

Goniophotometry Report

1_PHOT_NINETY-NINE-1750lmChip-3000K-Spreader_2303
www.factorylux.com



Tested Light Source - 1_PHOT_NINETY-NINE-1750lmChip-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

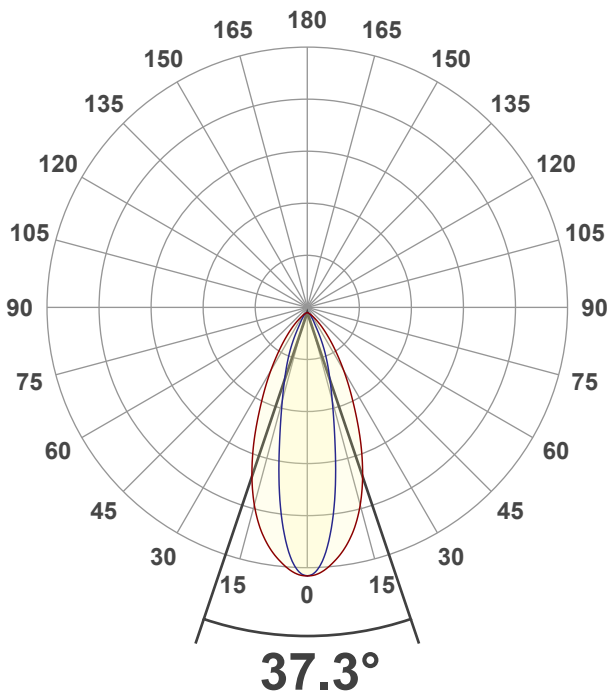
32 planes – 11.25°
1°
1.50 m
14.6 W – PF 0.46 – DPF 0.78
244 V – 0.129 A
49.9 Hz

Main Light Measurement Results

Output
Efficiency
Peak Intensity and Beam Angle
Color Rendering Index

1303 lm
89 lm/W
2254 cd – 37.3°
CRI 93.0

Light Intensity Distribution



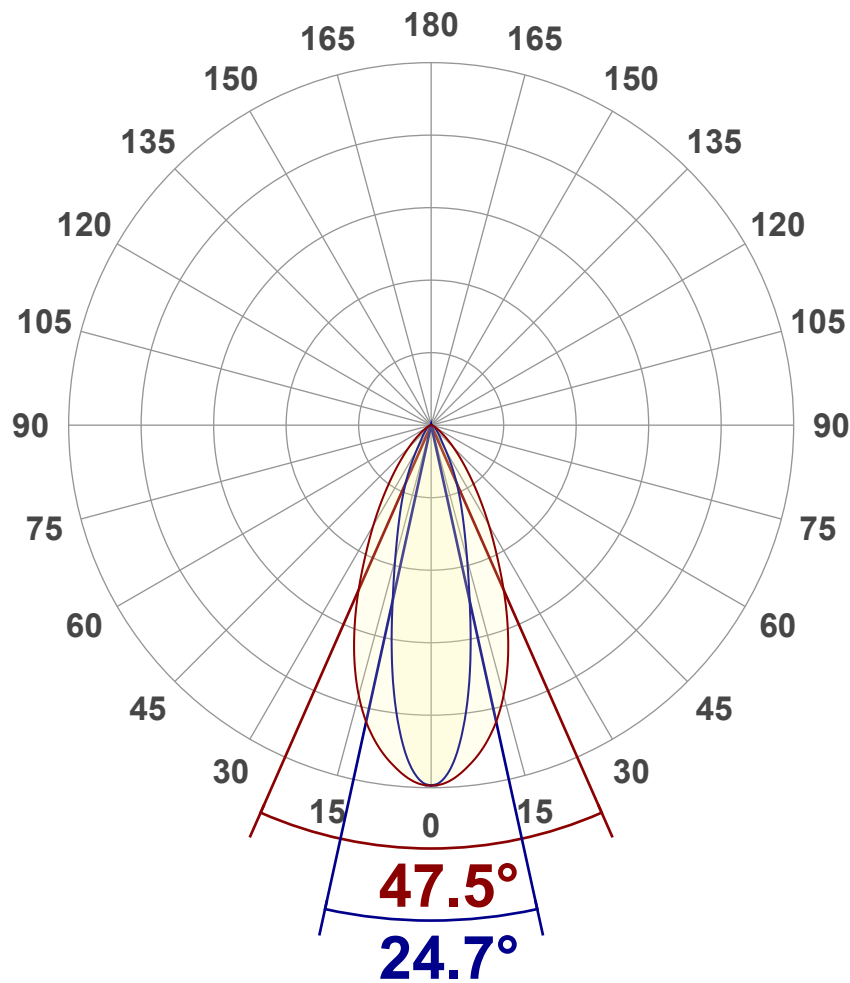
Goniophotometry Report

1_PHOT_NINETY-NINE-1750lmChip-3000K-Spreader_2303
www.factorylux.com



Luminous Intensity diagram

Unit: 0-100% of peak intensity



Main Values

Output (total Lumen)	1303 lm
Peak Intensity	2254 cd
Beam Angle (50%)	37.3°
Beam Angle (90%)	24.7°
Beam Angle (10%)	58.5°

