

Tested Light Source - 1_PHOT_REFLEKTER-L-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°

1.5°

3.00 m

41.3 W – PF 0.97 – DPF 0.97

238 V – 0.180 A

49.9 Hz

Main Light Measurement Results

Output

Efficiency

Peak Intensity and Beam Angle

Color Rendering Index

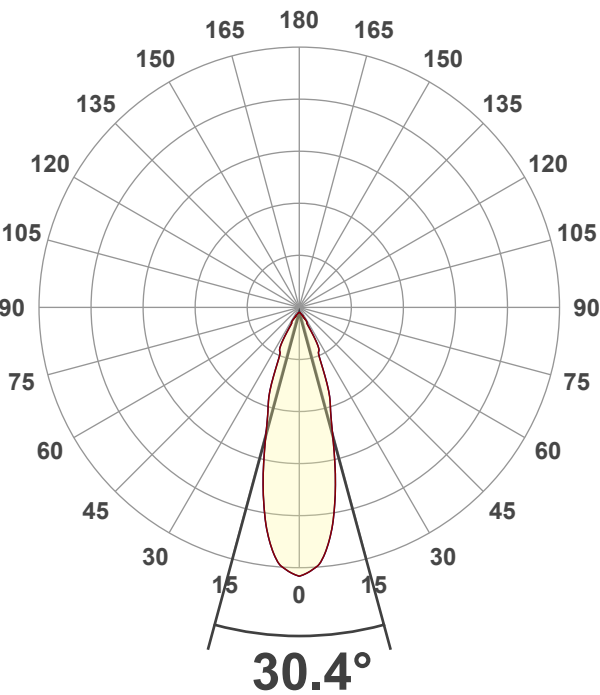
2611 lm

63 lm/W

6431 cd – 30.4°

CRI 92.6

Light Intensity Distribution



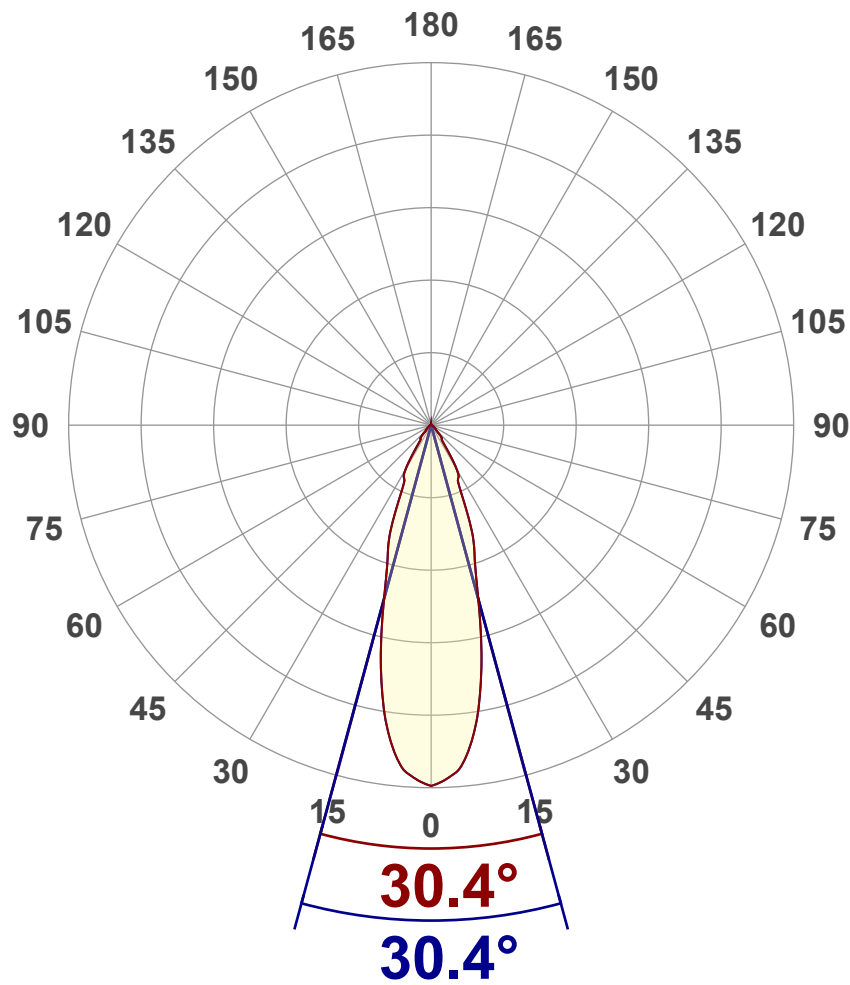
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Luminous Intensity diagram

