Light Measurement Report

Print date: 19-12-2024
Measurement date and time: 19-12-2024 14:48:34 – Measurement no. VFR-241219-2610-MS
Measurement tracking No. and Link: VT241219-005560
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

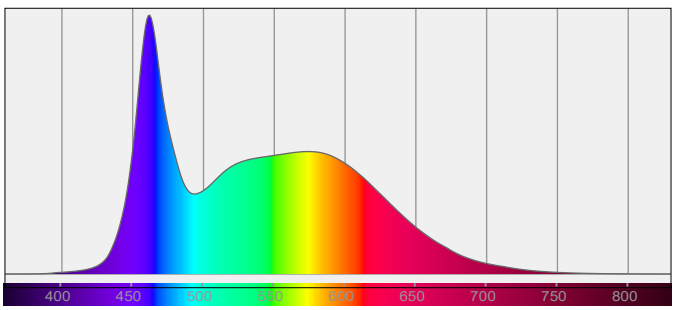
Number of C-planes and Resolution	52 planes – 6,92°
γ (gamma)-Resolution	5°
Test Distance	4,78 m
Input Power, Power and Displ. Factors	51,6 W – PF 0,99 – DPF 1,0
Input RMS Voltage and Current	230 V – 0,227 A
Frequency of Input Power	50 Hz
Warm-up Time and Variation	Lamp stabilized in 21 min 8 sec – 2,0%

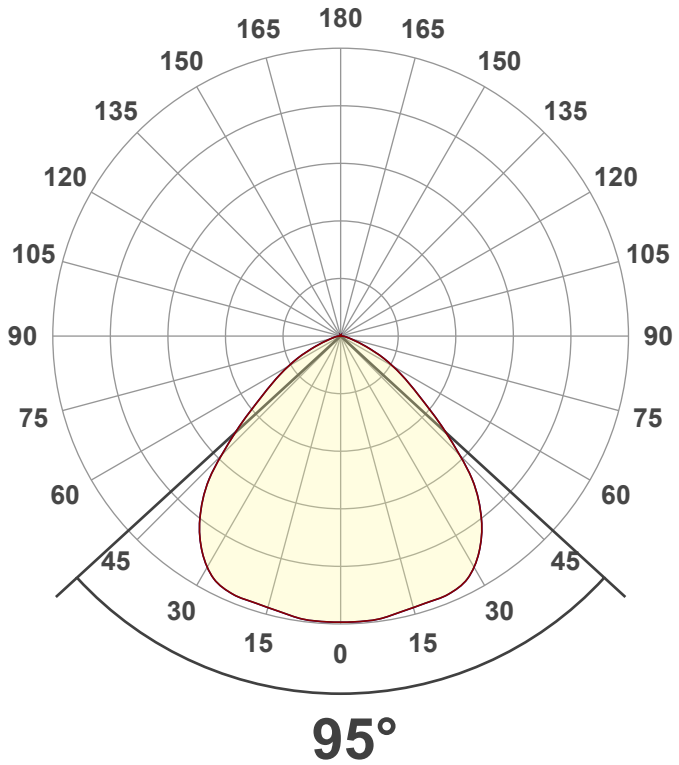
Tested Light Source

Product Name	808228-6000K
Item No. and Manufacturer	808228-6000K – Dutchfulfillment
Product Description (line 1)	LED STRAATLAMP | HERSE | 50W | MET INGEBOUWDE DAGLICHTSENSOR

Main Light Measurement Results

Output – Total Lumen (Up% / Down%)	7212 lm – 0,38% / 99,62%
Efficiency	140 lm/W
Peak Intensity and Beam Angle	3171 cd – 95°
Correlated Color Temperature, Target/Measured	CCT = 6000 K / 6289 K
Color Rendering Index	CRI 81,9
Color Rendering TM30-18	R_f 79,2 – R_g 86,9
Color Shift, CIE duv and MacAdam Steps	Duv 0,0047 – SDCM 12,0
Flicker	SVM 3,99 – PstLM 0,12





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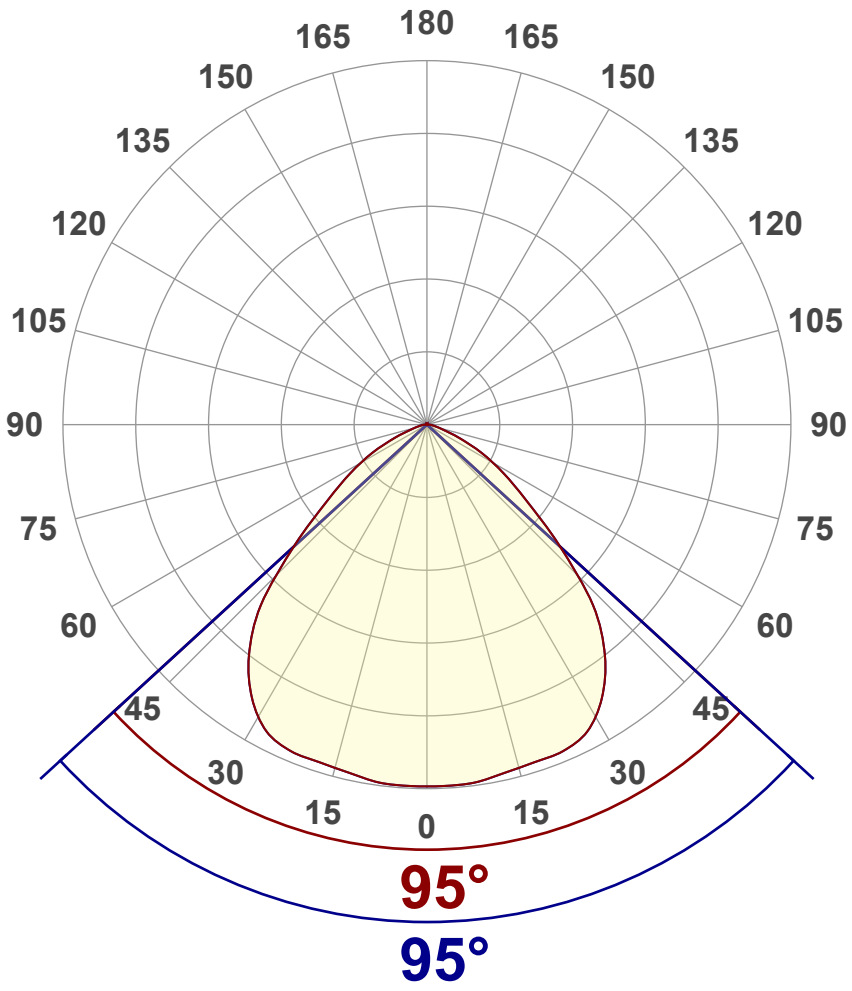
Luminous Intensity diagram

