

Tested Light Source - 1_PHOT_SKIN+BONES-4050lmChip-2700K-58Deg-HoneycombLouve_2303

Laboratory and Equipment

Laboratory Owner and Location	Factorylux, Greenhill Mills, Hebden Bridge, HX7 5QF, UK
Goniospectrometer System and Type	BaseSpion – Type C, horizontal
Spectrometer Manufacturer and Model	Ibsen Photonics, Denmark – Freedom VIS (Custom Viso)

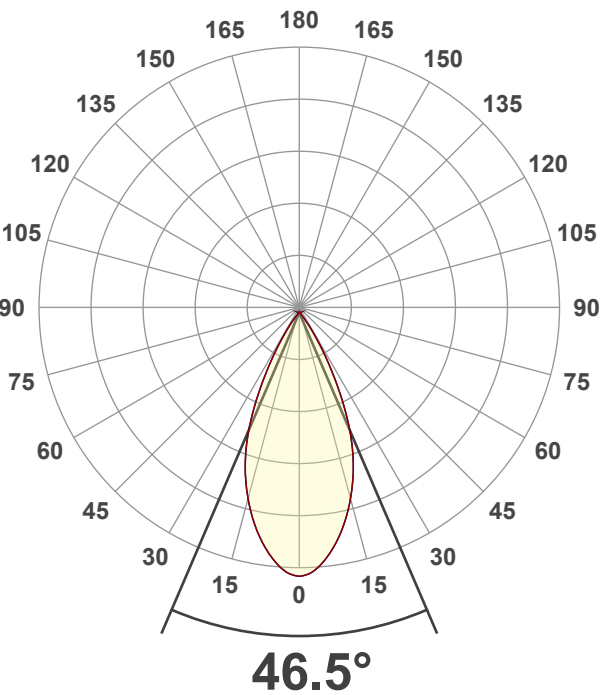
Measurement Conditions

Number of C-planes and Resolution	4 planes – 90°
γ (gamma)-Resolution	2°
Test Distance	1.50 m
Input Power, Power and Displ. Factors	41.3 W – PF 0.97 – DPF 0.97
Input RMS Voltage and Current	239 V – 0.179 A
Frequency of Input Power	50 Hz

Main Light Measurement Results

Output	2242 lm
Efficiency	54 lm/W
Peak Intensity and Beam Angle	3783 cd – 46.5°
Color Rendering Index	CRI 92.6

Light Intensity Distribution



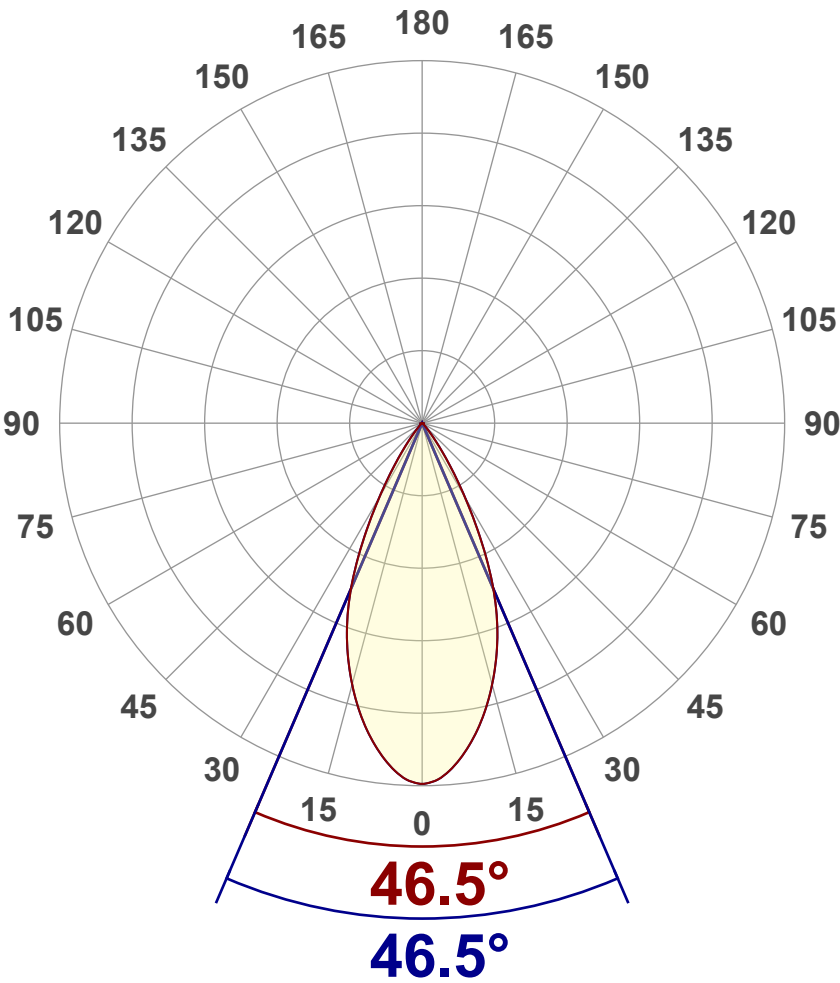
Goniophotometry Report

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Luminous Intensity diagram

Unit: 0-100% of peak intensity



Main Values

Output (total Lumen)	2242 lm
Peak Intensity	3783 cd
Beam Angle (50%)	46.5°
Beam Angle (90%)	46.5°
Beam Angle (10%)	46.5°

