

Tested Light Source - 1\_PHOT\_NINETY-NINE-2125lmChip-3000K-21Deg-HoneycombLouvre\_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°

1.50 m

16.0 W – PF 0.98 – DPF 0.98

240 V – 0.068 A

50.1 Hz

Main Light Measurement Results

Output

Efficiency

Peak Intensity and Beam Angle

Color Rendering Index

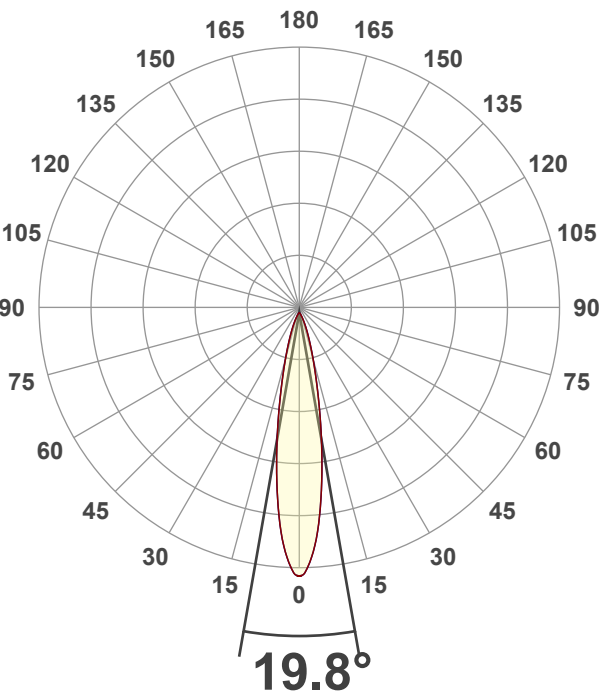
1129 lm

71 lm/W

6390 cd – 19.8°

CRI 92.8

Light Intensity Distribution



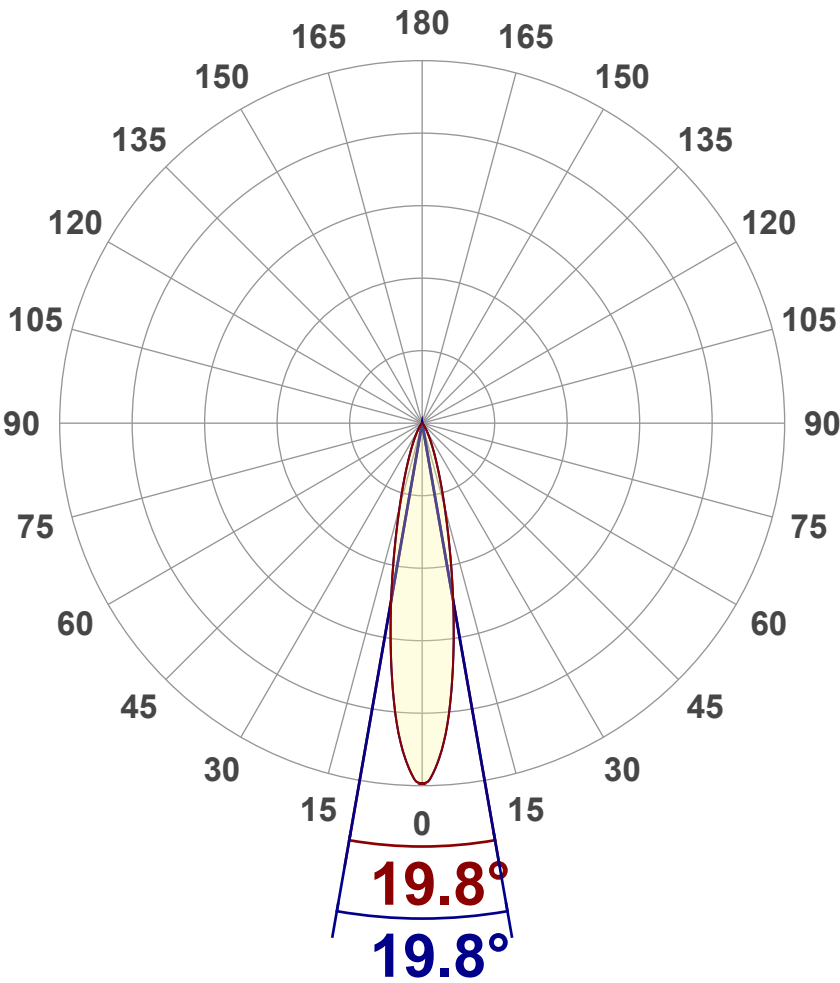
Goniophotometry Report

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Luminous Intensity diagram

Unit: 0-100% of peak intensity



Main Values

Output (total Lumen)	1129 lm
Peak Intensity	6390 cd
Beam Angle (50%)	19.8°
Beam Angle (90%)	19.8°
Beam Angle (10%)	19.8°

Cut-off Angle

Average 2,5%	61°
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Field Angle

