

# Goniophotometry Report

1\_PHOT\_NINETY-NINE-1750lmChip-3000K-58Deg-HoneycombLouvre\_2303  
www.factorylux.com



Tested Light Source - 1\_PHOT\_NINETY-NINE-1750lmChip-3000K-58Deg-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  
 $\gamma$  (gamma)-Resolution  
Test Distance  
Input Power, Power and Displ. Factors  
Input RMS Voltage and Current  
Frequency of Input Power

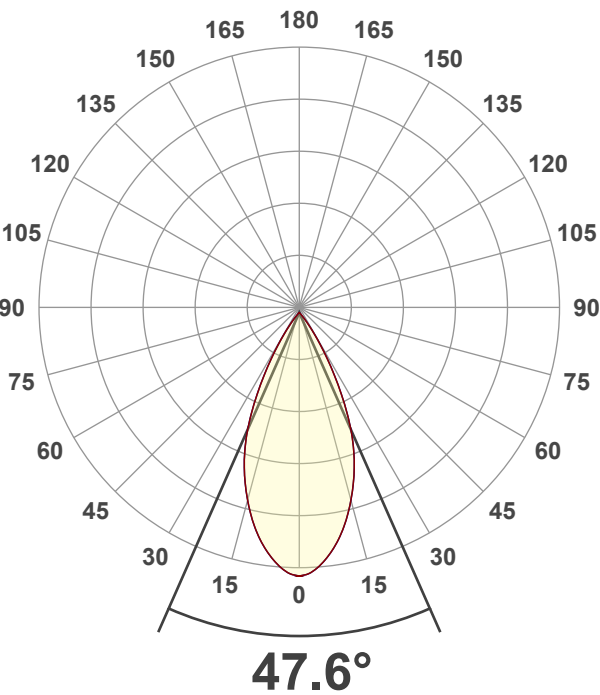
32 planes – 11.25°  
2°  
1.50 m  
14.6 W – PF 0.47 – DPF 0.78  
244 V – 0.128 A  
50 Hz

## Main Light Measurement Results

Output  
Efficiency  
Peak Intensity and Beam Angle  
Color Rendering Index

828 lm  
57 lm/W  
1399 cd – 47.6°  
CRI 93.0

## Light Intensity Distribution



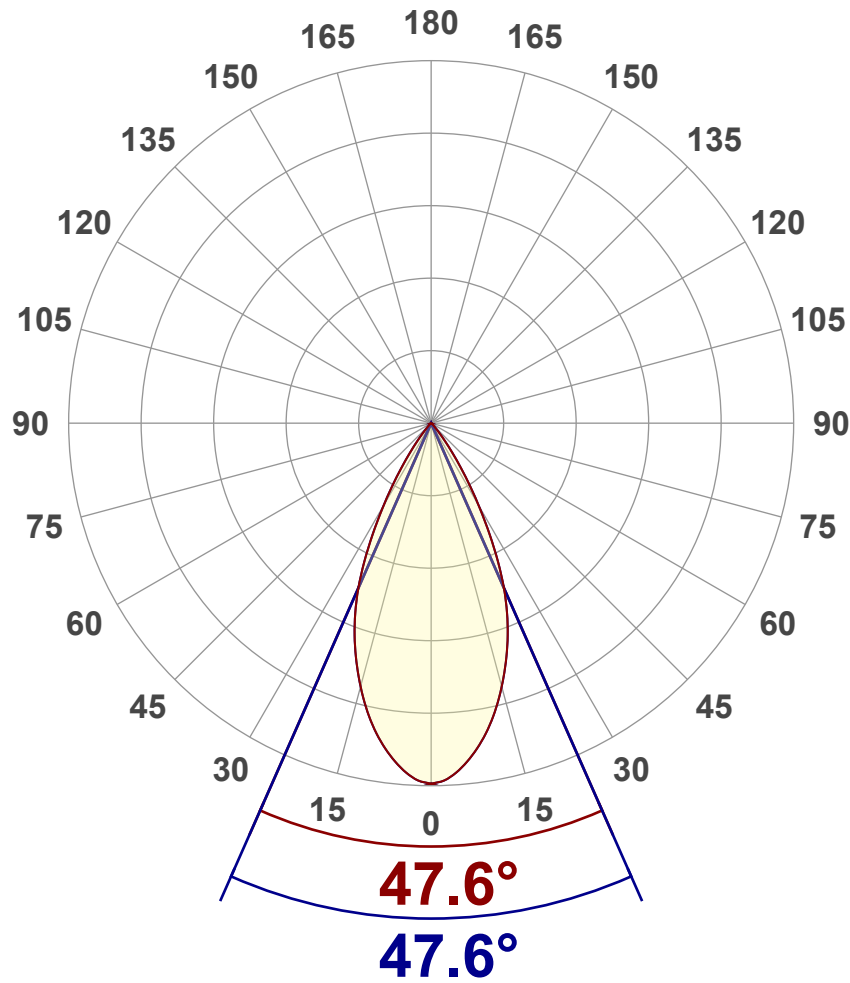
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Luminous Intensity diagram

