

# Light Measurement Report

Print date: 27-8-2025

Measurement date and time: 27-8-2025 09:42:27 – Measurement no. VFR-250827-2750-MS

Measurement tracking No. and Link: [VT250827-002624](#)

Operator:



## Laboratory and Equipment

Laboratory Owner and Location  
Goniospectrometer System and Type  
Sensor Name, Calibr. Date and Serial No.  
Spectrometer Manufacturer and Model

Viso Systems, Copenhagen V, Denmark  
LabSpion – Type C, horizontal  
LabSensor Model2 – 11-1-2024 – 3130191315  
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  
Warm-up Time and Variation

12 planes – 30°  
5°  
4,16 m  
147,7 W – PF 0,98 – DPF 0,98  
230 V – 0,656 A  
50 Hz  
Lamp stabilized in 15 min 3 sec – 2,0%

## Tested Light Source

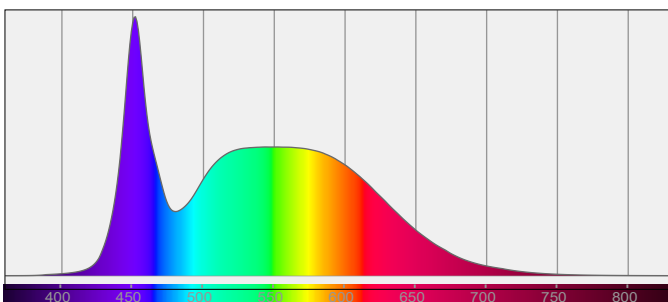
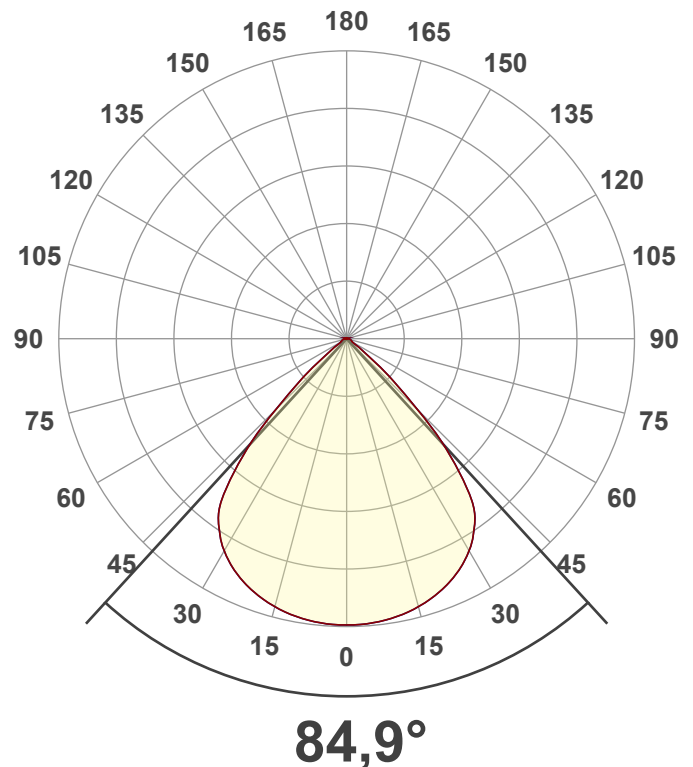
Product Name  
Item No. and Manufacturer  
Product Description (line 1)  
UGR <23

812874-6500K-150W  
812874-6500K-150W – Dutchfulfillment  
LED HIGHBAY SPARTA | 0-10V | 200W/150W/100W | 90° | CCT SWITCH |

## Main Light Measurement Results

Output – Total Lumen (Up% / Down%)  
Efficiency  
Peak Intensity and Beam Angle  
Correlated Color Temperature, Target/Measured  
Color Rendering Index  
Color Rendering TM30-18  
Color Shift, CIE duv and MacAdam Steps  
Flicker

22144 lm – 0,23% / 99,77%  
150 lm/W  
13495 cd – 84,9°  
CCT = 6500 K / 6331 K  
CRI 80,8  
 $R_f$  82,6 –  $R_g$  92,6  
Duv 0,0099 – SDCM 13,4  
SVM 0,01 – PstLM 0,11



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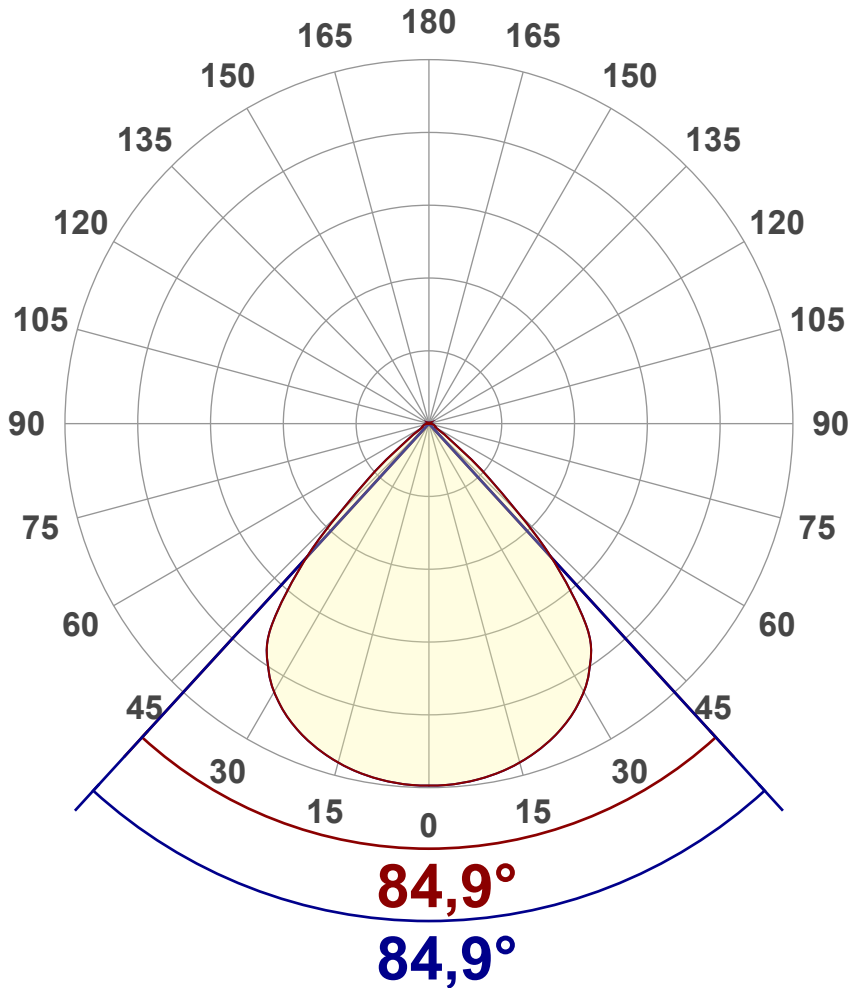
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## Luminous Intensity diagram

