

Goniophotometry Report

1_PHOT_REFLEKTER-XL-4050lmChip-2700K-38Deg-ConcentricLouvre_2303
www.factorylux.com



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

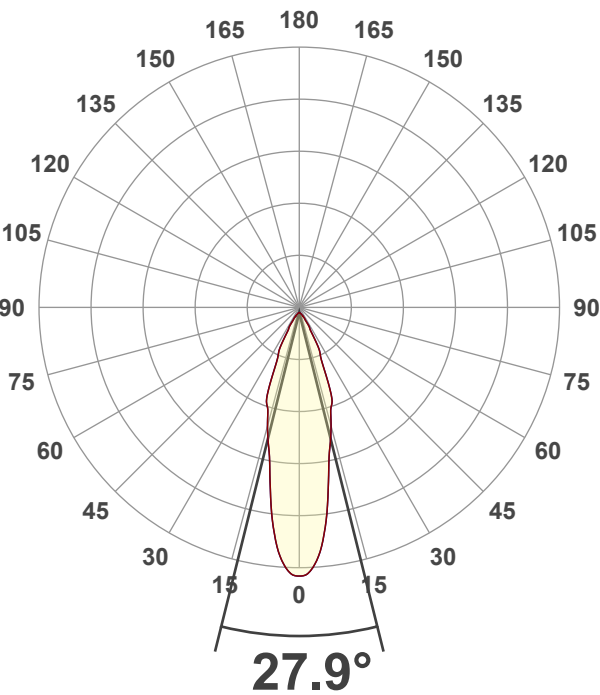
32 planes – 11.25°
1°
4.50 m
41.4 W – PF 0.97 – DPF 0.97
241 V – 0.178 A
50 Hz

Main Light Measurement Results

Output
Efficiency
Peak Intensity and Beam Angle
Color Rendering Index

2492 lm
60 lm/W
6255 cd – 27.9°
CRI 92.8

Light Intensity Distribution



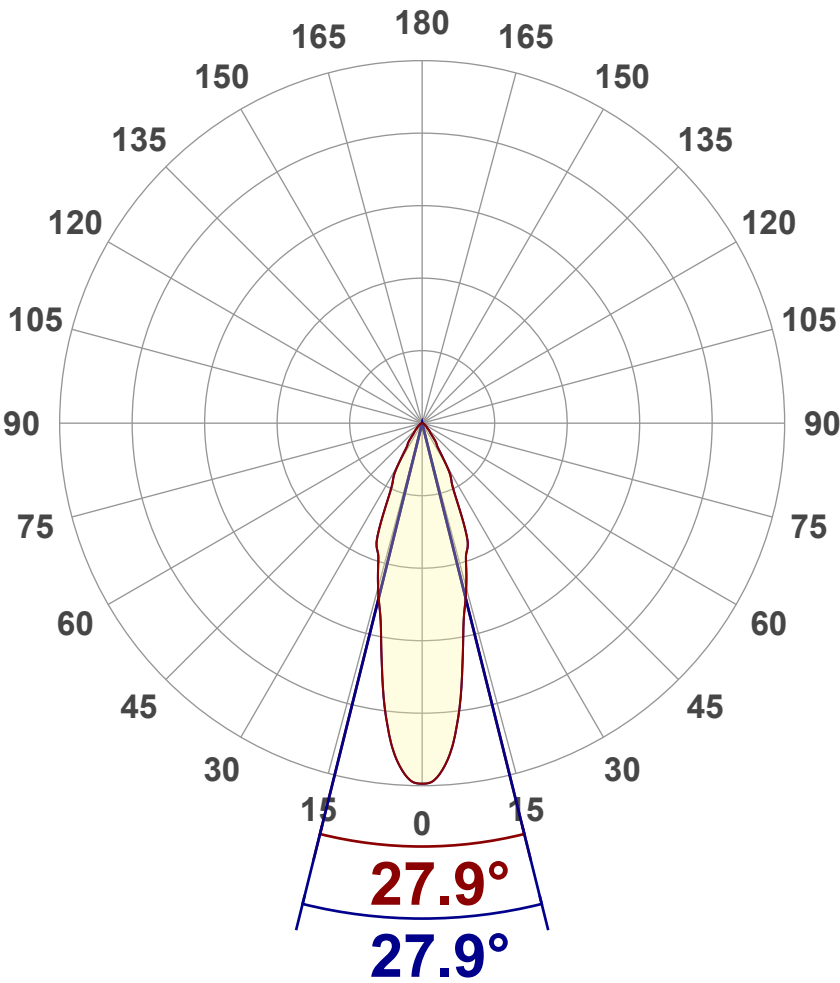
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Luminous Intensity diagram

