Light Measurement Report

Print date: 12-8-2025
Measurement date and time: 31-7-2025 14:53:29 – Measurement no. VFR-250731-2282-MS
Measurement tracking No. and Link: VT250731-003435
Operator:

Laboratory and Equipment

Laboratory Owner and Location	Viso Systems, Copenhagen V, Denmark
Goniospectrometer System and Type	LabSpion – Type C, horizontal
Sensor Name, Calibr. Date and Serial No.	LabSensor Model2 – 11-1-2024 – 3130191315
Spectrometer Manufacturer and Model	Ibsen Photonics, Denmark – Freedom VIS (Custom Viso)

Measurement Conditions

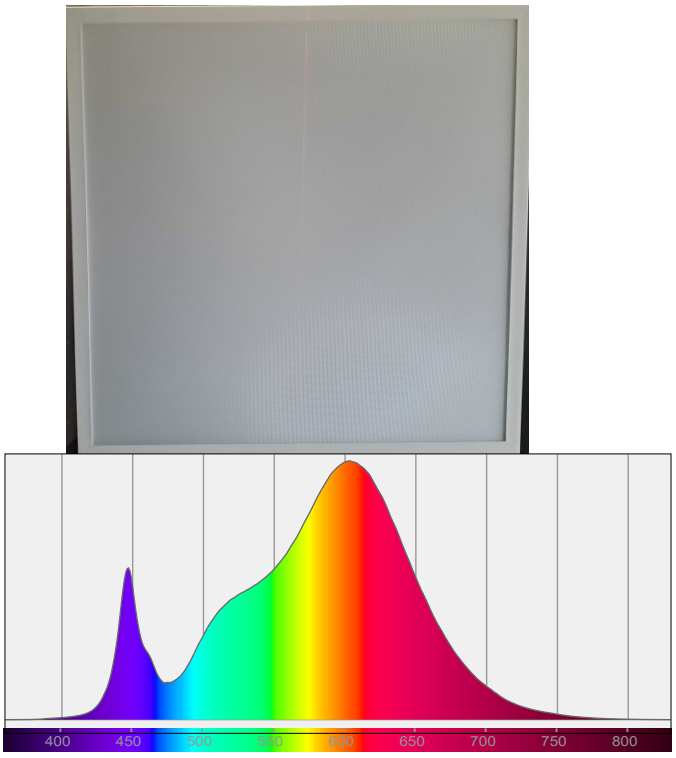
Number of C-planes and Resolution	12 planes – 30°
γ (gamma)-Resolution	5°
Test Distance	6,22 m
Input Power, Power and Displ. Factors	31,0 W – PF 0,97 – DPF 0,97
Input RMS Voltage and Current	230 V – 0,139 A
Frequency of Input Power	50 Hz
Warm-up Time and Variation	Lamp stabilized in 15 min 1 sec – 2,0%

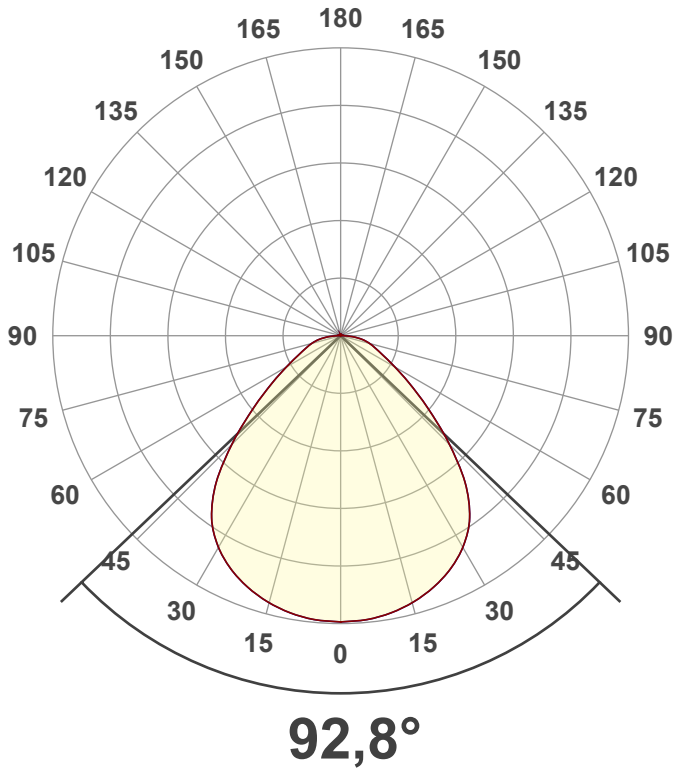
Tested Light Source

Product Name	812645-28W-3000K
Item No. and Manufacturer	812645 – Dutchfulfillment
Product Description (line 1)	BACK-LIT LED PANEEL | EUROPA | 60X60CM | 28W | CCT-SWITCH |
ZONDER DRIVER	

Main Light Measurement Results

Output – Total Lumen (Up% / Down%)	3308 lm – 0,48% / 99,52%
Efficiency	107 lm/W
Peak Intensity and Beam Angle	1445 cd – 92,8°
Correlated Color Temperature, Target/Measured	CCT = 3000 K / 2982 K
Color Rendering Index	CRI 82,4
Color Rendering TM30-18	R_f 84,0 – R_g 97,7
Color Shift, CIE duv and MacAdam Steps	Duv -0,0007 – SDCM 0,8
Flicker	SVM 0,02 – PstLM 0,01