Unit: 0-100% of peak intensity



### Main Values

Output (total Lumen)	22144 lm
Lumen Up% / Down%	0,23% / 99,77%
Peak Intensity	13495 cd
Beam Angle (50%)	84,9°
Beam Angle (90%)	84,9°
Beam Angle (10%)	84,9°

### Cut-off Angle

Average 2,5%	120,1°
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### Field Angle

Average 10%	103,7°
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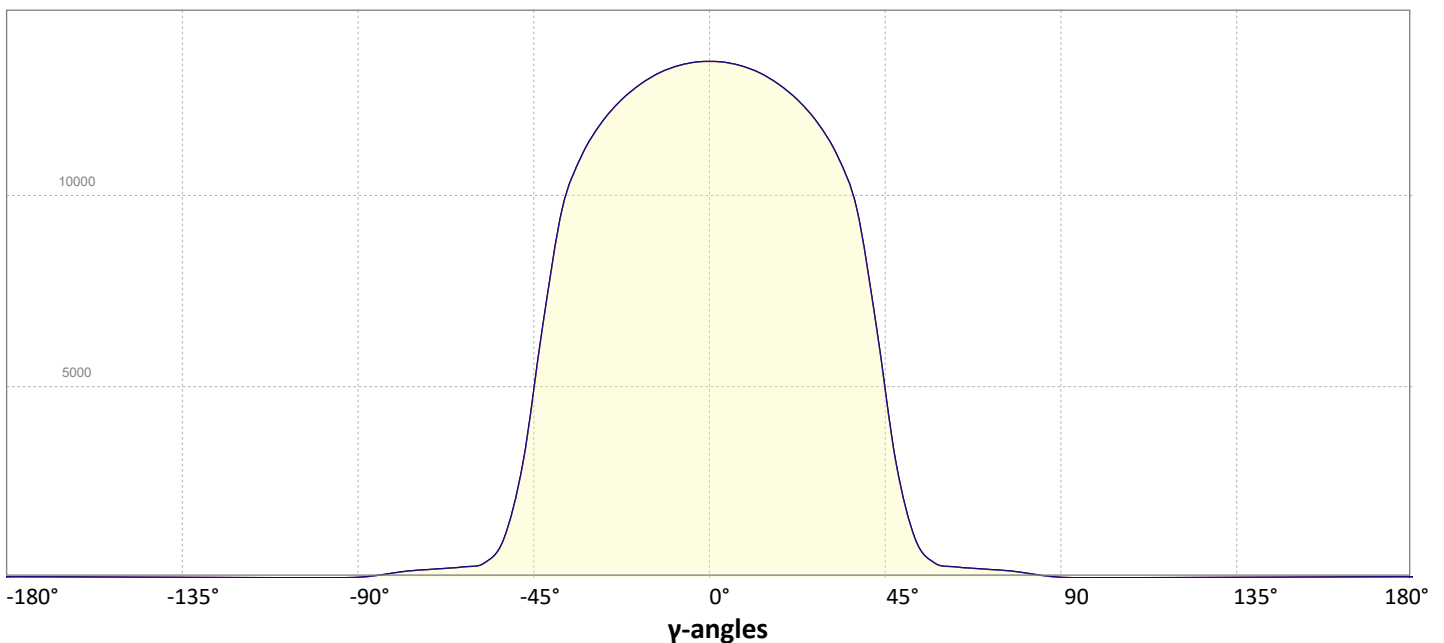
### Intensity Ratio

In 120° cone	97,3%
In 90° cone	88,5%

**C000-C180**

**C090-C270**

## Linear distribution diagram - Intensity (candela) vs $\gamma$ -angle



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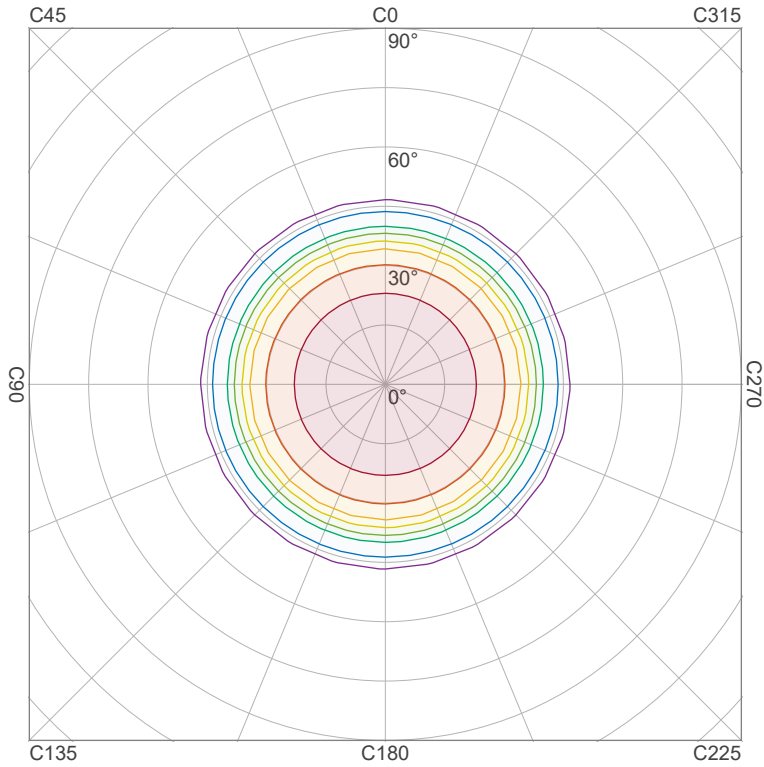
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## Iso-intensity Diagram (Iso-candela)

