

Goniophotometry Report

1_PHOT_REFLEKTER-XL-4050lmChip-2700K-38Deg-HoneycombLouvre_2303
www.factorylux.com



Tested Light Source - 1_PHOT_REFLEKTER-XL-4050lmChip-2700K-38Deg-HoneycombLouvre_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

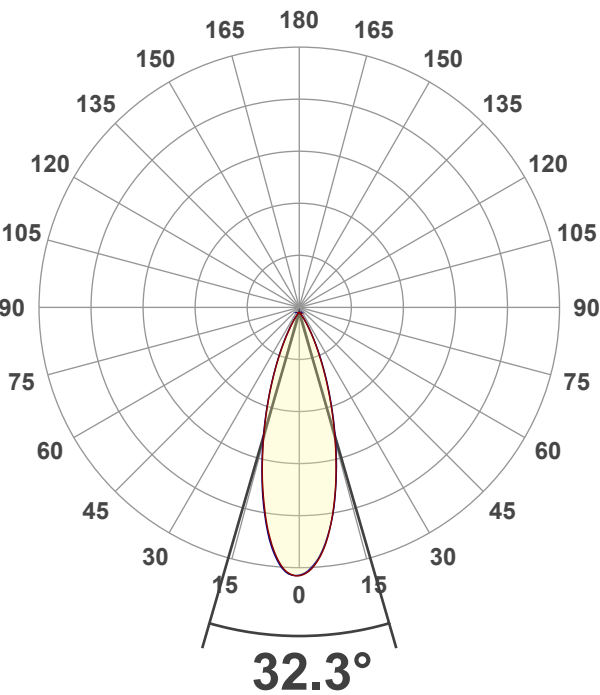
32 planes – 11.25°
1.5°
4.50 m
41.5 W – PF 0.97 – DPF 0.97
241 V – 0.178 A
50 Hz

Main Light Measurement Results

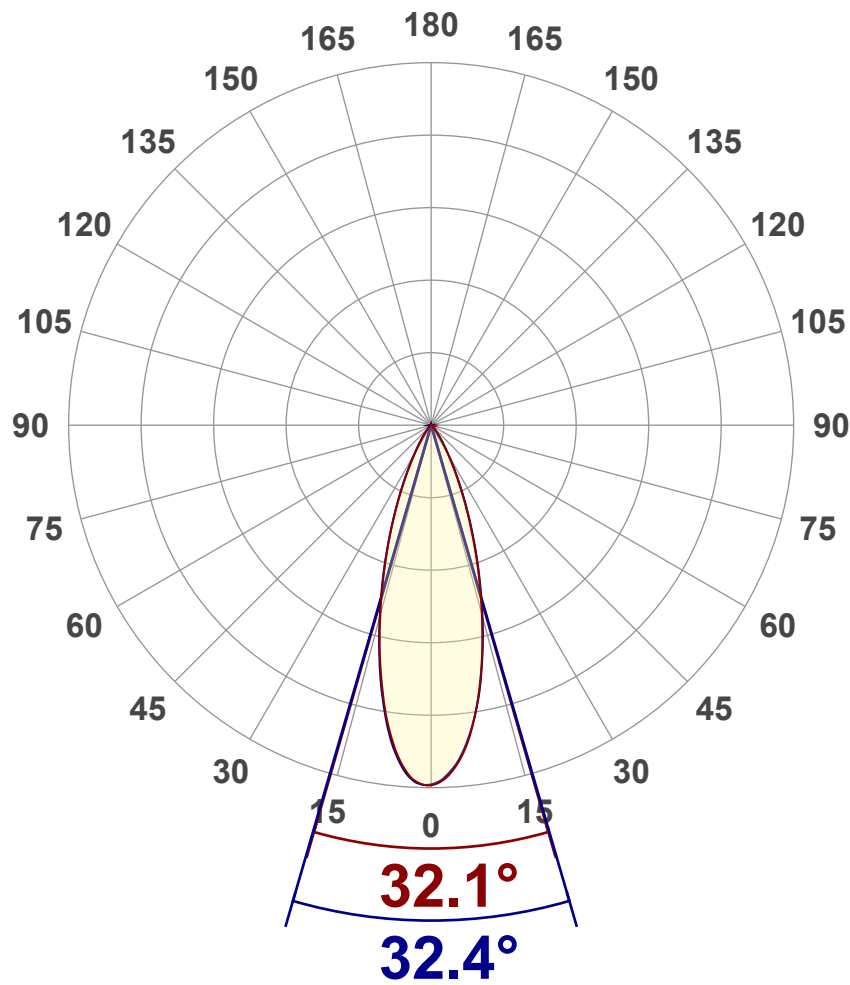
Output
Efficiency
Peak Intensity and Beam Angle
Color Rendering Index

