

Goniophotometry Report

1_PHOT_REFLEKTER-XL-4300lmChip-3000K-58Deg-ConcentricLouvre_2303
www.factorylux.com



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

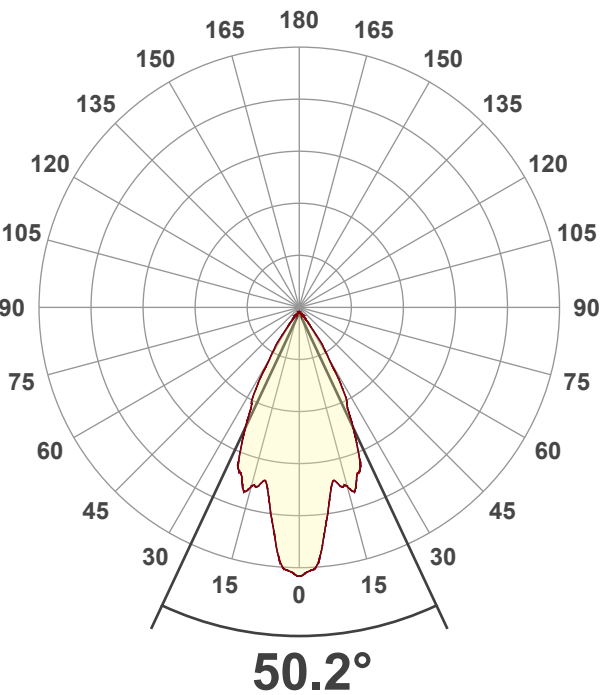
32 planes – 11.25°
0.1°
4.50 m
41.4 W – PF 0.97 – DPF 0.97
238 V – 0.180 A
50 Hz

Main Light Measurement Results

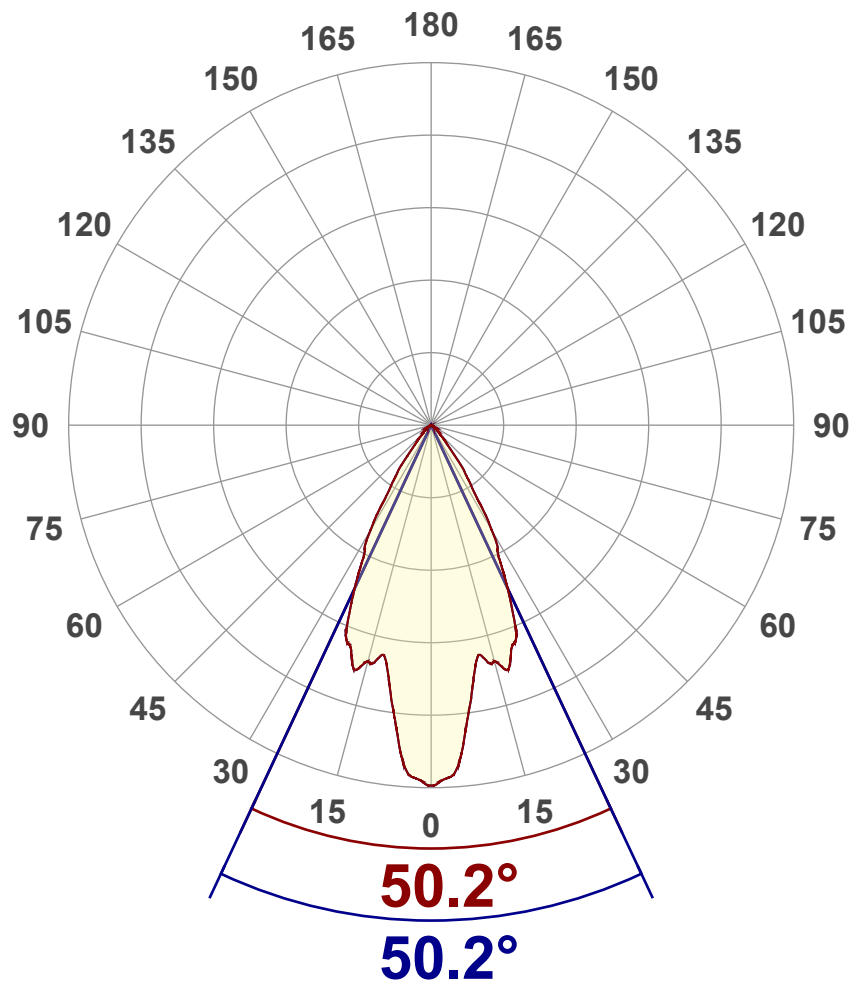
Output
Efficiency
Peak Intensity and Beam Angle
Color Rendering Index

