

Light Measurement Report

Print date: 2-6-2025

Measurement date and time: 2-6-2025 15:48:23 – Measurement no. VFR-250602-1509-MS

Measurement tracking No. and Link: [VT250602-006244](#)

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

γ (gamma)-Resolution

Test Distance

Input Power, Power and Displ. Factors

Input RMS Voltage and Current

Frequency of Input Power

Warm-up Time and Variation

32 planes – 11,25°

5°

10,10 m

24,7 W – PF 0,91 – DPF 0,92

230 V – 0,118 A

50 Hz

Lamp stabilized in 15 min 1 sec – 2,0%

Tested Light Source

Product Name

Item No. and Manufacturer

Product Description (line 1)

RL1-24-4000K

RL1-24-4000K – Dutchfulfillment

MI-LIGHT WALL WASHER 24W RGB+CCT

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

1862 lm – 0,94% / 99,06%

75 lm/W

2089 cd – 44°

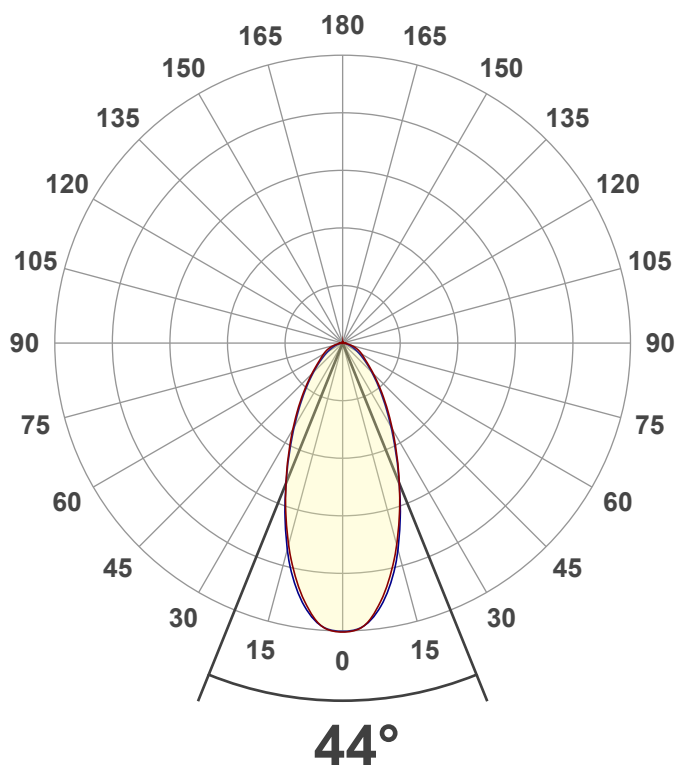
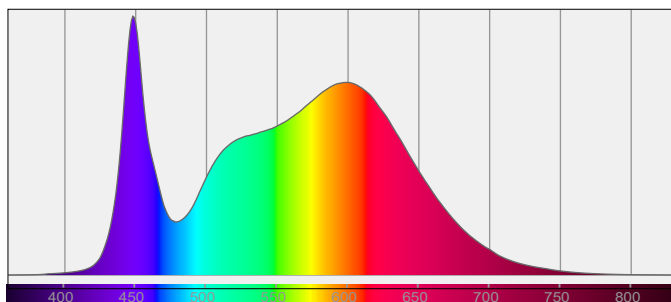
CCT = 4000 K / 4124 K

CRI 86,7

R_f 85,3 – R_g 99,3

Duv -0,0048 – SDCM 4,8

SVM 0,01 – PstLM 0,01



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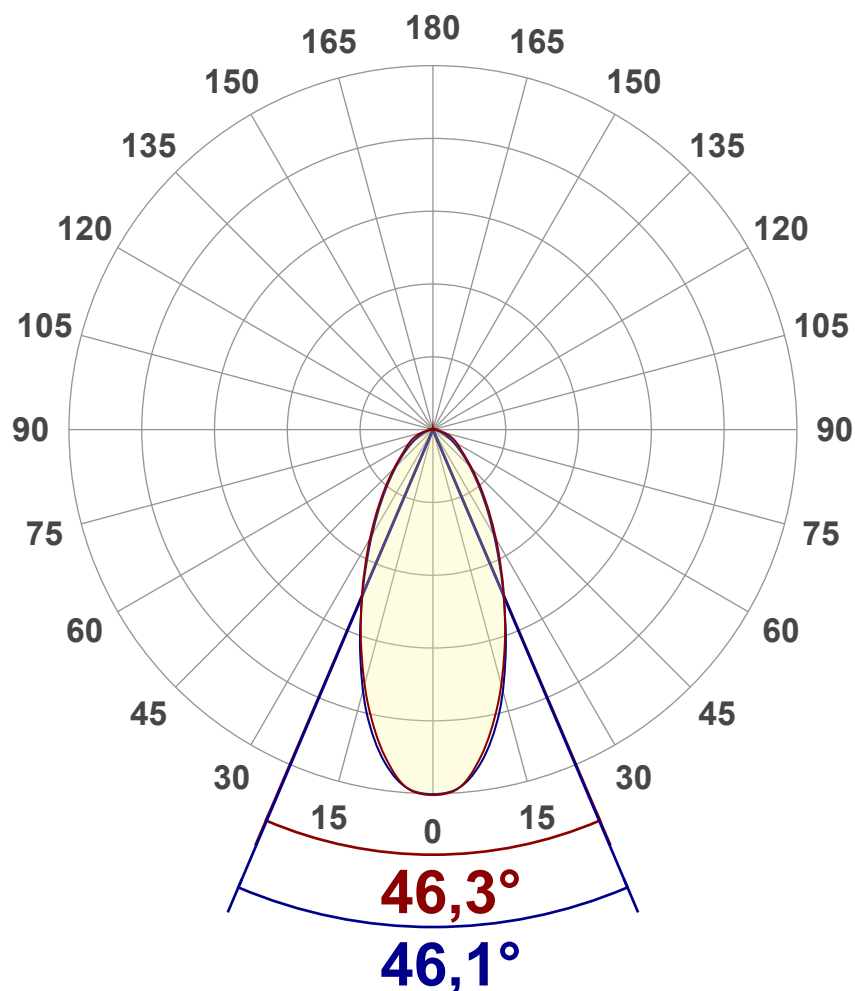
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Operator:



Luminous Intensity diagram

Unit: 0-100% of peak intensity



Main Values

Output (total Lumen)	1862 lm
Lumen Up% / Down%	0,94% / 99,06%
Peak Intensity	2089 cd
Beam Angle (50%)	44°
Beam Angle (90%)	46,1°
Beam Angle (10%)	45,6°

Cut-off Angle

Average 2,5%	145,5°
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Field Angle

Average 10%	102,6°
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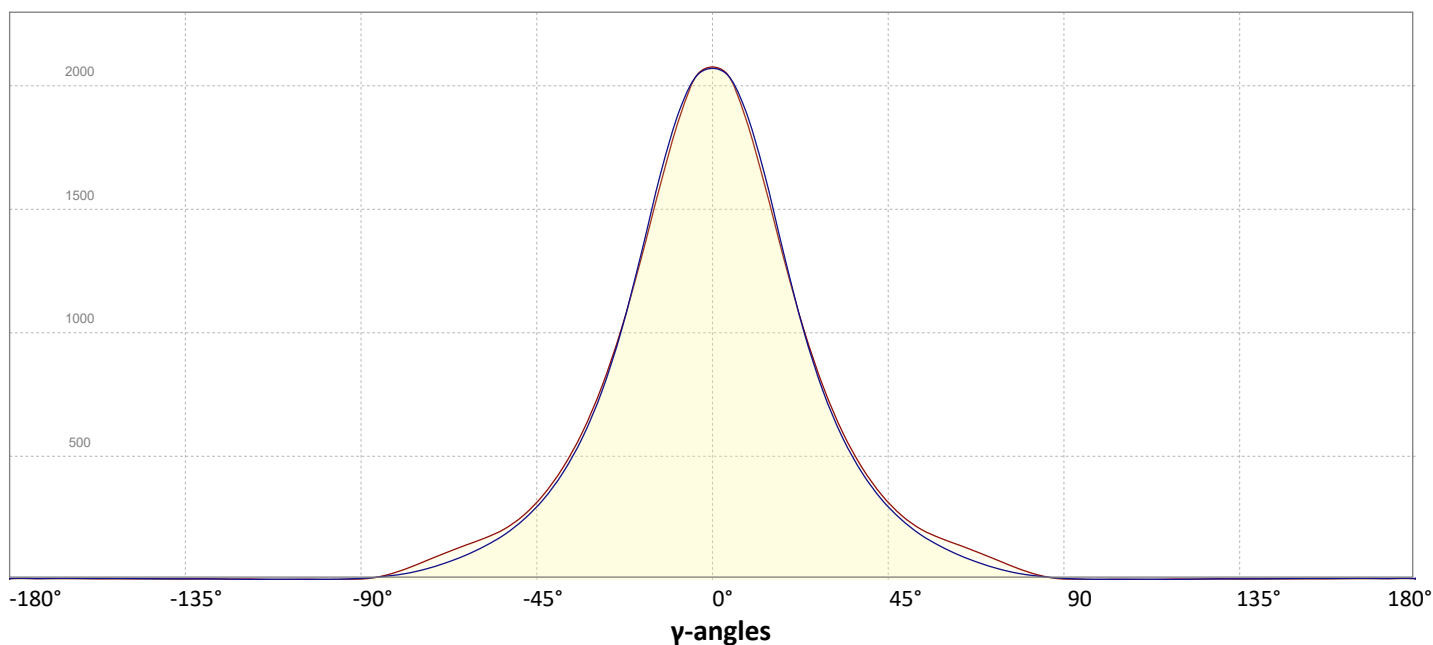
Intensity Ratio