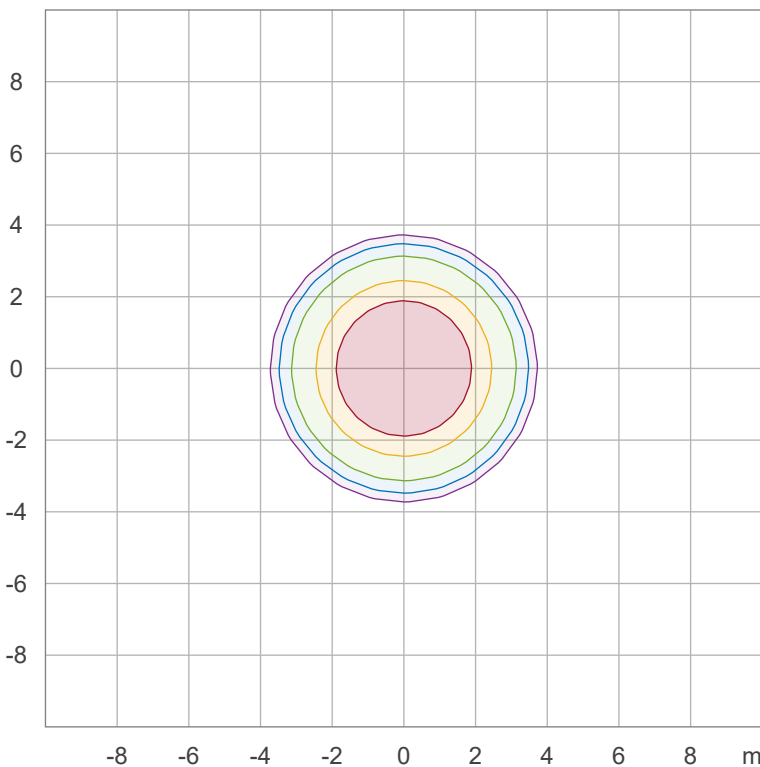


90 %	12145,2 cd
80 %	10795,7 cd
70 %	9446,2 cd
60 %	8096,8 cd
50 %	6747,3 cd
40 %	5397,9 cd
30 %	4048,4 cd
20 %	2698,9 cd
10 %	1349,5 cd

Peak intensity: 13494,6 cd

Number of c-planes: 12

## Iso-illuminance Diagram (Iso-lux)



50,0 %	749,7 lx
30,0 %	449,8 lx
10,0 %	149,9 lx
5,0 %	75,0 lx
3,0 %	45,0 lx

Peak illuminance: 1499,4 lx

Mounting height: 3,0 m

Number of c-planes: 12

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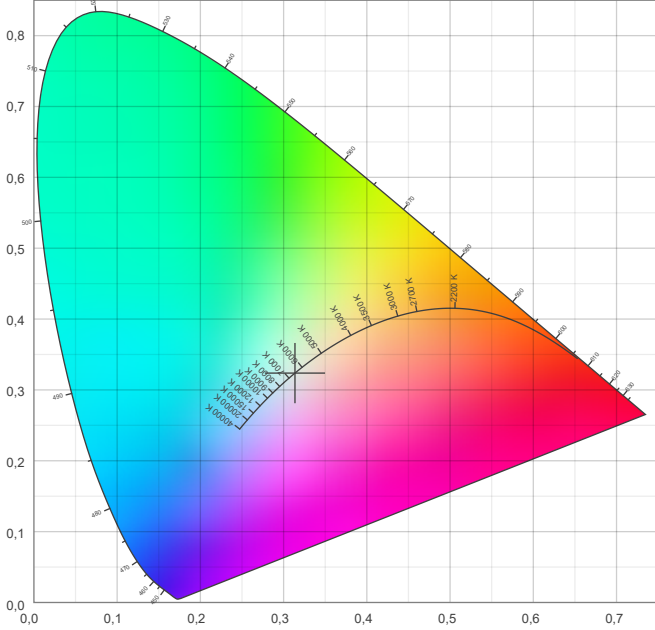


## Color details

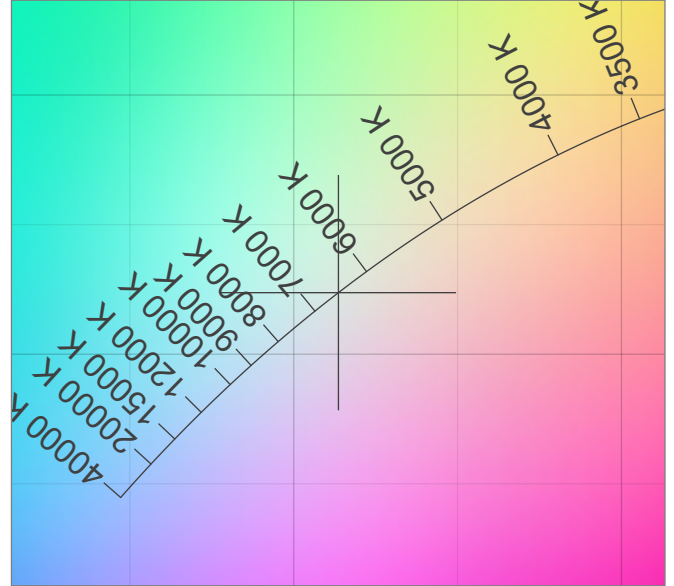
Correlated Color Temperature, Target CCT = 6500 K  
 Correlated Color Temperature, Measured CCT = 6331 K  
 Color Rendering Index CRI 80,8  
 Color Rendering Index, R9 (red component) R9 = -10,3  
 Color Rendering TM30-18 R<sub>f</sub> 82,6 – R<sub>g</sub> 92,6  
 Color Quality Scale CQS = 80,4

MacAdam Steps SDCM = 13,4  
 Color coordinates CIE 1931 (x;y) = (0,314;0,324)  
 Color coordinate CIEs 1960 (u;v) = (0,200;0,310)  
 Color deviation from BBL Duv = 0,0099  
 Color coordinate CIEs 1976 (CIELUV) (u';v') = (0,200;0,466)