2716 lm
66 lm/W
4071 cd – 50.2°
CRI 92.8

Light Intensity Distribution



Luminous Intensity diagramUnit: 0-100% of peak intensity



Main Values	
Output (total Lumen)	2716 lm
Peak Intensity	4071 cd
Beam Angle (50%)	50.2°
Beam Angle (90%)	50.2°
Beam Angle (10%)	50.2°

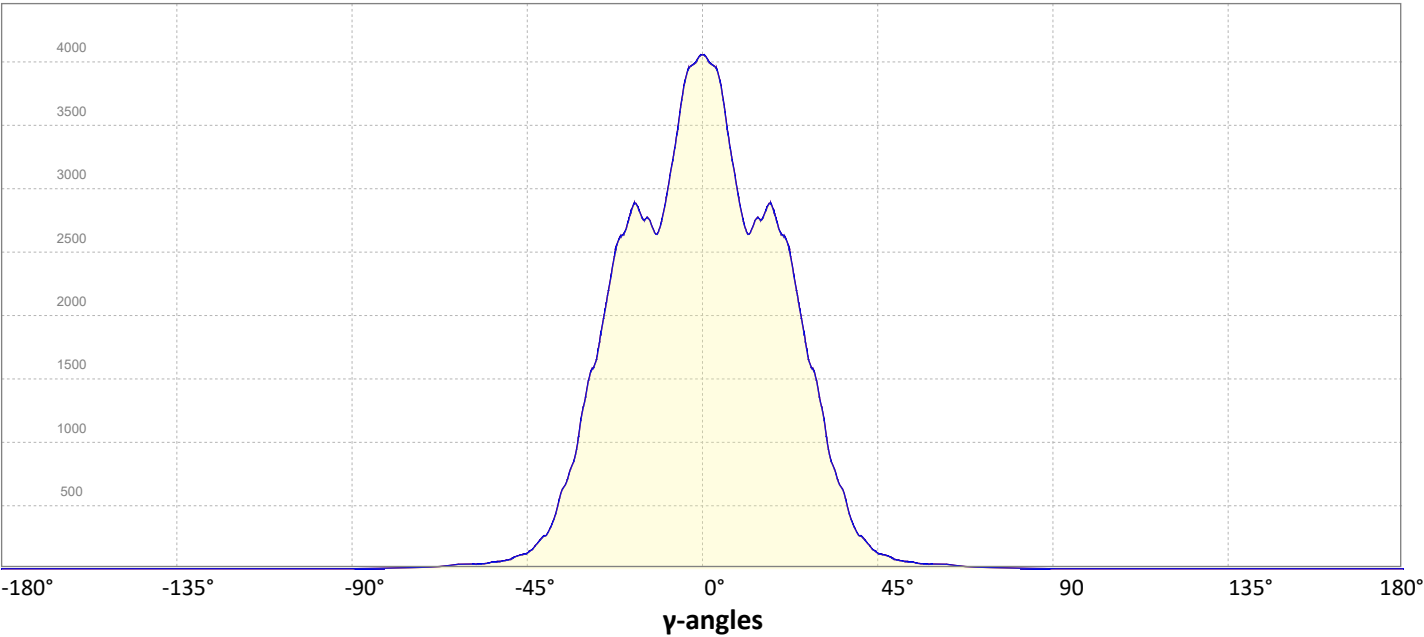
Cut-off Angle	
Average 2,5%	95.6°

Field Angle	
Average 10%	76.1°

Intensity Ratio	
In 120° cone	97.5%
In 90° cone	94.3%

C000-C180
C090-C270

