

Tested Light Source - 1_PHOT_REFLEKTER-L-4750lmChip-4000K-21Deg-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°

3.00 m

41.3 W – PF 0.97 – DPF 0.97

239 V – 0.178 A

50 Hz

Main Light Measurement Results

Output

Efficiency

Peak Intensity and Beam Angle

Color Rendering Index

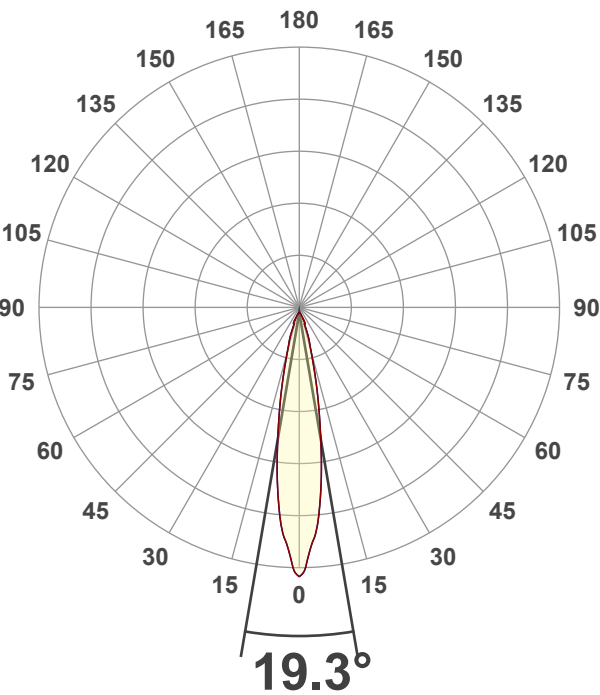
3198 lm

77 lm/W

17156 cd – 19.3°

CRI 92.7

Light Intensity Distribution



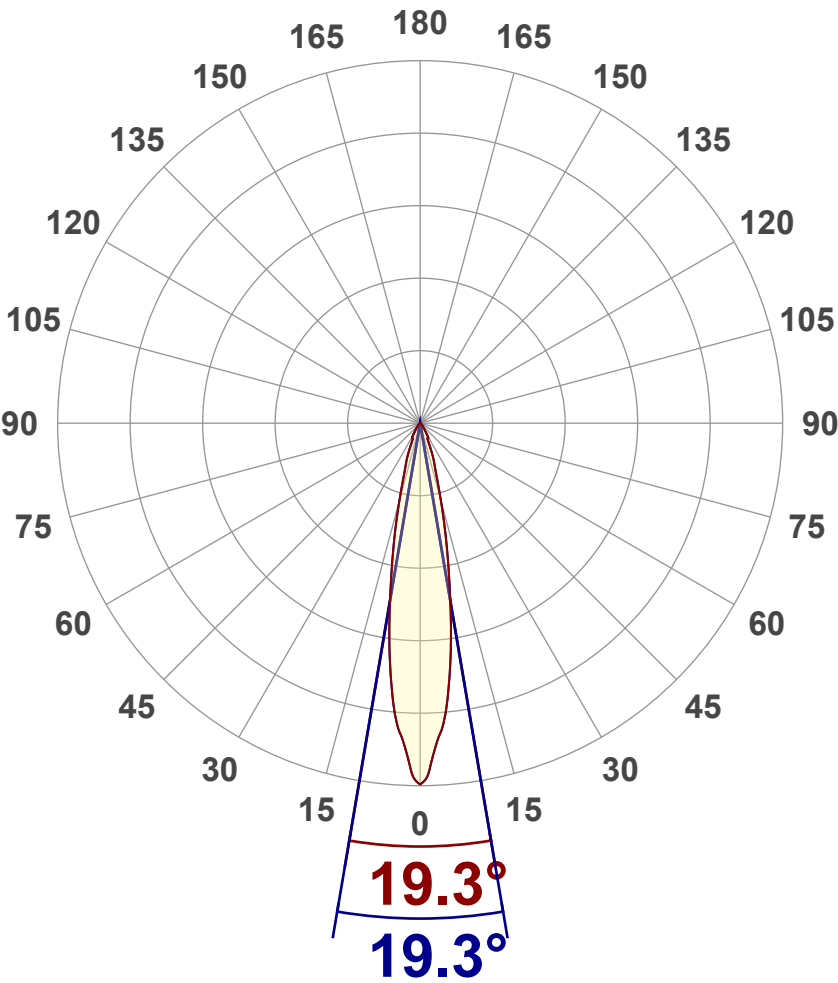
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Luminous Intensity diagram