Unit: 0-100% of peak intensity



Main Values

Output (total Lumen)	2611 lm
Peak Intensity	6431 cd
Beam Angle (50%)	30.4°
Beam Angle (90%)	30.4°
Beam Angle (10%)	30.4°

Cut-off Angle

Average 2,5%	87.5°
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Field Angle

Average 10%	64.5°
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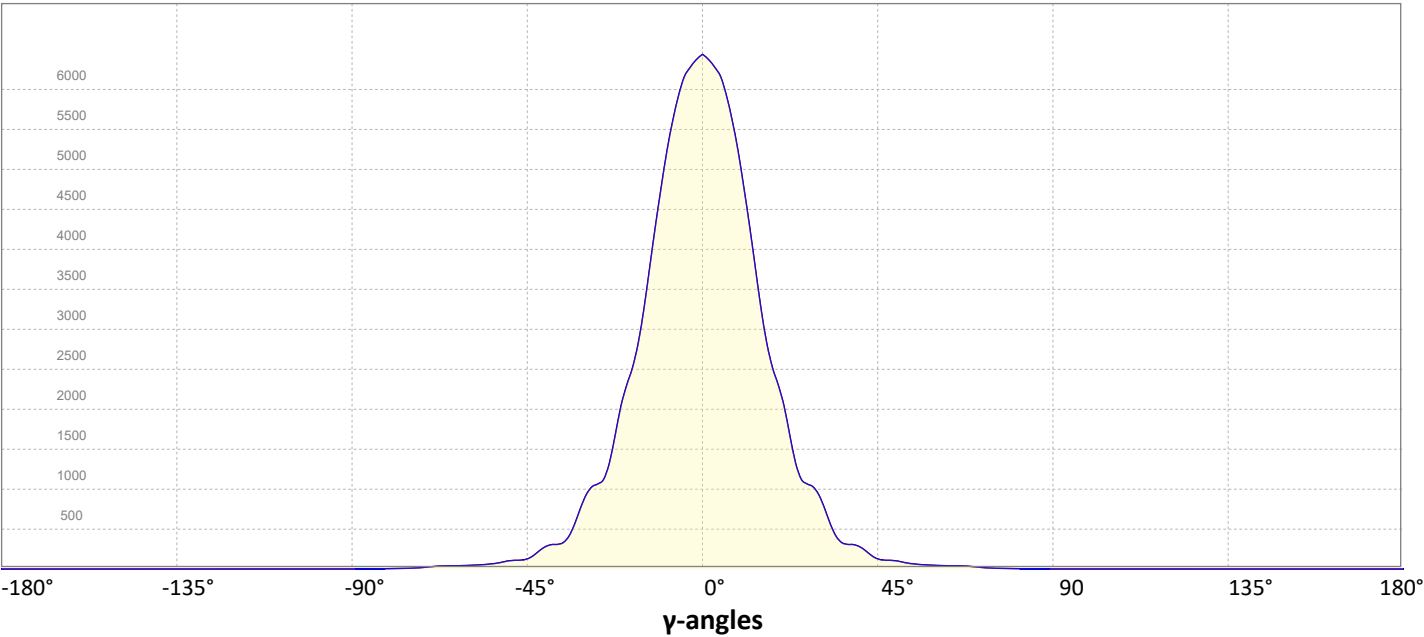
Intensity Ratio

