Light Measurement Report

Print date: 21-2-2025
Measurement date and time: 21-2-2025 13:53:03 – Measurement no. VFR-250221-0113-MS
Measurement tracking No. and Link: VT250221-006769
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

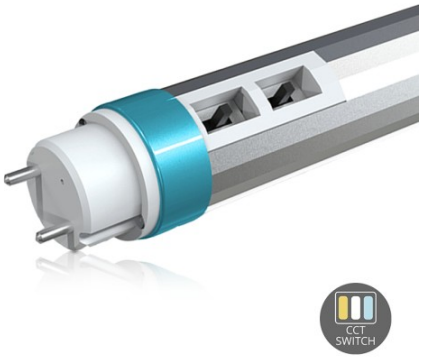
Number of C-planes and Resolution	12 planes – 30°
γ (gamma)-Resolution	5°
Test Distance	12,10 m
Input Power, Power and Displ. Factors	17,2 W – PF 0,9 – DPF 0,92
Input RMS Voltage and Current	230 V – 0,083 A
Frequency of Input Power	50 Hz
Warm-up Time and Variation	Lamp stabilized in 15 min 1 sec – 2,0%

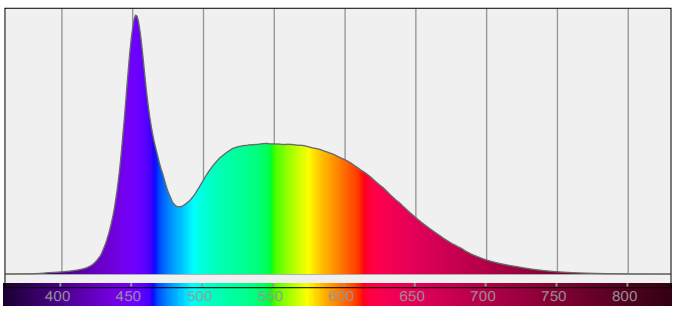
Tested Light Source

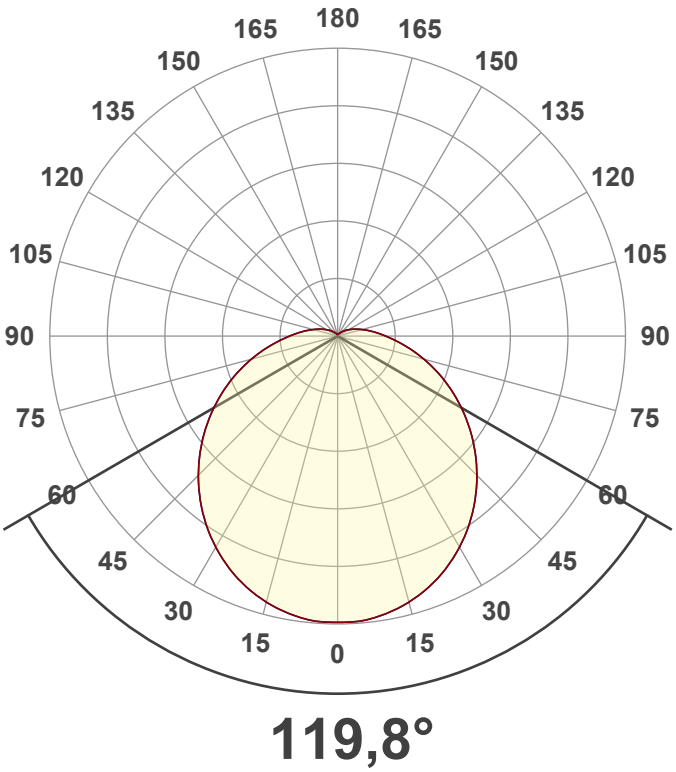
Product Name	276758-6000K-18W
Item No. and Manufacturer	276758-6000K-18W – Dutchfulfillment
Product Description (line 1)	LED TL-BUIS | T8 | 150CM | 18W/20W/25W | CCT-SWITCH

Main Light Measurement Results

Output – Total Lumen (Up% / Down%)	2162 lm – 9,9% / 90,1%
Efficiency	126 lm/W
Peak Intensity and Beam Angle	589 cd – 119,8°
Correlated Color Temperature, Target/Measured	CCT = 6000 K / 6147 K
Color Rendering Index	CRI 83,8
Color Rendering TM30-18	R_f 84,2 – R_g 94,1
Color Shift, CIE duv and MacAdam Steps	Duv 0,0041 – SDCM 10,5
Flicker	SVM 2,3 – PstLM 0,08