Unit: 0-100% of peak intensity



Main Values

Output (total Lumen)	3198 lm
Peak Intensity	17156 cd
Beam Angle (50%)	19.3°
Beam Angle (90%)	19.3°
Beam Angle (10%)	19.3°

Cut-off Angle

Average 2,5%	67.3°
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Field Angle

Average 10%	41.5°
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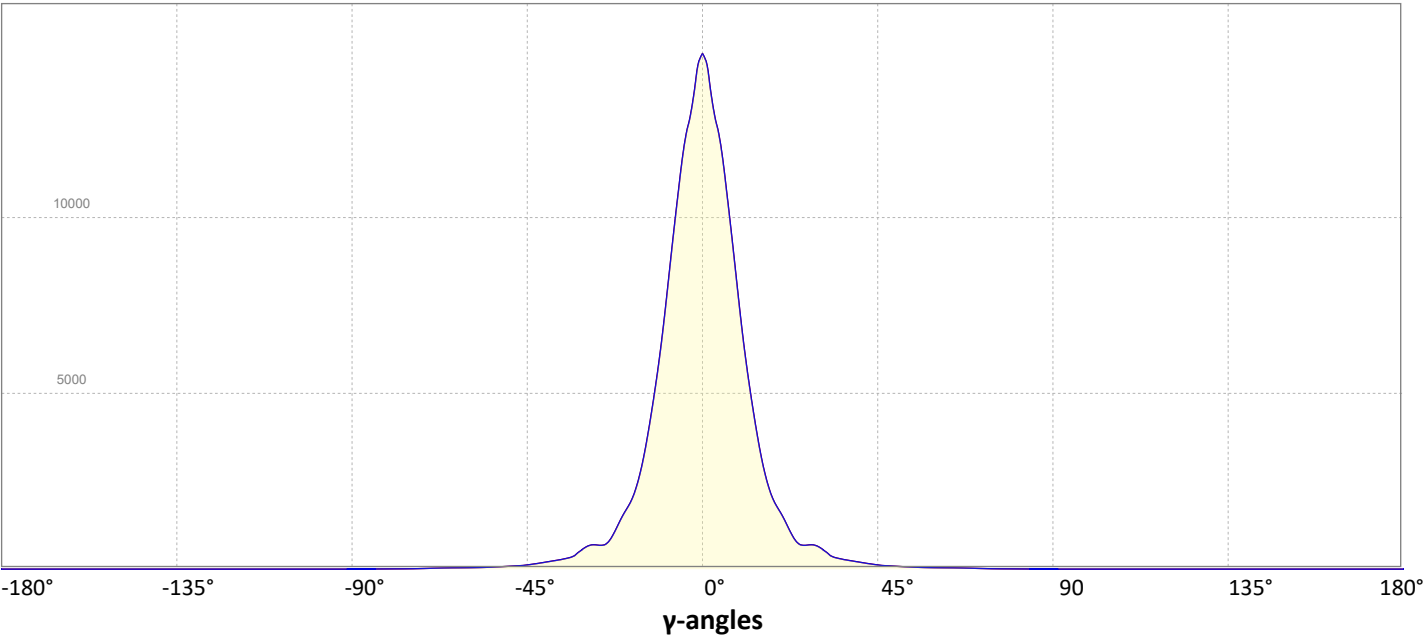
Intensity Ratio