Unit: 0-100% of peak intensity



Main Values

Output (total Lumen)	7212 lm
Lumen Up% / Down%	0,38% / 99,62%
Peak Intensity	3171 cd
Beam Angle (50%)	95°
Beam Angle (90%)	95°
Beam Angle (10%)	95°

Cut-off Angle

Average 2,5%	156,8°

Field Angle

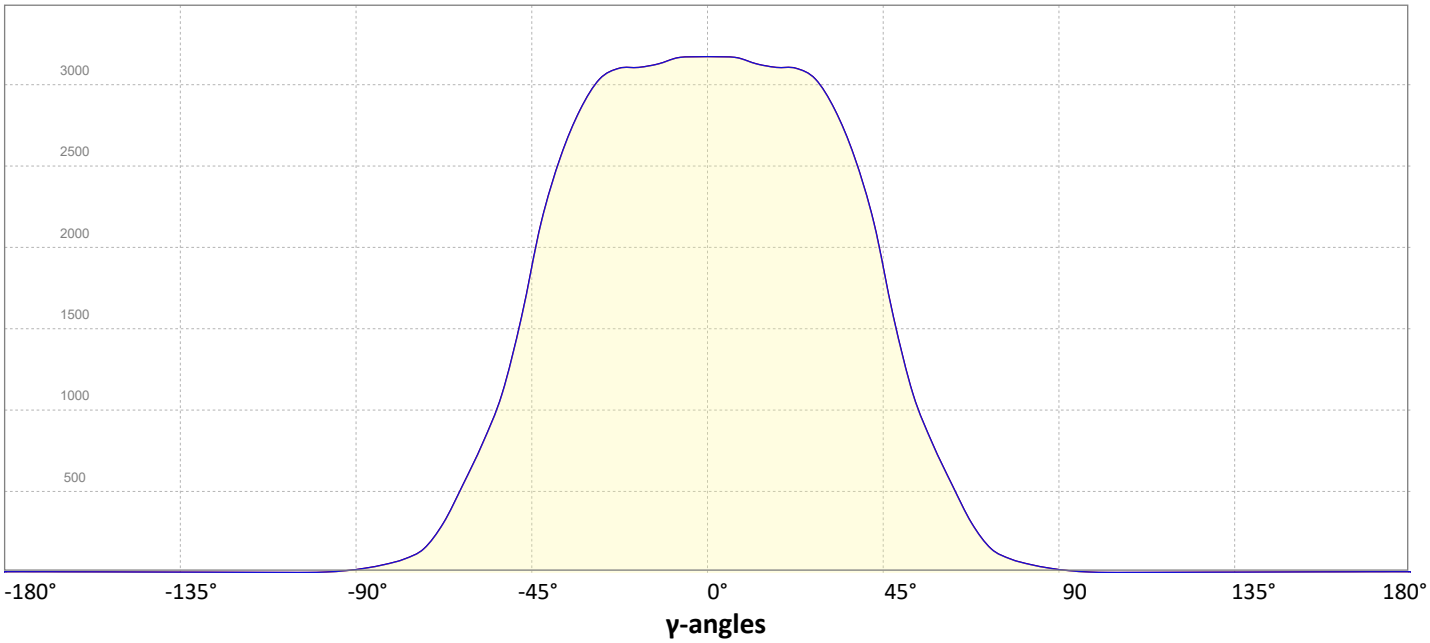
Average 10%	134,8°

Intensity Ratio

In 120° cone	91,4%
In 90° cone	70,7%

C000-C180
C090-C270

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



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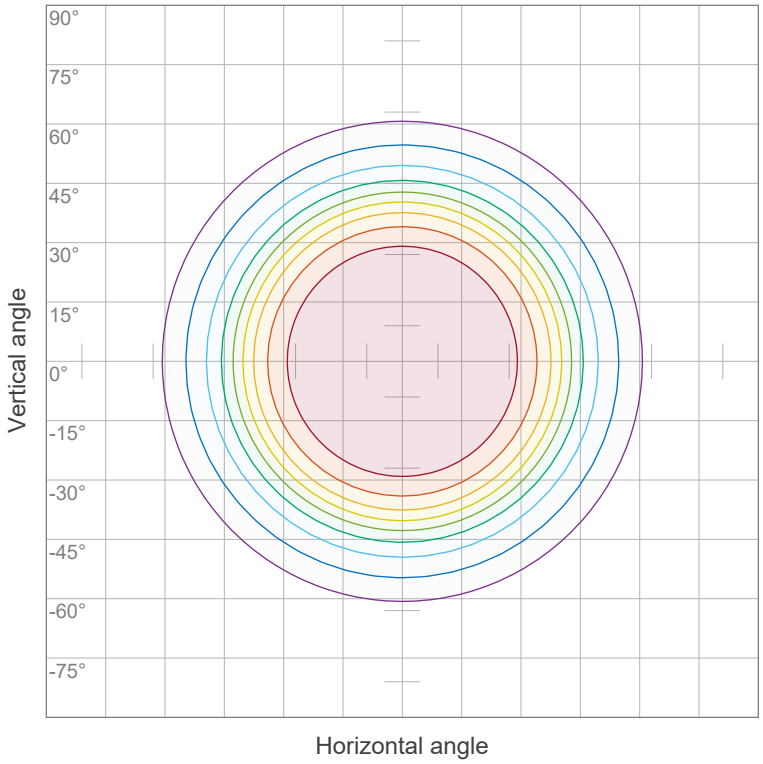
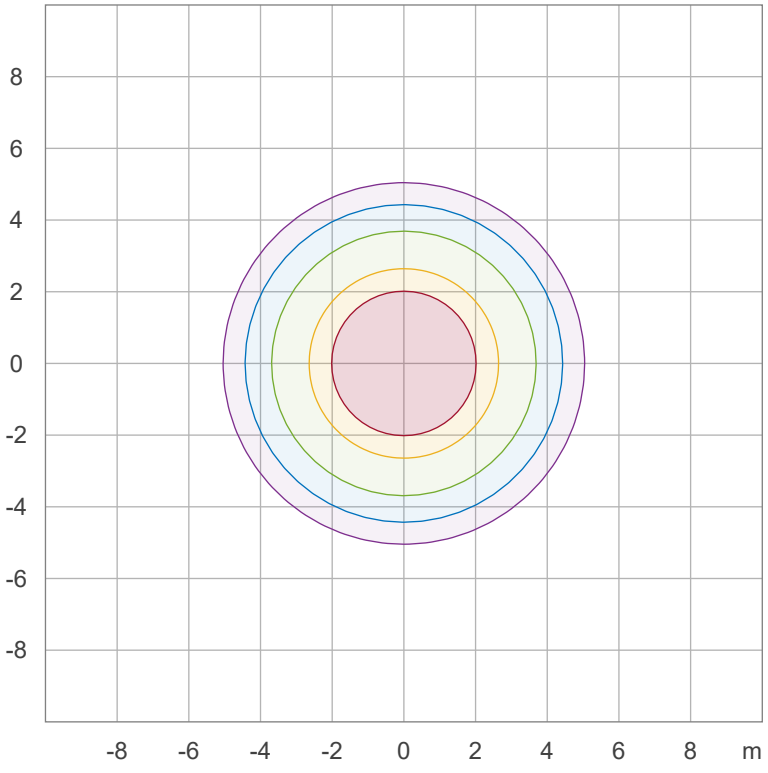
Iso-intensity Diagram (Iso-candela)



90 %	2854,2 cd
80 %	2537,1 cd
70 %	2220,0 cd
60 %	1902,8 cd
50 %	1585,7 cd
40 %	1268,5 cd
30 %	951,4 cd
20 %	634,3 cd
10 %	317,1 cd

Peak intensity: 3171,4 cd
Number of c-planes: 52