Unit: 0-100% of peak intensity



Main Values

Output (total Lumen)	2492 lm
Peak Intensity	6255 cd
Beam Angle (50%)	27.9°
Beam Angle (90%)	27.9°
Beam Angle (10%)	27.9°

Cut-off Angle

Average 2,5%	88.6°
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Field Angle

Average 10%	63.1°
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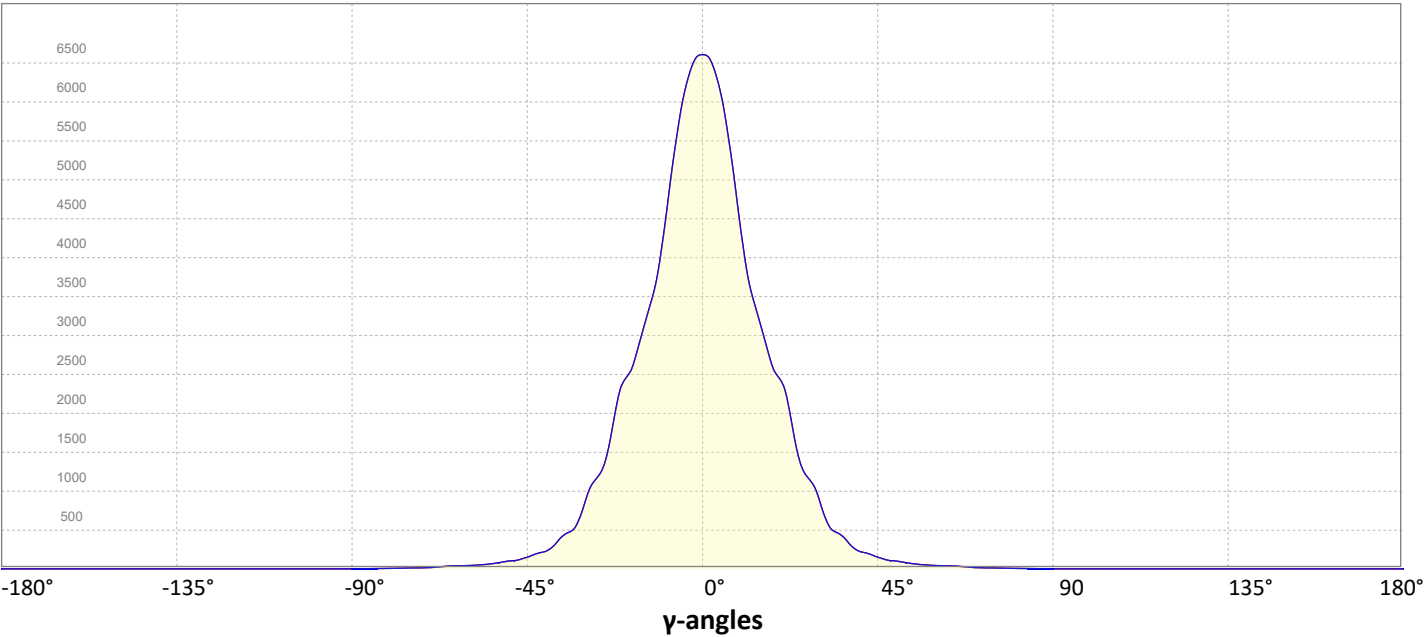
Intensity Ratio

