Goniophotometry Report

1_PHOT_NINETY-NINE-2275lmChip-3500K-WallWash-HoneycombLouvre_2309
www.factorylux.com

Tested Light Source - 1_PHOT_NINETY-NINE-2275lmChip-3500K-WallWash-HoneycombLouvre_2309

Laboratory and Equipment

Laboratory Owner and Location	Factorylux, Greenhill Mills, Hebden Bridge, HX7 5QF, UK
Goniospectrometer System and Type	BaseSpion – Type C, horizontal
Spectrometer Manufacturer and Model	Ibsen Photonics, Denmark – Freedom VIS (Custom Viso)

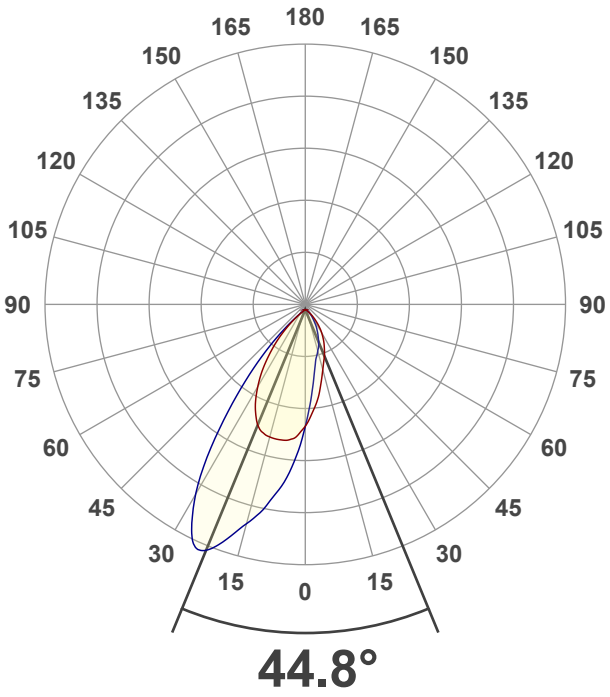
Measurement Conditions

Number of C-planes and Resolution	24 planes – 15°
γ (gamma)-Resolution	1.5°
Test Distance	1.50 m
Input Power, Power and Displ. Factors	16.0 W – PF 0.99 – DPF 0.99
Input RMS Voltage and Current	240 V – 0.068 A
Frequency of Input Power	50 Hz

Main Light Measurement Results

Output	573 lm
Efficiency	36 lm/W
Peak Intensity and Beam Angle	929 cd – 44.8°
Color Rendering Index	CRI 91.8

Light Intensity Distribution



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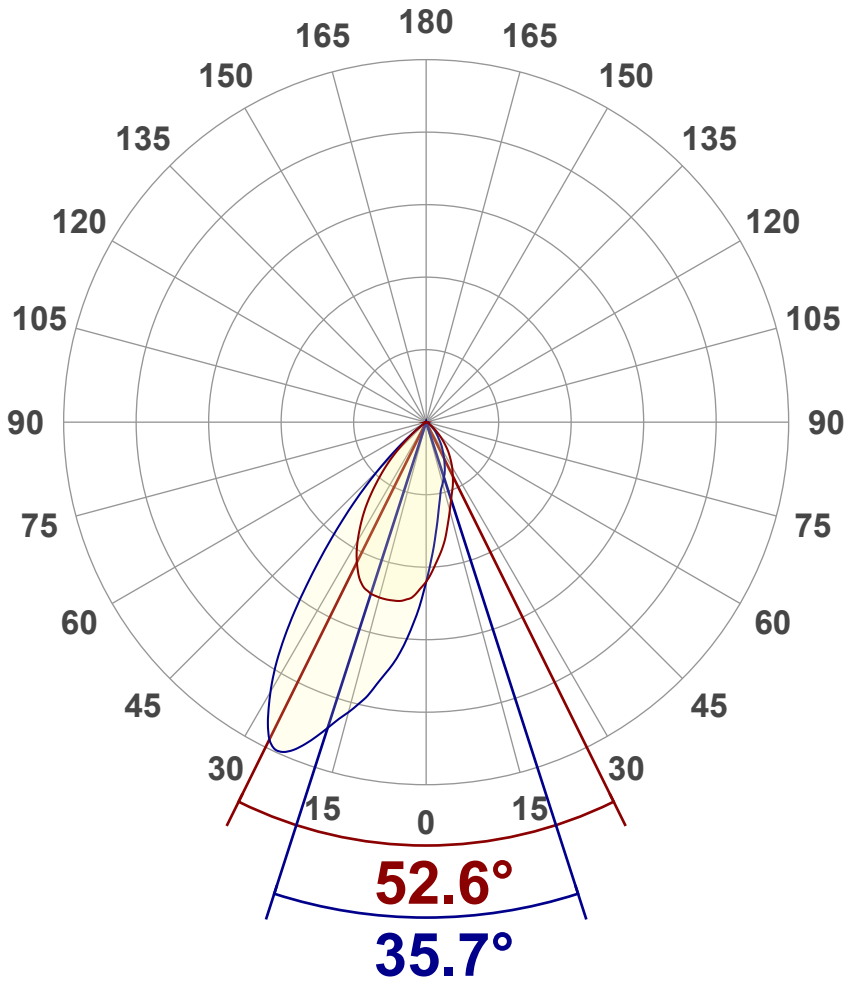
Luminous Intensity diagram

