6	1.4	1.2	1	0.9	0.8	0.7	0.6	0.5	0.5	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
2119	2109	2075	2023	1963	1889	1803	1702	1587	1460	1324	1184	1042	907	786	680	584	497	420	354	cd
100%	100%	98%	95%	93%	89%	85%	80%	75%	69%	62%	56%	49%	43%	37%	32%	28%	23%	20%	17%	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
2119	2082	1972	1795	1578	1337	1098	901	745	624	525	440	364	293	229	175	134	109	92	79	cd
100%	98%	93%	85%	74%	63%	52%	43%	35%	29%	25%	21%	17%	14%	11%	8%	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
2119	2109	2075	2023	1963	1889	1803	1702	1587	1460	1324	1184	1042	907	786	680	584	497	420	354	cd
100%	100%	98%	95%	93%	89%	85%	80%	75%	69%	62%	56%	49%	43%	37%	32%	28%	23%	20%	17%	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
2119	2082	1972	1795	1578	1337	1098	901	745	624	525	440	364	293	229	175	134	109	92	79	cd
100%	98%	93%	85%	74%	63%	52%	43%	35%	29%	25%	21%	17%	14%	11%	8%	6%	5%	4%	4%	of 0°val



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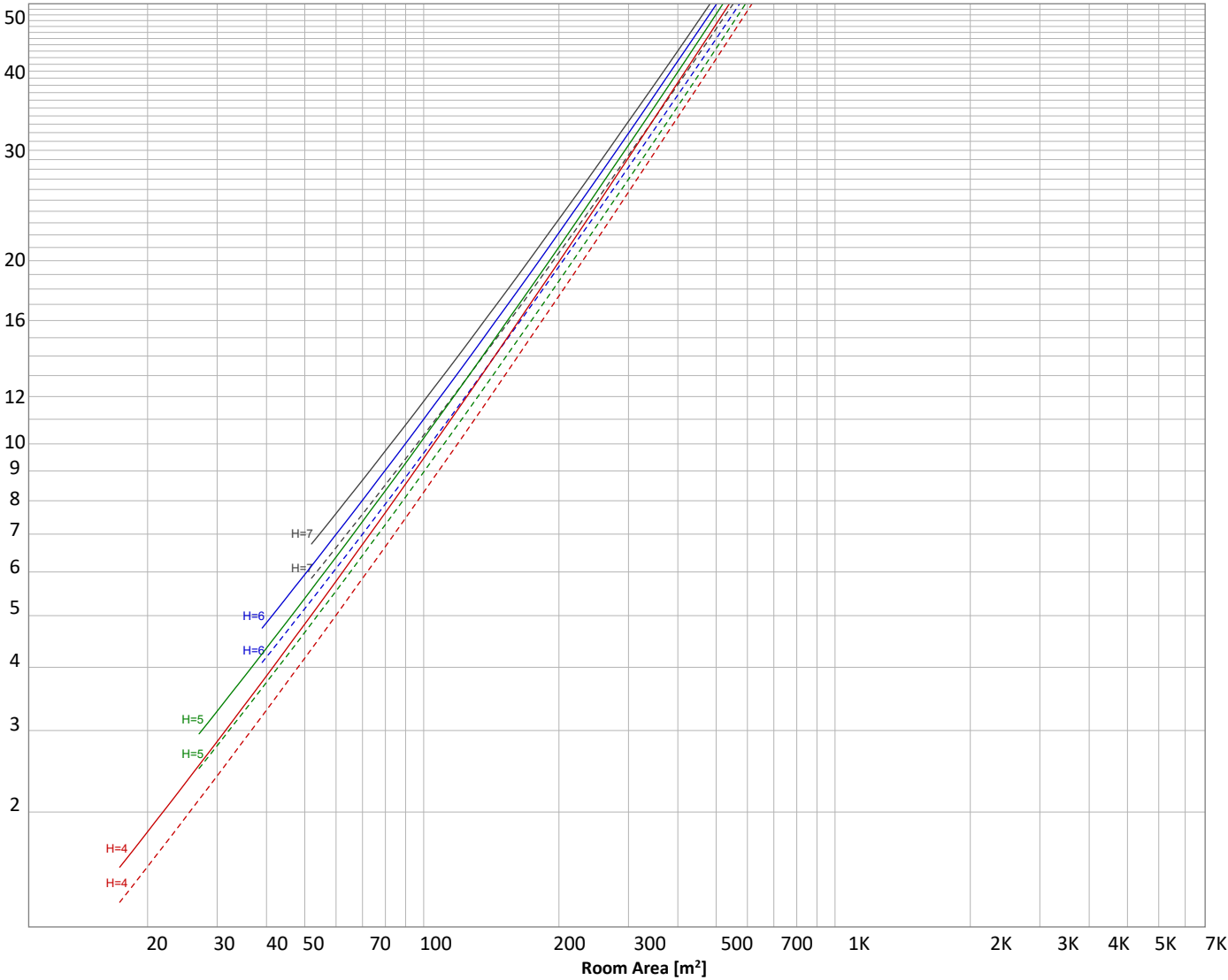
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Luminaire budgetary diagram