Cut-off Angle

Average 2,5%	100.2°
--------------	--------

Field Angle

Average 10%	72.5°
-------------	-------

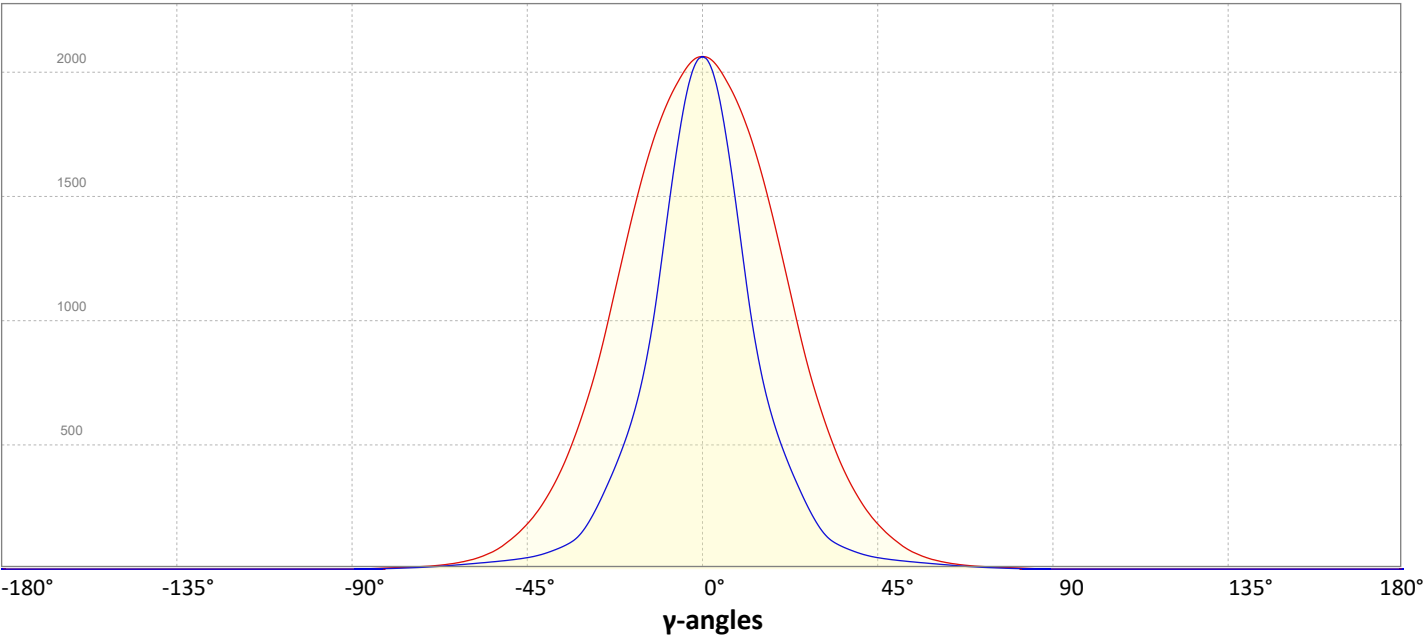
Intensity Ratio

In 120° cone	97.6%
In 90° cone	90.3%

C000-C180

C090-C270

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

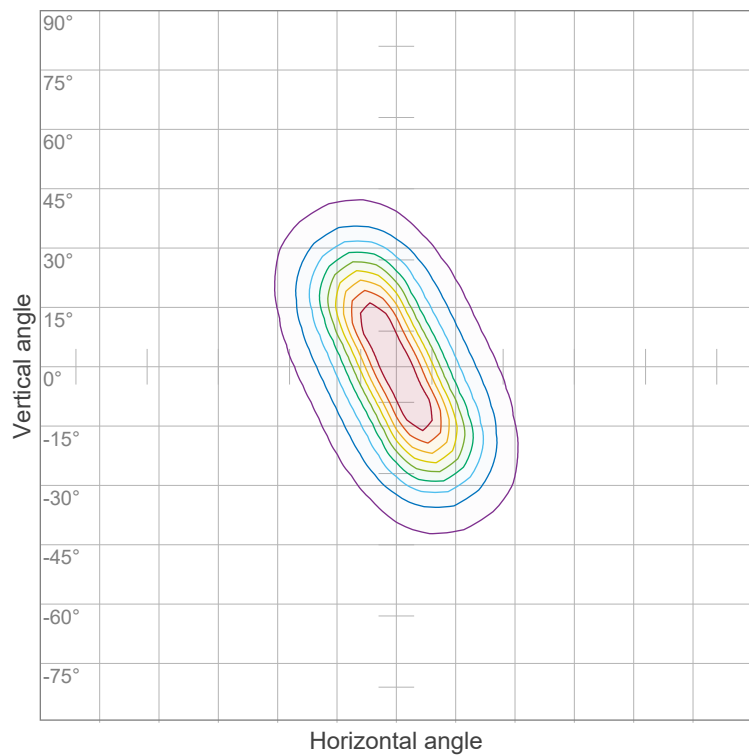


Goniophotometry Report

