

Tested Light Source - 1_PHOT_SKIN+BONES-4750lmChip-4000K-38Deg-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)

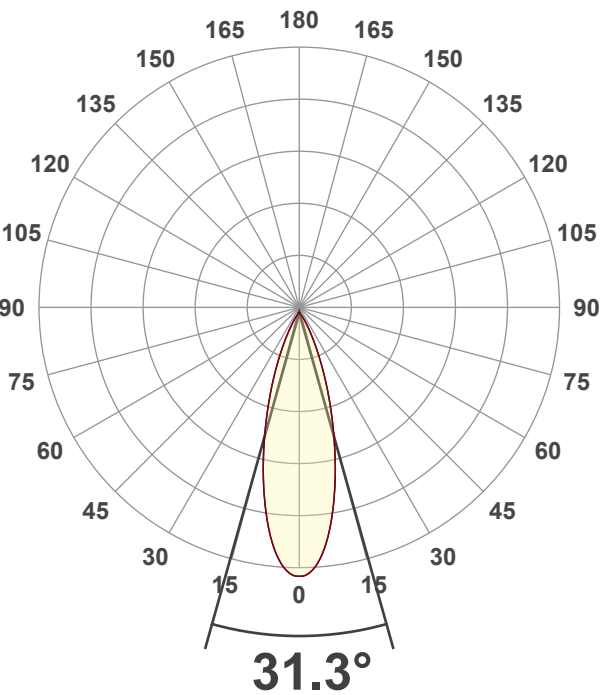
Measurement Conditions

Number of C-planes and Resolution	4 planes – 90°
γ (gamma)-Resolution	1.5°
Test Distance	1.50 m
Input Power, Power and Displ. Factors	41.5 W – PF 0.97 – DPF 0.97
Input RMS Voltage and Current	242 V – 0.177 A
Frequency of Input Power	50 Hz

Main Light Measurement Results

Output	2655 lm
Efficiency	64 lm/W
Peak Intensity and Beam Angle	7587 cd – 31.3°
Color Rendering Index	CRI 92.6

Light Intensity Distribution



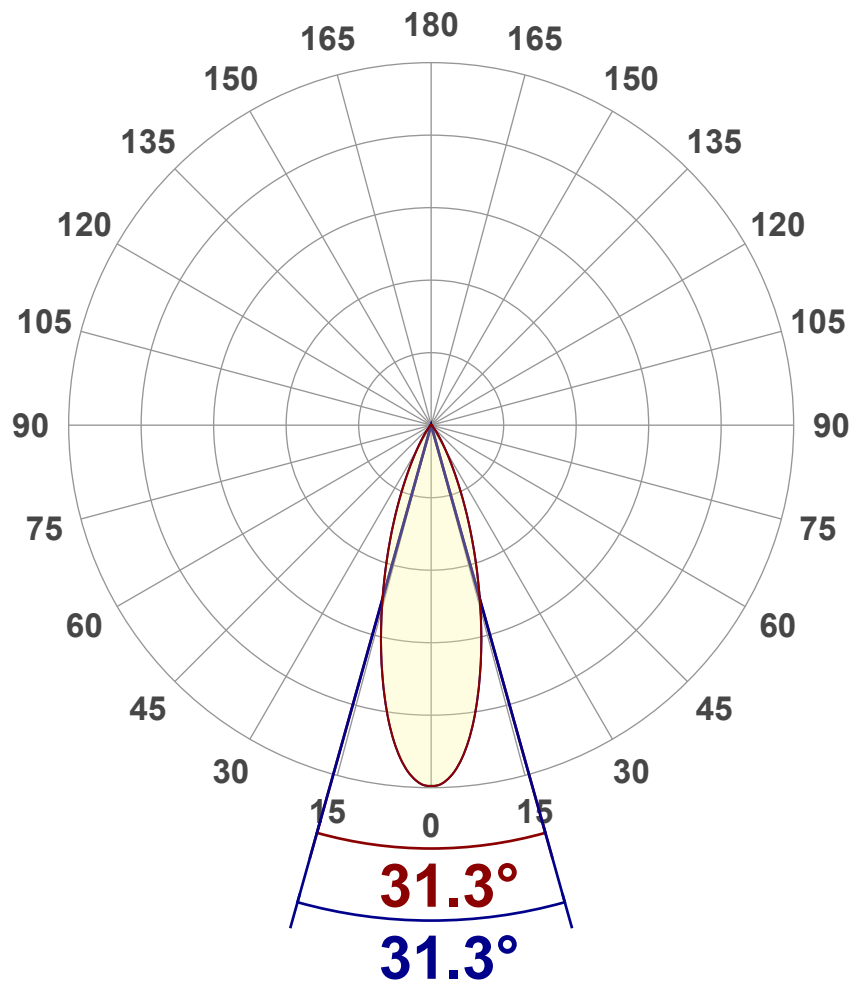
Goniophotometry Report

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Luminous Intensity diagram

Unit: 0-100% of peak intensity



Main Values

Output (total Lumen)	2655 lm
Peak Intensity	7587 cd
Beam Angle (50%)	31.3°
Beam Angle (90%)	31.3°
Beam Angle (10%)	31.3°