Unit: 0-100% of peak intensity



Main Values

Output (total Lumen)	573 lm
Peak Intensity	929 cd
Beam Angle (50%)	44.8°
Beam Angle (90%)	35.7°
Beam Angle (10%)	57.8°

Cut-off Angle

Average 2,5%	107.3°

Field Angle

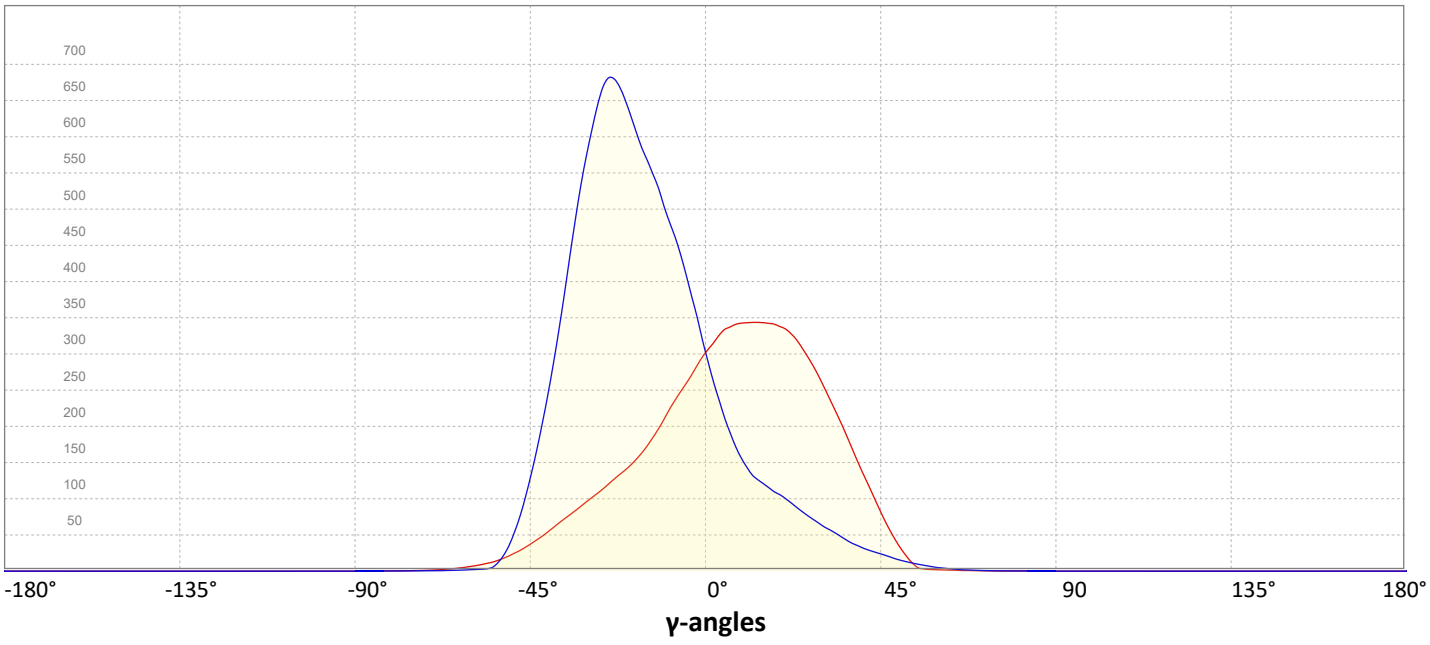
Average 10%	86.9°

Intensity Ratio

In 120° cone	99.3%
In 90° cone	92.8%

C000-C180
C090-C270

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