In 120° cone	97.3%
In 90° cone	93.3%

C000-C180

C090-C270

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

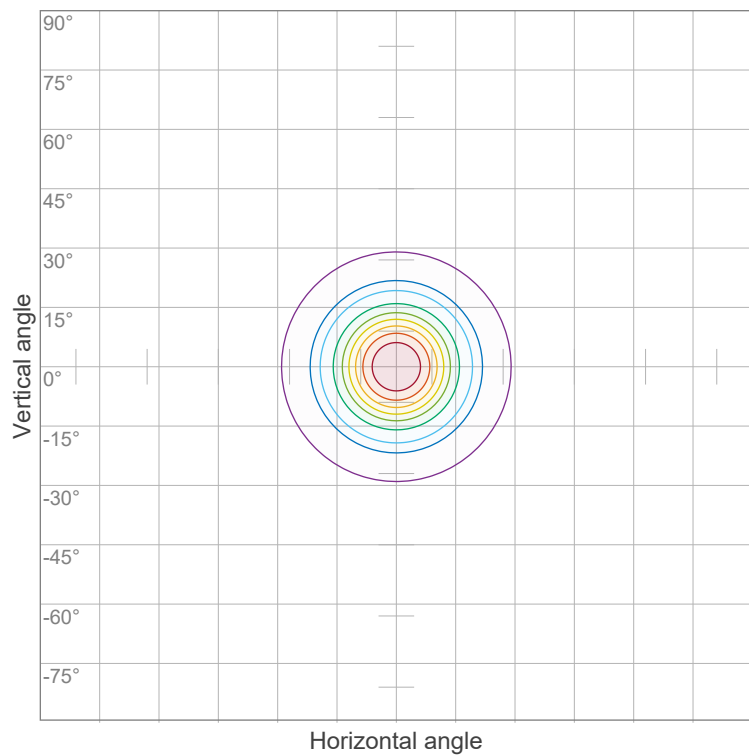


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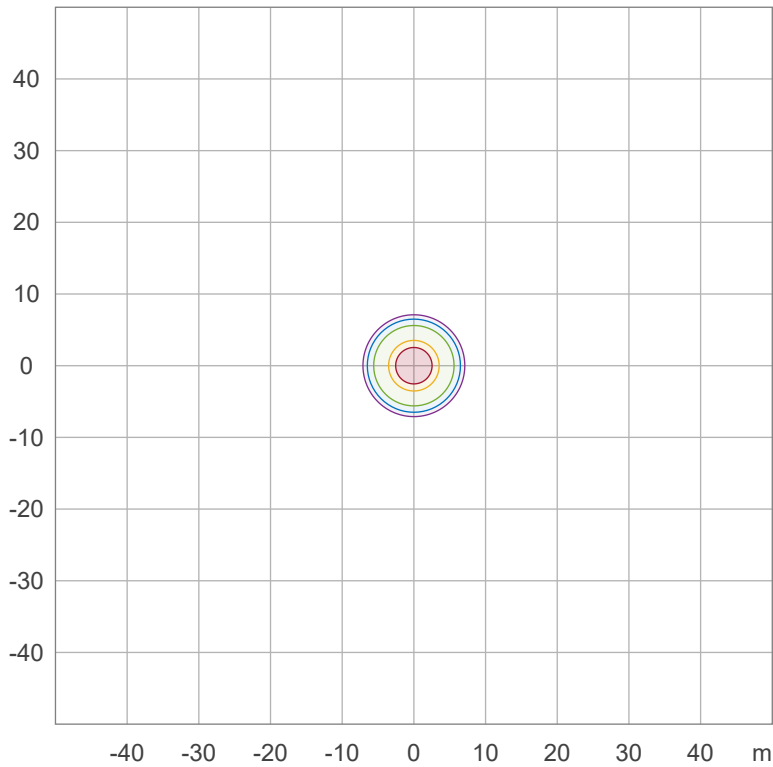
Iso-intensity Diagram (Iso-candela)



90 %	5787.9 cd
80 %	5144.8 cd
70 %	4501.7 cd
60 %	3858.6 cd
50 %	3215.5 cd
40 %	2572.4 cd
30 %	1929.3 cd
20 %	1286.2 cd
10 %	643.1 cd

