

Tested Light Source - 1_PHOT_REFLEKTER-XL-4300lmChip-3000K-58Deg-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°

2°

4.50 m

41.4 W – PF 0.97 – DPF 0.97

235 V – 0.182 A

50.1 Hz

Main Light Measurement Results

Output

Efficiency

Peak Intensity and Beam Angle

Color Rendering Index

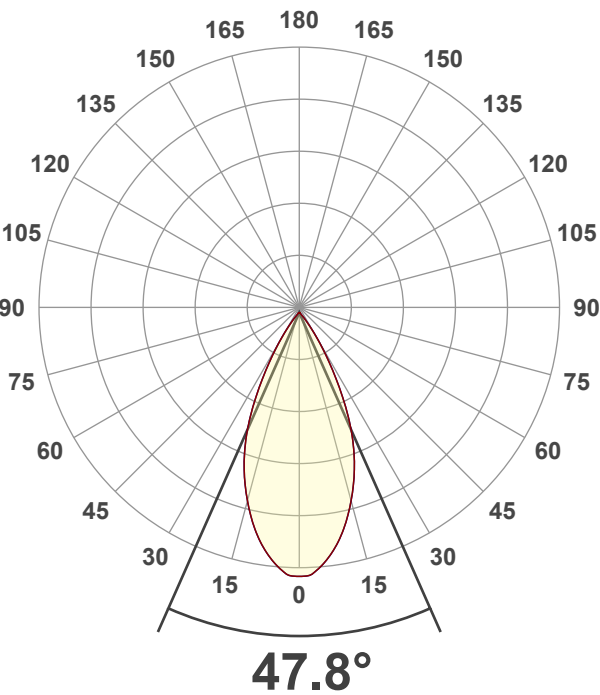
2307 lm

56 lm/W

3743 cd – 47.8°

CRI 92.7

Light Intensity Distribution



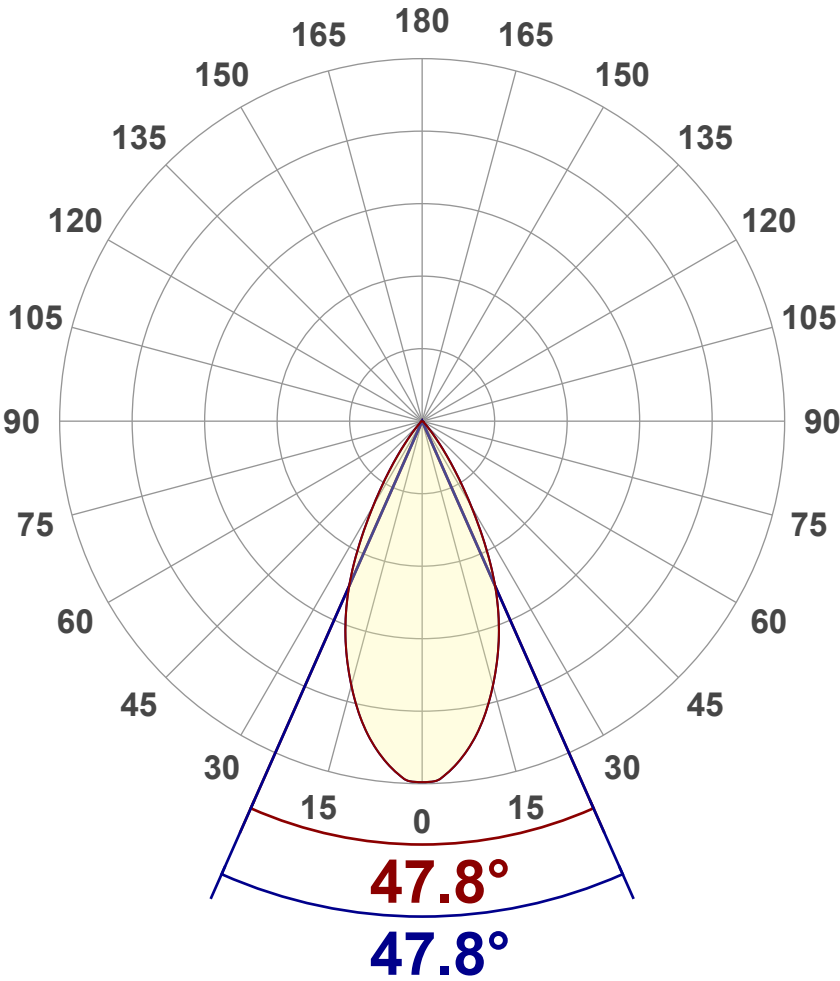
Goniophotometry Report

1_PHOT_REFLEKTER-XL-4300lmChip-3000K-58Deg-HoneycombLouvre_2303
www.factorylux.com