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

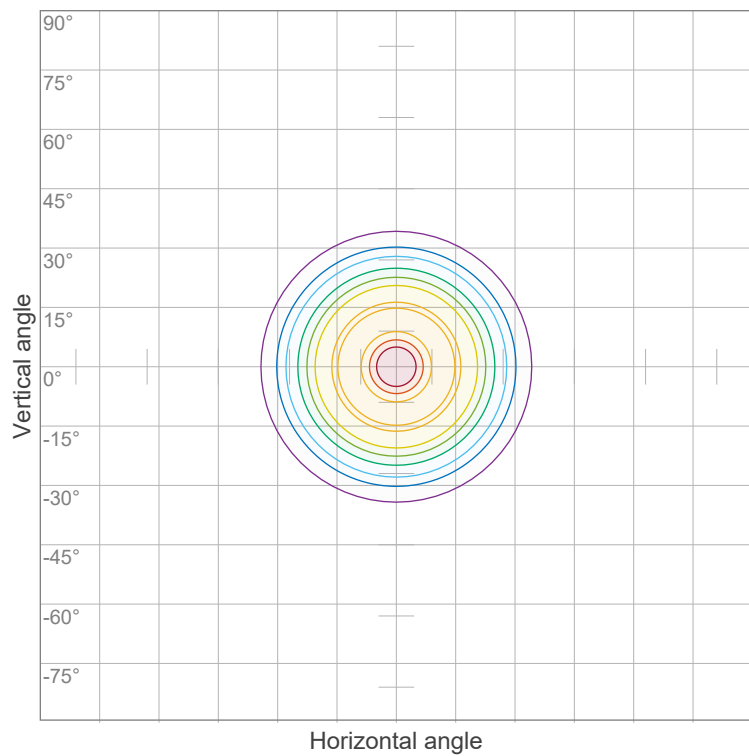


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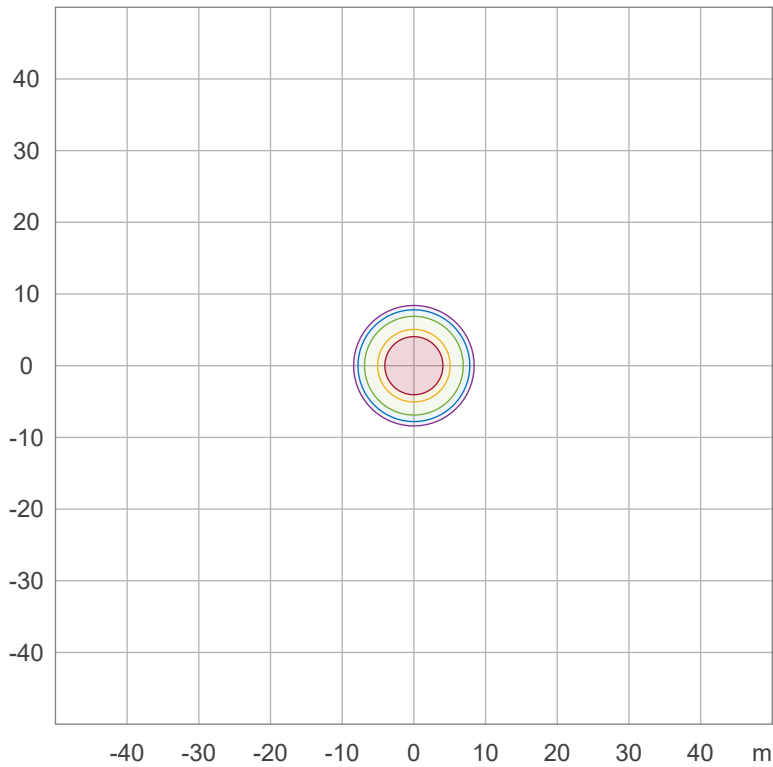
Iso-intensity Diagram (Iso-candela)



90 %	3663.6 cd
80 %	3256.5 cd
70 %	2849.4 cd
60 %	2442.4 cd
50 %	2035.3 cd
40 %	1628.3 cd
30 %	1221.2 cd
20 %	814.1 cd
10 %	407.1 cd

Peak intensity: 4070.6 cd
Number of c-planes: 32

Iso-illuminance Diagram (Iso-lux)



