

Tested Light Source - 1_PHOT_REFLEKTER-L-4750lmChip-4000K-58Deg-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°

1.5°

3.00 m

41.4 W – PF 0.97 – DPF 0.97

238 V – 0.180 A

50 Hz

Main Light Measurement Results

Output

Efficiency

Peak Intensity and Beam Angle

Color Rendering Index

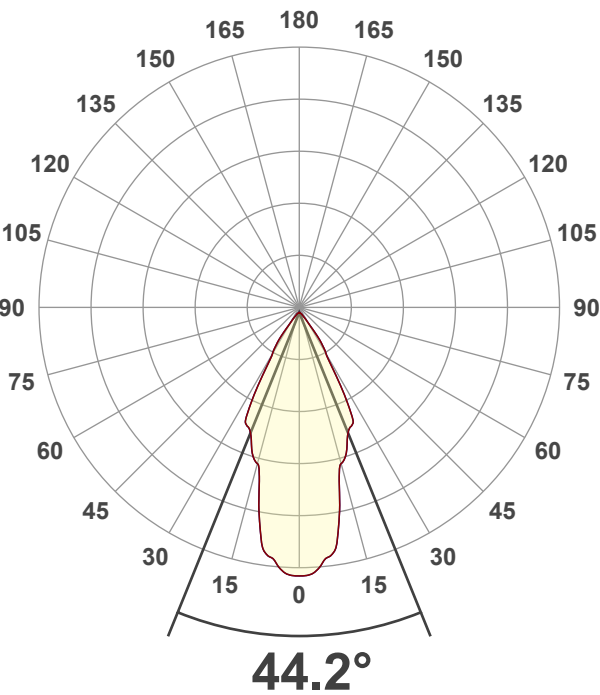
2936 lm

71 lm/W

4586 cd – 44.2°

CRI 92.7

Light Intensity Distribution



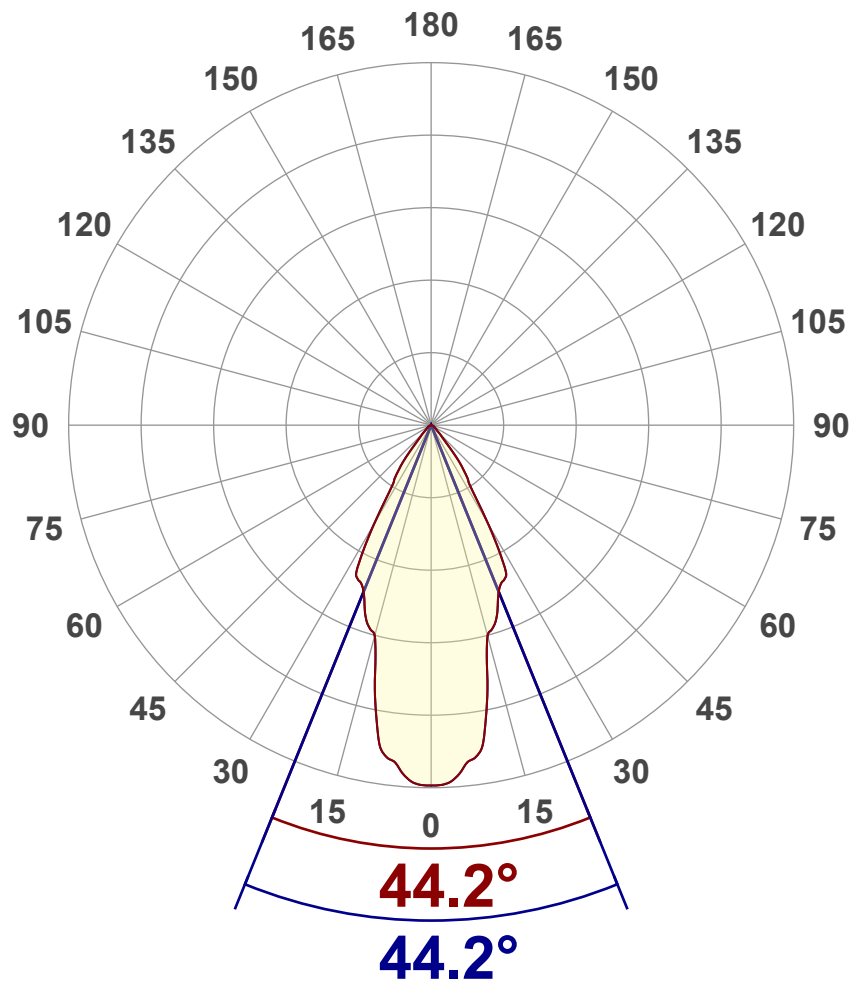
Goniophotometry Report

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Luminous Intensity diagram

Unit: 0-100% of peak intensity



Main Values

Output (total Lumen)	2936 lm
Peak Intensity	4586 cd
Beam Angle (50%)	44.2°
Beam Angle (90%)	44.2°
Beam Angle (10%)	44.2°

Cut-off Angle

Average 2,5%	93.6°
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Field Angle