Cut-off Angle

Average 2,5%	74.3°
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Field Angle

Average 10%	57.4°
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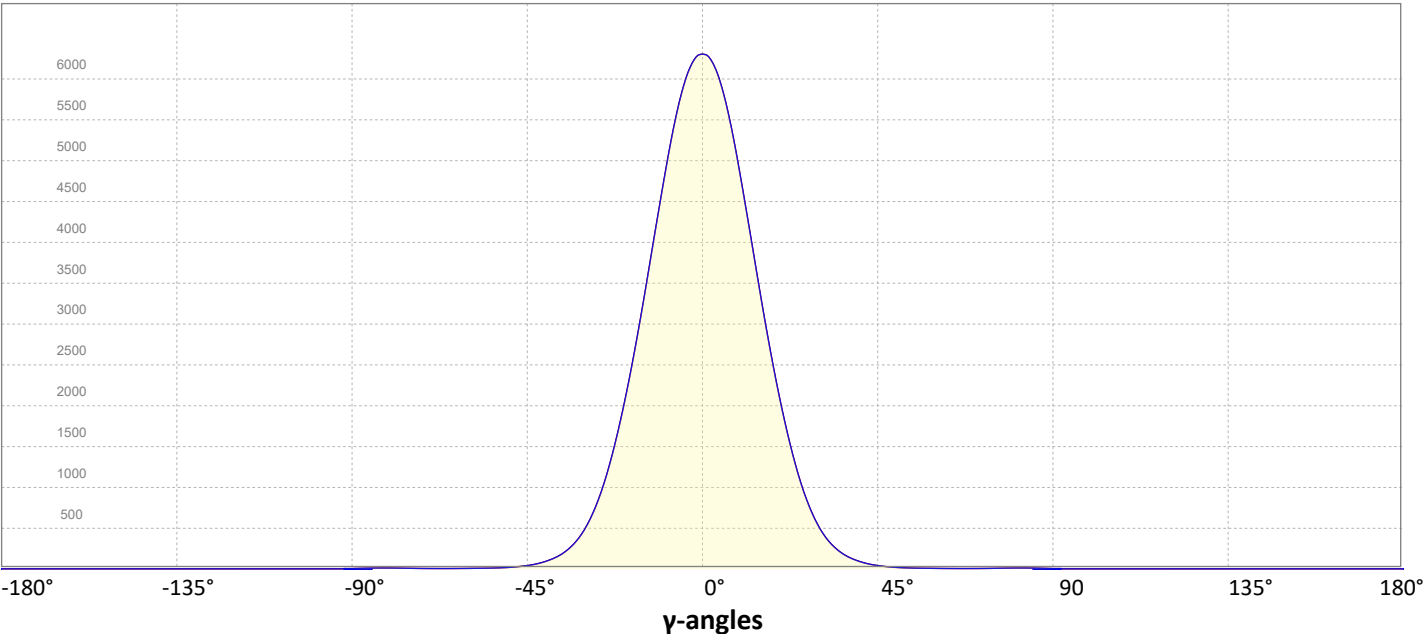
Intensity Ratio