Cut-off Angle

Average 2,5%	81.7°
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Field Angle

Average 10%	70°
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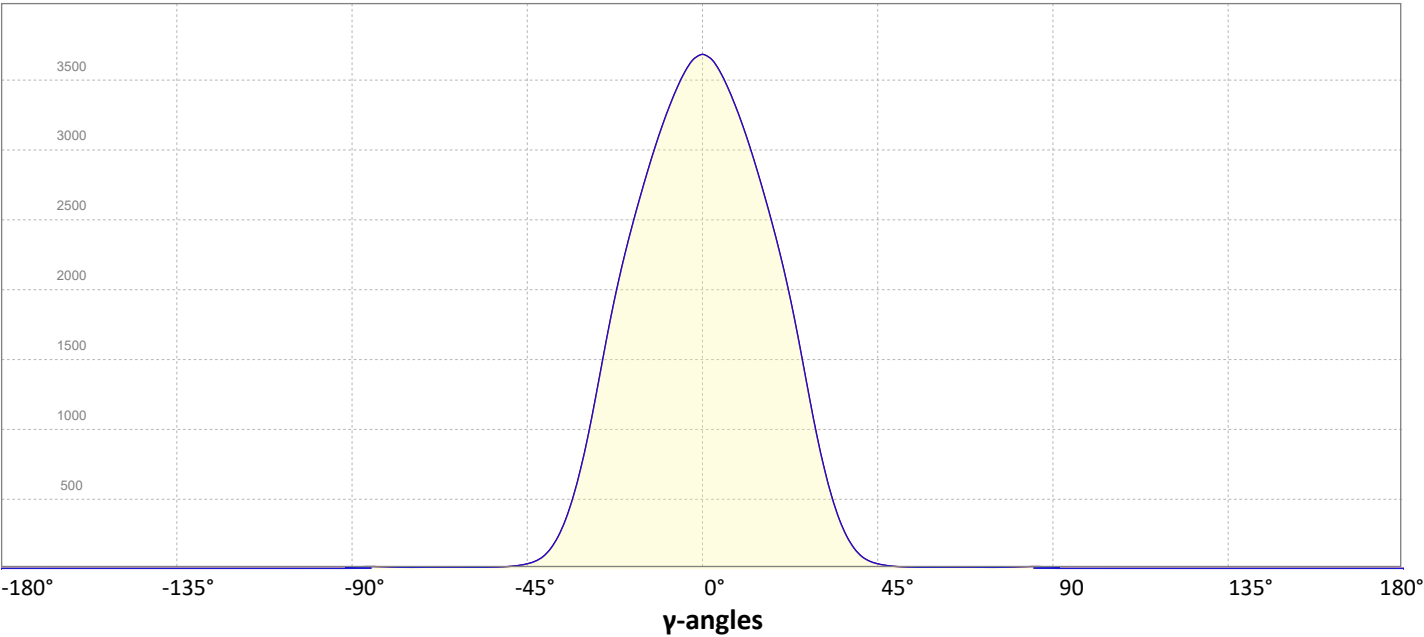
Intensity Ratio

