Light Measurement Report

Print date: 17-12-2024
Measurement date and time: 17-12-2024 11:44:06 – Measurement no. VFR-241217-2528-MS
Measurement tracking No. and Link: VT241217-001349
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

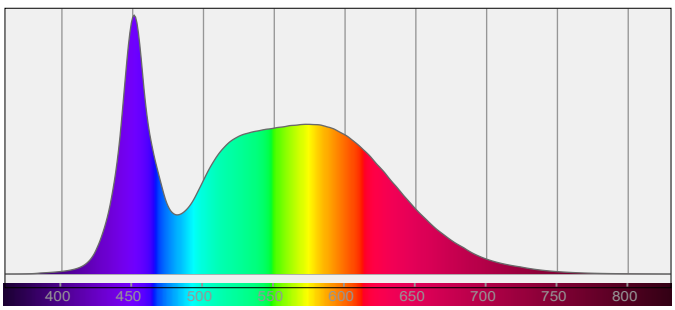
Number of C-planes and Resolution	72 planes – 5°
γ (gamma)-Resolution	5°
Test Distance	2,27 m
Input Power, Power and Displ. Factors	99,9 W – PF 0,99 – DPF 0,99
Input RMS Voltage and Current	230 V – 0,439 A
Frequency of Input Power	50 Hz
Warm-up Time and Variation	Lamp stabilized in 19 min 2 sec – 2,0%

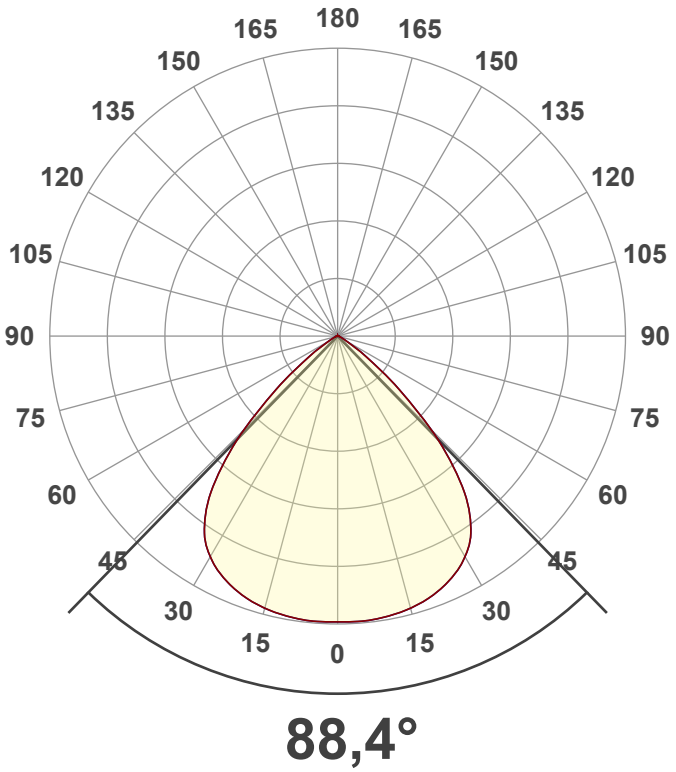
Tested Light Source

Product Name	274334-5500K
Item No. and Manufacturer	274334-5500K – Dutchfulfillment
Product Description (line 1)	LED TERREINVERLICHTING | HARPAL | IP65 | 100W

Main Light Measurement Results

Output – Total Lumen (Up% / Down%)	10808 lm – 0,07% / 99,93%
Efficiency	108 lm/W
Peak Intensity and Beam Angle	6029 cd – 88,4°
Correlated Color Temperature, Target/Measured	CCT = 5500 K / 5469 K
Color Rendering Index	CRI 81,8
Color Rendering TM30-18	R_f 83,0 – R_g 95,6
Color Shift, CIE duv and MacAdam Steps	Duv 0,0012 – SDCM 6,0
Flicker	SVM 0,03 – PstLM 0,01





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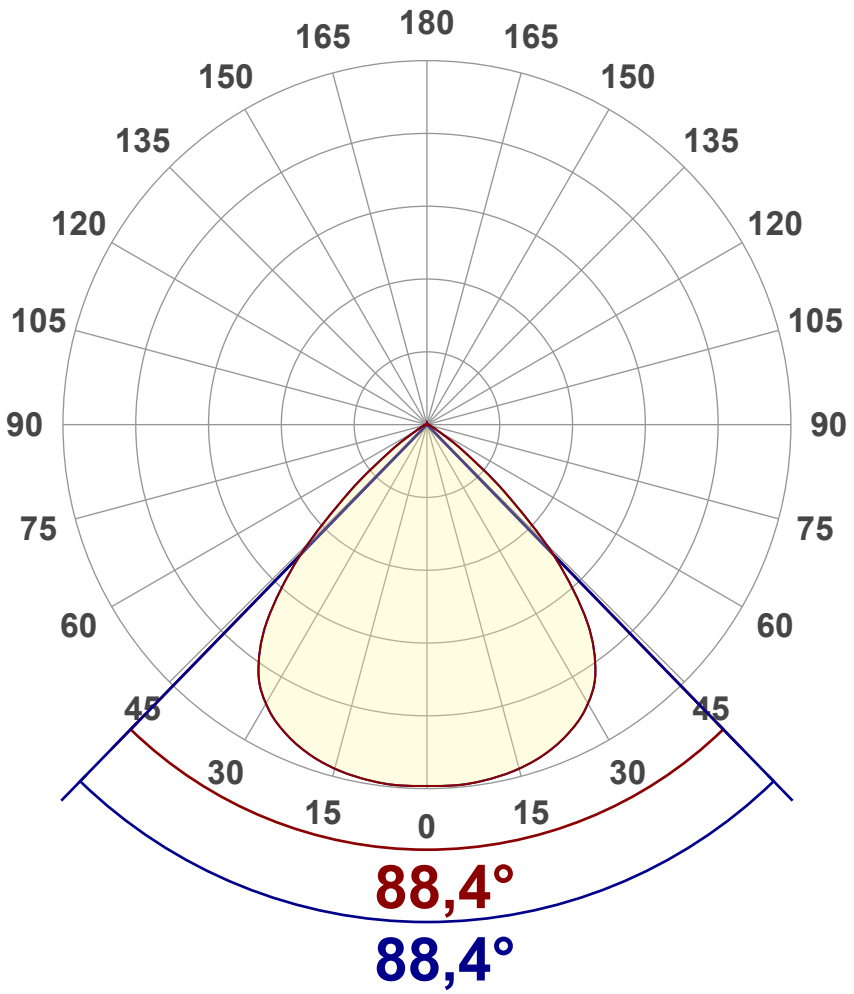
Luminous Intensity diagram Unit: 0-100% of peak intensity