In 120° cone	97.9%
In 90° cone	94.6%

C000-C180

C090-C270

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

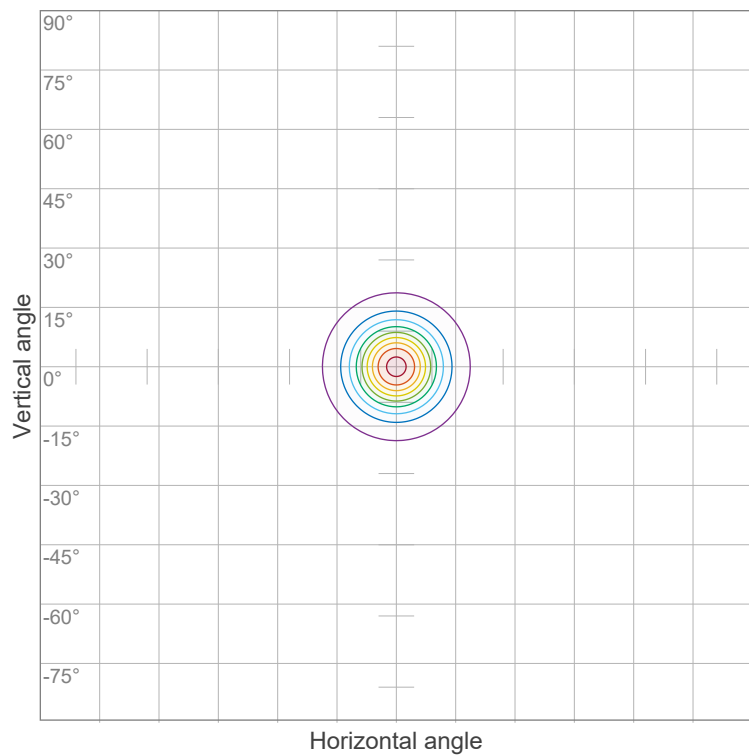


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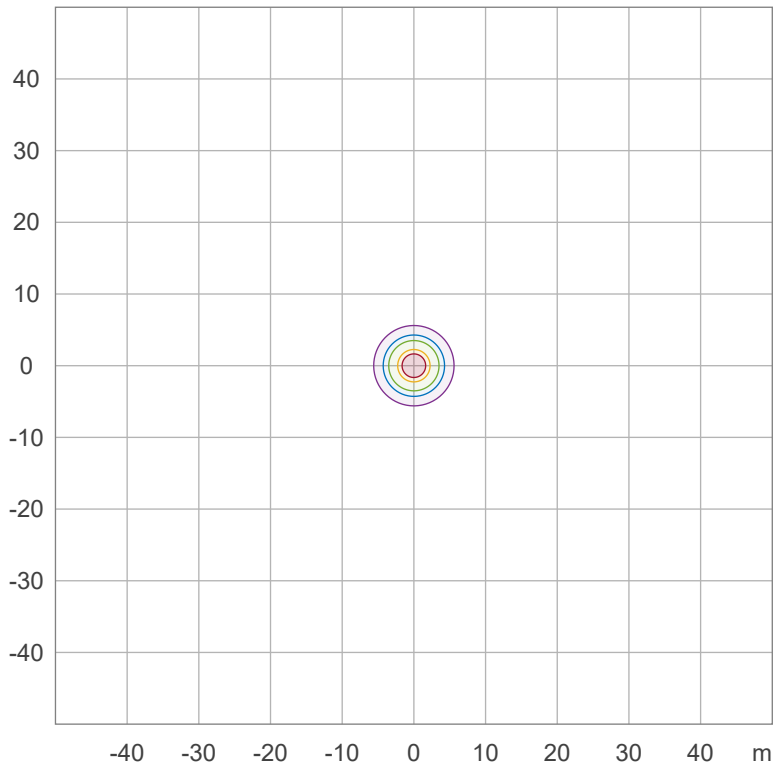
Iso-intensity Diagram (Iso-candela)



90 %	15440.0 cd
80 %	13724.5 cd
70 %	12008.9 cd
60 %	10293.3 cd
50 %	8577.8 cd
40 %	6862.2 cd
30 %	5146.7 cd
20 %	3431.1 cd
10 %	1715.6 cd

