

Goniophotometry Report

1_PHOT_REFLEKTER-L-4300lmChip-3000K-UGR_2303
www.factorylux.com



Tested Light Source - 1_PHOT_REFLEKTER-L-4300lmChip-3000K-UGR_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

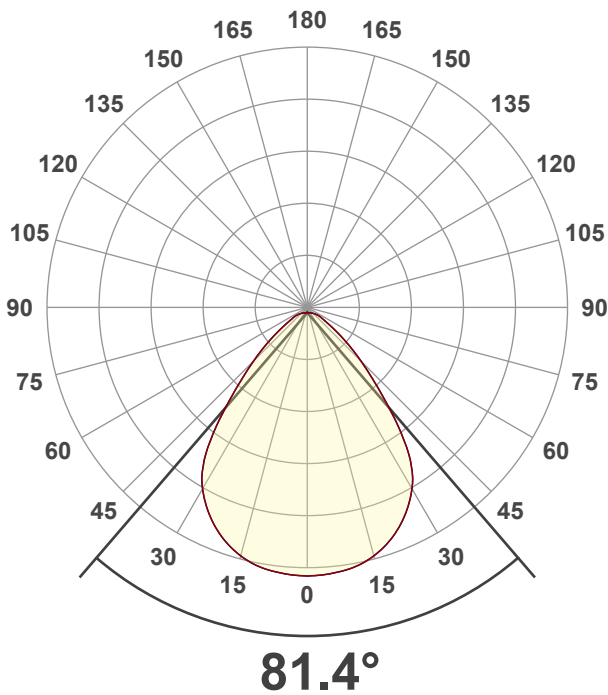
32 planes – 11.25°
3°
3.00 m
41.2 W – PF 0.97 – DPF 0.97
243 V – 0.176 A
49.9 Hz

Main Light Measurement Results

Output
Efficiency
Peak Intensity and Beam Angle
Color Rendering Index

2730 lm
66 lm/W
1530 cd – 81.4°
CRI 92.7

Light Intensity Distribution

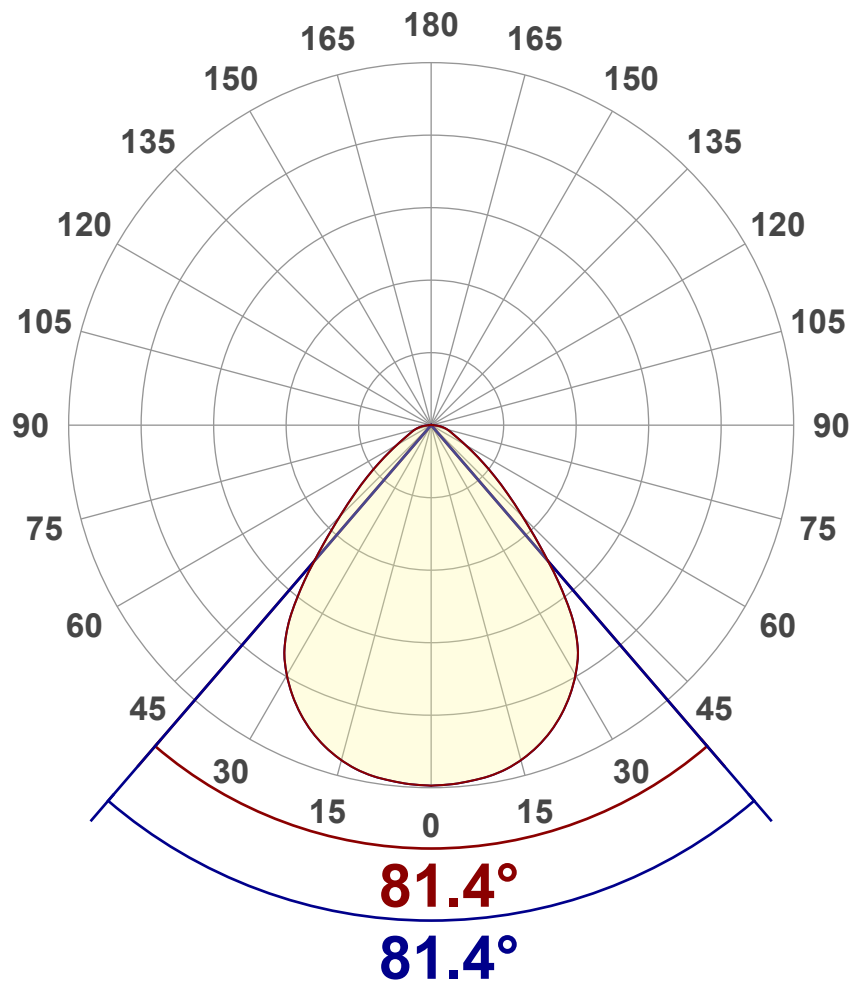


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Luminous Intensity diagram Unit: 0-100% of peak intensity