50.0 %	20.4 lx
30.0 %	12.2 lx
10.0 %	4.1 lx
5.0 %	2.0 lx
3.0 %	1.2 lx

Peak illuminance: 40.7 lx
Mounting height: 10.0 m
Number of c-planes: 32

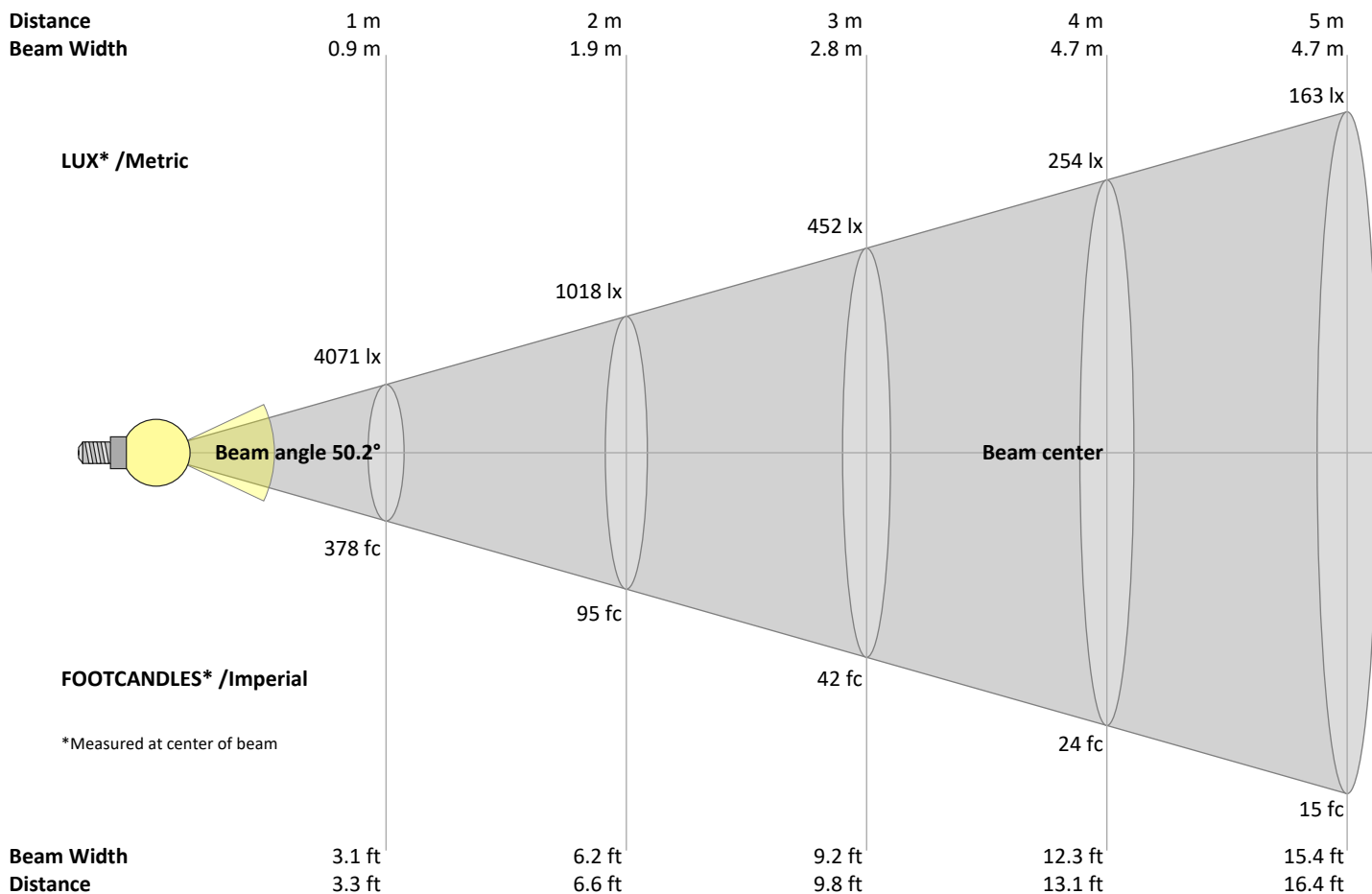
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Beam Details



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
4071	1018	452	254	163	113	83	64	50	41	34	28	24	21	18	16	14	13	11	10	lux
378.2	94.5	42	23.6	15.1	10.5	7.7	5.9	4.7	3.8	3.1	2.6	2.2	1.9	1.7	1.5	1.3	1.2	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
4071	4007	3924	3567	3176	2827	2653	2780	2819	2861	2668	2568	2231	1883	1595	1368	1014	781	631	410	cd
100%	98%	96%	88%	78%	69%	65%	68%	69%	70%	66%	63%	55%	46%	39%	34%	25%	19%	16%	10%	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
4071	4007	3924	3567	3176	2827	2653	2780	2819	2861	2668	2568	2231	1883	1595	1368	1014	781	631	410	cd
100%	98%	96%	88%	78%	69%	65%	68%	69%	70%	66%	63%	55%	46%	39%	34%	25%	19%	16%	10%	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
4071	4007	3924	3567	3176	2827	2653	2780	2819	2861	2668	2568	2231	1883	1595	1368	1014	781	631	410	cd
100%	98%	96%	88%	78%	69%	65%	68%	69%	70%	66%	63%	55%	46%	39%	34%	25%	19%	16%	10%	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
4071	4007	3924	3567	3176	2827	2653	2780	2819	2861	2668	2568	2231	1883	1595	1368	1014	781	631	410	cd
100%	98%	96%	88%	78%	69%	65%	68%	69%	70%	66%	63%	55%	46%	39%	34%	25%	19%	16%	10%	of 0°val