1_PHOT_NINETY-NINE-1750lmChip-3000K-Spreader_2303
www.factorylux.com



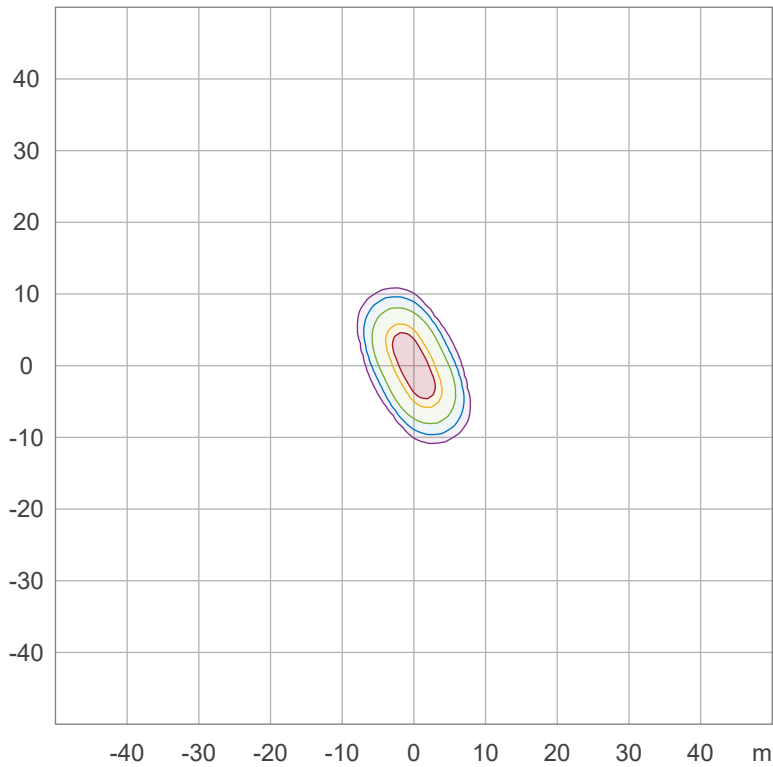
Iso-intensity Diagram (Iso-candela)



90 %	2028.5 cd
80 %	1803.1 cd
70 %	1577.7 cd
60 %	1352.3 cd
50 %	1126.9 cd
40 %	901.6 cd
30 %	676.2 cd
20 %	450.8 cd
10 %	225.4 cd

Peak intensity: 2253.9 cd
Number of c-planes: 32

Iso-illuminance Diagram (Iso-lux)