In 120° cone	97.5%
In 90° cone	96.4%

C000-C180

C090-C270

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

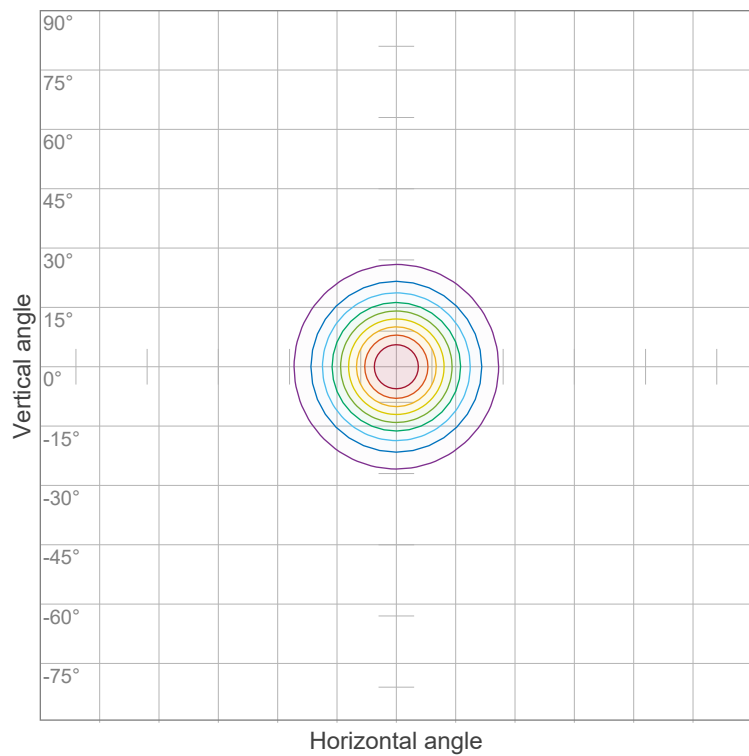


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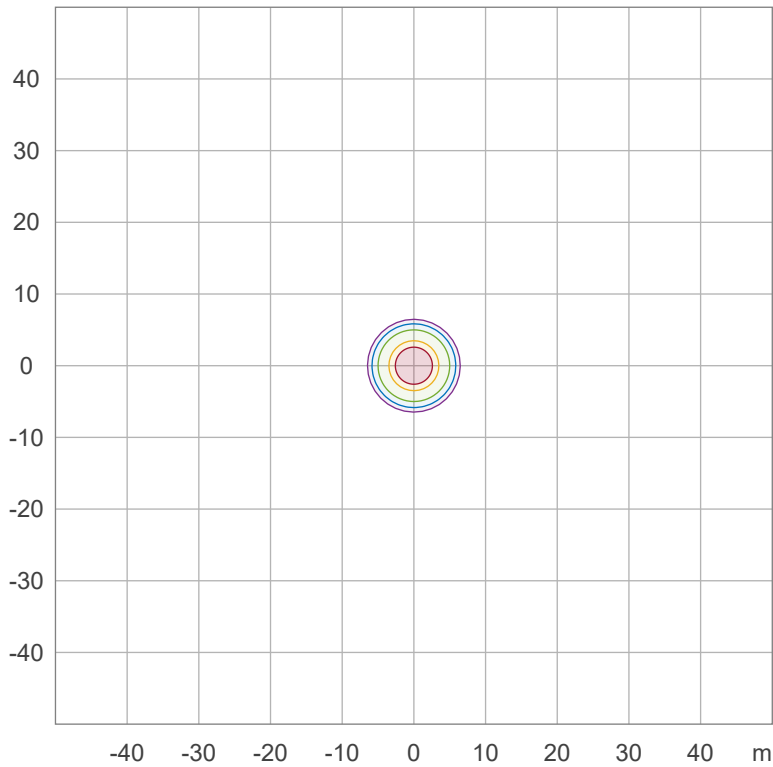
Iso-intensity Diagram (Iso-candela)



90 %	6828.4 cd
80 %	6069.7 cd
70 %	5311.0 cd
60 %	4552.3 cd
50 %	3793.5 cd
40 %	3034.8 cd
30 %	2276.1 cd
20 %	1517.4 cd
10 %	758.7 cd

Peak intensity: 7587.1 cd
Number of c-planes: 4

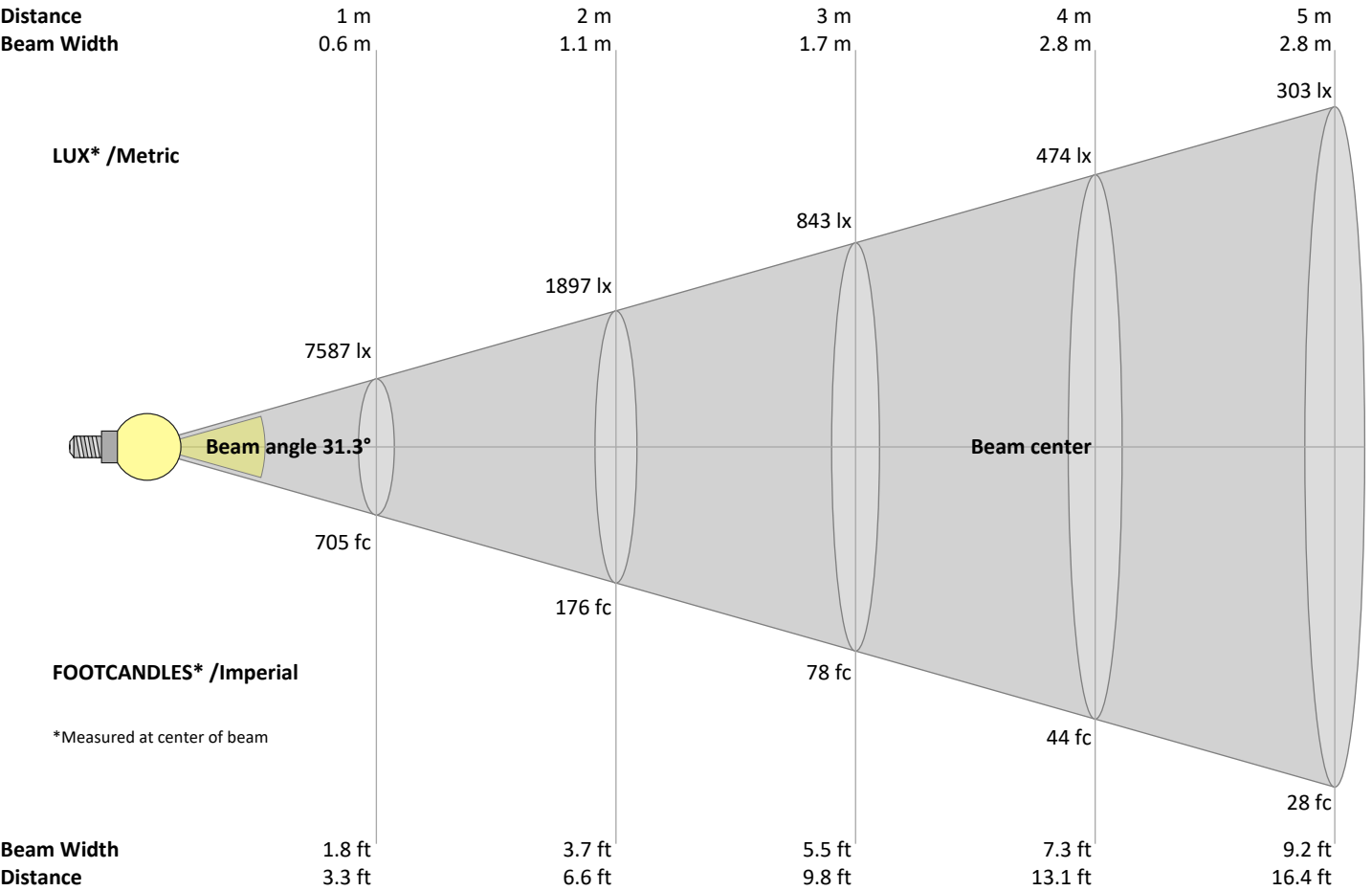
Iso-illuminance Diagram (Iso-lux)