Peak intensity: 17155.6 cd
Number of c-planes: 32

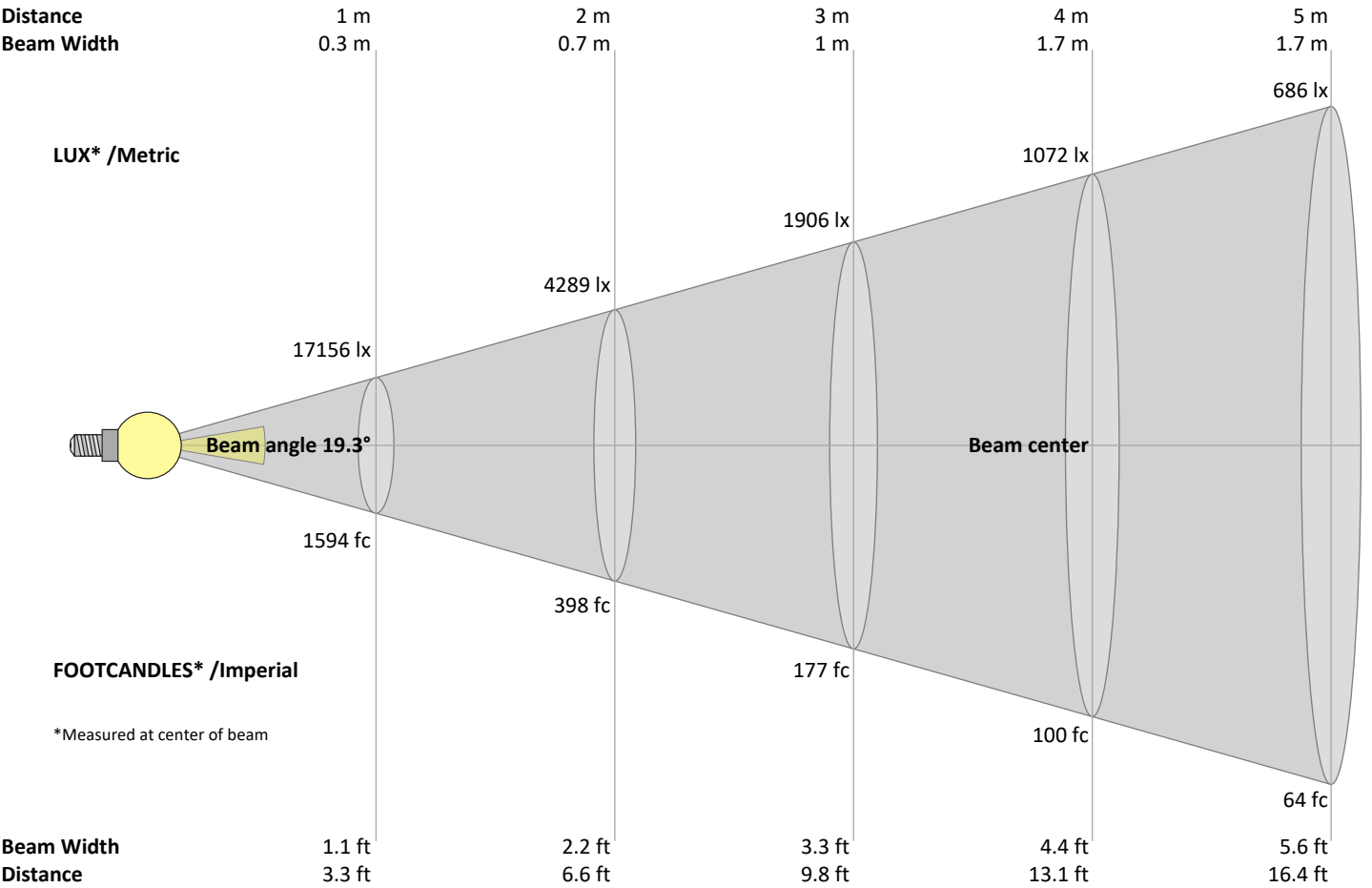
Iso-illuminance Diagram (Iso-lux)