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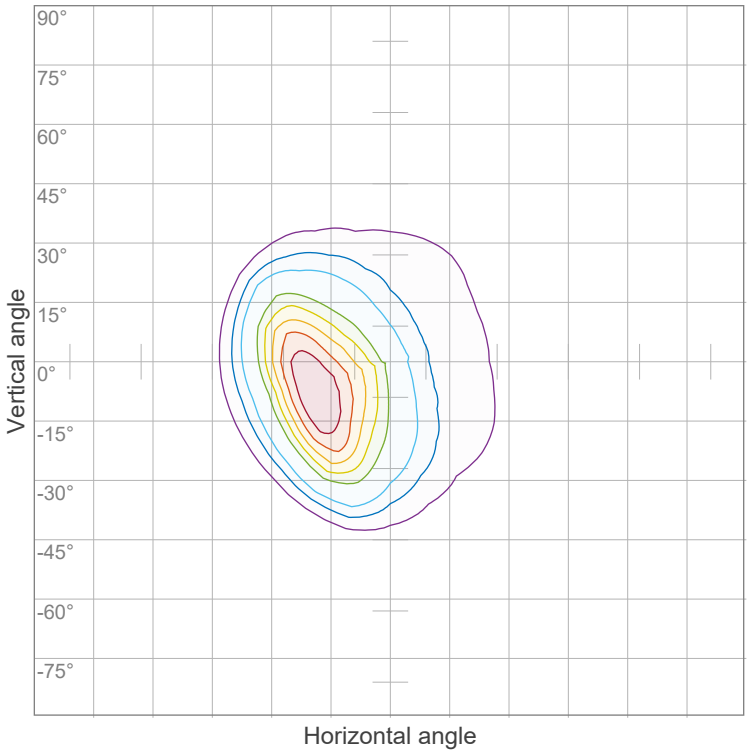
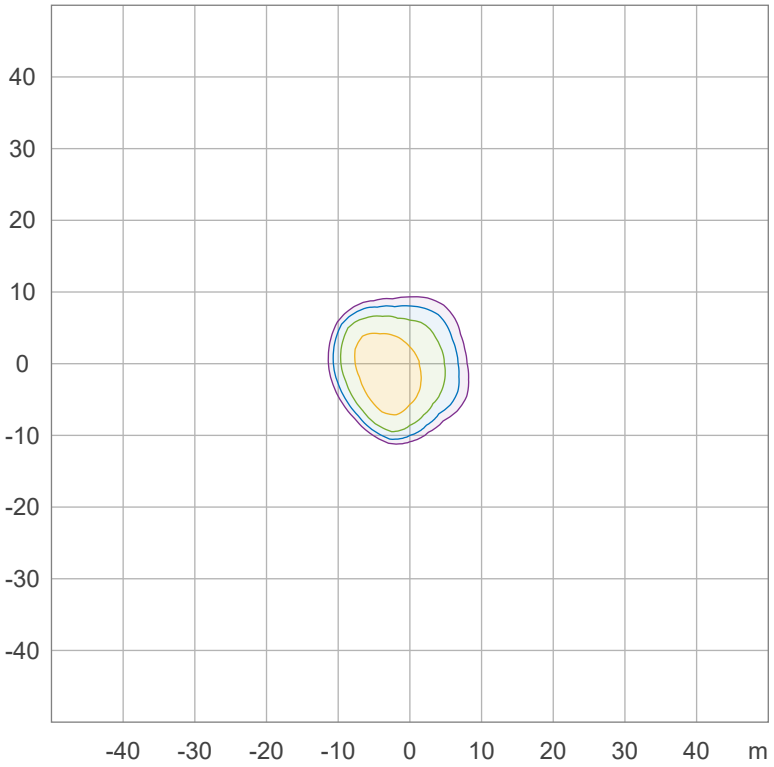
Iso-intensity Diagram (Iso-candela)



90 %	835.6 cd
80 %	742.7 cd
70 %	649.9 cd
60 %	557.1 cd
50 %	464.2 cd
40 %	371.4 cd
30 %	278.5 cd
20 %	185.7 cd
10 %	92.8 cd

Peak intensity: 928.4 cd
Number of c-planes: 24

Iso-illuminance Diagram (Iso-lux)