Average 10%	77.4°
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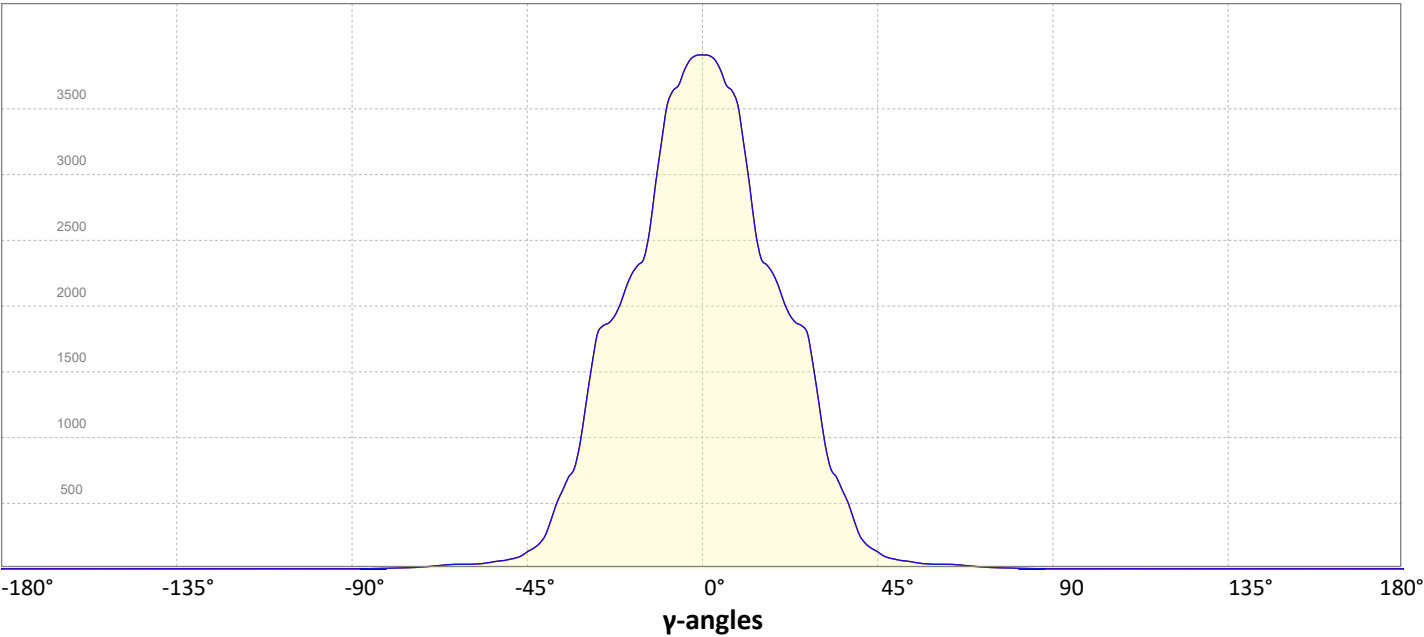
Intensity Ratio