50.0 %	11.2 lx
30.0 %	6.7 lx
10.0 %	2.2 lx
5.0 %	1.1 lx
3.0 %	0.7 lx

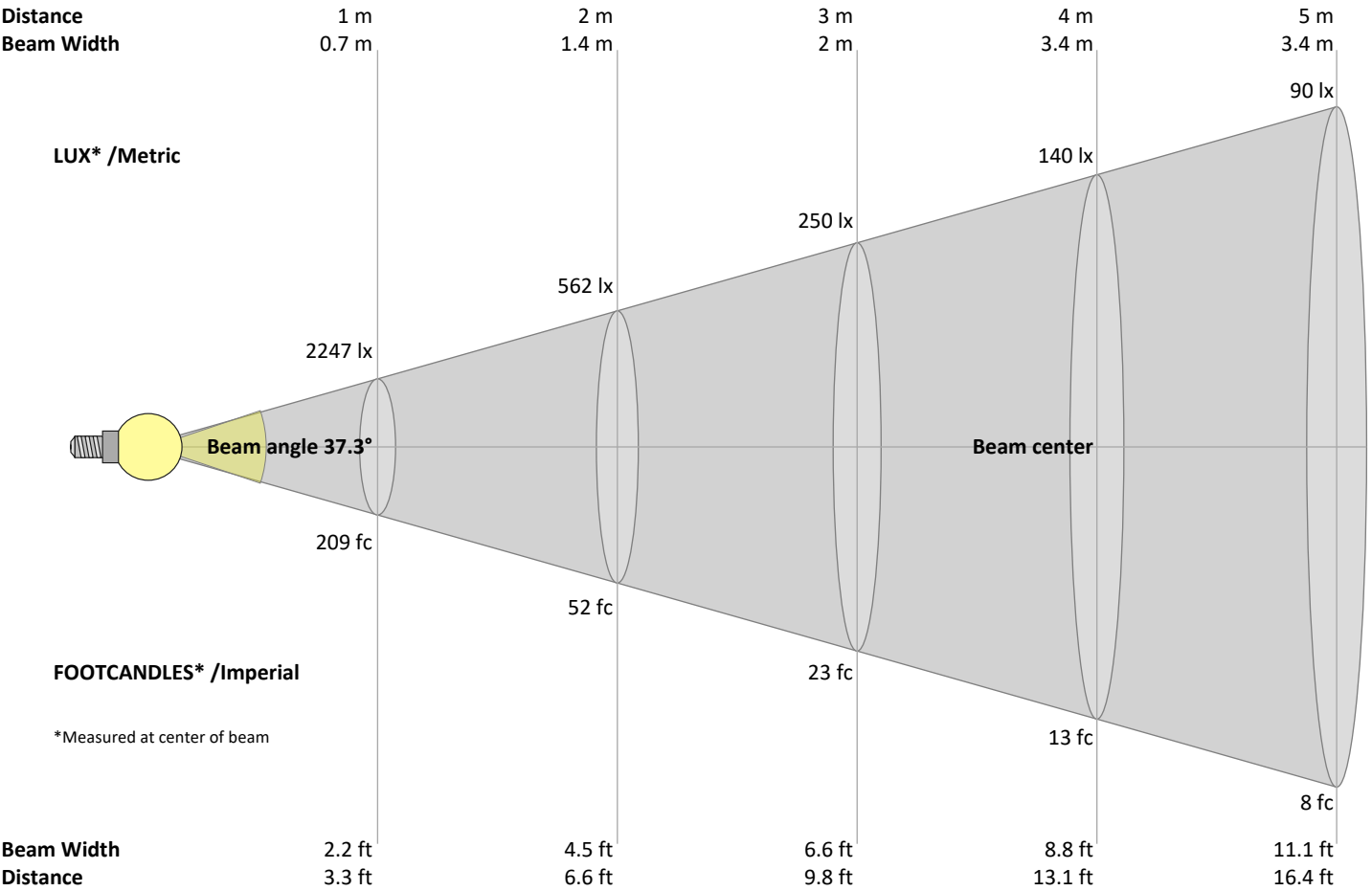
Peak illuminance: 22.5 lx
Mounting height: 10.0 m
Number of c-planes: 32

Goniophotometry Report

1_PHOT_NINETY-NINE-1750lmChip-3000K-Spreader_2303
www.factorylux.com



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
2247	562	250	140	90	62	46	35	28	22	19	16	13	11	10	9	8	7	6	6	lux
208.8	52.2	23.2	13	8.4	5.8	4.3	3.3	2.6	2.1	1.7	1.4	1.2	1.1	0.9	0.8	0.7	0.6	0.6	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
2247	2236	2200	2145	2081	2003	1912	1804	1682	1548	1403	1255	1105	961	833	721	619	527	446	376	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
2247	2208	2091	1904	1673	1417	1164	955	790	661	556	466	386	310	243	185	142	116	98	84	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
2247	2236	2200	2145	2081	2003	1912	1804	1682	1548	1403	1255	1105	961	833	721	619	527	446	376	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
2247	2208	2091	1904	1673	1417	1164	955	790	661	556	466	386	310	243	185	142	116	98	84	cd
100%	98%	93%	85%	74%	63%	52%	43%	35%	29%	25%	21%	17%	14%	11%	8%	6%	5%	4%	4%	of 0°val

1_PHOT_NINETY-NINE-1750lmChip-3000K-Spreader_2303
www.factorylux.com

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	91	94	92	90	92	89	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	80	76	72	79	75	71	77	74	71	69
6	87	78	72	68	86	77	72	68	76	71	67	74	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	74	65	60	56	65	59	56	64	59	56	63	59	55	54
10	72	63	57	53	71	62	57	53	61	56	53	61	56	53	60	56	53	51