In 120° cone	97.0%
In 90° cone	92.8%

C000-C180

C090-C270

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

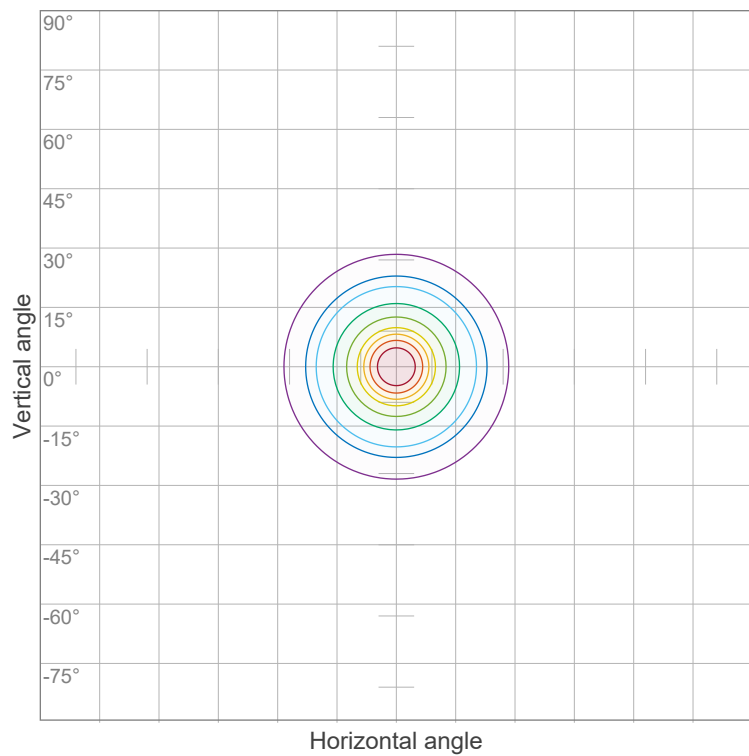


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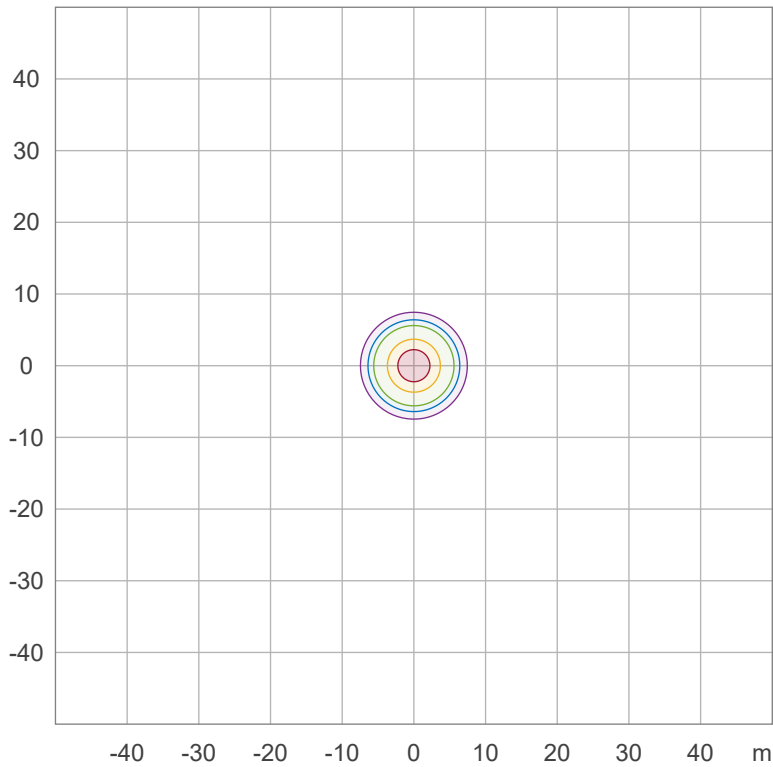
Iso-intensity Diagram (Iso-candela)



90 %	5629.8 cd
80 %	5004.3 cd
70 %	4378.7 cd
60 %	3753.2 cd
50 %	3127.7 cd
40 %	2502.1 cd
30 %	1876.6 cd
20 %	1251.1 cd
10 %	625.5 cd

Peak intensity: 6255.3 cd
Number of c-planes: 32

Iso-illuminance Diagram (Iso-lux)