Main Values	
Output (total Lumen)	2730 lm
Peak Intensity	1530 cd
Beam Angle (50%)	81.4°
Beam Angle (90%)	81.4°
Beam Angle (10%)	81.4°

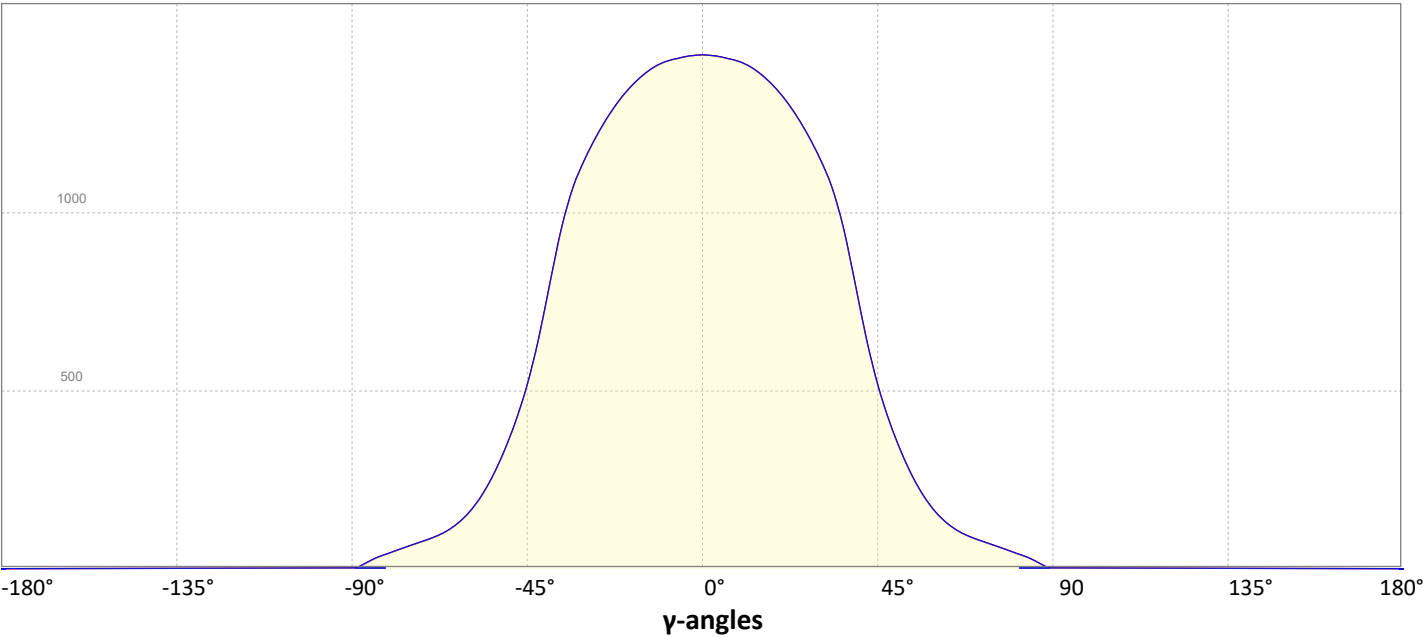
Cut-off Angle	
Average 2,5%	165.4°

Field Angle	
Average 10%	122.7°

Intensity Ratio	
In 120° cone	91.2%
In 90° cone	75.9%

C000-C180
C090-C270

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

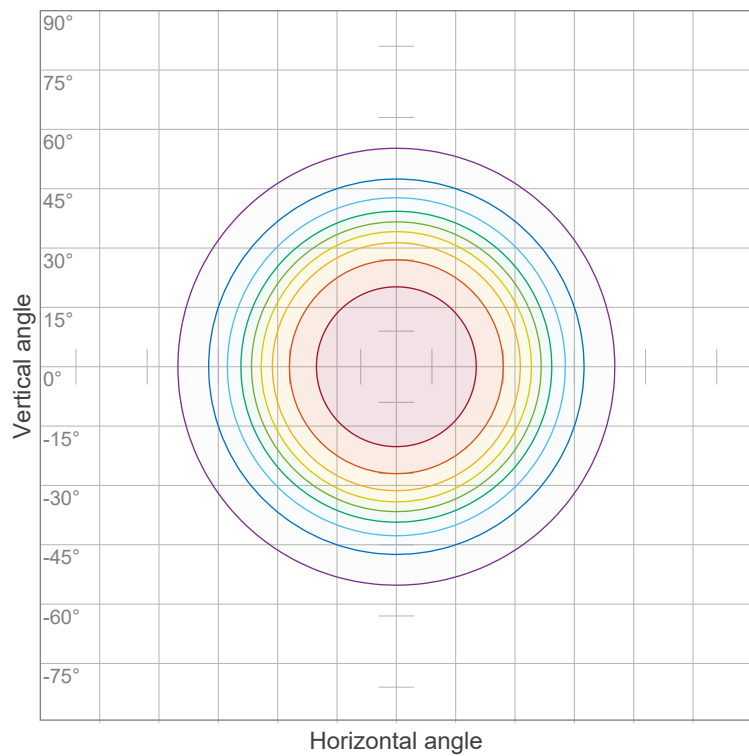


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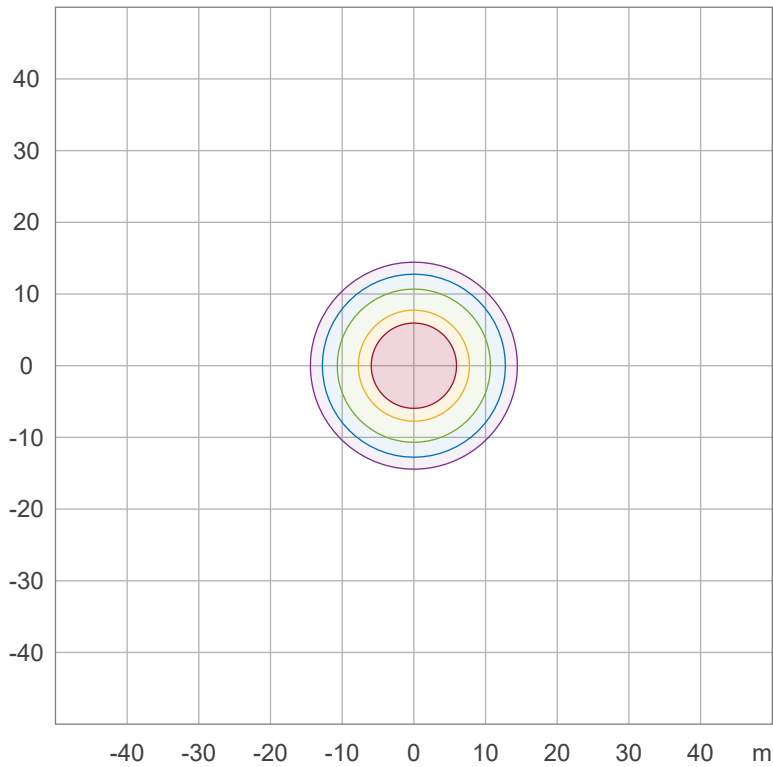
Iso-intensity Diagram (Iso-candela)



90 %	1377.2 cd
80 %	1224.2 cd
70 %	1071.2 cd
60 %	918.2 cd
50 %	765.1 cd
40 %	612.1 cd
30 %	459.1 cd
20 %	306.1 cd
10 %	153.0 cd

Peak intensity: 1530.3 cd
Number of c-planes: 32

Iso-illuminance Diagram (Iso-lux)