50.0 %	3.8 lx
30.0 %	2.3 lx
10.0 %	0.8 lx
5.0 %	0.4 lx
3.0 %	0.2 lx

Peak illuminance: 7.6 lx
Mounting height: 10.0 m
Number of c-planes: 24

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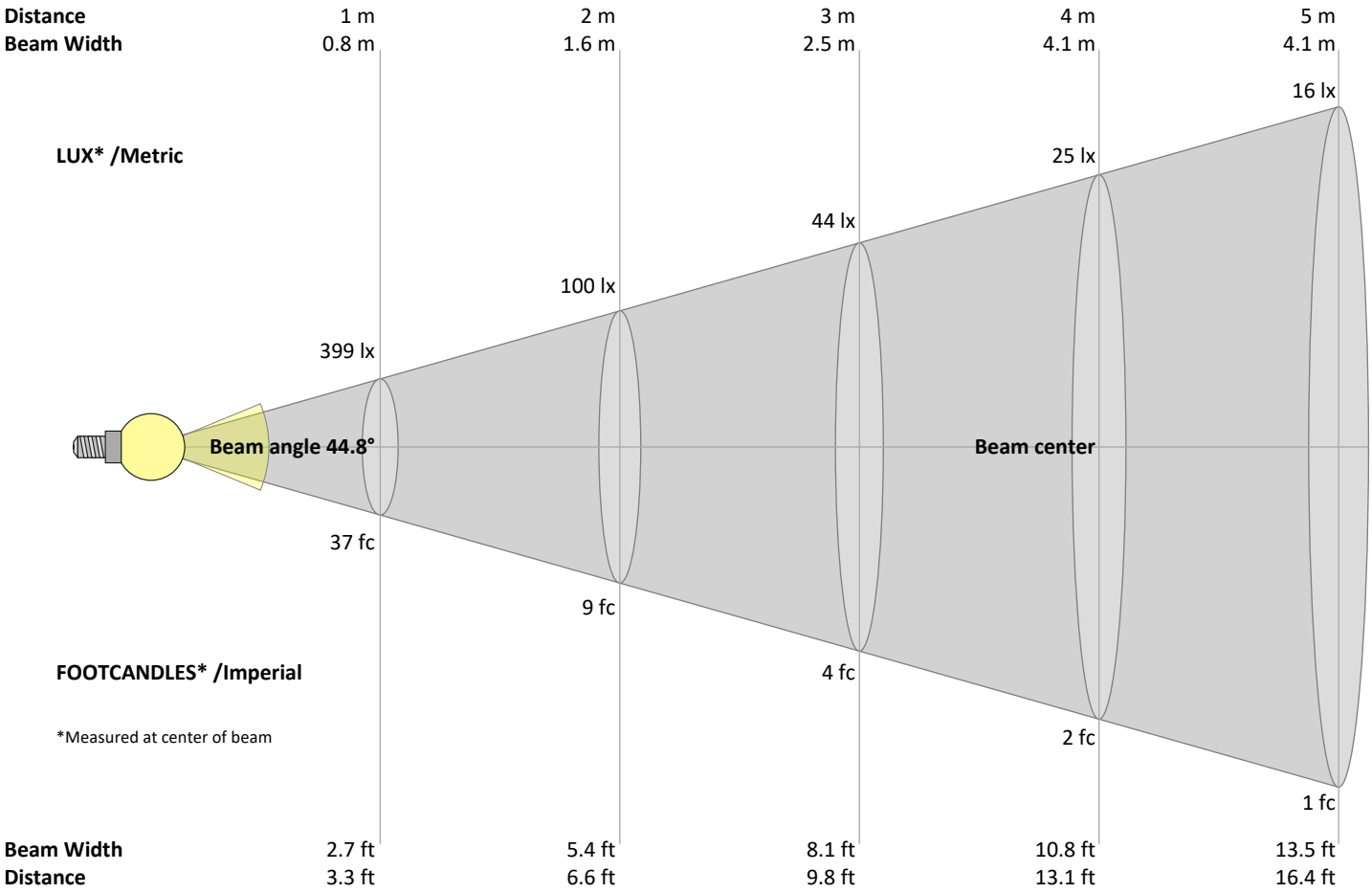
Beam Details



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
399	100	44	25	16	11	8	6	5	4	3	3	2	2	2	2	1	1	1	1	lux
37.1	9.3	4.1	2.3	1.5	1	0.8	0.6	0.5	0.4	0.3	0.3	0.2	0.2	0.2	0.1	0.1	0.1	0.1	0.1	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
399	373	350	328	307	283	258	236	217	201	187	175	163	151	139	128	117	106	96	85	cd
100%	94%	88%	82%	77%	71%	65%	59%	54%	50%	47%	44%	41%	38%	35%	32%	29%	27%	24%	21%	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
399	343	298	256	221	195	174	162	152	142	134	123	112	102	92	82	74	66	57	49	cd
100%	86%	75%	64%	55%	49%	44%	41%	38%	36%	34%	31%	28%	25%	23%	21%	19%	17%	14%	12%	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
399	412	430	440	446	449	450	449	448	445	439	429	412	390	366	339	310	280	249	216	cd
100%	103%	108%	110%	112%	112%	113%	113%	112%	112%	110%	107%	103%	98%	92%	85%	78%	70%	62%	54%	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
399	455	509	562	607	646	691	726	759	798	839	874	890	879	834	770	697	608	512	421	cd
100%	114%	128%	141%	152%	162%	173%	182%	190%	200%	210%	219%	223%	220%	209%	193%	175%	152%	128%	105%	of 0°val