Luminous Intensity diagram

Unit: 0-100% of peak intensity



Main Values

Output (total Lumen)	2307 lm
Peak Intensity	3743 cd
Beam Angle (50%)	47.8°
Beam Angle (90%)	47.8°
Beam Angle (10%)	47.8°

Cut-off Angle

Average 2,5%	85.4°
--------------	-------

Field Angle

Average 10%	72.7°
-------------	-------

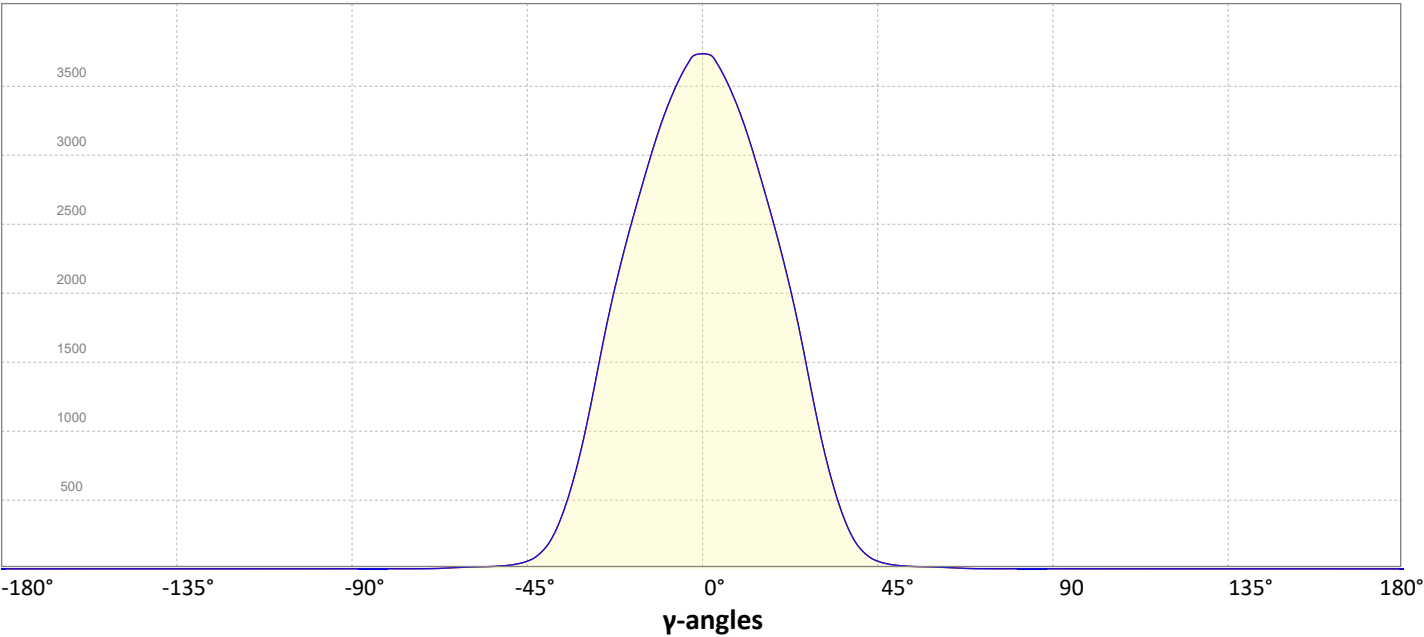
Intensity Ratio

In 120° cone	98.6%
In 90° cone	97.2%

C000-C180

C090-C270

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

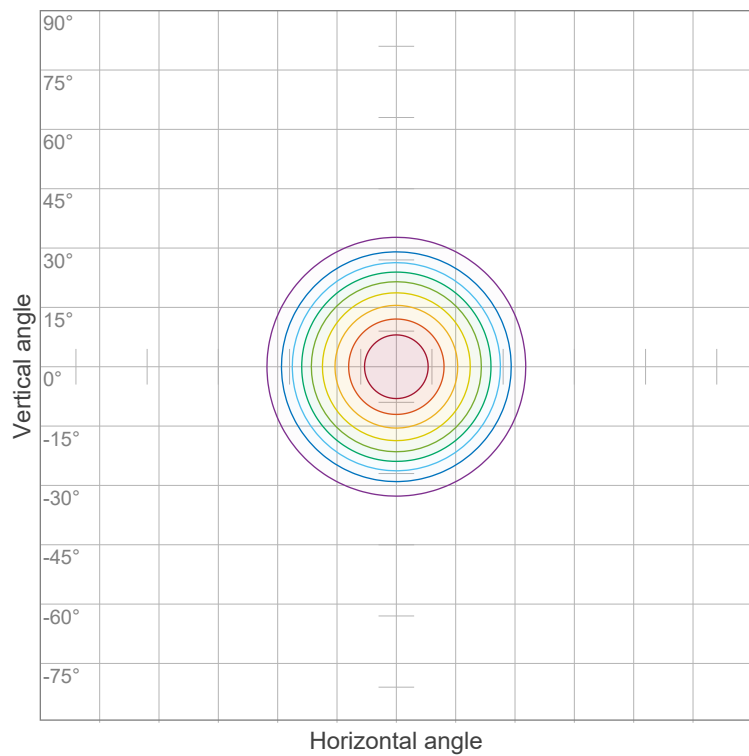


Goniophotometry Report

1_PHOT_REFLEKTER-XL-4300lmChip-3000K-58Deg-HoneycombLouvre_2303
www.factorylux.com