Peak intensity: 6431.0 cd
Number of c-planes: 32

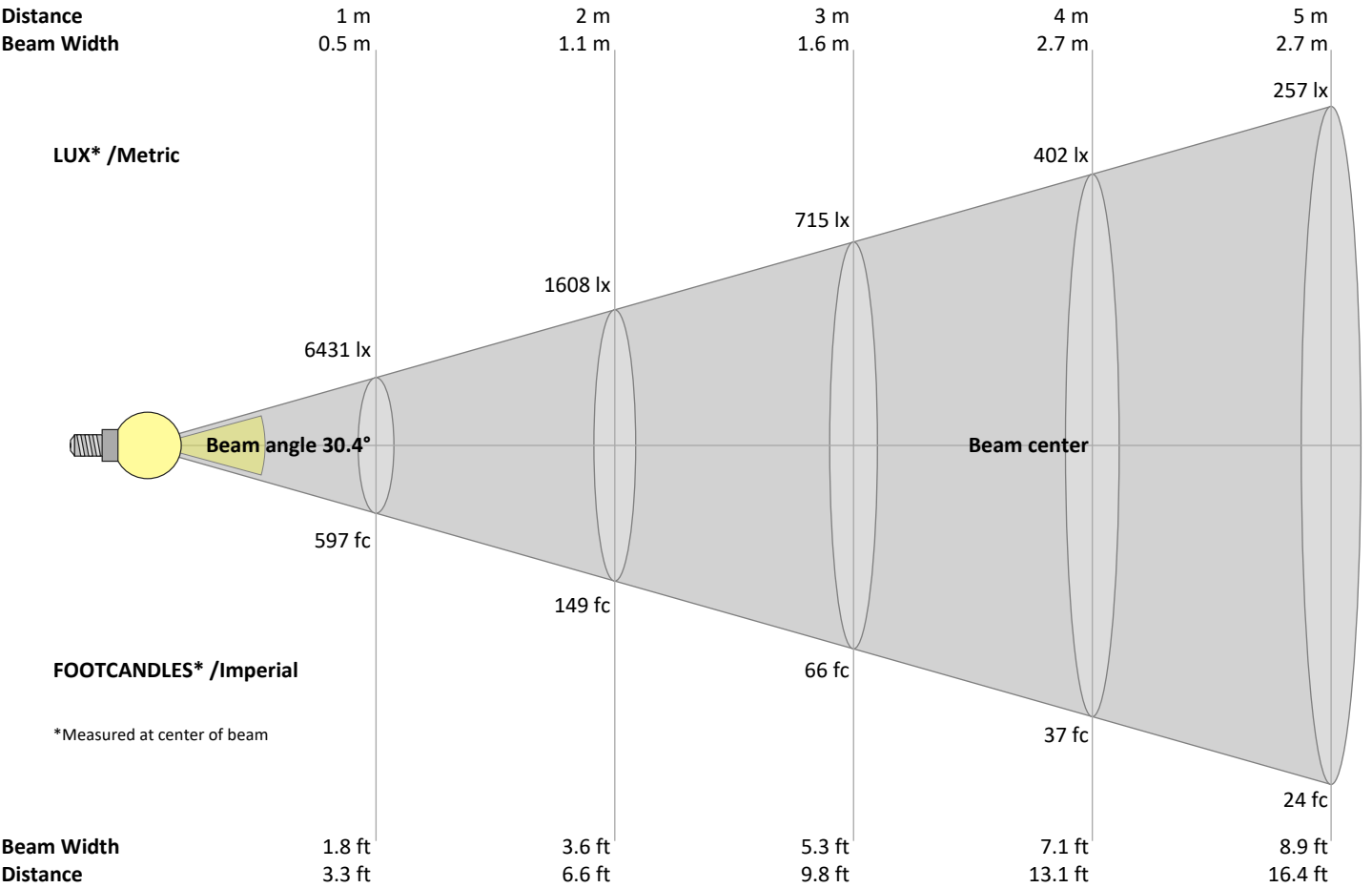
Iso-illuminance Diagram (Iso-lux)



50.0 %	32.2 lx
30.0 %	19.3 lx
10.0 %	6.4 lx
5.0 %	3.2 lx
3.0 %	1.9 lx

Peak illuminance: 64.3 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
6431	1608	715	402	257	179	131	100	79	64	53	45	38	33	29	25	22	20	18	16	lux
597.5	149.4	66.4	37.3	23.9	16.6	12.2	9.3	7.4	6	4.9	4.1	3.5	3	2.7	2.3	2.1	1.8	1.7	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
6431	6348	6211	5947	5517	4963	4321	3619	2974	2516	2207	1779	1314	1099	1039	914	674	442	328	308	cd
100%	99%	97%	92%	86%	77%	67%	56%	46%	39%	34%	28%	20%	17%	16%	14%	10%	7%	5%	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
6431	6348	6211	5947	5517	4963	4321	3619	2974	2516	2207	1779	1314	1099	1039	914	674	442	328	308	cd
100%	99%	97%	92%	86%	77%	67%	56%	46%	39%	34%	28%	20%	17%	16%	14%	10%	7%	5%	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
6431	6348	6211	5947	5517	4963	4321	3619	2974	2516	2207	1779	1314	1099	1039	914	674	442	328	308	cd
100%	99%	97%	92%	86%	77%	67%	56%	46%	39%	34%	28%	20%	17%	16%	14%	10%	7%	5%	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
6431	6348	6211	5947	5517	4963	4321	3619	2974	2516	2207	1779	1314	1099	1039	914	674	442	328	308	cd
100%	99%	97%	92%	86%	77%	67%	56%	46%	39%	34%	28%	20%	17%	16%	14%	10%	7%	5%	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	20.1	20.6	20.2	20.8	21.0	20.1	20.6	20.2	20.8	21.0
	3H	20.3	21.0	20.7	21.2	21.4	20.3	21.0	20.7	21.2	21.4
	4H	20.4	21.0	20.7	21.3	21.5	20.4	21.0	20.7	21.3	21.5
	6H	20.4	21.0	20.7	21.3	21.6	20.4	21.0	20.7	21.3	21.6
	8H	20.4	20.9	20.7	21.3	21.6	20.4	20.9	20.7	21.3	21.6
	12H	20.4	20.9	20.7	21.2	21.7	20.4	20.9	20.7	21.2	21.7
4H	2H	20.0	20.7	20.4	20.9	21.1	20.0	20.7	20.4	20.9	21.1
	3H	20.6	21.1	20.9	21.5	21.9	20.6	21.1	20.9	21.5	21.9
	4H	20.6	21.1	21.0	21.5	22.0	20.6	21.1	21.0	21.5	22.0
	6H	20.6	21.1	21.1	21.5	21.8	20.6	21.1	21.1	21.5	21.8
	8H	20.6	21.1	21.1	21.4	21.8	20.6	21.1	21.1	21.4	21.8
	12H	20.5	20.9	21.1	21.3	21.8	20.5	20.9	21.1	21.3	21.8
8H	4H	20.5	21.0	21.1	21.4	21.7	20.5	21.0	21.1	21.4	21.7
	6H	20.6	20.9	21.1	21.4	21.9	20.6	20.9	21.1	21.4	21.9
	8H	20.7	20.9	21.2	21.4	22.1	20.7	20.9	21.2	21.4	22.1
	12H	20.6	20.9	21.2	21.4	22.0	20.6	20.9	21.2	21.4	22.0
12H	4H	20.5	20.9	21.0	21.3	21.7	20.5	20.9	21.0	21.3	21.7
	6H	20.6	20.9	21.1	21.4	22.0	20.6	20.9	21.1	21.4	22.0
	8H	20.6	20.8	21.2	21.3	21.9	20.6	20.8	21.2	21.3	21.9