Light Planning – UGR table

Uncorrected, comprehensive UGR table according to 117-1995

Reflectances											
	ρ Ceiling	70	70	50	50	30	70	70	50	50	30
	ρ Walls	50	30	50	30	30	50	30	50	30	30
	ρ Floor	20	20	20	20	20	20	20	20	20	20
Room size H = mounting height above eye level		**Viewed Crosswise** (Viewing direction orthogonal to lamp length axis)					**Viewed Endwise** (Viewing direction parallel to lamp length axis)				
X	**Y**										
	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a

Variations with the observer position for the luminaire spacings, S:

n/a	n/a	n/a
n/a	n/a	n/a
n/a	n/a	n/a

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

Coefficients of Utilization

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	107	105	110	108	105	103	104	102	100	100	98	97	96	95	94	92
2	107	101	97	93	104	99	95	92	96	93	90	93	90	88	90	88	86	84
3	100	93	88	83	98	92	87	83	89	85	81	87	83	80	84	81	79	77
4	94	86	80	75	93	85	79	75	83	78	74	81	76	73	79	75	72	71
5	89	80	73	68	87	79	73	68	77	71	67	75	70	67	73	69	66	65
6	84	74	67	62	82	73	67	62	71	66	62	70	65	61	69	64	61	59
7	79	69	62	57	77	68	62	57	66	61	57	65	60	56	64	60	56	54
8	74	64	57	53	73	63	57	52	62	56	52	61	56	52	60	55	52	50
9	70	60	53	49	69	59	53	49	58	52	48	57	52	48	56	51	48	46
10	66	56	49	45	65	55	49	45	54	49	45	54	48	45	53	48	45	43

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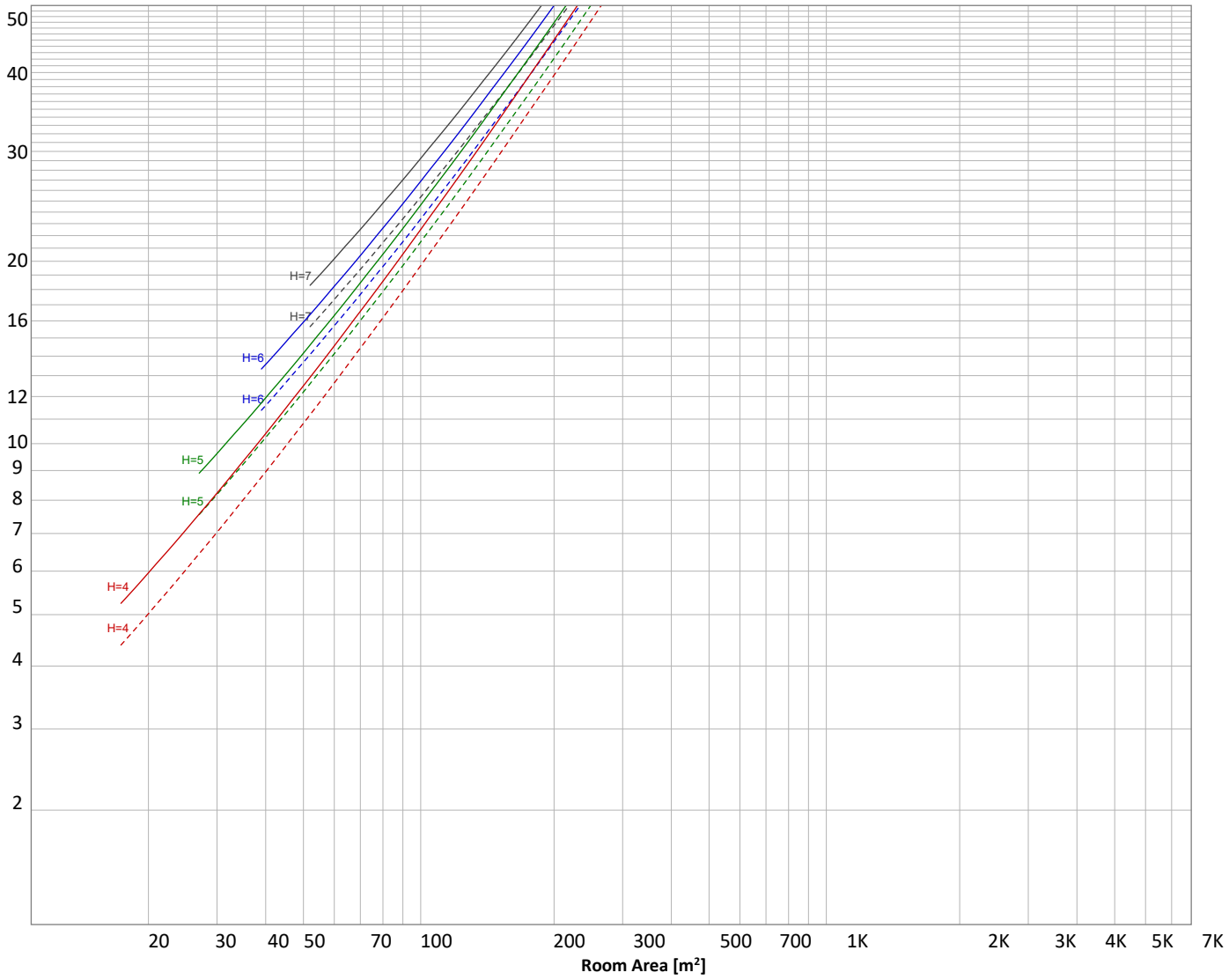
Luminaire budgetary diagram