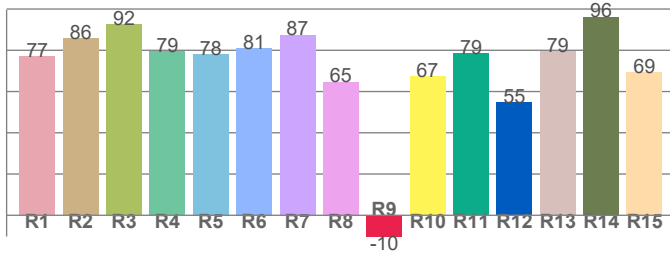
### CIE 1931



### CIE 1931 – zoomed on Planckian locus



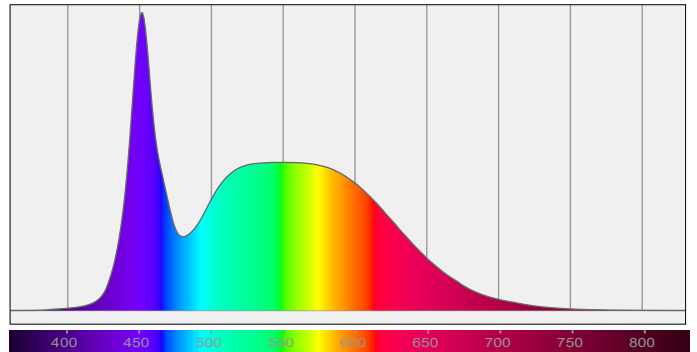
### Color Rendering Index per reference color (CIE 1995)



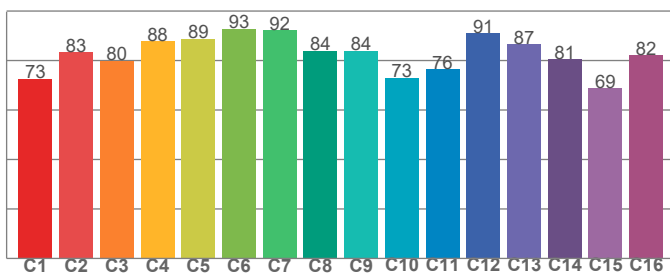
CRI R values, only R1-R8 are used to calculate final CRI value

R1	R2	R3	R4	R5	R6	R7	R8	R9	R10	R11	R12	R13	R14	R15
77,0	85,8	92,5	79,5	78,2	81,1	87,5	64,7	-10,3	67,3	78,5	54,7	79,5	96,2	69,3

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



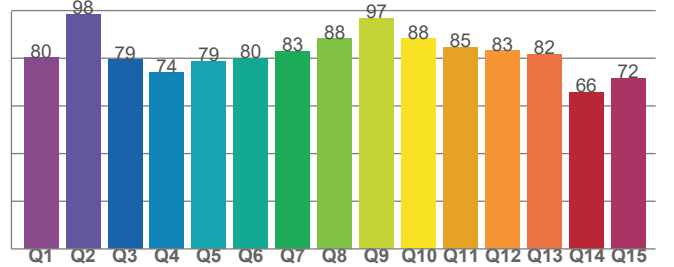
### TM30-18 R<sub>f</sub>-values per hue bin



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
72,7	83,3	79,9	87,7	88,8	92,8	92,3	84,0	83,9	73,0	76,5	91,0	86,5	80,6	68,8	82,1

### Color Quality Scale by reference color



CQS Q values

Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10	Q11	Q12	Q13	Q14	Q15
80,2	98,4	79,4	73,9	78,7	80,1	82,9	88,2	96,9	88,2	84,6	83,1	81,8	65,8	71,7

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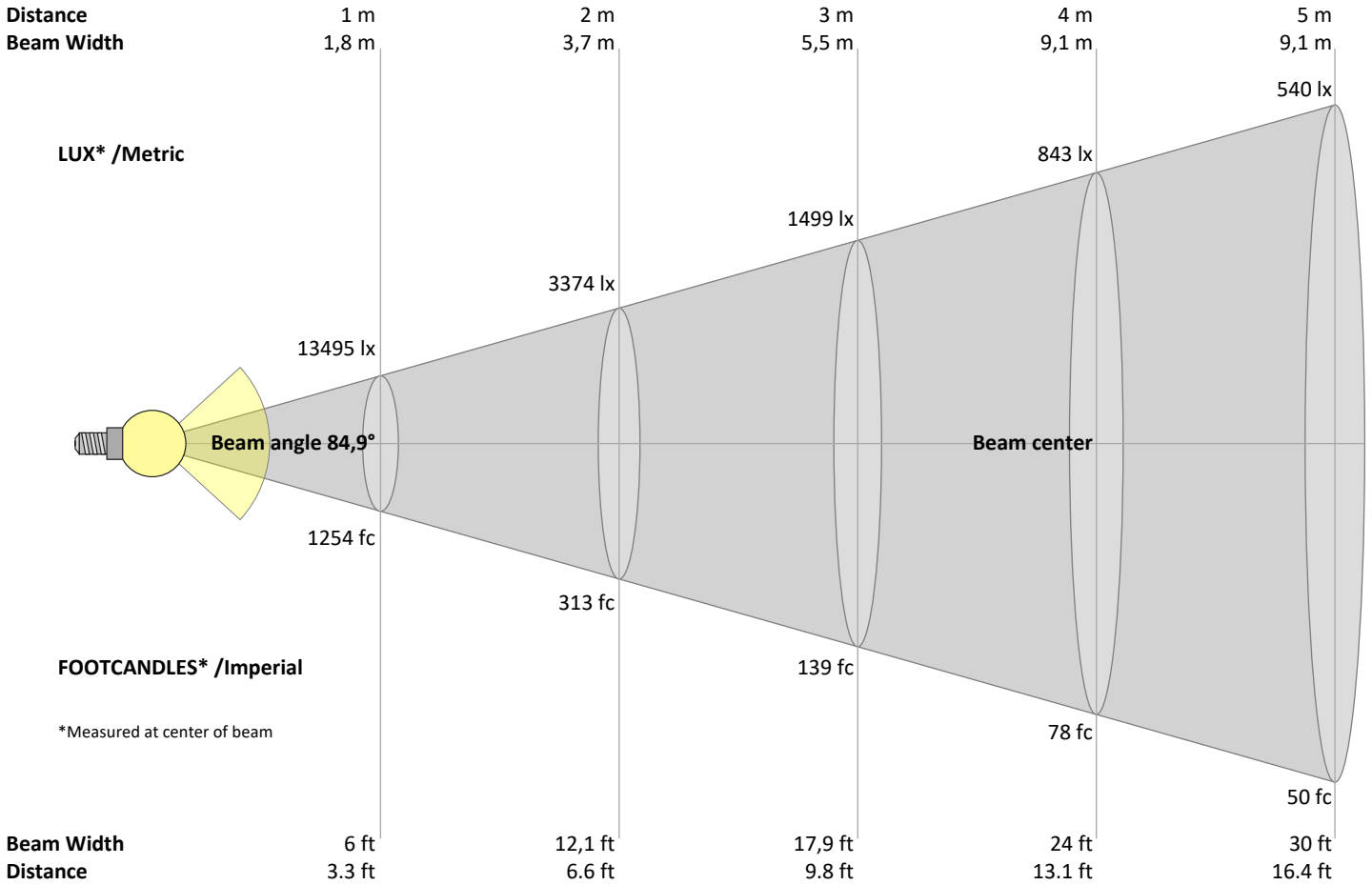
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## Beam Details