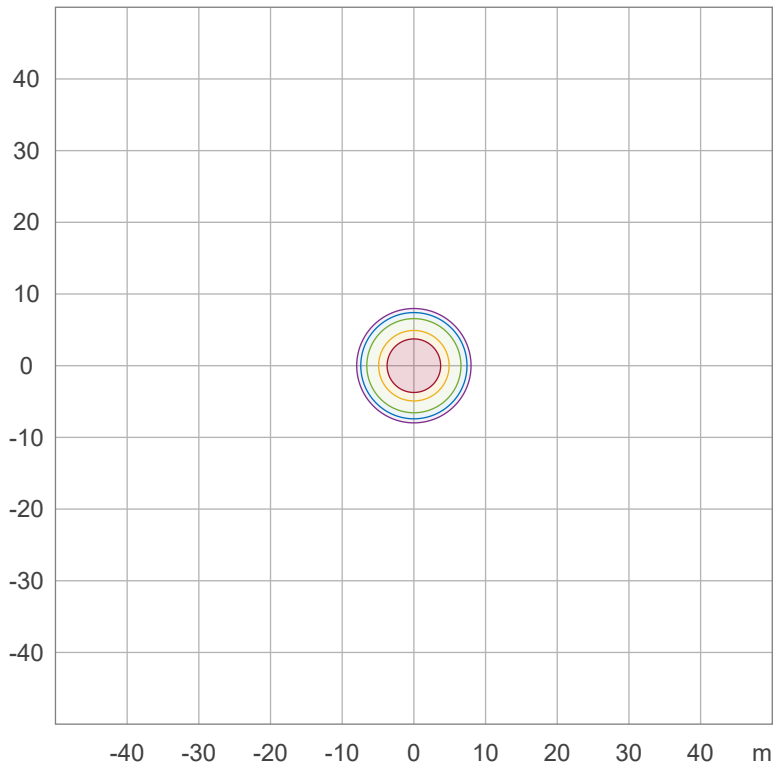
Iso-intensity Diagram (Iso-candela)



90 %	3368.5 cd
80 %	2994.2 cd
70 %	2619.9 cd
60 %	2245.7 cd
50 %	1871.4 cd
40 %	1497.1 cd
30 %	1122.8 cd
20 %	748.6 cd
10 %	374.3 cd