Main Values

Output (total Lumen)	10808 lm
Lumen Up% / Down%	0,07% / 99,93%
Peak Intensity	6029 cd
Beam Angle (50%)	88,4°
Beam Angle (90%)	88,4°
Beam Angle (10%)	88,4°

Cut-off Angle

Average 2,5%	125,9°

Field Angle

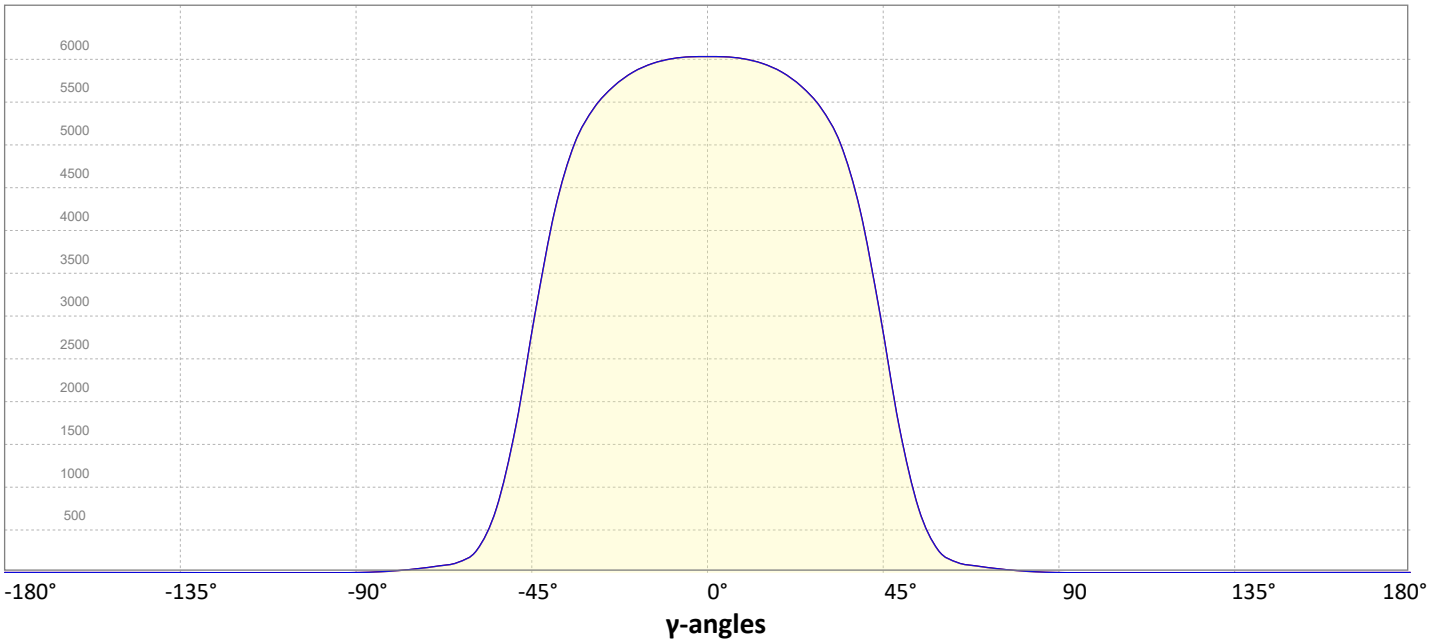
Average 10%	111,2°

Intensity Ratio

In 120° cone	98,2%
In 90° cone	84,3%

C000-C180
C090-C270

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



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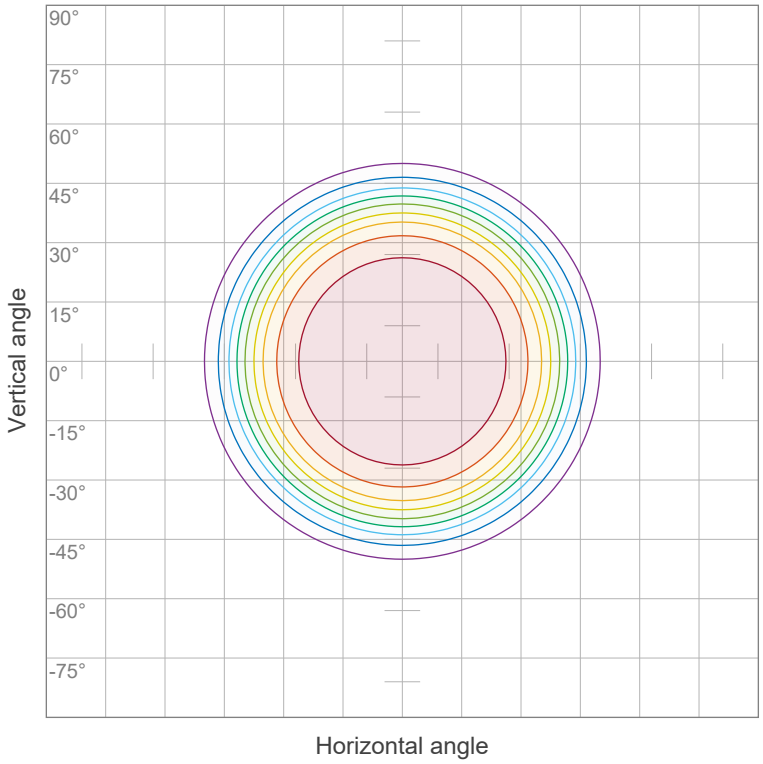
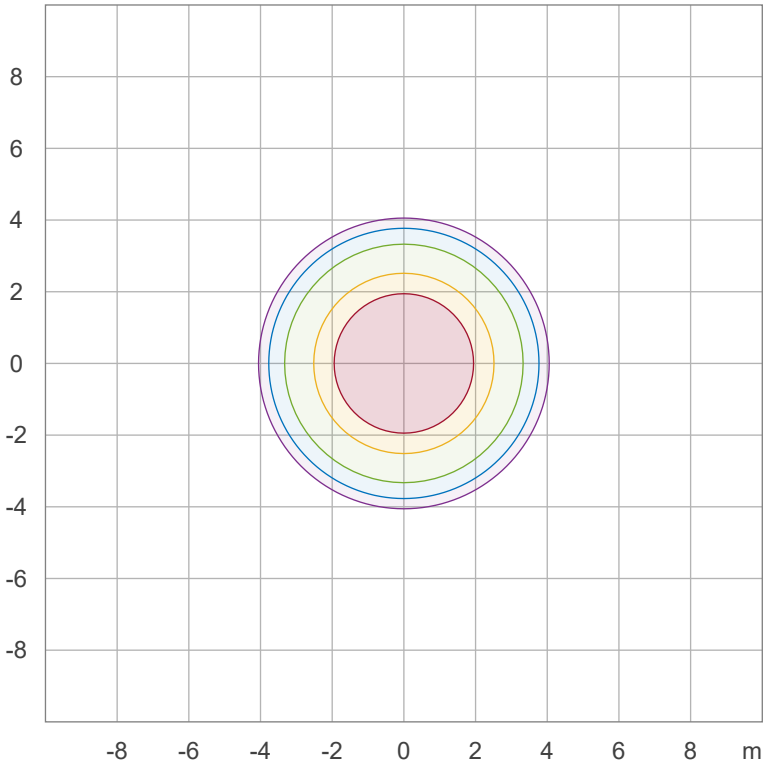