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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		Viewed Crosswise					Viewed Endwise				
H = mounting height above eye level		(Viewing direction orthogonal to lamp length axis)					(Viewing direction parallel to lamp length axis)				
X	Y										
2H	2H	21.3	22.0	21.4	22.2	22.4	21.3	22.0	21.4	22.2	22.4
	3H	21.2	21.9	21.6	22.2	22.3	21.2	21.9	21.6	22.2	22.3
	4H	21.2	21.9	21.6	22.1	22.4	21.2	21.9	21.6	22.1	22.4
	6H	21.2	21.8	21.5	22.1	22.5	21.2	21.8	21.5	22.1	22.5
	8H	21.2	21.8	21.5	22.1	22.5	21.2	21.8	21.5	22.1	22.5
	12H	21.2	21.7	21.5	22.1	22.5	21.2	21.7	21.5	22.1	22.5
4H	2H	21.1	21.8	21.5	22.0	22.3	21.1	21.8	21.5	22.0	22.3
	3H	21.2	21.7	21.5	22.1	22.5	21.2	21.7	21.5	22.1	22.5
	4H	21.1	21.6	21.5	22.1	22.6	21.1	21.6	21.5	22.1	22.6
	6H	21.1	21.7	21.6	22.0	22.4	21.1	21.7	21.6	22.0	22.4
	8H	21.1	21.6	21.6	22.0	22.3	21.1	21.6	21.6	22.0	22.3
	12H	21.1	21.5	21.6	21.9	22.4	21.1	21.5	21.6	21.9	22.4
8H	4H	21.0	21.6	21.6	21.9	22.3	21.0	21.6	21.6	21.9	22.3
	6H	21.1	21.5	21.6	21.9	22.4	21.1	21.5	21.6	21.9	22.4
	8H	21.2	21.4	21.7	22.0	22.6	21.2	21.4	21.7	22.0	22.6
	12H	21.2	21.4	21.8	21.9	22.5	21.2	21.4	21.8	21.9	22.5
12H	4H	21.0	21.4	21.5	21.8	22.3	21.0	21.4	21.5	21.8	22.3
	6H	21.1	21.4	21.6	21.9	22.5	21.1	21.4	21.6	21.9	22.5
	8H	21.1	21.4	21.7	21.9	22.5	21.1	21.4	21.7	21.9	22.5

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

S = 1.0H	4.2 / -4.2	4.2 / -4.2
S = 1.5H	6.8 / -4.4	6.8 / -4.4
S = 2.0H	8.7 / -5.5	8.7 / -5.5

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	113	110	108	106	111	108	106	104	104	102	101	100	99	97	97	96	95	93
2	108	103	99	95	105	101	97	94	98	95	92	95	92	90	92	90	88	86
3	102	96	91	87	100	95	90	86	92	88	85	89	86	83	87	84	82	80
4	97	90	84	80	95	89	84	80	86	82	79	84	81	78	82	79	77	75
5	93	84	79	74	91	83	78	74	82	77	73	80	76	73	78	75	72	70
6	88	79	74	69	87	79	73	69	77	72	68	76	71	68	74	70	67	66
7	84	75	69	65	83	74	69	65	73	68	64	72	67	64	70	66	63	62
8	80	71	65	61	79	70	65	61	69	64	60	68	63	60	67	63	60	58
9	76	67	61	57	75	66	61	57	65	60	57	65	60	57	64	60	57	55
10	73	64	58	54	72	63	58	54	62	57	54	61	57	54	61	57	53	52

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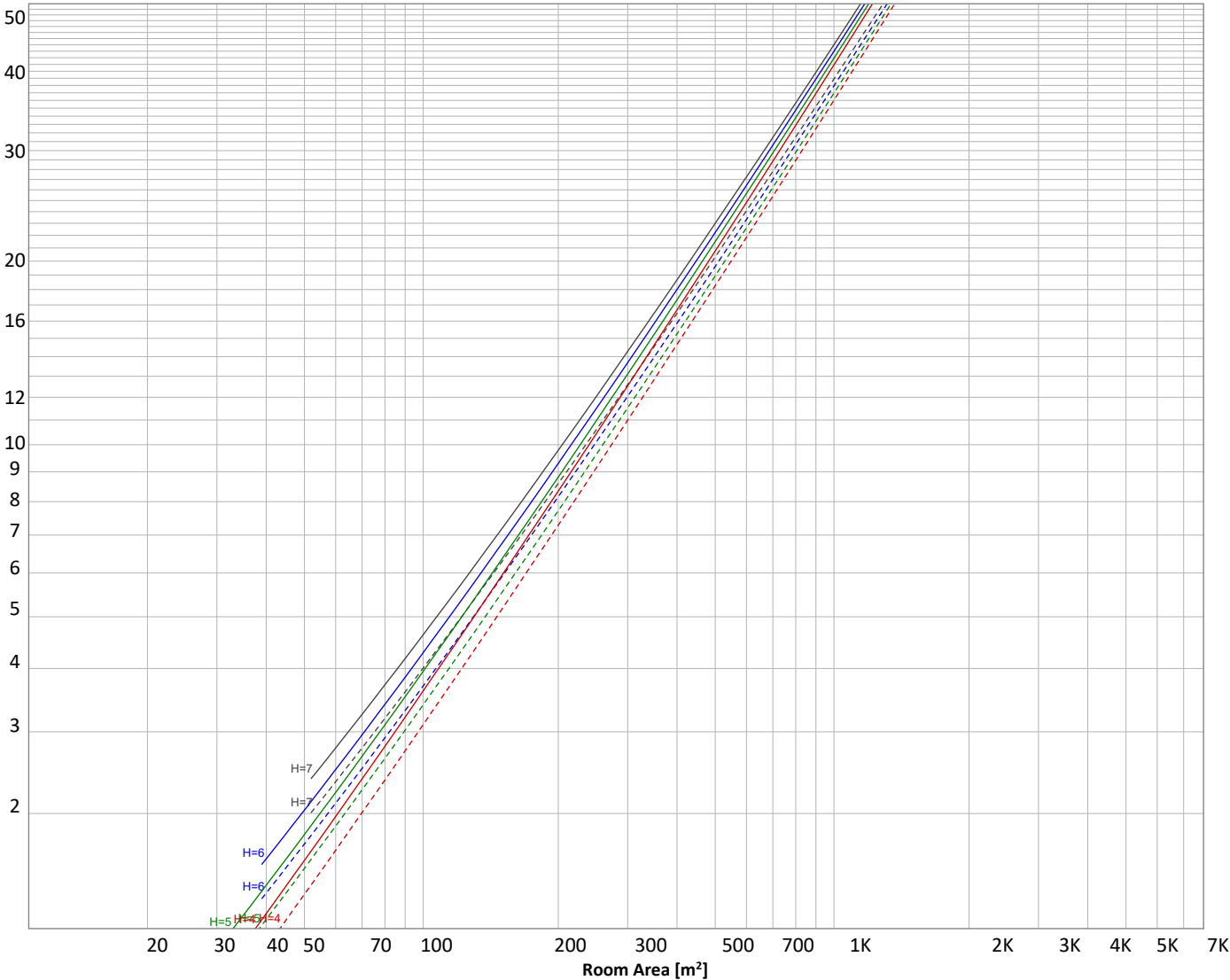
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Luminaire budgetary diagram