50.0 %	85.8 lx
30.0 %	51.5 lx
10.0 %	17.2 lx
5.0 %	8.6 lx
3.0 %	5.1 lx

Peak illuminance: 171.6 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
17156	4289	1906	1072	686	477	350	268	212	172	142	119	102	88	76	67	59	53	48	43	lux
1593.8	398.5	177.1	99.6	63.8	44.3	32.5	24.9	19.7	15.9	13.2	11.1	9.4	8.1	7.1	6.2	5.5	4.9	4.4	4	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
17.2K	16.0K	14.6K	12.8K	10.5K	8.2K	6.2K	4.5K	3.2K	2.4K	1.9K	1.4K	0.9K	0.8K	0.8K	0.7K	0.6K	0.4K	0.3K	0.3K	cd
100%	94%	85%	75%	61%	48%	36%	26%	19%	14%	11%	8%	5%	5%	5%	4%	3%	2%	2%	2%	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
17.2K	16.0K	14.6K	12.8K	10.5K	8.2K	6.2K	4.5K	3.2K	2.4K	1.9K	1.4K	0.9K	0.8K	0.8K	0.7K	0.6K	0.4K	0.3K	0.3K	cd
100%	94%	85%	75%	61%	48%	36%	26%	19%	14%	11%	8%	5%	5%	5%	4%	3%	2%	2%	2%	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
17.2K	16.0K	14.6K	12.8K	10.5K	8.2K	6.2K	4.5K	3.2K	2.4K	1.9K	1.4K	0.9K	0.8K	0.8K	0.7K	0.6K	0.4K	0.3K	0.3K	cd
100%	94%	85%	75%	61%	48%	36%	26%	19%	14%	11%	8%	5%	5%	5%	4%	3%	2%	2%	2%	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
17.2K	16.0K	14.6K	12.8K	10.5K	8.2K	6.2K	4.5K	3.2K	2.4K	1.9K	1.4K	0.9K	0.8K	0.8K	0.7K	0.6K	0.4K	0.3K	0.3K	cd
100%	94%	85%	75%	61%	48%	36%	26%	19%	14%	11%	8%	5%	5%	5%	4%	3%	2%	2%	2%	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	18.9	19.4	19.0	19.6	19.8	18.9	19.4	19.0	19.6	19.8
	3H	19.2	19.8	19.6	20.0	20.2	19.2	19.8	19.6	20.0	20.2
	4H	19.3	19.9	19.7	20.1	20.3	19.3	19.9	19.7	20.1	20.3
	6H	19.4	19.9	19.6	20.2	20.5	19.4	19.9	19.6	20.2	20.5
	8H	19.3	19.8	19.7	20.2	20.5	19.3	19.8	19.7	20.2	20.5
	12H	19.3	19.8	19.7	20.1	20.6	19.3	19.8	19.7	20.1	20.6
4H	2H	18.9	19.5	19.3	19.7	20.0	18.9	19.5	19.3	19.7	20.0
	3H	19.5	20.0	19.8	20.3	20.7	19.5	20.0	19.8	20.3	20.7
	4H	19.5	20.0	19.9	20.4	20.9	19.5	20.0	19.9	20.4	20.9
	6H	19.6	20.1	20.1	20.4	20.8	19.6	20.1	20.1	20.4	20.8
	8H	19.6	20.0	20.1	20.4	20.7	19.6	20.0	20.1	20.4	20.7
	12H	19.6	19.9	20.1	20.3	20.8	19.6	19.9	20.1	20.3	20.8
8H	4H	19.5	20.0	20.0	20.3	20.7	19.5	20.0	20.0	20.3	20.7
	6H	19.6	19.9	20.1	20.4	20.9	19.6	19.9	20.1	20.4	20.9
	8H	19.7	19.9	20.2	20.4	21.1	19.7	19.9	20.2	20.4	21.1
	12H	19.7	19.9	20.3	20.4	21.0	19.7	19.9	20.3	20.4	21.0
12H	4H	19.4	19.8	19.9	20.2	20.7	19.4	19.8	19.9	20.2	20.7
	6H	19.6	19.9	20.1	20.4	21.0	19.6	19.9	20.1	20.4	21.0
	8H	19.7	19.9	20.3	20.4	21.0	19.7	19.9	20.3	20.4	21.0
Variations with the observer position for the luminaire spacings, S:											
S = 1.0H		2.2 / -1.7					2.2 / -1.7				
S = 1.5H		4.2 / -2.3					4.2 / -2.3				
S = 2.0H		5.8 / -2.6					5.8 / -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	112	110	108	112	110	108	106	106	104	103	102	101	100	99	98	97	95
2	110	106	102	100	108	104	101	99	101	98	96	98	96	94	95	94	92	91
3	106	101	96	93	104	99	95	92	97	94	91	94	92	90	92	90	88	87
4	102	96	91	88	100	95	91	88	93	89	87	91	88	86	89	87	85	83
5	98	92	87	84	97	91	87	83	89	86	83	88	85	82	86	84	81	80
6	95	88	84	80	94	88	83	80	86	82	79	85	81	79	84	81	78	77
7	92	85	80	77	91	84	80	77	83	79	76	82	79	76	81	78	76	75
8	89	82	77	74	88	82	77	74	81	77	74	80	76	74	79	76	73	72
9	87	79	75	72	86	79	75	72	78	74	72	77	74	71	77	73	71	70
10	84	77	73	70	84	77	72	70	76	72	69	75	72	69	75	71	69	68

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LAMPS (number of lamps)

[illegible]

Outdoor Light Planning

Lumen per Zone

Zone (γ)	Lumen	% Total
0-10°	1129 lm	35.3%
10-20°	1102 lm	34.5%
20-30°	469 lm	14.7%
30-40°	268 lm	8.4%
40-50°	103 lm	3.2%
50-60°	59 lm	1.8%
60-70°	38 lm	1.2%
70-80°	16 lm	0.5%
80-90°	6 lm	0.2%
90-100°	0 lm	0.0%
100-110°	0 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°	7 lm	0.2%
Total	3198 lm	100.0%