Unit: 0-100% of peak intensity



Main Values

Output (total Lumen)	828 lm
Peak Intensity	1399 cd
Beam Angle (50%)	47.6°
Beam Angle (90%)	47.6°
Beam Angle (10%)	47.6°

Cut-off Angle

Average 2,5%	82.3°
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Field Angle

Average 10%	71.3°
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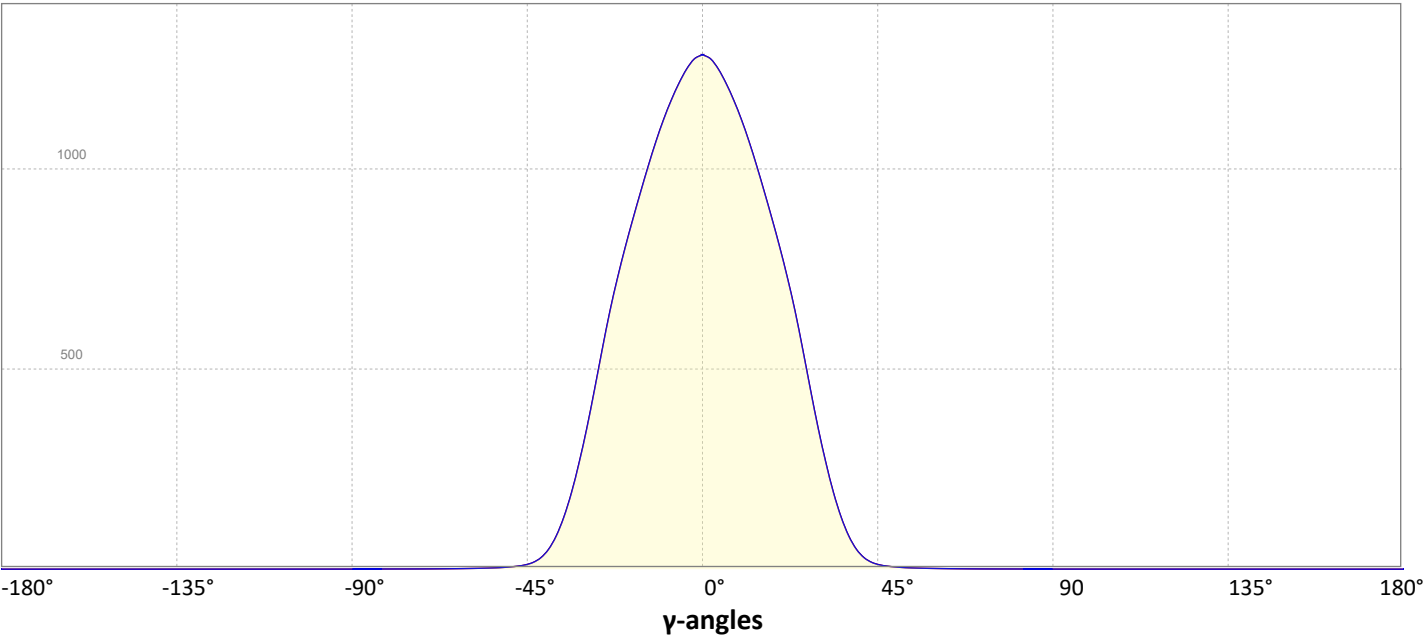
Intensity Ratio