Iso-intensity Diagram (Iso-candela)



90 %	5426,5 cd
80 %	4823,6 cd
70 %	4220,6 cd
60 %	3617,7 cd
50 %	3014,7 cd
40 %	2411,8 cd
30 %	1808,8 cd
20 %	1205,9 cd
10 %	602,9 cd

Peak intensity: 6029,5 cd
Number of c-planes: 72

Iso-illuminance Diagram (Iso-lux)



50,0 %	335,0 lx
30,0 %	201,0 lx
10,0 %	67,0 lx
5,0 %	33,5 lx
3,0 %	20,1 lx

Peak illuminance: 669,9 lx
Mounting height: 3,0 m
Number of c-planes: 72

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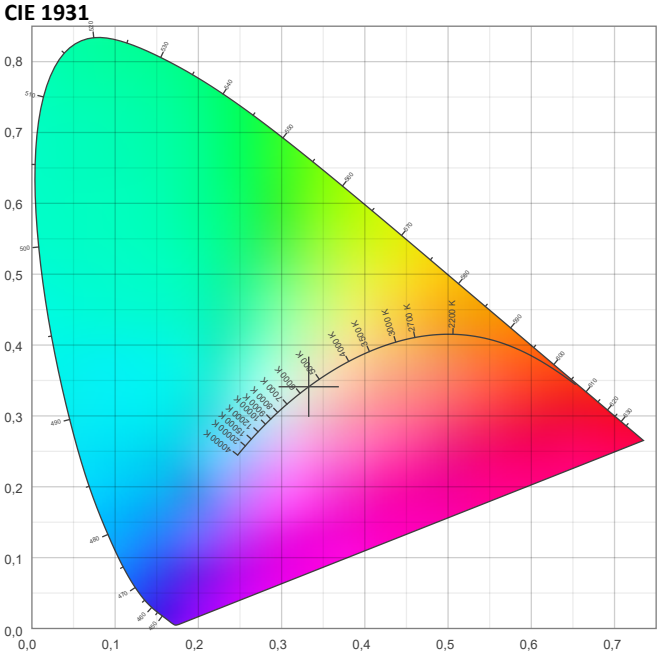
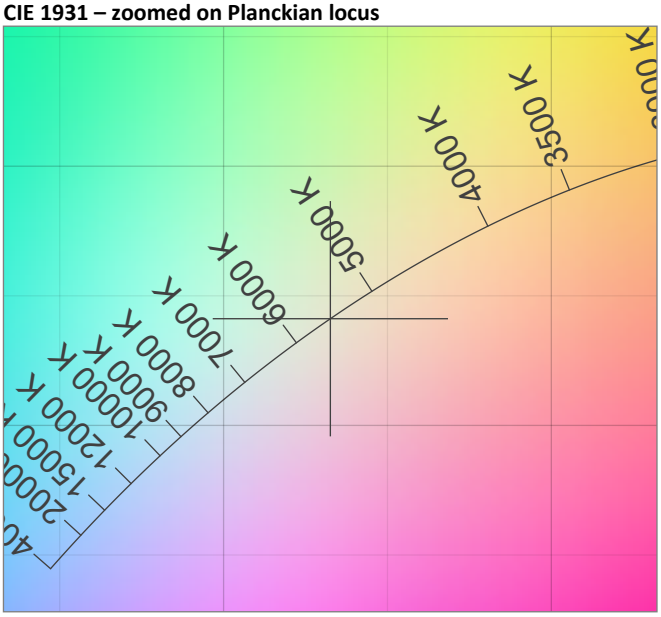
Color details