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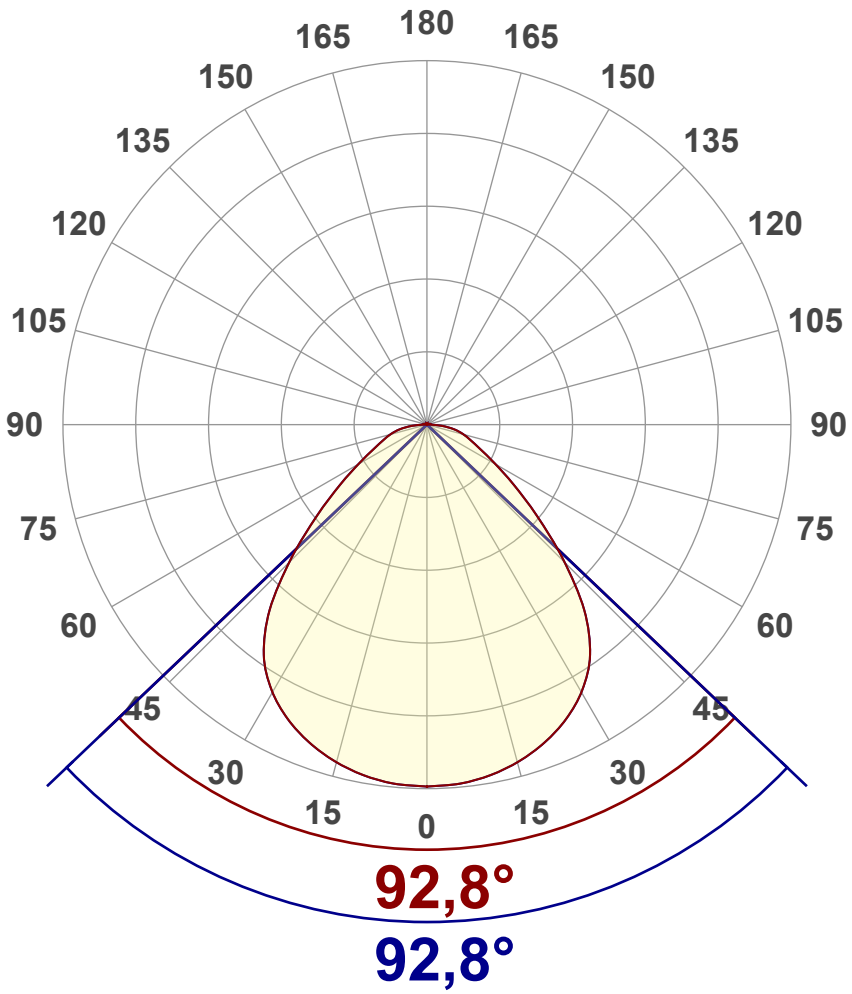
Luminous Intensity diagram Unit: 0-100% of peak intensity



Main Values

Output (total Lumen)	3308 lm
Lumen Up% / Down%	0,48% / 99,52%
Peak Intensity	1445 cd
Beam Angle (50%)	92,8°
Beam Angle (90%)	92,8°
Beam Angle (10%)	92,8°