Iso-illuminance Diagram (Iso-lux)



50,0 %	176,2 lx
30,0 %	105,7 lx
10,0 %	35,2 lx
5,0 %	17,6 lx
3,0 %	10,6 lx

Peak illuminance: 352,4 lx
Mounting height: 3,0 m
Number of c-planes: 52

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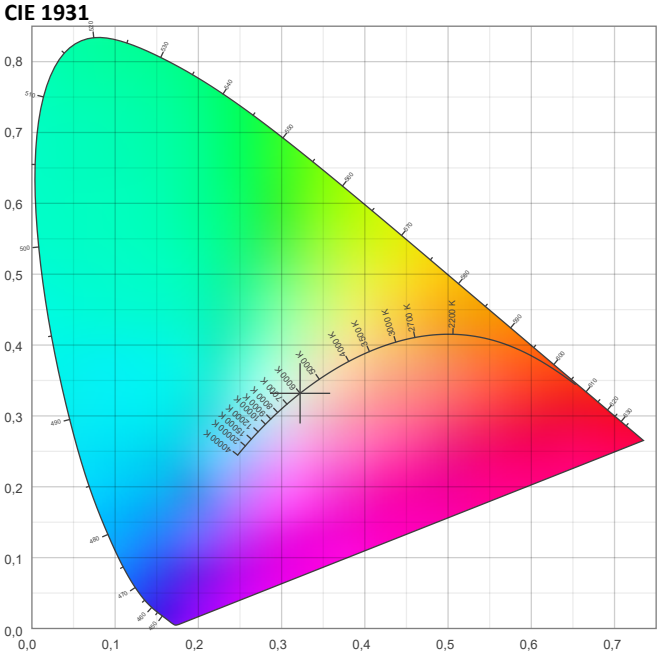
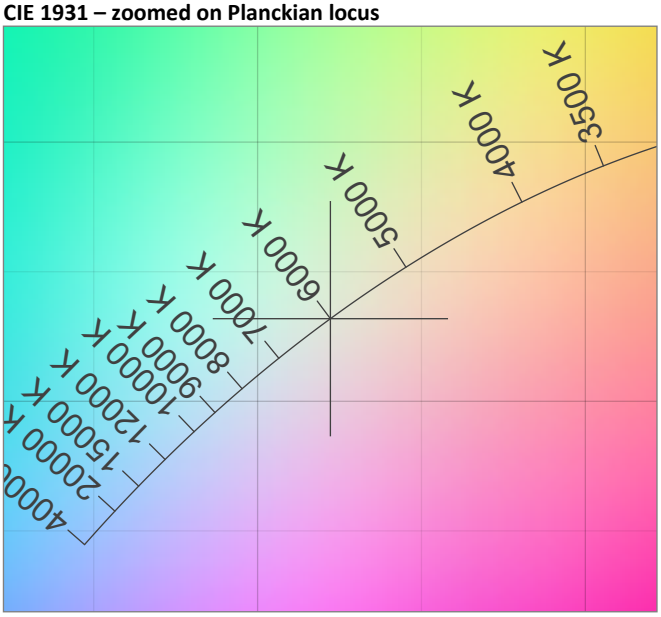
Color details

Correlated Color Temperature, Target	CCT = 6000 K
Correlated Color Temperature, Measured	CCT = 6289 K
Color Rendering Index	CRI 81,9
Color Rendering Index, R9 (red component)	R9 = 5,5
Color Rendering TM30-18	R_f 79,2 – R_g 86,9
Color Quality Scale	CQS = 79,3
MacAdam Steps	SDCM = 12,0
Color coordinates CIE 1931	(x;y) = (0,322;0,332)
Color coordinate CIEs 1960	(u;v) = (0,203;0,314)
Color deviation from BBL	Duv = 0,0047
Color coordinate CIEs 1976 (CIELUV)	(u';v') = (0,203;0,471)