Uncorrected, comprehensive UGR table according to 117-1995

LAMPS (number of lamps)



Conditions

H = Room height	Flux = 1229 lm	p(%)		
H <sub>down</sub> = Lamp distance from ceiling =	0.00 m	Line type	Ceiling reflectance	Wall reflectance
H <sub>work</sub> = Work area height from floor =	0.00 m	-----	70	50
E <sub>work</sub> = 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°
177 lm	350 lm	323 lm	201 lm	101 lm	47.4 lm	19.9 lm	7.50 lm	1.80 lm
90°-100°	100°-110°	110°-120°	120°-130°	130°-140°	140°-150°	150°-160°	160°-170°	170°-180°
0.162 lm	0.156 lm	0.147 lm	0.133 lm	0.050 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°	177 lm	14.4%
10-20°	350 lm	28.4%
20-30°	323 lm	26.3%
30-40°	201 lm	16.4%
40-50°	101 lm	8.2%
50-60°	47 lm	3.9%
60-70°	20 lm	1.6%
70-80°	7 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	1229 lm	100.0%

### Intensity peaks

Max intensity	2126 cd
Intensity, 90°	0 cd
Intensity, 0°	2119 cd

### Zonal Lumen summary

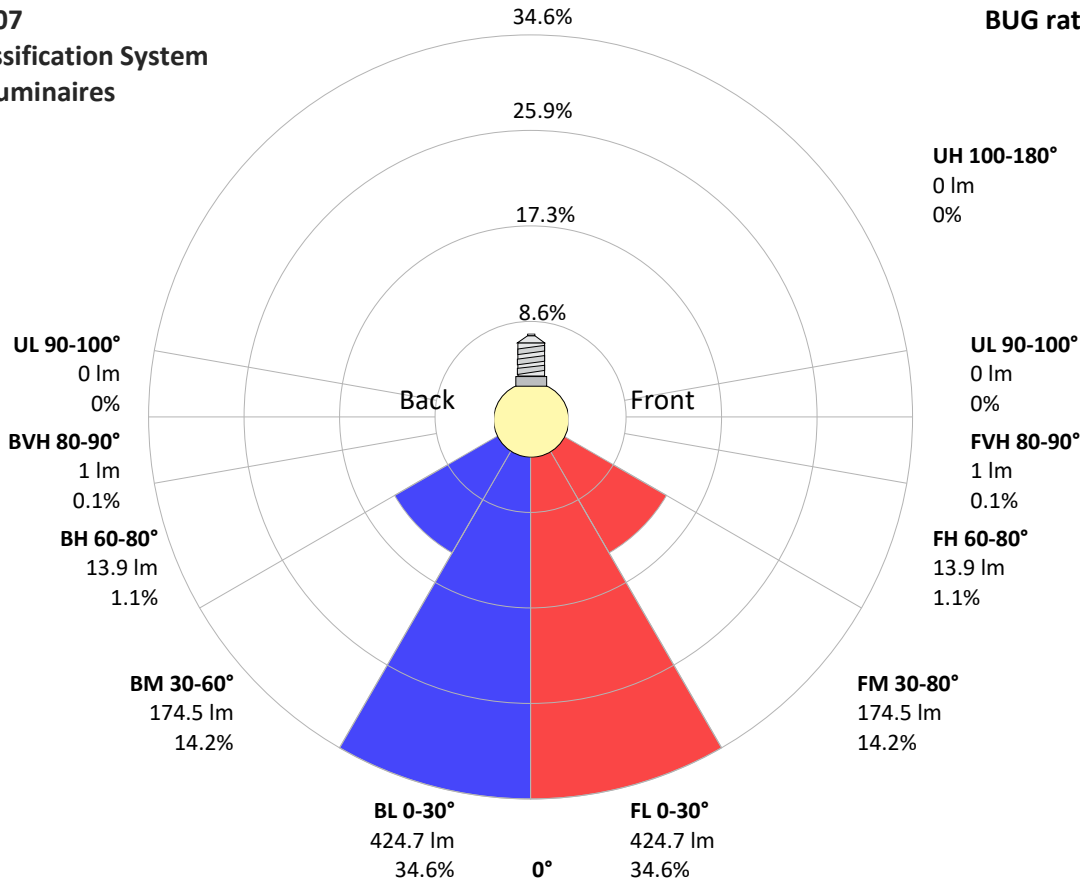
Zone (γ)	Lumen	% Total
0-30°	850 lm	69.1%
0-40°	1051 lm	85.5%
0-60°	1199 lm	97.6%
60-90°	29 lm	2.4%
70-100°	9 lm	0.8%
90-120°	0 lm	0.0%
0-90°	1228 lm	99.9%
90-180°	1 lm	0.1%
0-180°	1229 lm	100.0%