Intensity peaks

Max intensity	17156 cd
Intensity, 90°	3 cd
Intensity, 0°	17156 cd

Zonal Lumen summary

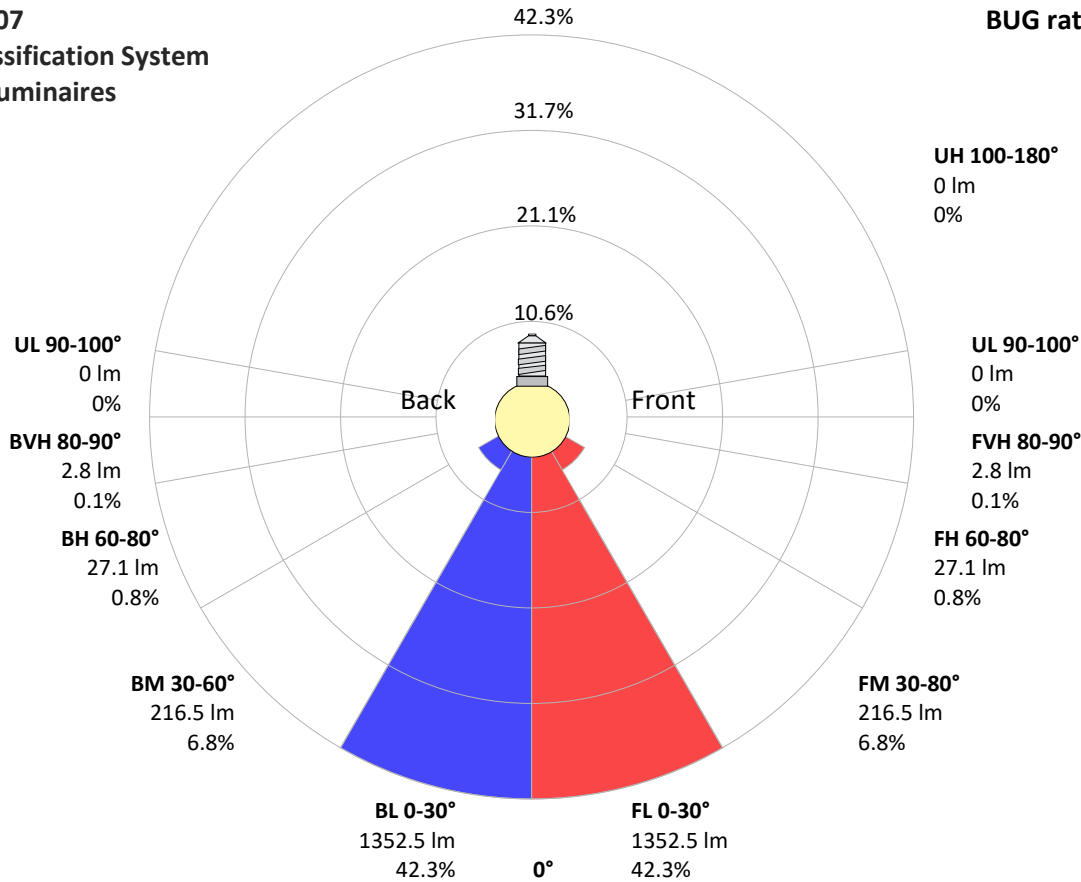
Zone (γ)	Lumen	% Total
0-30°	2701 lm	84.5%
0-40°	2969 lm	92.8%
0-60°	3131 lm	97.9%
60-90°	60 lm	1.9%
70-100°	22 lm	0.7%
90-120°	0 lm	0.0%
0-90°	3191 lm	99.8%
90-180°	7 lm	0.2%
0-180°	3198 lm	100.0%

BUG rating

	Lumen	% Total
Forward light		
Low(0-30°)	1353 lm	42.3%
Medium(30-60°)	217 lm	6.8%
High(60-80°)	27 lm	0.8%
Very high(80-90°)	3 lm	0.1%
Back light		
Low(0-30°)	1353 lm	42.3%
Medium(30-60°)	217 lm	6.8%
High(60-80°)	27 lm	0.8%
Very high(80-90°)	3 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