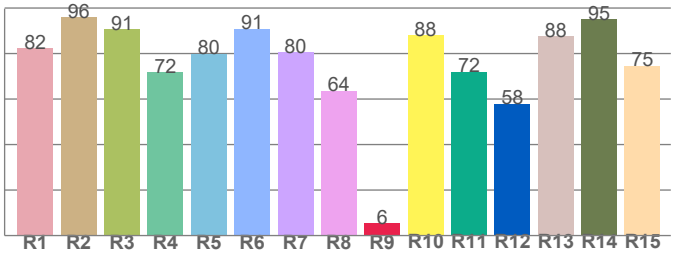
CIE 1931



CIE 1931 – zoomed on Planckian locus



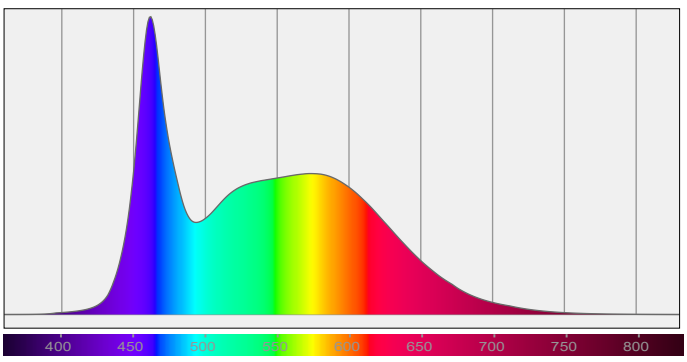
Color Rendering Index per reference color (CIE 1995)



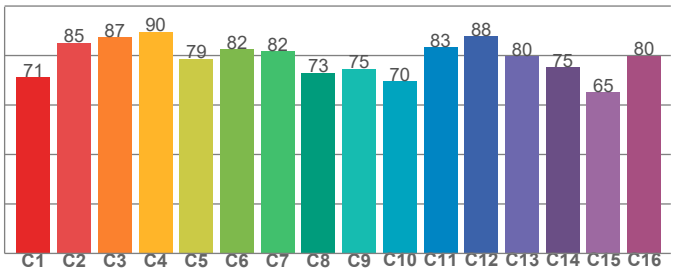
CRI R values, only R1-R8 are used to calculate final CRI value

R1	R2	R3	R4	R5	R6	R7	R8	R9	R10	R11	R12	R13	R14	R15
82,3	96,0	90,7	71,8	79,9	90,9	80,4	63,6	5,5	88,1	71,9	57,8	87,7	95,2	74,7

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



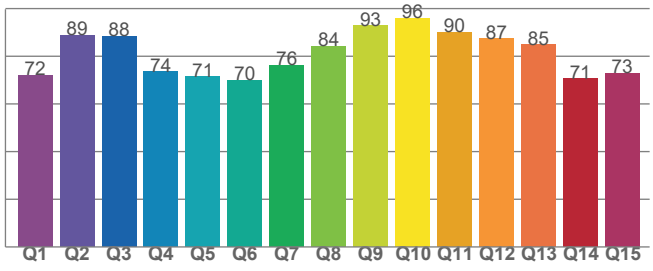
TM30-18 Rf-values per hue bin



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
71,2	85,1	87,3	89,6	78,7	82,4	81,8	73,0	74,6	69,6	83,4	87,8	79,8	75,2	65,3	79,9

Color Quality Scale by reference color



CQS Q values

Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10	Q11	Q12	Q13	Q14	Q15
72,0	88,7	88,4	73,6	71,4	69,8	76,3	84,1	92,9	96,1	90,2	87,4	84,8	70,5	72,8

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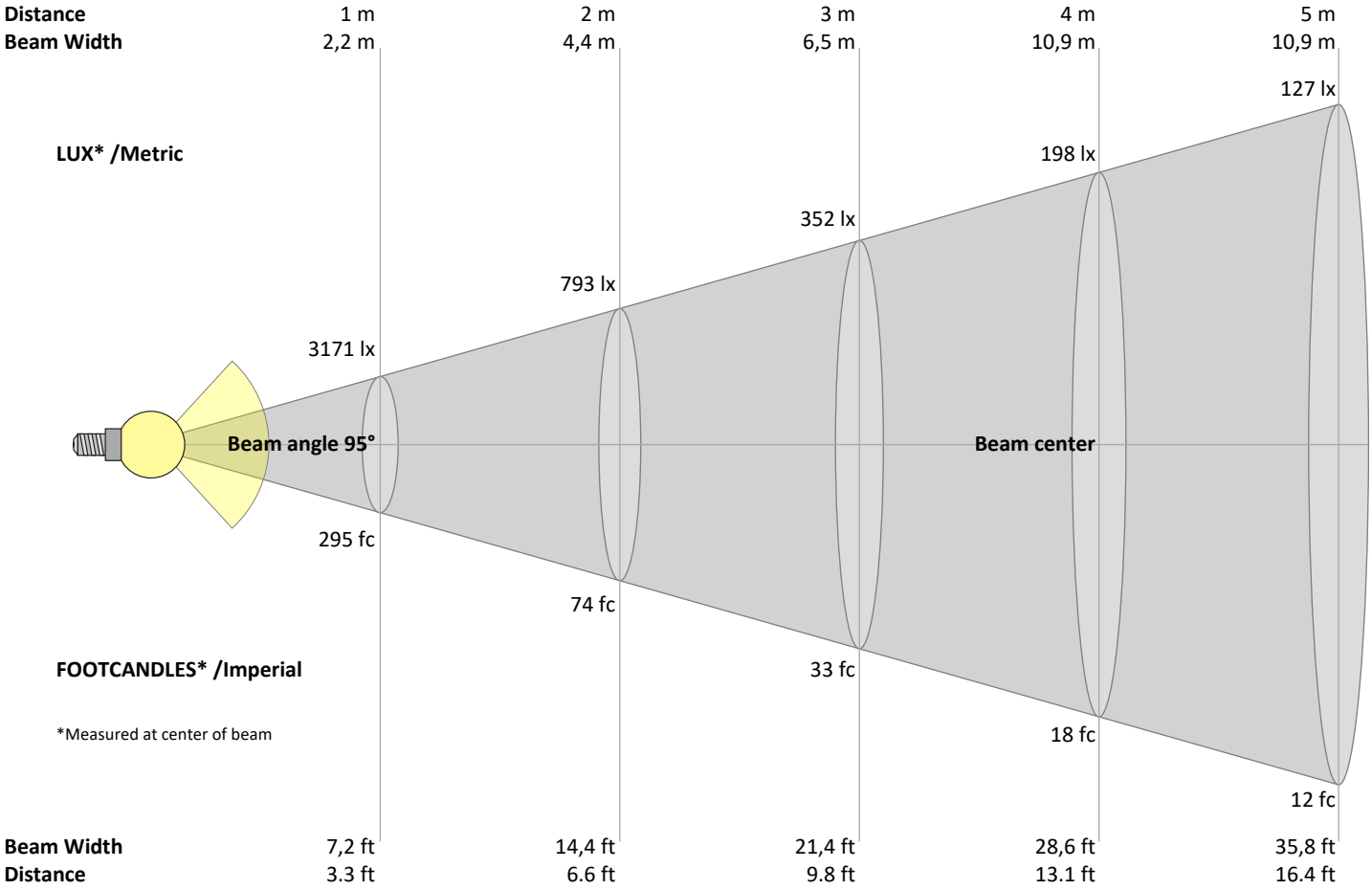
Beam Details