Peak intensity: 3742.8 cd
Number of c-planes: 32

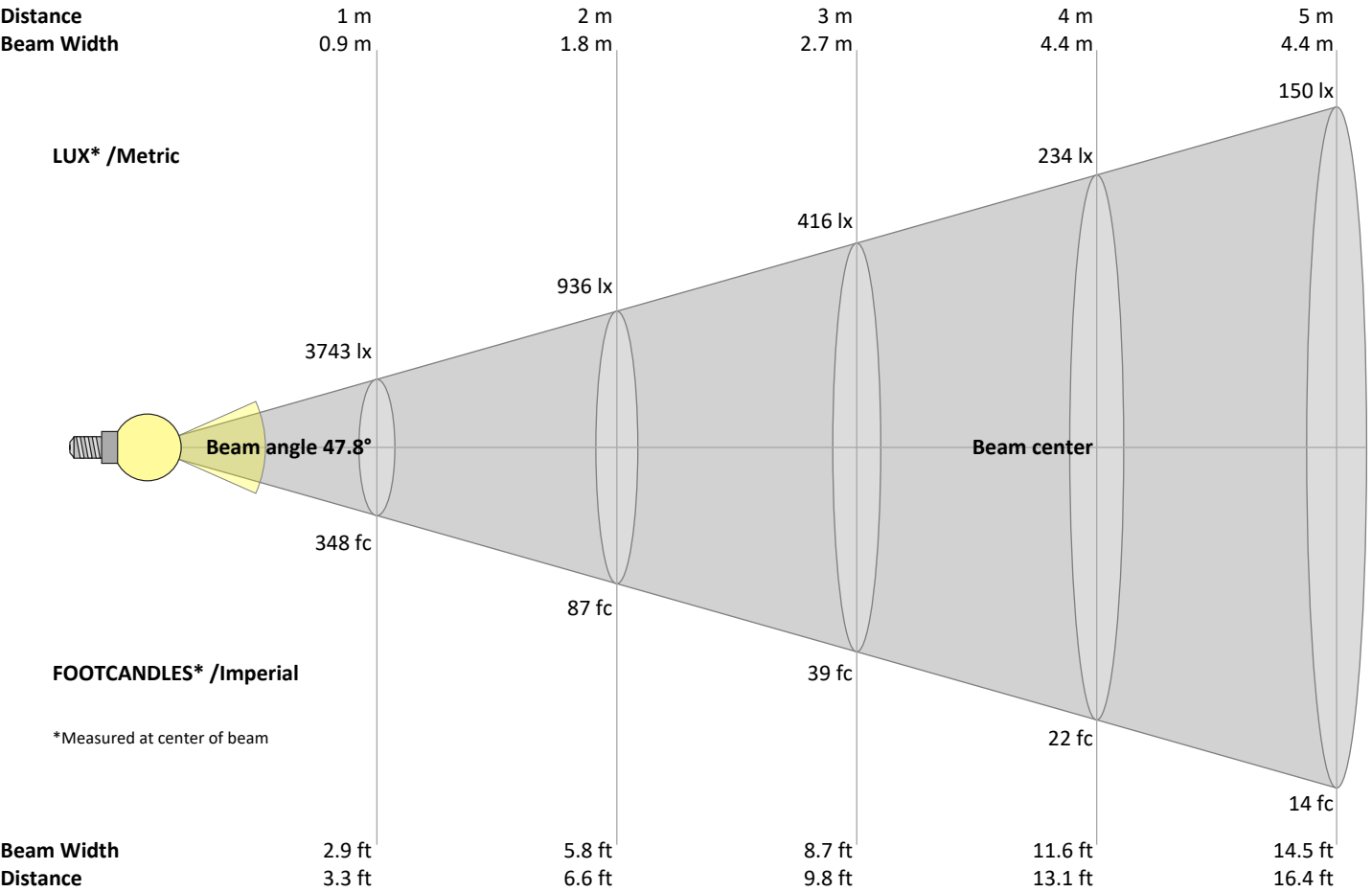
Iso-illuminance Diagram (Iso-lux)



50.0 %	18.7 lx
30.0 %	11.2 lx
10.0 %	3.7 lx
5.0 %	1.9 lx
3.0 %	1.1 lx

Peak illuminance: 37.4 lx
Mounting height: 10.0 m
Number of c-planes: 32

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
3743	936	416	234	150	104	76	58	46	37	31	26	22	19	17	15	13	12	10	9	lux
347.7	86.9	38.6	21.7	13.9	9.7	7.1	5.4	4.3	3.5	2.9	2.4	2.1	1.8	1.5	1.4	1.2	1.1	1	0.9	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
3743	3741	3668	3563	3436	3290	3123	2938	2743	2542	2331	2103	1855	1581	1294	1020	777	571	399	265	cd
100%	100%	98%	95%	92%	88%	83%	78%	73%	68%	62%	56%	50%	42%	35%	27%	21%	15%	11%	7%	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
3743	3741	3668	3563	3436	3290	3123	2938	2743	2542	2331	2103	1855	1581	1294	1020	777	571	399	265	cd
100%	100%	98%	95%	92%	88%	83%	78%	73%	68%	62%	56%	50%	42%	35%	27%	21%	15%	11%	7%	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
3743	3741	3668	3563	3436	3290	3123	2938	2743	2542	2331	2103	1855	1581	1294	1020	777	571	399	265	cd
100%	100%	98%	95%	92%	88%	83%	78%	73%	68%	62%	56%	50%	42%	35%	27%	21%	15%	11%	7%	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
3743	3741	3668	3563	3436	3290	3123	2938	2743	2542	2331	2103	1855	1581	1294	1020	777	571	399	265	cd
100%	100%	98%	95%	92%	88%	83%	78%	73%	68%	62%	56%	50%	42%	35%	27%	21%	15%	11%	7%	of 0°val

Goniophotometry Report

1_PHOT_REFLEKTER-XL-4300lmChip-3000K-58Deg-HoneycombLouvre_2303
www.factorylux.com