In 120° cone	90,9%
In 90° cone	77,2%

C000-C180

C090-C270

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

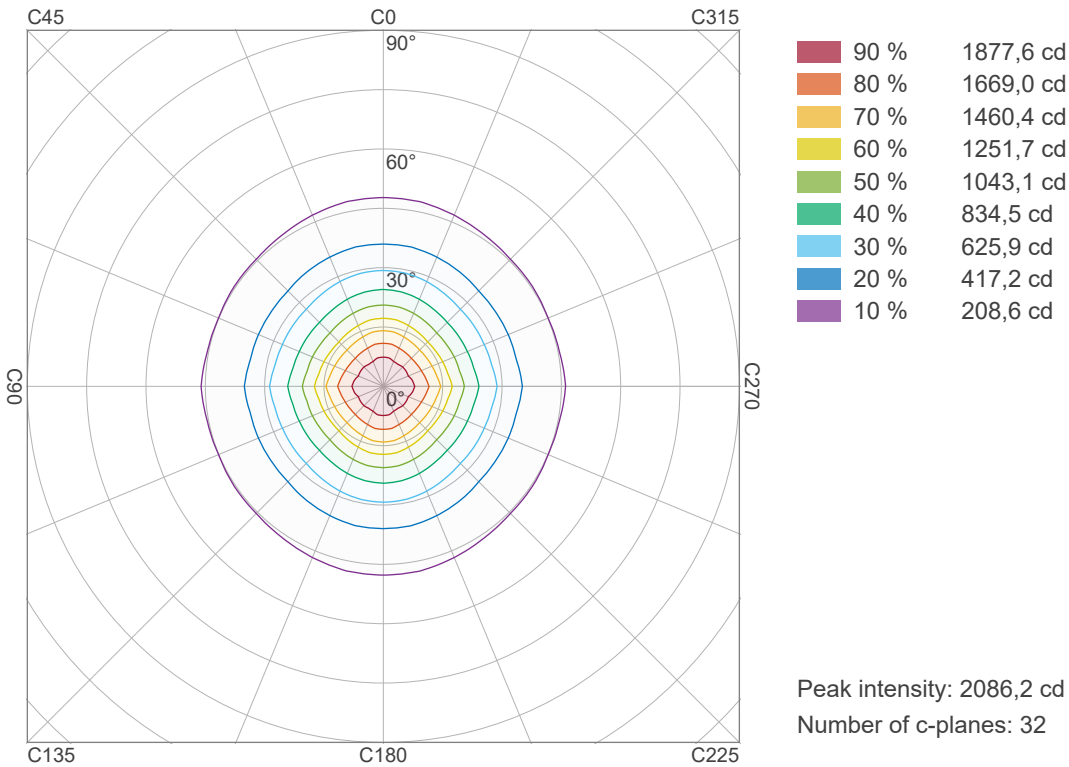


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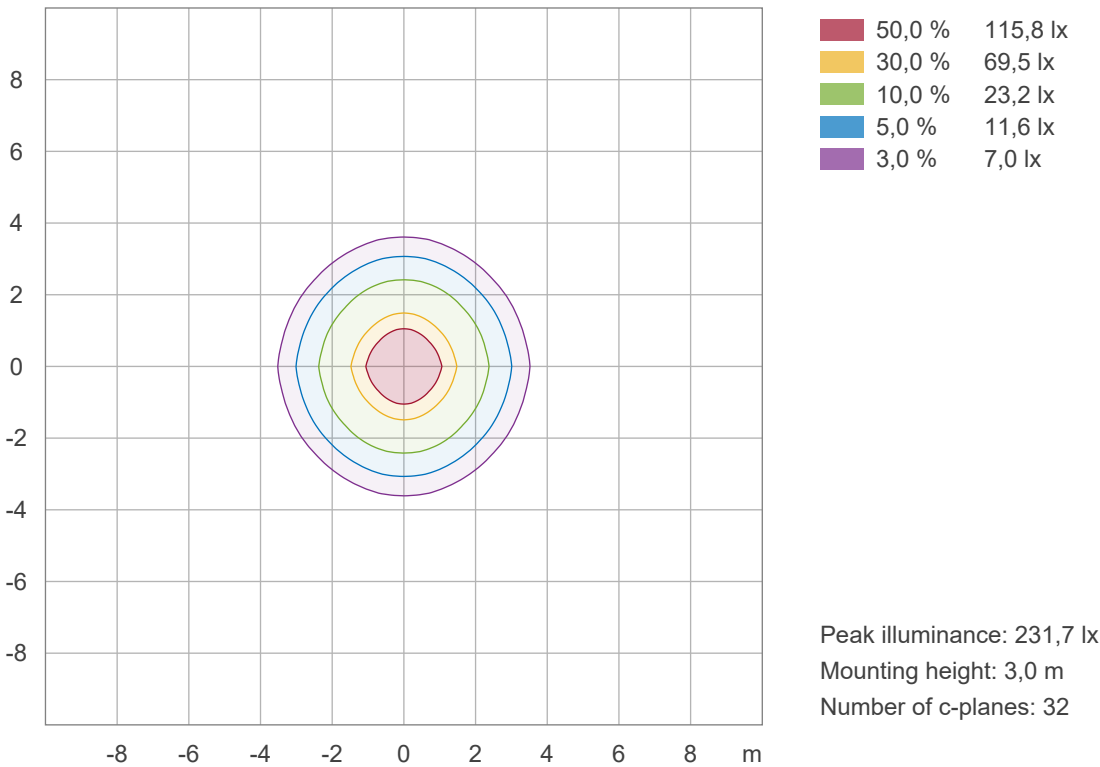
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Iso-intensity Diagram (Iso-candela)



Iso-illuminance Diagram (Iso-lux)



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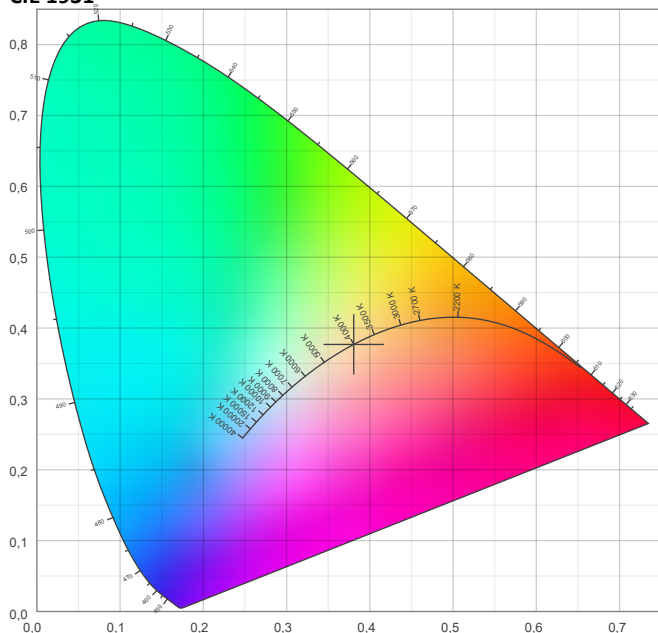


Color details

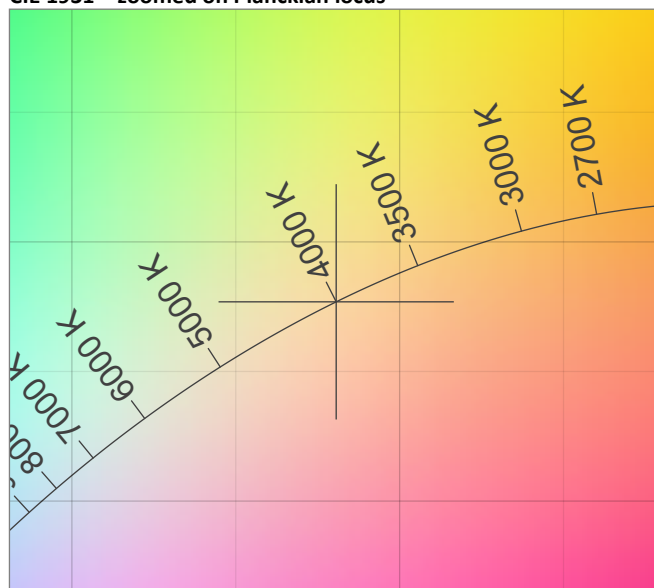
Correlated Color Temperature, Target CCT = 4000 K
Correlated Color Temperature, Measured CCT = 4124 K
Color Rendering Index CRI 86,7
Color Rendering Index, R9 (red component) R9 = 26,3
Color Rendering TM30-18 R_f 85,3 – R_g 99,3
Color Quality Scale CQS = 84,1