Average 10%	42.1°
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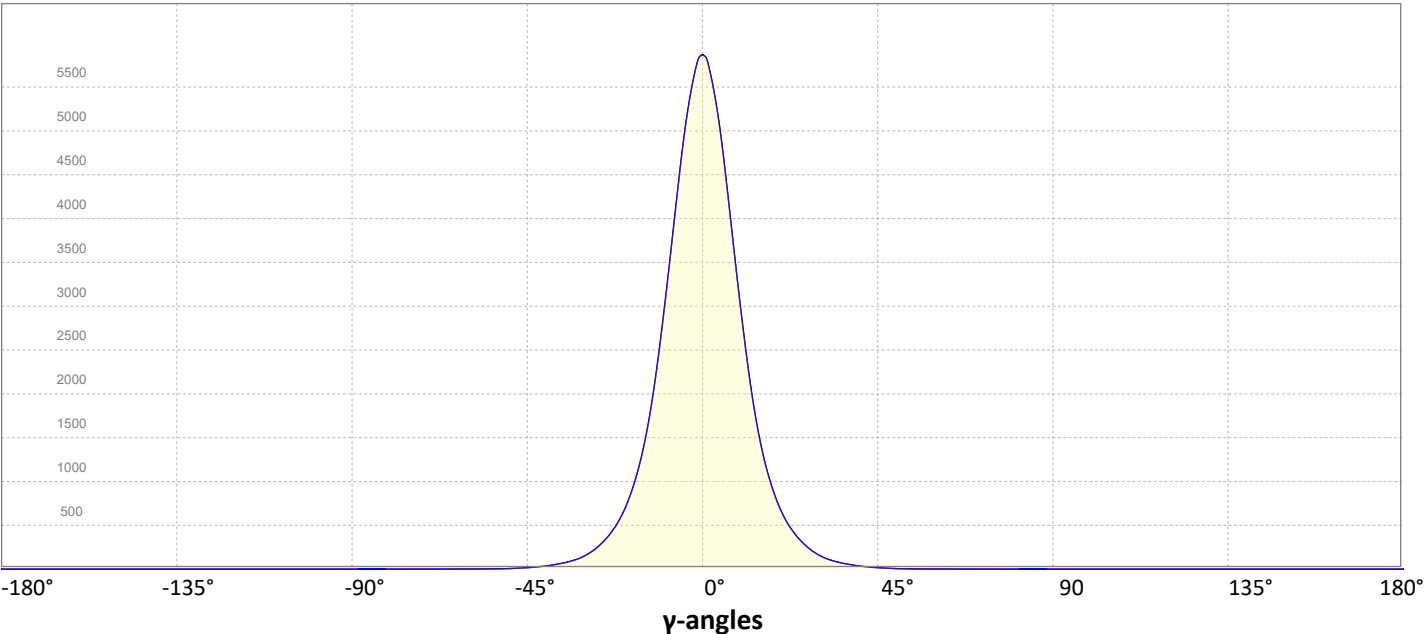
Intensity Ratio