2185 lm
53 lm/W
5970 cd – 32.3°
CRI 92.7

Light Intensity Distribution



Luminous Intensity diagramUnit: 0-100% of peak intensity



Main Values	
Output (total Lumen)	2185 lm
Peak Intensity	5970 cd
Beam Angle (50%)	32.3°
Beam Angle (90%)	32.4°
Beam Angle (10%)	32°

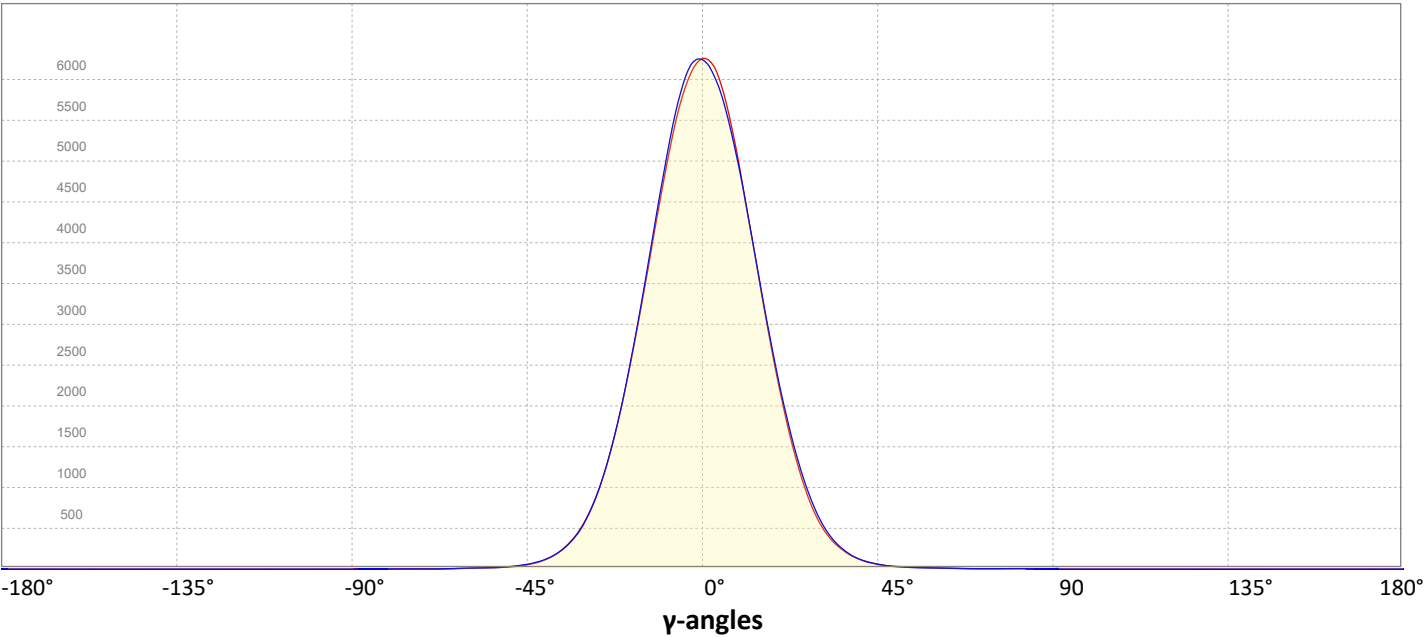
Cut-off Angle	
Average 2,5%	77.5°

Field Angle	
Average 10%	59.6°