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
3171	793	352	198	127	88	65	50	39	32	26	22	19	16	14	12	11	10	9	8	lux
294,6	73,7	32,7	18,4	11,8	8,2	6	4,6	3,6	2,9	2,4	2	1,7	1,5	1,3	1,2	1	0,9	0,8	0,7	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
3171	3169	3147	3117	3104	3069	2944	2708	2363	1875	1346	954	674	429	231	118	68	40	21	9	cd
100%	100%	99%	98%	98%	97%	93%	85%	75%	59%	42%	30%	21%	14%	7%	4%	2%	1%	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
3171	3169	3147	3117	3104	3069	2944	2708	2363	1875	1346	954	674	429	231	118	68	40	21	9	cd
100%	100%	99%	98%	98%	97%	93%	85%	75%	59%	42%	30%	21%	14%	7%	4%	2%	1%	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
3171	3169	3147	3117	3104	3069	2944	2708	2363	1875	1346	954	674	429	231	118	68	40	21	9	cd
100%	100%	99%	98%	98%	97%	93%	85%	75%	59%	42%	30%	21%	14%	7%	4%	2%	1%	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
3171	3169	3147	3117	3104	3069	2944	2708	2363	1875	1346	954	674	429	231	118	68	40	21	9	cd
100%	100%	99%	98%	98%	97%	93%	85%	75%	59%	42%	30%	21%	14%	7%	4%	2%	1%	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	28,0	29,0	28,2	29,3	29,5	27,9	28,9	28,1	29,2	29,4
	3H	28,2	29,3	28,6	29,6	29,8	28,1	29,2	28,5	29,4	29,6
	4H	28,3	29,3	28,7	29,5	29,8	28,1	29,1	28,5	29,4	29,7
	6H	28,3	29,2	28,6	29,5	29,9	28,2	29,1	28,5	29,3	29,7
	8H	28,3	29,2	28,6	29,5	29,9	28,2	29,0	28,5	29,3	29,7
	12H	28,3	29,1	28,6	29,4	29,9	28,1	28,9	28,5	29,3	29,7
4H	2H	28,1	29,1	28,5	29,4	29,6	28,0	29,0	28,4	29,3	29,5
	3H	28,5	29,3	28,9	29,7	30,1	28,4	29,2	28,8	29,6	30,0
	4H	28,5	29,3	29,0	29,7	30,2	28,4	29,2	28,8	29,6	30,1
	6H	28,6	29,3	29,1	29,7	30,0	28,4	29,2	28,9	29,5	29,9
	8H	28,6	29,2	29,1	29,6	30,0	28,4	29,1	28,9	29,5	29,8
	12H	28,5	29,1	29,0	29,5	30,0	28,4	29,0	28,9	29,4	29,9
8H	4H	28,5	29,2	29,0	29,5	29,9	28,4	29,0	28,9	29,4	29,8
	6H	28,6	29,1	29,1	29,5	30,1	28,4	28,9	28,9	29,4	29,9
	8H	28,6	29,0	29,1	29,6	30,2	28,5	28,9	29,0	29,4	30,1
	12H	28,6	29,0	29,2	29,5	30,1	28,5	28,8	29,1	29,4	30,0
12H	4H	28,4	29,0	28,9	29,4	29,9	28,3	28,9	28,8	29,3	29,8
	6H	28,6	29,0	29,1	29,5	30,2	28,5	28,9	29,0	29,4	30,0
	8H	28,6	28,9	29,2	29,5	30,1	28,5	28,8	29,1	29,3	29,9

Variations with the observer position for the luminaire spacings, S:		
S = 1.0H	0,5 / -0,8	0,5 / -0,9
S = 1.5H	1,5 / -1,9	1,5 / -2,0
S = 2.0H	2,7 / -3,5	2,8 / -3,6

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	111	107	104	101	108	105	102	99	101	98	96	97	95	93	93	92	90	88
2	103	96	90	85	100	94	89	84	91	86	82	87	84	81	84	81	79	77
3	95	86	79	74	93	84	78	73	82	76	72	79	74	70	76	72	69	67
4	88	77	70	64	86	76	69	64	74	68	63	71	66	62	69	65	61	59
5	81	70	62	56	79	69	61	56	67	60	55	65	59	55	63	58	54	52
6	76	64	56	50	74	63	55	50	61	54	49	59	53	49	58	52	48	46
7	70	58	50	45	69	57	50	44	56	49	44	54	48	44	53	48	43	42
8	66	53	45	40	64	53	45	40	51	45	40	50	44	39	49	43	39	37
9	62	49	41	36	60	48	41	36	47	41	36	46	40	36	45	40	36	34
10	58	45	38	33	57	45	38	33	44	37	33	43	37	33	42	37	33	31