In 120° cone	96.2%
In 90° cone	95.1%

C000-C180

C090-C270

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

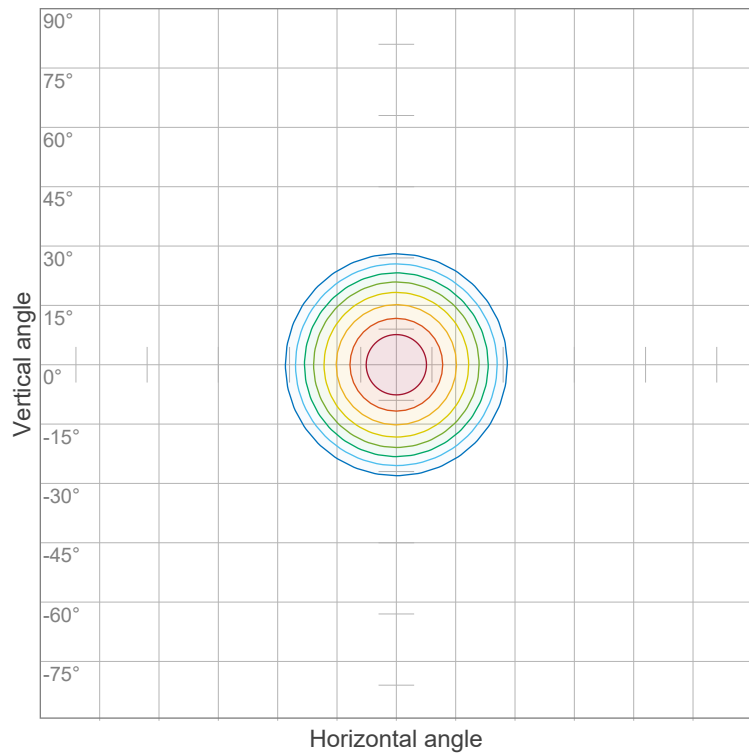


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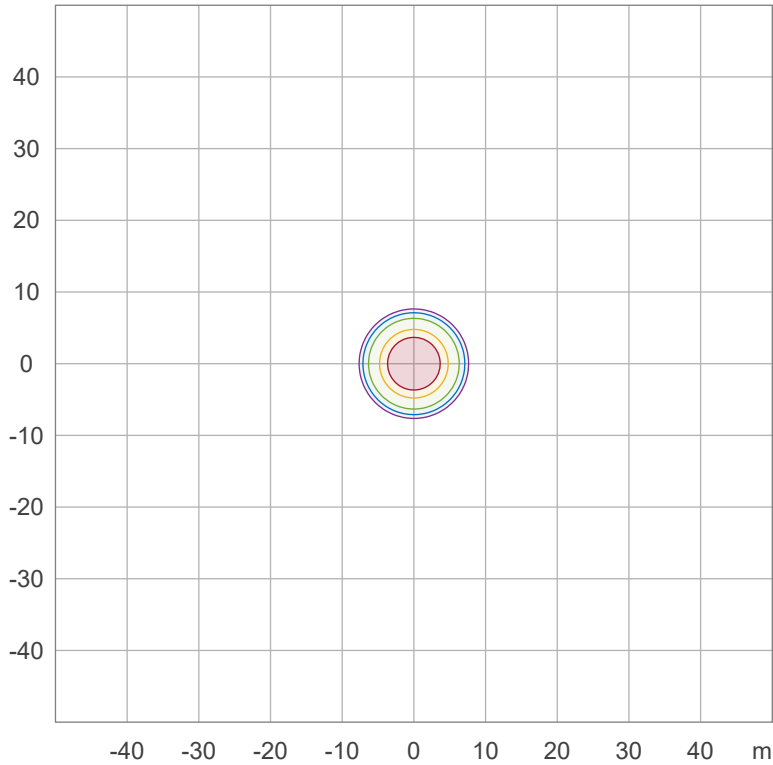
Iso-intensity Diagram (Iso-candela)



90 %	3404.9 cd
80 %	3026.6 cd
70 %	2648.2 cd
60 %	2269.9 cd
50 %	1891.6 cd
40 %	1513.3 cd
30 %	1135.0 cd
20 %	756.6 cd
10 %	378.3 cd

Peak intensity: 3783.2 cd
Number of c-planes: 4

Iso-illuminance Diagram (Iso-lux)