Power Details

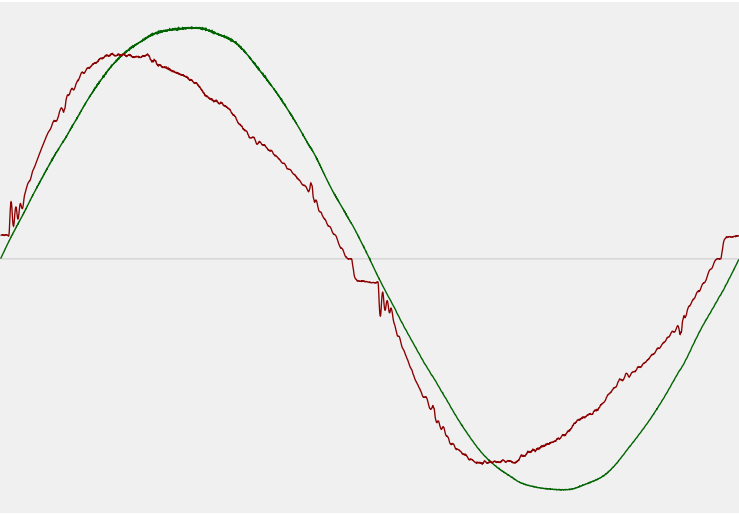
Input Power

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}	0.178 A
Volt-Ampere or apparent power = $V_{RMS} \cdot I_{RMS}$	42.67 VA
Displacement factor of AC power feed	0.97
Power factor of AC current feed	0.97
Total harmonic distortion of the current	10.64%
Total harmonic distortion of the voltage	1.09%

Efficiency

Radiated power efficiency	28.1%
<div><div></div></div>	
Lumen efficiency	77 lm/W
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Input Power Curve



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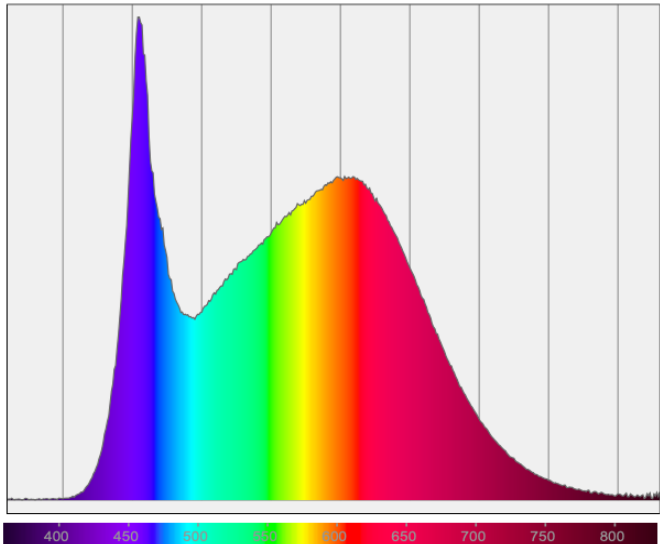
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Color Measurements

Correlated Color Temperature	CCT = 4000 K
Color Rendering TM30-18	R _f 88.9 – R _g 98.5
Color Shift, CIE duv	Duv ±0.0003

Spectral distribution



Color details

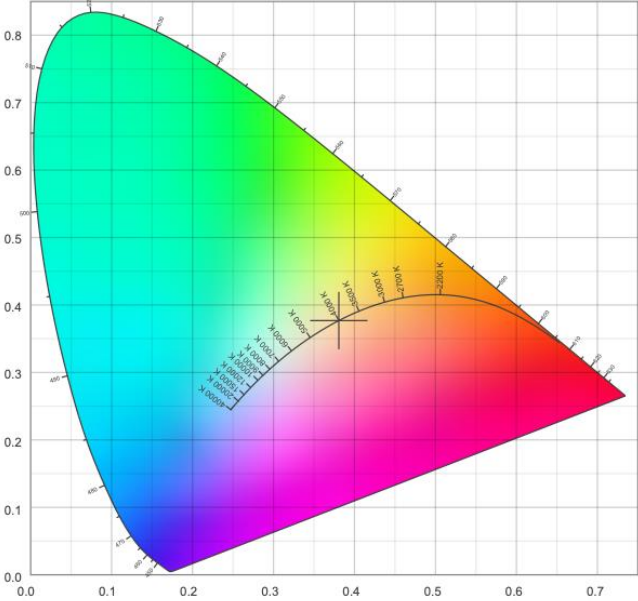
Correlated Color Temperature	CCT = 4000 K	Color coordinates CIE 1931	(x;y) = (0.381;0.377)
Color Rendering Index	CRI 92.6	Color coordinate CIEs 1960	(u;v) = (0.225;0.334)
Color Rendering Index, R9 (red component)	R9 = 72.2	Color deviation from BBL	Duv = ±0.0003
Color Rendering TM30-18	R _f 88.9 – R _g 98.5	Color coordinate CIEs 1976 (CIELUV)	(u';v') = (0.225;0.225)
Color Quality Scale	CQS = 88.9		