Uncorrected, comprehensive UGR table according to 117-1995

LAMPS (number of lamps)



Conditions

H = Room height	Flux = 2716 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
				20

Zonal Lumen Summary

0°-10°	10°-20°	20°-30°	30°-40°	40°-50°	50°-60°	60°-70°	70°-80°	80°-90°
325 lm	787 lm	934 lm	443 lm	115 lm	45.0 lm	29.4 lm	12.8 lm	5.75 lm
90°-100°	100°-110°	110°-120°	120°-130°	130°-140°	140°-150°	150°-160°	160°-170°	170°-180°
3.52 lm	3.41 lm	3.20 lm	2.89 lm	2.50 lm	2.02 lm	1.49 lm	0.914 lm	0.308 lm

Outdoor Light Planning

Lumen per Zone

Zone (γ)	Lumen	% Total
0-10°	325 lm	12.0%
10-20°	787 lm	29.0%
20-30°	934 lm	34.4%
30-40°	443 lm	16.3%
40-50°	115 lm	4.2%
50-60°	45 lm	1.7%
60-70°	29 lm	1.1%
70-80°	13 lm	0.5%
80-90°	6 lm	0.2%
90-100°	4 lm	0.1%
100-110°	3 lm	0.1%
110-120°	3 lm	0.1%
120-130°	3 lm	0.1%
130-140°	2 lm	0.1%
140-150°	2 lm	0.1%
150-160°	1 lm	0.1%
160-170°	1 lm	0.0%
170-180°	0 lm	0.0%
Total	2716 lm	100.0%