50.0 %	7.7 lx
30.0 %	4.6 lx
10.0 %	1.5 lx
5.0 %	0.8 lx
3.0 %	0.5 lx

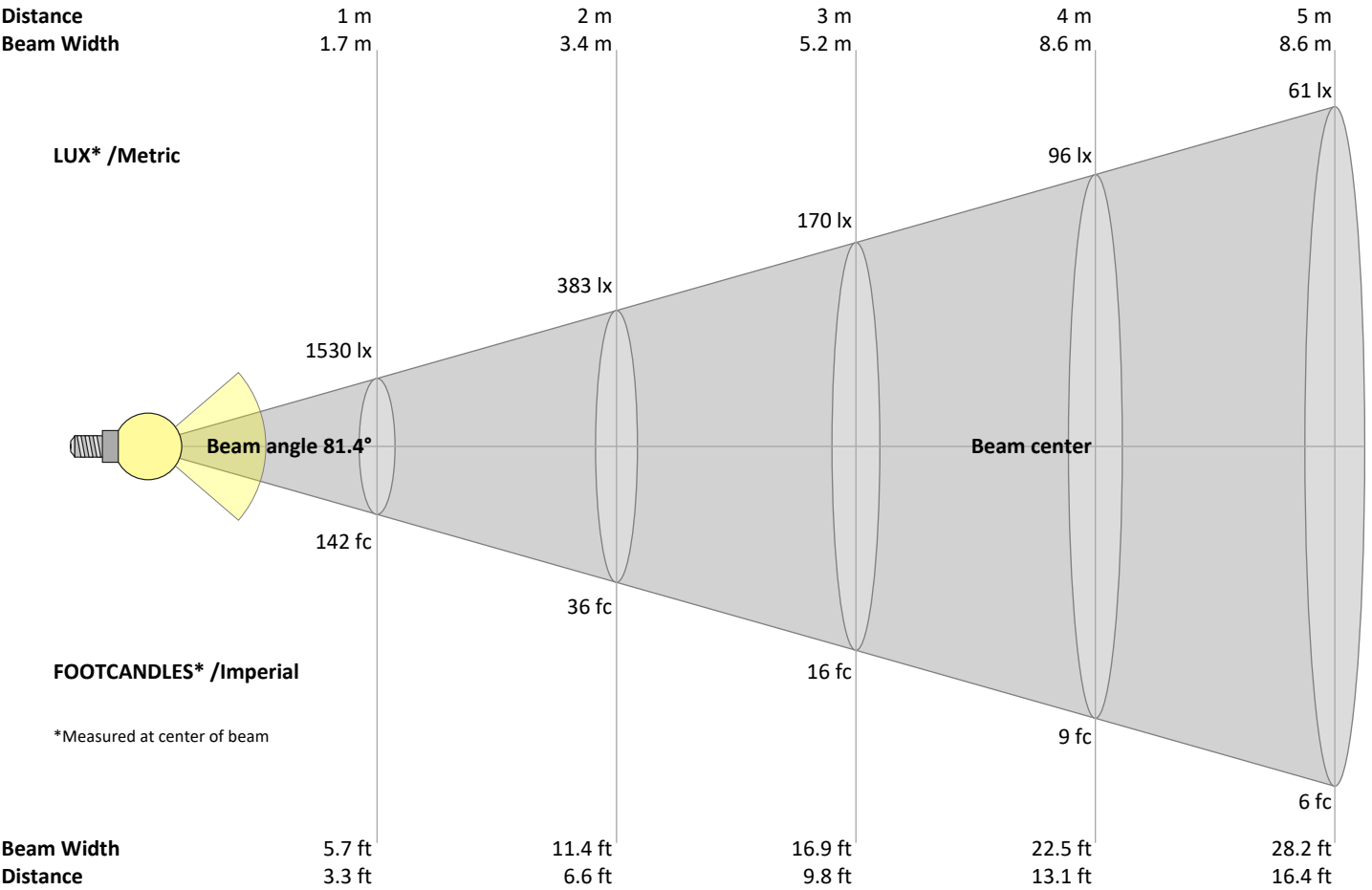
Peak illuminance: 15.3 lx
Mounting height: 10.0 m
Number of c-planes: 32

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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
1530	383	170	96	61	43	31	24	19	15	13	11	9	8	7	6	5	5	4	4	lux
142.2	35.5	15.8	8.9	5.7	3.9	2.9	2.2	1.8	1.4	1.2	1	0.8	0.7	0.6	0.6	0.5	0.4	0.4	0.4	fc

Intensities in 0° c-plane

0°	5°	10°	15°	20°	25°	30°	35°	40°	45°	50°	55°	60°	65°	70°	75°	80°	85°	90°	95°	γ
1530	1523	1508	1473	1414	1332	1225	1064	805	550	379	254	168	119	91	70	50	27	4	3	cd
100%	100%	99%	96%	92%	87%	80%	70%	53%	36%	25%	17%	11%	8%	6%	5%	3%	2%	0%	0%	of 0°val

Intensities in 90° c-plane

0°	5°	10°	15°	20°	25°	30°	35°	40°	45°	50°	55°	60°	65°	70°	75°	80°	85°	90°	95°	γ
1530	1523	1508	1473	1414	1332	1225	1064	805	550	379	254	168	119	91	70	50	27	4	3	cd
100%	100%	99%	96%	92%	87%	80%	70%	53%	36%	25%	17%	11%	8%	6%	5%	3%	2%	0%	0%	of 0°val

Intensities in 180° c-plane

0°	5°	10°	15°	20°	25°	30°	35°	40°	45°	50°	55°	60°	65°	70°	75°	80°	85°	90°	95°	γ
1530	1523	1508	1473	1414	1332	1225	1064	805	550	379	254	168	119	91	70	50	27	4	3	cd
100%	100%	99%	96%	92%	87%	80%	70%	53%	36%	25%	17%	11%	8%	6%	5%	3%	2%	0%	0%	of 0°val