Intensity Ratio	
In 120° cone	99.3%
In 90° cone	97.8%

C000-C180
C090-C270

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

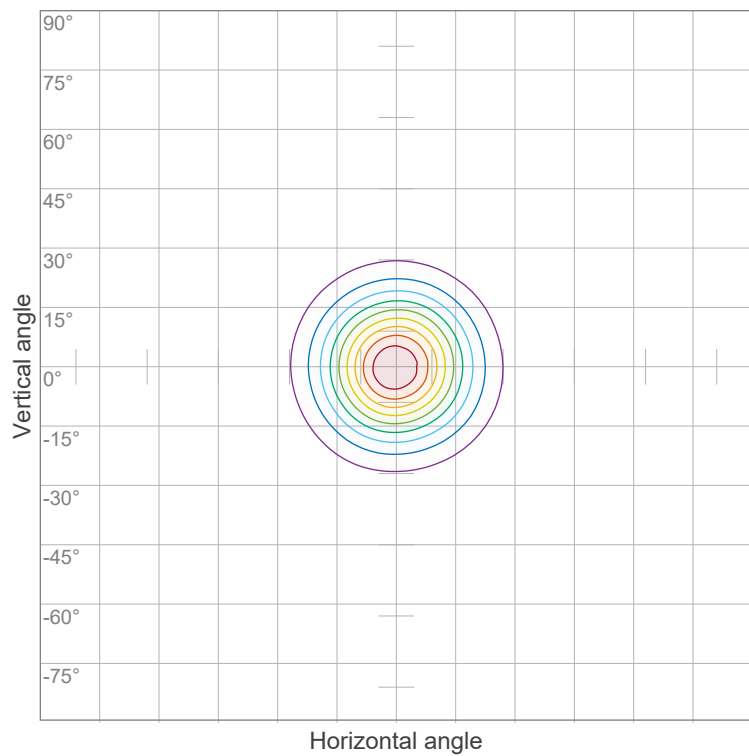


Goniophotometry Report

1_PHOT_REFLEKTER-XL-4050lmChip-2700K-38Deg-HoneycombLouvre_2303
www.factorylux.com



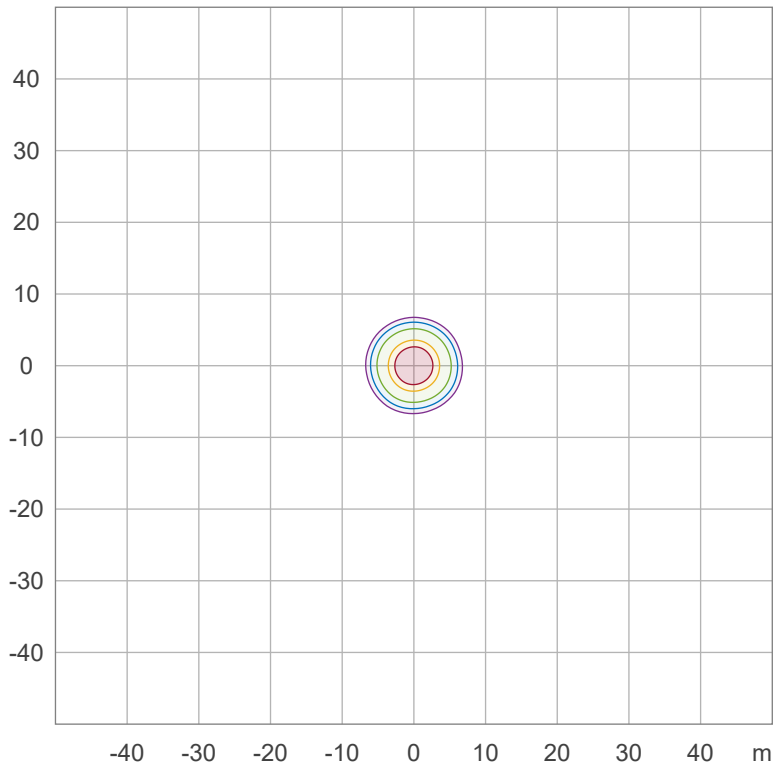
Iso-intensity Diagram (Iso-candela)