In 120° cone	99.6%
In 90° cone	98.9%

C000-C180

C090-C270

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

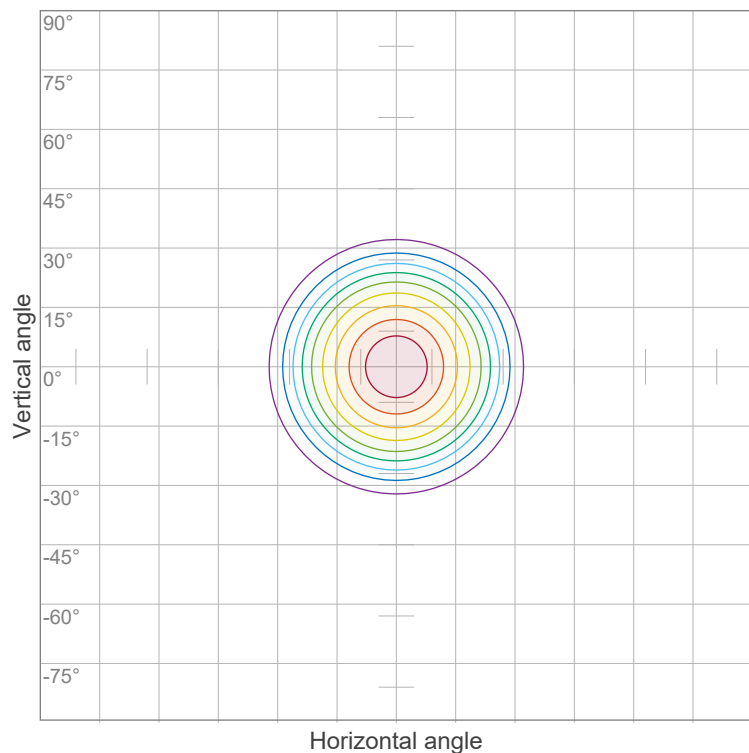


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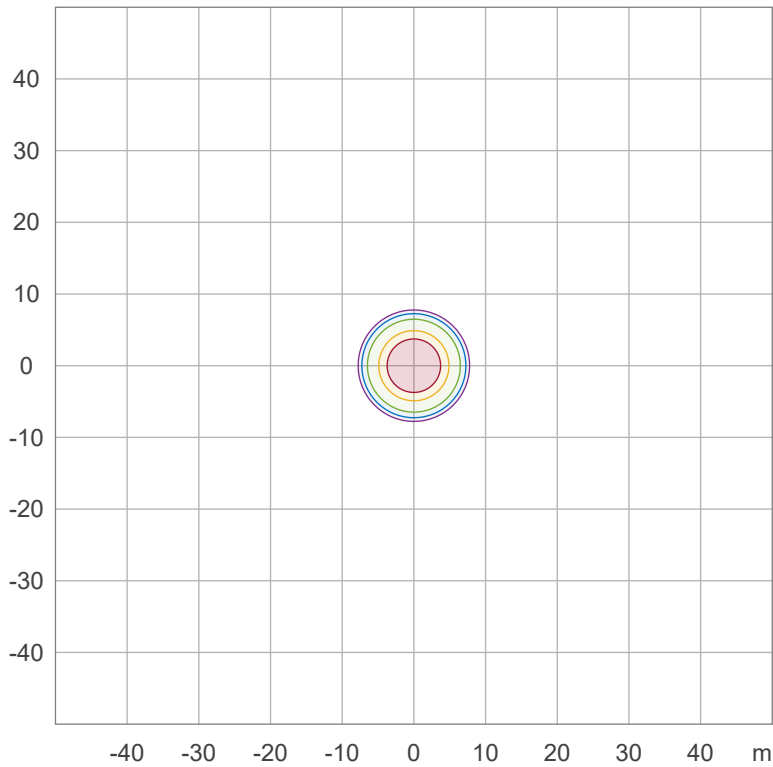
Iso-intensity Diagram (Iso-candela)



90 %	1259.0 cd
80 %	1119.1 cd
70 %	979.2 cd
60 %	839.3 cd
50 %	699.4 cd
40 %	559.5 cd
30 %	419.7 cd
20 %	279.8 cd
10 %	139.9 cd

Peak intensity: 1398.8 cd  
Number of c-planes: 32

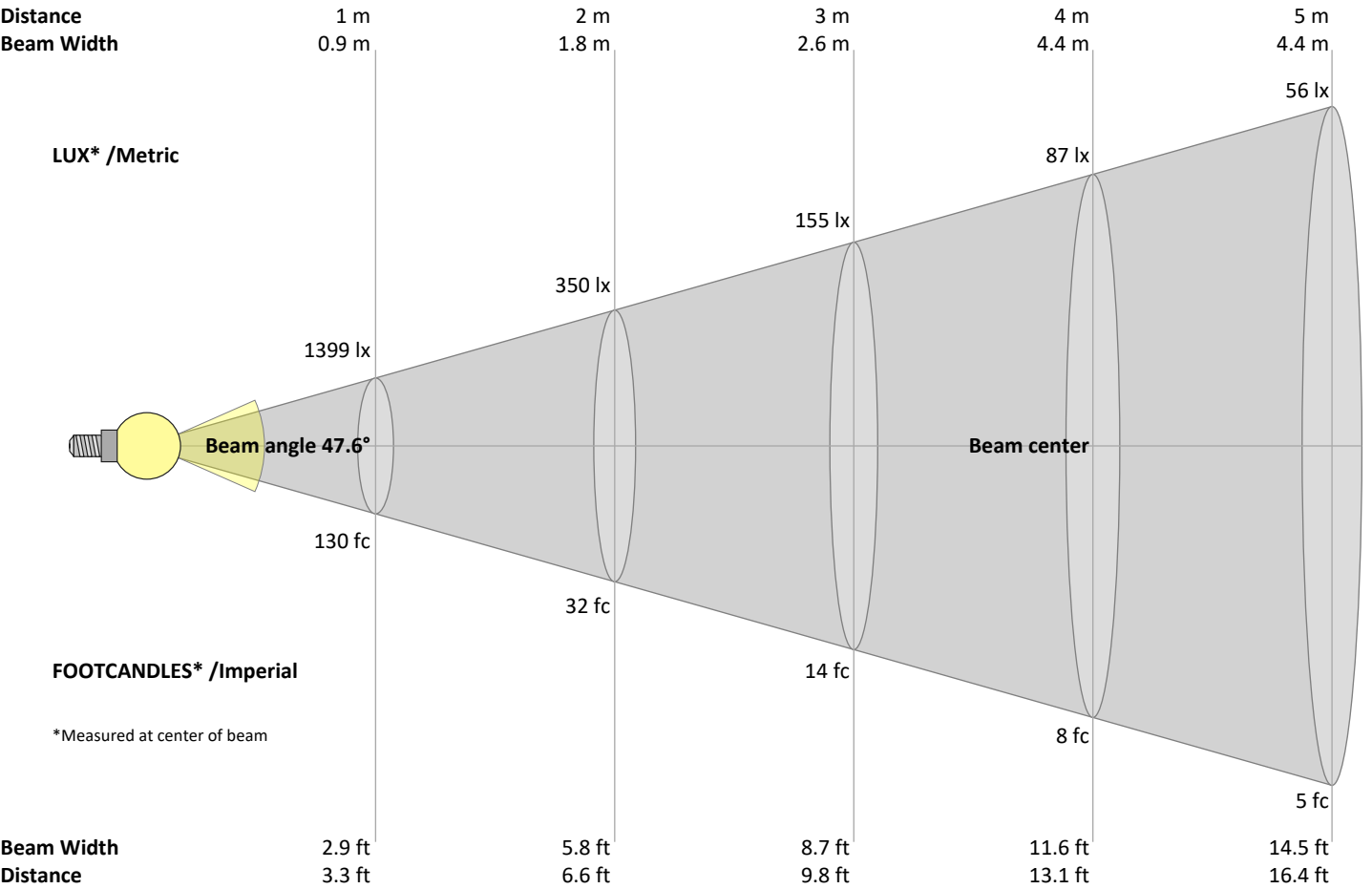
Iso-illuminance Diagram (Iso-lux)