In 120° cone	97.5%
In 90° cone	94.1%

C000-C180

C090-C270

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

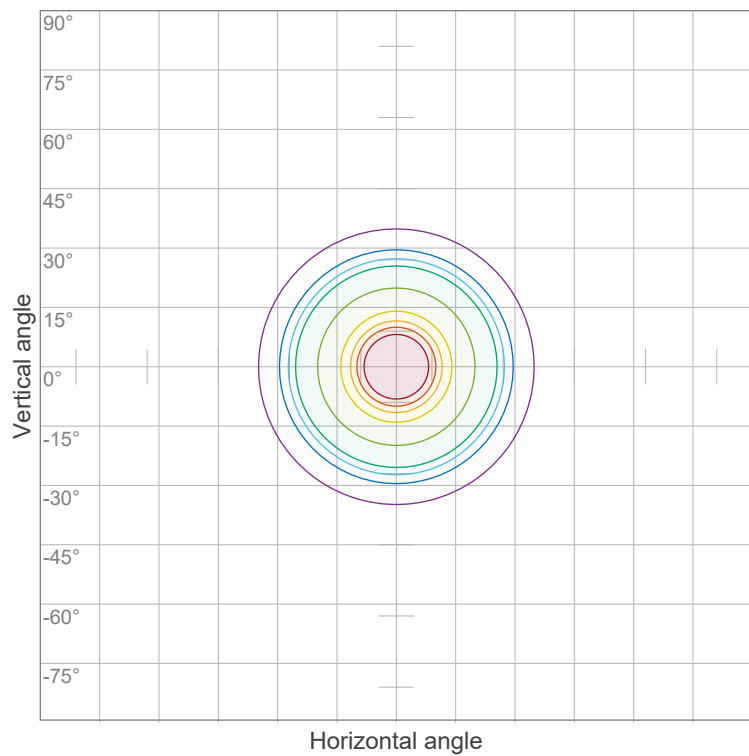


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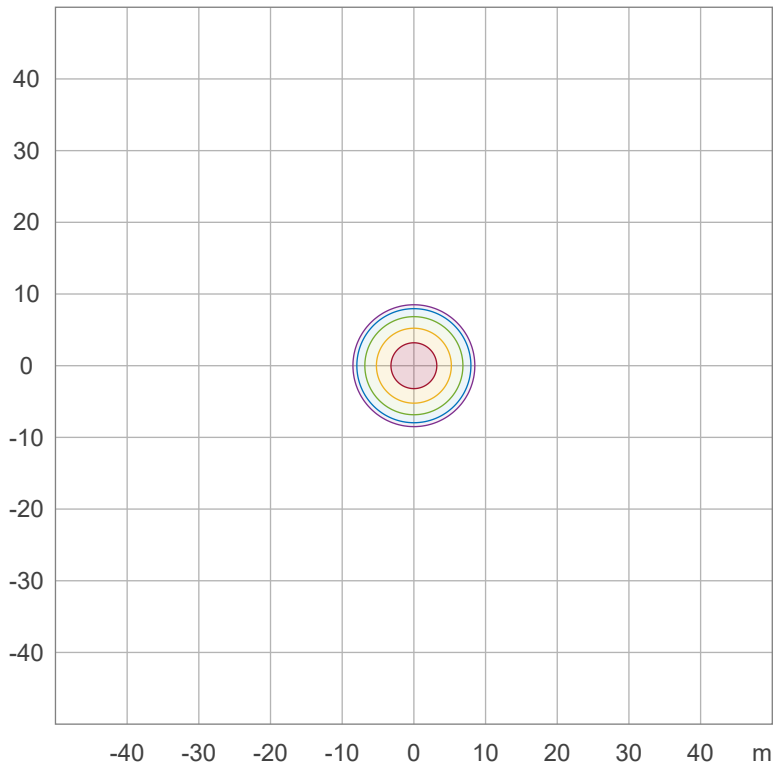
Iso-intensity Diagram (Iso-candela)



90 %	4127.3 cd
80 %	3668.7 cd
70 %	3210.1 cd
60 %	2751.5 cd
50 %	2292.9 cd
40 %	1834.3 cd
30 %	1375.8 cd
20 %	917.2 cd
10 %	458.6 cd

Peak intensity: 4585.9 cd
Number of c-planes: 32

Iso-illuminance Diagram (Iso-lux)



50.0 %	22.9 lx
30.0 %	13.8 lx
10.0 %	4.6 lx
5.0 %	2.3 lx
3.0 %	1.4 lx

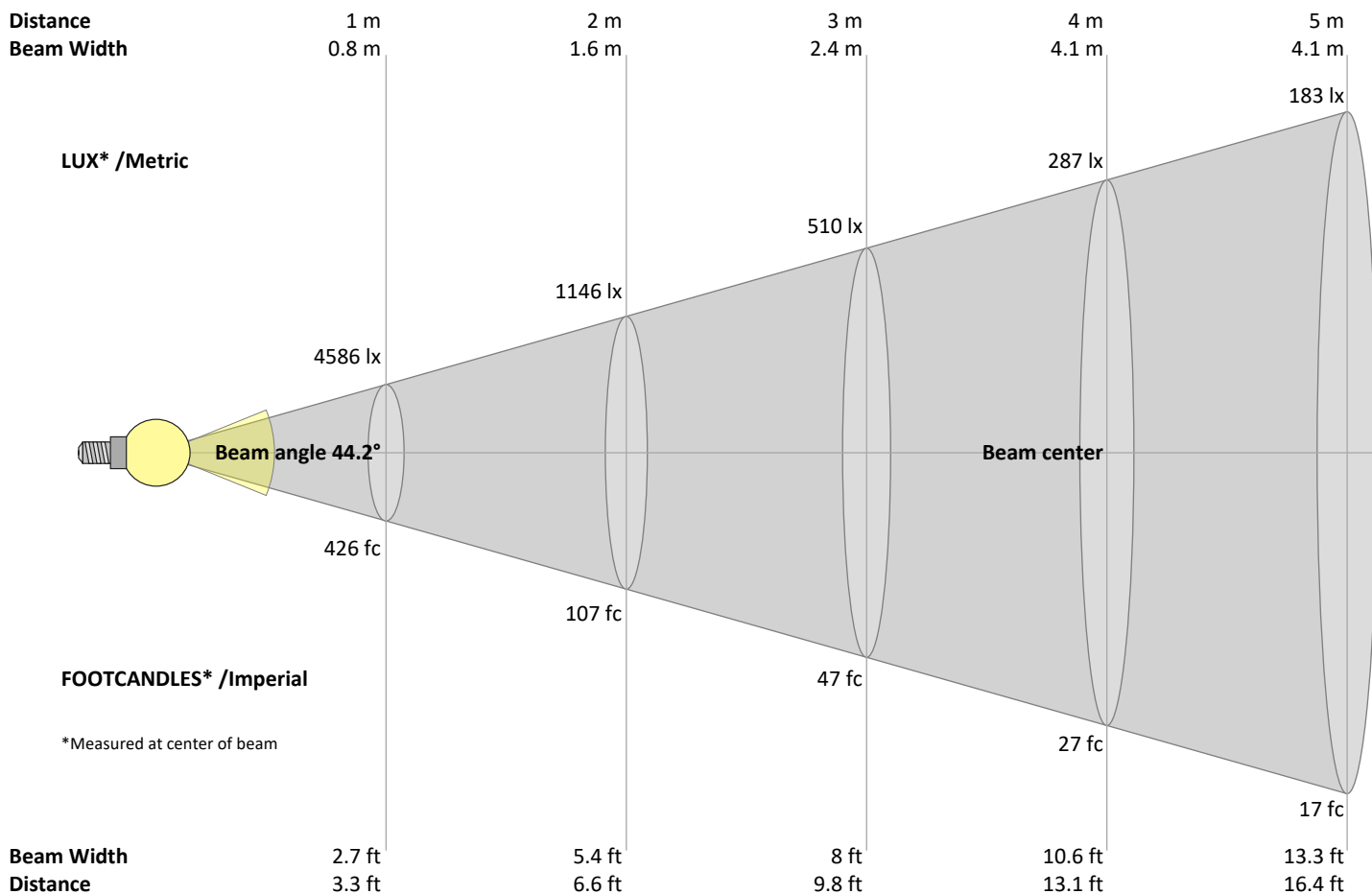
Peak illuminance: 45.9 lx
Mounting height: 10.0 m
Number of c-planes: 32