Intensities in 270° c-plane

0°	5°	10°	15°	20°	25°	30°	35°	40°	45°	50°	55°	60°	65°	70°	75°	80°	85°	90°	95°	γ
1530	1523	1508	1473	1414	1332	1225	1064	805	550	379	254	168	119	91	70	50	27	4	3	cd
100%	100%	99%	96%	92%	87%	80%	70%	53%	36%	25%	17%	11%	8%	6%	5%	3%	2%	0%	0%	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	16.9	17.8	17.1	18.1	18.3	16.9	17.8	17.1	18.1	18.3
	3H	17.2	18.3	17.6	18.5	18.7	17.2	18.3	17.6	18.5	18.7
	4H	17.5	18.5	17.9	18.8	19.0	17.5	18.5	17.9	18.8	19.0
	6H	17.9	18.8	18.2	19.0	19.4	17.9	18.8	18.2	19.0	19.4
	8H	18.1	18.9	18.4	19.2	19.6	18.1	18.9	18.4	19.2	19.6
	12H	18.2	18.9	18.5	19.3	19.7	18.2	18.9	18.5	19.3	19.7
4H	2H	16.9	17.9	17.3	18.1	18.4	16.9	17.9	17.3	18.1	18.4
	3H	17.6	18.4	18.0	18.8	19.2	17.6	18.4	18.0	18.8	19.2
	4H	18.0	18.7	18.4	19.2	19.7	18.0	18.7	18.4	19.2	19.7
	6H	18.5	19.2	19.0	19.5	19.9	18.5	19.2	19.0	19.5	19.9
	8H	18.7	19.4	19.2	19.7	20.1	18.7	19.4	19.2	19.7	20.1
	12H	18.9	19.4	19.4	19.8	20.3	18.9	19.4	19.4	19.8	20.3
8H	4H	18.2	18.8	18.7	19.2	19.6	18.2	18.8	18.7	19.2	19.6
	6H	18.8	19.3	19.3	19.8	20.3	18.8	19.3	19.3	19.8	20.3
	8H	19.2	19.6	19.7	20.1	20.7	19.2	19.6	19.7	20.1	20.7
	12H	19.5	19.8	20.0	20.3	20.9	19.5	19.8	20.0	20.3	20.9