In 120° cone	99.4%
In 90° cone	98.8%

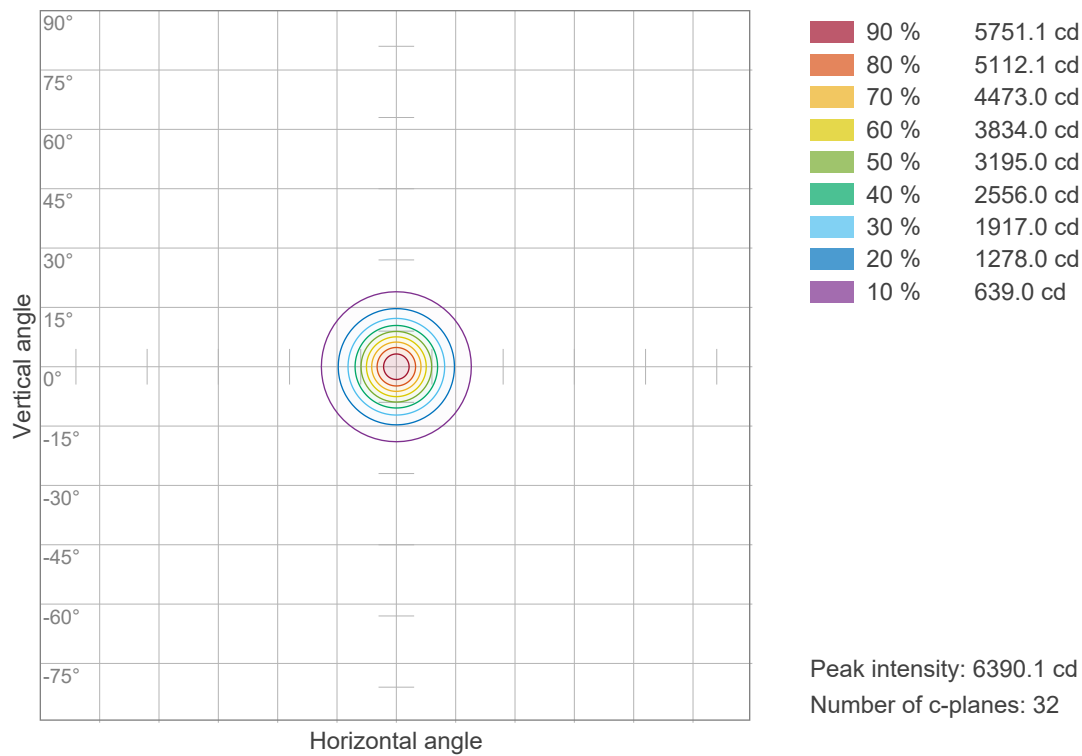
C000-C180

C090-C270

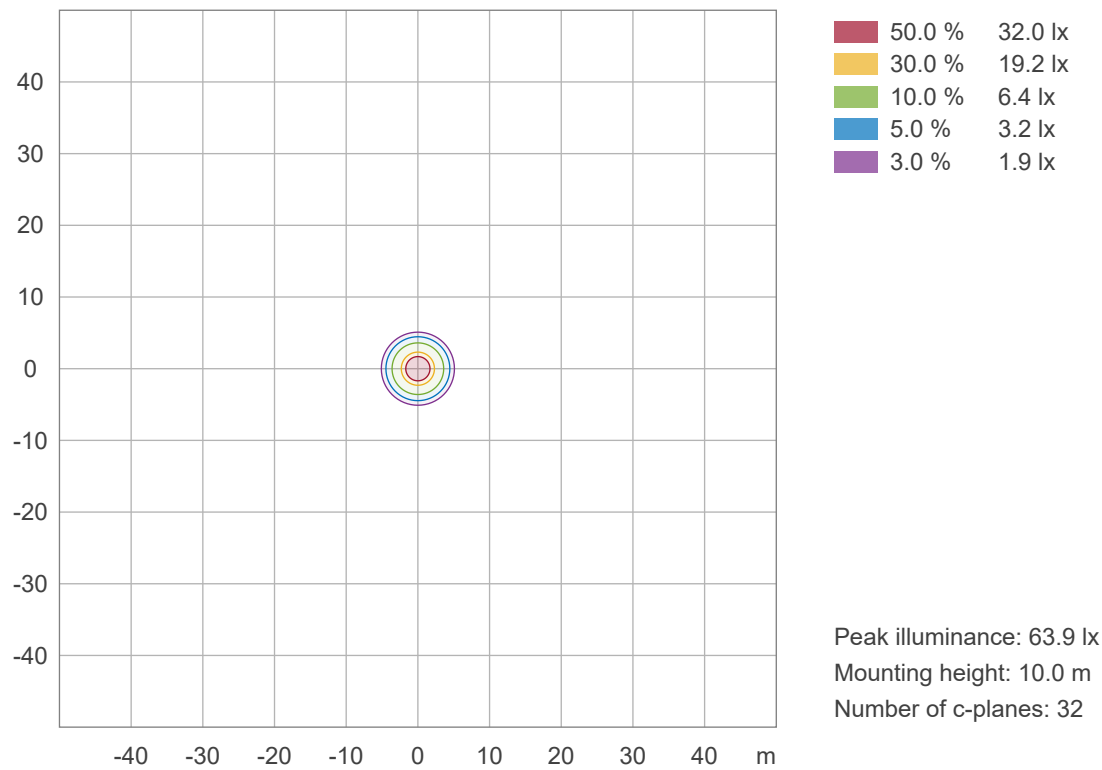
Linear distribution diagram - Intensity (candela) vs γ-angle



Iso-intensity Diagram (Iso-candela)



Iso-illuminance Diagram (Iso-lux)