Correlated Color Temperature, Target	CCT = 5500 K
Correlated Color Temperature, Measured	CCT = 5469 K
Color Rendering Index	CRI 81,8
Color Rendering Index, R9 (red component)	R9 = 2,8
Color Rendering TM30-18	R_f 83,0 – R_g 95,6
Color Quality Scale	CQS = 80,4
MacAdam Steps	SDCM = 6,0
Color coordinates CIE 1931	(x;y) = (0,333;0,341)
Color coordinate CIEs 1960	(u;v) = (0,207;0,318)
Color deviation from BBL	Duv = 0,0012
Color coordinate CIEs 1976 (CIELUV)	(u';v') = (0,207;0,478)

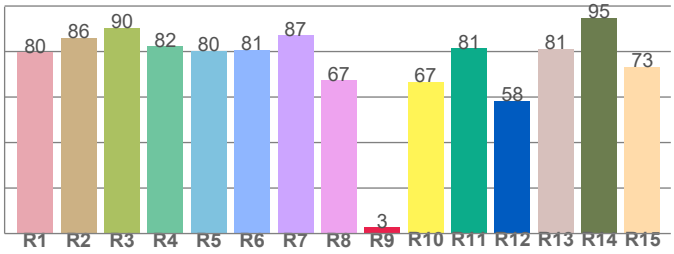
CIE 1931



CIE 1931 – zoomed on Planckian locus



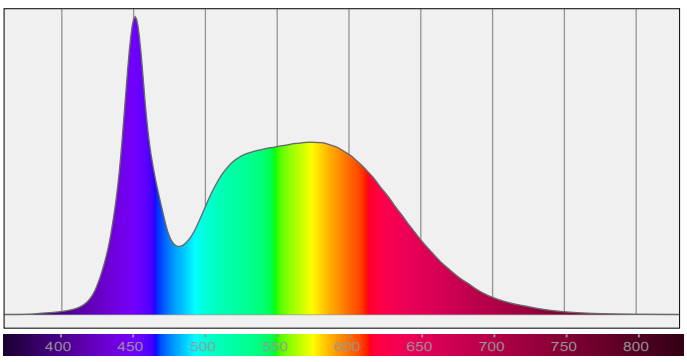
Color Rendering Index per reference color (CIE 1995)



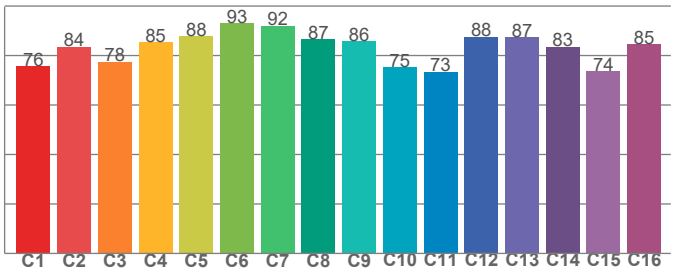
CRI R values, only R1-R8 are used to calculate final CRI value

R1	R2	R3	R4	R5	R6	R7	R8	R9	R10	R11	R12	R13	R14	R15
79,7	86,0	90,4	82,2	80,4	80,8	87,2	67,4	2,8	66,7	81,4	58,4	81,3	94,9	73,4

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



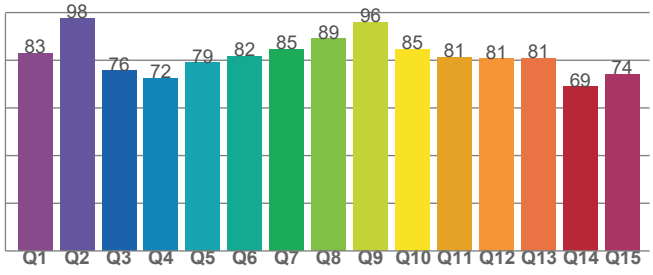
TM30-18 Rf-values per hue bin



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
75,7	83,6	77,5	85,4	87,8	93,1	92,1	86,7	85,7	75,3	73,4	87,6	87,3	83,5	73,6	84,6

Color Quality Scale by reference color



CQS Q values

Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10	Q11	Q12	Q13	Q14	Q15
82,9	97,7	75,6	72,4	79,1	81,7	84,6	89,1	95,9	84,6	81,2	80,6	80,9	68,9	74,2

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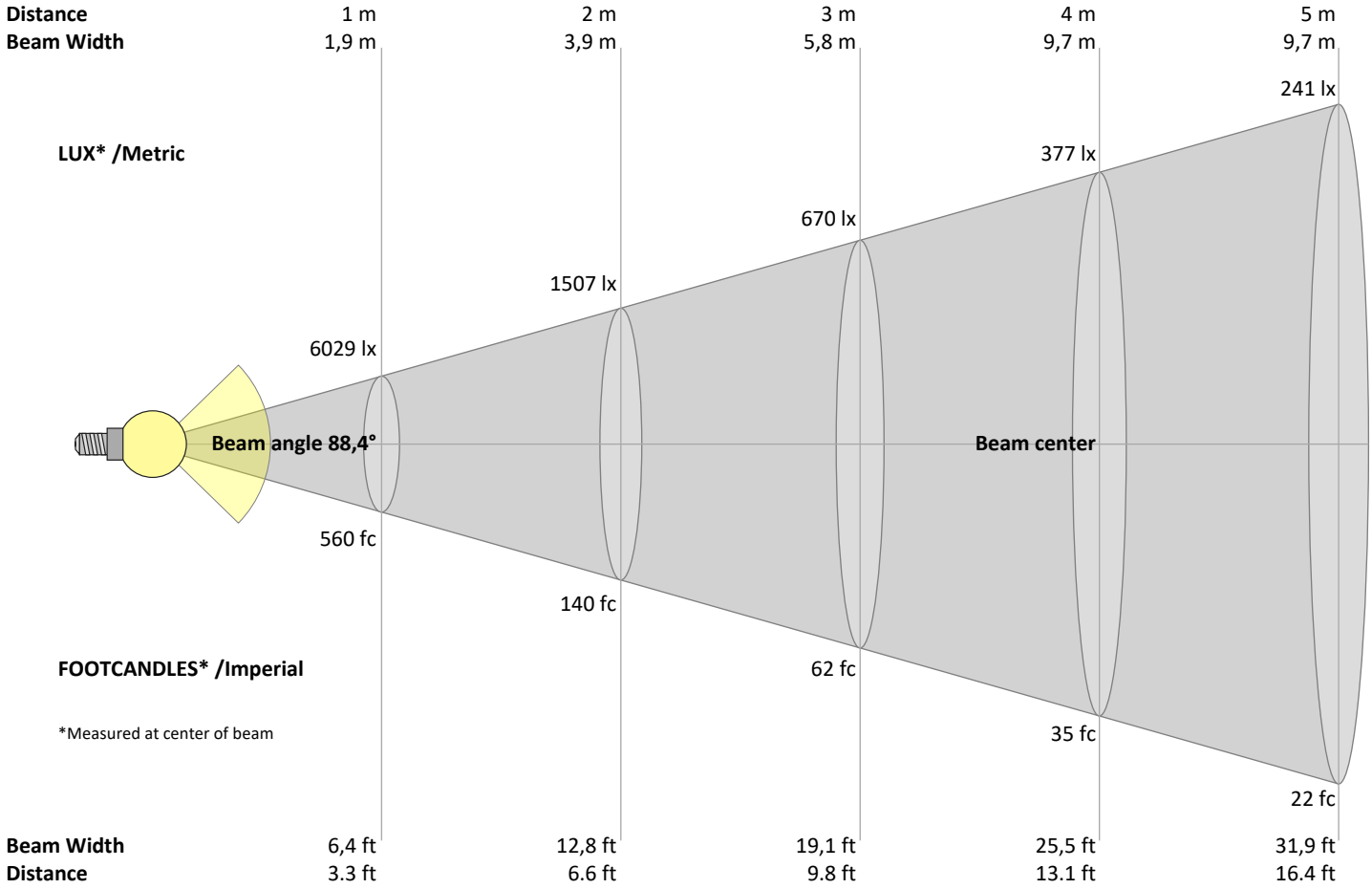
Beam Details