50.0 %	37.9 lx
30.0 %	22.8 lx
10.0 %	7.6 lx
5.0 %	3.8 lx
3.0 %	2.3 lx

Peak illuminance: 75.9 lx
Mounting height: 10.0 m
Number of c-planes: 4

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
7587	1897	843	474	303	211	155	119	94	76	63	53	45	39	34	30	26	23	21	19	lux
704.9	176.2	78.3	44.1	28.2	19.6	14.4	11	8.7	7	5.8	4.9	4.2	3.6	3.1	2.8	2.4	2.2	2	1.8	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
7587	7519	7282	6873	6342	5709	5037	4350	3680	3048	2476	1965	1517	1148	848	617	445	319	230	166	cd
100%	99%	96%	91%	84%	75%	66%	57%	48%	40%	33%	26%	20%	15%	11%	8%	6%	4%	3%	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
7587	7519	7282	6873	6342	5709	5037	4350	3680	3048	2476	1965	1517	1148	848	617	445	319	230	166	cd
100%	99%	96%	91%	84%	75%	66%	57%	48%	40%	33%	26%	20%	15%	11%	8%	6%	4%	3%	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
7587	7519	7282	6873	6342	5709	5037	4350	3680	3048	2476	1965	1517	1148	848	617	445	319	230	166	cd
100%	99%	96%	91%	84%	75%	66%	57%	48%	40%	33%	26%	20%	15%	11%	8%	6%	4%	3%	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
7587	7519	7282	6873	6342	5709	5037	4350	3680	3048	2476	1965	1517	1148	848	617	445	319	230	166	cd
100%	99%	96%	91%	84%	75%	66%	57%	48%	40%	33%	26%	20%	15%	11%	8%	6%	4%	3%	2%	of 0°val