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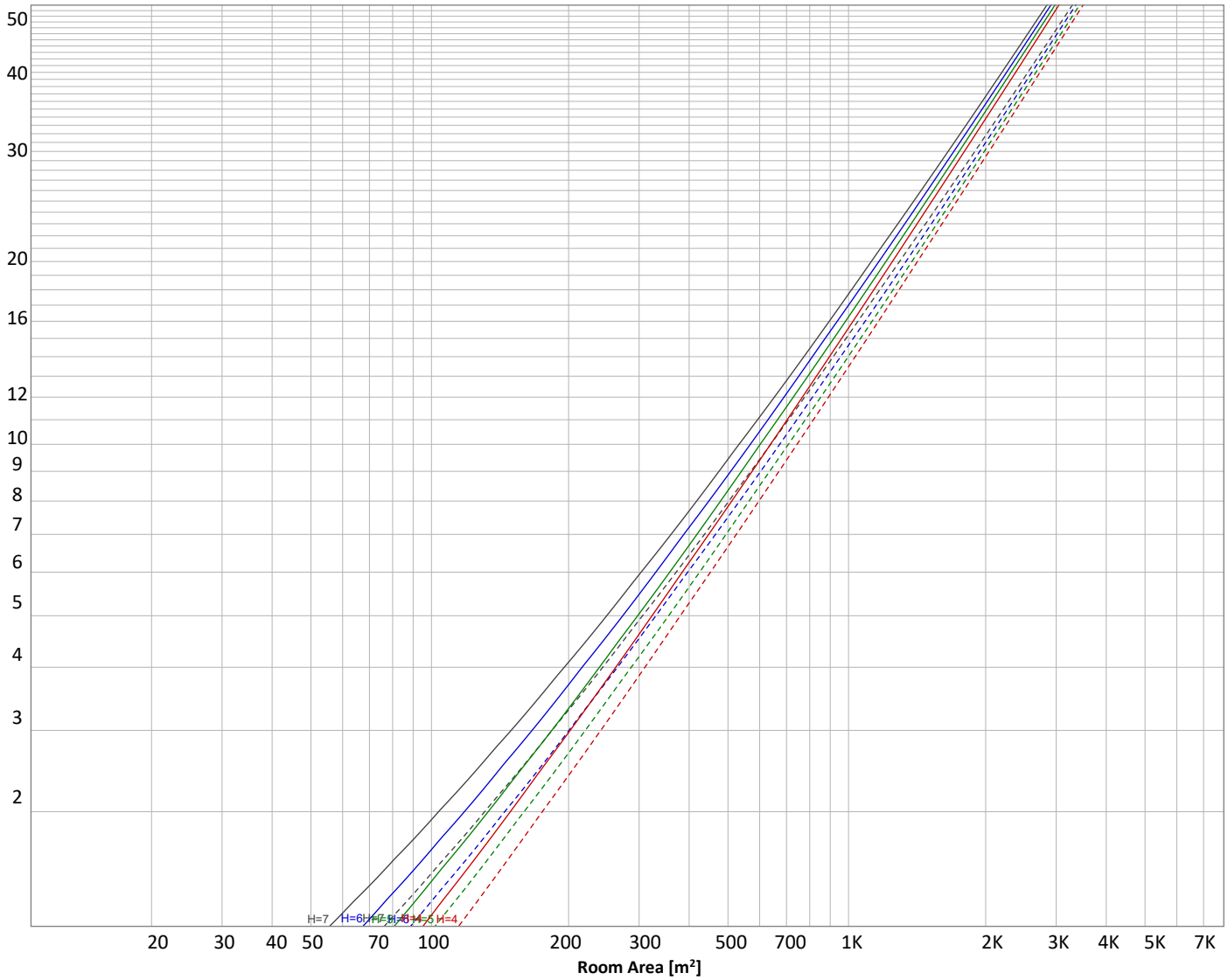
Luminaire budgetary diagram

Uncorrected, comprehensive UGR table according to 117-1995

LAMPS (number of lamps)



Conditions

H = Room height	Flux = 7212 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°
302 lm	883 lm	1419 lm	1694 lm	1440 lm	853 lm	424 lm	125 lm	43,9 lm

90°-100°	100°-110°	110°-120°	120°-130°	130°-140°	140°-150°	150°-160°	160°-170°	170°-180°
9,77 lm	2,15 lm	2,45 lm	2,91 lm	2,97 lm	2,78 lm	2,36 lm	1,60 lm	0,584 lm

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Outdoor Light Planning

Lumen per Zone

Zone (γ)	Lumen	% Total
0-10°	302 lm	4,2%
10-20°	883 lm	12,2%
20-30°	1419 lm	19,7%
30-40°	1694 lm	23,5%
40-50°	1440 lm	20,0%
50-60°	853 lm	11,8%
60-70°	424 lm	5,9%
70-80°	125 lm	1,7%
80-90°	44 lm	0,6%
90-100°	10 lm	0,1%
100-110°	2 lm	0,0%
110-120°	2 lm	0,0%
120-130°	3 lm	0,0%
130-140°	3 lm	0,0%
140-150°	3 lm	0,0%
150-160°	2 lm	0,0%
160-170°	2 lm	0,0%
170-180°	1 lm	0,0%
Total	7212 lm	100,0%