Cut-off Angle

Average 2,5%	175,6°

Field Angle

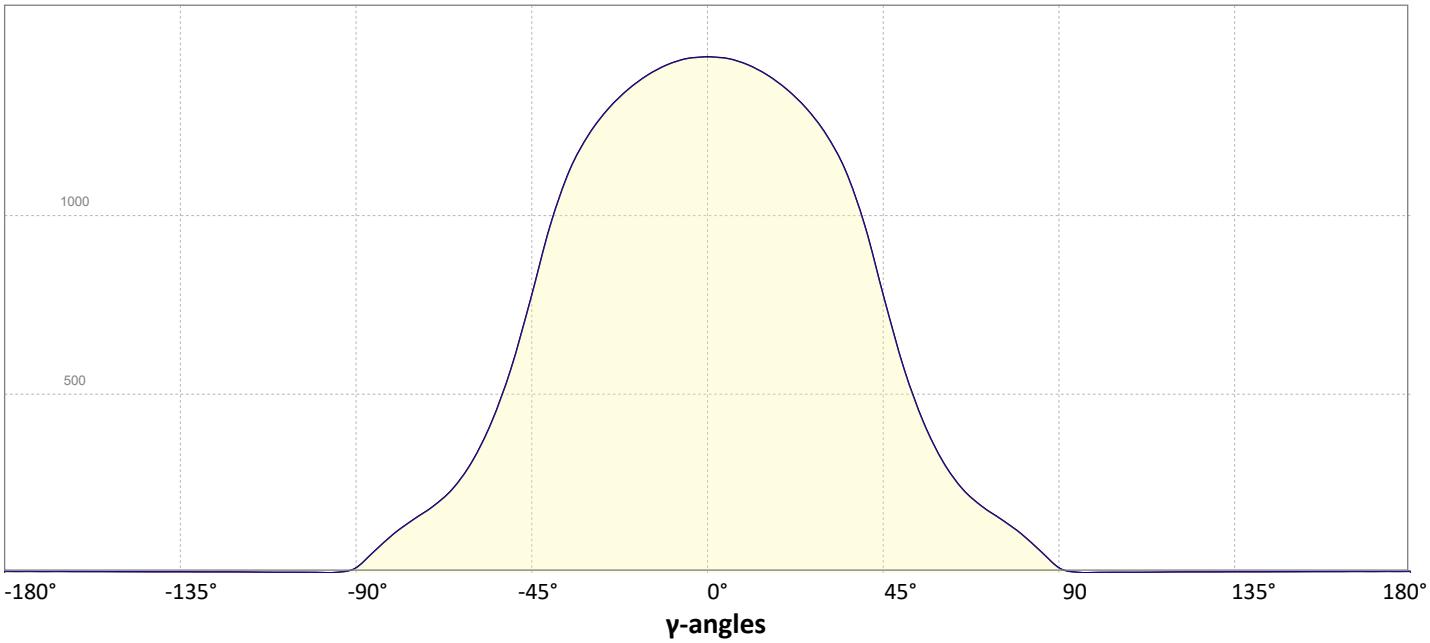
Average 10%	151,8°

Intensity Ratio

In 120° cone	85,3%
In 90° cone	65,2%

C000-C180
C090-C270

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



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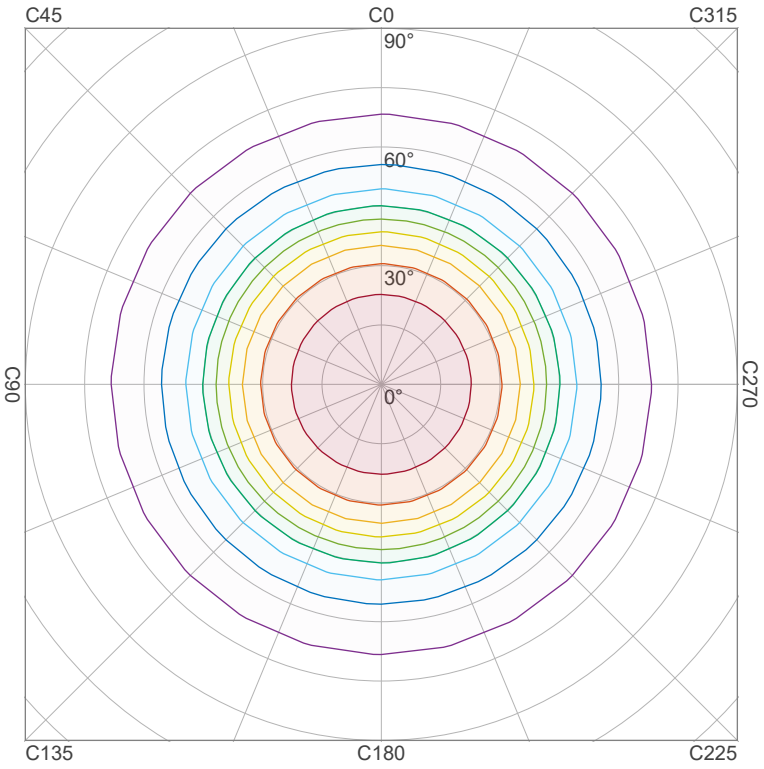
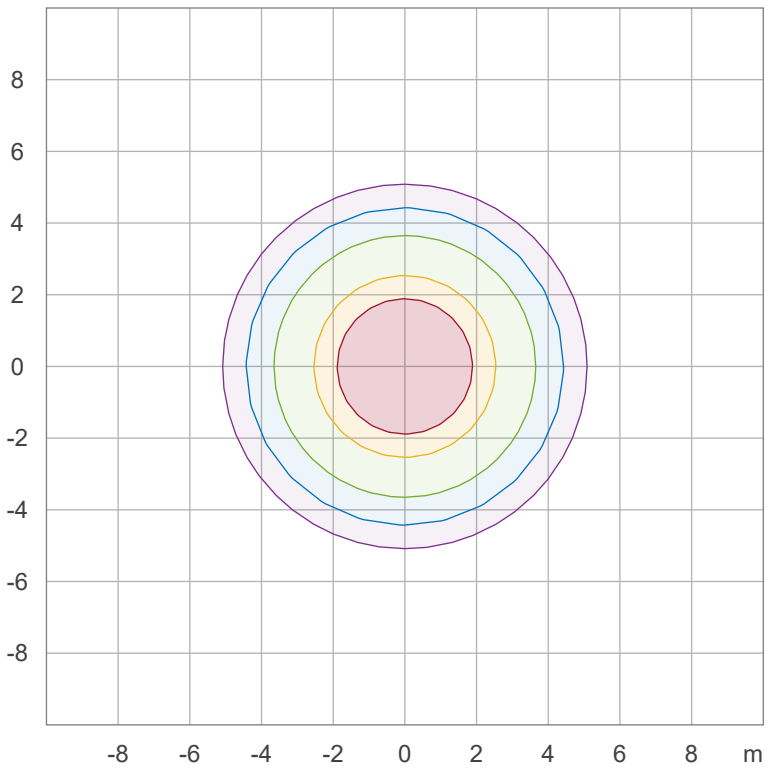
Iso-intensity Diagram (Iso-candela)



90 %	1300,1 cd
80 %	1155,7 cd
70 %	1011,2 cd
60 %	866,7 cd
50 %	722,3 cd
40 %	577,8 cd
30 %	433,4 cd
20 %	288,9 cd
10 %	144,5 cd

Peak intensity: 1444,6 cd
Number of c-planes: 12

Iso-illuminance Diagram (Iso-lux)



50,0 %	80,3 lx
30,0 %	48,2 lx
10,0 %	16,1 lx
5,0 %	8,0 lx
3,0 %	4,8 lx

Peak illuminance: 160,5 lx
Mounting height: 3,0 m
Number of c-planes: 12

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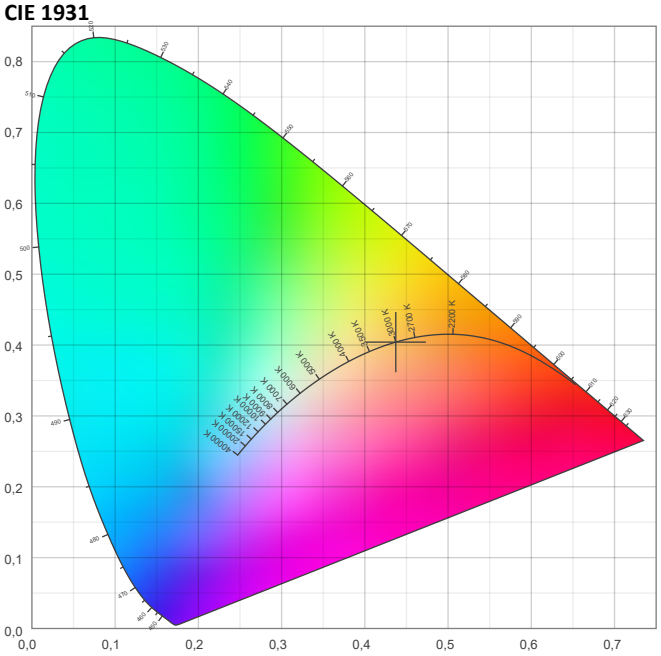
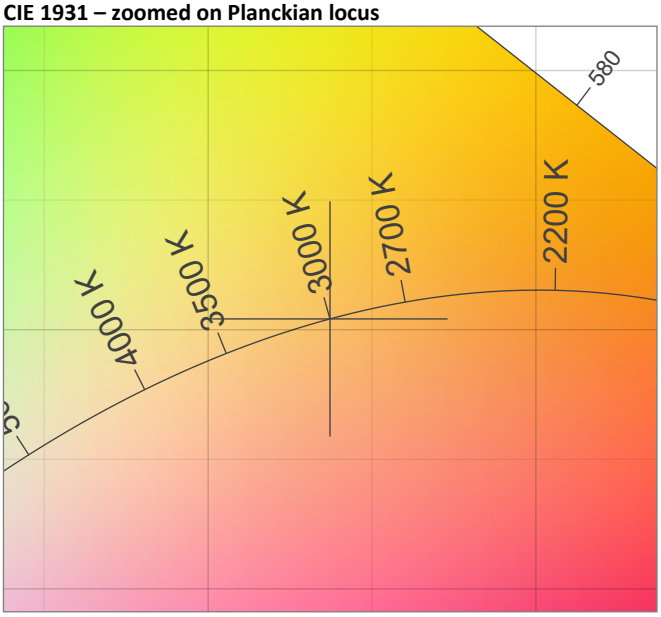
Color details