50.0 %	7.0 lx
30.0 %	4.2 lx
10.0 %	1.4 lx
5.0 %	0.7 lx
3.0 %	0.4 lx

Peak illuminance: 14.0 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
1399	350	155	87	56	39	29	22	17	14	12	10	8	7	6	5	5	4	4	3	lux
130	32.5	14.4	8.1	5.2	3.6	2.7	2	1.6	1.3	1.1	0.9	0.8	0.7	0.6	0.5	0.4	0.4	0.4	0.3	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
1399	1389	1361	1323	1276	1223	1162	1094	1022	947	869	784	690	584	474	370	277	196	131	82	cd
100%	99%	97%	95%	91%	87%	83%	78%	73%	68%	62%	56%	49%	42%	34%	26%	20%	14%	9%	6%	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
1399	1389	1361	1323	1276	1223	1162	1094	1022	947	869	784	690	584	474	370	277	196	131	82	cd
100%	99%	97%	95%	91%	87%	83%	78%	73%	68%	62%	56%	49%	42%	34%	26%	20%	14%	9%	6%	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
1399	1389	1361	1323	1276	1223	1162	1094	1022	947	869	784	690	584	474	370	277	196	131	82	cd
100%	99%	97%	95%	91%	87%	83%	78%	73%	68%	62%	56%	49%	42%	34%	26%	20%	14%	9%	6%	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
1399	1389	1361	1323	1276	1223	1162	1094	1022	947	869	784	690	584	474	370	277	196	131	82	cd
100%	99%	97%	95%	91%	87%	83%	78%	73%	68%	62%	56%	49%	42%	34%	26%	20%	14%	9%	6%	of 0°val

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Light Planning – UGR table

Uncorrected, comprehensive UGR table according to 117-1995

Reflectances											
ρ Ceiling		70	70	50	50	30	70	70	50	50	30
ρ Walls		50	30	50	30	30	50	30	50	30	30
ρ Floor		20	20	20	20	20	20	20	20	20	20
Room size											
H = mounting height above eye level		Viewed Crosswise					Viewed Endwise				
X	Y	(Viewing direction orthogonal to lamp length axis)					(Viewing direction parallel to lamp length axis)				
2H	2H	15.4	16.0	15.5	16.2	16.4	15.4	16.0	15.5	16.2	16.4
	3H	15.1	15.8	15.5	16.0	16.2	15.1	15.8	15.5	16.0	16.2
	4H	15.0	15.7	15.4	15.9	16.2	15.0	15.7	15.4	15.9	16.2
	6H	15.0	15.6	15.3	15.9	16.2	15.0	15.6	15.3	15.9	16.2
	8H	15.0	15.5	15.3	15.8	16.2	15.0	15.5	15.3	15.8	16.2
	12H	14.9	15.4	15.3	15.8	16.2	14.9	15.4	15.3	15.8	16.2
4H	2H	15.0	15.7	15.4	15.9	16.1	15.0	15.7	15.4	15.9	16.1
	3H	14.9	15.4	15.3	15.8	16.2	14.9	15.4	15.3	15.8	16.2
	4H	14.8	15.3	15.2	15.7	16.2	14.8	15.3	15.2	15.7	16.2
	6H	14.7	15.2	15.2	15.6	15.9	14.7	15.2	15.2	15.6	15.9
	8H	14.7	15.1	15.2	15.5	15.8	14.7	15.1	15.2	15.5	15.8
	12H	14.6	15.0	15.1	15.4	15.8	14.6	15.0	15.1	15.4	15.8
8H	4H	14.6	15.1	15.2	15.5	15.8	14.6	15.1	15.2	15.5	15.8
	6H	14.6	14.9	15.1	15.4	15.9	14.6	14.9	15.1	15.4	15.9
	8H	14.6	14.8	15.1	15.4	16.0	14.6	14.8	15.1	15.4	16.0
	12H	14.5	14.8	15.1	15.3	15.9	14.5	14.8	15.1	15.3	15.9
12H	4H	14.6	14.9	15.1	15.4	15.8	14.6	14.9	15.1	15.4	15.8
	6H	14.6	14.8	15.1	15.3	16.0	14.6	14.8	15.1	15.3	16.0
	8H	14.5	14.7	15.1	15.2	15.8	14.5	14.7	15.1	15.2	15.8