### 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
13495	3374	1499	843	540	375	275	211	167	135	112	94	80	69	60	53	47	42	37	34	lux
1253,7	313,4	139,3	78,4	50,1	34,8	25,6	19,6	15,5	12,5	10,4	8,7	7,4	6,4	5,6	4,9	4,3	3,9	3,5	3,1	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
13,5K	13,5K	13,3K	13,1K	12,7K	12,2K	11,5K	10,4K	8,3K	5,0K	2,1K	0,7K	0,3K	0,3K	0,2K	0,2K	0,1K	0,1K	0,0K	0,0K	cd
100%	100%	99%	97%	94%	91%	85%	77%	61%	37%	16%	5%	3%	2%	2%	1%	1%	0%	0%	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
13,5K	13,5K	13,3K	13,1K	12,7K	12,2K	11,5K	10,4K	8,3K	5,0K	2,1K	0,7K	0,3K	0,3K	0,2K	0,2K	0,1K	0,1K	0,0K	0,0K	cd
100%	100%	99%	97%	94%	91%	85%	77%	61%	37%	16%	5%	3%	2%	2%	1%	1%	0%	0%	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
13,5K	13,5K	13,3K	13,1K	12,7K	12,2K	11,5K	10,4K	8,3K	5,0K	2,1K	0,7K	0,3K	0,3K	0,2K	0,2K	0,1K	0,1K	0,0K	0,0K	cd
100%	100%	99%	97%	94%	91%	85%	77%	61%	37%	16%	5%	3%	2%	2%	1%	1%	0%	0%	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
13,5K	13,5K	13,3K	13,1K	12,7K	12,2K	11,5K	10,4K	8,3K	5,0K	2,1K	0,7K	0,3K	0,3K	0,2K	0,2K	0,1K	0,1K	0,0K	0,0K	cd
100%	100%	99%	97%	94%	91%	85%	77%	61%	37%	16%	5%	3%	2%	2%	1%	1%	0%	0%	0%	of 0°val

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## Light Planning – UGR table

Uncorrected, comprehensive UGR table according to 117-1995

Reflectances		70	70	50	50	30	70	70	50	50	30
	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		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	25,1	26,0	25,3	26,3	26,5	25,1	26,0	25,3	26,3	26,5
	3H	24,9	25,9	25,3	26,1	26,3	24,9	25,9	25,3	26,1	26,3
	4H	24,9	25,8	25,3	26,1	26,3	24,9	25,8	25,3	26,1	26,3
	6H	25,0	25,7	25,3	26,0	26,4	25,0	25,7	25,3	26,0	26,4
	8H	25,0	25,7	25,3	26,0	26,4	25,0	25,7	25,3	26,0	26,4
	12H	24,9	25,6	25,3	26,0	26,4	24,9	25,6	25,3	26,0	26,4
4H	2H	24,8	25,7	25,2	26,0	26,2	24,8	25,7	25,2	26,0	26,2
	3H	24,8	25,5	25,2	25,9	26,3	24,8	25,5	25,2	25,9	26,3
	4H	24,8	25,4	25,2	25,9	26,4	24,8	25,4	25,2	25,9	26,4
	6H	24,8	25,5	25,3	25,8	26,2	24,8	25,5	25,3	25,8	26,2
	8H	24,8	25,4	25,4	25,8	26,2	24,8	25,4	25,4	25,8	26,2
	12H	24,8	25,3	25,3	25,7	26,2	24,8	25,3	25,3	25,7	26,2
8H	4H	24,7	25,3	25,2	25,7	26,0	24,7	25,3	25,2	25,7	26,0
	6H	24,8	25,2	25,3	25,7	26,2	24,8	25,2	25,3	25,7	26,2
	8H	24,9	25,2	25,4	25,8	26,4	24,9	25,2	25,4	25,8	26,4
	12H	24,9	25,2	25,5	25,7	26,3	24,9	25,2	25,5	25,7	26,3
12H	4H	24,7	25,2	25,2	25,6	26,0	24,7	25,2	25,2	25,6	26,0
	6H	24,8	25,2	25,4	25,7	26,3	24,8	25,2	25,4	25,7	26,3
	8H	24,9	25,2	25,5	25,7	26,3	24,9	25,2	25,5	25,7	26,3

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

S = 1.0H	1,9 / -4,6	1,9 / -4,6
S = 1.5H	4,0 / -5,7	4,0 / -5,7
S = 2.0H	5,9 / -6,0	5,9 / -6,0

## 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	112	109	106	103	110	107	104	102	103	101	99	99	97	96	95	94	93	91
2	105	100	95	91	103	98	93	90	94	91	88	91	88	86	88	86	84	82
3	99	91	85	80	97	90	84	80	87	82	78	84	80	77	82	79	76	74
4	92	84	77	72	91	82	76	71	80	75	71	78	73	70	76	72	69	67
5	87	77	70	65	85	76	69	64	74	68	64	72	67	63	70	66	63	61
6	81	71	64	59	80	70	63	58	68	62	58	67	61	57	65	61	57	55
7	76	65	58	53	75	65	58	53	63	57	53	62	56	52	61	56	52	50
8	72	60	53	49	70	60	53	48	59	53	48	57	52	48	56	51	48	46
9	67	56	49	45	66	56	49	44	55	49	44	54	48	44	53	48	44	42
10	64	52	46	41	62	52	45	41	51	45	41	50	45	41	49	44	41	39