Goniophotometry Report

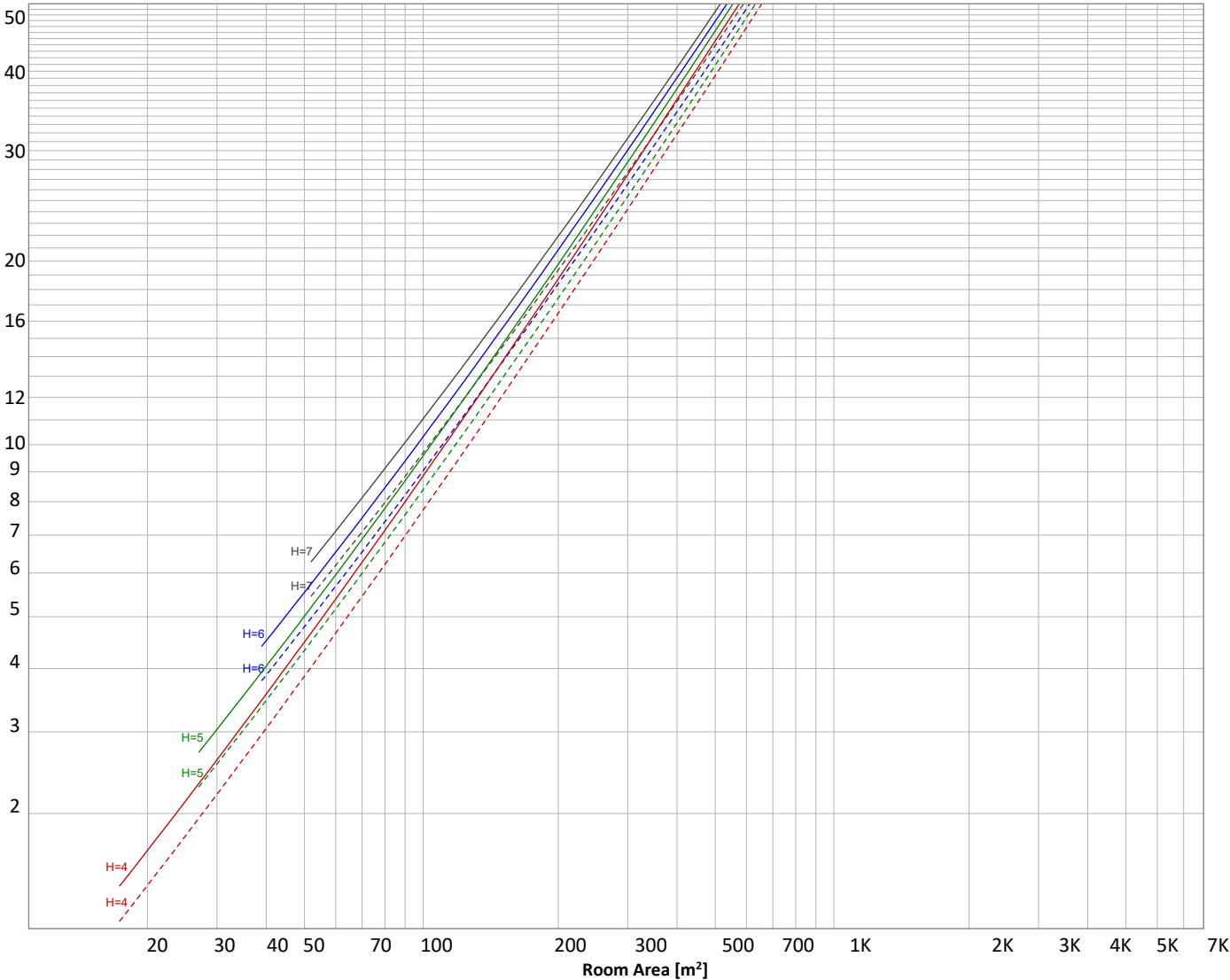
1_PHOT_NINETY-NINE-1750lmChip-3000K-Spreader_2303
www.factorylux.com



Luminaire budgetary diagram

Uncorrected, comprehensive UGR table according to 117-1995

LAMPS (number of lamps)



Conditions

H = Room height	Flux = 1303 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°
187 lm	371 lm	343 lm	213 lm	107 lm	50.3 lm	21.1 lm	7.95 lm	1.91 lm
90°-100°	100°-110°	110°-120°	120°-130°	130°-140°	140°-150°	150°-160°	160°-170°	170°-180°
0.172 lm	0.166 lm	0.156 lm	0.141 lm	0.053 lm	0.000 lm	0.000 lm	0.000 lm	0.000 lm