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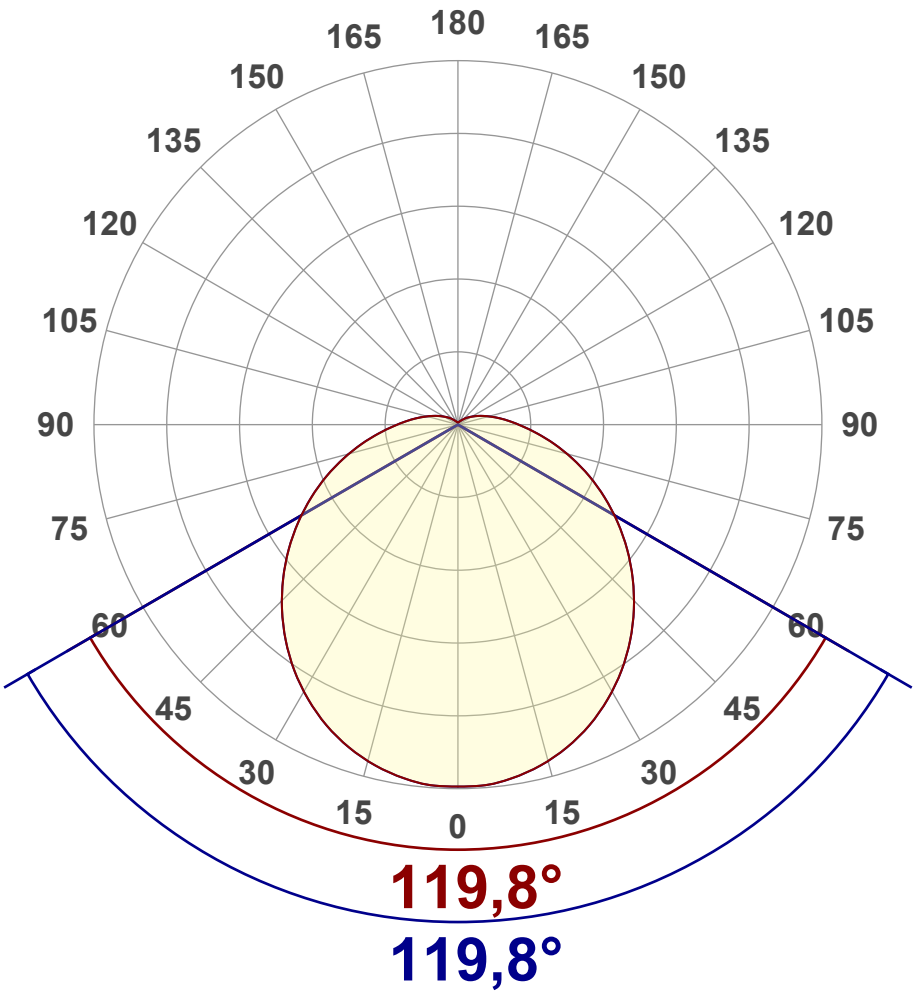
Luminous Intensity diagram Unit: 0-100% of peak intensity



Main Values

Output (total Lumen)	2162 lm
Lumen Up% / Down%	9,9% / 90,1%
Peak Intensity	589 cd
Beam Angle (50%)	119,8°
Beam Angle (90%)	119,8°
Beam Angle (10%)	119,8°