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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
4586	1146	510	287	183	127	94	72	57	46	38	32	27	23	20	18	16	14	13	11	lux
426	106.5	47.3	26.6	17	11.8	8.7	6.7	5.3	4.3	3.5	3	2.5	2.2	1.9	1.7	1.5	1.3	1.2	1.1	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
4586	4572	4491	4327	4230	3926	3446	2946	2733	2641	2474	2299	2198	2146	1896	1454	1036	841	696	529	cd
100%	100%	98%	94%	92%	86%	75%	64%	60%	58%	54%	50%	48%	47%	41%	32%	23%	18%	15%	12%	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
4586	4572	4491	4327	4230	3926	3446	2946	2733	2641	2474	2299	2198	2146	1896	1454	1036	841	696	529	cd
100%	100%	98%	94%	92%	86%	75%	64%	60%	58%	54%	50%	48%	47%	41%	32%	23%	18%	15%	12%	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
4586	4572	4491	4327	4230	3926	3446	2946	2733	2641	2474	2299	2198	2146	1896	1454	1036	841	696	529	cd
100%	100%	98%	94%	92%	86%	75%	64%	60%	58%	54%	50%	48%	47%	41%	32%	23%	18%	15%	12%	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
4586	4572	4491	4327	4230	3926	3446	2946	2733	2641	2474	2299	2198	2146	1896	1454	1036	841	696	529	cd
100%	100%	98%	94%	92%	86%	75%	64%	60%	58%	54%	50%	48%	47%	41%	32%	23%	18%	15%	12%	of 0°val

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Light Planning – UGR table

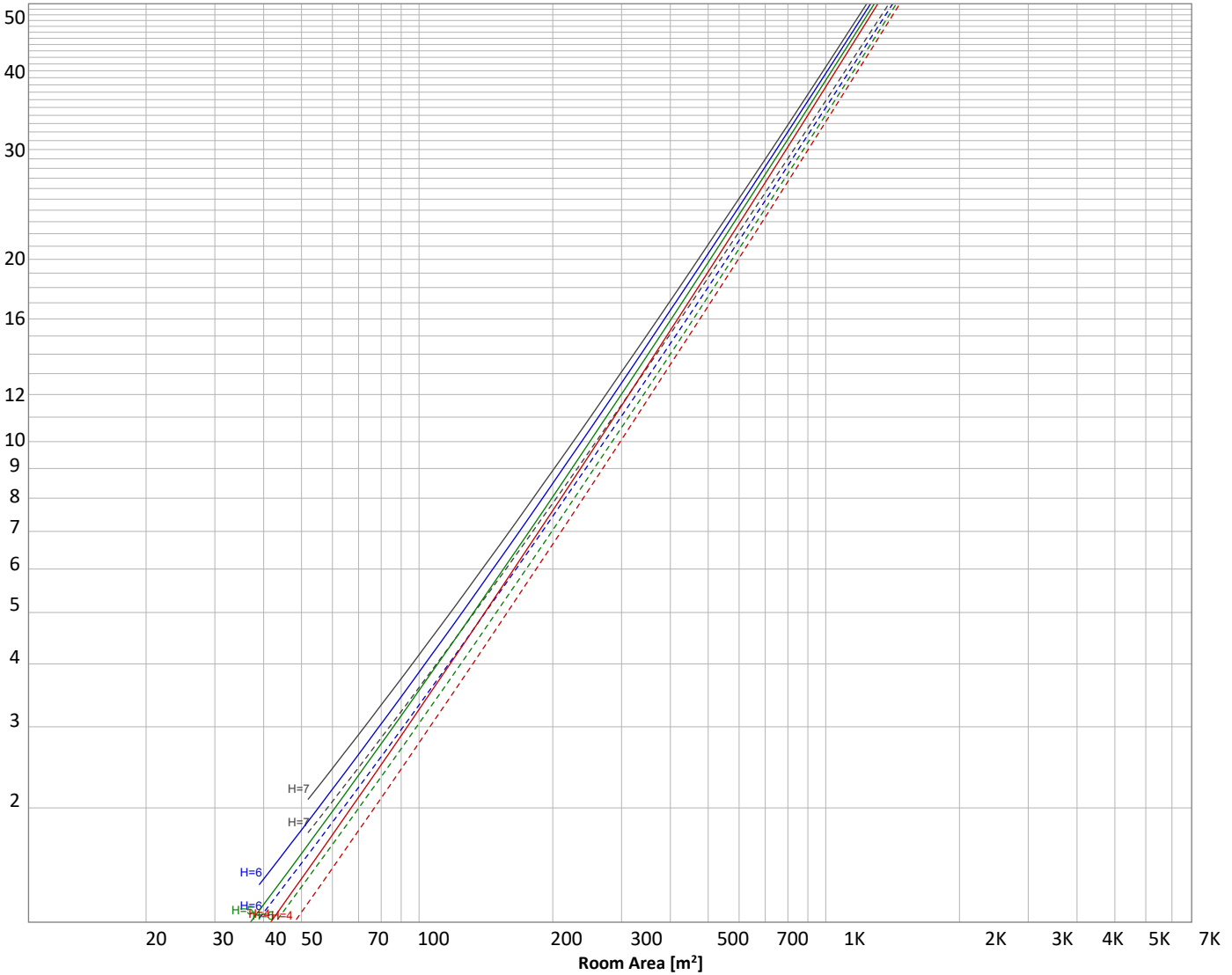
Uncorrected, comprehensive UGR table according to 117-1995