50.0 %	31.3 lx
30.0 %	18.8 lx
10.0 %	6.3 lx
5.0 %	3.1 lx
3.0 %	1.9 lx

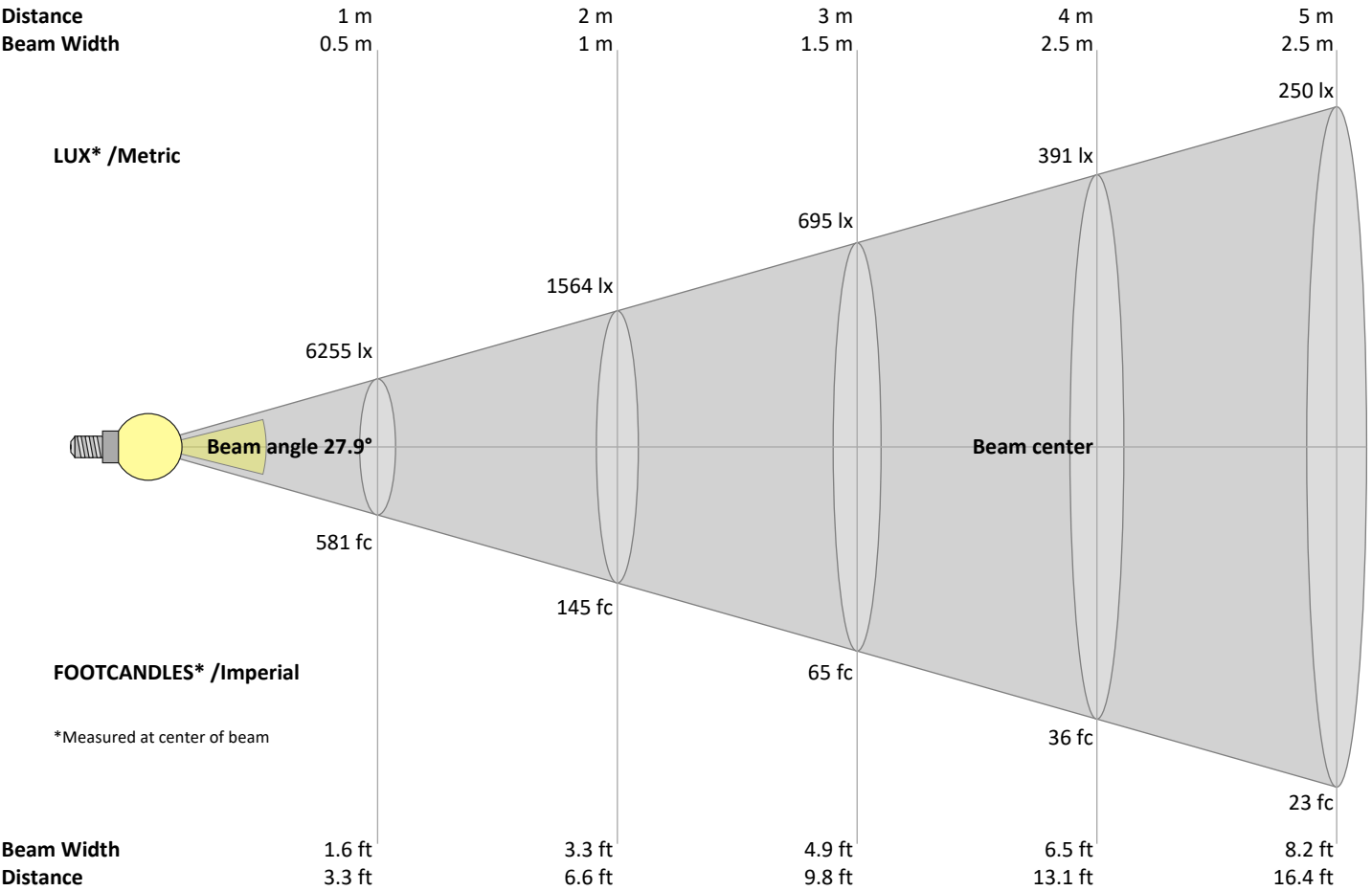
Peak illuminance: 62.6 lx
Mounting height: 10.0 m
Number of c-planes: 32

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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
6255	1564	695	391	250	174	128	98	77	63	52	43	37	32	28	24	22	19	17	16	lux
581.1	145.3	64.6	36.3	23.2	16.1	11.9	9.1	7.2	5.8	4.8	4	3.4	3	2.6	2.3	2	1.8	1.6	1.5	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
6255	6189	5916	5446	4799	4071	3483	3122	2786	2464	2302	2005	1501	1187	1056	841	574	456	397	294	cd
100%	99%	95%	87%	77%	65%	56%	50%	45%	39%	37%	32%	24%	19%	17%	13%	9%	7%	6%	5%	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
6255	6189	5916	5446	4799	4071	3483	3122	2786	2464	2302	2005	1501	1187	1056	841	574	456	397	294	cd
100%	99%	95%	87%	77%	65%	56%	50%	45%	39%	37%	32%	24%	19%	17%	13%	9%	7%	6%	5%	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
6255	6189	5916	5446	4799	4071	3483	3122	2786	2464	2302	2005	1501	1187	1056	841	574	456	397	294	cd
100%	99%	95%	87%	77%	65%	56%	50%	45%	39%	37%	32%	24%	19%	17%	13%	9%	7%	6%	5%	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
6255	6189	5916	5446	4799	4071	3483	3122	2786	2464	2302	2005	1501	1187	1056	841	574	456	397	294	cd
100%	99%	95%	87%	77%	65%	56%	50%	45%	39%	37%	32%	24%	19%	17%	13%	9%	7%	6%	5%	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	19.8	20.4	19.9	20.6	20.8	19.8	20.4	19.9	20.6	20.8
	3H	19.9	20.6	20.3	20.8	21.0	19.9	20.6	20.3	20.8	21.0
	4H	19.9	20.6	20.3	20.9	21.1	19.9	20.6	20.3	20.9	21.1
	6H	20.1	20.6	20.4	20.9	21.3	20.1	20.6	20.4	20.9	21.3
	8H	20.1	20.6	20.4	20.9	21.3	20.1	20.6	20.4	20.9	21.3
	12H	20.1	20.6	20.4	21.0	21.4	20.1	20.6	20.4	21.0	21.4
4H	2H	19.7	20.4	20.1	20.7	20.9	19.7	20.4	20.1	20.7	20.9
	3H	20.1	20.6	20.4	21.0	21.4	20.1	20.6	20.4	21.0	21.4
	4H	20.1	20.6	20.5	21.0	21.6	20.1	20.6	20.5	21.0	21.6
	6H	20.2	20.8	20.7	21.1	21.4	20.2	20.8	20.7	21.1	21.4
	8H	20.2	20.7	20.8	21.1	21.5	20.2	20.7	20.8	21.1	21.5
	12H	20.3	20.7	20.8	21.1	21.5	20.3	20.7	20.8	21.1	21.5
8H	4H	20.1	20.6	20.6	20.9	21.3	20.1	20.6	20.6	20.9	21.3
	6H	20.3	20.6	20.8	21.1	21.6	20.3	20.6	20.8	21.1	21.6
	8H	20.4	20.7	20.9	21.2	21.8	20.4	20.7	20.9	21.2	21.8
	12H	20.5	20.7	21.1	21.2	21.8	20.5	20.7	21.1	21.2	21.8
12H	4H	20.0	20.4	20.5	20.8	21.3	20.0	20.4	20.5	20.8	21.3
	6H	20.3	20.6	20.8	21.1	21.7	20.3	20.6	20.8	21.1	21.7
	8H	20.4	20.6	21.0	21.1	21.7	20.4	20.6	21.0	21.1	21.7
Variations with the observer position for the luminaire spacings, S:											
S = 1.0H		2.3 / -1.8					2.3 / -1.8				
S = 1.5H		4.4 / -2.4					4.4 / -2.4				
S = 2.0H		6.0 / -3.3					6.0 / -3.3				