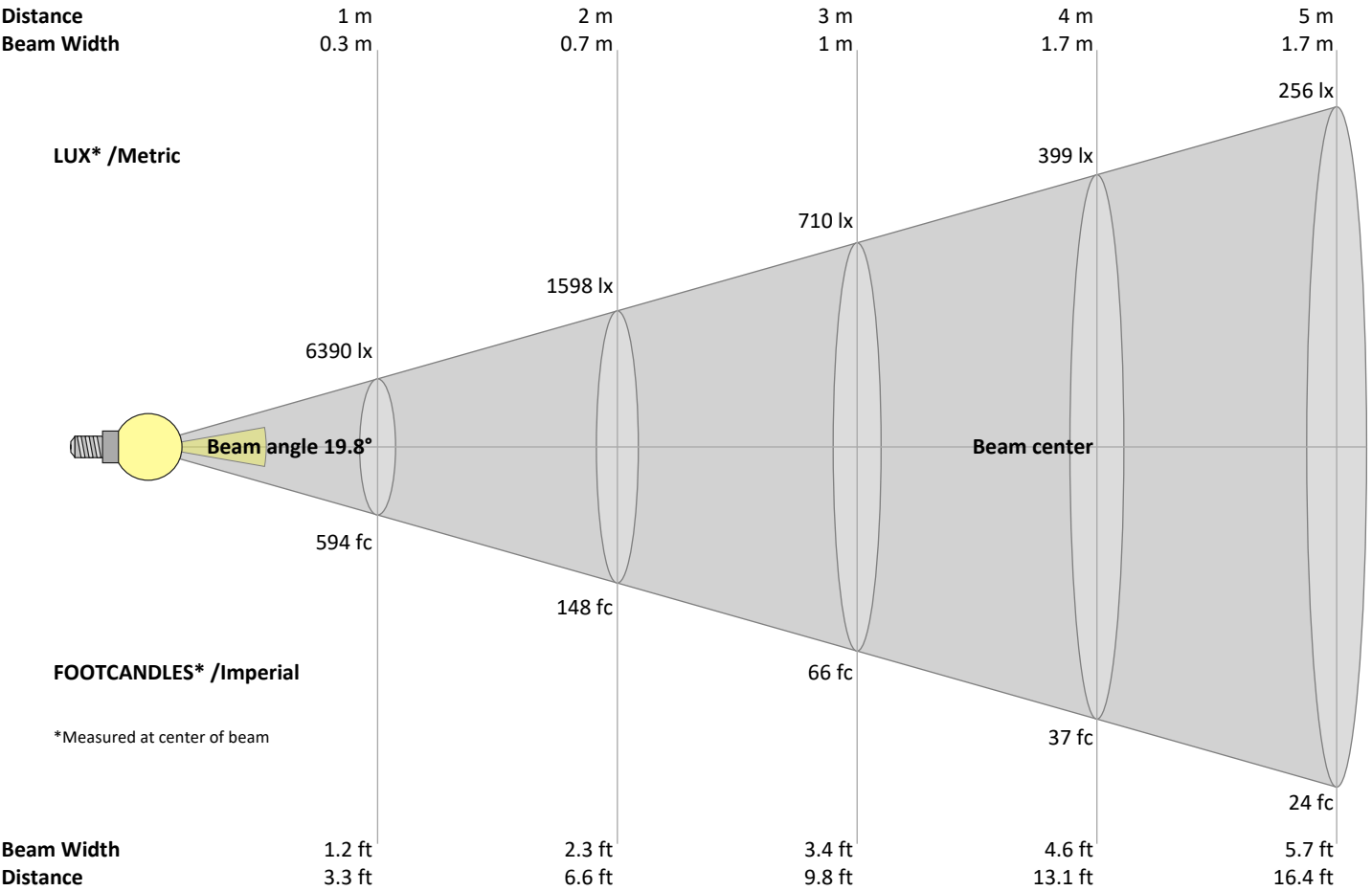


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Beam Details



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
6390	1598	710	399	256	178	130	100	79	64	53	44	38	33	28	25	22	20	18	16	lux
593.7	148.4	66	37.1	23.7	16.5	12.1	9.3	7.3	5.9	4.9	4.1	3.5	3	2.6	2.3	2.1	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
6390	6166	5628	4870	4004	3161	2407	1794	1336	998	744	558	421	316	233	172	127	97	75	56	cd
100%	96%	88%	76%	63%	49%	38%	28%	21%	16%	12%	9%	7%	5%	4%	3%	2%	2%	1%	1%	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
6390	6166	5628	4870	4004	3161	2407	1794	1336	998	744	558	421	316	233	172	127	97	75	56	cd
100%	96%	88%	76%	63%	49%	38%	28%	21%	16%	12%	9%	7%	5%	4%	3%	2%	2%	1%	1%	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
6390	6166	5628	4870	4004	3161	2407	1794	1336	998	744	558	421	316	233	172	127	97	75	56	cd
100%	96%	88%	76%	63%	49%	38%	28%	21%	16%	12%	9%	7%	5%	4%	3%	2%	2%	1%	1%	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
6390	6166	5628	4870	4004	3161	2407	1794	1336	998	744	558	421	316	233	172	127	97	75	56	cd
100%	96%	88%	76%	63%	49%	38%	28%	21%	16%	12%	9%	7%	5%	4%	3%	2%	2%	1%	1%	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	10.3	10.7	10.4	10.9	11.1	10.3	10.7	10.4	10.9	11.1
	3H	10.0	10.6	10.4	10.8	10.9	10.0	10.6	10.4	10.8	10.9
	4H	10.0	10.5	10.4	10.8	11.0	10.0	10.5	10.4	10.8	11.0
	6H	10.1	10.5	10.3	10.8	11.1	10.1	10.5	10.3	10.8	11.1
	8H	10.1	10.5	10.4	10.8	11.2	10.1	10.5	10.4	10.8	11.2
	12H	10.1	10.5	10.4	10.9	11.3	10.1	10.5	10.4	10.9	11.3
4H	2H	9.9	10.5	10.3	10.7	10.9	9.9	10.5	10.3	10.7	10.9
	3H	9.9	10.3	10.2	10.7	11.1	9.9	10.3	10.2	10.7	11.1
	4H	9.8	10.2	10.2	10.6	11.1	9.8	10.2	10.2	10.6	11.1
	6H	9.8	10.3	10.3	10.6	11.0	9.8	10.3	10.3	10.6	11.0
	8H	9.9	10.3	10.4	10.6	11.0	9.9	10.3	10.4	10.6	11.0
	12H	10.0	10.3	10.5	10.7	11.2	10.0	10.3	10.5	10.7	11.2
8H	4H	9.7	10.1	10.2	10.5	10.8	9.7	10.1	10.2	10.5	10.8
	6H	9.8	10.1	10.3	10.5	11.1	9.8	10.1	10.3	10.5	11.1
	8H	10.0	10.2	10.5	10.7	11.3	10.0	10.2	10.5	10.7	11.3
	12H	10.2	10.4	10.8	10.9	11.5	10.2	10.4	10.8	10.9	11.5
12H	4H	9.6	10.0	10.1	10.4	10.8	9.6	10.0	10.1	10.4	10.8
	6H	9.9	10.1	10.4	10.6	11.2	9.9	10.1	10.4	10.6	11.2
	8H	10.0	10.2	10.6	10.7	11.3	10.0	10.2	10.6	10.7	11.3
Variations with the observer position for the luminaire spacings, S:											
S = 1.0H		4.2 / -4.0					4.2 / -4.0				
S = 1.5H		6.7 / -4.3					6.7 / -4.3				
S = 2.0H		8.6 / -4.6					8.6 / -4.6				