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	21.6	22.2	21.7	22.4	22.6	21.6	22.2	21.7	22.4	22.6
	3H	21.5	22.3	21.9	22.5	22.7	21.5	22.3	21.9	22.5	22.7
	4H	21.5	22.3	21.9	22.5	22.7	21.5	22.3	21.9	22.5	22.7
	6H	21.6	22.2	21.9	22.5	22.8	21.6	22.2	21.9	22.5	22.8
	8H	21.5	22.1	21.9	22.5	22.8	21.5	22.1	21.9	22.5	22.8
	12H	21.5	22.1	21.9	22.4	22.8	21.5	22.1	21.9	22.4	22.8
4H	2H	21.3	22.1	21.7	22.3	22.5	21.3	22.1	21.7	22.3	22.5
	3H	21.6	22.2	21.9	22.5	22.9	21.6	22.2	21.9	22.5	22.9
	4H	21.5	22.1	22.0	22.5	23.0	21.5	22.1	22.0	22.5	23.0
	6H	21.6	22.1	22.0	22.4	22.8	21.6	22.1	22.0	22.4	22.8
	8H	21.5	22.0	22.0	22.4	22.8	21.5	22.0	22.0	22.4	22.8
	12H	21.5	21.9	22.0	22.3	22.8	21.5	21.9	22.0	22.3	22.8
8H	4H	21.5	22.0	22.0	22.3	22.7	21.5	22.0	22.0	22.3	22.7
	6H	21.5	21.9	22.0	22.3	22.9	21.5	21.9	22.0	22.3	22.9
	8H	21.6	21.8	22.1	22.4	23.0	21.6	21.8	22.1	22.4	23.0
	12H	21.6	21.8	22.1	22.3	22.9	21.6	21.8	22.1	22.3	22.9
12H	4H	21.4	21.8	21.9	22.2	22.7	21.4	21.8	21.9	22.2	22.7
	6H	21.5	21.8	22.0	22.3	23.0	21.5	21.8	22.0	22.3	23.0
	8H	21.5	21.8	22.1	22.3	22.9	21.5	21.8	22.1	22.3	22.9
Variations with the observer position for the luminaire spacings, S:											
S = 1.0H		4.0 / -3.7					4.0 / -3.7				
S = 1.5H		6.5 / -4.2					6.5 / -4.2				
S = 2.0H		8.4 / -4.7					8.4 / -4.7				

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	111	106	106	106	102	102	102	99
1	113	111	108	106	111	108	106	104	104	102	101	100	99	98	97	96	95	93
2	108	103	99	96	106	101	98	94	98	95	92	95	92	90	92	90	88	87
3	102	96	91	87	100	95	90	87	92	88	85	90	86	84	87	85	82	81
4	98	90	85	80	96	89	84	80	87	82	79	85	81	78	83	80	77	76
5	93	85	79	75	91	84	78	74	82	77	74	80	76	73	79	75	72	71
6	88	80	74	70	87	79	73	69	77	73	69	76	72	68	75	71	68	67
7	84	75	69	65	83	75	69	65	73	68	65	72	68	64	71	67	64	63
8	80	71	65	61	79	71	65	61	70	65	61	68	64	61	67	63	60	59
9	77	68	62	58	76	67	62	58	66	61	58	65	61	57	64	60	57	56
10	74	64	59	55	73	64	58	55	63	58	55	62	58	54	61	57	54	53