Light Planning – UGR table

Uncorrected, comprehensive UGR table according to 117-1995

Reflectances											
	p Ceiling	70	70	50	50	30	70	70	50	50	30
	p Walls	50	30	50	30	30	50	30	50	30	30
	p Floor	20	20	20	20	20	20	20	20	20	20
Room size											
H = mounting height above eye level											
X	Y	Viewed Crosswise (Viewing direction orthogonal to lamp length axis)					Viewed Endwise (Viewing direction parallel to lamp length axis)				
2H	2H	19.0	19.6	19.1	19.8	20.0	19.0	19.6	19.1	19.8	20.0
	3H	18.8	19.5	19.1	19.7	19.9	18.8	19.5	19.1	19.7	19.9
	4H	18.7	19.4	19.1	19.6	19.8	18.7	19.4	19.1	19.6	19.8
	6H	18.7	19.3	19.0	19.6	19.9	18.7	19.3	19.0	19.6	19.9
	8H	18.7	19.2	19.0	19.5	19.9	18.7	19.2	19.0	19.5	19.9
	12H	18.6	19.2	19.0	19.5	19.9	18.6	19.2	19.0	19.5	19.9
4H	2H	18.7	19.4	19.1	19.6	19.8	18.7	19.4	19.1	19.6	19.8
	3H	18.6	19.1	19.0	19.5	19.9	18.6	19.1	19.0	19.5	19.9
	4H	18.5	19.0	18.9	19.4	19.9	18.5	19.0	18.9	19.4	19.9
	6H	18.4	19.0	18.9	19.3	19.6	18.4	19.0	18.9	19.3	19.6
	8H	18.4	18.9	18.9	19.2	19.6	18.4	18.9	18.9	19.2	19.6
	12H	18.4	18.7	18.9	19.1	19.6	18.4	18.7	18.9	19.1	19.6
8H	4H	18.4	18.8	18.9	19.2	19.6	18.4	18.8	18.9	19.2	19.6
	6H	18.3	18.7	18.8	19.1	19.6	18.3	18.7	18.8	19.1	19.6
	8H	18.4	18.6	18.9	19.1	19.8	18.4	18.6	18.9	19.1	19.8
	12H	18.3	18.6	18.9	19.1	19.7	18.3	18.6	18.9	19.1	19.7
12H	4H	18.3	18.7	18.8	19.1	19.5	18.3	18.7	18.8	19.1	19.5
	6H	18.3	18.6	18.9	19.1	19.7	18.3	18.6	18.9	19.1	19.7
	8H	18.3	18.5	18.9	19.0	19.6	18.3	18.5	18.9	19.0	19.6

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

S = 1.0H	5.6 / -7.7	5.6 / -7.7
S = 1.5H	8.3 / -8.1	8.3 / -8.1
S = 2.0H	10.3 / -9.3	10.3 / -9.3

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	101	101	101	99
1	114	111	109	107	111	109	107	105	105	103	102	101	100	98	97	96	95	94
2	109	104	100	97	106	102	99	96	99	96	94	96	94	92	93	91	90	88
3	104	98	93	90	102	96	92	89	94	90	87	91	88	86	89	87	85	83
4	99	92	87	83	97	91	86	83	89	85	82	87	83	81	85	82	80	78
5	95	87	82	78	93	86	81	77	84	80	77	83	79	76	81	78	75	74
6	91	82	77	73	89	82	77	73	80	76	72	79	75	72	77	74	71	70
7	87	78	73	69	85	78	72	69	76	72	68	75	71	68	74	70	67	66
8	83	74	69	65	82	74	69	65	73	68	65	72	67	64	71	67	64	63
9	80	71	65	62	78	70	65	62	69	65	61	68	64	61	68	64	61	60
10	76	67	62	59	75	67	62	59	66	62	58	65	61	58	65	61	58	57