## 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	115	113	111	109	113	111	109	107	107	105	104	103	102	101	99	99	98	96
2	111	107	104	102	109	106	103	101	103	100	99	100	98	96	97	96	94	93
3	108	103	99	96	106	102	98	96	99	96	94	97	94	93	95	93	91	90
4	104	99	95	92	103	98	94	91	96	93	90	94	91	89	92	90	88	87
5	101	95	91	88	100	94	90	88	93	89	87	91	88	86	90	87	85	84
6	98	92	88	85	97	91	87	84	90	86	84	89	86	83	87	85	83	82
7	95	89	85	82	94	88	84	82	87	84	81	86	83	81	85	83	80	79
8	93	86	82	79	92	86	82	79	85	81	79	84	81	79	83	80	78	77
9	90	84	80	77	90	83	79	77	83	79	77	82	79	76	81	78	76	75
10	88	81	77	75	87	81	77	75	80	77	75	80	77	74	79	76	74	73

Goniophotometry Report

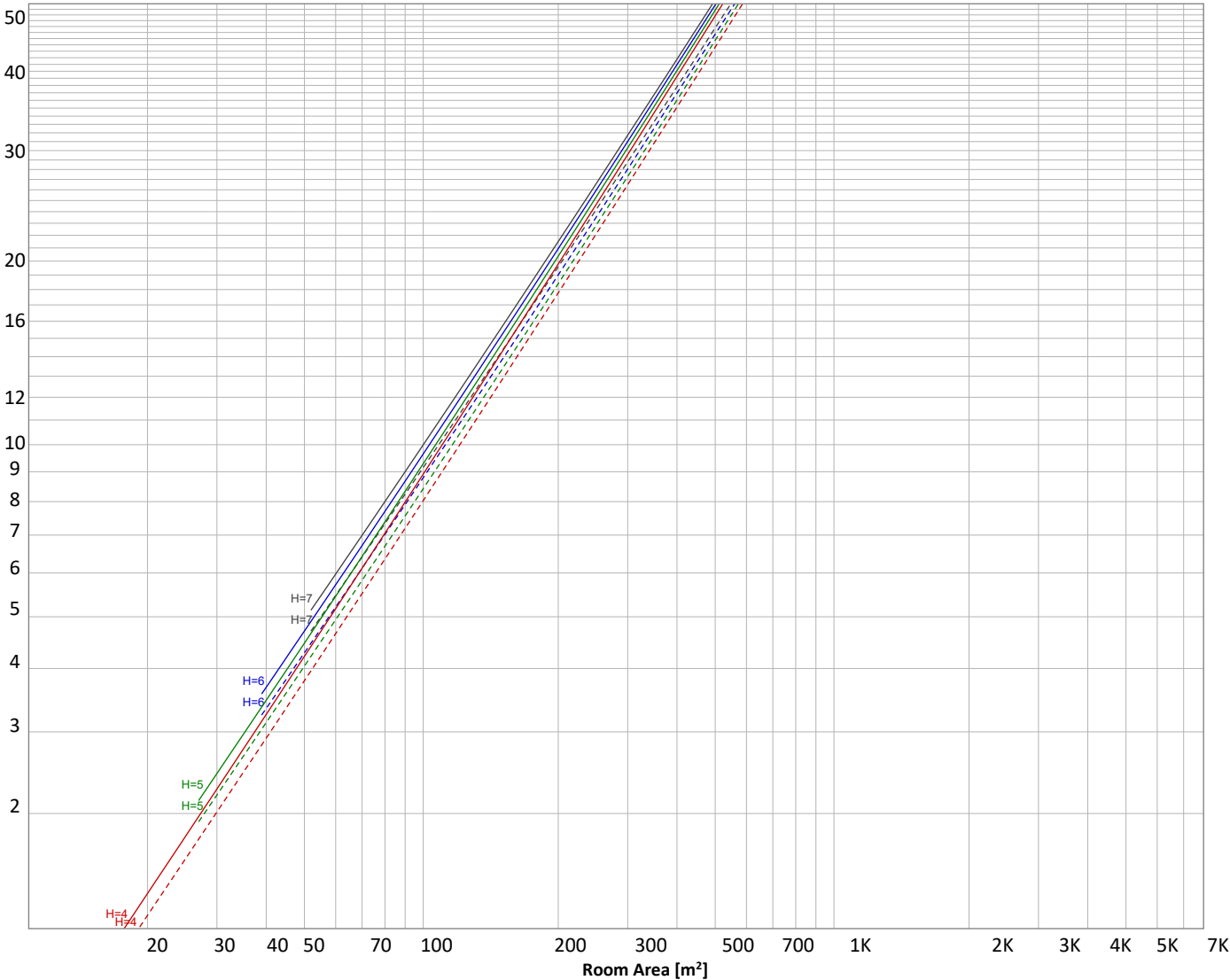
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Luminaire budgetary diagram