Luminaire budgetary diagram
Uncorrected, comprehensive UGR table according to 117-1995
LAMPS (number of lamps)



Conditions		ρ(%)			
H = Room height	Flux = 2936 lm	Line type	Ceiling reflectance	Wall reflectance	Floor reflectance
H _{down} = Lamp distance from ceiling =	0.00 m		70	50	30
H _{work} = Work area height from floor =	0.00 m		50	30	20
E _{work} = Average lux on work area =	100 lx				

Zonal Lumen Summary

0°-10°	10°-20°	20°-30°	30°-40°	40°-50°	50°-60°	60°-70°	70°-80°	80°-90°
410 lm	824 lm	963 lm	486 lm	125 lm	52.7 lm	36.7 lm	15.3 lm	5.34 lm
90°-100°	100°-110°	110°-120°	120°-130°	130°-140°	140°-150°	150°-160°	160°-170°	170°-180°
2.99 lm	2.90 lm	2.72 lm	2.46 lm	2.12 lm	1.72 lm	1.27 lm	0.777 lm	0.262 lm

Outdoor Light Planning

Lumen per Zone

Zone (γ)	Lumen	% Total
0-10°	410 lm	14.0%
10-20°	824 lm	28.1%
20-30°	963 lm	32.8%
30-40°	486 lm	16.5%
40-50°	125 lm	4.3%
50-60°	53 lm	1.8%
60-70°	37 lm	1.3%
70-80°	15 lm	0.5%
80-90°	5 lm	0.2%
90-100°	3 lm	0.1%
100-110°	3 lm	0.1%
110-120°	3 lm	0.1%
120-130°	2 lm	0.1%
130-140°	2 lm	0.1%
140-150°	2 lm	0.1%
150-160°	1 lm	0.0%
160-170°	1 lm	0.0%
170-180°	0 lm	0.0%
Total	2936 lm	100.0%

Intensity peaks

Max intensity	4586 cd
Intensity, 90°	3 cd
Intensity, 0°	4586 cd

Zonal Lumen summary

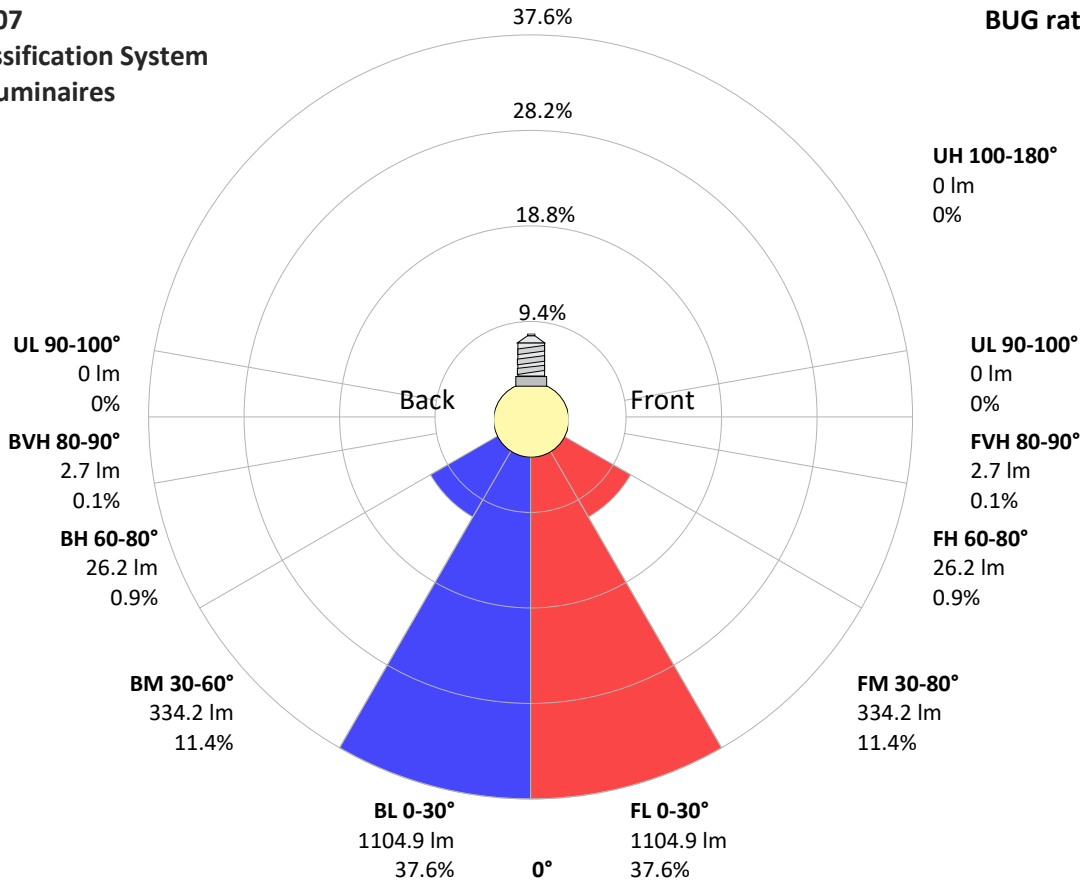
Zone (γ)	Lumen	% Total
0-30°	2198 lm	74.9%
0-40°	2683 lm	91.4%
0-60°	2861 lm	97.5%
60-90°	57 lm	2.0%
70-100°	24 lm	0.8%
90-120°	9 lm	0.3%
0-90°	2919 lm	99.4%
90-180°	17 lm	0.6%
0-180°	2936 lm	100.0%

