

# Goniophotometry Report

1\_PHOT\_SKIN+BONES-4300lmChip-3000K-WallWash\_2309  
www.factorylux.com



Tested Light Source - 1\_PHOT\_SKIN+BONES-4300lmChip-3000K-WallWash\_2309

## 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

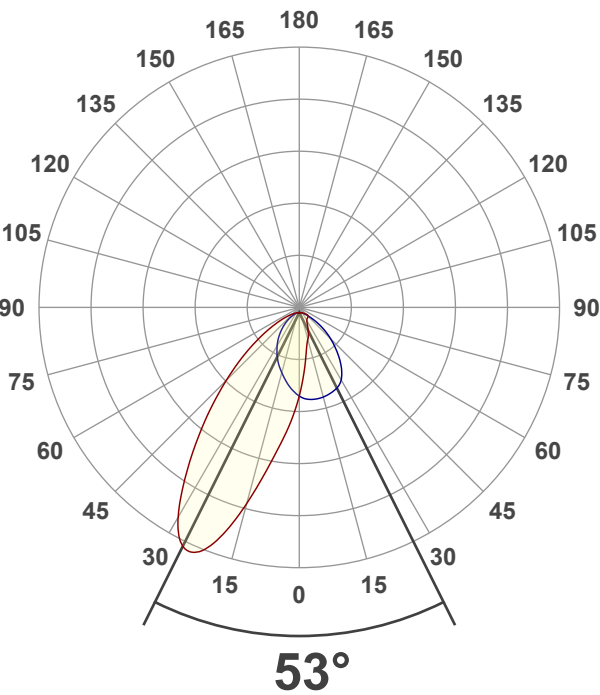
24 planes – 15°  
2°  
1.50 m  
40.7 W – PF 0.97 – DPF 0.97  
243 V – 0.173 A  
49.9 Hz

## Main Light Measurement Results

Output  
Efficiency  
Peak Intensity and Beam Angle  
Color Rendering Index

3359 lm  
82 lm/W  
3273 cd – 53°  
CRI 91.3

## Light Intensity Distribution



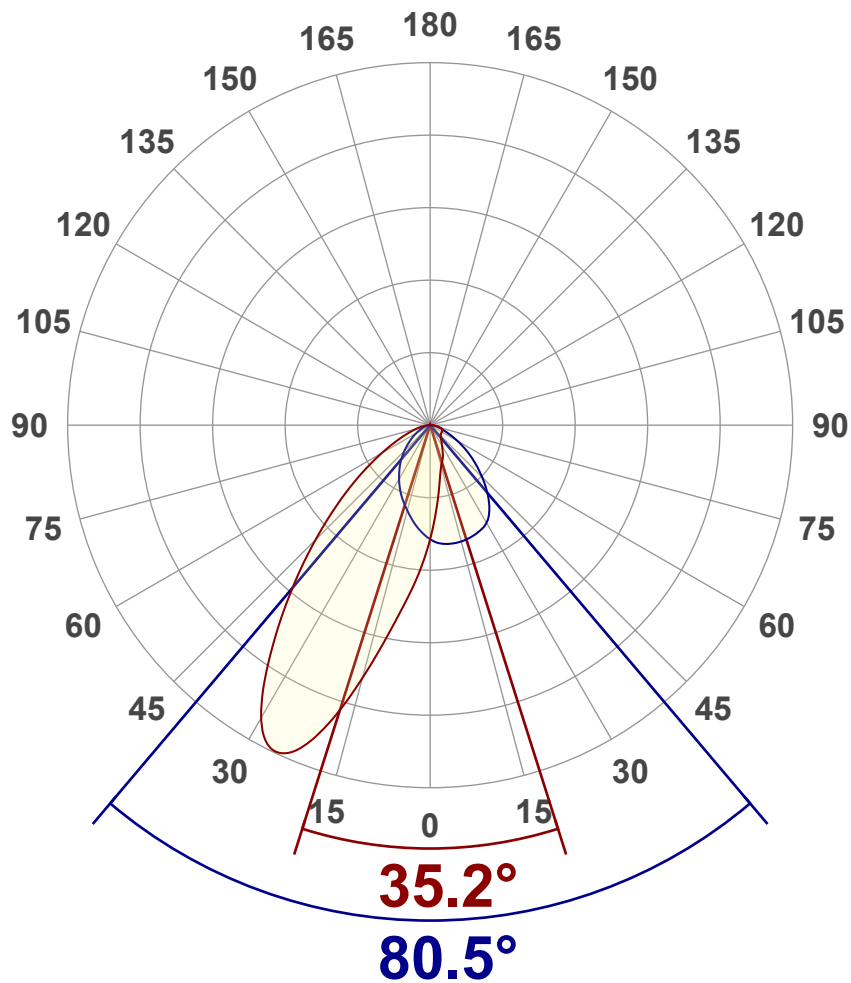
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## Luminous Intensity diagram