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

S = 1.0H	6.1 / -11.7	6.1 / -11.7
S = 1.5H	8.8 / -12.2	8.8 / -12.2
S = 2.0H	10.8 / -12.7	10.8 / -12.7

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	106	106	106	102	102	102	100	
1	114	112	109	107	112	109	107	105	105	104	102	102	100	99	98	97	96	95
2	109	105	101	98	107	103	100	97	100	97	95	97	95	93	94	92	91	89
3	104	99	94	91	102	97	93	90	95	91	88	92	89	87	90	88	86	84
4	100	93	88	84	98	92	87	84	90	86	83	88	85	82	86	83	81	80
5	96	88	83	79	94	87	82	79	85	81	78	84	80	77	82	79	77	75
6	91	84	78	74	90	83	78	74	81	77	74	80	76	73	79	75	73	71
7	88	79	74	70	86	79	74	70	78	73	70	76	72	69	75	72	69	68
8	84	76	70	67	83	75	70	66	74	69	66	73	69	66	72	68	66	64
9	81	72	67	63	80	71	66	63	71	66	63	70	66	63	69	65	62	61
10	77	69	63	60	76	68	63	60	67	63	60	67	63	60	66	62	59	58

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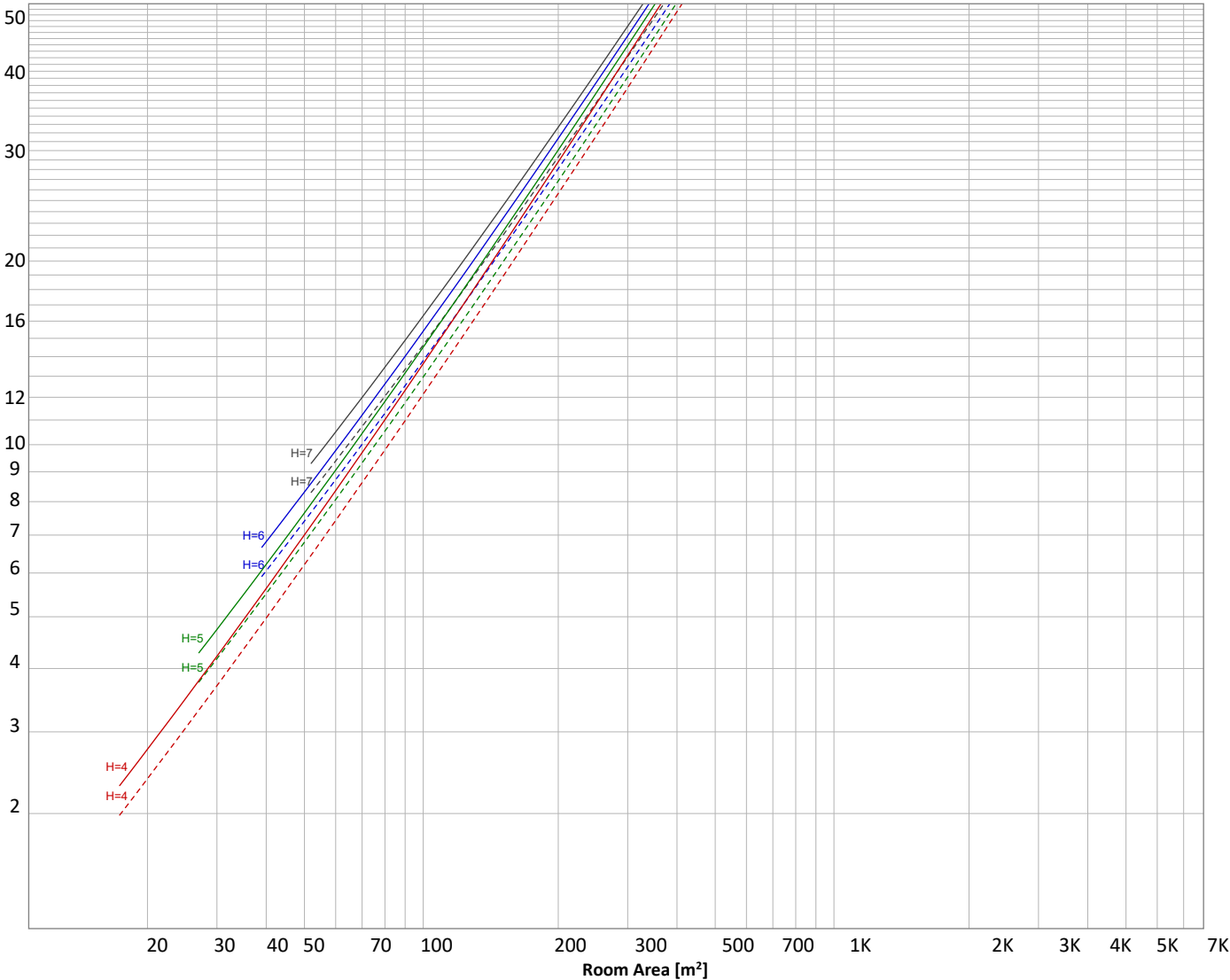
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Luminaire budgetary diagram