50.0 %	18.9 lx
30.0 %	11.3 lx
10.0 %	3.8 lx
5.0 %	1.9 lx
3.0 %	1.1 lx

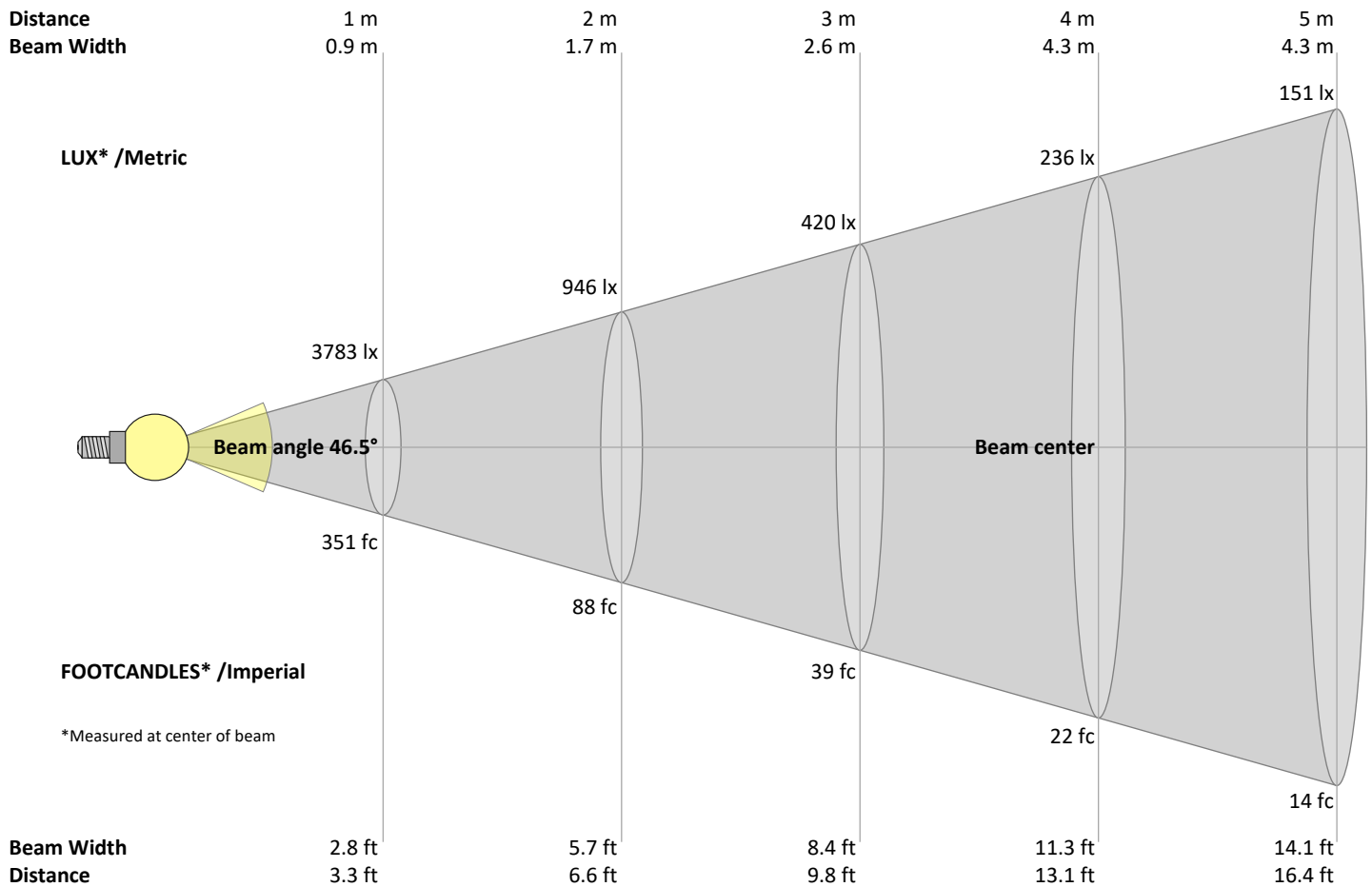
Peak illuminance: 37.8 lx
Mounting height: 10.0 m
Number of c-planes: 4

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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
3783	946	420	236	151	105	77	59	47	38	31	26	22	19	17	15	13	12	10	9	lux
351.5	87.9	39.1	22	14.1	9.8	7.2	5.5	4.3	3.5	2.9	2.4	2.1	1.8	1.6	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
3783	3756	3682	3573	3440	3289	3120	2937	2740	2532	2308	2061	1785	1485	1182	903	662	464	309	197	cd
100%	99%	97%	94%	91%	87%	82%	78%	72%	67%	61%	54%	47%	39%	31%	24%	18%	12%	8%	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
3783	3756	3682	3573	3440	3289	3120	2937	2740	2532	2308	2061	1785	1485	1182	903	662	464	309	197	cd
100%	99%	97%	94%	91%	87%	82%	78%	72%	67%	61%	54%	47%	39%	31%	24%	18%	12%	8%	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
3783	3756	3682	3573	3440	3289	3120	2937	2740	2532	2308	2061	1785	1485	1182	903	662	464	309	197	cd
100%	99%	97%	94%	91%	87%	82%	78%	72%	67%	61%	54%	47%	39%	31%	24%	18%	12%	8%	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
3783	3756	3682	3573	3440	3289	3120	2937	2740	2532	2308	2061	1785	1485	1182	903	662	464	309	197	cd
100%	99%	97%	94%	91%	87%	82%	78%	72%	67%	61%	54%	47%	39%	31%	24%	18%	12%	8%	5%	of 0°val