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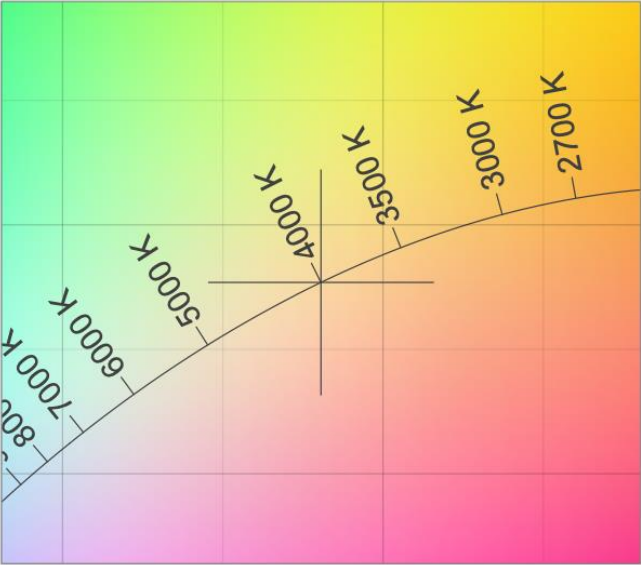
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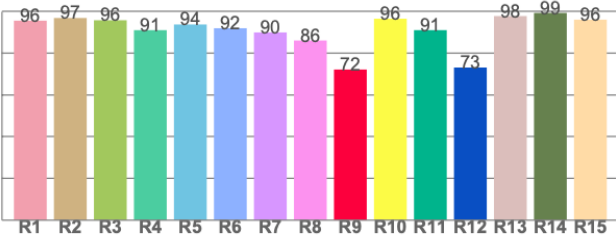
CIE 1931



CIE 1931 – zoomed on Planckian locus



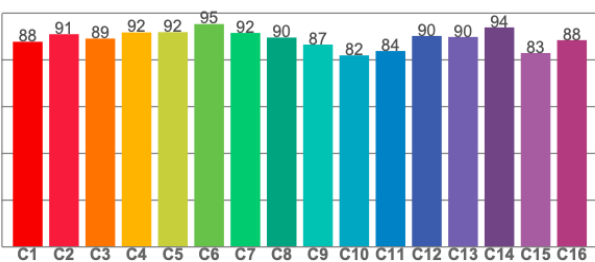
Color Rendering Index per reference color (CIE 1995)



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
95.5	96.8	95.7	91.0	93.7	91.9	89.9	86.0	72.2	96.4	91.0	73.1	97.7	99.2	96.0

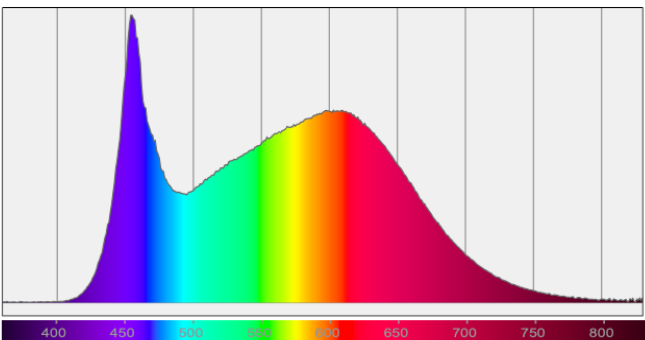
TM30-18 Rf-values per hue bin



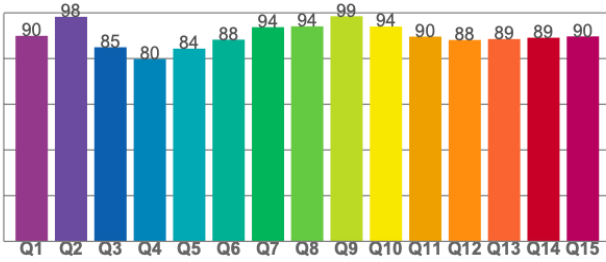
TM30 C values, 16 binned values out of total of 99 C values

C1	C2	C3	C4	C5	C6	C7	C8	C9	C10	C11	C12	C13	C14	C15	C16
87.8	91.0	89.1	91.7	91.9	95.3	91.5	89.6	86.6	81.9	83.8	90.3	89.8	93.9	83.0	88.4

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



Color Quality Scale by reference color



CQS Q values

Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10	Q11	Q12	Q13	Q14	Q15
89.9	98.3	84.9	79.8	84.3	88.3	93.7	94.1	98.5	94.0	89.6	88.1	88.6	89.1	89.7