Uncorrected, comprehensive UGR table according to 117-1995

LAMPS (number of lamps)



Conditions

H = Room height	Flux = 828 lm	ρ(%)		
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°
124 lm	293 lm	284 lm	107 lm	13.1 lm	2.75 lm	1.16 lm	0.559 lm	0.403 lm
90°-100°	100°-110°	110°-120°	120°-130°	130°-140°	140°-150°	150°-160°	160°-170°	170°-180°
0.194 lm	0.188 lm	0.177 lm	0.160 lm	0.067 lm	0.000 lm	0.000 lm	0.000 lm	0.000 lm

Outdoor Light Planning

Lumen per Zone

Zone (γ)	Lumen	% Total
0-10°	124 lm	15.0%
10-20°	293 lm	35.4%
20-30°	284 lm	34.3%
30-40°	107 lm	13.0%
40-50°	13 lm	1.6%
50-60°	3 lm	0.3%
60-70°	1 lm	0.1%
70-80°	1 lm	0.1%
80-90°	0 lm	0.0%
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°	0 lm	0.0%
Total	828 lm	100.0%

Intensity peaks

Max intensity	1399 cd
Intensity, 90°	0 cd
Intensity, 0°	1399 cd

Zonal Lumen summary

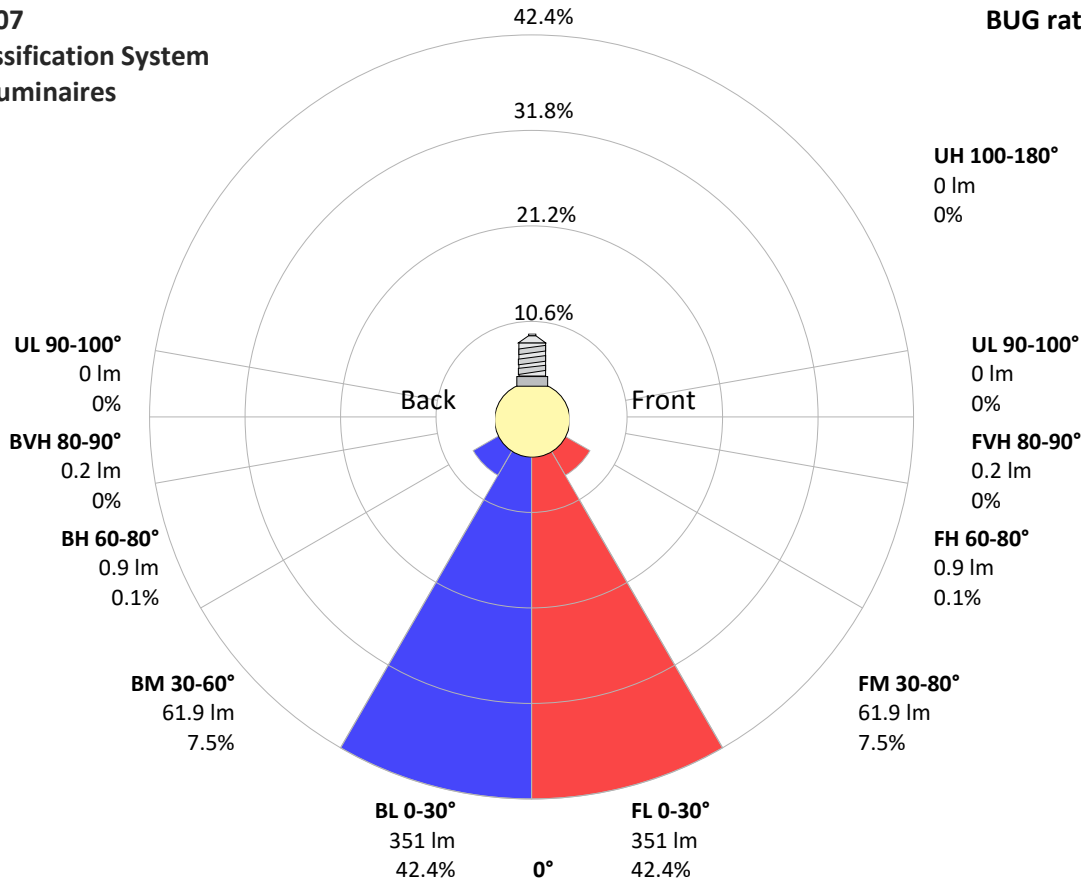
Zone (γ)	Lumen	% Total
0-30°	702 lm	84.8%
0-40°	809 lm	97.7%
0-60°	825 lm	99.6%
60-90°	2 lm	0.3%
70-100°	1 lm	0.1%
90-120°	1 lm	0.1%
0-90°	827 lm	99.9%
90-180°	1 lm	0.1%
0-180°	828 lm	100.0%