Unit: 0-100% of peak intensity



## Main Values

Output (total Lumen)	3359 lm
Peak Intensity	3273 cd
Beam Angle (50%)	53°
Beam Angle (90%)	80.5°
Beam Angle (10%)	34.9°

## Cut-off Angle

Average 2,5%	157.7°
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## Field Angle

Average 10%	108.7°
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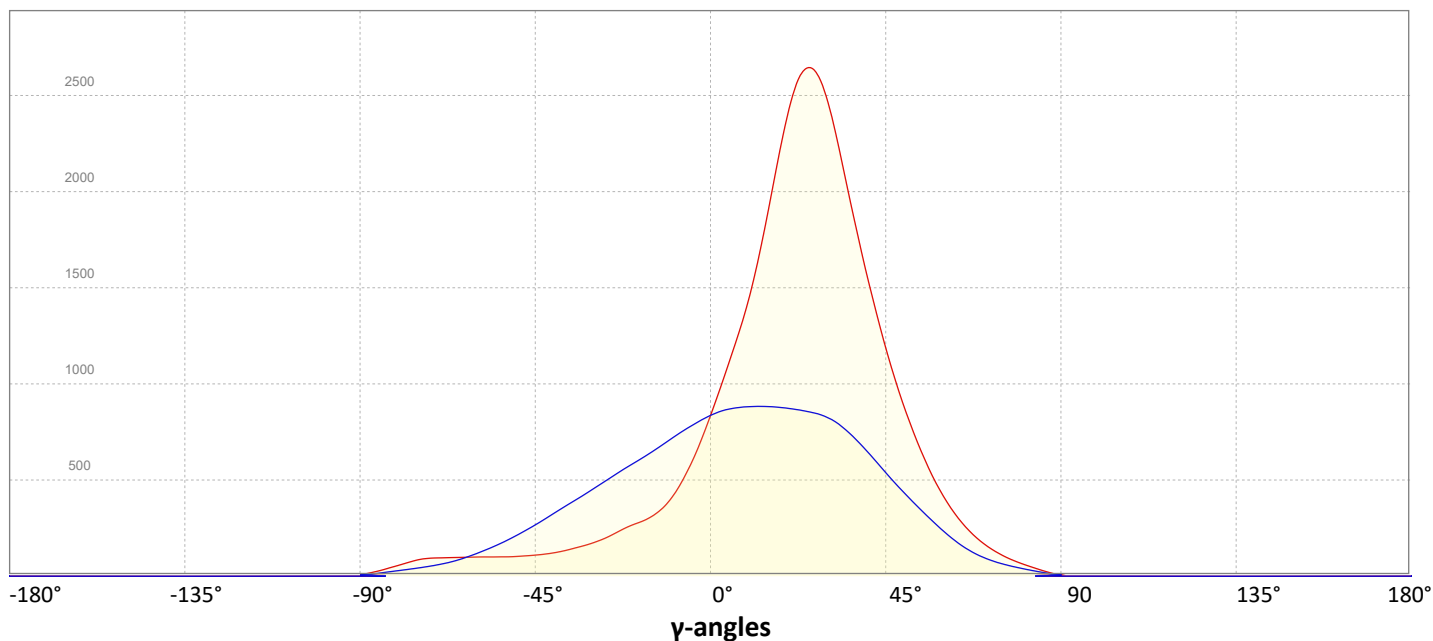
## Intensity Ratio