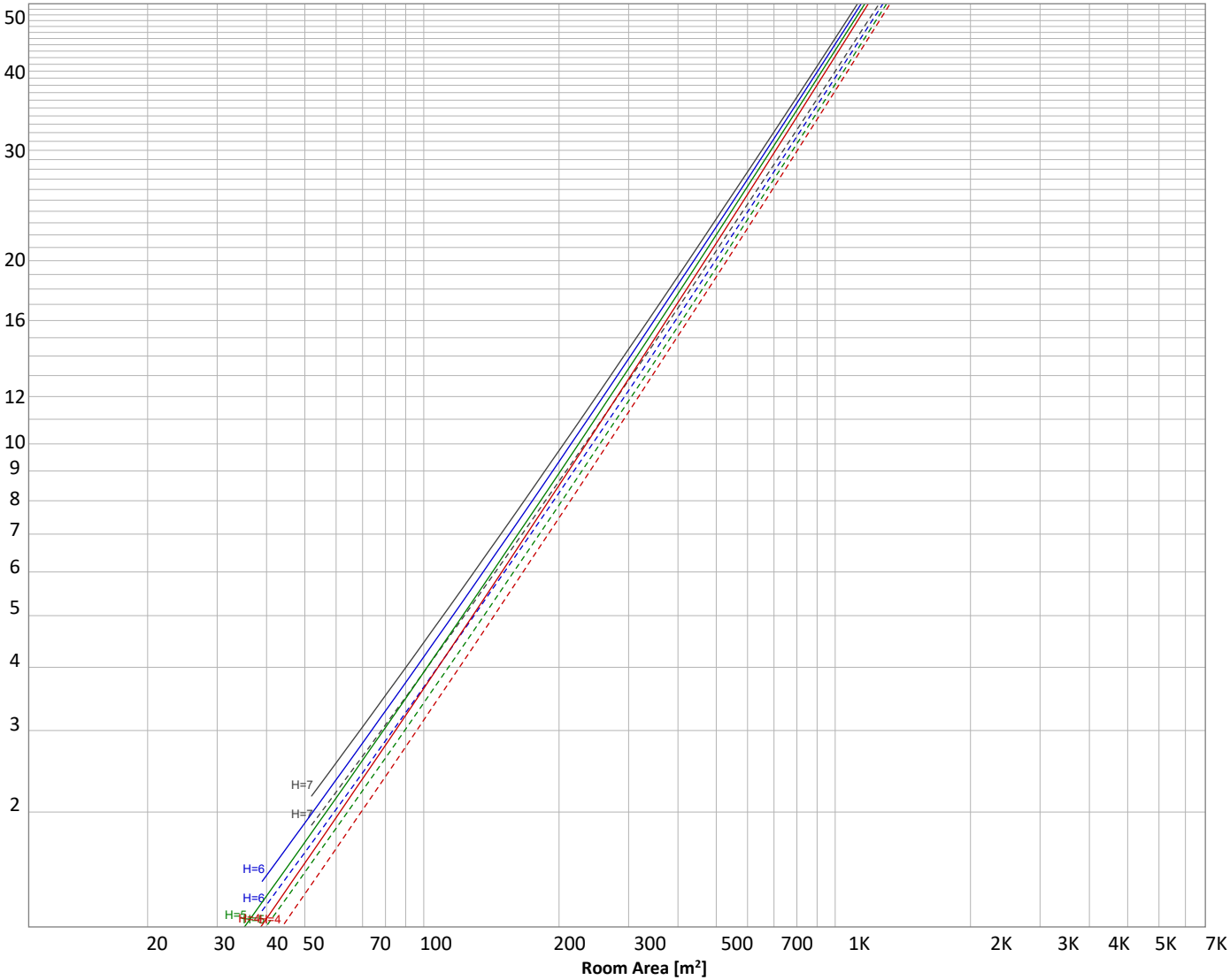
Variations with the observer position for the luminaire spacings, S:

S = 1.0H	2.8 / -1.9	2.8 / -1.9
S = 1.5H	5.0 / -2.6	5.0 / -2.6
S = 2.0H	6.7 / -2.6	6.7 / -2.6

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

Luminaire budgetary diagram
Uncorrected, comprehensive UGR table according to 117-1995
LAMPS (number of lamps)



Conditions		ρ(%)			
H = Room height	Flux = 2611 lm	Line type	Ceiling reflectance	Wall reflectance	Floor reflectance
H _{down} = Lamp distance from ceiling =	0.00 m		70	50	30
H _{work} = Work area height from floor =	0.00 m				
E _{work} = Average lux on work area =	100 lx		50	30	20

Zonal Lumen Summary

0°-10°	10°-20°	20°-30°	30°-40°	40°-50°	50°-60°	60°-70°	70°-80°	80°-90°
547 lm	918 lm	609 lm	286 lm	121 lm	59.8 lm	40.9 lm	13.9 lm	4.59 lm
90°-100°	100°-110°	110°-120°	120°-130°	130°-140°	140°-150°	150°-160°	160°-170°	170°-180°
1.98 lm	1.92 lm	1.81 lm	1.63 lm	1.19 lm	0.833 lm	0.614 lm	0.376 lm	0.127 lm

Outdoor Light Planning

Lumen per Zone

Zone (γ)	Lumen	% Total
0-10°	547 lm	20.9%
10-20°	918 lm	35.2%
20-30°	609 lm	23.3%
30-40°	286 lm	10.9%
40-50°	121 lm	4.6%
50-60°	60 lm	2.3%
60-70°	41 lm	1.6%
70-80°	14 lm	0.5%
80-90°	5 lm	0.2%
90-100°	2 lm	0.1%
100-110°	2 lm	0.1%
110-120°	2 lm	0.1%
120-130°	2 lm	0.1%
130-140°	1 lm	0.0%
140-150°	1 lm	0.0%
150-160°	1 lm	0.0%
160-170°	0 lm	0.0%
170-180°	0 lm	0.0%
Total	2611 lm	100.0%