Uncorrected, comprehensive UGR table according to 117-1995

LAMPS (number of lamps)



Conditions

H = Room height	Flux = 1129 lm	$\rho(\%)$		
H <sub>down</sub> = Lamp distance from ceiling =	0.00 m	Line type	Ceiling reflectance	Wall reflectance
H <sub>work</sub> = Work area height from floor =	0.00 m	-----	70	50
E <sub>work</sub> = 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°
432 lm	441 lm	175 lm	56.4 lm	15.4 lm	2.75 lm	1.33 lm	1.09 lm	0.850 lm
90°-100°	100°-110°	110°-120°	120°-130°	130°-140°	140°-150°	150°-160°	160°-170°	170°-180°
0.528 lm	0.512 lm	0.480 lm	0.434 lm	0.375 lm	0.304 lm	0.224 lm	0.137 lm	0.046 lm

Outdoor Light Planning

Lumen per Zone

Zone (γ)	Lumen	% Total
0-10°	432 lm	38.3%
10-20°	441 lm	39.1%
20-30°	175 lm	15.5%
30-40°	56 lm	5.0%
40-50°	15 lm	1.4%
50-60°	3 lm	0.2%
60-70°	1 lm	0.1%
70-80°	1 lm	0.1%
80-90°	1 lm	0.1%
90-100°	1 lm	0.0%
100-110°	1 lm	0.0%
110-120°	0 lm	0.0%
120-130°	0 lm	0.0%
130-140°	0 lm	0.0%
140-150°	0 lm	0.0%
150-160°	0 lm	0.0%
160-170°	0 lm	0.0%
170-180°	0 lm	0.0%
Total	1129 lm	100.0%

Intensity peaks

Max intensity	6390 cd
Intensity, 90°	0 cd
Intensity, 0°	6390 cd

Zonal Lumen summary

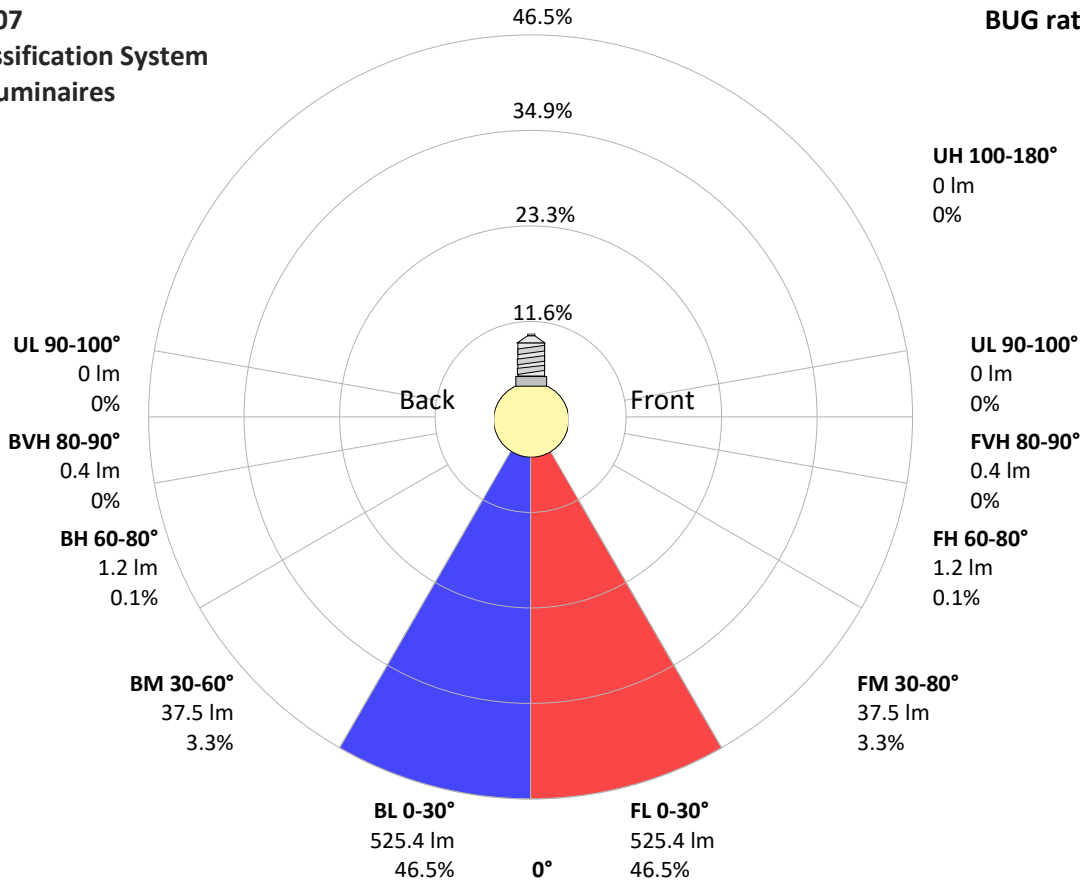
Zone (γ)	Lumen	% Total
0-30°	1048 lm	92.8%
0-40°	1105 lm	97.8%
0-60°	1123 lm	99.4%
60-90°	3 lm	0.3%
70-100°	2 lm	0.2%
90-120°	2 lm	0.1%
0-90°	1126 lm	99.7%
90-180°	3 lm	0.3%
0-180°	1129 lm	100.0%