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Light Planning – UGR table

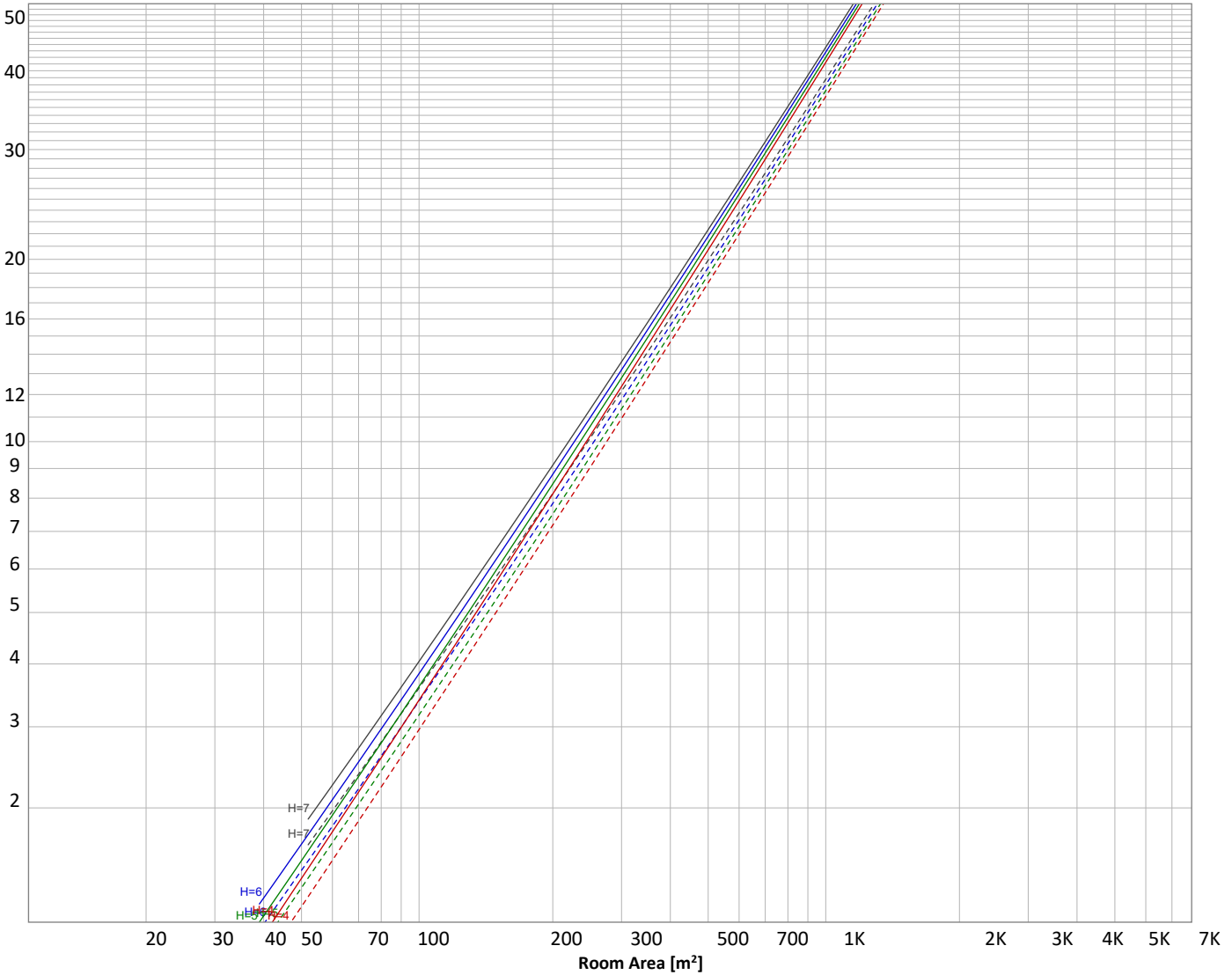
Uncorrected, comprehensive UGR table according to 117-1995

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	15.1	15.6	15.2	15.8	16.0	15.1	15.6	15.2	15.8	16.0
	3H	15.0	15.7	15.4	15.9	16.0	15.0	15.7	15.4	15.9	16.0
	4H	15.3	15.9	15.6	16.1	16.3	15.3	15.9	15.6	16.1	16.3
	6H	16.0	16.5	16.3	16.8	17.1	16.0	16.5	16.3	16.8	17.1
	8H	16.5	17.0	16.8	17.3	17.7	16.5	17.0	16.8	17.3	17.7
	12H	17.0	17.4	17.3	17.8	18.2	17.0	17.4	17.3	17.8	18.2
4H	2H	14.8	15.4	15.2	15.7	15.9	14.8	15.4	15.2	15.7	15.9
	3H	15.0	15.5	15.4	15.9	16.3	15.0	15.5	15.4	15.9	16.3
	4H	15.4	15.9	15.8	16.3	16.8	15.4	15.9	15.8	16.3	16.8
	6H	16.4	16.9	16.9	17.3	17.6	16.4	16.9	16.9	17.3	17.6
	8H	17.2	17.6	17.7	18.0	18.3	17.2	17.6	17.7	18.0	18.3
	12H	17.9	18.2	18.4	18.6	19.1	17.9	18.2	18.4	18.6	19.1
8H	4H	15.6	16.1	16.1	16.4	16.8	15.6	16.1	16.1	16.4	16.8
	6H	17.0	17.3	17.5	17.8	18.3	17.0	17.3	17.5	17.8	18.3
	8H	18.1	18.3	18.6	18.8	19.4	18.1	18.3	18.6	18.8	19.4
	12H	19.0	19.2	19.6	19.7	20.3	19.0	19.2	19.6	19.7	20.3
12H	4H	15.7	16.1	16.2	16.5	16.9	15.7	16.1	16.2	16.5	16.9
	6H	17.3	17.5	17.8	18.1	18.7	17.3	17.5	17.8	18.1	18.7
	8H	18.3	18.6	18.9	19.1	19.7	18.3	18.6	18.9	19.1	19.7
Variations with the observer position for the luminaire spacings, S:											
S = 1.0H		1.9 / -0.7					1.9 / -0.7				
S = 1.5H		3.7 / -0.8					3.7 / -0.8				
S = 2.0H		5.2 / -0.9					5.2 / -0.9				