Intensity peaks

Max intensity	6431 cd
Intensity, 90°	2 cd
Intensity, 0°	6431 cd

Zonal Lumen summary

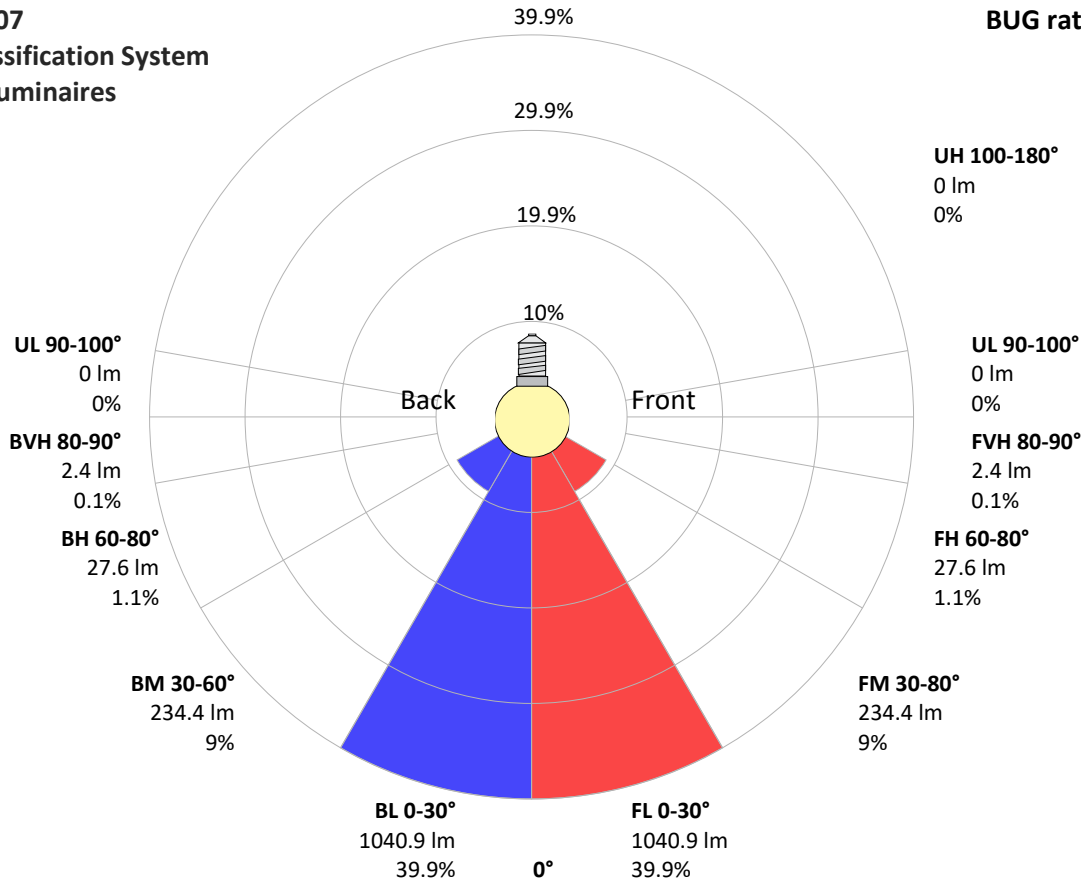
Zone (γ)	Lumen	% Total
0-30°	2074 lm	79.4%
0-40°	2360 lm	90.4%
0-60°	2541 lm	97.3%
60-90°	59 lm	2.3%
70-100°	21 lm	0.8%
90-120°	6 lm	0.2%
0-90°	2600 lm	99.6%
90-180°	10 lm	0.4%
0-180°	2611 lm	100.0%

BUG rating

	Lumen	% Total
Forward light		
Low(0-30°)	1041 lm	39.9%
Medium(30-60°)	234 lm	9.0%
High(60-80°)	28 lm	1.1%
Very high(80-90°)	2 lm	0.1%
Back light		
Low(0-30°)	1041 lm	39.9%
Medium(30-60°)	234 lm	9.0%
High(60-80°)	28 lm	1.1%
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 B3 U1 G0



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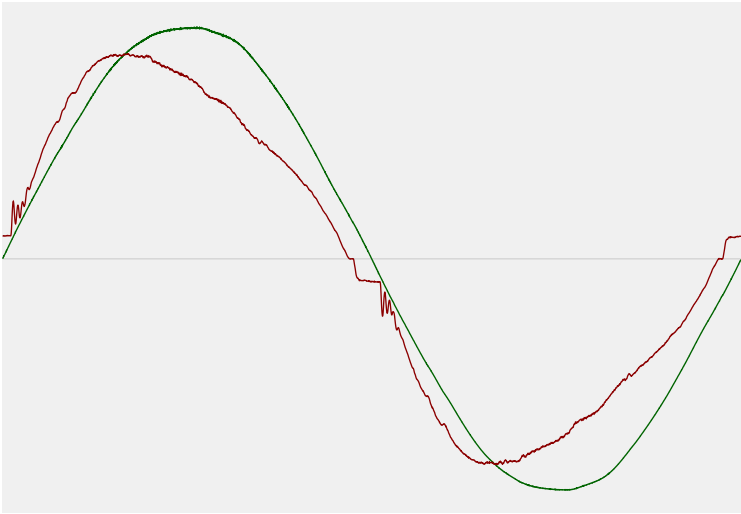


Power Details

Input Power

Power feed to light source	41.3 W
Frequency of input power	49.9 Hz
RMS Input voltage feed, V_{RMS}	238 V
RMS Input current feed, I_{RMS}	0.180 A
Volt-Ampere or apparent power = $V_{RMS} \cdot I_{RMS}$	42.68 VA
Displacement factor of AC power feed	0.97
Power factor of AC current feed	0.97
Total harmonic distortion of the current	10.62%
Total harmonic distortion of the voltage	1.11%