90 %	5370.5 cd
80 %	4773.7 cd
70 %	4177.0 cd
60 %	3580.3 cd
50 %	2983.6 cd
40 %	2386.9 cd
30 %	1790.2 cd
20 %	1193.4 cd
10 %	596.7 cd

Peak intensity: 5967.2 cd
Number of c-planes: 32

Iso-illuminance Diagram (Iso-lux)



50.0 %	29.8 lx
30.0 %	17.9 lx
10.0 %	6.0 lx
5.0 %	3.0 lx
3.0 %	1.8 lx

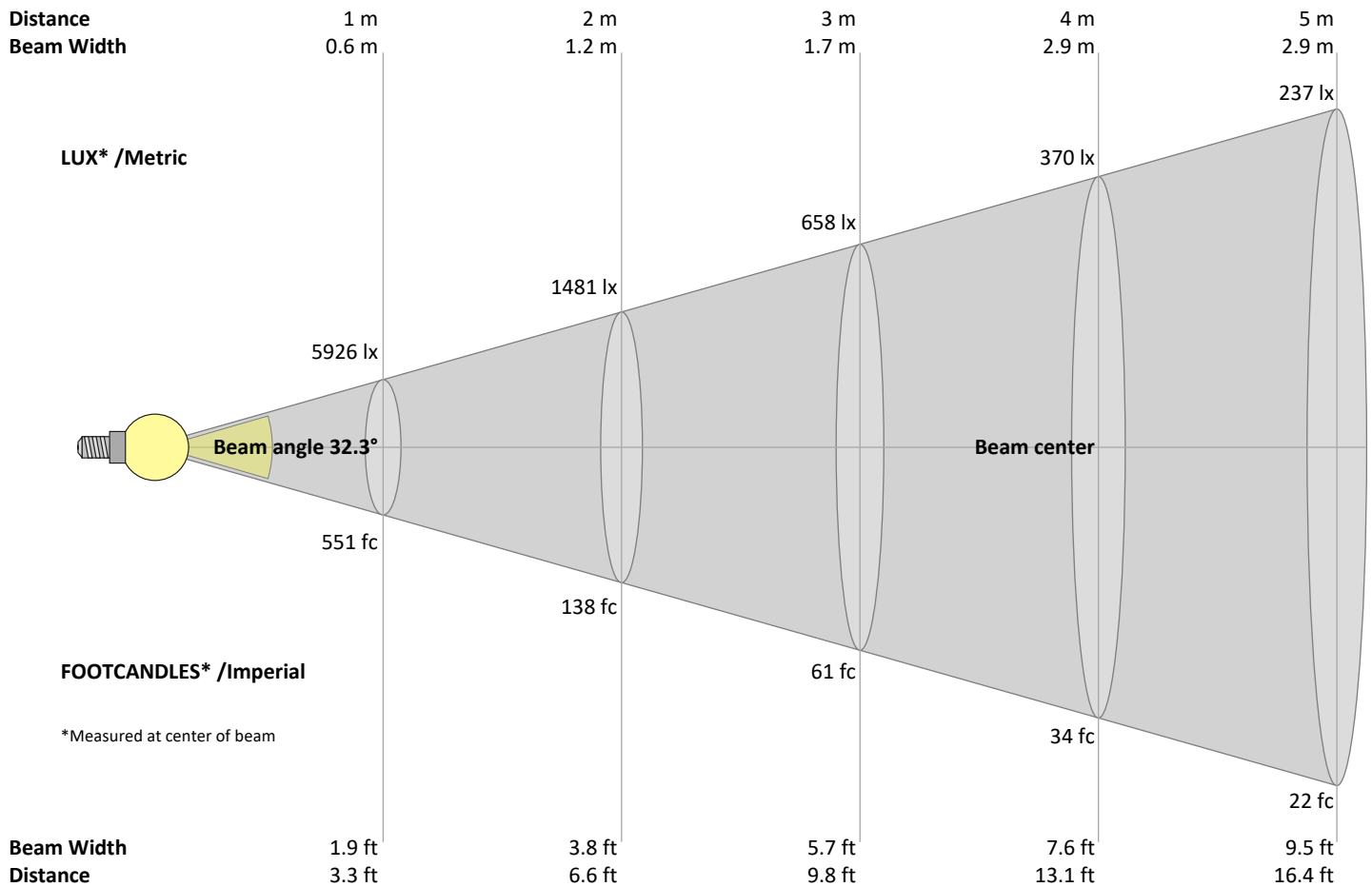
Peak illuminance: 59.6 lx
Mounting height: 10.0 m
Number of c-planes: 32