### BUG rating

	Lumen	% Total
<b>Forward light</b>		
Low(0-30°)	425 lm	34.6%
Medium(30-60°)	174 lm	14.2%
High(60-80°)	14 lm	1.1%
Very high(80-90°)	1 lm	0.1%
<b>Back light</b>		
Low(0-30°)	425 lm	34.6%
Medium(30-60°)	174 lm	14.2%
High(60-80°)	14 lm	1.1%
Very high(80-90°)	1 lm	0.1%
<b>Uplight</b>		
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

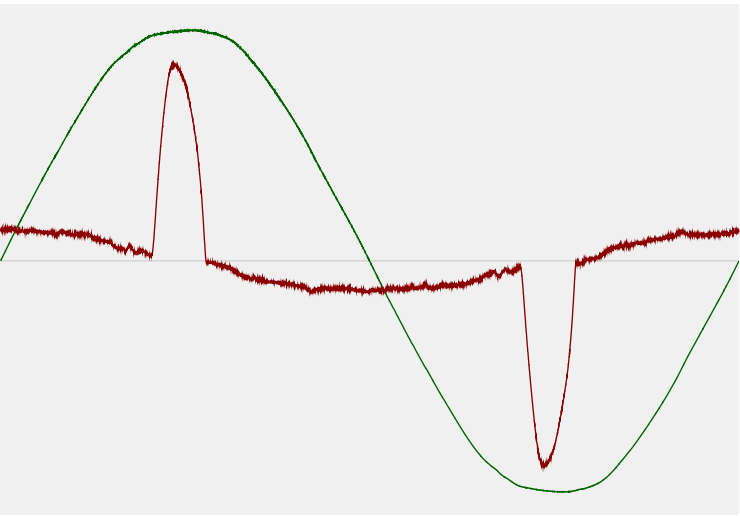
### Input Power

Power feed to light source	14.6 W
Frequency of input power	49.9 Hz
RMS Input voltage feed, $V_{RMS}$	244 V
RMS Input current feed, $I_{RMS}$	0.129 A
Volt-Ampere or apparent power = $V_{RMS} * I_{RMS}$	31.5 VA
Displacement factor of AC power feed	0.78
Power factor of AC current feed	0.46
Total harmonic distortion of the current	134.39%
Total harmonic distortion of the voltage	1.36%

### Efficiency

Radiated power efficiency	30.8%
<div><div></div></div>	
Lumen efficiency	84 lm/W
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### Input Power Curve