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	108	106	111	109	106	104	104	103	101	101	99	98	97	96	95	93
2	108	104	100	97	106	102	98	95	99	96	93	95	93	91	93	91	89	87
3	103	97	93	89	101	96	92	88	93	90	87	91	88	85	88	86	84	82
4	99	92	87	83	97	91	86	82	88	84	81	86	83	80	84	81	79	78
5	94	87	81	77	93	86	81	77	84	80	76	82	78	76	81	77	75	73
6	90	82	77	73	89	81	76	73	80	75	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	68	66
8	83	75	69	65	82	74	69	65	73	68	65	72	68	65	71	67	64	63
9	80	71	66	62	79	71	66	62	70	65	62	69	65	62	68	64	62	60
10	77	68	63	60	76	68	63	59	67	62	59	66	62	59	65	62	59	58

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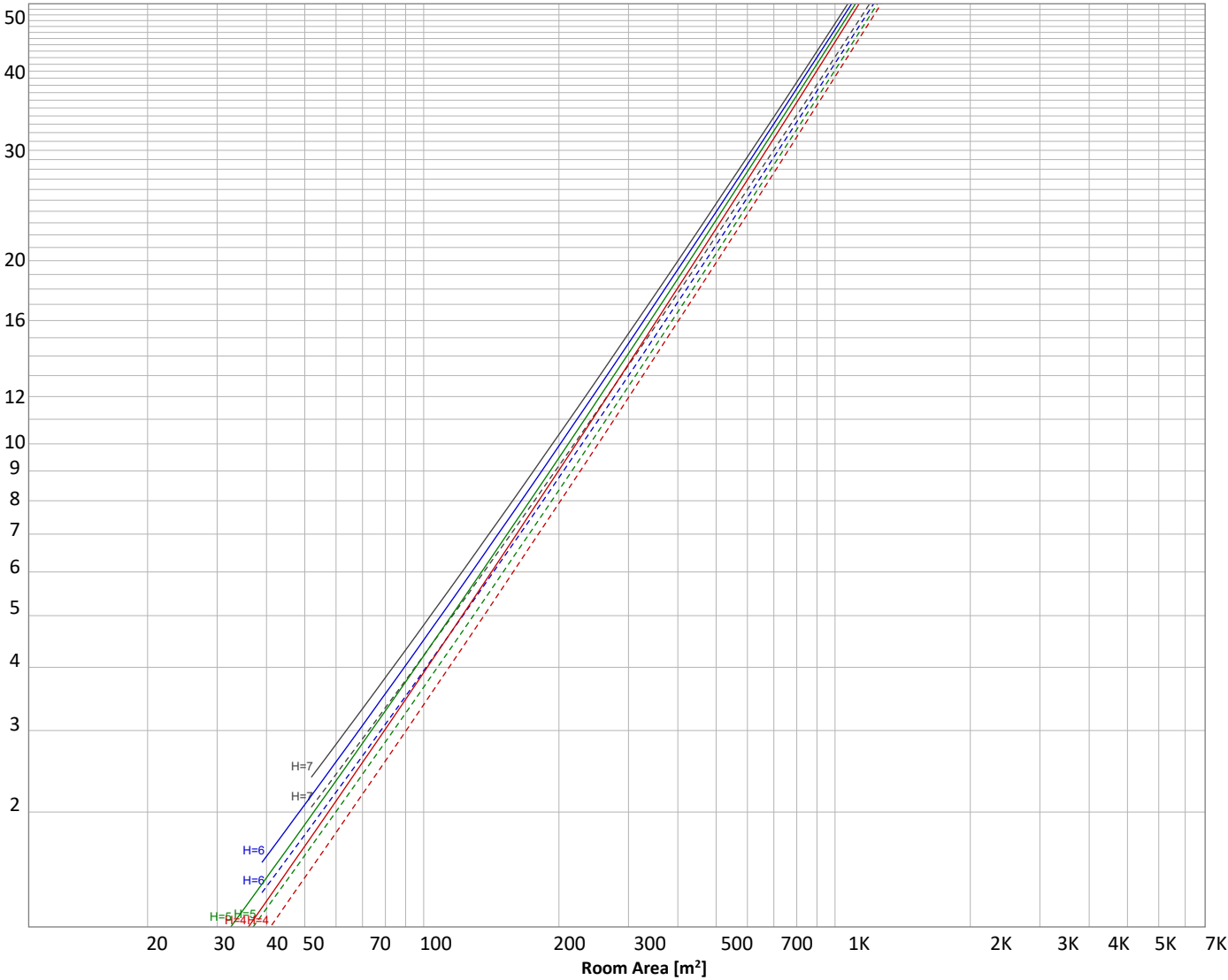
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Luminaire budgetary diagram