Goniophotometry Report

1_PHOT_REFLEKTER-XL-4050lmChip-2700K-38Deg-HoneycombLouvre_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
5926	1481	658	370	237	165	121	93	73	59	49	41	35	30	26	23	21	18	16	15	lux
550.5	137.6	61.2	34.4	22	15.3	11.2	8.6	6.8	5.5	4.5	3.8	3.3	2.8	2.4	2.2	1.9	1.7	1.5	1.4	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
5926	5836	5644	5349	4960	4498	4001	3480	2983	2502	2057	1658	1306	1008	768	576	427	314	229	163	cd
100%	98%	95%	90%	84%	76%	68%	59%	50%	42%	35%	28%	22%	17%	13%	10%	7%	5%	4%	3%	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
5926	5811	5613	5324	4945	4518	4020	3518	3008	2535	2089	1698	1347	1044	798	593	436	321	234	170	cd
100%	98%	95%	90%	83%	76%	68%	59%	51%	43%	35%	29%	23%	18%	13%	10%	7%	5%	4%	3%	of 0°val

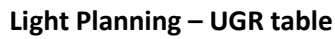
Intensities in 180° c-plane

0°	2°	4°	6°	8°	10°	12°	14°	16°	18°	20°	22°	24°	26°	28°	30°	32°	34°	36°	38°	γ
5926	5889	5721	5425	5018	4537	4026	3502	2983	2494	2046	1635	1285	984	738	546	402	299	223	162	cd
100%	99%	97%	92%	85%	77%	68%	59%	50%	42%	35%	28%	22%	17%	12%	9%	7%	5%	4%	3%	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
5926	5896	5756	5462	5065	4583	4067	3533	3011	2522	2062	1659	1304	1009	763	567	419	309	227	167	cd
100%	100%	97%	92%	85%	77%	69%	60%	51%	43%	35%	28%	22%	17%	13%	10%	7%	5%	4%	3%	of 0°val

1_PHOT_REFLEKTER-XL-4050lmChip-2700K-38Deg-HoneycombLouvre_2303
www.factorylux.com

[illegible]

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

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	114	112	110	108	112	110	108	106	106	104	103	102	101	100	99	98	97	95
2	110	106	102	99	108	104	101	98	101	98	96	98	96	94	95	94	92	91
3	105	100	96	93	104	99	95	92	96	93	90	94	91	89	92	90	88	86
4	101	95	91	87	100	94	90	87	92	88	86	90	87	85	88	86	84	82
5	98	91	86	82	96	90	85	82	88	84	81	87	83	81	85	82	80	79
6	94	87	82	78	93	86	81	78	84	80	77	83	80	77	82	79	76	75
7	91	83	78	75	89	82	78	74	81	77	74	80	76	74	79	76	73	72
8	87	80	75	71	86	79	74	71	78	74	71	77	73	71	76	73	70	69
9	84	76	72	68	83	76	71	68	75	71	68	74	71	68	74	70	68	67
10	81	74	69	66	81	73	69	66	72	68	65	72	68	65	71	68	65	64

1_PHOT_REFLEKTER-XL-4050lmChip-2700K-38Deg-HoneycombLouvre_2303
www.factorylux.com

LAMPS (number of lamps)

[illegible]

Goniophotometry Report

1_PHOT_REFLEKTER-XL-4050lmChip-2700K-38Deg-HoneycombLouvre_2303
www.factorylux.com