Goniophotometry Report

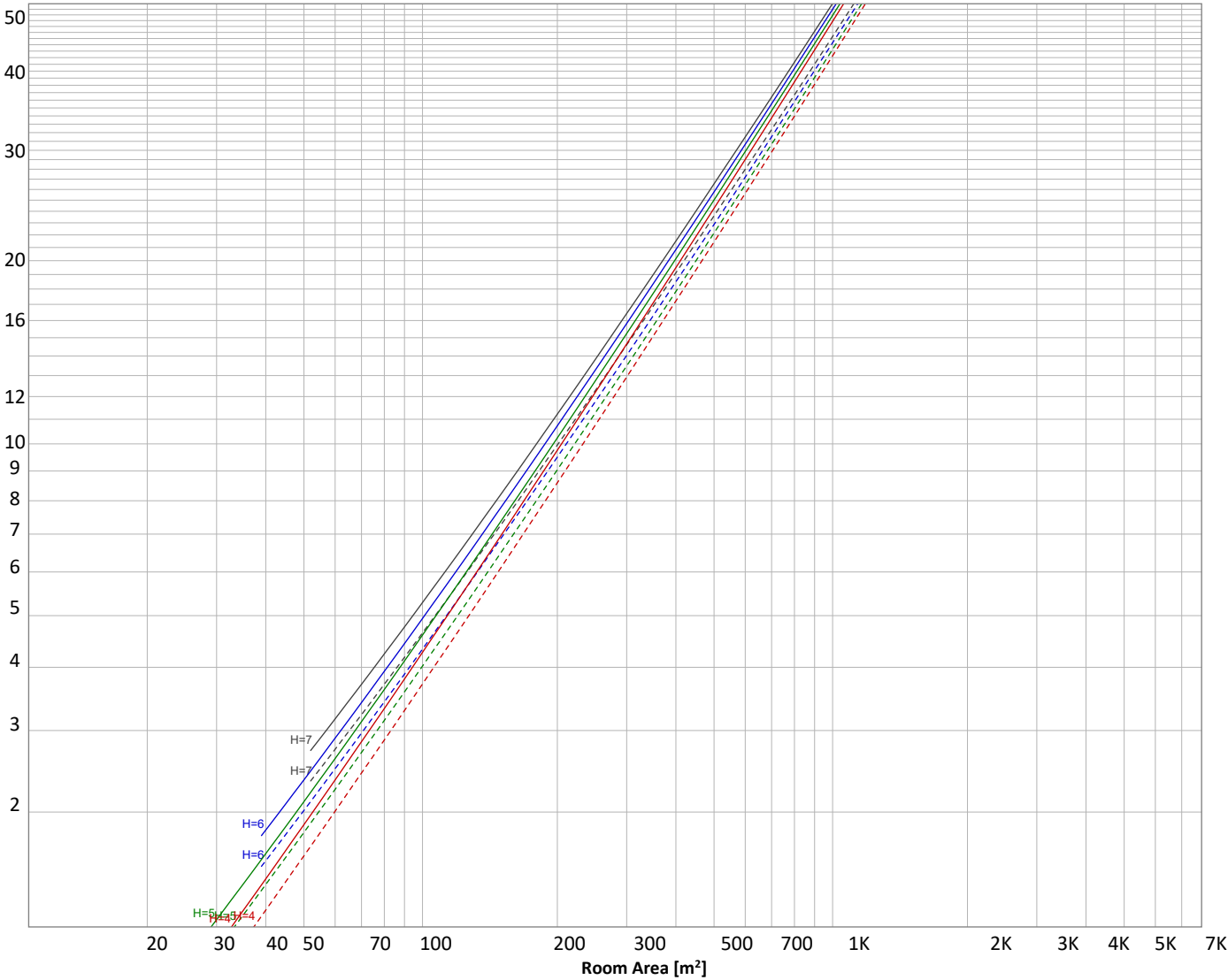
1_PHOT_REFLEKTER-XL-4300lmChip-3000K-58Deg-HoneycombLouvre_2303
www.factorylux.com



Luminaire budgetary diagram

Uncorrected, comprehensive UGR table according to 117-1995

LAMPS (number of lamps)



Conditions

H = Room height	Flux = 2307 lm	$\rho(\%)$		
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
				20

Zonal Lumen Summary

0°-10°	10°-20°	20°-30°	30°-40°	40°-50°	50°-60°	60°-70°	70°-80°	80°-90°
335 lm	788 lm	769 lm	314 lm	53.5 lm	17.4 lm	8.72 lm	3.40 lm	3.24 lm
90°-100°	100°-110°	110°-120°	120°-130°	130°-140°	140°-150°	150°-160°	160°-170°	170°-180°
2.99 lm	2.90 lm	2.72 lm	2.46 lm	1.82 lm	1.33 lm	0.978 lm	0.599 lm	0.202 lm

Outdoor Light Planning

Lumen per Zone

Zone (γ)	Lumen	% Total
0-10°	335 lm	14.5%
10-20°	788 lm	34.2%
20-30°	769 lm	33.3%
30-40°	314 lm	13.6%
40-50°	53 lm	2.3%
50-60°	17 lm	0.8%
60-70°	9 lm	0.4%
70-80°	3 lm	0.1%
80-90°	3 lm	0.1%
90-100°	3 lm	0.1%
100-110°	3 lm	0.1%
110-120°	3 lm	0.1%
120-130°	2 lm	0.1%
130-140°	2 lm	0.1%
140-150°	1 lm	0.1%
150-160°	1 lm	0.0%
160-170°	1 lm	0.0%
170-180°	0 lm	0.0%
Total	2307 lm	100.0%