Uncorrected, comprehensive UGR table according to 117-1995

LAMPS (number of lamps)



Conditions

H = Room height	Flux = 573 lm
H_{down} = Lamp distance from ceiling =	0.00 m
H_{work} = Work area height from floor =	0.00 m
E_{work} = Average lux on work area =	100 lx

	ρ(%)		
Line type	Ceiling reflectance	Wall reflectance	Floor reflectance
----------	70	50	30
————	50	30	20

Zonal Lumen Summary

0°-10°	10°-20°	20°-30°	30°-40°	40°-50°	50°-60°	60°-70°	70°-80°	80°-90°
38.0 lm	113 lm	175 lm	158 lm	72.5 lm	12.3 lm	2.88 lm	0.793 lm	0.372 lm

90°-100°	100°-110°	110°-120°	120°-130°	130°-140°	140°-150°	150°-160°	160°-170°	170°-180°
0.000 lm	0.000 lm	0.000 lm	0.000 lm	0.000 lm	0.000 lm	0.000 lm	0.000 lm	0.000 lm

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1_PHOT_NINETY-NINE-2275lmChip-3500K-WallWash-HoneycombLouvre_2309
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Outdoor Light Planning

Lumen per Zone

Zone (γ)	Lumen	% Total
0-10°	38 lm	6.6%
10-20°	113 lm	19.7%
20-30°	175 lm	30.6%
30-40°	158 lm	27.6%
40-50°	72 lm	12.6%
50-60°	12 lm	2.2%
60-70°	3 lm	0.5%
70-80°	1 lm	0.1%
80-90°	0 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	573 lm	100.0%

Zonal Lumen summary

Zone (γ)	Lumen	% Total
0-30°	326 lm	56.9%
0-40°	484 lm	84.5%
0-60°	569 lm	99.3%
60-90°	4 lm	0.7%
70-100°	1 lm	0.2%
90-120°	0 lm	0.0%
0-90°	573 lm	100.0%
90-180°	0 lm	0.0%
0-180°	573 lm	100.0%

Intensity peaks

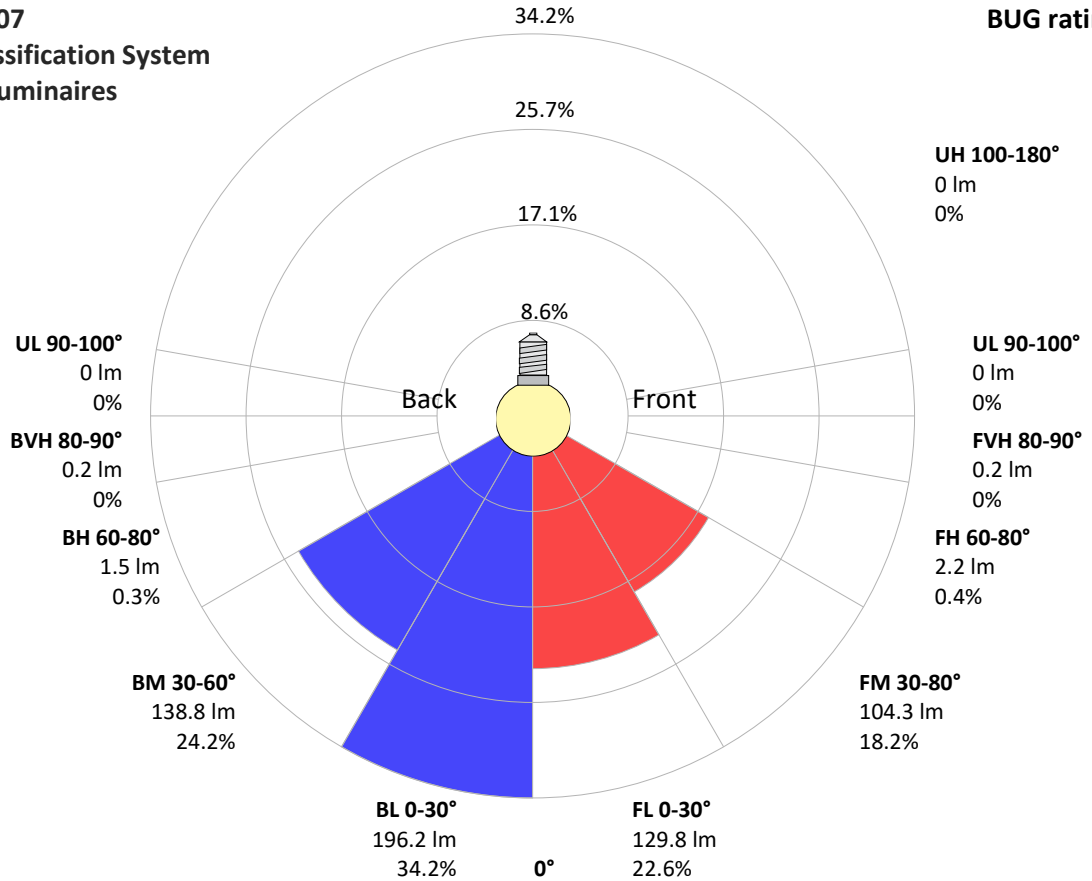
Max intensity	929 cd
Intensity, 90°	0 cd
Intensity, 0°	399 cd