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	101	101	101	99
1	114	111	109	107	111	109	107	105	105	103	102	101	100	99	98	97	96	94
2	109	105	102	99	107	103	100	98	100	98	95	97	95	93	94	93	91	89
3	105	100	96	92	103	98	94	91	96	92	90	93	91	88	91	89	87	85
4	101	95	90	87	99	94	90	86	92	88	85	90	87	84	88	85	83	82
5	97	91	86	82	96	90	85	82	88	84	81	86	83	80	85	82	80	78
6	94	87	82	78	93	86	81	78	84	80	77	83	79	77	82	79	76	75
7	91	83	78	75	89	82	78	75	81	77	74	80	76	74	79	76	73	72
8	87	80	75	72	86	79	75	71	78	74	71	77	73	71	76	73	70	69
9	85	77	72	69	84	76	72	69	75	71	68	75	71	68	74	70	68	67
10	82	74	69	66	81	74	69	66	73	69	66	72	68	66	71	68	65	64

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



Conditions		p(%)			
H = Room height	Flux = 2655 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				
E _{work} = Average lux on work area =	100 lx		50	30	20

Zonal Lumen Summary

0°-10°	10°-20°	20°-30°	30°-40°	40°-50°	50°-60°	60°-70°	70°-80°	80°-90°
632 lm	1094 lm	620 lm	184 lm	44.9 lm	14.0 lm	9.60 lm	13.0 lm	15.1 lm
90°-100°	100°-110°	110°-120°	120°-130°	130°-140°	140°-150°	150°-160°	160°-170°	170°-180°
5.62 lm	4.58 lm	4.30 lm	3.89 lm	3.36 lm	2.72 lm	2.01 lm	1.23 lm	0.414 lm

Outdoor Light Planning

Lumen per Zone

Zone (γ)	Lumen	% Total
0-10°	632 lm	23.8%
10-20°	1094 lm	41.2%
20-30°	620 lm	23.4%
30-40°	184 lm	6.9%
40-50°	45 lm	1.7%
50-60°	14 lm	0.5%
60-70°	10 lm	0.4%
70-80°	13 lm	0.5%
80-90°	15 lm	0.6%
90-100°	6 lm	0.2%
100-110°	5 lm	0.2%
110-120°	4 lm	0.2%
120-130°	4 lm	0.1%
130-140°	3 lm	0.1%
140-150°	3 lm	0.1%
150-160°	2 lm	0.1%
160-170°	1 lm	0.0%
170-180°	0 lm	0.0%
Total	2655 lm	100.0%

Intensity peaks

Max intensity	7587 cd
Intensity, 90°	9 cd
Intensity, 0°	7587 cd

Zonal Lumen summary

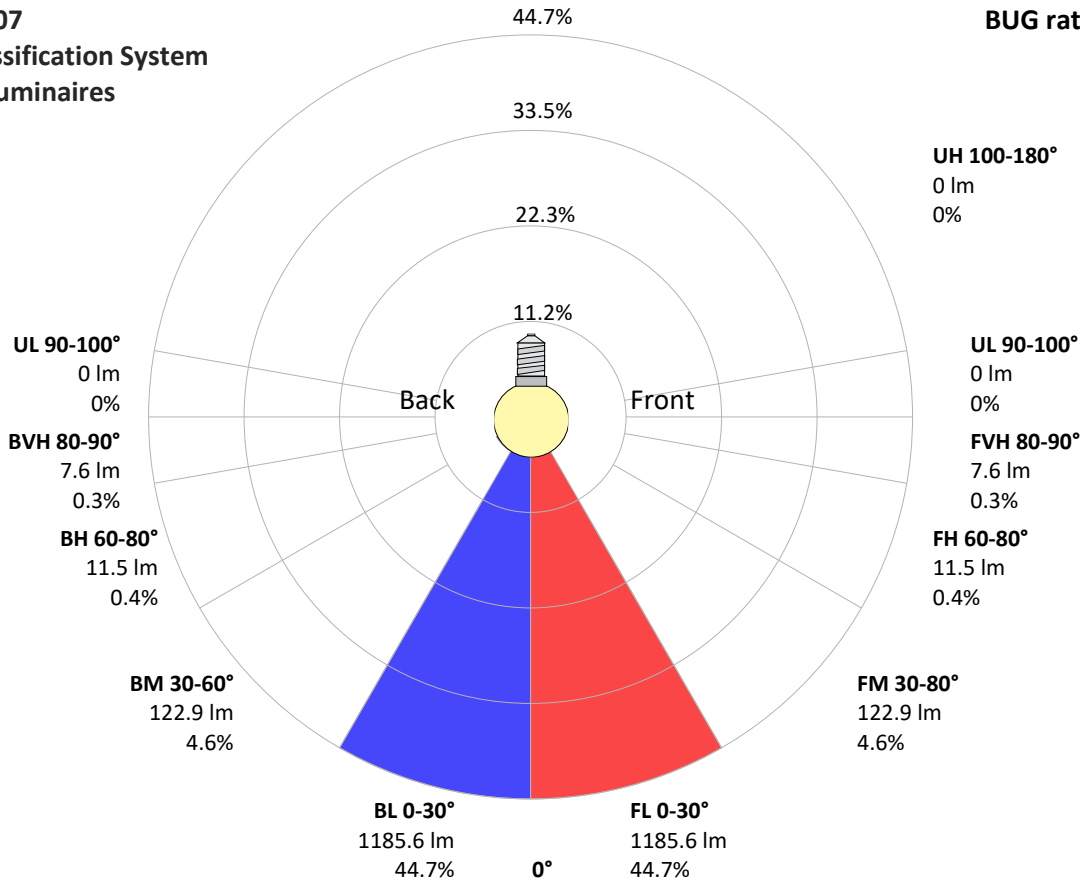
Zone (γ)	Lumen	% Total
0-30°	2347 lm	88.4%
0-40°	2530 lm	95.3%
0-60°	2589 lm	97.5%
60-90°	38 lm	1.4%
70-100°	34 lm	1.3%
90-120°	15 lm	0.5%
0-90°	2627 lm	98.9%
90-180°	28 lm	1.1%
0-180°	2655 lm	100.0%