In 120° cone	87.3%
In 90° cone	63.9%

C000-C180

C090-C270

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

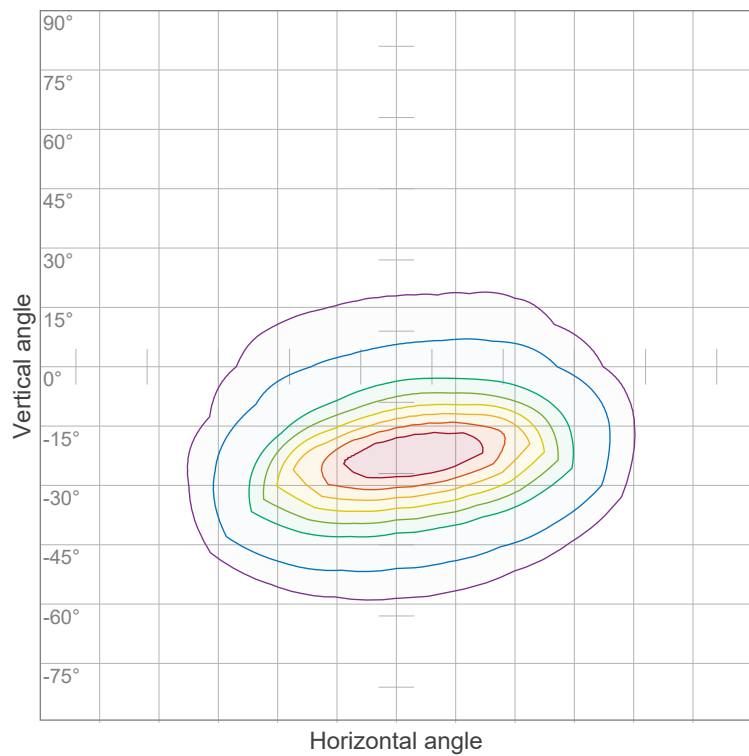


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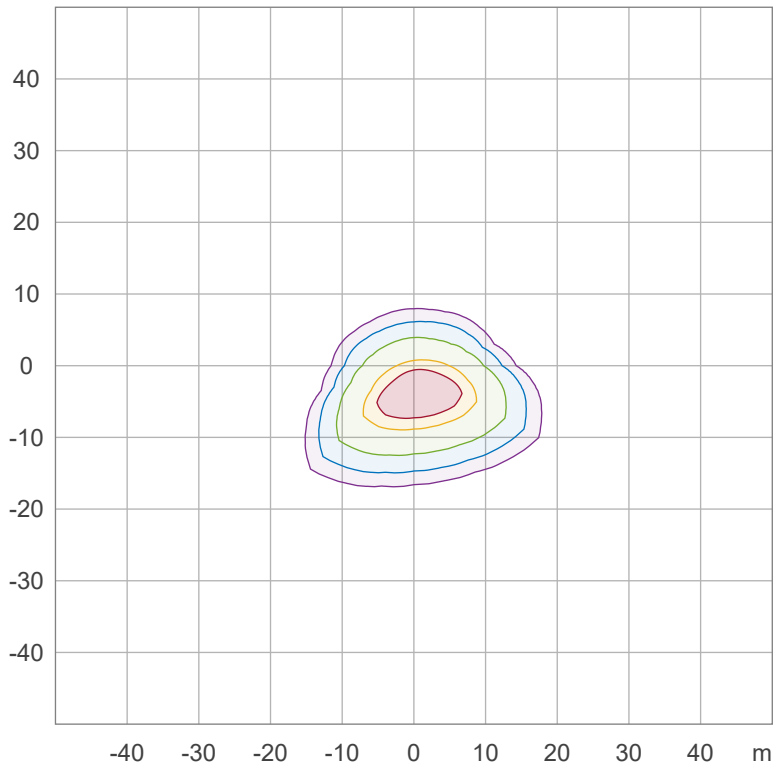
## Iso-intensity Diagram (Iso-candela)



90 %	2944.3 cd
80 %	2617.1 cd
70 %	2290.0 cd
60 %	1962.9 cd
50 %	1635.7 cd
40 %	1308.6 cd
30 %	981.4 cd
20 %	654.3 cd
10 %	327.1 cd