Correlated Color Temperature, Target	CCT = 3000 K
Correlated Color Temperature, Measured	CCT = 2982 K
Color Rendering Index	CRI 82,4
Color Rendering Index, R9 (red component)	R9 = 3,0
Color Rendering TM30-18	R_f 84,0 – R_g 97,7
Color Quality Scale	CQS = 81,4
MacAdam Steps	SDCM = 0,8
Color coordinates CIE 1931	(x;y) = (0,437;0,404)
Color coordinate CIEs 1960	(u;v) = (0,251;0,348)
Color deviation from BBL	Duv = -0,0007
Color coordinate CIEs 1976 (CIELUV)	(u';v') = (0,251;0,521)

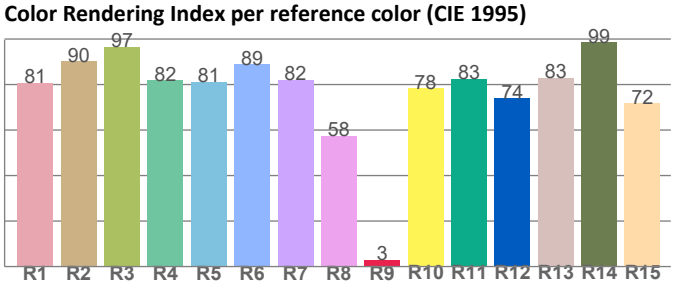
CIE 1931



CIE 1931 – zoomed on Planckian locus



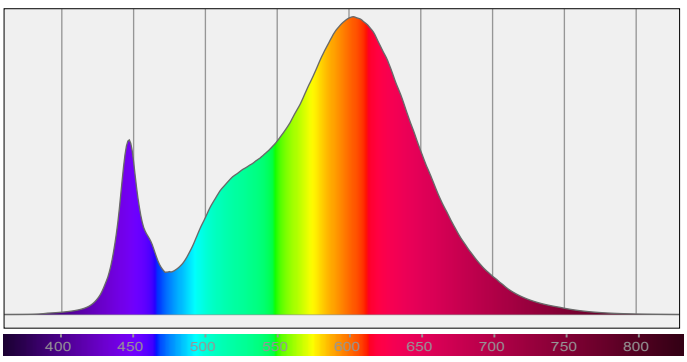
Color Rendering Index per reference color (CIE 1995)



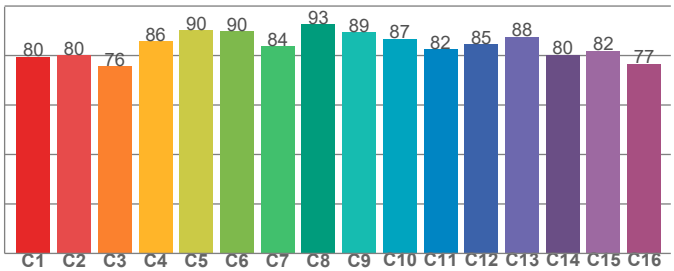
CRI R values, only R1-R8 are used to calculate final CRI value

R1	R2	R3	R4	R5	R6	R7	R8	R9	R10	R11	R12	R13	R14	R15
80,8	90,2	96,6	81,8	81,3	88,8	82,1	57,6	3,0	78,5	82,6	74,1	83,0	98,7	71,8

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



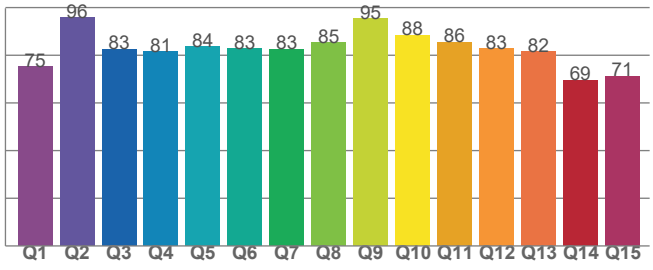
TM30-18 Rf-values per hue bin



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
79,5	80,2	75,6	85,7	90,3	89,9	83,8	92,6	89,4	86,8	82,5	84,6	87,5	80,3	82,0	76,6

Color Quality Scale by reference color



CQS Q values

Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10	Q11	Q12	Q13	Q14	Q15
75,2	95,8	82,5	81,4	83,6	82,8	82,6	85,3	95,3	88,4	85,6	82,7	81,6	69,4	71,3