12H	4H	18.2	18.7	18.7	19.1	19.6	18.2	18.7	18.7	19.1	19.6
	6H	18.9	19.3	19.4	19.8	20.5	18.9	19.3	19.4	19.8	20.5
	8H	19.3	19.6	19.9	20.1	20.7	19.3	19.6	19.9	20.1	20.7
Variations with the observer position for the luminaire spacings, S:											
S = 1.0H		0.4 / -0.6					0.4 / -0.6				
S = 1.5H		1.2 / -1.0					1.2 / -1.0				
S = 2.0H		2.1 / -1.4					2.1 / -1.4				

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	111	107	104	101	108	105	102	99	101	98	96	97	95	93	93	92	90	88
2	103	97	91	87	101	95	90	86	91	87	84	88	85	82	85	82	80	78
3	96	87	81	75	94	86	80	75	83	78	73	80	76	72	78	74	71	69
4	89	79	72	67	87	78	71	66	76	70	65	73	68	64	71	67	63	62
5	83	72	65	59	81	71	64	59	69	63	58	67	62	58	66	61	57	55
6	78	66	59	53	76	65	58	53	64	57	53	62	56	52	61	56	52	50
7	73	61	53	48	71	60	53	48	59	52	48	57	52	47	56	51	47	45
8	68	56	49	44	67	56	49	44	54	48	43	53	47	43	52	47	43	41
9	64	52	45	40	63	52	45	40	51	44	40	50	44	40	49	43	39	38
10	60	49	42	37	59	48	41	37	47	41	37	46	41	36	45	40	36	35

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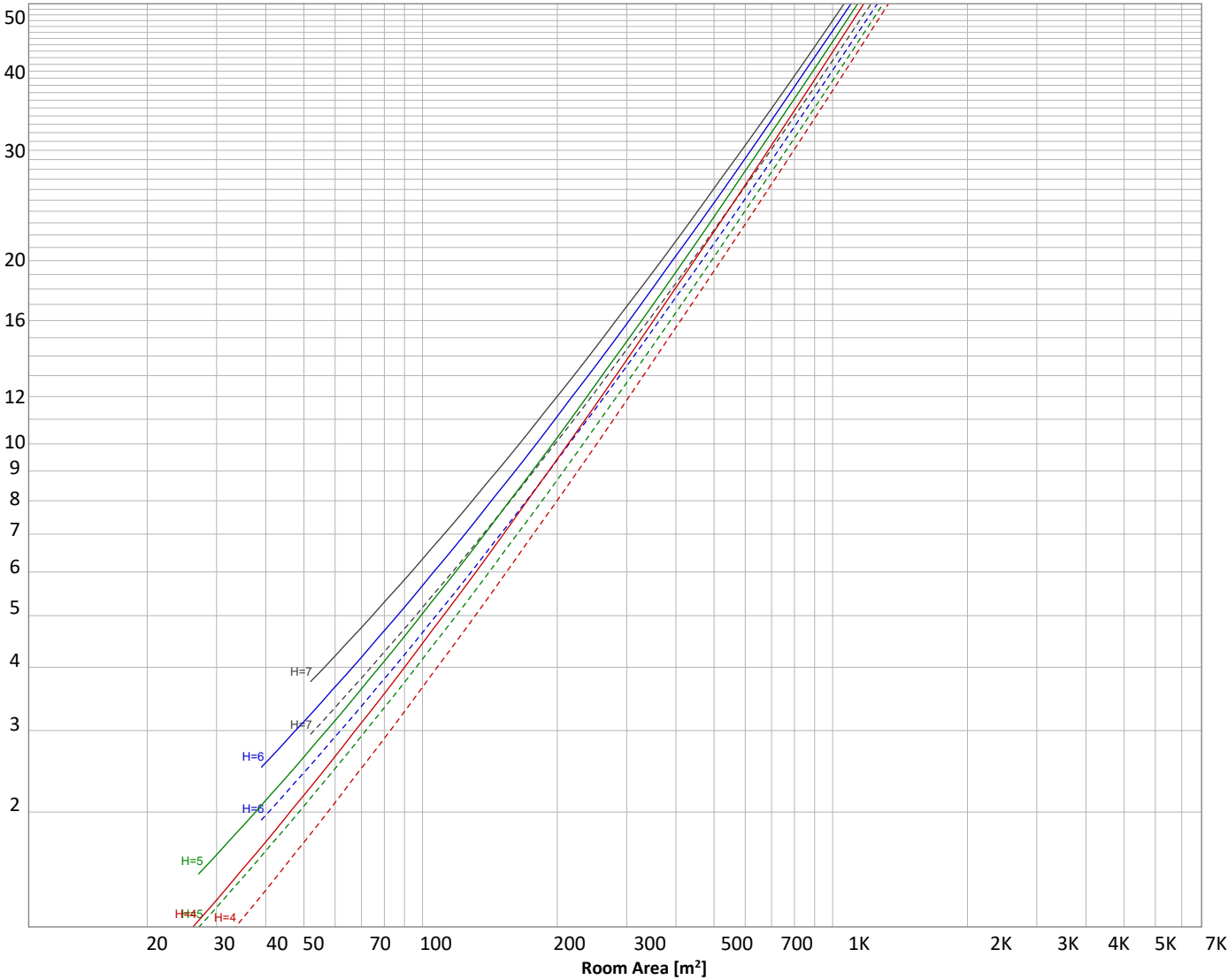
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Luminaire budgetary diagram