Peak intensity: 3271.4 cd  
Number of c-planes: 24

## Iso-illuminance Diagram (Iso-lux)



50.0 %	12.6 lx
30.0 %	7.5 lx
10.0 %	2.5 lx
5.0 %	1.3 lx
3.0 %	0.8 lx

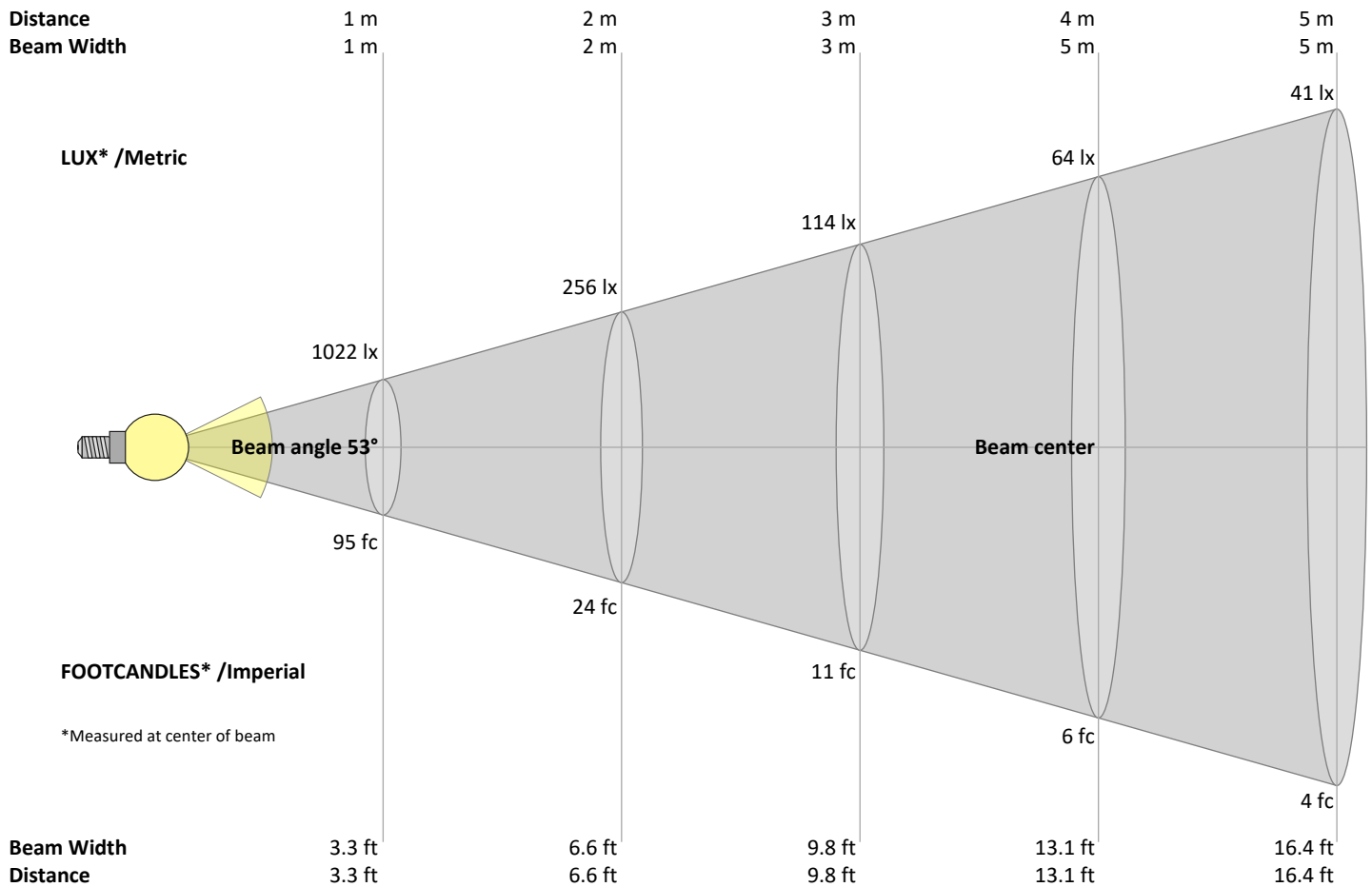
Peak illuminance: 25.1 lx  
Mounting height: 10.0 m  
Number of c-planes: 24