Intensity peaks

Max intensity	3743 cd
Intensity, 90°	3 cd
Intensity, 0°	3743 cd

Zonal Lumen summary

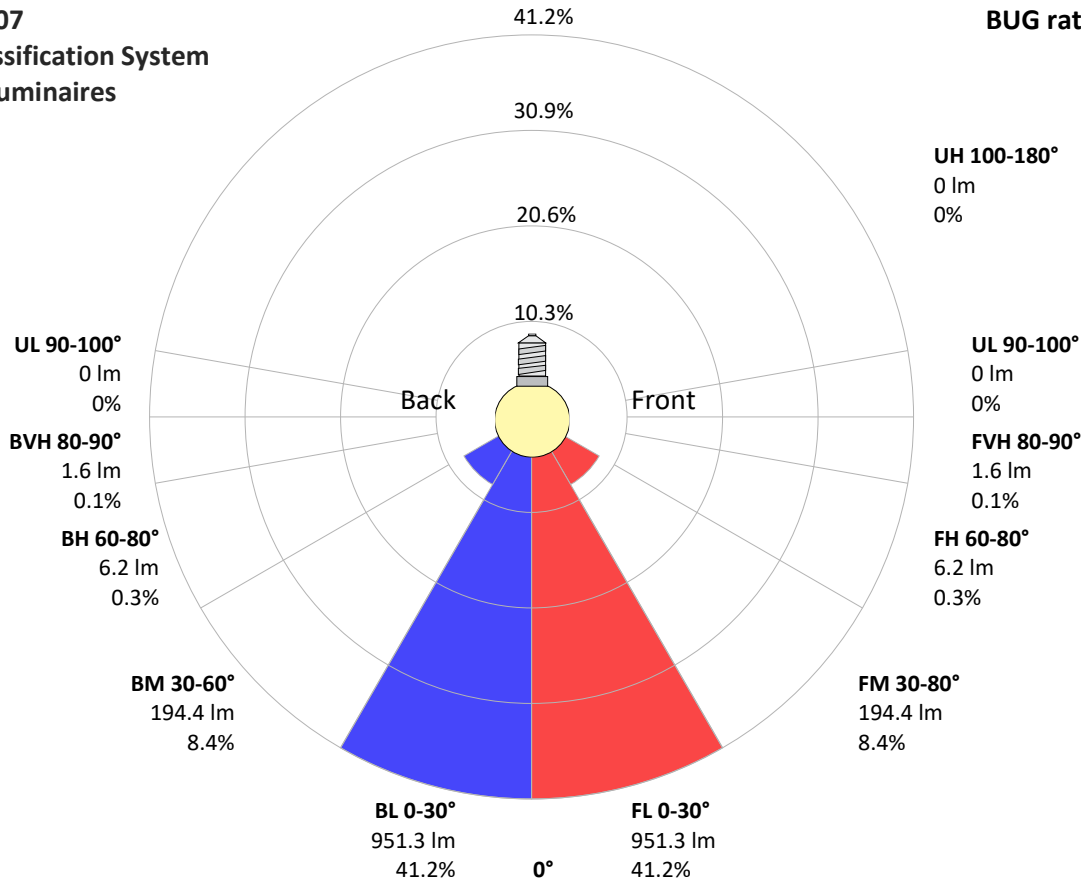
Zone (γ)	Lumen	% Total
0-30°	1891 lm	82.0%
0-40°	2205 lm	95.6%
0-60°	2276 lm	98.6%
60-90°	15 lm	0.7%
70-100°	10 lm	0.4%
90-120°	9 lm	0.4%
0-90°	2291 lm	99.3%
90-180°	16 lm	0.7%
0-180°	2307 lm	100.0%

BUG rating

	Lumen	% Total
Forward light		
Low(0-30°)	951 lm	41.2%
Medium(30-60°)	194 lm	8.4%
High(60-80°)	6 lm	0.3%
Very high(80-90°)	2 lm	0.1%
Back light		
Low(0-30°)	951 lm	41.2%
Medium(30-60°)	194 lm	8.4%
High(60-80°)	6 lm	0.3%
Very high(80-90°)	2 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-4300lmChip-3000K-58Deg-HoneycombLouvre_2303
www.factorylux.com



Power Details

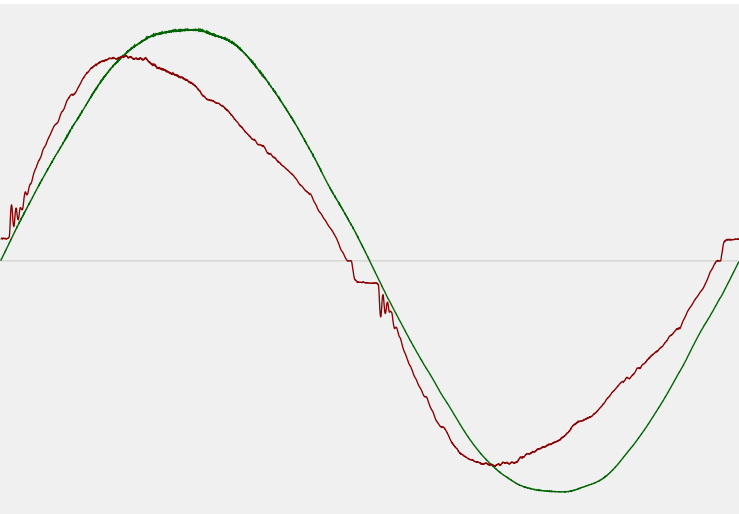
Input Power

Power feed to light source	41.4 W
Frequency of input power	50.1 Hz
RMS Input voltage feed, V_{RMS}	235 V
RMS Input current feed, I_{RMS}	0.182 A
Volt-Ampere or apparent power = $V_{RMS} \cdot I_{RMS}$	42.74 VA
Displacement factor of AC power feed	0.97
Power factor of AC current feed	0.97
Total harmonic distortion of the current	10.49%
Total harmonic distortion of the voltage	1.13%