MacAdam Steps
Color coordinates CIE 1931 (x;y) = (0,381;0,377)
Color coordinate CIEs 1960 (u;v) = (0,225;0,334)
Color deviation from BBL Duv = -0,0048
Color coordinate CIEs 1976 (CIELUV) (u';v') = (0,225;0,502)

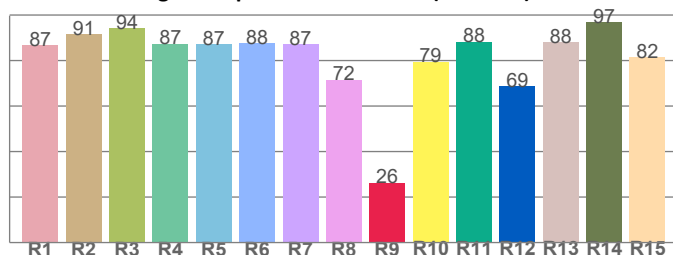
CIE 1931



CIE 1931 – zoomed on Planckian locus



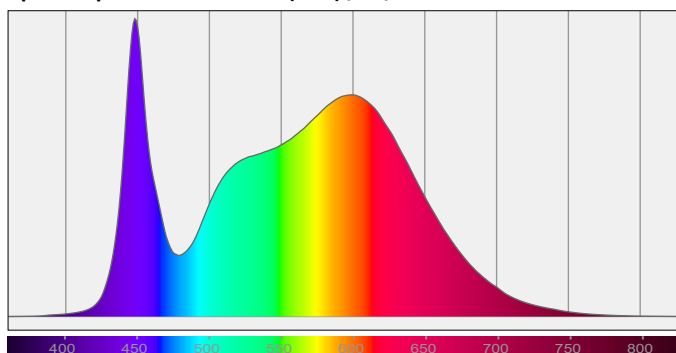
Color Rendering Index per reference color (CIE 1995)



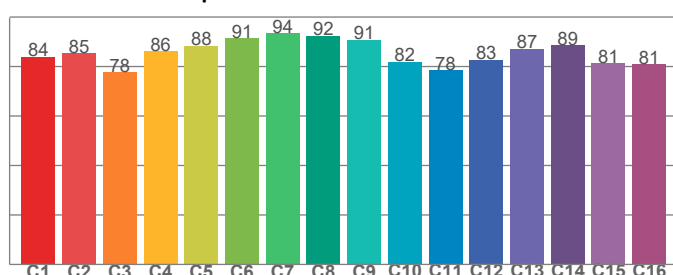
CRI R values, only R1-R8 are used to calculate final CRI value

R1	R2	R3	R4	R5	R6	R7	R8	R9	R10	R11	R12	R13	R14	R15
86,8	91,5	94,1	87,4	87,1	87,7	87,3	71,5	26,3	79,5	88,2	68,8	88,2	96,8	81,6

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



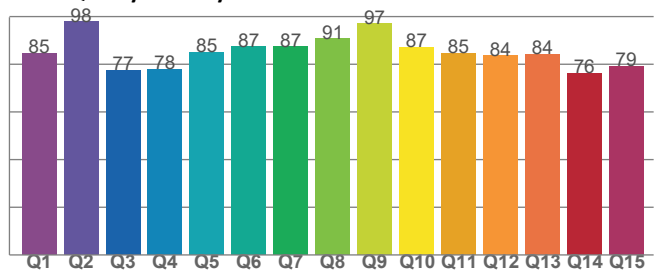
TM30-18 R_f-values per hue bin



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
84,0	85,3	77,7	86,1	88,4	91,4	93,6	92,4	90,8	81,9	78,4	82,7	87,2	88,6	81,4	80,8

Color Quality Scale by reference color



CQS Q values

Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10	Q11	Q12	Q13	Q14	Q15
84,7	97,9	77,5	77,8	85,1	87,3	87,3	90,7	97,1	87,2	84,7	83,6	84,2	76,3	79,3

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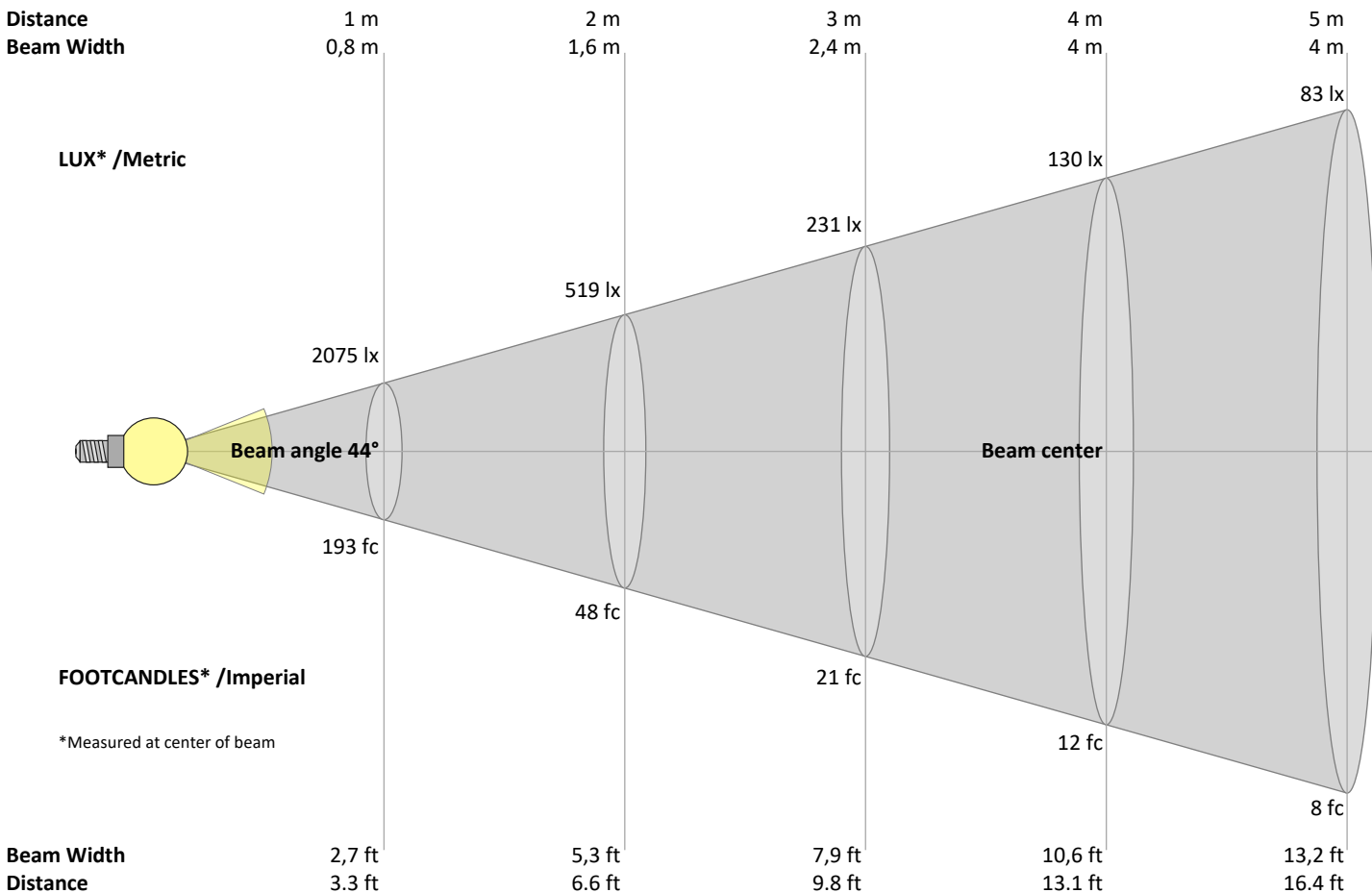
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Beam Details