BUG rating

	Lumen	% Total
Forward light		
Low(0-30°)	1105 lm	37.6%
Medium(30-60°)	334 lm	11.4%
High(60-80°)	26 lm	0.9%
Very high(80-90°)	3 lm	0.1%
Back light		
Low(0-30°)	1105 lm	37.6%
Medium(30-60°)	334 lm	11.4%
High(60-80°)	26 lm	0.9%
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



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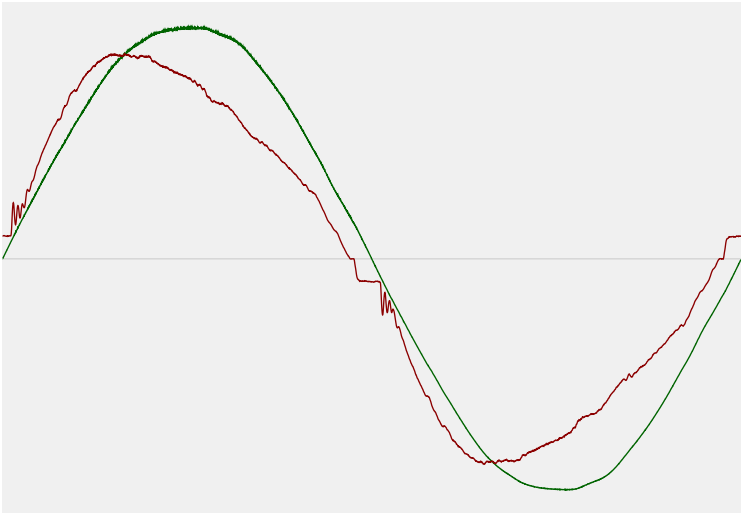


Power Details

Input Power

Power feed to light source	41.4 W
Frequency of input power	50 Hz
RMS Input voltage feed, V_{RMS}	238 V
RMS Input current feed, I_{RMS}	0.180 A
Volt-Ampere or apparent power = $V_{RMS} \cdot I_{RMS}$	42.75 VA
Displacement factor of AC power feed	0.97
Power factor of AC current feed	0.97
Total harmonic distortion of the current	10.66%
Total harmonic distortion of the voltage	1.11%

Input Power Curve



Efficiency

Radiated power efficiency	25.8%
Lumen efficiency	71 lm/W

Goniophotometry Report

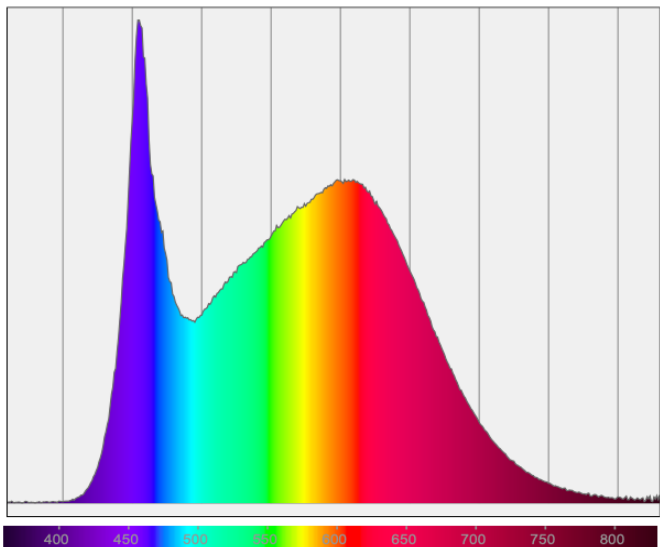
1_PHOT_REFLEKTER-L-4750lmChip-4000K-58Deg-ConcentricLouvre_2303
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Color Measurements