BUG rating

	Lumen	% Total
<b>Forward light</b>		
Low(0-30°)	525 lm	46.5%
Medium(30-60°)	37 lm	3.3%
High(60-80°)	1 lm	0.1%
Very high(80-90°)	0 lm	0.0%
<b>Back light</b>		
Low(0-30°)	525 lm	46.5%
Medium(30-60°)	37 lm	3.3%
High(60-80°)	1 lm	0.1%
Very high(80-90°)	0 lm	0.0%
<b>Uplight</b>		
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

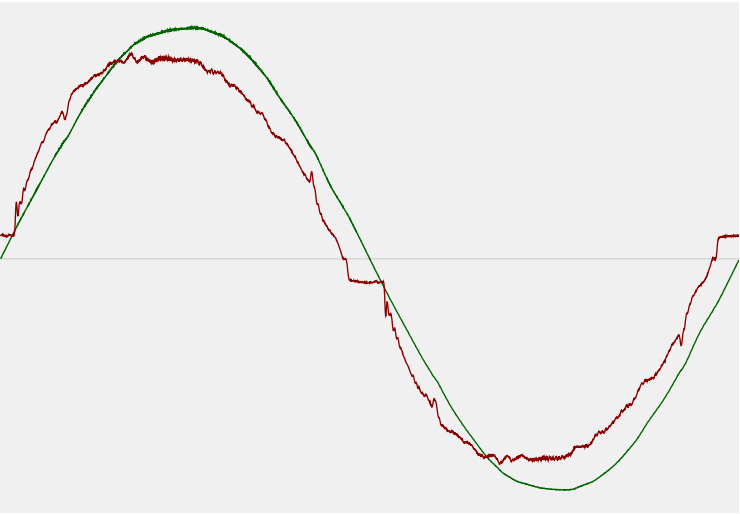


Power Details

Input Power

Power feed to light source	16.0 W
Frequency of input power	50.1 Hz
RMS Input voltage feed, $V_{RMS}$	240 V
RMS Input current feed, $I_{RMS}$	0.068 A
Volt-Ampere or apparent power = $V_{RMS} * I_{RMS}$	16.3 VA
Displacement factor of AC power feed	0.98
Power factor of AC current feed	0.98
Total harmonic distortion of the current	6.37%
Total harmonic distortion of the voltage	0.99%

Input Power Curve



Efficiency

Radiated power efficiency	25.9%
Lumen efficiency	71 lm/W

# Goniophotometry Report

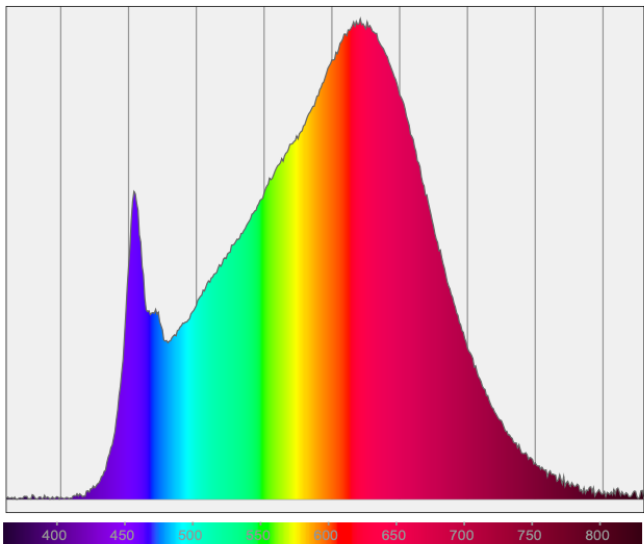
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## Color Measurements

Correlated Color Temperature	CCT = 3000 K
Color Rendering TM30-18	R <sub>f</sub> 91.0 — R <sub>g</sub> 97.7
Color Shift, CIE duv	Duv ±0.0003