Outdoor Light Planning

Lumen per Zone

Zone (γ)	Lumen	% Total
0-10°	497 lm	22.8%
10-20°	889 lm	40.7%
20-30°	540 lm	24.7%
30-40°	179 lm	8.2%
40-50°	47 lm	2.2%
50-60°	16 lm	0.7%
60-70°	7 lm	0.3%
70-80°	4 lm	0.2%
80-90°	4 lm	0.2%
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	2185 lm	100.0%

Intensity peaks

Max intensity	5970 cd
Intensity, 90°	0 cd
Intensity, 0°	5926 cd

Zonal Lumen summary

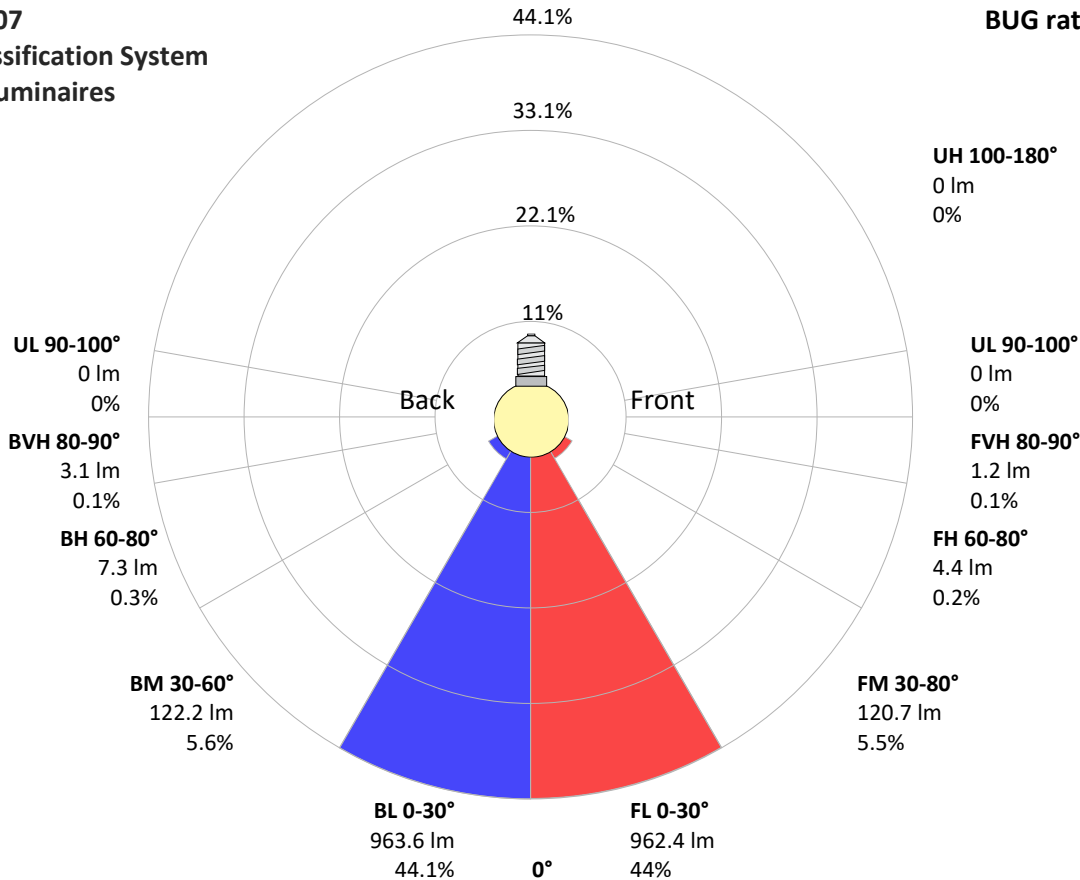
Zone (γ)	Lumen	% Total
0-30°	1926 lm	88.2%
0-40°	2105 lm	96.4%
0-60°	2169 lm	99.3%
60-90°	16 lm	0.7%
70-100°	9 lm	0.4%
90-120°	0 lm	0.0%
0-90°	2185 lm	100.0%
90-180°	0 lm	0.0%
0-180°	2185 lm	100.0%