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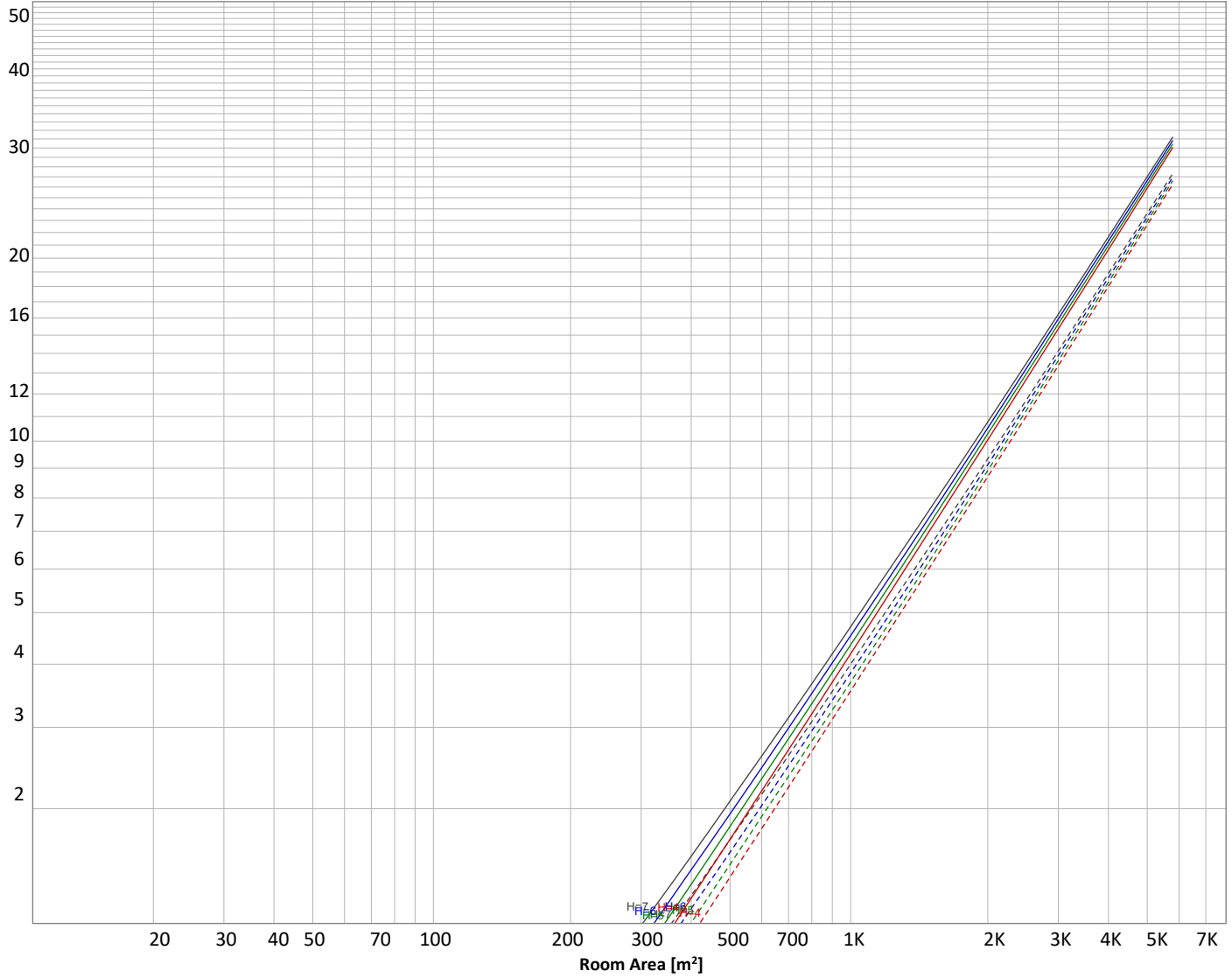
Operator:



## Luminaire budgetary diagram

Uncorrected, comprehensive UGR table according to 117-1995

LAMPS (number of lamps)



### Conditions

H = Room height	Flux = 22144 lm			
H <sub>down</sub> = Lamp distance from ceiling =	0.00 m	Line type	Ceiling reflectance	ρ(%)
H <sub>work</sub> = Work area height from floor =	0.00 m		70	Wall reflectance
E <sub>work</sub> = Average lux on work area =	100 lx		50	30
				Floor reflectance
				20

### Zonal Lumen Summary

0°-10°	10°-20°	20°-30°	30°-40°	40°-50°	50°-60°	60°-70°	70°-80°	80°-90°
1282 lm	3697 lm	5637 lm	6499 lm	3772 lm	664 lm	266 lm	203 lm	72,0 lm
90°-100°	100°-110°	110°-120°	120°-130°	130°-140°	140°-150°	150°-160°	160°-170°	170°-180°
2,99 lm	1,54 lm	3,99 lm	7,17 lm	9,03 lm	9,45 lm	8,52 lm	6,17 lm	2,34 lm

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## Outdoor Light Planning

### Lumen per Zone

Zone (γ)	Lumen	% Total
0-10°	1282 lm	5,8%
10-20°	3697 lm	16,7%
20-30°	5637 lm	25,5%
30-40°	6499 lm	29,3%
40-50°	3772 lm	17,0%
50-60°	664 lm	3,0%
60-70°	266 lm	1,2%
70-80°	203 lm	0,9%
80-90°	72 lm	0,3%
90-100°	3 lm	0,0%
100-110°	2 lm	0,0%
110-120°	4 lm	0,0%
120-130°	7 lm	0,0%
130-140°	9 lm	0,0%
140-150°	9 lm	0,0%
150-160°	9 lm	0,0%
160-170°	6 lm	0,0%
170-180°	2 lm	0,0%
<b>Total</b>	<b>22144 lm</b>	<b>100,0%</b>