Cut-off Angle

Average 2,5%	263,4°

Field Angle

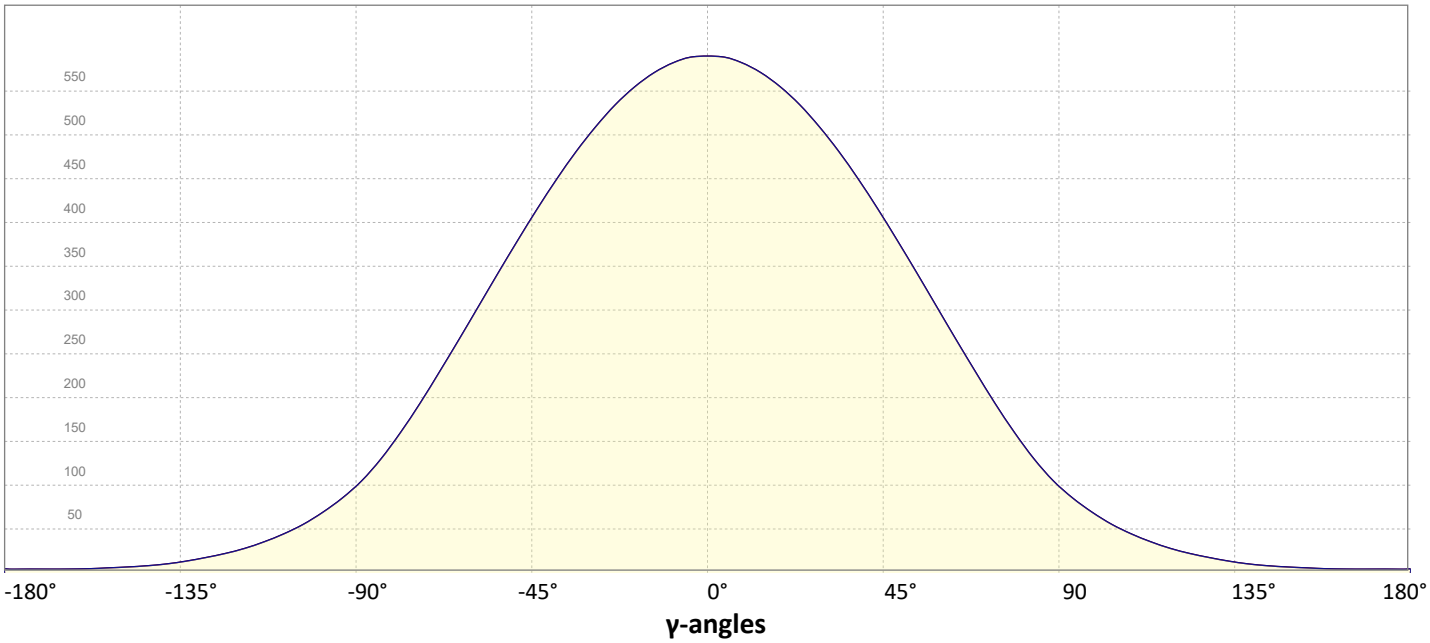
Average 10%	204,4°

Intensity Ratio

In 120° cone	63,1%
In 90° cone	42,1%

C000-C180
C090-C270

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



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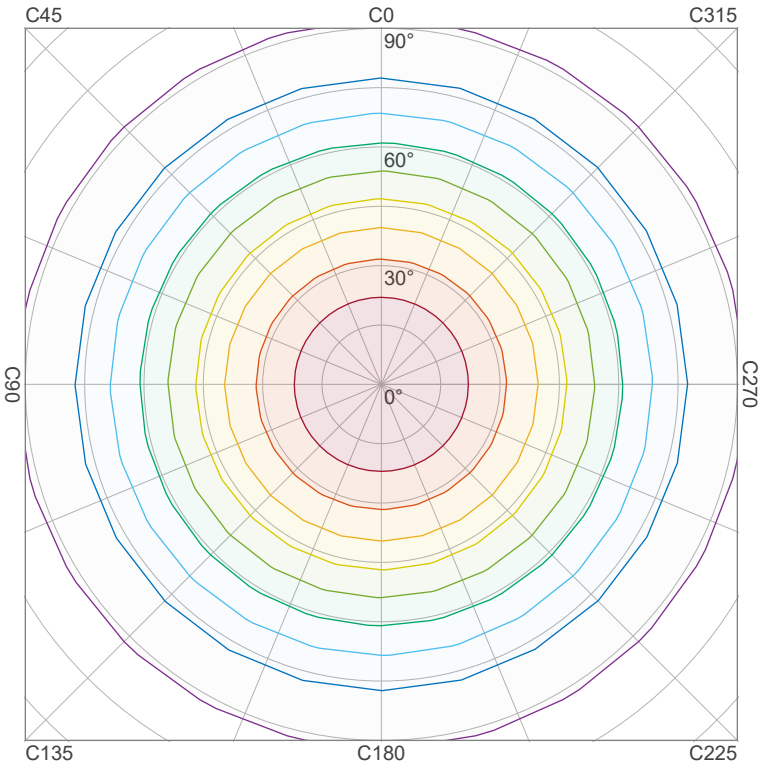
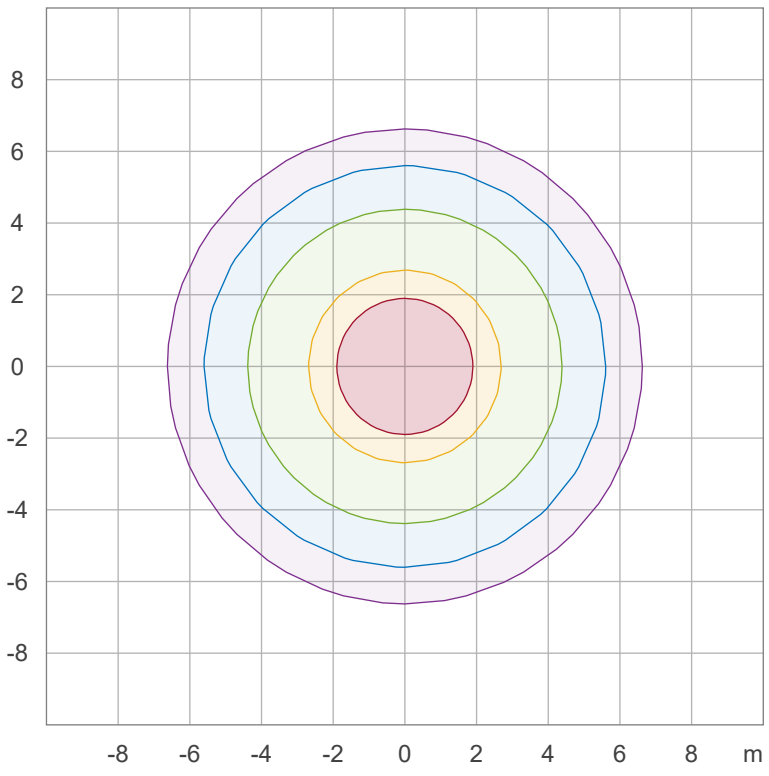
Iso-intensity Diagram (Iso-candela)