BUG rating

	Lumen	% Total
<b>Forward light</b>		
Low(0-30°)	351 lm	42.4%
Medium(30-60°)	62 lm	7.5%
High(60-80°)	1 lm	0.1%
Very high(80-90°)	0 lm	0.0%
<b>Back light</b>		
Low(0-30°)	351 lm	42.4%
Medium(30-60°)	62 lm	7.5%
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 B1 U1 G0



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## Power Details

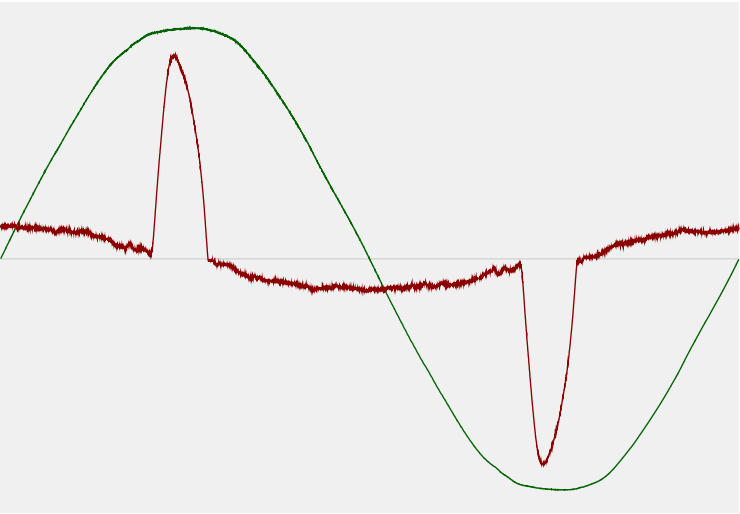
### Input Power

Power feed to light source	14.6 W
Frequency of input power	50 Hz
RMS Input voltage feed, $V_{RMS}$	244 V
RMS Input current feed, $I_{RMS}$	0.128 A
Volt-Ampere or apparent power = $V_{RMS} * I_{RMS}$	31.17 VA
Displacement factor of AC power feed	0.78
Power factor of AC current feed	0.47
Total harmonic distortion of the current	132.16%
Total harmonic distortion of the voltage	1.39%

### Efficiency

Radiated power efficiency	20.8%
<div><div></div></div>	
Lumen efficiency	57 lm/W
<div><div></div></div>	

### Input Power Curve



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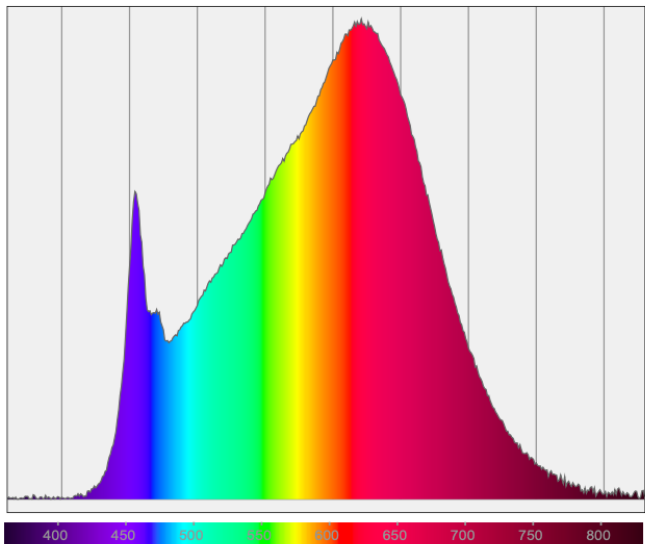
1\_PHOT\_NINETY-NINE-1750lmChip-3000K-58Deg-HoneycombLouvre\_2303  
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## Color Measurements