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
6029	1507	670	377	241	167	123	94	74	60	50	42	36	31	27	24	21	19	17	15	lux
560,2	140	62,2	35	22,4	15,6	11,4	8,8	6,9	5,6	4,6	3,9	3,3	2,9	2,5	2,2	1,9	1,7	1,6	1,4	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
6029	6025	5997	5932	5818	5635	5352	4867	4015	2801	1533	659	238	111	73	44	23	10	3	1	cd
100%	100%	99%	98%	96%	93%	89%	81%	67%	46%	25%	11%	4%	2%	1%	1%	0%	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
6029	6025	5997	5932	5818	5635	5352	4867	4015	2801	1533	659	238	111	73	44	23	10	3	1	cd
100%	100%	99%	98%	96%	93%	89%	81%	67%	46%	25%	11%	4%	2%	1%	1%	0%	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
6029	6025	5997	5932	5818	5635	5352	4867	4015	2801	1533	659	238	111	73	44	23	10	3	1	cd
100%	100%	99%	98%	96%	93%	89%	81%	67%	46%	25%	11%	4%	2%	1%	1%	0%	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
6029	6025	5997	5932	5818	5635	5352	4867	4015	2801	1533	659	238	111	73	44	23	10	3	1	cd
100%	100%	99%	98%	96%	93%	89%	81%	67%	46%	25%	11%	4%	2%	1%	1%	0%	0%	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 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	27,0	27,9	27,1	28,1	28,3	27,1	27,9	27,2	28,2	28,4
	3H	26,7	27,7	27,1	27,9	28,1	26,8	27,8	27,2	28,0	28,2
	4H	26,7	27,6	27,1	27,8	28,1	26,8	27,7	27,2	27,9	28,2
	6H	26,7	27,4	27,0	27,7	28,1	26,8	27,5	27,1	27,8	28,2
	8H	26,6	27,4	27,0	27,7	28,1	26,7	27,5	27,0	27,8	28,2
	12H	26,6	27,3	26,9	27,6	28,1	26,7	27,4	27,0	27,7	28,2
4H	2H	26,7	27,6	27,1	27,8	28,1	26,8	27,7	27,2	27,9	28,2
	3H	26,6	27,3	27,0	27,7	28,1	26,7	27,4	27,1	27,8	28,2
	4H	26,5	27,2	26,9	27,6	28,1	26,6	27,2	27,0	27,7	28,2
	6H	26,4	27,1	26,9	27,4	27,8	26,5	27,2	27,0	27,5	27,9
	8H	26,4	27,0	26,9	27,3	27,7	26,5	27,1	27,0	27,4	27,8
	12H	26,3	26,8	26,8	27,2	27,7	26,4	26,9	26,9	27,3	27,8
8H	4H	26,4	27,0	26,9	27,3	27,7	26,5	27,1	27,0	27,4	27,8
	6H	26,3	26,8	26,8	27,2	27,8	26,4	26,9	26,9	27,3	27,8
	8H	26,3	26,7	26,9	27,2	27,8	26,4	26,8	26,9	27,3	27,9
	12H	26,3	26,6	26,9	27,1	27,7	26,4	26,7	27,0	27,2	27,8
12H	4H	26,3	26,8	26,8	27,2	27,7	26,4	26,9	26,9	27,3	27,8
	6H	26,3	26,7	26,9	27,2	27,8	26,4	26,8	26,9	27,3	27,9
	8H	26,3	26,6	26,9	27,1	27,7	26,4	26,7	27,0	27,2	27,8

Variations with the observer position for the luminaire spacings, S:		
S = 1.0H	1,7 / -5,2	1,8 / -5,1
S = 1.5H	3,9 / -10,2	4,0 / -10,1
S = 2.0H	5,8 / -11,8	5,8 / -11,7