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
2075	519	231	130	83	58	42	32	26	21	17	14	12	11	9	8	7	6	6	5	lux
192,8	48,2	21,4	12	7,7	5,4	3,9	3	2,4	1,9	1,6	1,3	1,1	1	0,9	0,8	0,7	0,6	0,5	0,5	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
2075	1996	1784	1499	1202	937	720	549	416	316	243	193	159	129	98	66	37	15	4	2	cd
100%	96%	86%	72%	58%	45%	35%	26%	20%	15%	12%	9%	8%	6%	5%	3%	2%	1%	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
2075	2002	1817	1532	1212	926	700	527	397	298	223	167	123	88	60	38	22	12	6	3	cd
100%	96%	88%	74%	58%	45%	34%	25%	19%	14%	11%	8%	6%	4%	3%	2%	1%	1%	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
2075	1996	1784	1499	1202	937	720	549	416	316	243	193	159	129	98	66	37	15	4	2	cd
100%	96%	86%	72%	58%	45%	35%	26%	20%	15%	12%	9%	8%	6%	5%	3%	2%	1%	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
2075	2002	1817	1532	1212	926	700	527	397	298	223	167	123	88	60	38	22	12	6	3	cd
100%	96%	88%	74%	58%	45%	34%	25%	19%	14%	11%	8%	6%	4%	3%	2%	1%	1%	0%	0%	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		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	18,8	19,7	19,0	20,0	20,2	18,4	19,2	18,5	19,5	19,7
	3H	19,7	20,7	20,1	20,9	21,1	18,9	19,9	19,3	20,1	20,3
	4H	20,1	21,0	20,5	21,3	21,6	19,1	20,1	19,6	20,3	20,6
	6H	20,4	21,2	20,8	21,5	21,9	19,4	20,1	19,7	20,5	20,8
	8H	20,5	21,2	20,8	21,6	22,0	19,4	20,2	19,8	20,5	20,9
	12H	20,5	21,2	20,8	21,6	22,0	19,5	20,2	19,8	20,5	21,0
4H	2H	18,9	19,8	19,3	20,1	20,3	18,5	19,4	18,9	19,7	19,9
	3H	20,1	20,9	20,5	21,2	21,7	19,4	20,1	19,7	20,4	20,9
	4H	20,5	21,2	21,0	21,6	22,2	19,6	20,3	20,0	20,7	21,2
	6H	20,8	21,5	21,3	21,9	22,2	19,8	20,5	20,3	20,8	21,2
	8H	20,9	21,5	21,4	21,9	22,3	19,9	20,5	20,4	20,9	21,3
	12H	20,9	21,4	21,4	21,9	22,3	19,9	20,4	20,5	20,9	21,4
8H	4H	20,5	21,1	21,1	21,5	21,9	19,6	20,2	20,2	20,6	21,0
	6H	20,9	21,3	21,4	21,8	22,4	19,9	20,4	20,4	20,8	21,4
	8H	21,0	21,4	21,6	21,9	22,6	20,1	20,4	20,6	21,0	21,6
	12H	21,1	21,4	21,7	21,9	22,5	20,2	20,5	20,8	21,0	21,6
12H	4H	20,5	21,0	21,0	21,4	21,9	19,6	20,1	20,1	20,5	21,0
	6H	20,9	21,3	21,4	21,8	22,5	19,9	20,3	20,5	20,8	21,5
	8H	21,0	21,3	21,6	21,8	22,5	20,1	20,4	20,7	20,9	21,5
Variations with the observer position for the luminaire spacings, S:											
S = 1.0H		0,4 / -0,4					0,5 / -0,5				
S = 1.5H		1,1 / -0,9					1,3 / -1,1				
S = 2.0H		2,0 / -1,6					2,1 / -2,0				

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	106	106	106	101	101	101	99	
1	112	108	105	102	109	106	103	100	101	99	97	97	96	94	94	92	89	
2	104	98	93	89	102	96	92	88	93	89	86	90	86	84	87	84	80	
3	98	90	83	78	95	88	82	78	85	80	76	82	78	75	80	77	72	
4	91	82	75	70	89	81	75	70	79	73	69	76	72	68	74	70	65	
5	86	76	69	64	84	75	68	63	73	67	63	71	66	62	69	65	60	
6	81	70	63	58	79	69	63	58	68	62	57	66	61	57	65	60	55	
7	76	65	58	54	75	65	58	53	63	57	53	62	57	53	61	56	51	
8	72	61	54	50	71	61	54	49	59	53	49	58	53	49	57	52	47	
9	68	57	51	46	67	57	50	46	56	50	46	55	49	46	54	49	44	
10	65	54	48	43	64	54	47	43	53	47	43	52	46	43	51	46	41	