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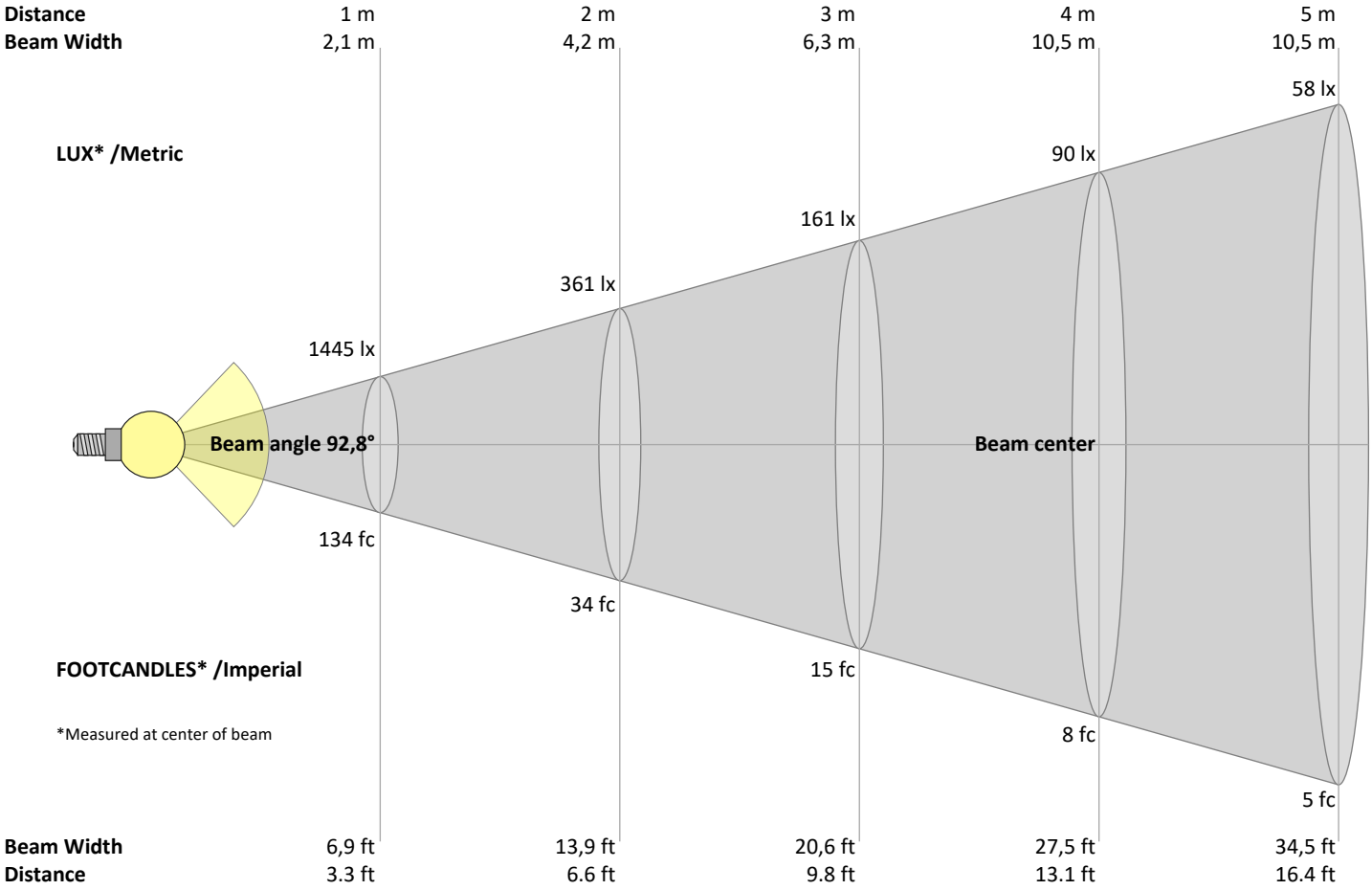
Beam Details



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
1445	361	161	90	58	40	29	23	18	14	12	10	9	7	6	6	5	4	4	4	lux
134,2	33,6	14,9	8,4	5,4	3,7	2,7	2,1	1,7	1,3	1,1	0,9	0,8	0,7	0,6	0,5	0,5	0,4	0,4	0,3	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
1445	1440	1423	1395	1356	1303	1233	1133	981	778	584	431	318	239	189	151	112	63	15	2	cd
100%	100%	99%	97%	94%	90%	85%	78%	68%	54%	40%	30%	22%	17%	13%	10%	8%	4%	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
1445	1440	1423	1395	1356	1303	1233	1133	981	778	584	431	318	239	189	151	112	63	15	2	cd
100%	100%	99%	97%	94%	90%	85%	78%	68%	54%	40%	30%	22%	17%	13%	10%	8%	4%	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
1445	1440	1423	1395	1356	1303	1233	1133	981	778	584	431	318	239	189	151	112	63	15	2	cd
100%	100%	99%	97%	94%	90%	85%	78%	68%	54%	40%	30%	22%	17%	13%	10%	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
1445	1440	1423	1395	1356	1303	1233	1133	981	778	584	431	318	239	189	151	112	63	15	2	cd
100%	100%	99%	97%	94%	90%	85%	78%	68%	54%	40%	30%	22%	17%	13%	10%	8%	4%	1%	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 H = mounting height above eye level		**Viewed Crosswise** (Viewing direction orthogonal to lamp length axis)					**Viewed Endwise** (Viewing direction parallel to lamp length axis)				
X	**Y**										
2H	2H	15,2	16,3	15,4	16,6	16,8	15,2	16,3	15,4	16,6	16,8
	3H	16,1	17,2	16,5	17,5	17,7	16,1	17,2	16,5	17,5	17,7
	4H	16,6	17,7	17,0	18,0	18,2	16,6	17,7	17,0	18,0	18,2
	6H	17,3	18,2	17,6	18,5	18,9	17,3	18,2	17,6	18,5	18,9
	8H	17,5	18,4	17,8	18,7	19,2	17,5	18,4	17,8	18,7	19,2
	12H	17,7	18,6	18,1	19,0	19,4	17,7	18,6	18,1	19,0	19,4
4H	2H	15,5	16,6	15,9	16,9	17,1	15,5	16,6	15,9	16,9	17,1
	3H	16,7	17,6	17,1	18,0	18,4	16,7	17,6	17,1	18,0	18,4
	4H	17,4	18,2	17,8	18,6	19,2	17,4	18,2	17,8	18,6	19,2
	6H	18,2	19,0	18,7	19,3	19,7	18,2	19,0	18,7	19,3	19,7
	8H	18,5	19,2	19,0	19,6	20,0	18,5	19,2	19,0	19,6	20,0
	12H	18,8	19,4	19,3	19,8	20,3	18,8	19,4	19,3	19,8	20,3
8H	4H	17,7	18,4	18,2	18,8	19,2	17,7	18,4	18,2	18,8	19,2
	6H	18,7	19,2	19,2	19,7	20,2	18,7	19,2	19,2	19,7	20,2
	8H	19,2	19,6	19,7	20,2	20,8	19,2	19,6	19,7	20,2	20,8
	12H	19,6	20,0	20,2	20,5	21,1	19,6	20,0	20,2	20,5	21,1
12H	4H	17,7	18,3	18,2	18,8	19,2	17,7	18,3	18,2	18,8	19,2
	6H	18,8	19,3	19,3	19,8	20,5	18,8	19,3	19,3	19,8	20,5
	8H	19,3	19,7	19,9	20,2	20,9	19,3	19,7	19,9	20,2	20,9