90 %	530,3 cd
80 %	471,3 cd
70 %	412,4 cd
60 %	353,5 cd
50 %	294,6 cd
40 %	235,7 cd
30 %	176,8 cd
20 %	117,8 cd
10 %	58,9 cd

Peak intensity: 589,2 cd
Number of c-planes: 12

Iso-illuminance Diagram (Iso-lux)



50,0 %	32,7 lx
30,0 %	19,6 lx
10,0 %	6,5 lx
5,0 %	3,3 lx
3,0 %	2,0 lx

Peak illuminance: 65,5 lx
Mounting height: 3,0 m
Number of c-planes: 12

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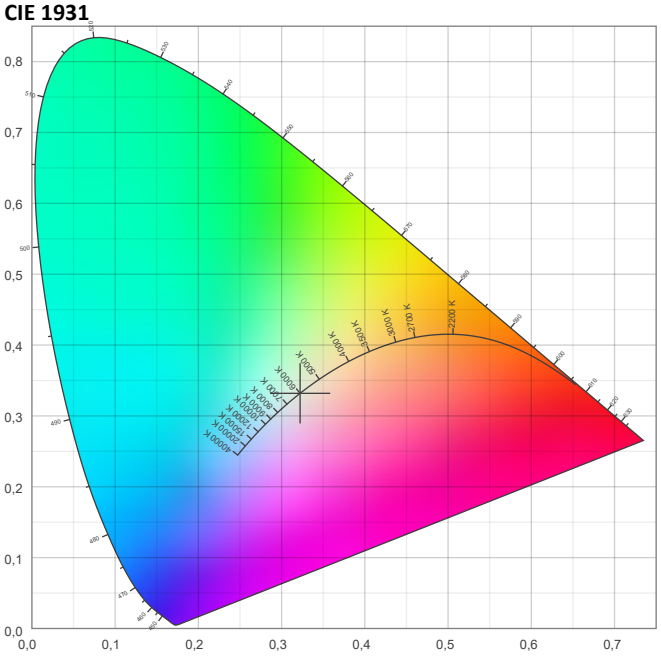
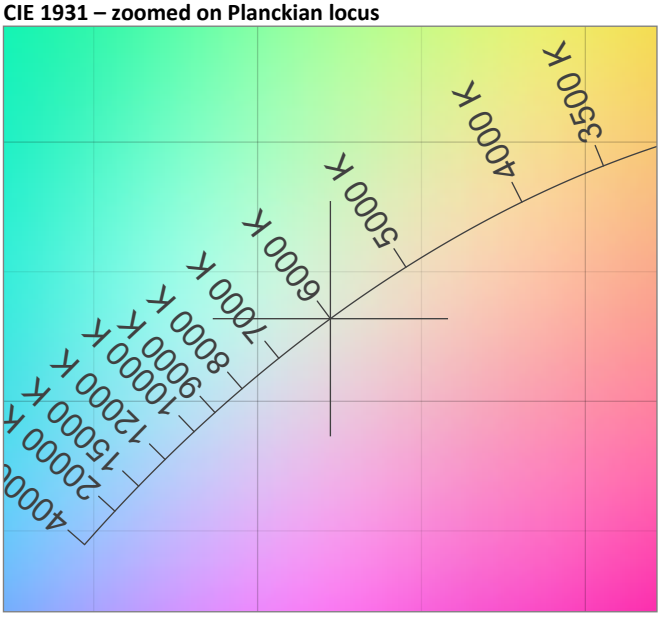
Color details