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	17.7	18.3	17.8	18.5	18.7	17.7	18.3	17.8	18.5	18.7
	3H	17.7	18.4	18.0	18.6	18.8	17.7	18.4	18.0	18.6	18.8
	4H	17.8	18.5	18.2	18.7	19.0	17.8	18.5	18.2	18.7	19.0
	6H	18.2	18.8	18.5	19.1	19.5	18.2	18.8	18.5	19.1	19.5
	8H	18.6	19.1	18.9	19.4	19.8	18.6	19.1	18.9	19.4	19.8
	12H	19.0	19.6	19.4	19.9	20.4	19.0	19.6	19.4	19.9	20.4
4H	2H	17.4	18.1	17.8	18.4	18.6	17.4	18.1	17.8	18.4	18.6
	3H	17.7	18.2	18.0	18.6	19.0	17.7	18.2	18.0	18.6	19.0
	4H	17.9	18.4	18.3	18.8	19.3	17.9	18.4	18.3	18.8	19.3
	6H	18.5	19.0	19.0	19.4	19.7	18.5	19.0	19.0	19.4	19.7
	8H	19.0	19.5	19.5	19.9	20.2	19.0	19.5	19.5	19.9	20.2
	12H	19.8	20.2	20.3	20.6	21.0	19.8	20.2	20.3	20.6	21.0
8H	4H	18.0	18.5	18.5	18.8	19.2	18.0	18.5	18.5	18.8	19.2
	6H	18.9	19.2	19.4	19.7	20.2	18.9	19.2	19.4	19.7	20.2
	8H	19.7	20.0	20.2	20.5	21.1	19.7	20.0	20.2	20.5	21.1
	12H	20.7	21.0	21.3	21.5	22.1	20.7	21.0	21.3	21.5	22.1
12H	4H	18.0	18.4	18.5	18.8	19.3	18.0	18.4	18.5	18.8	19.3
	6H	19.1	19.3	19.6	19.9	20.5	19.1	19.3	19.6	19.9	20.5
	8H	20.0	20.2	20.6	20.7	21.3	20.0	20.2	20.6	20.7	21.3
Variations with the observer position for the luminaire spacings, S:											
S = 1.0H		2.6 / -0.9					2.6 / -0.9				
S = 1.5H		4.7 / -1.0					4.7 / -1.0				
S = 2.0H		6.4 / -1.1					6.4 / -1.1				

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	110	110	105	105	105	101	101	101	98	
1	113	110	108	106	111	108	106	104	104	102	100	100	98	97	96	95	94	92
2	108	103	100	96	106	102	98	95	98	95	93	95	93	91	92	90	88	87
3	103	97	93	89	101	96	91	88	93	89	86	90	87	85	88	85	83	82
4	99	92	87	83	97	90	86	82	88	84	81	86	83	80	84	81	79	77
5	94	87	81	77	93	86	81	77	84	79	76	82	78	75	80	77	75	73
6	90	82	77	73	89	81	76	72	80	75	72	78	74	71	77	73	71	69
7	86	78	73	69	85	77	72	68	76	71	68	75	71	68	73	70	67	66
8	83	74	69	65	82	74	68	65	72	68	65	71	67	64	70	67	64	63
9	80	71	65	62	78	70	65	62	69	65	61	68	64	61	67	64	61	60
10	76	68	62	59	75	67	62	59	66	62	58	65	61	58	65	61	58	57