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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
1022	256	114	64	41	28	21	16	13	10	8	7	6	5	5	4	4	3	3	3	lux
95	23.7	10.6	5.9	3.8	2.6	1.9	1.5	1.2	0.9	0.8	0.7	0.6	0.5	0.4	0.4	0.3	0.3	0.3	0.2	fc

### Intensities in 0° c-plane

0°	5°	10°	15°	20°	25°	30°	35°	40°	45°	50°	55°	60°	65°	70°	75°	80°	85°	90°	95°	γ
1022	717	498	382	326	266	214	178	149	134	125	122	122	119	116	104	70	35	10	0	cd
100%	70%	49%	37%	32%	26%	21%	17%	15%	13%	12%	12%	12%	12%	11%	10%	7%	3%	1%	0%	of 0°val

### Intensities in 90° c-plane

0°	5°	10°	15°	20°	25°	30°	35°	40°	45°	50°	55°	60°	65°	70°	75°	80°	85°	90°	95°	γ
1022	1063	1078	1078	1067	1047	1007	924	800	659	524	399	284	187	122	78	49	25	7	0	cd
100%	104%	106%	106%	104%	102%	99%	90%	78%	64%	51%	39%	28%	18%	12%	8%	5%	2%	1%	0%	of 0°val

### Intensities in 180° c-plane

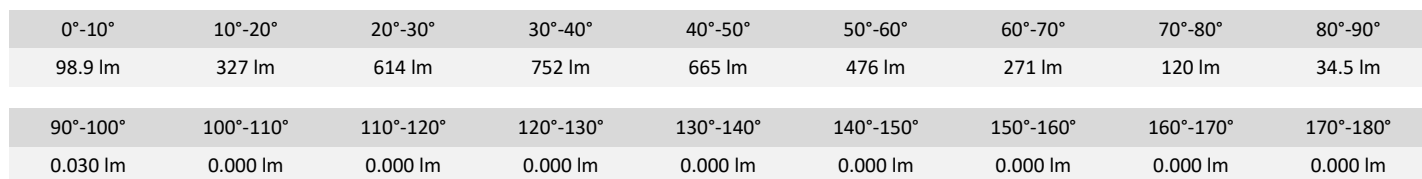
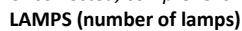
0°	5°	10°	15°	20°	25°	30°	35°	40°	45°	50°	55°	60°	65°	70°	75°	80°	85°	90°	95°	γ
1022	1378	1783	2347	2950	3229	3027	2490	1934	1454	1060	745	502	328	210	132	79	38	6	0	cd
100%	135%	174%	230%	289%	316%	296%	244%	189%	142%	104%	73%	49%	32%	21%	13%	8%	4%	1%	0%	of 0°val

### Intensities in 270° c-plane

0°	5°	10°	15°	20°	25°	30°	35°	40°	45°	50°	55°	60°	65°	70°	75°	80°	85°	90°	95°	γ
1022	955	875	791	715	637	557	479	403	326	257	196	145	102	73	52	35	19	5	0	cd
100%	93%	86%	77%	70%	62%	55%	47%	39%	32%	25%	19%	14%	10%	7%	5%	3%	2%	0%	0%	of 0°val



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## Outdoor Light Planning

### Lumen per Zone

Zone (γ)	Lumen	% Total
0-10°	99 lm	2.9%
10-20°	327 lm	9.7%
20-30°	614 lm	18.3%
30-40°	752 lm	22.4%
40-50°	665 lm	19.8%
50-60°	476 lm	14.2%
60-70°	271 lm	8.1%
70-80°	120 lm	3.6%
80-90°	35 lm	1.0%
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	3359 lm	100.0%