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	112	109	106	103	110	107	104	102	103	100	99	99	97	96	95	94	93	91
2	105	99	94	90	103	97	93	89	94	90	87	91	88	85	88	86	83	82
3	98	90	84	80	96	89	83	79	86	81	78	84	80	76	81	78	75	73
4	92	83	76	71	90	81	75	70	79	74	69	77	72	68	75	71	68	66
5	86	76	68	63	84	75	68	63	73	67	62	71	66	62	69	65	61	59
6	80	69	62	57	78	68	62	57	67	61	56	65	60	56	64	59	55	54
7	75	64	56	51	73	63	56	51	62	55	51	60	55	51	59	54	50	49
8	70	59	52	47	69	58	51	47	57	51	46	56	50	46	55	50	46	44
9	66	55	47	43	65	54	47	43	53	47	42	52	46	42	51	46	42	40
10	62	51	44	39	61	50	44	39	49	43	39	48	43	39	48	42	39	37

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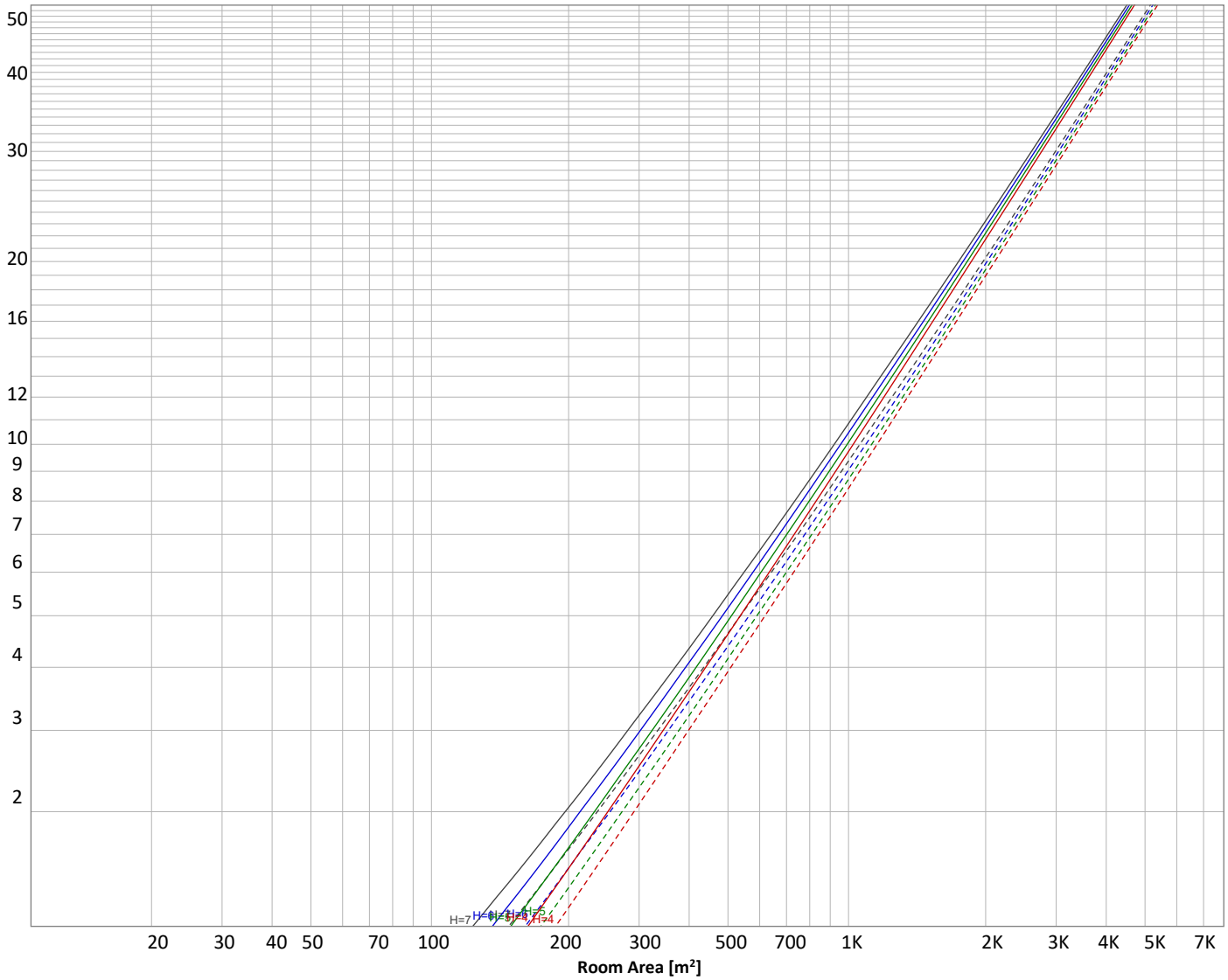
Luminaire budgetary diagram

Uncorrected, comprehensive UGR table according to 117-1995

LAMPS (number of lamps)



Conditions

H = Room height	Flux = 10808 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°
574 lm	1677 lm	2596 lm	3005 lm	2119 lm	645 lm	125 lm	47,7 lm	11,6 lm

90°-100°	100°-110°	110°-120°	120°-130°	130°-140°	140°-150°	150°-160°	160°-170°	170°-180°
1,01 lm	0,268 lm	0,454 lm	0,914 lm	1,39 lm	1,41 lm	1,18 lm	0,797 lm	0,279 lm

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Outdoor Light Planning

Lumen per Zone

Zone (γ)	Lumen	% Total
0-10°	574 lm	5,3%
10-20°	1677 lm	15,5%
20-30°	2596 lm	24,0%
30-40°	3005 lm	27,8%
40-50°	2119 lm	19,6%
50-60°	645 lm	6,0%
60-70°	125 lm	1,2%
70-80°	48 lm	0,4%
80-90°	12 lm	0,1%
90-100°	1 lm	0,0%
100-110°	0 lm	0,0%
110-120°	0 lm	0,0%
120-130°	1 lm	0,0%
130-140°	1 lm	0,0%
140-150°	1 lm	0,0%
150-160°	1 lm	0,0%
160-170°	1 lm	0,0%
170-180°	0 lm	0,0%
Total	10808 lm	100,0%