Goniophotometry Report

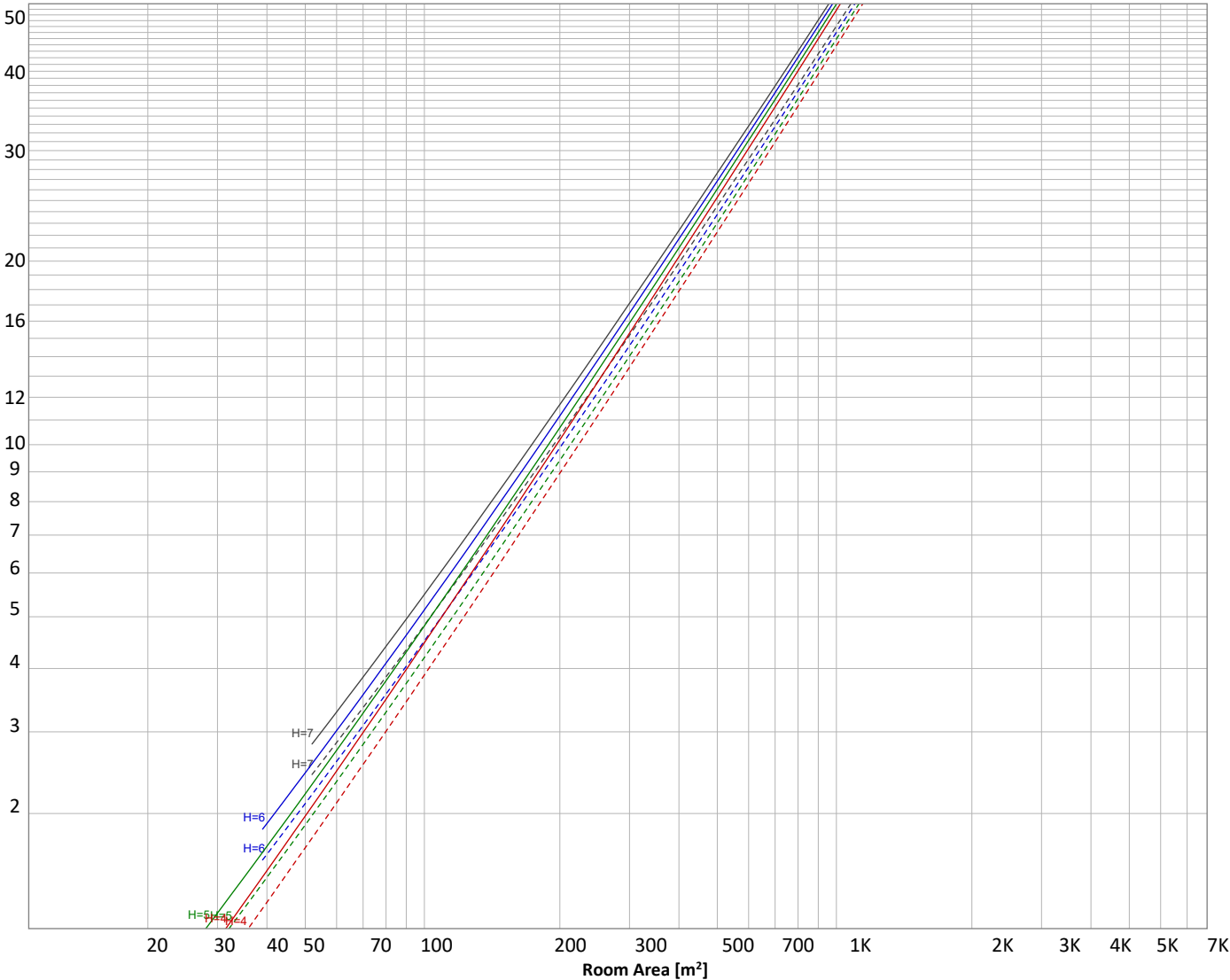
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Luminaire budgetary diagram

Uncorrected, comprehensive UGR table according to 117-1995

LAMPS (number of lamps)



Conditions

H = Room height	Flux = 2242 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°
335 lm	786 lm	732 lm	256 lm	36.0 lm	13.1 lm	13.8 lm	14.5 lm	19.0 lm
90°-100°	100°-110°	110°-120°	120°-130°	130°-140°	140°-150°	150°-160°	160°-170°	170°-180°
7.46 lm	6.09 lm	5.71 lm	5.16 lm	4.46 lm	3.61 lm	2.66 lm	1.63 lm	0.549 lm

Outdoor Light Planning

Lumen per Zone

Zone (γ)	Lumen	% Total
0-10°	335 lm	15.0%
10-20°	786 lm	35.0%
20-30°	732 lm	32.6%
30-40°	256 lm	11.4%
40-50°	36 lm	1.6%
50-60°	13 lm	0.6%
60-70°	14 lm	0.6%
70-80°	15 lm	0.6%
80-90°	19 lm	0.8%
90-100°	7 lm	0.3%
100-110°	6 lm	0.3%
110-120°	6 lm	0.3%
120-130°	5 lm	0.2%
130-140°	4 lm	0.2%
140-150°	4 lm	0.2%
150-160°	3 lm	0.1%
160-170°	2 lm	0.1%
170-180°	1 lm	0.0%
Total	2242 lm	100.0%