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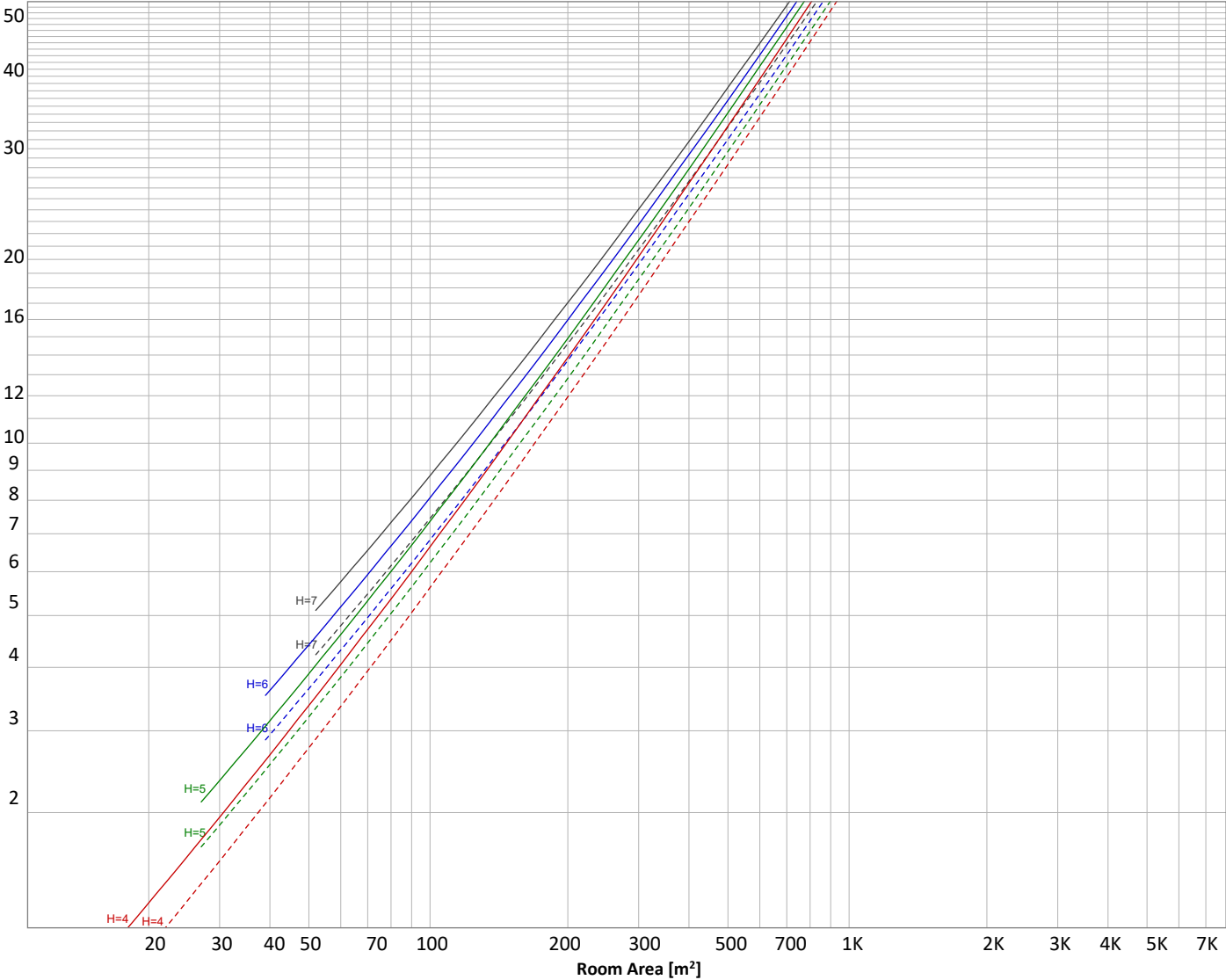
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Operator:



Luminaire budgetary diagram

Uncorrected, comprehensive UGR table according to 117-1995

LAMPS (number of lamps)



Conditions

H = Room height	Flux = 1862 lm	p(%)		
H _{down} = Lamp distance from ceiling =	0.00 m	Line type	Ceiling reflectance	Wall reflectance
H _{work} = Work area height from floor =	0.00 m	-----	70	50
E _{work} = 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°
184 lm	405 lm	405 lm	320 lm	227 lm	152 lm	95,5 lm	45,3 lm	10,8 lm
90°-100°	100°-110°	110°-120°	120°-130°	130°-140°	140°-150°	150°-160°	160°-170°	170°-180°
2,11 lm	2,06 lm	2,12 lm	2,36 lm	2,55 lm	2,45 lm	1,99 lm	1,31 lm	0,471 lm

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Outdoor Light Planning

Lumen per Zone

Zone (γ)	Lumen	% Total
0-10°	184 lm	9,9%
10-20°	405 lm	21,7%
20-30°	405 lm	21,8%
30-40°	320 lm	17,2%
40-50°	227 lm	12,2%
50-60°	152 lm	8,2%
60-70°	96 lm	5,1%
70-80°	45 lm	2,4%
80-90°	11 lm	0,6%
90-100°	2 lm	0,1%
100-110°	2 lm	0,1%
110-120°	2 lm	0,1%
120-130°	2 lm	0,1%
130-140°	3 lm	0,1%
140-150°	2 lm	0,1%
150-160°	2 lm	0,1%
160-170°	1 lm	0,1%
170-180°	0 lm	0,0%
Total	1862 lm	100,0%