### Intensity peaks

Max intensity	13495 cd
Intensity, 90°	17 cd
Intensity, 0°	13495 cd

### Zonal Lumen summary

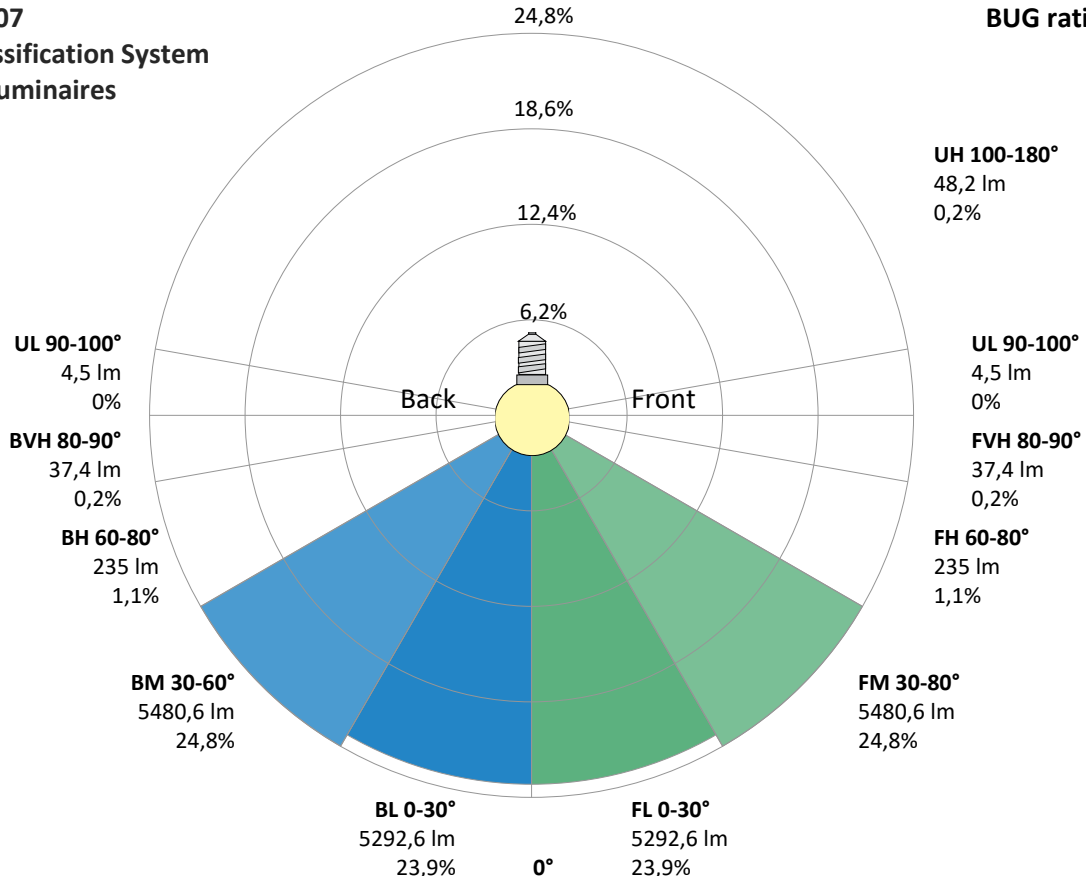
Zone (γ)	Lumen	% Total
0-30°	10616 lm	47,9%
0-40°	17115 lm	77,3%
0-60°	21551 lm	97,3%
60-90°	542 lm	2,4%
70-100°	278 lm	1,3%
90-120°	9 lm	0,0%
0-90°	22093 lm	99,8%
90-180°	51 lm	0,2%
0-180°	22144 lm	100,0%

### BUG rating

	Lumen	% Total
<b>Forward light</b>		
Low(0-30°)	5293 lm	23,9%
Medium(30-60°)	5481 lm	24,8%
High(60-80°)	235 lm	1,1%
Very high(80-90°)	37 lm	0,2%
<b>Back light</b>		
Low(0-30°)	5293 lm	23,9%
Medium(30-60°)	5481 lm	24,8%
High(60-80°)	235 lm	1,1%
Very high(80-90°)	37 lm	0,2%
<b>Uplight</b>		
Low(90-100°)	4 lm	0,0%
High(100-180°)	48 lm	0,2%

## IESNA TM-15-07 Luminaire Classification System For Outdoor Luminaires

**BUG rating B5 U2 G1**



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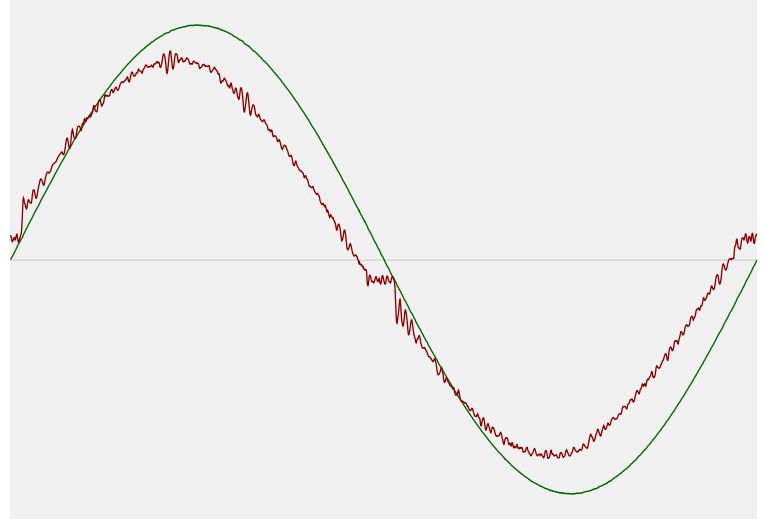