Intensity peaks

Max intensity	3783 cd
Intensity, 90°	14 cd
Intensity, 0°	3783 cd

Zonal Lumen summary

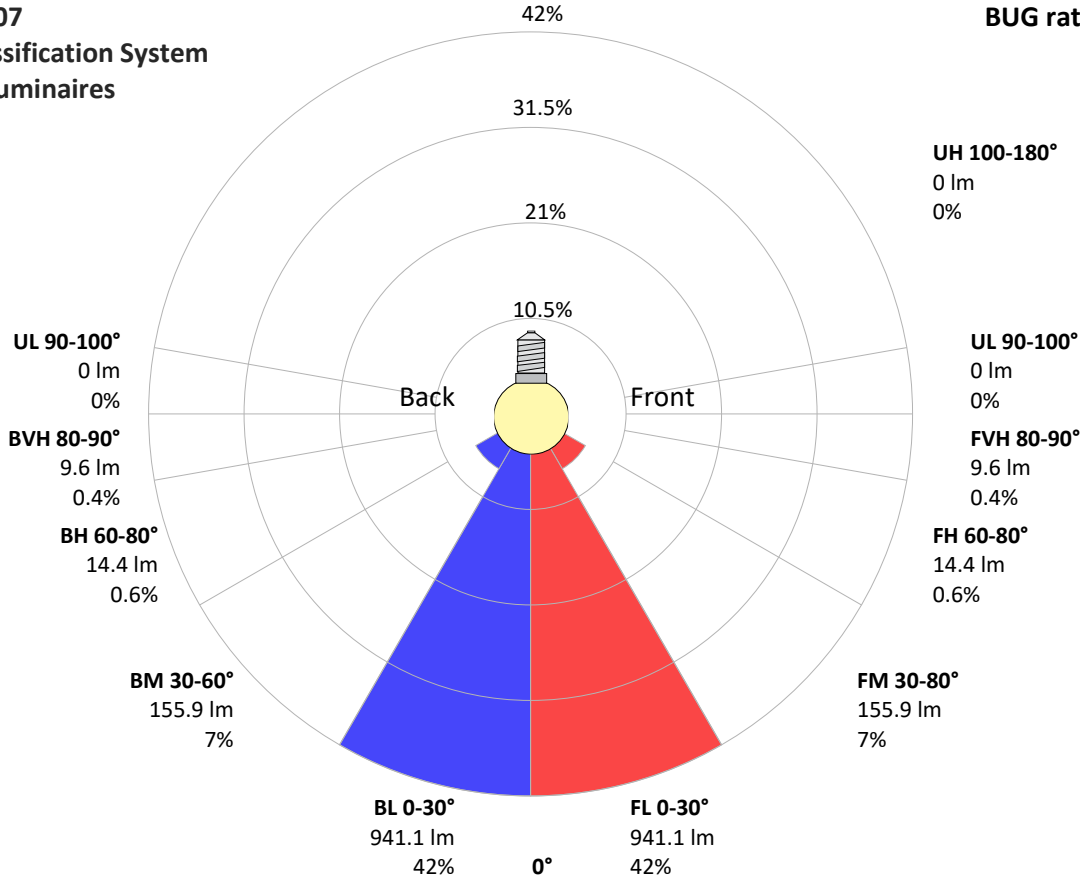
Zone (γ)	Lumen	% Total
0-30°	1853 lm	82.6%
0-40°	2108 lm	94.0%
0-60°	2157 lm	96.2%
60-90°	47 lm	2.1%
70-100°	41 lm	1.8%
90-120°	19 lm	0.9%
0-90°	2205 lm	98.3%
90-180°	37 lm	1.7%
0-180°	2242 lm	100.0%

BUG rating

	Lumen	% Total
Forward light		
Low(0-30°)	941 lm	42.0%
Medium(30-60°)	156 lm	7.0%
High(60-80°)	14 lm	0.6%
Very high(80-90°)	10 lm	0.4%
Back light		
Low(0-30°)	941 lm	42.0%
Medium(30-60°)	156 lm	7.0%
High(60-80°)	14 lm	0.6%
Very high(80-90°)	10 lm	0.4%
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



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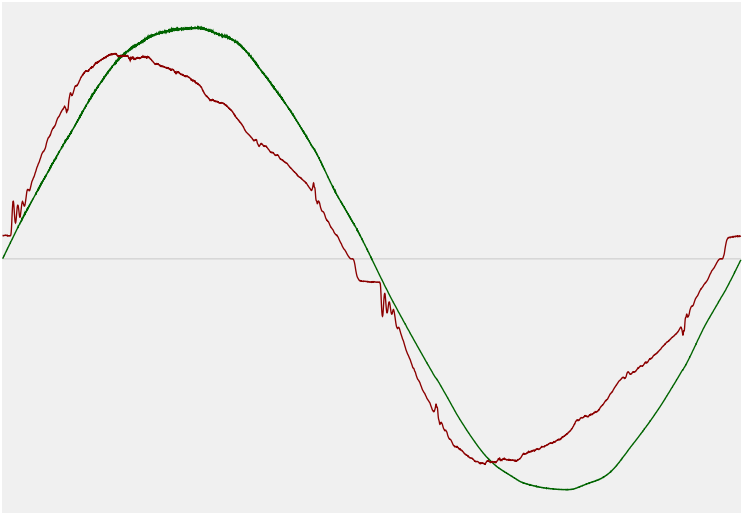


Power Details

Input Power

Power feed to light source	41.3 W
Frequency of input power	50 Hz
RMS Input voltage feed, V_{RMS}	239 V
RMS Input current feed, I_{RMS}	0.179 A
Volt-Ampere or apparent power = $V_{RMS} * I_{RMS}$	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	10.93%
Total harmonic distortion of the voltage	1.21%