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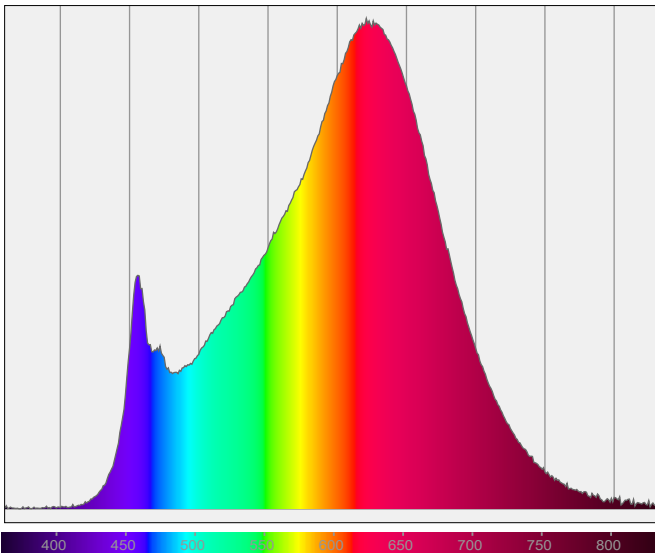
1\_PHOT\_NINETY-NINE-1650lmChip-2700K-Spreader\_2303  
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## Color Measurements

Correlated Color Temperature	CCT = 2700 K
Color Rendering TM30-18	R <sub>f</sub> 91.4 — R <sub>g</sub> 98.8
Color Shift, CIE duv	Duv ±0.0003

## Spectral distribution



## Color details

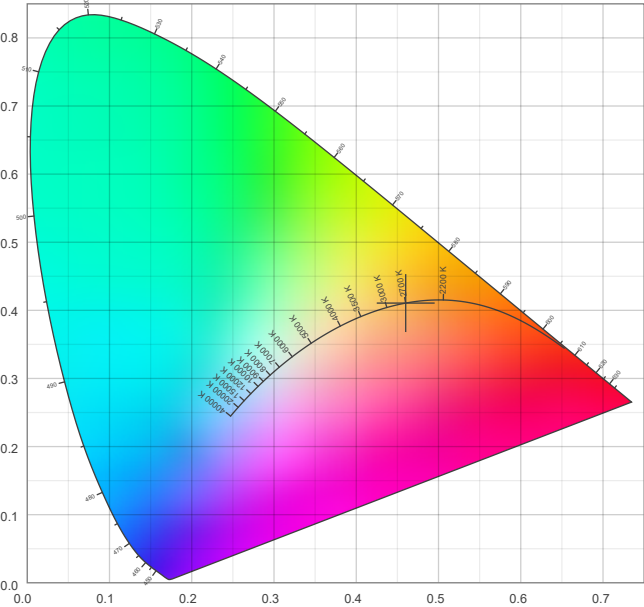
Correlated Color Temperature	CCT = 2700 K	Color coordinates CIE 1931	(x;y) = (0.460;0.411)
Color Rendering Index	CRI 93.0	Color coordinate CIEs 1960	(u;v) = (0.263;0.352)
Color Rendering Index, R9 (red component)	R9 = 67.7	Color deviation from BBL	Duv = ±0.0003
Color Rendering TM30-18	R <sub>f</sub> 91.4 — R <sub>g</sub> 98.8	Color coordinate CIEs 1976 (CIELUV)	(u';v') = (0.263;0.263)
Color Quality Scale	CQS = 90.9		