Goniophotometry Report

1_PHOT_NINETY-NINE-1750lmChip-3000K-Spreader_2303
www.factorylux.com



Outdoor Light Planning

Lumen per Zone

Zone (γ)	Lumen	% Total
0-10°	187 lm	14.4%
10-20°	371 lm	28.4%
20-30°	343 lm	26.3%
30-40°	213 lm	16.4%
40-50°	107 lm	8.2%
50-60°	50 lm	3.9%
60-70°	21 lm	1.6%
70-80°	8 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	1303 lm	100.0%

Zonal Lumen summary

Zone (γ)	Lumen	% Total
0-30°	901 lm	69.1%
0-40°	1114 lm	85.5%
0-60°	1271 lm	97.6%
60-90°	31 lm	2.4%
70-100°	10 lm	0.8%
90-120°	0 lm	0.0%
0-90°	1302 lm	99.9%
90-180°	1 lm	0.1%
0-180°	1303 lm	100.0%

BUG rating

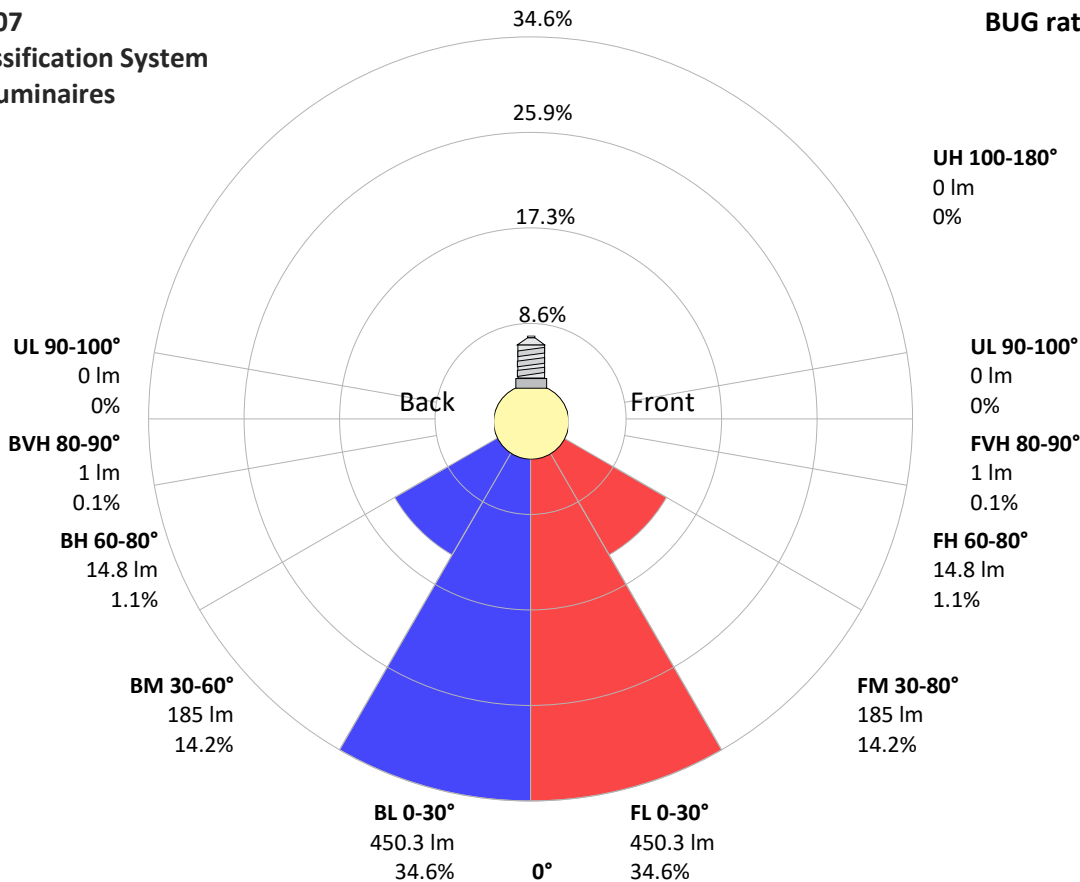
	Lumen	% Total
Forward light		
Low(0-30°)	450 lm	34.6%
Medium(30-60°)	185 lm	14.2%
High(60-80°)	15 lm	1.1%
Very high(80-90°)	1 lm	0.1%
Back light		
Low(0-30°)	450 lm	34.6%
Medium(30-60°)	185 lm	14.2%
High(60-80°)	15 lm	1.1%
Very high(80-90°)	1 lm	0.1%
Uplight		
Low(90-100°)	0 lm	0.0%
High(100-180°)	0 lm	0.0%