Intensity peaks

Max intensity	4071 cd
Intensity, 90°	3 cd
Intensity, 0°	4071 cd

Zonal Lumen summary

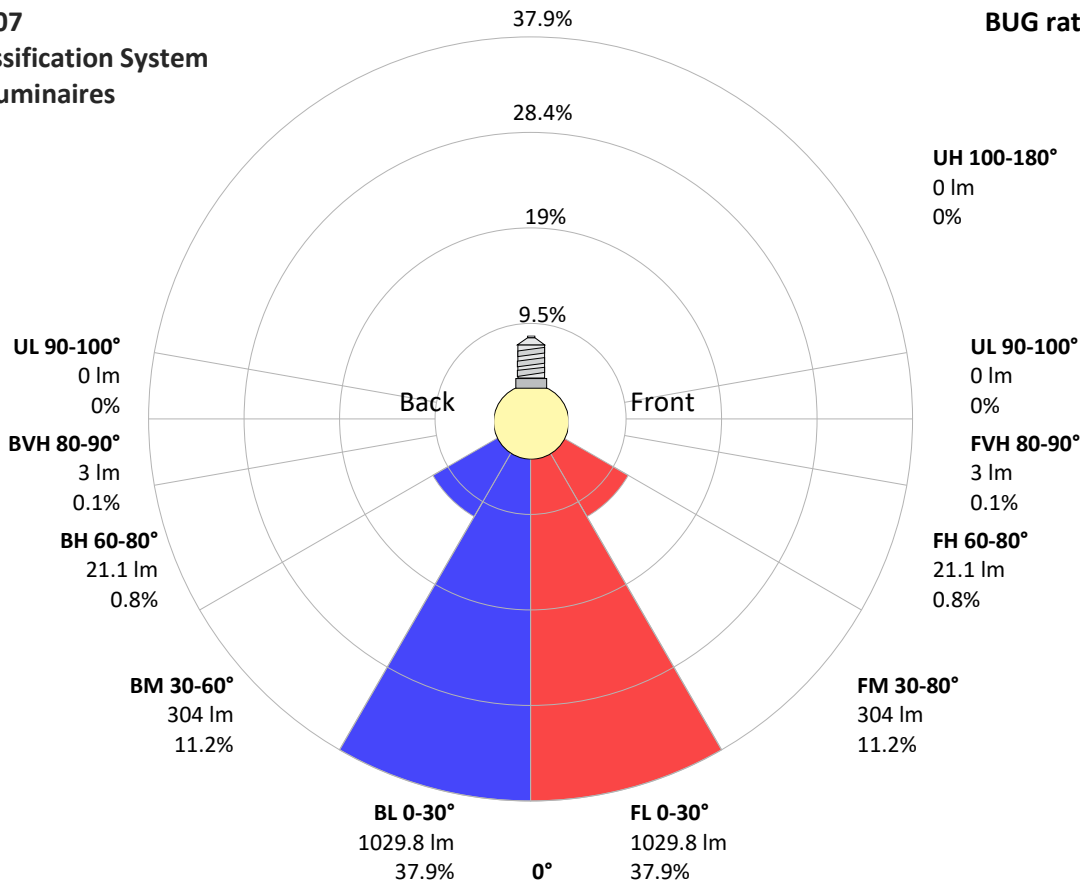
Zone (γ)	Lumen	% Total
0-30°	2045 lm	75.3%
0-40°	2488 lm	91.6%
0-60°	2648 lm	97.5%
60-90°	48 lm	1.8%
70-100°	22 lm	0.8%
90-120°	10 lm	0.4%
0-90°	2696 lm	99.3%
90-180°	20 lm	0.7%
0-180°	2716 lm	100.0%

BUG rating

	Lumen	% Total
Forward light		
Low(0-30°)	1030 lm	37.9%
Medium(30-60°)	304 lm	11.2%
High(60-80°)	21 lm	0.8%
Very high(80-90°)	3 lm	0.1%
Back light		
Low(0-30°)	1030 lm	37.9%
Medium(30-60°)	304 lm	11.2%
High(60-80°)	21 lm	0.8%
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 B3 U1 G0



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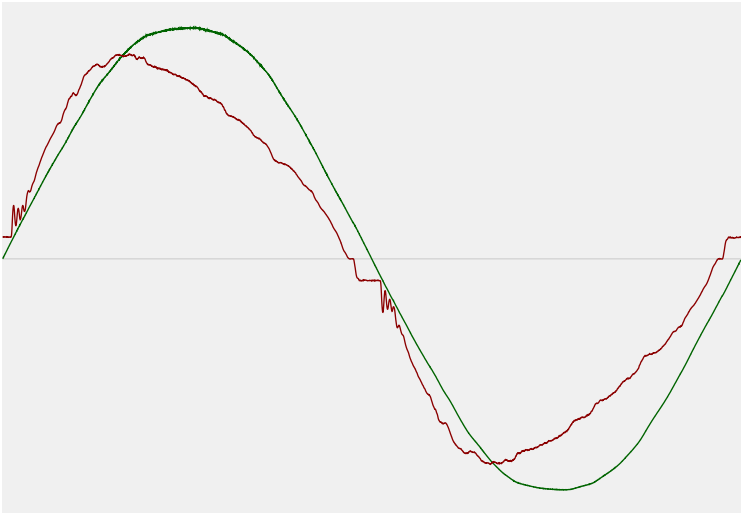


Power Details

Input Power

Power feed to light source	41.4 W
Frequency of input power	50 Hz
RMS Input voltage feed, V_{RMS}	238 V
RMS Input current feed, I_{RMS}	0.180 A
Volt-Ampere or apparent power = $V_{RMS} \cdot I_{RMS}$	42.79 VA
Displacement factor of AC power feed	0.97
Power factor of AC current feed	0.97
Total harmonic distortion of the current	10.96%
Total harmonic distortion of the voltage	1.35%