BUG rating

	Lumen	% Total
Forward light		
Low(0-30°)	962 lm	44.0%
Medium(30-60°)	121 lm	5.5%
High(60-80°)	4 lm	0.2%
Very high(80-90°)	1 lm	0.1%
Back light		
Low(0-30°)	964 lm	44.1%
Medium(30-60°)	122 lm	5.6%
High(60-80°)	7 lm	0.3%
Very high(80-90°)	3 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



Goniophotometry Report

1_PHOT_REFLEKTER-XL-4050lmChip-2700K-38Deg-HoneycombLouvre_2303
www.factorylux.com

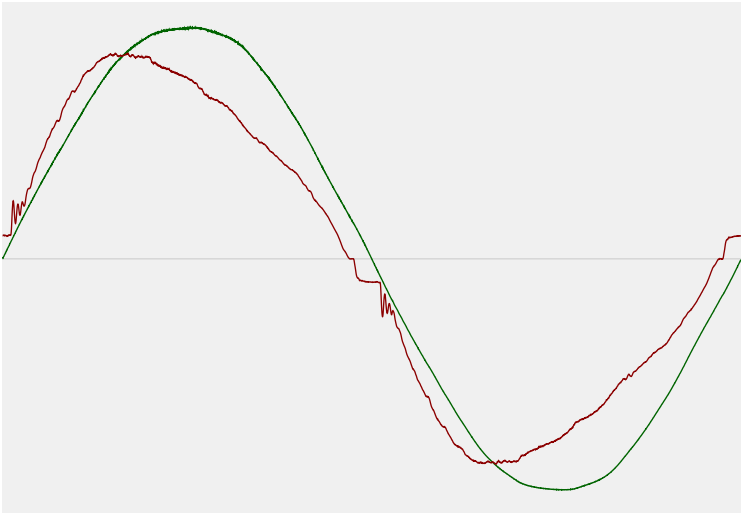


Power Details

Input Power

Power feed to light source	41.5 W
Frequency of input power	50 Hz
RMS Input voltage feed, V_{RMS}	241 V
RMS Input current feed, I_{RMS}	0.178 A
Volt-Ampere or apparent power = $V_{RMS} \cdot I_{RMS}$	42.91 VA
Displacement factor of AC power feed	0.97
Power factor of AC current feed	0.97
Total harmonic distortion of the current	10.7%
Total harmonic distortion of the voltage	1.17%

Input Power Curve



Efficiency

Radiated power efficiency	19.1%
<div><div></div></div>	
Lumen efficiency	53 lm/W
<div><div></div></div>	

Goniophotometry Report

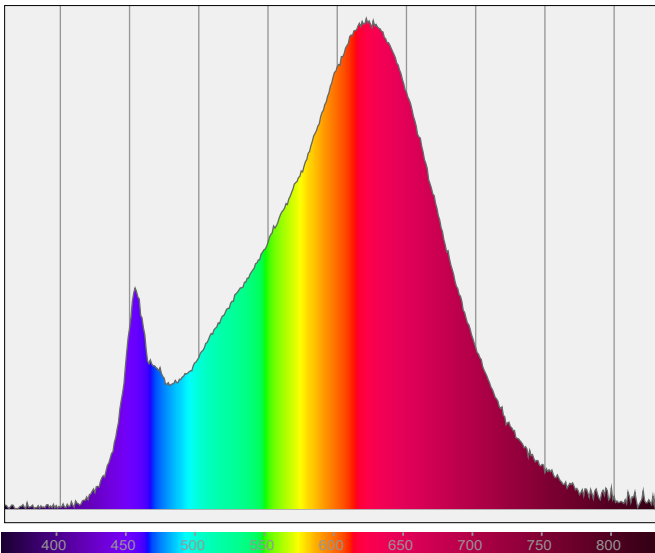
1_PHOT_REFLEKTER-XL-4050lmChip-2700K-38Deg-HoneycombLouvre_2303
www.factorylux.com