Variations with the observer position for the luminaire spacings, S:		
S = 1.0H	0,1 / -0,2	0,1 / -0,2
S = 1.5H	0,4 / -0,4	0,4 / -0,4
S = 2.0H	0,8 / -0,7	0,8 / -0,7

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	100
1	110	105	101	98	107	103	99	96	99	96	93	95	92	90	91	89	87	85
2	101	93	87	82	98	91	86	81	88	83	79	85	81	77	82	78	75	73
3	93	83	76	70	90	82	75	69	79	73	68	76	71	67	73	69	66	63
4	86	75	67	60	83	73	66	60	71	64	59	69	63	58	66	62	58	56
5	79	67	59	53	77	66	59	53	64	57	52	62	56	52	60	55	51	49
6	74	61	53	47	72	60	52	47	59	52	46	57	51	46	55	50	45	44
7	69	56	48	42	67	55	47	42	54	47	41	52	46	41	51	45	41	39
8	64	51	43	38	63	51	43	38	49	42	37	48	42	37	47	41	37	35
9	60	47	40	34	59	47	39	34	46	39	34	44	38	34	43	38	34	32
10	56	44	36	31	55	43	36	31	42	36	31	41	35	31	40	35	31	29

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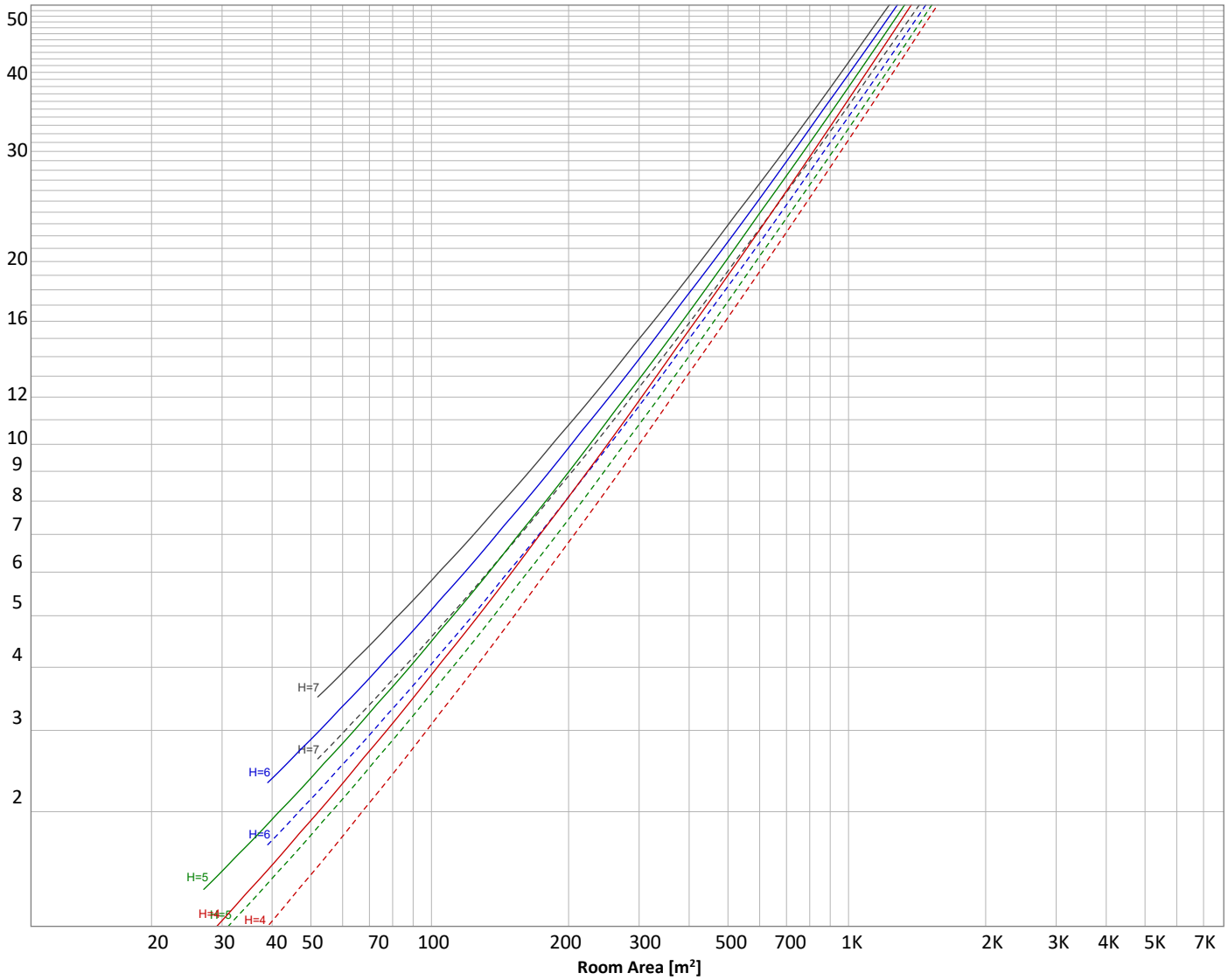
Luminaire budgetary diagram

Uncorrected, comprehensive UGR table according to 117-1995

LAMPS (number of lamps)



Conditions

H = Room height	Flux = 3308 lm		ρ(%)		
H_{down} = Lamp distance from ceiling =	0.00 m	Line type	Ceiling reflectance	Wall reflectance	Floor reflectance
H_{work} = Work area height from floor =	0.00 m	----------	70	50	30
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°
137 lm	394 lm	599 lm	701 lm	600 lm	391 lm	242 lm	159 lm	69,1 lm

90°-100°	100°-110°	110°-120°	120°-130°	130°-140°	140°-150°	150°-160°	160°-170°	170°-180°
4,43 lm	1,37 lm	1,69 lm	2,03 lm	1,99 lm	1,72 lm	1,45 lm	0,968 lm	0,340 lm

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Outdoor Light Planning

Lumen per Zone

Zone (γ)	Lumen	% Total
0-10°	137 lm	4,1%
10-20°	394 lm	11,9%
20-30°	599 lm	18,1%
30-40°	701 lm	21,2%
40-50°	600 lm	18,1%
50-60°	391 lm	11,8%
60-70°	242 lm	7,3%
70-80°	159 lm	4,8%
80-90°	69 lm	2,1%
90-100°	4 lm	0,1%
100-110°	1 lm	0,0%
110-120°	2 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	3308 lm	100,0%