Intensity peaks

Max intensity	2254 cd
Intensity, 90°	0 cd
Intensity, 0°	2247 cd

IESNA TM-15-07 Luminaire Classification System For Outdoor Luminaires

BUG rating B1 U1 G0



Goniophotometry Report

1_PHOT_NINETY-NINE-1750lmChip-3000K-Spreader_2303
www.factorylux.com



Power Details

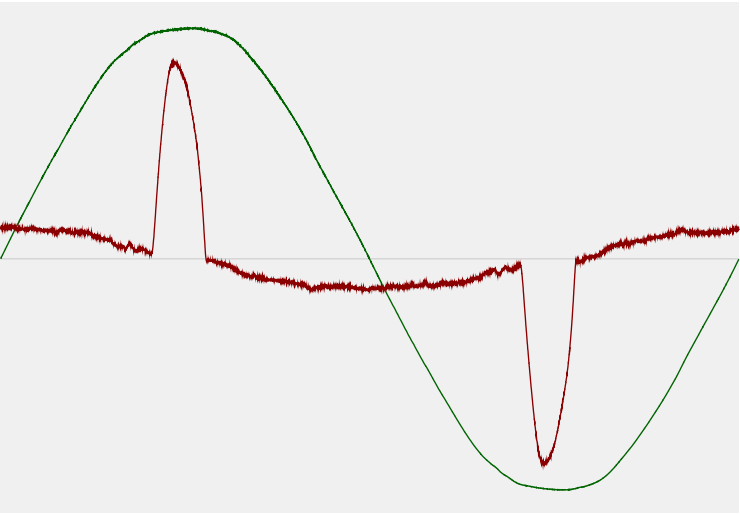
Input Power

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	32.6%
<div><div></div></div>	
Lumen efficiency	89 lm/W
<div><div></div></div>	

Input Power Curve



Goniophotometry Report

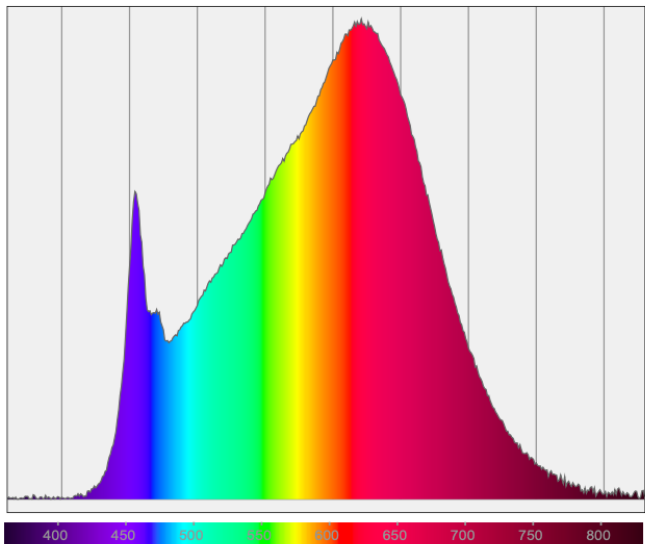
1_PHOT_NINETY-NINE-1750lmChip-3000K-Spreader_2303
www.factorylux.com



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

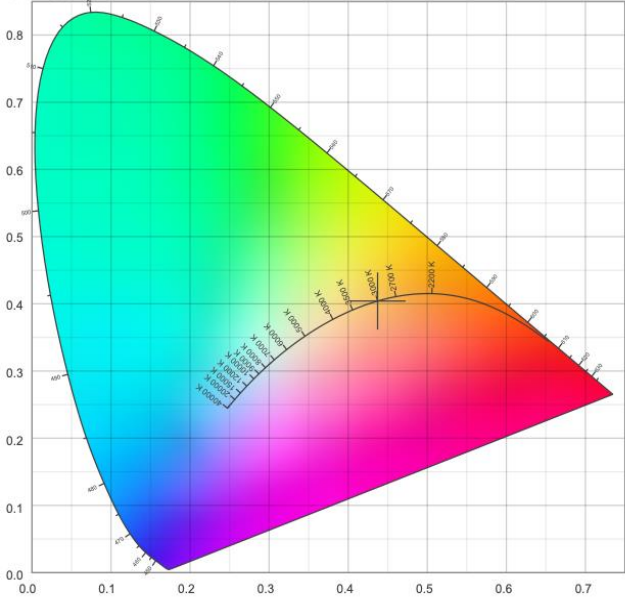
Correlated Color Temperature	CCT = 3000 K	Color coordinates CIE 1931	(x;y) = (0.437;0.404)
Color Rendering Index	CRI 94.1	Color coordinate CIEs 1960	(u;v) = (0.251;0.348)
Color Rendering Index, R9 (red component)	R9 = 68.6	Color deviation from BBL	Duv = ±0.0003
Color Rendering TM30-18	R _f 91.0 — R _g 97.7	Color coordinate CIEs 1976 (CIELUV)	(u';v') = (0.251;0.251)
Color Quality Scale	CQS = 91.8		