BUG rating

	Lumen	% Total
Forward light		
Low(0-30°)	130 lm	22.6%
Medium(30-60°)	104 lm	18.2%
High(60-80°)	2 lm	0.4%
Very high(80-90°)	0 lm	0.0%
Back light		
Low(0-30°)	196 lm	34.2%
Medium(30-60°)	139 lm	24.2%
High(60-80°)	1 lm	0.3%
Very high(80-90°)	0 lm	0.0%
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 B1 U1 G0



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Power Details

Input Power

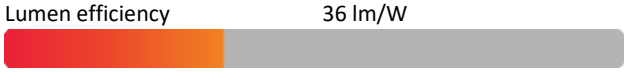
Power feed to light source	16.0 W
Frequency of input power	50 Hz
RMS Input voltage feed, V_{RMS}	240 V
RMS Input current feed, I_{RMS}	0.068 A
Volt-Ampere or apparent power = V_{RMS}*I_{RMS}	16.24 VA
Displacement factor of AC power feed	0.99
Power factor of AC current feed	0.99
Total harmonic distortion of the current	6.55%
Total harmonic distortion of the voltage	1.09%

Input Power Curve

Efficiency

Radiated power efficiency 13.1%

Lumen efficiency 36 lm/W



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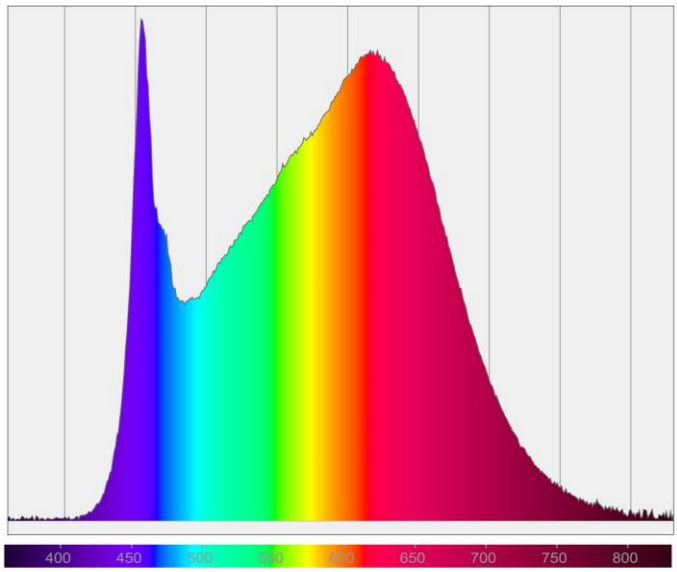
Color Measurements