Uncorrected, comprehensive UGR table according to 117-1995

LAMPS (number of lamps)



Conditions

H = Room height	Flux = 2730 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
				30
				20

Zonal Lumen Summary

0°-10°	10°-20°	20°-30°	30°-40°	40°-50°	50°-60°	60°-70°	70°-80°	80°-90°
145 lm	415 lm	612 lm	654 lm	433 lm	230 lm	121 lm	74.1 lm	27.8 lm
90°-100°	100°-110°	110°-120°	120°-130°	130°-140°	140°-150°	150°-160°	160°-170°	170°-180°
3.88 lm	3.77 lm	3.53 lm	3.19 lm	1.76 lm	0.870 lm	0.641 lm	0.393 lm	0.132 lm

Outdoor Light Planning

Lumen per Zone

Zone (γ)	Lumen	% Total
0-10°	145 lm	5.3%
10-20°	415 lm	15.2%
20-30°	612 lm	22.4%
30-40°	654 lm	23.9%
40-50°	433 lm	15.9%
50-60°	230 lm	8.4%
60-70°	121 lm	4.4%
70-80°	74 lm	2.7%
80-90°	28 lm	1.0%
90-100°	4 lm	0.1%
100-110°	4 lm	0.1%
110-120°	4 lm	0.1%
120-130°	3 lm	0.1%
130-140°	2 lm	0.1%
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	2730 lm	100.0%

Zonal Lumen summary

Zone (γ)	Lumen	% Total
0-30°	1172 lm	42.9%
0-40°	1825 lm	66.9%
0-60°	2488 lm	91.2%
60-90°	223 lm	8.2%
70-100°	106 lm	3.9%
90-120°	11 lm	0.4%
0-90°	2712 lm	99.3%
90-180°	18 lm	0.7%
0-180°	2730 lm	100.0%