Uncorrected, comprehensive UGR table according to 117-1995

LAMPS (number of lamps)



Conditions

H = Room height	Flux = 2492 lm	p(%)		
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°
491 lm	823 lm	657 lm	274 lm	115 lm	57.5 lm	33.9 lm	14.4 lm	7.07 lm
90°-100°	100°-110°	110°-120°	120°-130°	130°-140°	140°-150°	150°-160°	160°-170°	170°-180°
3.42 lm	3.31 lm	3.11 lm	2.81 lm	2.43 lm	1.97 lm	1.45 lm	0.888 lm	0.299 lm

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Outdoor Light Planning

Lumen per Zone

Zone (γ)	Lumen	% Total
0-10°	491 lm	19.7%
10-20°	823 lm	33.0%
20-30°	657 lm	26.4%
30-40°	274 lm	11.0%
40-50°	115 lm	4.6%
50-60°	58 lm	2.3%
60-70°	34 lm	1.4%
70-80°	14 lm	0.6%
80-90°	7 lm	0.3%
90-100°	3 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	2492 lm	100.0%

Zonal Lumen summary

Zone (γ)	Lumen	% Total
0-30°	1971 lm	79.1%
0-40°	2245 lm	90.1%
0-60°	2417 lm	97.0%
60-90°	55 lm	2.2%
70-100°	25 lm	1.0%
90-120°	10 lm	0.4%
0-90°	2472 lm	99.2%
90-180°	20 lm	0.8%
0-180°	2492 lm	100.0%