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		

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1_PHOT_NINETY-NINE-2275lmChip-3500K-WallWash-HoneycombLouvre_2309
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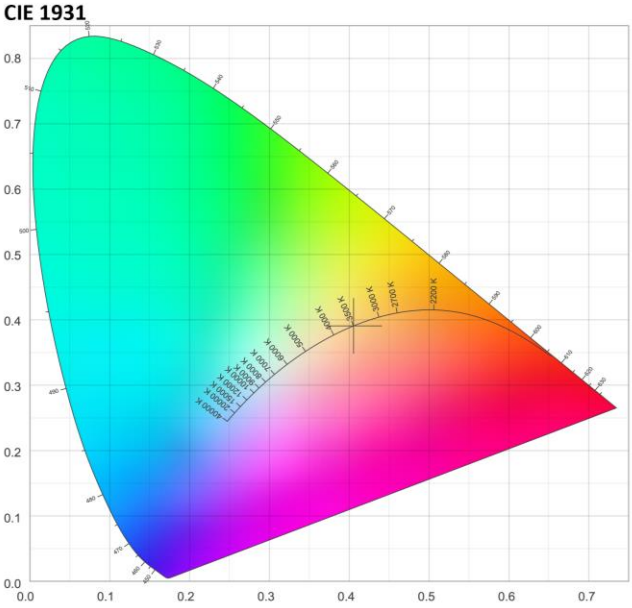
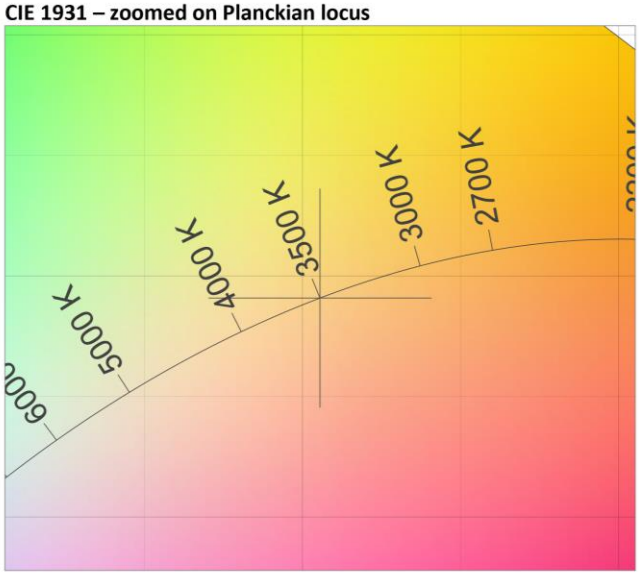
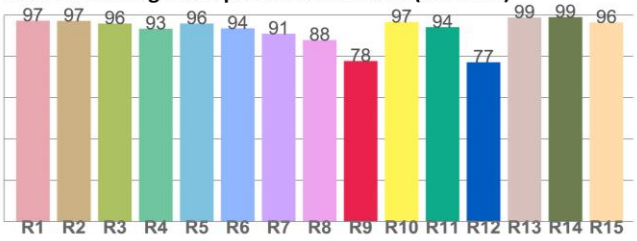
CIE 1931



CIE 1931 – zoomed on Planckian locus



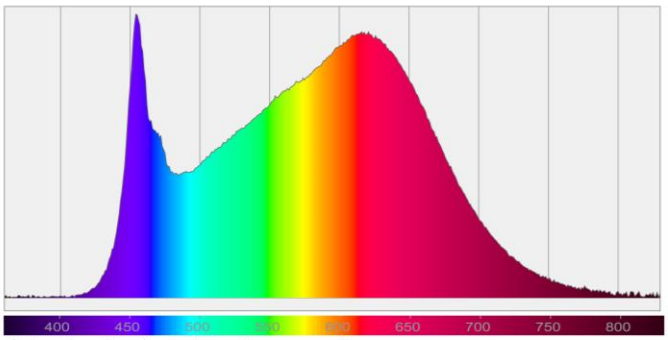
Color Rendering Index per reference color (CIE 1995)



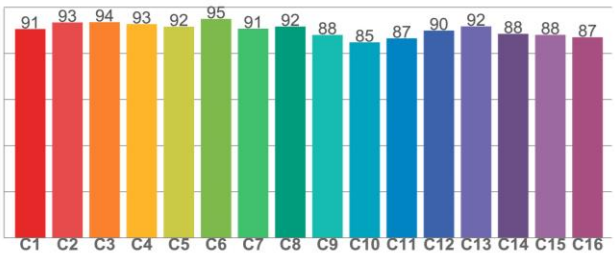
CRI R values, only R1-R8 are used to calculate final CRI value

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

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



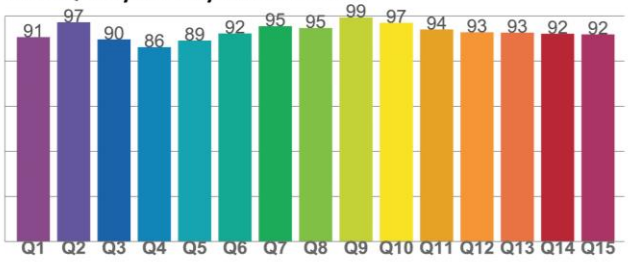
TM30-18 Rf-values per hue bin



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	93.6	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

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