### Intensity peaks

Max intensity	3273 cd
Intensity, 90°	10 cd
Intensity, 0°	1022 cd

### Zonal Lumen summary

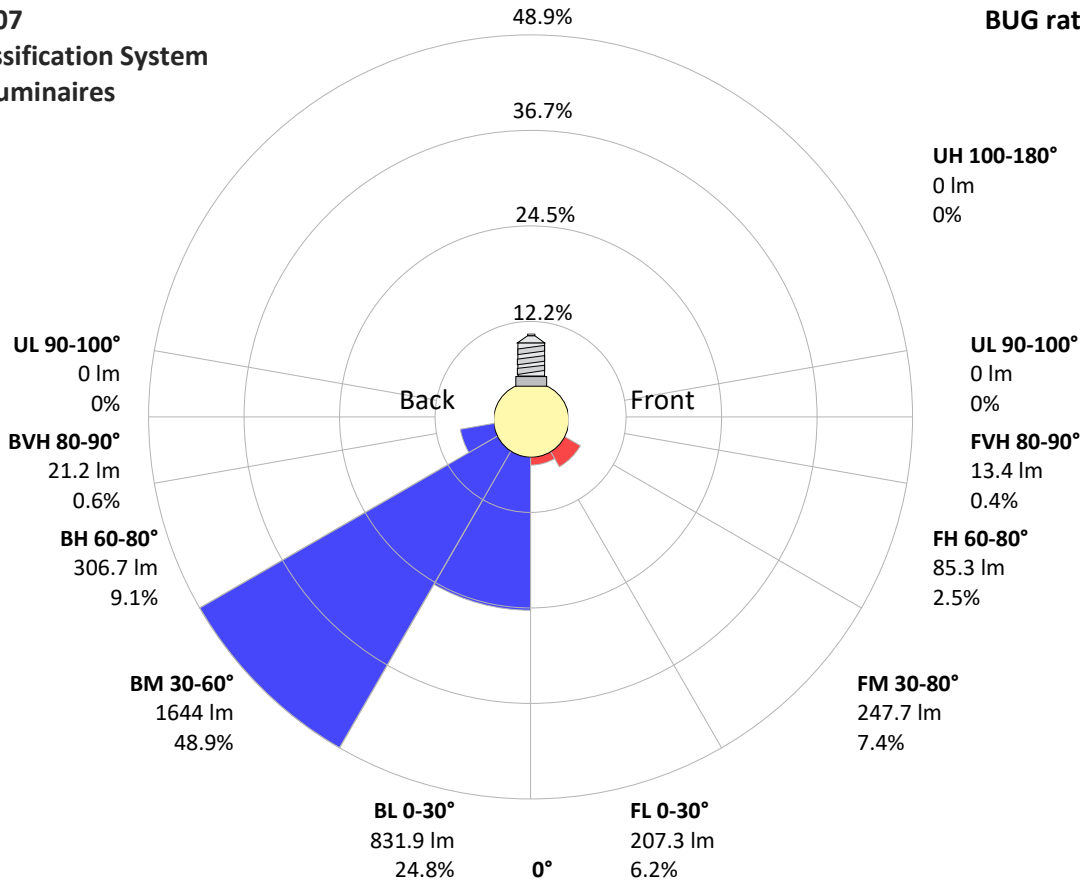
Zone (γ)	Lumen	% Total
0-30°	1040 lm	30.9%
0-40°	1792 lm	53.3%
0-60°	2933 lm	87.3%
60-90°	426 lm	12.7%
70-100°	155 lm	4.6%
90-120°	0 lm	0.0%
0-90°	3359 lm	100.0%
90-180°	0 lm	0.0%
0-180°	3359 lm	100.0%

### BUG rating

	Lumen	% Total
<b>Forward light</b>		
Low(0-30°)	207 lm	6.2%
Medium(30-60°)	248 lm	7.4%
High(60-80°)	85 lm	2.5%
Very high(80-90°)	13 lm	0.4%
<b>Back light</b>		
Low(0-30°)	832 lm	24.8%
Medium(30-60°)	1644 lm	48.9%
High(60-80°)	307 lm	9.1%
Very high(80-90°)	21 lm	0.6%
<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 G1