Efficiency

Radiated power efficiency	20.2%
<div><div></div></div>	
Lumen efficiency	56 lm/W
<div><div></div></div>	

Input Power Curve



Goniophotometry Report

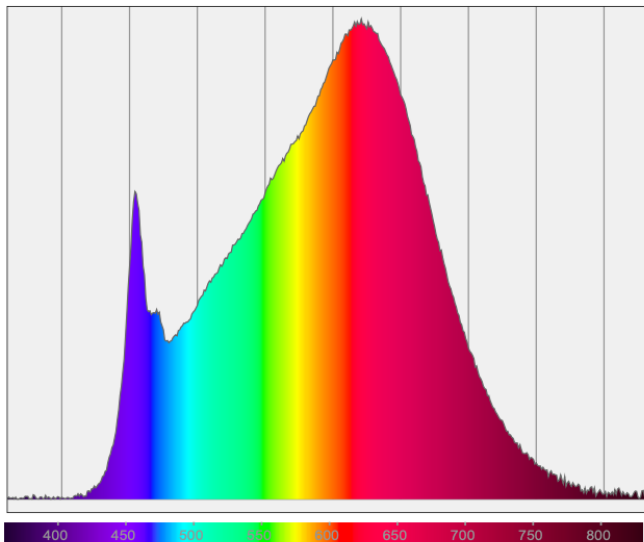
1_PHOT_REFLEKTER-XL-4300lmChip-3000K-58Deg-HoneycombLouvre_2303
www.factorylux.com



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_REFLEKTER-XL-4300lmChip-3000K-58Deg-HoneycombLouvre_2303
www.factorylux.com



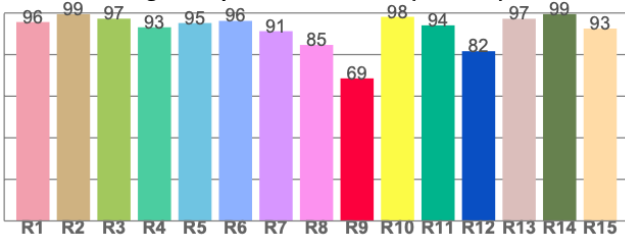
CIE 1931



CIE 1931 – zoomed on Planckian locus



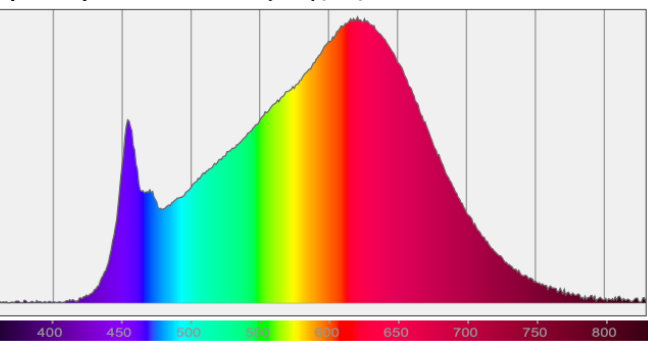
Color Rendering Index per reference color (CIE 1995)



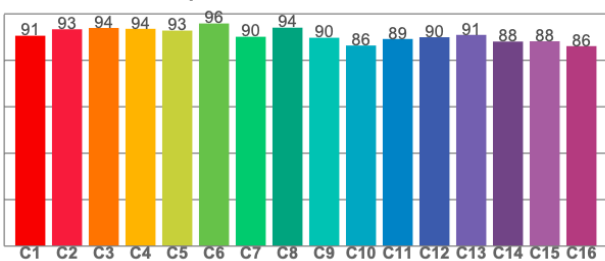
CRI R values, only R1-R8 are used to calculate final CRI value

R1	R2	R3	R4	R5	R6	R7	R8	R9	R10	R11	R12	R13	R14	R15
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

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



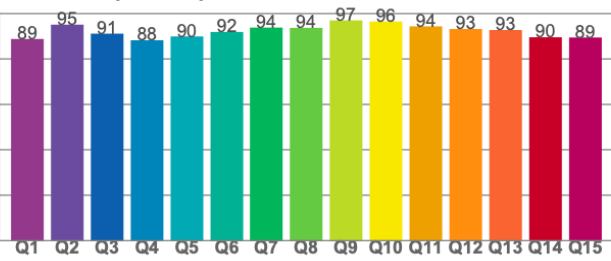
TM30-18 Rf-values per hue bin



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	93.9	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

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