BUG rating

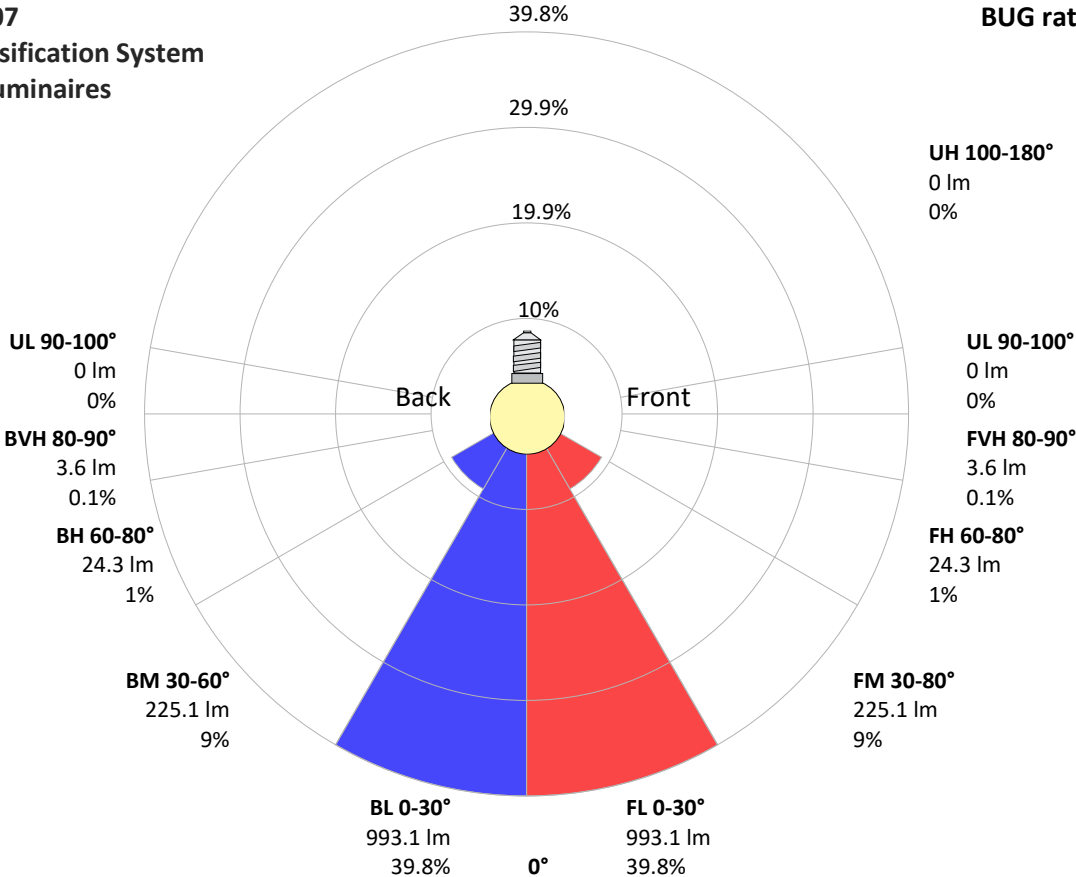
	Lumen	% Total
Forward light		
Low(0-30°)	993 lm	39.8%
Medium(30-60°)	225 lm	9.0%
High(60-80°)	24 lm	1.0%
Very high(80-90°)	4 lm	0.1%
Back light		
Low(0-30°)	993 lm	39.8%
Medium(30-60°)	225 lm	9.0%
High(60-80°)	24 lm	1.0%
Very high(80-90°)	4 lm	0.1%
Uplight		
Low(90-100°)	0 lm	0.0%
High(100-180°)	0 lm	0.0%

Intensity peaks

Max intensity	6255 cd
Intensity, 90°	3 cd
Intensity, 0°	6255 cd

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

BUG rating B2 U1 G0



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Power Details

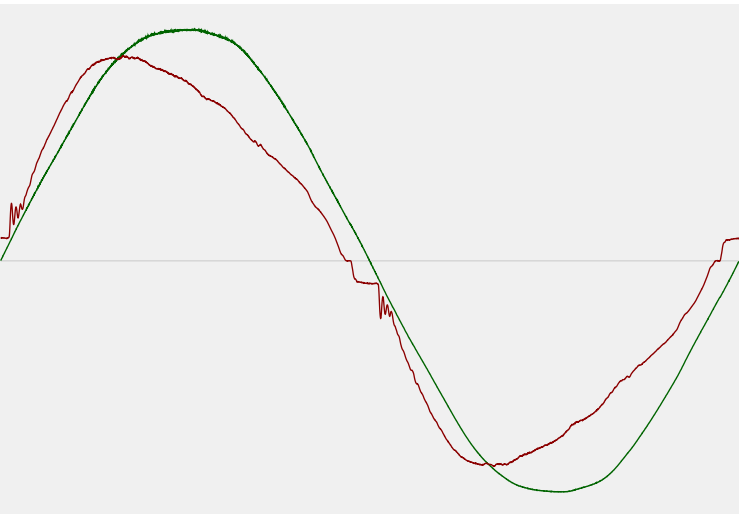
Input Power

Power feed to light source	41.4 W
Frequency of input power	50 Hz
RMS Input voltage feed, V_{RMS}	241 V
RMS Input current feed, I_{RMS}	0.178 A
Volt-Ampere or apparent power = $V_{RMS} \cdot I_{RMS}$	42.77 VA
Displacement factor of AC power feed	0.97
Power factor of AC current feed	0.97
Total harmonic distortion of the current	11.01%
Total harmonic distortion of the voltage	1.46%

Efficiency

Radiated power efficiency	21.9%
<div><div></div></div>	
Lumen efficiency	60 lm/W
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Input Power Curve