BUG rating

	Lumen	% Total
Forward light		
Low(0-30°)	1186 lm	44.7%
Medium(30-60°)	123 lm	4.6%
High(60-80°)	11 lm	0.4%
Very high(80-90°)	8 lm	0.3%
Back light		
Low(0-30°)	1186 lm	44.7%
Medium(30-60°)	123 lm	4.6%
High(60-80°)	11 lm	0.4%
Very high(80-90°)	8 lm	0.3%
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

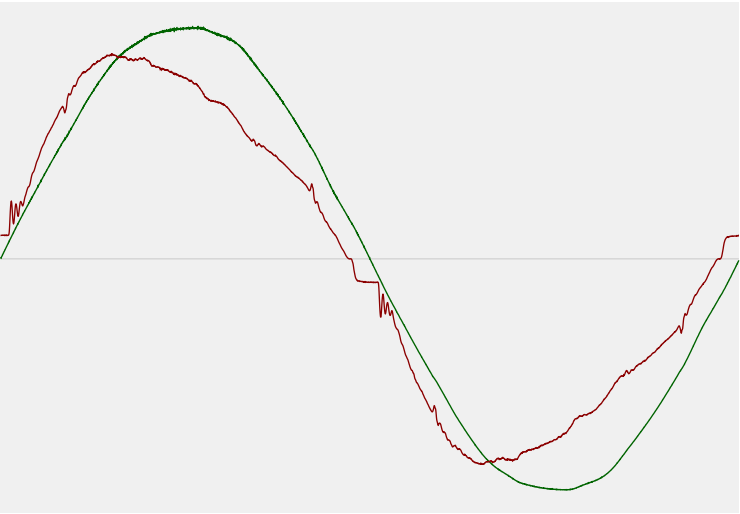
Input Power

Power feed to light source	41.5 W
Frequency of input power	50 Hz
RMS Input voltage feed, V_{RMS}	242 V
RMS Input current feed, I_{RMS}	0.177 A
Volt-Ampere or apparent power = $V_{RMS} \cdot I_{RMS}$	42.92 VA
Displacement factor of AC power feed	0.97
Power factor of AC current feed	0.97
Total harmonic distortion of the current	11.01%
Total harmonic distortion of the voltage	1.23%

Efficiency

Radiated power efficiency	23.1%
<div><div></div></div>	
Lumen efficiency	64 lm/W
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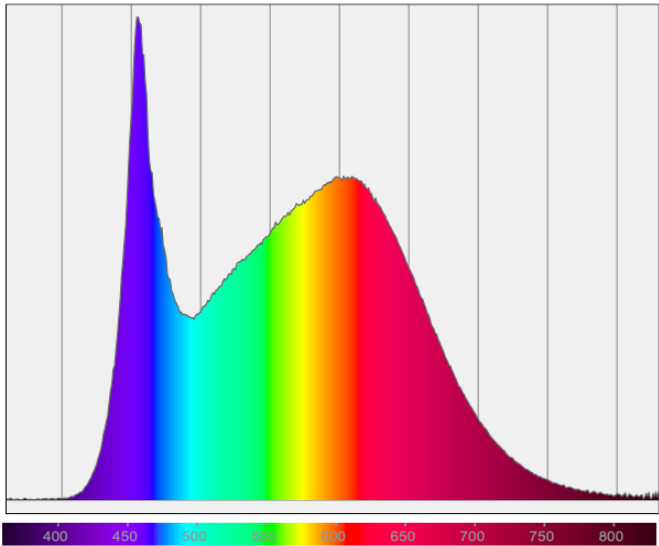
Input Power Curve