BUG rating

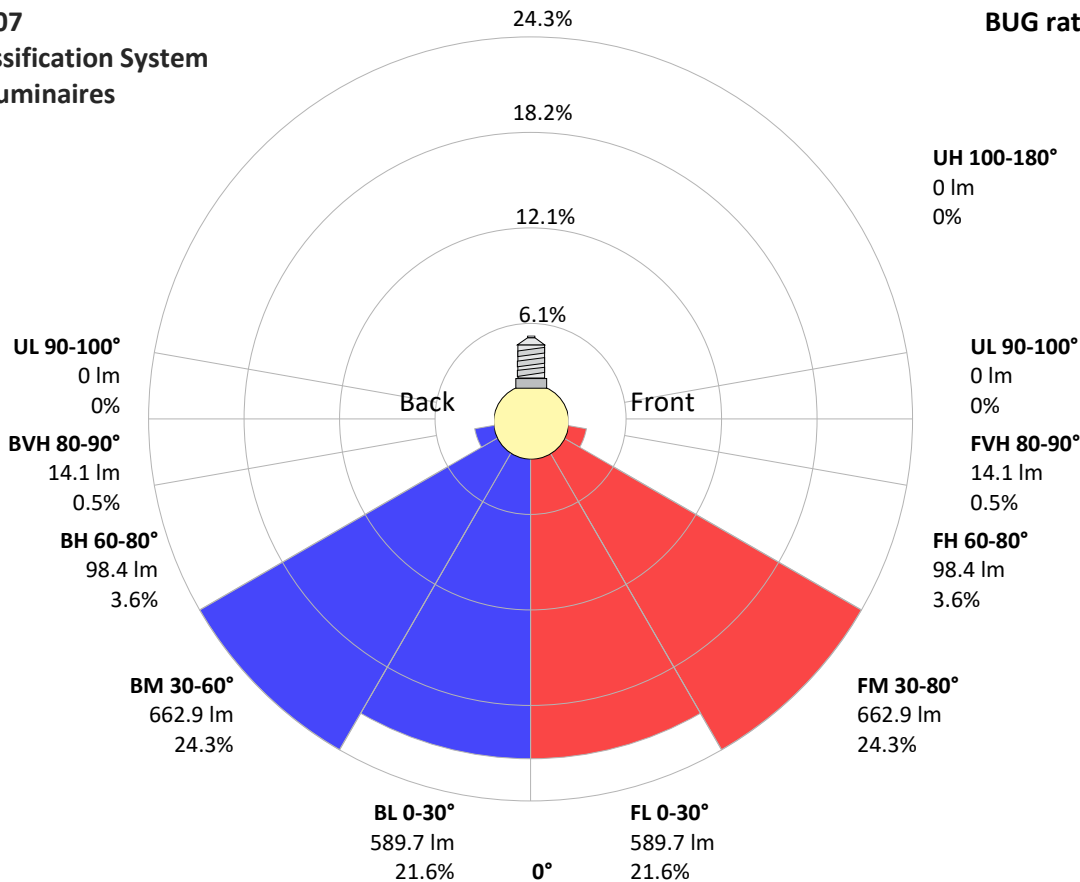
	Lumen	% Total
Forward light		
Low(0-30°)	590 lm	21.6%
Medium(30-60°)	663 lm	24.3%
High(60-80°)	98 lm	3.6%
Very high(80-90°)	14 lm	0.5%
Back light		
Low(0-30°)	590 lm	21.6%
Medium(30-60°)	663 lm	24.3%
High(60-80°)	98 lm	3.6%
Very high(80-90°)	14 lm	0.5%
Uplight		
Low(90-100°)	0 lm	0.0%
High(100-180°)	0 lm	0.0%

Intensity peaks

Max intensity	1530 cd
Intensity, 90°	4 cd
Intensity, 0°	1530 cd

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

BUG rating B2 U1 G1



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Power Details

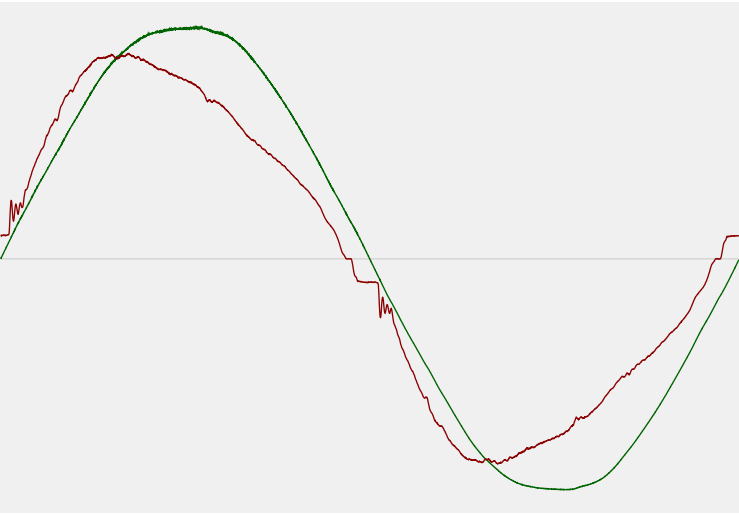
Input Power

Power feed to light source	41.2 W
Frequency of input power	49.9 Hz
RMS Input voltage feed, V_{RMS}	243 V
RMS Input current feed, I_{RMS}	0.176 A
Volt-Ampere or apparent power = $V_{RMS} \cdot I_{RMS}$	42.7 VA
Displacement factor of AC power feed	0.97
Power factor of AC current feed	0.97
Total harmonic distortion of the current	11.14%
Total harmonic distortion of the voltage	1.4%

Efficiency

Radiated power efficiency	24.4%
<div><div></div></div>	
Lumen efficiency	66 lm/W
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Input Power Curve