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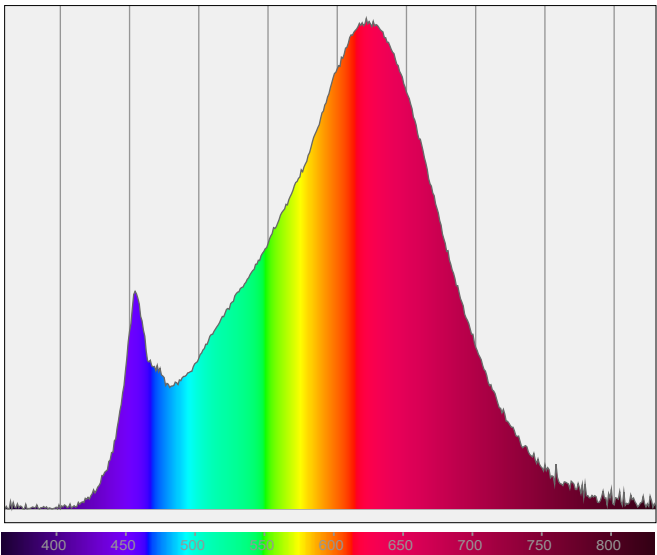
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Color Measurements

Correlated Color Temperature	CCT = 2700 K
Color Rendering TM30-18	R _f 91.6 — R _g 99.6
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 92.8	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 99.6	Color coordinate CIEs 1976 (CIELUV)	(u';v') = (0.263;0.263)
Color Quality Scale	CQS = 90.0		

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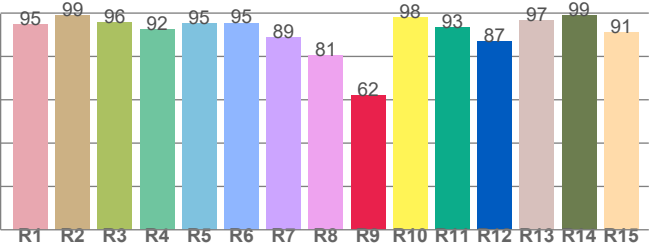
CIE 1931



CIE 1931 – zoomed on Planckian locus



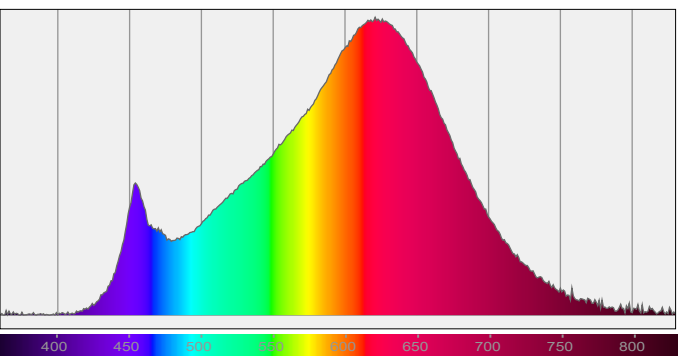
Color Rendering Index per reference color (CIE 1995)



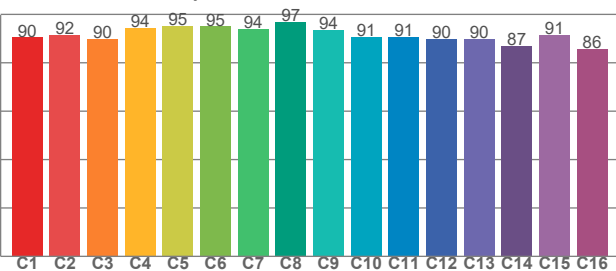
CRI R values, only R1-R8 are used to calculate final CRI value

R1	R2	R3	R4	R5	R6	R7	R8	R9	R10	R11	R12	R13	R14	R15
94.8	98.9	95.8	92.4	95.2	95.5	88.9	80.6	61.9	98.0	93.4	87.1	96.6	98.8	91.0

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



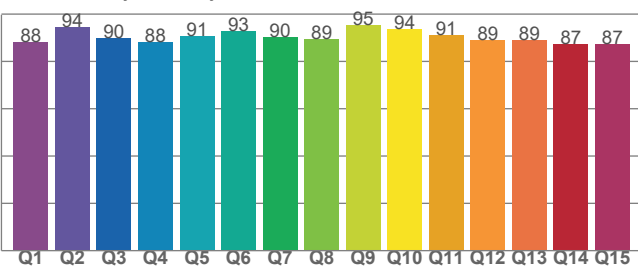
TM30-18 Rf-values per hue bin



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	89.8	94.5	95.3	95.0	93.9	96.8	93.5	90.6	90.6	89.8	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	89.8	87.9	90.9	92.9	90.1	89.4	95.3	93.7	91.1	89.1	88.8	87.1	87.2