Intensity peaks

Max intensity	6029 cd
Intensity, 90°	3 cd
Intensity, 0°	6029 cd

Zonal Lumen summary

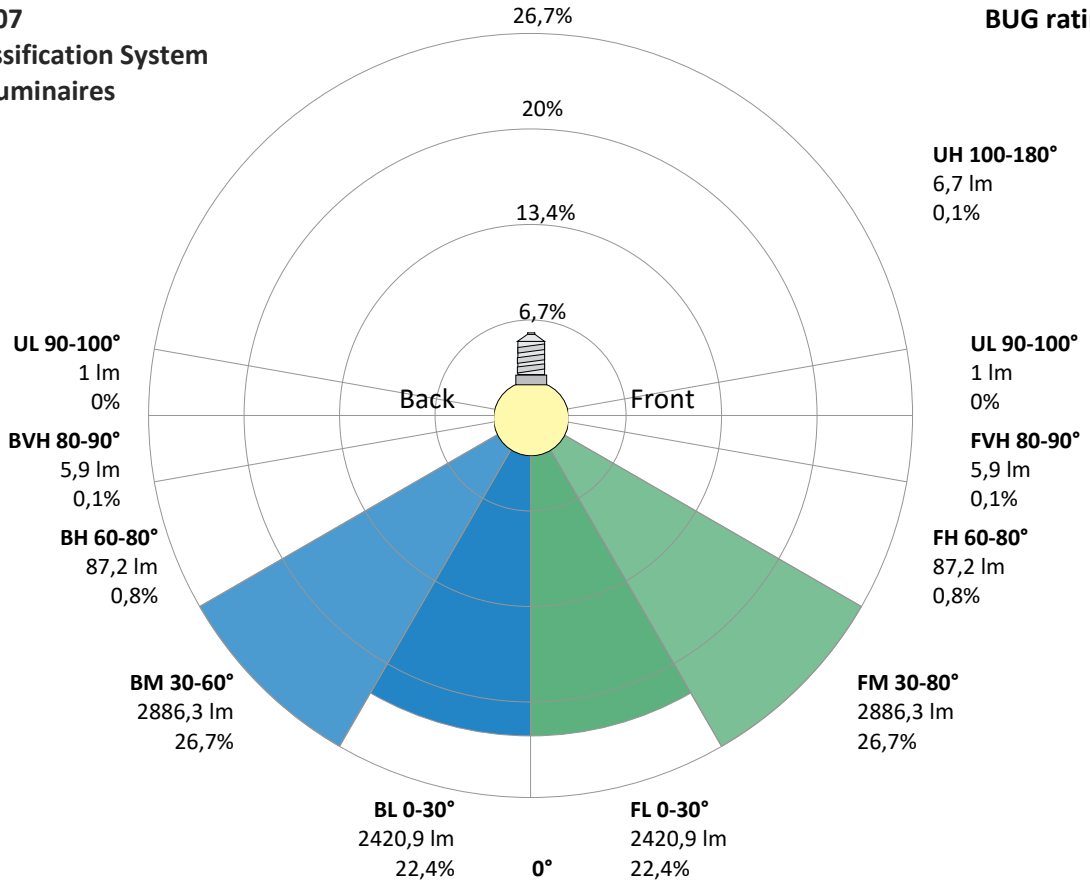
Zone (γ)	Lumen	% Total
0-30°	4847 lm	44,8%
0-40°	7851 lm	72,6%
0-60°	10616 lm	98,2%
60-90°	185 lm	1,7%
70-100°	60 lm	0,6%
90-120°	2 lm	0,0%
0-90°	10801 lm	99,9%
90-180°	8 lm	0,1%
0-180°	10808 lm	100,0%

BUG rating

	Lumen	% Total
Forward light		
Low(0-30°)	2421 lm	22,4%
Medium(30-60°)	2886 lm	26,7%
High(60-80°)	87 lm	0,8%
Very high(80-90°)	6 lm	0,1%
Back light		
Low(0-30°)	2421 lm	22,4%
Medium(30-60°)	2886 lm	26,7%
High(60-80°)	87 lm	0,8%
Very high(80-90°)	6 lm	0,1%
Uplight		
Low(90-100°)	1 lm	0,0%
High(100-180°)	7 lm	0,1%

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

BUG rating B3 U1 G0



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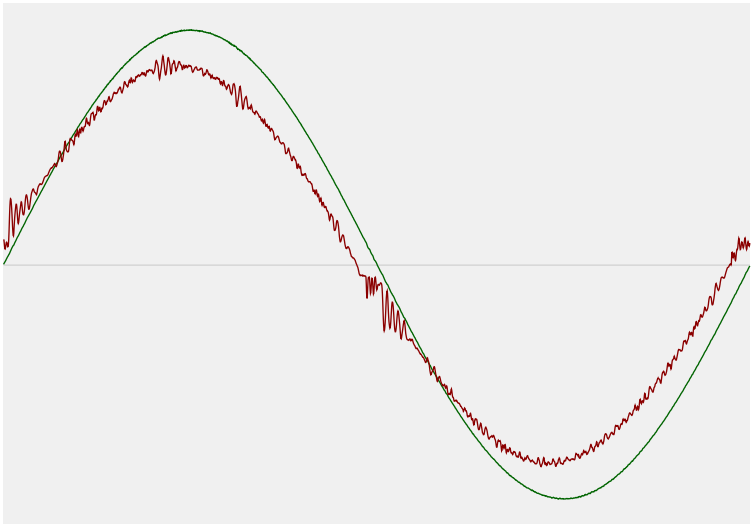
Power Details

Input Power

Power feed to light source	99,9 W
Frequency of input power	50 Hz
RMS Input voltage feed, V_{RMS}	230 V
RMS Input current feed, I_{RMS}	0,439 A
Volt-Ampere or apparent power = V_{RMS}*I_{RMS}	100,95 VA
Displacement factor of AC power feed	0,99
Power factor of AC current feed	0,99
Total harmonic distortion of the current	2,36%
Total harmonic distortion of the voltage	0,12%