Zonal Lumen summary

Zone (γ)	Lumen	% Total
0-30°	1130 lm	34,2%
0-40°	1831 lm	55,3%
0-60°	2822 lm	85,3%
60-90°	471 lm	14,2%
70-100°	233 lm	7,0%
90-120°	7 lm	0,2%
0-90°	3292 lm	99,5%
90-180°	16 lm	0,5%
0-180°	3308 lm	100,0%

Intensity peaks

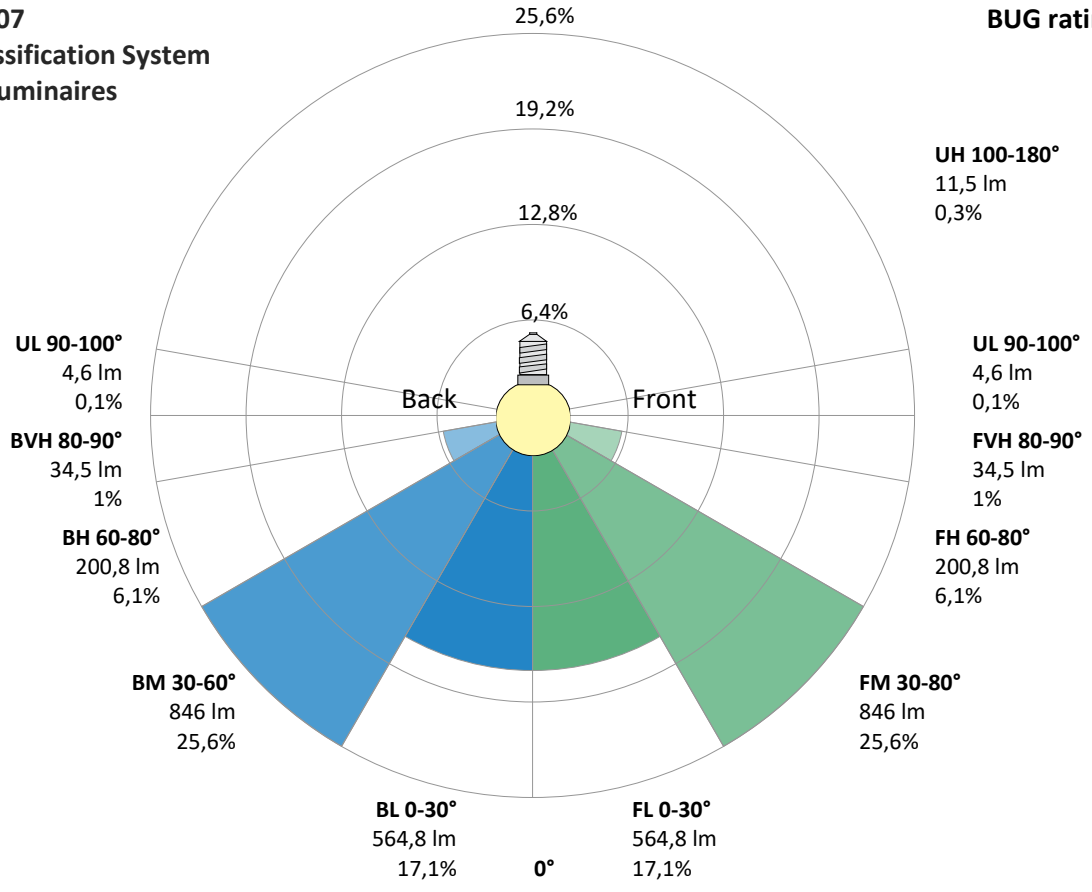
Max intensity	1445 cd
Intensity, 90°	15 cd
Intensity, 0°	1445 cd

BUG rating

	Lumen	% Total
Forward light		
Low(0-30°)	565 lm	17,1%
Medium(30-60°)	846 lm	25,6%
High(60-80°)	201 lm	6,1%
Very high(80-90°)	35 lm	1,0%
Back light		
Low(0-30°)	565 lm	17,1%
Medium(30-60°)	846 lm	25,6%
High(60-80°)	201 lm	6,1%
Very high(80-90°)	35 lm	1,0%
Uplight		
Low(90-100°)	5 lm	0,1%
High(100-180°)	12 lm	0,3%

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

BUG rating B2 U2 G1



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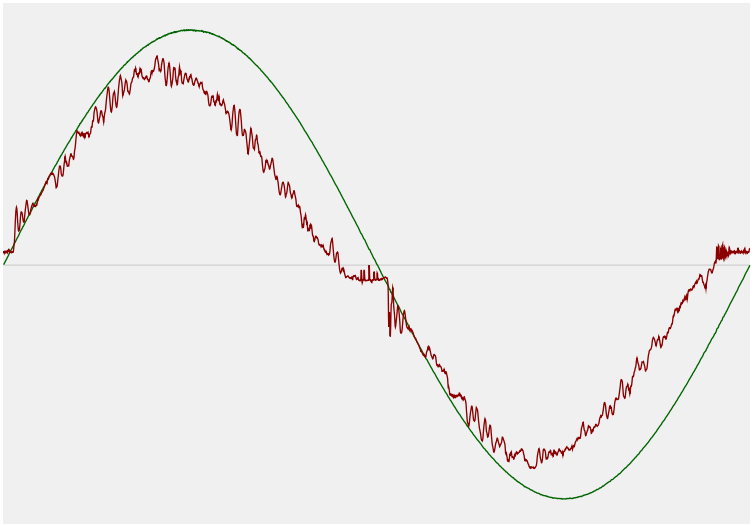
Power Details

Input Power

Power feed to light source	31,0 W
Frequency of input power	50 Hz
RMS Input voltage feed, V_{RMS}	230 V
RMS Input current feed, I_{RMS}	0,139 A
Volt-Ampere or apparent power = V_{RMS}*I_{RMS}	32,01 VA
Displacement factor of AC power feed	0,97
Power factor of AC current feed	0,97
Total harmonic distortion of the current	12,29%
Total harmonic distortion of the voltage	0,07%