Intensity peaks

Max intensity	2089 cd
Intensity, 90°	4 cd
Intensity, 0°	2075 cd

Zonal Lumen summary

Zone (γ)	Lumen	% Total
0-30°	994 lm	53,4%
0-40°	1314 lm	70,6%
0-60°	1693 lm	90,9%
60-90°	152 lm	8,1%
70-100°	58 lm	3,1%
90-120°	6 lm	0,3%
0-90°	1845 lm	99,1%
90-180°	17 lm	0,9%
0-180°	1862 lm	100,0%

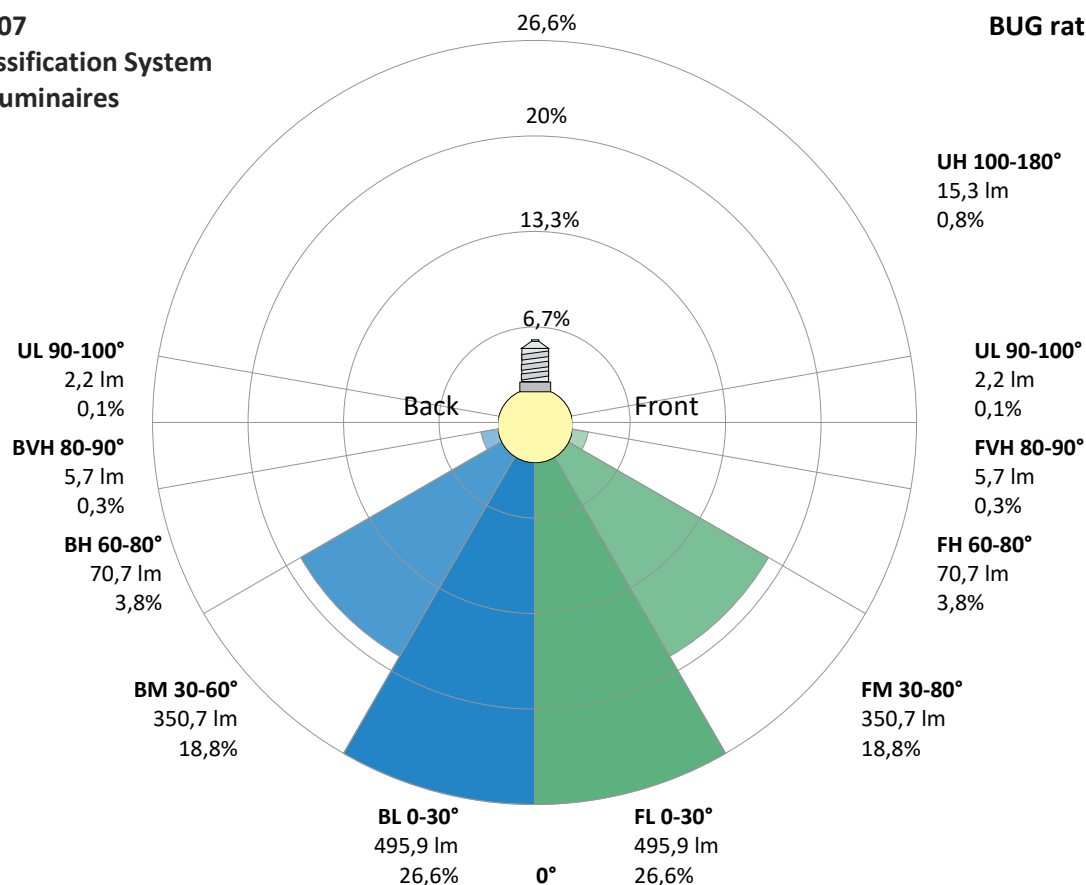
BUG rating

	Lumen	% Total
Forward light		
Low(0-30°)	496 lm	26,6%
Medium(30-60°)	351 lm	18,8%
High(60-80°)	71 lm	3,8%
Very high(80-90°)	6 lm	0,3%
Back light		
Low(0-30°)	496 lm	26,6%
Medium(30-60°)	351 lm	18,8%
High(60-80°)	71 lm	3,8%
Very high(80-90°)	6 lm	0,3%
Uplight		
Low(90-100°)	2 lm	0,1%
High(100-180°)	15 lm	0,8%

IESNA TM-15-07

Luminaire Classification System For Outdoor Luminaires

BUG rating B1 U2 G0



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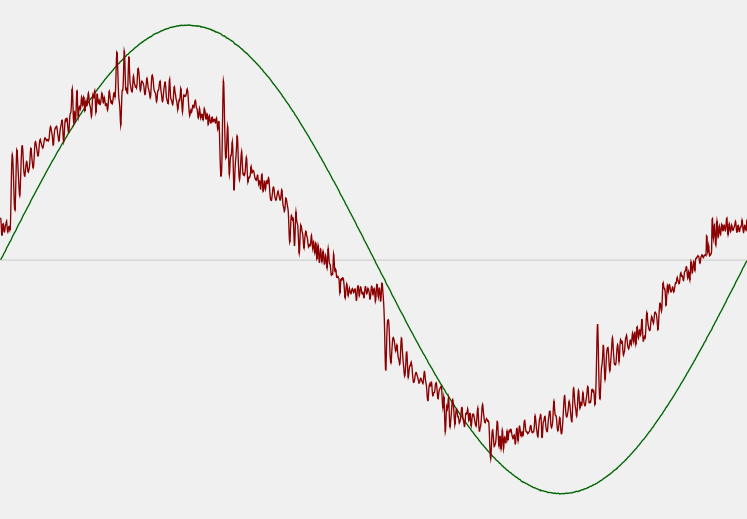


Power Details

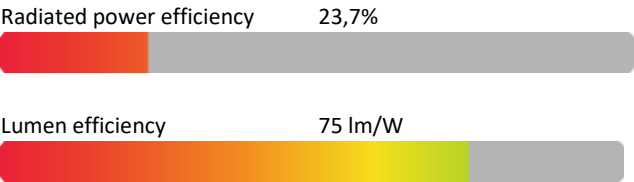
Input Power

Power feed to light source	24,7 W
Frequency of input power	50 Hz
RMS Input voltage feed, V_{RMS}	230 V
RMS Input current feed, I_{RMS}	0,118 A
Volt-Ampere or apparent power = $V_{RMS} \cdot I_{RMS}$	27,09 VA
Displacement factor of AC power feed	0,92
Power factor of AC current feed	0,91
Total harmonic distortion of the current	8,7%
Total harmonic distortion of the voltage	0,07%