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

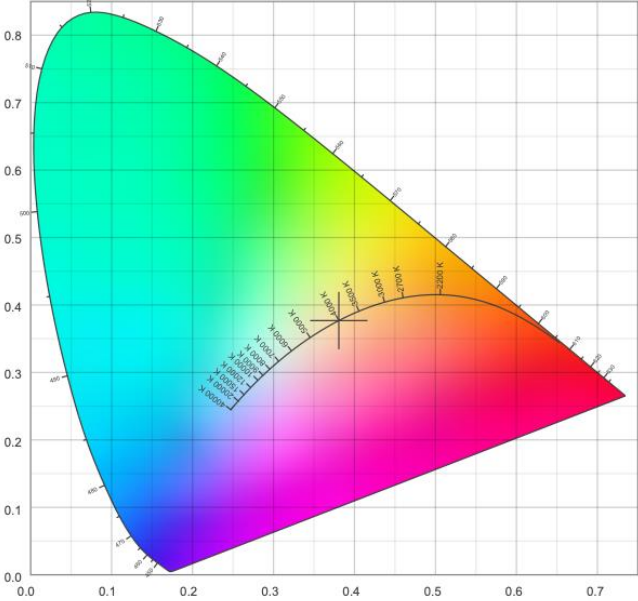
Correlated Color Temperature	CCT = 4000 K	Color coordinates CIE 1931	(x;y) = (0.381;0.377)
Color Rendering Index	CRI 92.6	Color coordinate CIEs 1960	(u;v) = (0.225;0.334)
Color Rendering Index, R9 (red component)	R9 = 72.2	Color deviation from BBL	Duv = ±0.0003
Color Rendering TM30-18	R _f 88.9 – R _g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

Goniophotometry Report

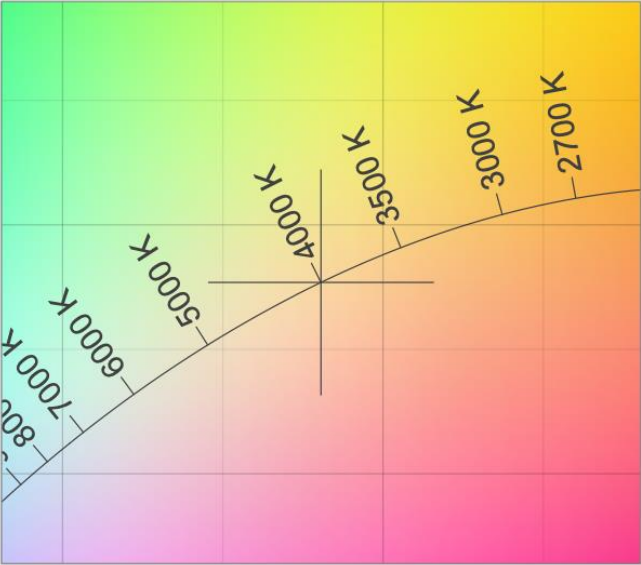
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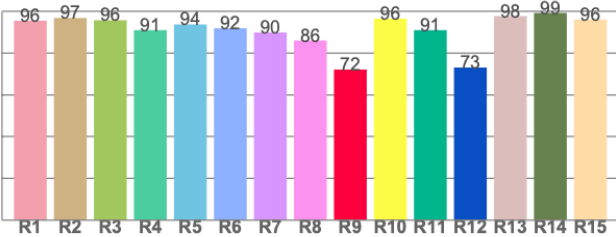
CIE 1931



CIE 1931 – zoomed on Planckian locus



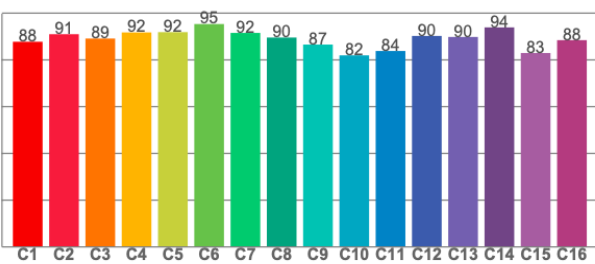
Color Rendering Index per reference color (CIE 1995)



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

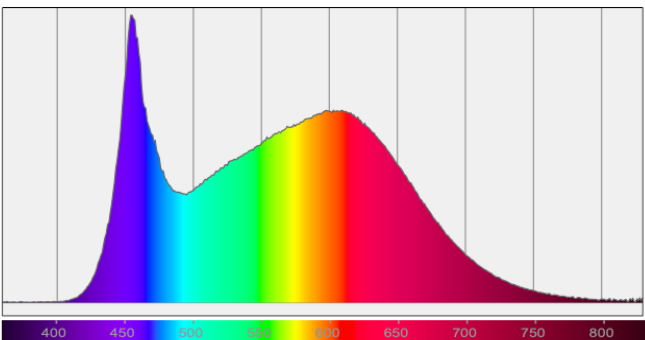
TM30-18 Rf-values per hue bin



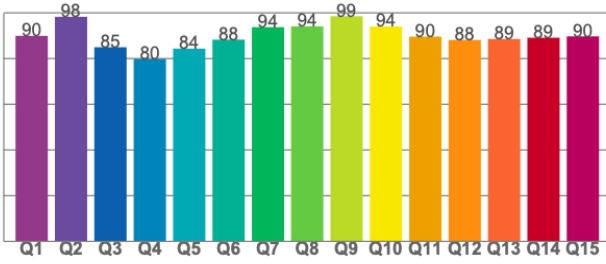
TM30 C values, 16 binned values out of total of 99 C values

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