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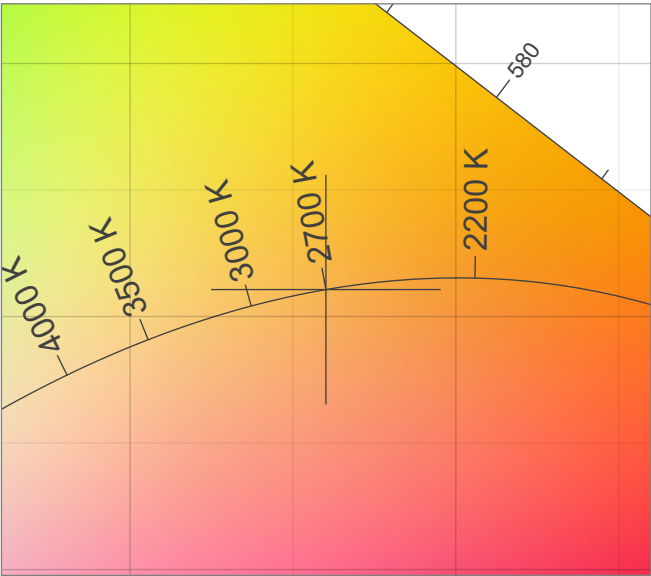
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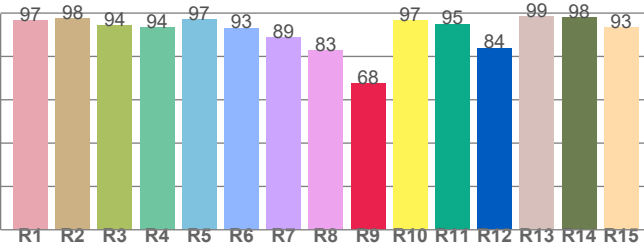
CIE 1931



CIE 1931 – zoomed on Planckian locus



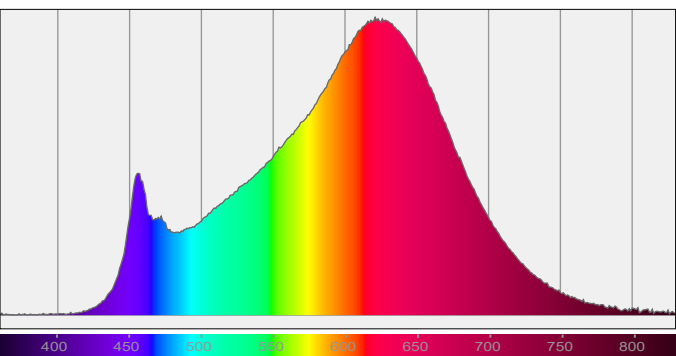
Color Rendering Index per reference color (CIE 1995)



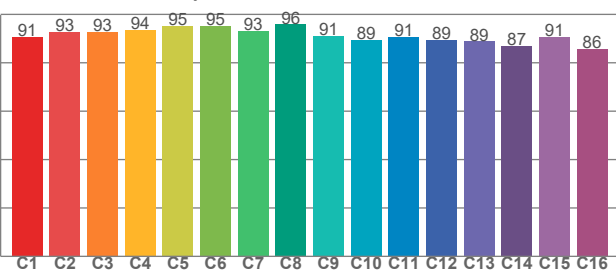
CRI R values, only R1-R8 are used to calculate final CRI value

R1	R2	R3	R4	R5	R6	R7	R8	R9	R10	R11	R12	R13	R14	R15
96.7	97.7	94.3	93.5	97.0	93.2	88.7	82.6	67.7	96.6	95.0	83.9	98.6	98.0	93.3

Spectral power distribution (SPD) / W/nm – 0-100%



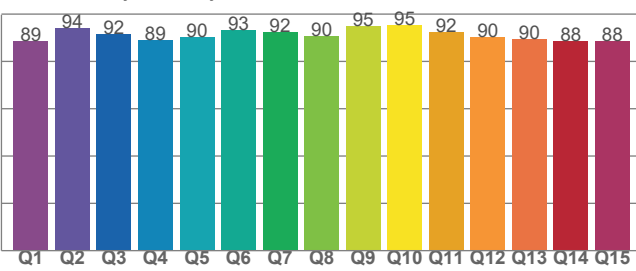
TM30-18 Rf-values per hue bin



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
90.5	92.7	92.6	93.7	95.1	95.1	93.1	95.8	91.0	89.4	90.6	89.5	88.8	87.1	90.7	85.6

Color Quality Scale by reference color



CQS Q values

Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10	Q11	Q12	Q13	Q14	Q15
88.6	93.9	91.6	88.9	90.3	93.1	92.3	90.5	94.8	95.3	92.5	90.3	89.6	88.4	88.4