Goniophotometry Report

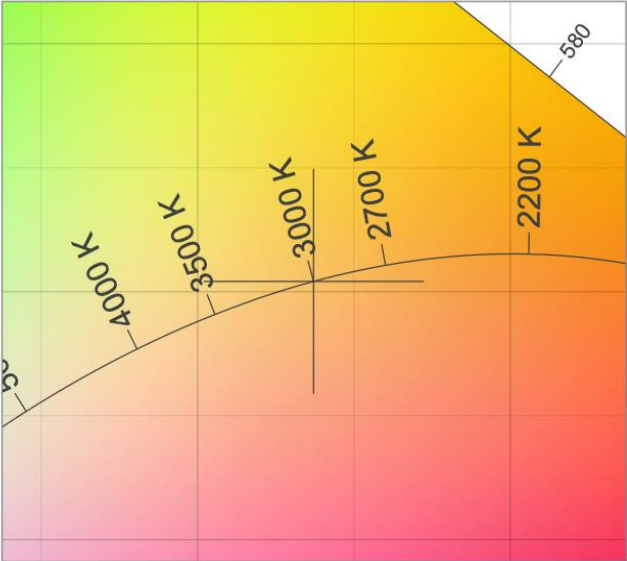
1_PHOT_NINETY-NINE-1750lmChip-3000K-Spreader_2303
www.factorylux.com



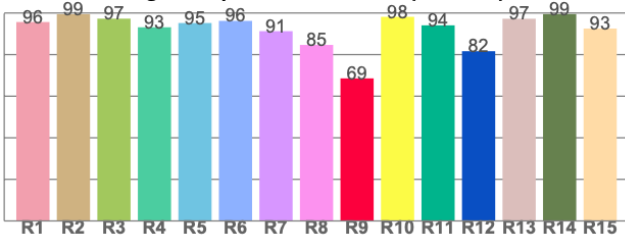
CIE 1931



CIE 1931 – zoomed on Planckian locus



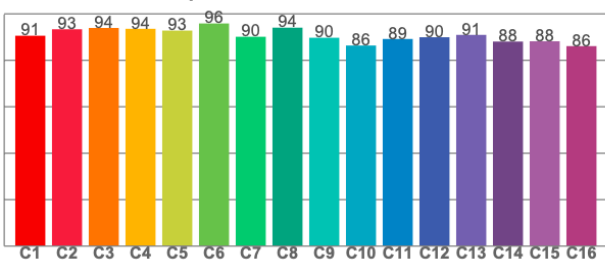
Color Rendering Index per reference color (CIE 1995)



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

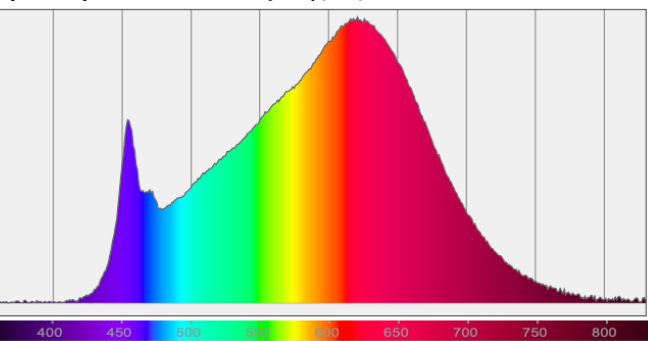
TM30-18 Rf-values per hue bin



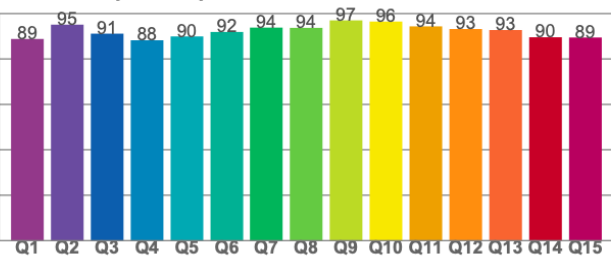
TM30 C values, 16 binned values out of total of 99 C values

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

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
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