## Spectral distribution



## Color details

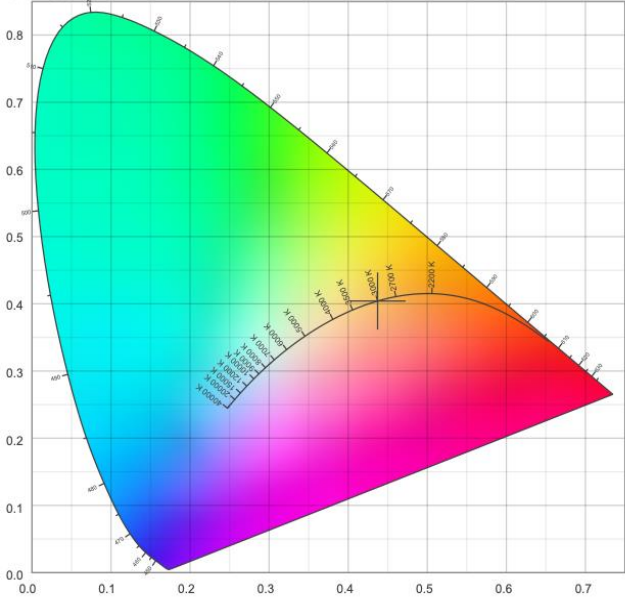
Correlated Color Temperature	CCT = 3000 K	Color coordinates CIE 1931	(x;y) = (0.437;0.404)
Color Rendering Index	CRI 94.1	Color coordinate CIEs 1960	(u;v) = (0.251;0.348)
Color Rendering Index, R9 (red component)	R9 = 68.6	Color deviation from BBL	Duv = ±0.0003
Color Rendering TM30-18	R <sub>f</sub> 91.0 — R <sub>g</sub> 97.7	Color coordinate CIEs 1976 (CIELUV)	(u';v') = (0.251;0.251)
Color Quality Scale	CQS = 91.8		

Goniophotometry Report

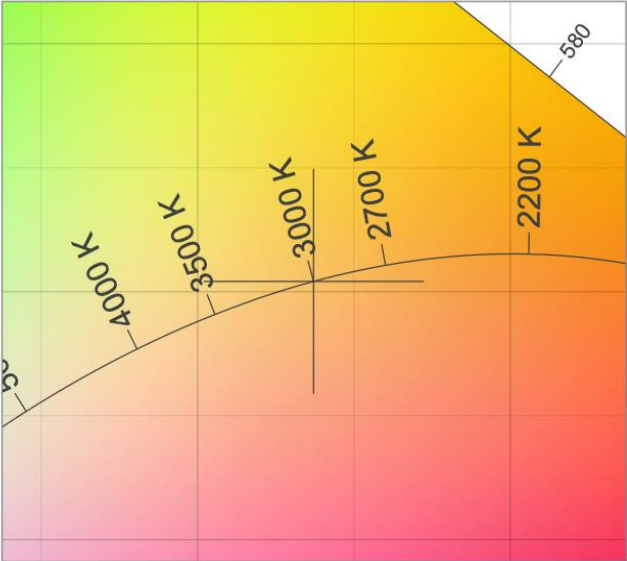
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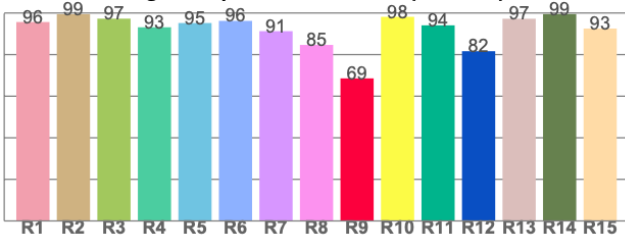
CIE 1931



CIE 1931 – zoomed on Planckian locus



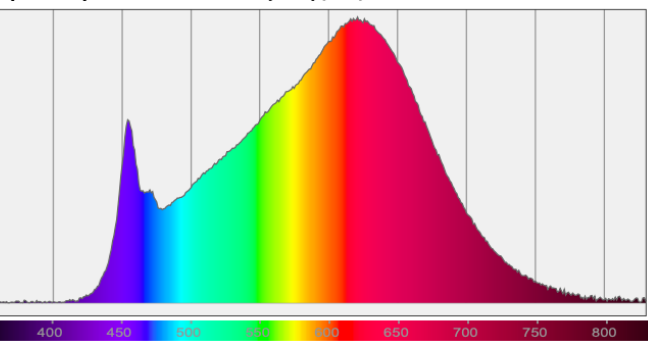
Color Rendering Index per reference color (CIE 1995)



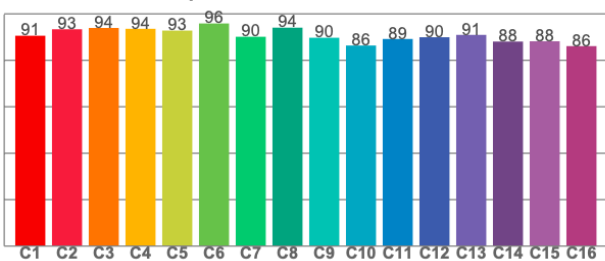
CRI R values, only R1-R8 are used to calculate final CRI value

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%



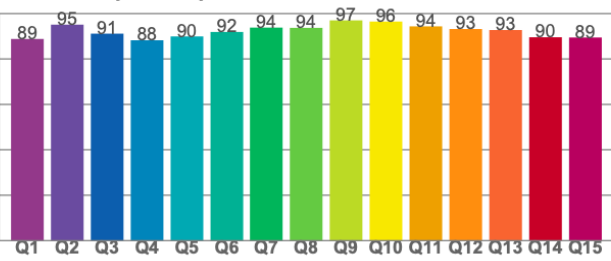
TM30-18 Rf-values per hue bin



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