Input Power Curve



Efficiency

Radiated power efficiency	23.8%
Lumen efficiency	66 lm/W

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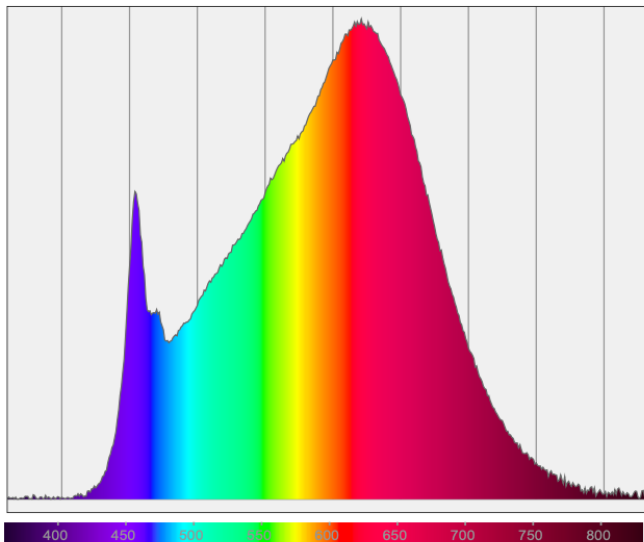
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Color Measurements

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		

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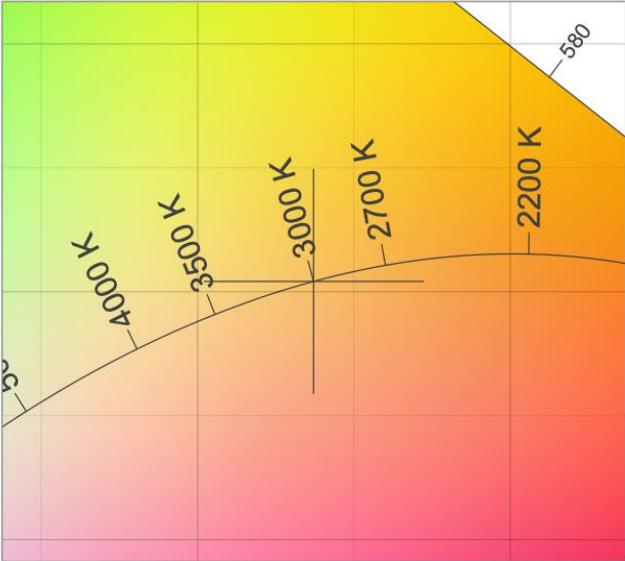
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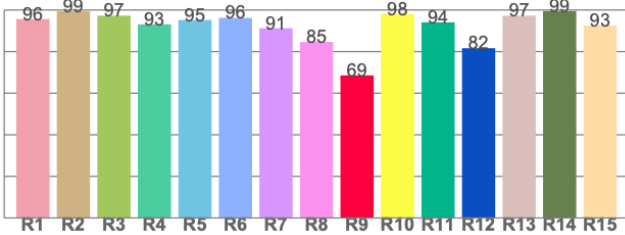
CIE 1931



CIE 1931 – zoomed on Planckian locus



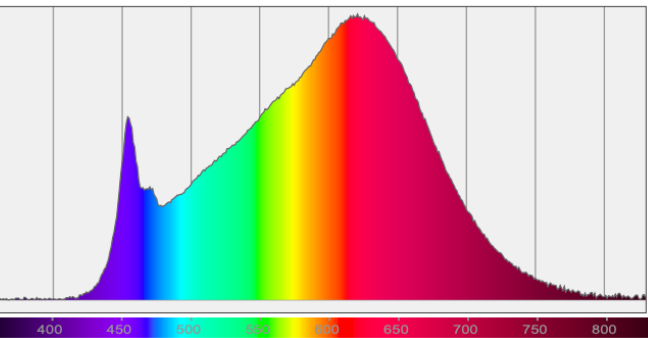
Color Rendering Index per reference color (CIE 1995)



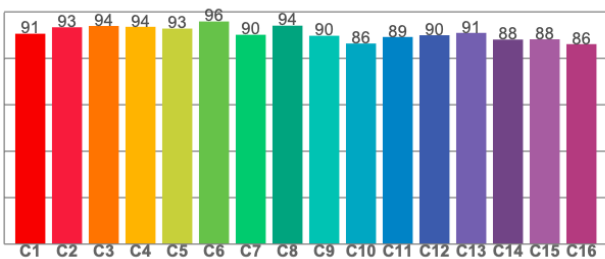
CRI R values, only R1-R8 are used to calculate final CRI value

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



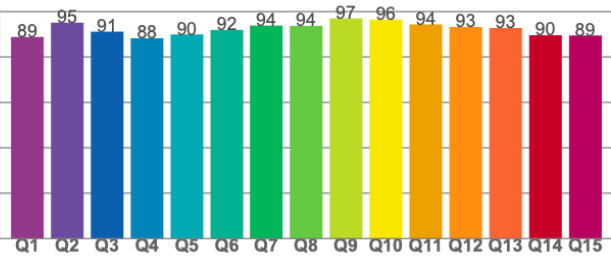
TM30-18 Rf-values per hue bin



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