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	3997 K
CCT shift	+3 K
CCT end	4000 K

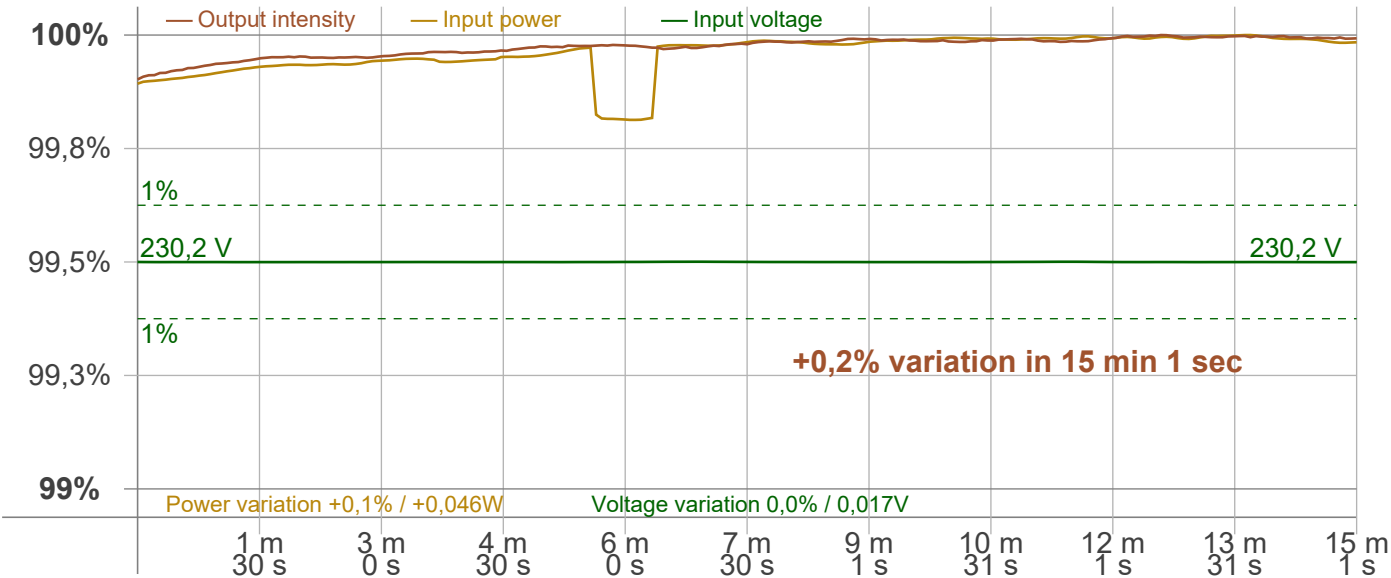
Warmup Result

Total warmup time	Lamp stabilized in 15 min 1 sec
Warmup variation	+0,2%

Output Change

Output start	1860 lm
Output change	+2 lm
Output end	1862 lm

Stabilization Curve



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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

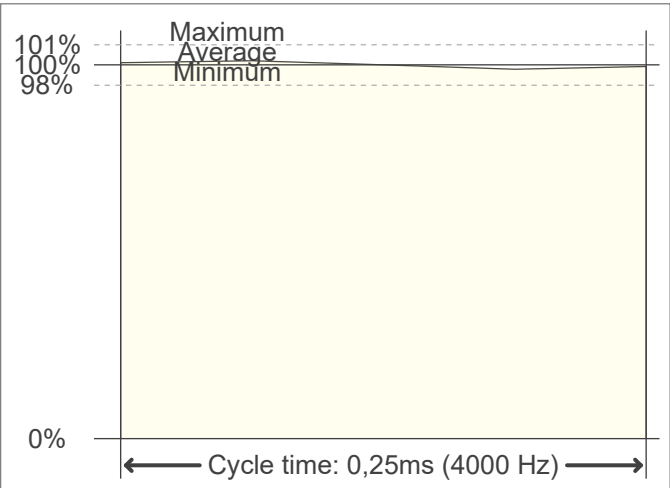
Flicker indices according to Illuminating Engineering Society (IES)
Flicker frequency 4000 Hz
Percent Flicker 1,79 %
Flicker index 0

Flicker indices according to California Energy Commission (CEC) 2016b
JA8/10 40 Hz 0,02 %
JA8/10 90 Hz 0,03 %
JA8/10 200 Hz 0,18 %
JA8/10 400 Hz 0,26 %
JA8/10 1000 Hz 0,46 %

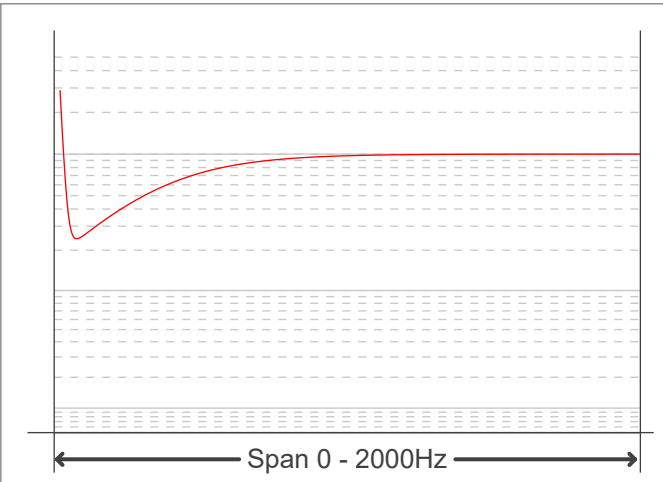
TLA indices (re IEC TR 61547-1, IEC 61000-3-3 and IEC 61000-4-15)
PstLM value (F < 80 Hz) 0,01
SVM value (80 < F < 2000 Hz) 0,01

Flicker indices according to Lighting Research Center (2015)
Perception metric, Assist Mp 0

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



Flicker FFT (flicker curve in frequency domain)



IEEE 1789 Frequency/modulation plot