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

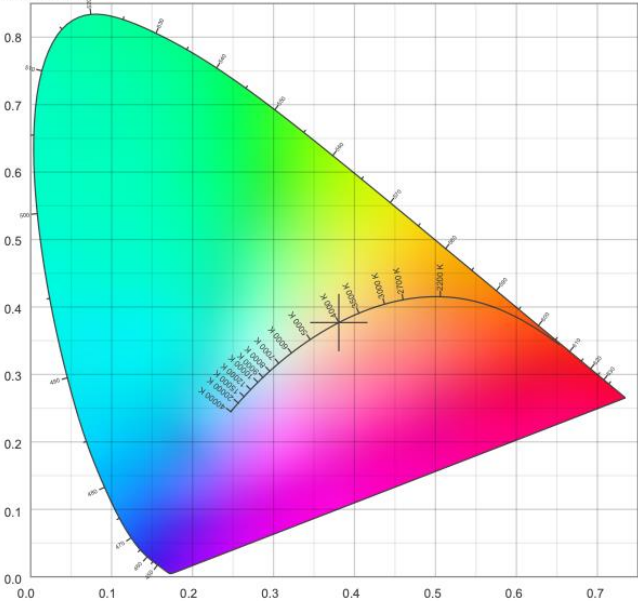
Correlated Color Temperature	CCT = 4000 K	Color coordinates CIE 1931	(x;y) = (0.381;0.377)
Color Rendering Index	CRI 92.6	Color coordinate CIEs 1960	(u;v) = (0.225;0.334)
Color Rendering Index, R9 (red component)	R9 = 72.2	Color deviation from BBL	Duv = ±0.0003
Color Rendering TM30-18	R _f 88.9 – R _g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

Goniophotometry Report

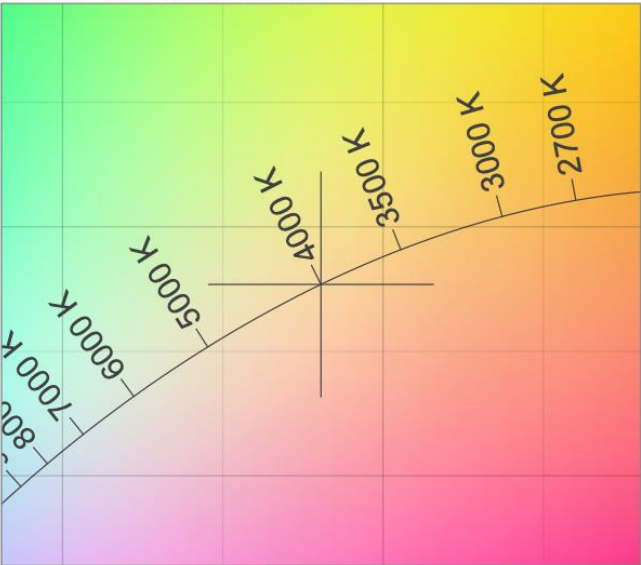
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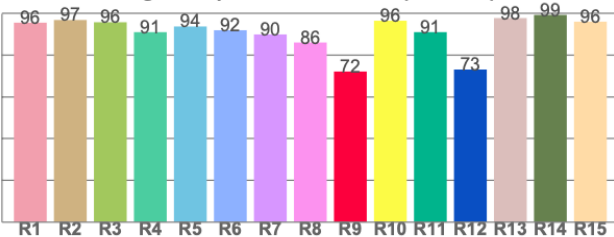
CIE 1931



CIE 1931 – zoomed on Planckian locus



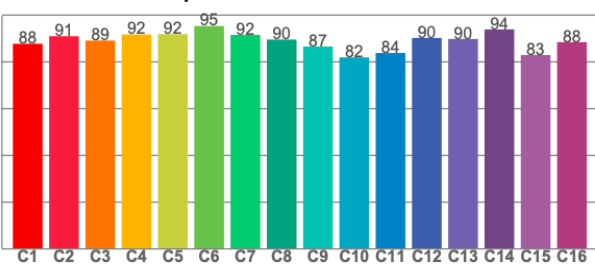
Color Rendering Index per reference color (CIE 1995)



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
95.5	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

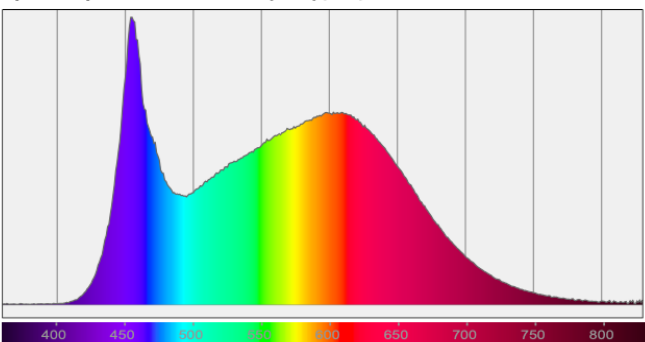
TM30-18 Rf-values per hue bin



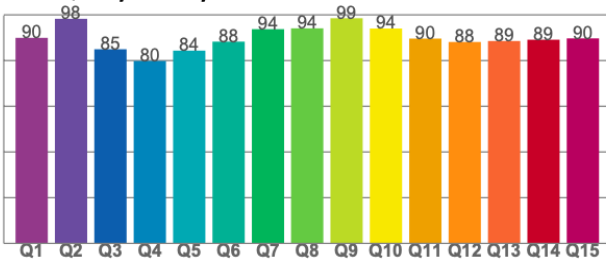
TM30 C values, 16 binned values out of total of 99 C values

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