Color Measurements

Correlated Color Temperature	CCT = 2700 K
Color Rendering TM30-18	R _f 91.6 — R _g 99.7
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 92.7	Color coordinate CIEs 1960	(u;v) = (0.263;0.352)
Color Rendering Index, R9 (red component)	R9 = 61.9	Color deviation from BBL	Duv = ±0.0003
Color Rendering TM30-18	R _f 91.6 — R _g 99.7	Color coordinate CIEs 1976 (CIELUV)	(u';v') = (0.263;0.263)
Color Quality Scale	CQS = 89.9		

Goniophotometry Report

1_PHOT_REFLEKTER-XL-4050lmChip-2700K-38Deg-HoneycombLouvre_2303
www.factorylux.com



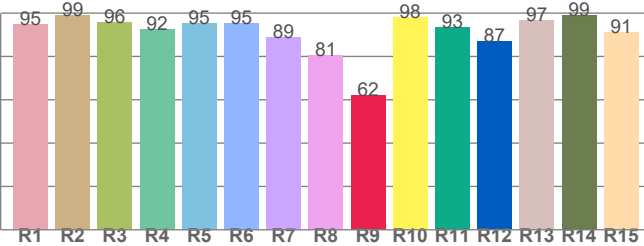
CIE 1931



CIE 1931 – zoomed on Planckian locus



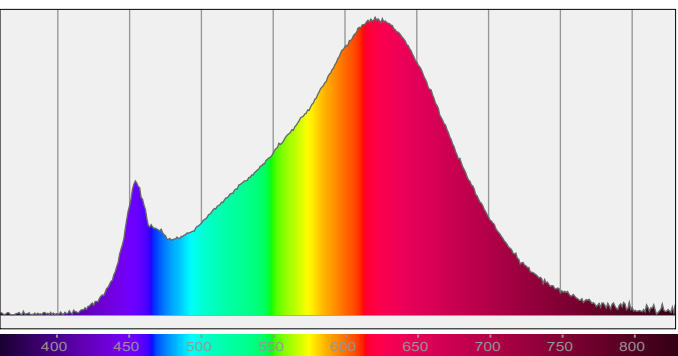
Color Rendering Index per reference color (CIE 1995)



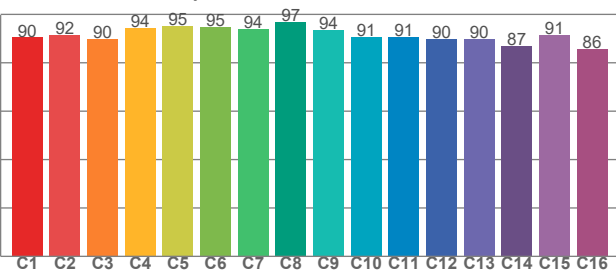
CRI R values, only R1-R8 are used to calculate final CRI value

R1	R2	R3	R4	R5	R6	R7	R8	R9	R10	R11	R12	R13	R14	R15
94.8	98.8	95.8	92.4	95.3	95.4	88.8	80.6	61.9	98.0	93.4	87.1	96.6	98.8	91.1

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



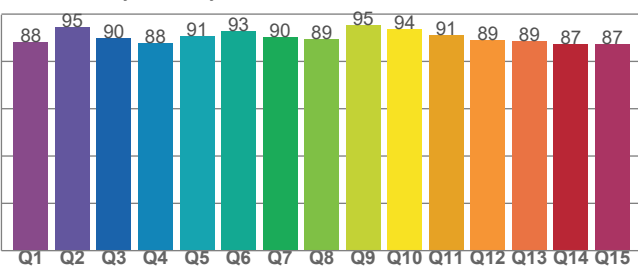
TM30-18 Rf-values per hue bin



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	91.6	89.7	94.5	95.3	94.9	93.9	96.8	93.6	90.7	90.6	89.7	89.8	87.1	91.4	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
88.1	94.5	89.7	87.9	90.9	92.9	90.1	89.4	95.3	93.7	91.0	89.1	88.7	87.1	87.2