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## Power Details

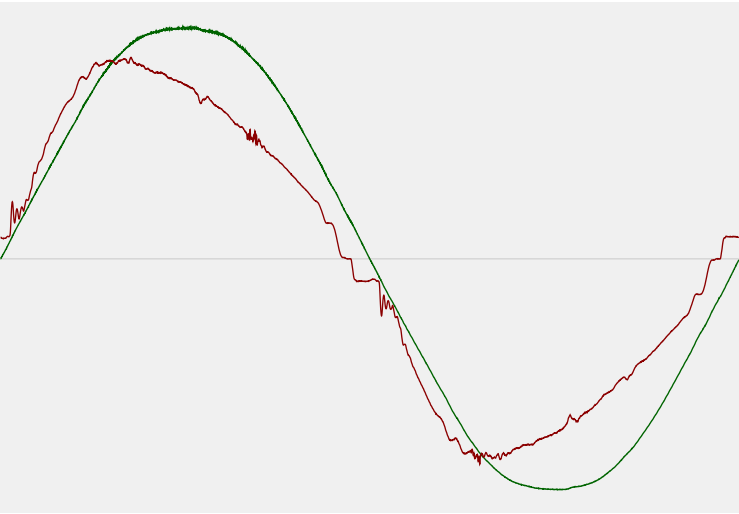
### Input Power

Power feed to light source	40.7 W
Frequency of input power	49.9 Hz
RMS Input voltage feed, $V_{RMS}$	243 V
RMS Input current feed, $I_{RMS}$	0.173 A
Volt-Ampere or apparent power = $V_{RMS} * I_{RMS}$	42.1 VA
Displacement factor of AC power feed	0.97
Power factor of AC current feed	0.97
Total harmonic distortion of the current	11.26%
Total harmonic distortion of the voltage	1.64%

### Efficiency

Radiated power efficiency	29.9%
<div><div></div></div>	
Lumen efficiency	82 lm/W
<div><div></div></div>	

### Input Power Curve





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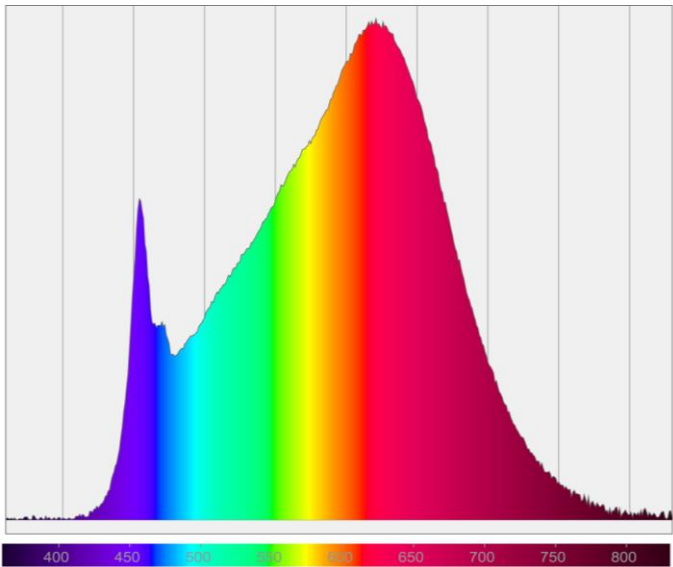
1\_PHOT\_SKIN+BONES-4300lmChip-3000K-WallWash\_2309  
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## Color Measurements

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

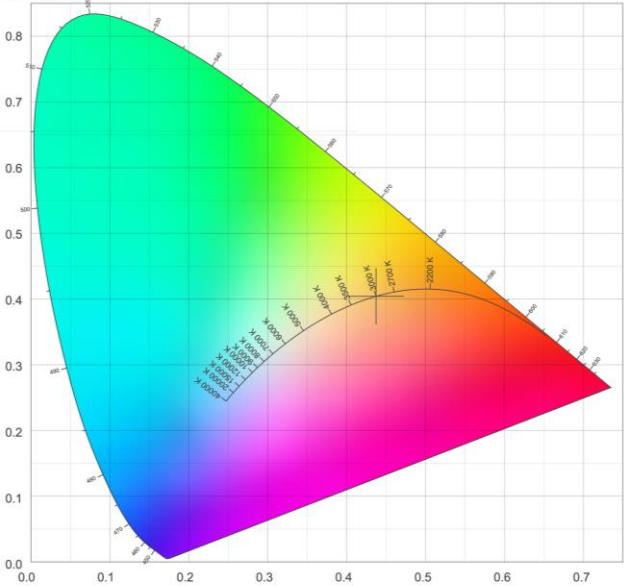
Correlated Color Temperature	CCT = 3000 K	Color coordinates CIE 1931	(x;y) = (0.437;0.404)
Color Rendering Index	CRI 94.1	Color coordinate CIEs 1960	(u;v) = (0.251;0.348)
Color Rendering Index, R9 (red component)	R9 = 68.6	Color deviation from BBL	Duv = ±0.0003
Color Rendering TM30-18	R <sub>f</sub>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