Input Power Curve



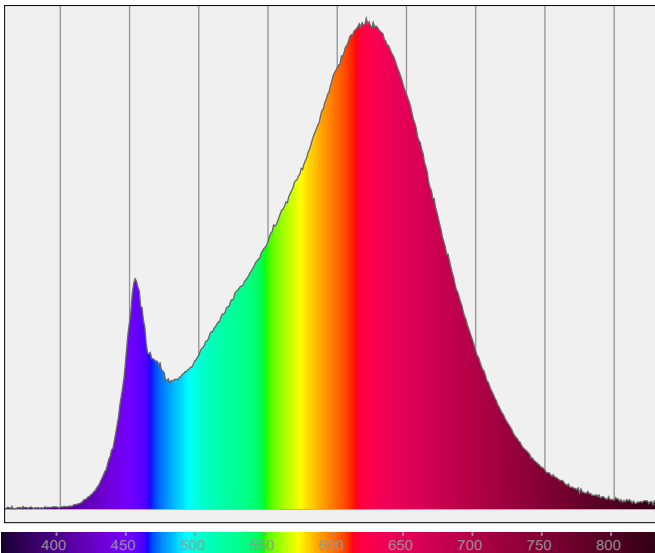
Efficiency

Radiated power efficiency	19.6%
Lumen efficiency	54 lm/W

Color Measurements

Correlated Color Temperature	CCT = 2700 K
Color Rendering TM30-18	R _f 91.5 — R _g 99.7
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 = 62.0	Color deviation from BBL	Duv = ±0.0003
Color Rendering TM30-18	R _f 91.5 — R _g 99.7	Color coordinate CIEs 1976 (CIELUV)	(u';v') = (0.263;0.263)
Color Quality Scale	CQS = 89.9		

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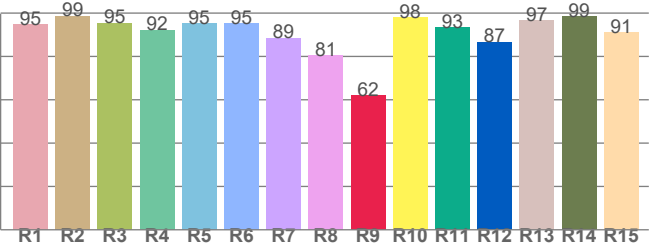
CIE 1931



CIE 1931 – zoomed on Planckian locus



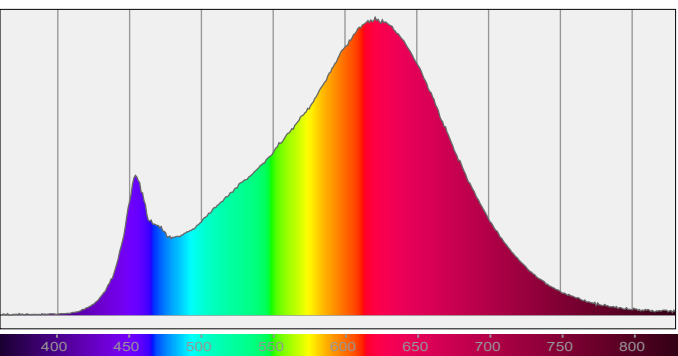
Color Rendering Index per reference color (CIE 1995)



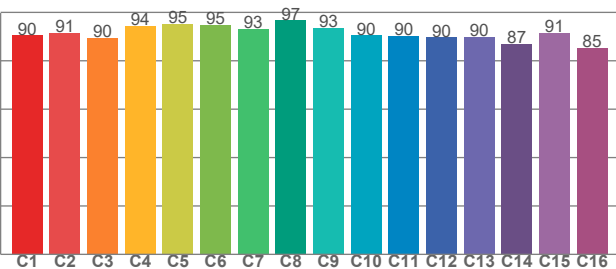
CRI R values, only R1-R8 are used to calculate final CRI value

R1	R2	R3	R4	R5	R6	R7	R8	R9	R10	R11	R12	R13	R14	R15
94.8	98.7	95.5	92.3	95.4	95.1	88.6	80.5	62.0	98.1	93.2	86.7	96.7	98.6	91.3

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



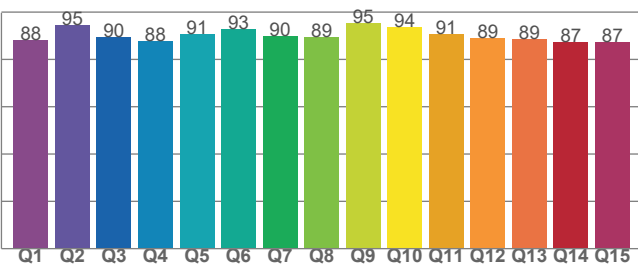
TM30-18 Rf-values per hue bin



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
90.4	91.5	89.5	94.3	95.2	94.8	93.1	96.6	93.5	90.5	90.3	89.7	89.8	87.0	91.4	85.4

Color Quality Scale by reference color



CQS Q values

Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10	Q11	Q12	Q13	Q14	Q15
88.2	94.7	89.6	87.7	90.8	93.0	90.0	89.3	95.3	93.6	90.8	88.8	88.5	87.1	87.2