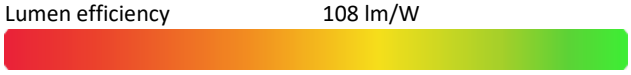
Input Power Curve



Efficiency

Radiated power efficiency 33,6%

Lumen efficiency 108 lm/W



Stabilization Details

Warmup Conditions

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

Color Temperature Change

CCT start	5440 K
CCT shift	+60 K
CCT end	5500 K

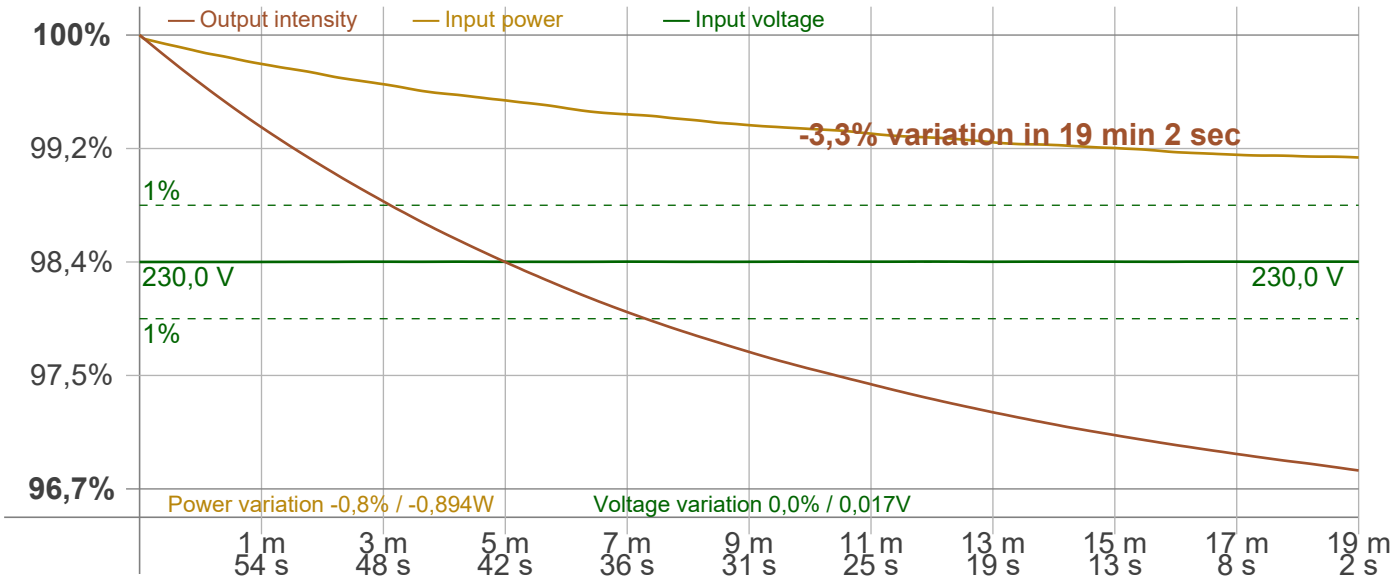
Warmup Result

Total warmup time	Lamp stabilized in 19 min 2 sec
Warmup variation	-3,3%

Output Change

Output start	11168 lm
Output change	-360 lm
Output end	10808 lm

Stabilization Curve



Light Measurement Report

Print date: 17-12-2024
Measurement date and time: 17-12-2024 11:44:06 – Measurement no. VFR-241217-2528-MS
Measurement tracking No. and Link: VT241217-001349
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	100,5 Hz
Percent Flicker	0,92 %
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)	0,03

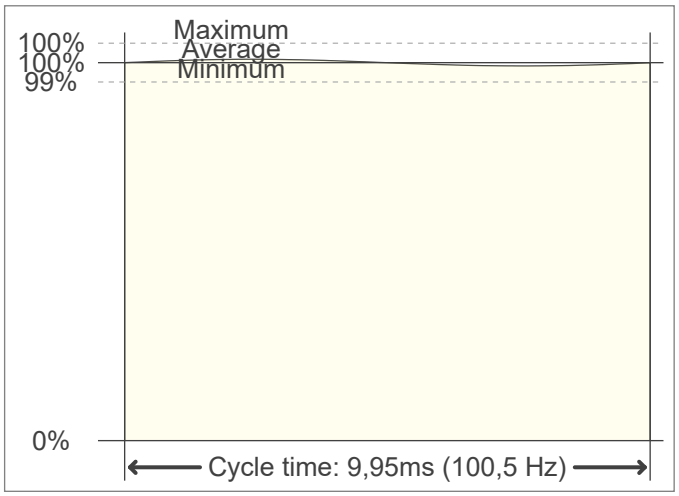
Flicker indices according to California Energy Commission (CEC) 2016b

JA8/10 40 Hz	0,01 %
JA8/10 90 Hz	0,02 %
JA8/10 200 Hz	0,91 %
JA8/10 400 Hz	0,91 %
JA8/10 1000 Hz	0,91 %

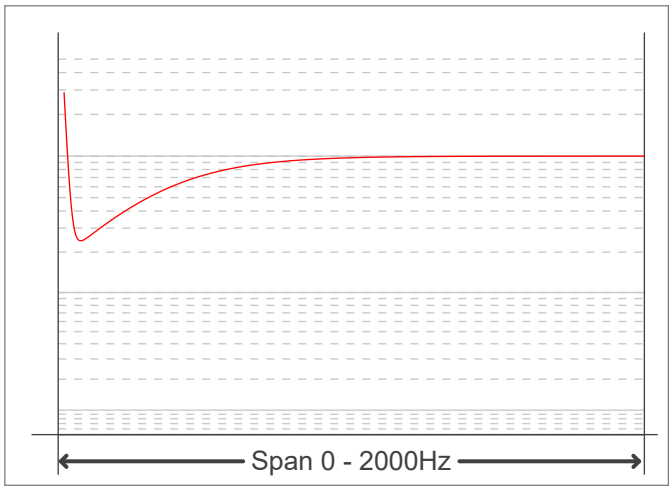
Flicker indices according to Lighting Research Center (2015)

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