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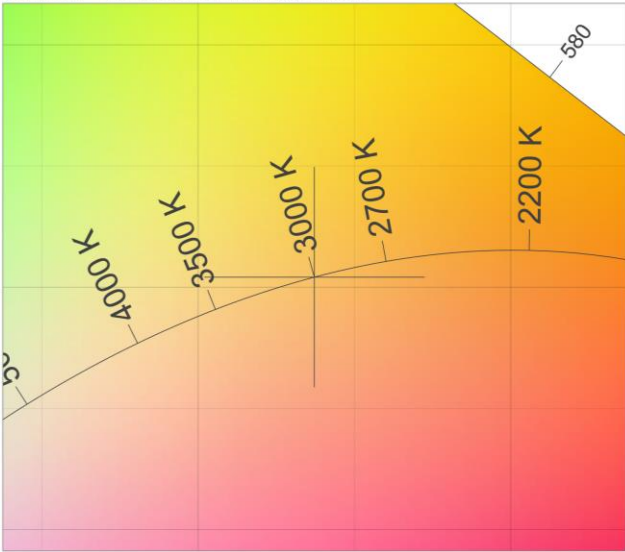
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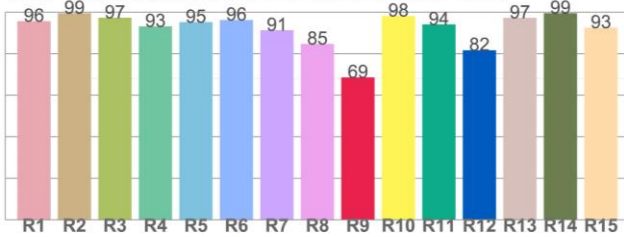
CIE 1931



CIE 1931 – zoomed on Planckian locus



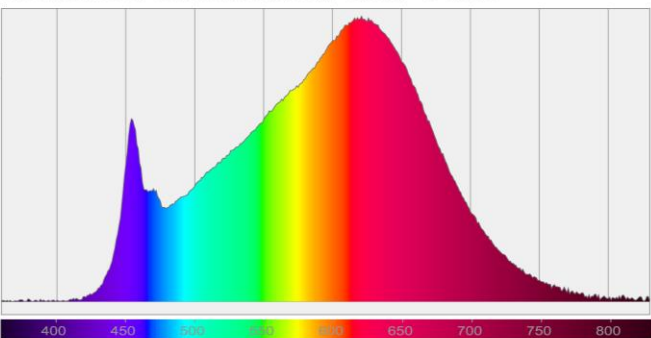
Color Rendering Index per reference color (CIE 1995)



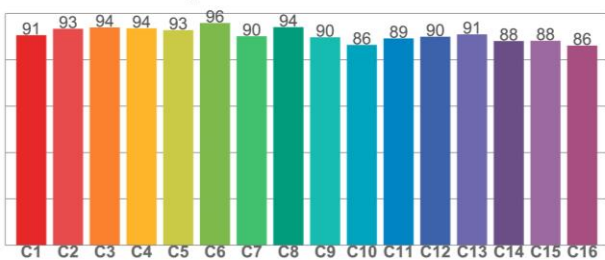
CRI R values, only R1-R8 are used to calculate final CRI value

R1	R2	R3	R4	R5	R6	R7	R8	R9	R10	R11	R12	R13	R14	R15
95.7	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%



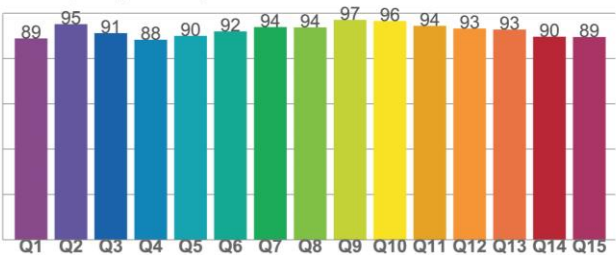
TM30-18 Rf-values per hue bin



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