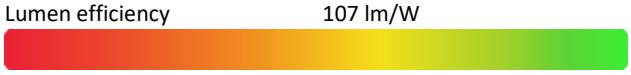
Input Power Curve



Efficiency

Radiated power efficiency 32,0%

Lumen efficiency 107 lm/W



Stabilization Details

Warmup Conditions

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

Color Temperature Change

CCT start	3000 K
CCT shift	+0 K
CCT end	3000 K

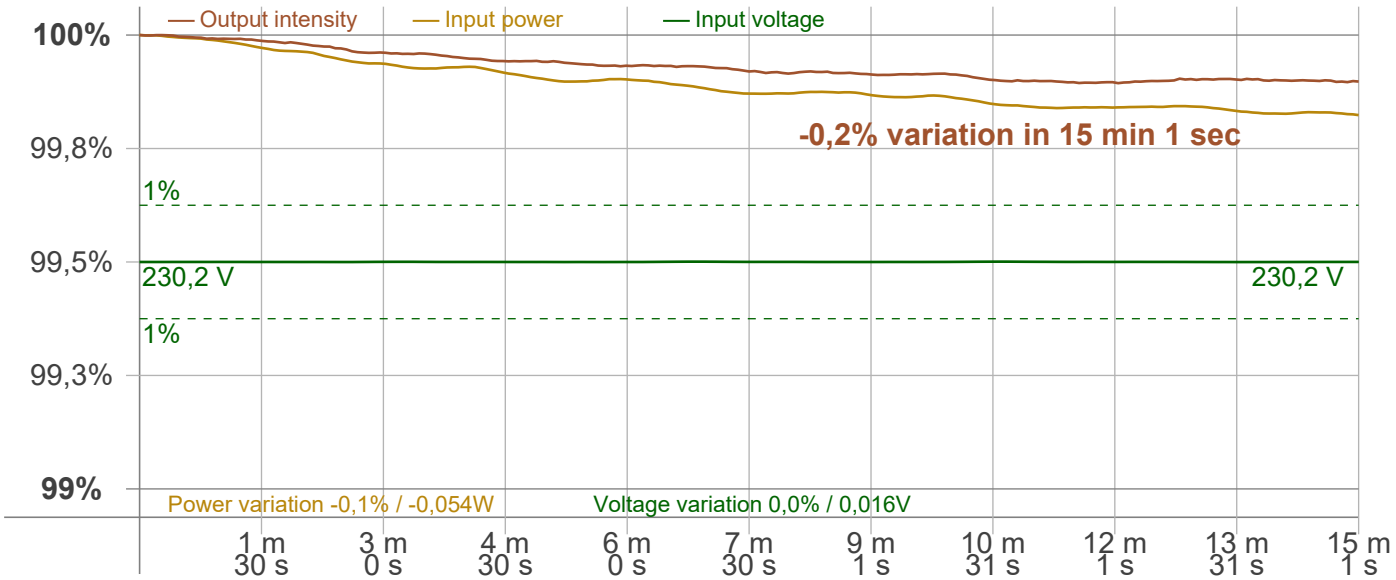
Warmup Result

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

Output Change

Output start	3312 lm
Output change	-3 lm
Output end	3308 lm

Stabilization Curve



Light Measurement Report

Print date: 12-8-2025
Measurement date and time: 31-7-2025 14:53:29 – Measurement no. VFR-250731-2282-MS
Measurement tracking No. and Link: VT250731-003435
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	190,48 Hz
Percent Flicker	1,43 %
Flicker index	0

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)	0,02

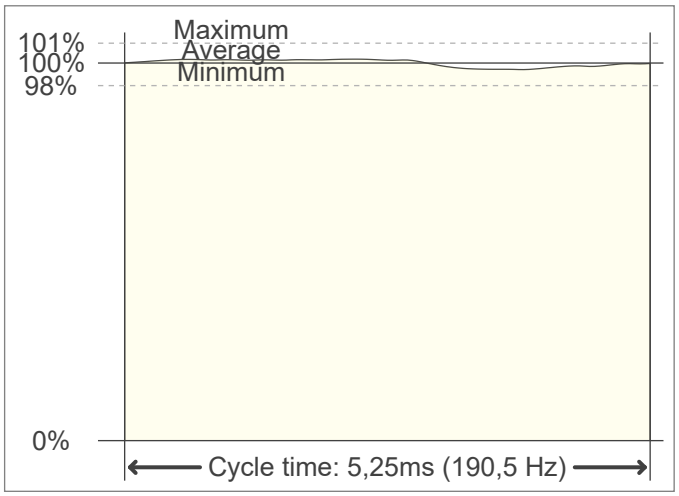
Flicker indices according to California Energy Commission (CEC) 2016b

JA8/10 40 Hz	0,02 %
JA8/10 90 Hz	0,05 %
JA8/10 200 Hz	0,79 %
JA8/10 400 Hz	1,38 %
JA8/10 1000 Hz	1,44 %

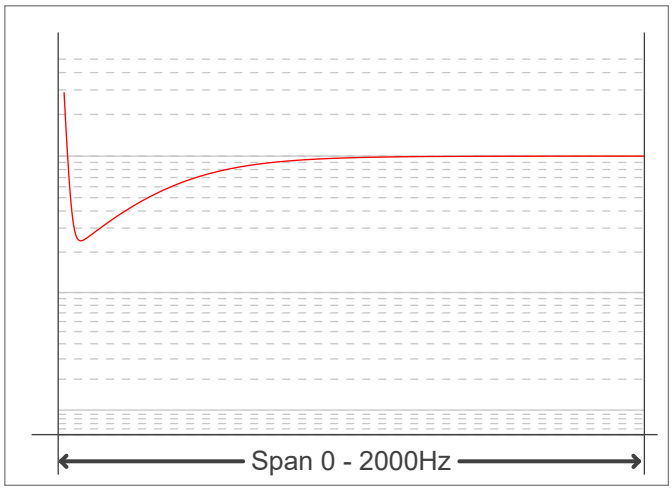
Flicker indices according to Lighting Research Center (2015)

Perception metric, Assist Mp	0,01

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



Flicker FFT (flicker curve in frequency domain)



IEEE 1789 Frequency/modulation plot