Input Power Curve



Efficiency

Radiated power efficiency	22.9%
Lumen efficiency	63 lm/W

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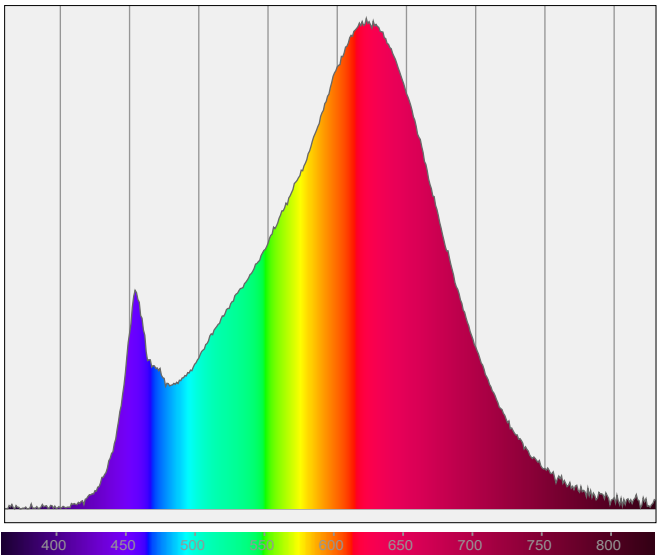
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Color Measurements

Correlated Color Temperature	CCT = 2700 K
Color Rendering TM30-18	R _f 91.5 — R _g 99.5
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 92.6	Color coordinate CIEs 1960	(u;v) = (0.263;0.352)
Color Rendering Index, R9 (red component)	R9 = 61.3	Color deviation from BBL	Duv = ±0.0003
Color Rendering TM30-18	R _f 91.5 — R _g 99.5	Color coordinate CIEs 1976 (CIELUV)	(u';v') = (0.263;0.263)
Color Quality Scale	CQS = 89.9		

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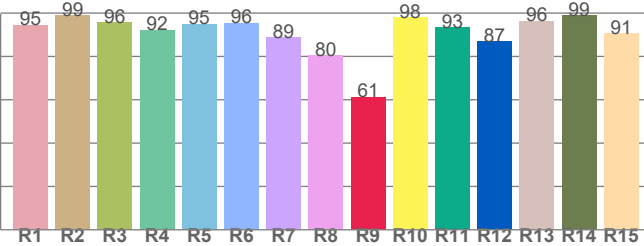
CIE 1931



CIE 1931 – zoomed on Planckian locus



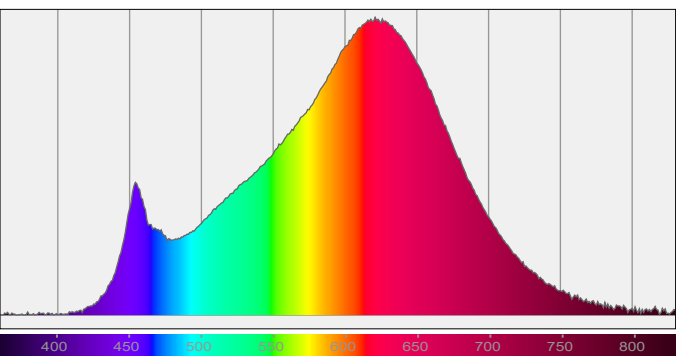
Color Rendering Index per reference color (CIE 1995)



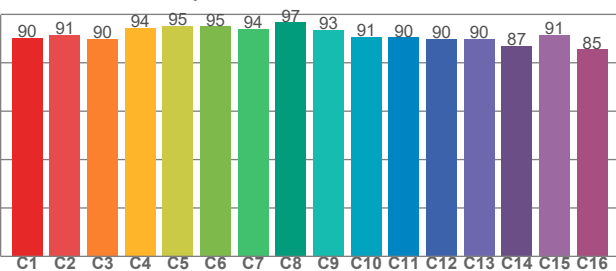
CRI R values, only R1-R8 are used to calculate final CRI value

R1	R2	R3	R4	R5	R6	R7	R8	R9	R10	R11	R12	R13	R14	R15
94.6	98.9	95.8	92.2	95.1	95.5	88.8	80.3	61.3	97.9	93.2	87.0	96.4	98.8	90.8

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



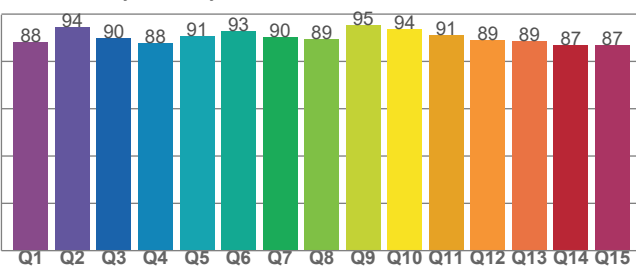
TM30-18 Rf-values per hue bin



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
90.3	91.5	89.7	94.5	95.3	95.0	93.9	96.7	93.4	90.5	90.5	89.7	89.7	87.0	91.3	85.5

Color Quality Scale by reference color



CQS Q values

Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10	Q11	Q12	Q13	Q14	Q15
88.0	94.5	89.8	87.8	90.7	92.8	90.2	89.4	95.2	93.7	91.0	89.1	88.8	86.9	87.0