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

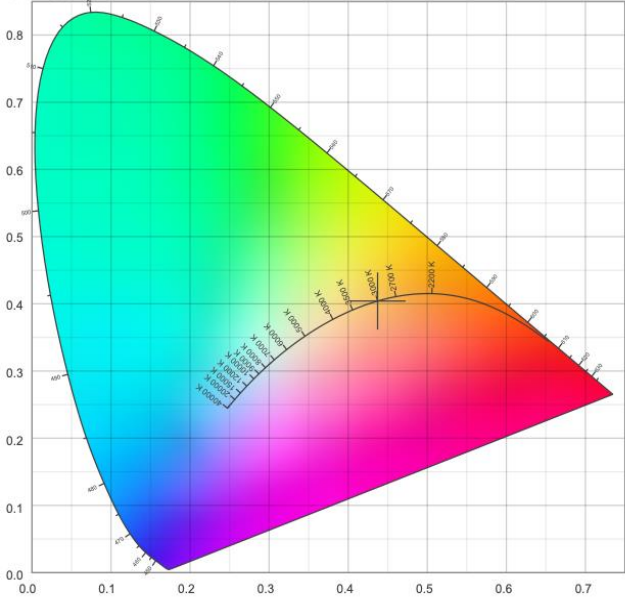
Correlated Color Temperature	CCT = 3000 K	Color coordinates CIE 1931	(x;y) = (0.437;0.404)
Color Rendering Index	CRI 94.1	Color coordinate CIEs 1960	(u;v) = (0.251;0.348)
Color Rendering Index, R9 (red component)	R9 = 68.6	Color deviation from BBL	Duv = ±0.0003
Color Rendering TM30-18	R <sub>f</sub>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

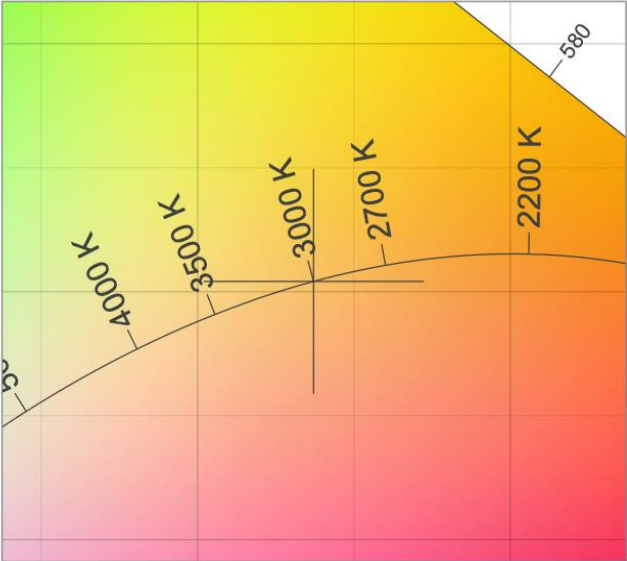
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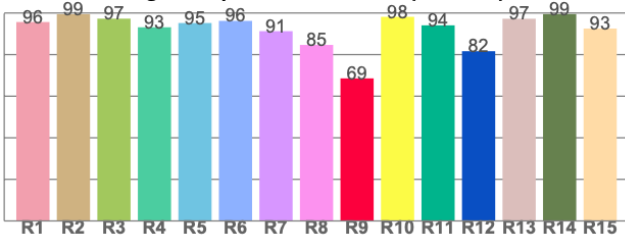
CIE 1931



CIE 1931 – zoomed on Planckian locus



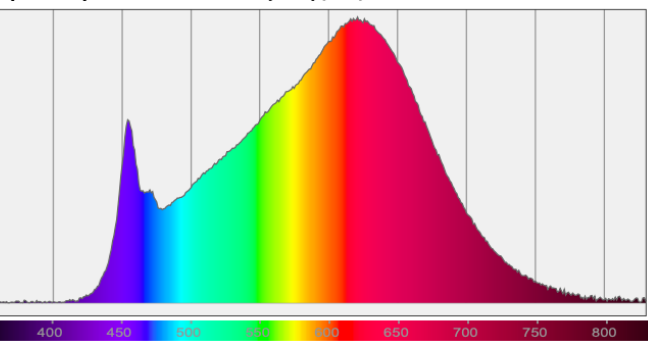
Color Rendering Index per reference color (CIE 1995)



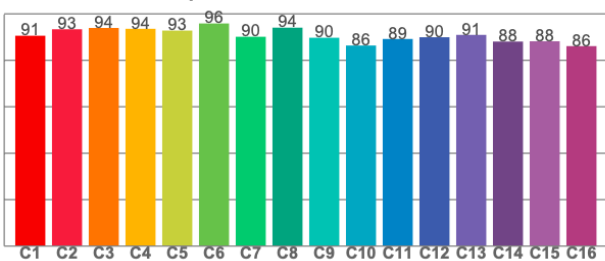
CRI R values, only R1-R8 are used to calculate final CRI value

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%



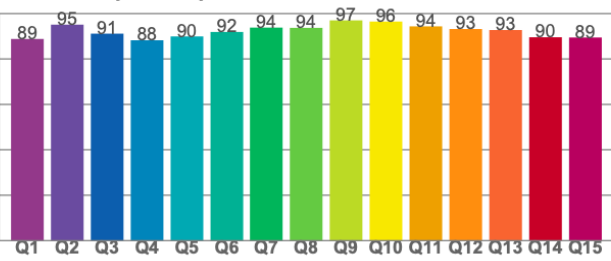
TM30-18 Rf-values per hue bin



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