Intensity peaks

Max intensity	3171 cd
Intensity, 90°	21 cd
Intensity, 0°	3171 cd

Zonal Lumen summary

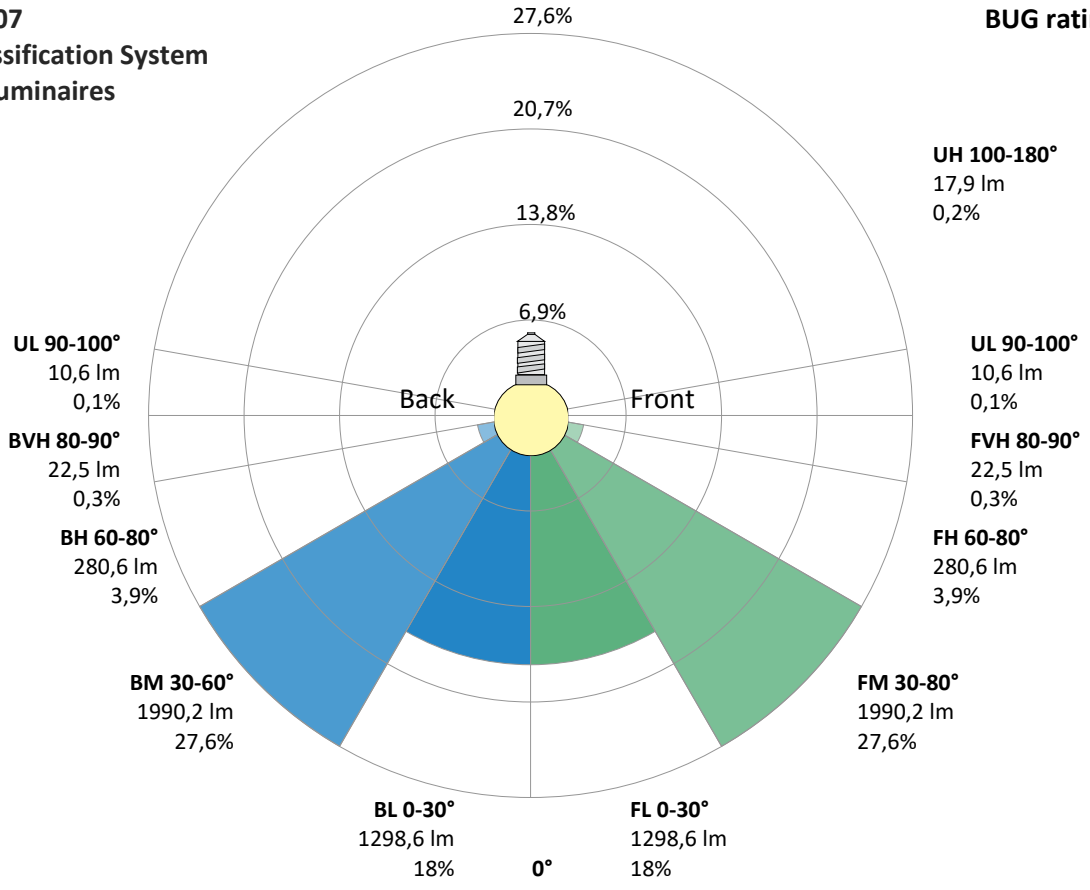
Zone (γ)	Lumen	% Total
0-30°	2604 lm	36,1%
0-40°	4299 lm	59,6%
0-60°	6592 lm	91,4%
60-90°	593 lm	8,2%
70-100°	179 lm	2,5%
90-120°	14 lm	0,2%
0-90°	7185 lm	99,6%
90-180°	28 lm	0,4%
0-180°	7212 lm	100,0%

BUG rating

	Lumen	% Total
Forward light		
Low(0-30°)	1299 lm	18,0%
Medium(30-60°)	1990 lm	27,6%
High(60-80°)	281 lm	3,9%
Very high(80-90°)	22 lm	0,3%
Back light		
Low(0-30°)	1299 lm	18,0%
Medium(30-60°)	1990 lm	27,6%
High(60-80°)	281 lm	3,9%
Very high(80-90°)	22 lm	0,3%
Uplight		
Low(90-100°)	11 lm	0,1%
High(100-180°)	18 lm	0,2%

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

BUG rating B3 U2 G1



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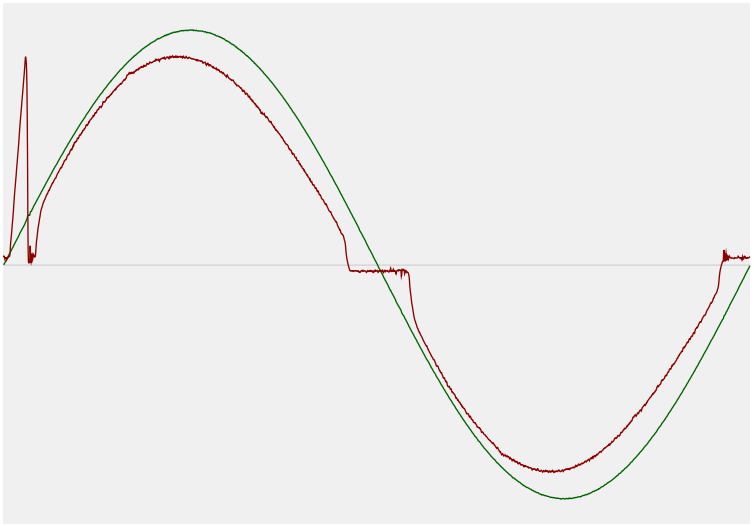
Power Details

Input Power

Power feed to light source	51,6 W
Frequency of input power	50 Hz
RMS Input voltage feed, V_{RMS}	230 V
RMS Input current feed, I_{RMS}	0,227 A
Volt-Ampere or apparent power = V_{RMS}*I_{RMS}	52,31 VA
Displacement factor of AC power feed	1,0
Power factor of AC current feed	0,99
Total harmonic distortion of the current	13,16%
Total harmonic distortion of the voltage	0,08%