## Power Details

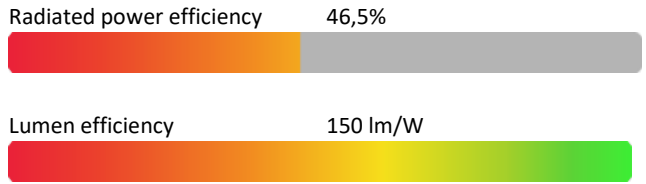
### Input Power

Power feed to light source	147,7 W
Frequency of input power	50 Hz
RMS Input voltage feed, $V_{RMS}$	230 V
RMS Input current feed, $I_{RMS}$	0,656 A
Volt-Ampere or apparent power = $V_{RMS} * I_{RMS}$	150,78 VA
Displacement factor of AC power feed	0,98
Power factor of AC current feed	0,98
Total harmonic distortion of the current	4,88%
Total harmonic distortion of the voltage	0,08%

### Input Power Curve



### Efficiency



## Stabilization Details

### Warmup Conditions

Stable period	15 min
Stable change max	2,0%
Minimum time	15 min

### Color Temperature Change

CCT start	6490 K
CCT shift	+10 K
CCT end	6500 K

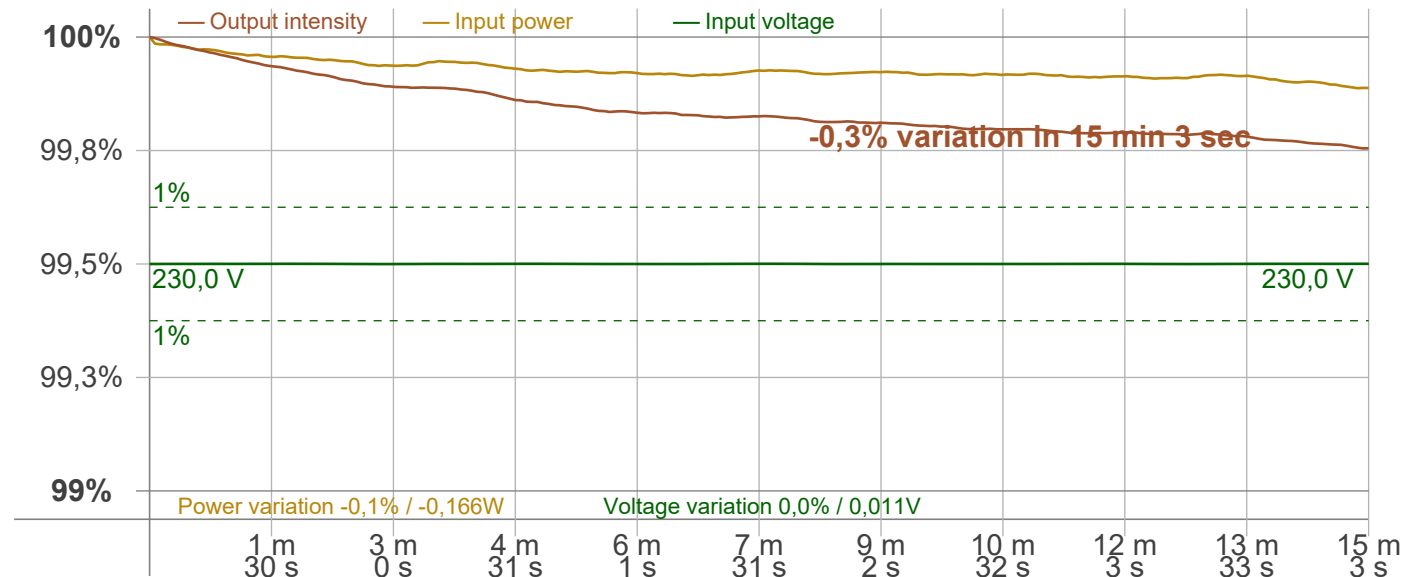
### Warmup Result

Total warmup time	Lamp stabilized in 15 min 3 sec
Warmup variation	-0,3%

### Output Change

Output start	22197 lm
Output change	-53 lm
Output end	22144 lm

## Stabilization Curve



# Light Measurement Report

Print date: 27-8-2025

Measurement date and time: 27-8-2025 09:42:27 – Measurement no. VFR-250827-2750-MS

Measurement tracking No. and Link: [VT250827-002624](https://www.viso-systems.com/VT250827-002624)

Operator:



## Flicker /TLA details

Flicker Meter Type Viso Systems LabFlicker  
 Frequency of input power 50 Hz  
 Flicker/TLA sample rate 20000 samples/s

**Measurement time**  
 PstLM 180 sec  
 All other indices 1,2 sec

### Flicker indices according to Illuminating Engineering Society (IES)

Flicker frequency 526,32 Hz  
 Percent Flicker 0,58 %  
 Flicker index 0

### Flicker indices according to California Energy Commission (CEC) 2016b

JA8/10 40 Hz 0,22 %  
 JA8/10 90 Hz 0,24 %  
 JA8/10 200 Hz 0,37 %  
 JA8/10 400 Hz 0,4 %  
 JA8/10 1000 Hz 0,55 %

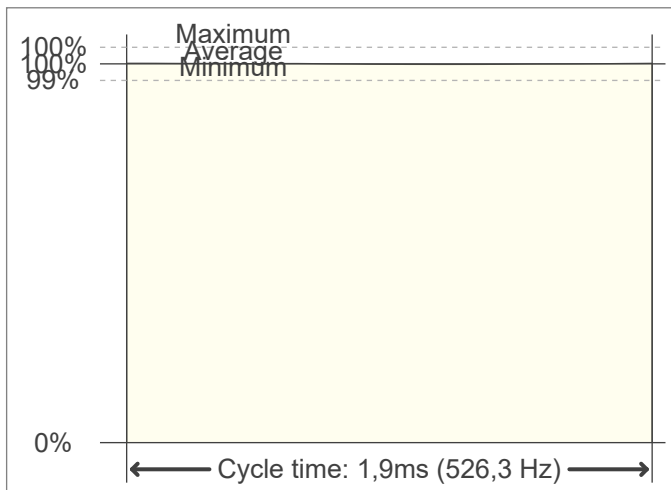
### TLA indices (re IEC TR 61547-1, IEC 61000-3-3 and IEC 61000-4-15)

PstLM value (F < 80 Hz) 0,11  
 SVM value (80 < F < 2000 Hz) 0,01

### Flicker indices according to Lighting Research Center (2015)

Perception metric, Assist Mp 0,05

### Flicker frame (frame of one flicker period in time domain)



### Flicker FFT (flicker curve in frequency domain)



### IEEE 1789 Frequency/modulation plot