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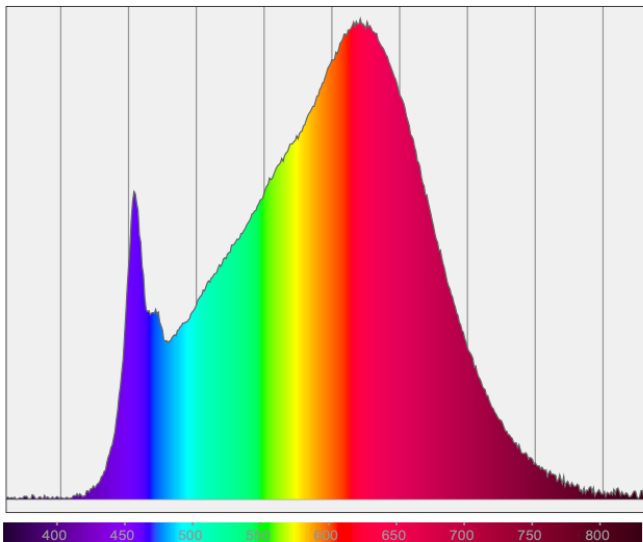
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Color Measurements

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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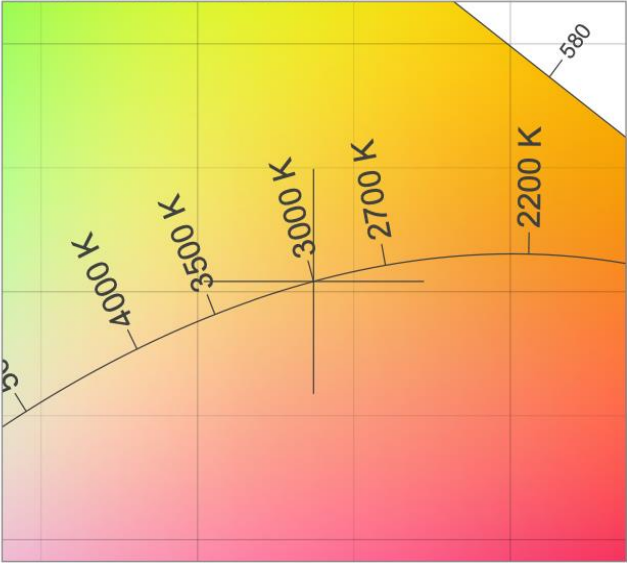
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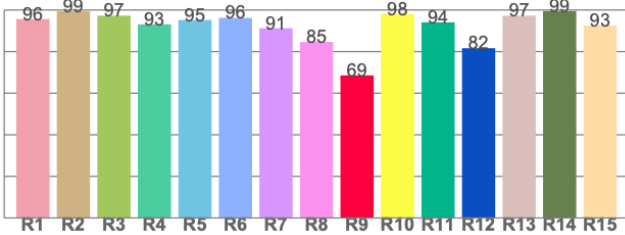
CIE 1931



CIE 1931 – zoomed on Planckian locus



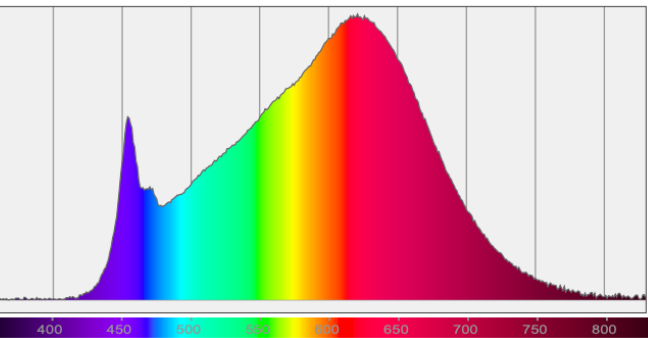
Color Rendering Index per reference color (CIE 1995)



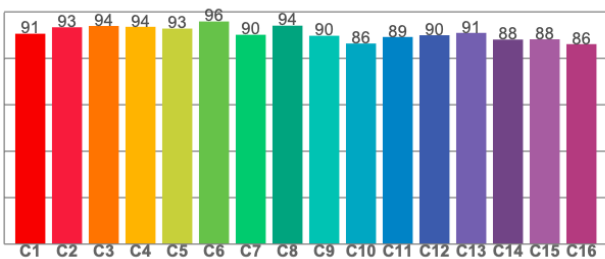
CRI R values, only R1-R8 are used to calculate final CRI value

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%



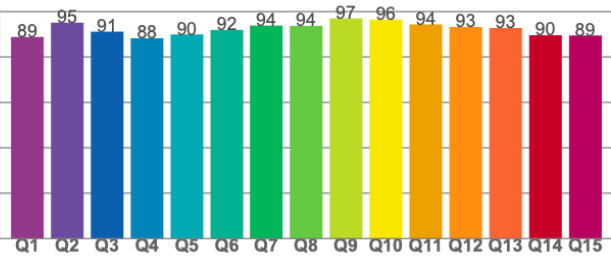
TM30-18 Rf-values per hue bin



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