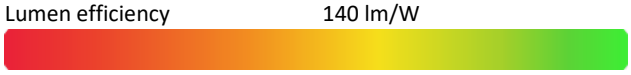
Input Power Curve



Efficiency

Radiated power efficiency 44,7%

Lumen efficiency 140 lm/W



Stabilization Details

Warmup Conditions

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

Color Temperature Change

CCT start	5968 K
CCT shift	+32 K
CCT end	6000 K

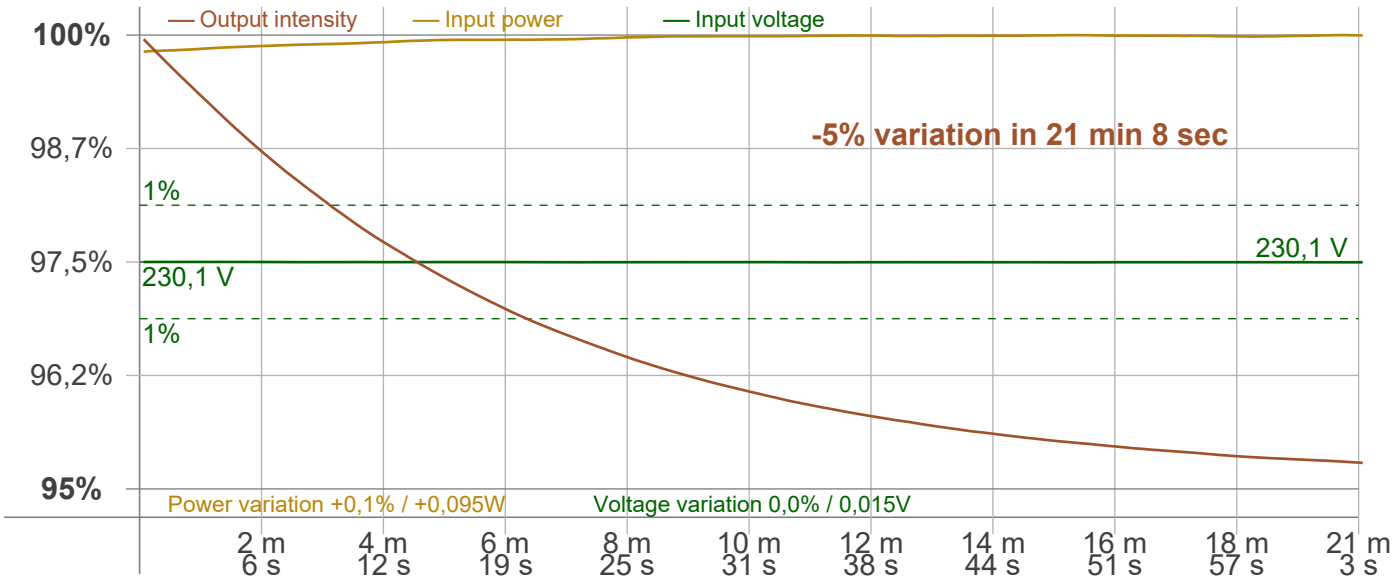
Warmup Result

Total warmup time	Lamp stabilized in 21 min 8 sec
Warmup variation	-5,0%

Output Change

Output start	7589 lm
Output change	-376 lm
Output end	7212 lm

Stabilization Curve



Light Measurement Report

Print date: 19-12-2024
Measurement date and time: 19-12-2024 14:48:34 – Measurement no. VFR-241219-2610-MS
Measurement tracking No. and Link: VT241219-005560
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 Hz
Percent Flicker	99,95 %
Flicker index	0,33

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

PstLM value (F < 80 Hz)	0,12
SVM value (80 < F < 2000 Hz)	3,99

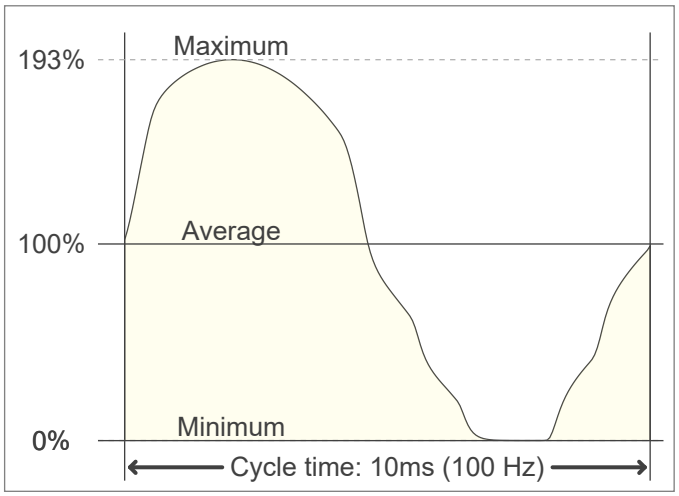
Flicker indices according to California Energy Commission (CEC) 2016b

JA8/10 40 Hz	0,23 %
JA8/10 90 Hz	0,89 %
JA8/10 200 Hz	103,66 %
JA8/10 400 Hz	102,58 %
JA8/10 1000 Hz	102,43 %

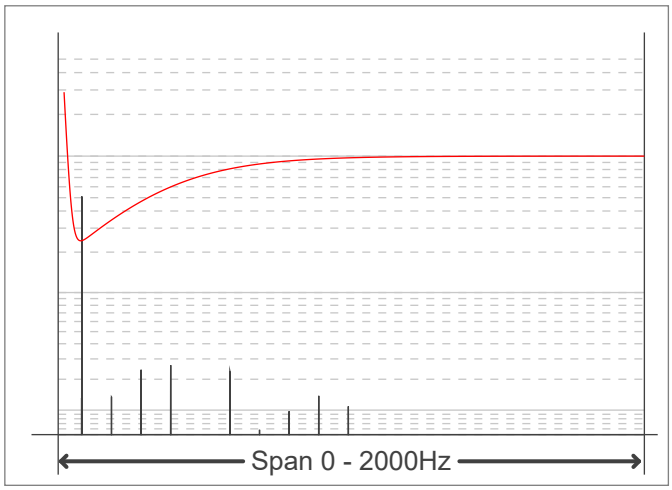
Flicker indices according to Lighting Research Center (2015)

Perception metric, Assist Mp	0,06

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



Flicker FFT (flicker curve in frequency domain)



IEEE 1789 Frequency/modulation plot