Correlated Color Temperature, Target	CCT = 6000 K
Correlated Color Temperature, Measured	CCT = 6147 K
Color Rendering Index	CRI 83,8
Color Rendering Index, R9 (red component)	R9 = 11,8
Color Rendering TM30-18	R_f 84,2 – R_g 94,1
Color Quality Scale	CQS = 82,7
MacAdam Steps	SDCM = 10,5
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 = 0,0041
Color coordinate CIEs 1976 (CIELUV)	(u';v') = (0,203;0,471)

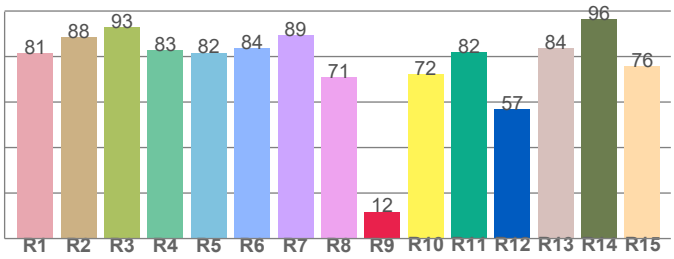
CIE 1931



CIE 1931 – zoomed on Planckian locus



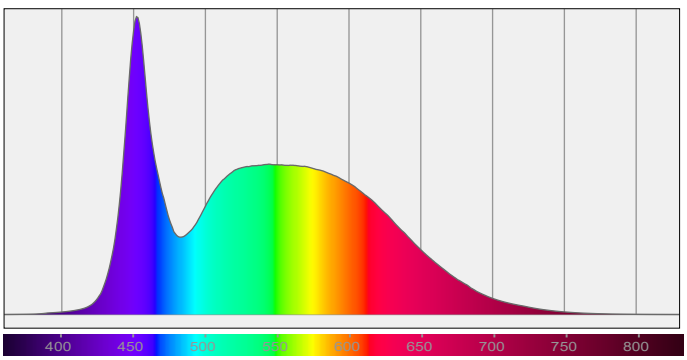
Color Rendering Index per reference color (CIE 1995)



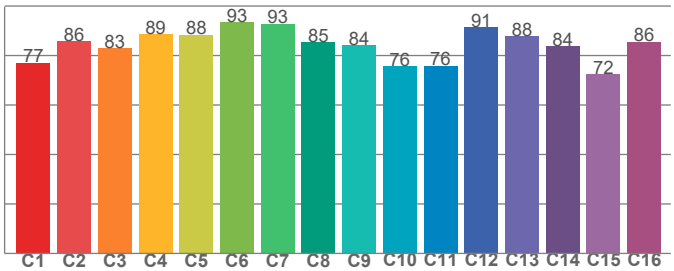
CRI R values, only R1-R8 are used to calculate final CRI value

R1	R2	R3	R4	R5	R6	R7	R8	R9	R10	R11	R12	R13	R14	R15
81,4	88,4	92,8	82,6	81,6	83,5	89,4	70,9	11,8	72,3	81,8	56,7	83,6	96,4	75,6

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



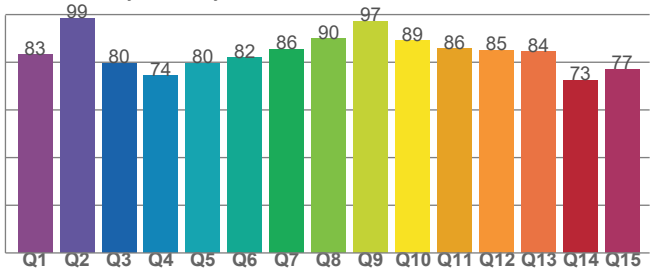
TM30-18 Rf-values per hue bin



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
77,1	85,9	82,9	88,6	88,4	93,3	92,8	85,5	84,1	75,6	75,9	91,4	87,9	83,9	72,4	85,6

Color Quality Scale by reference color



CQS Q values

Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10	Q11	Q12	Q13	Q14	Q15
83,2	98,5	79,7	74,4	79,6	81,8	85,6	89,9	97,3	89,0	85,7	85,0	84,5	72,6	77,0

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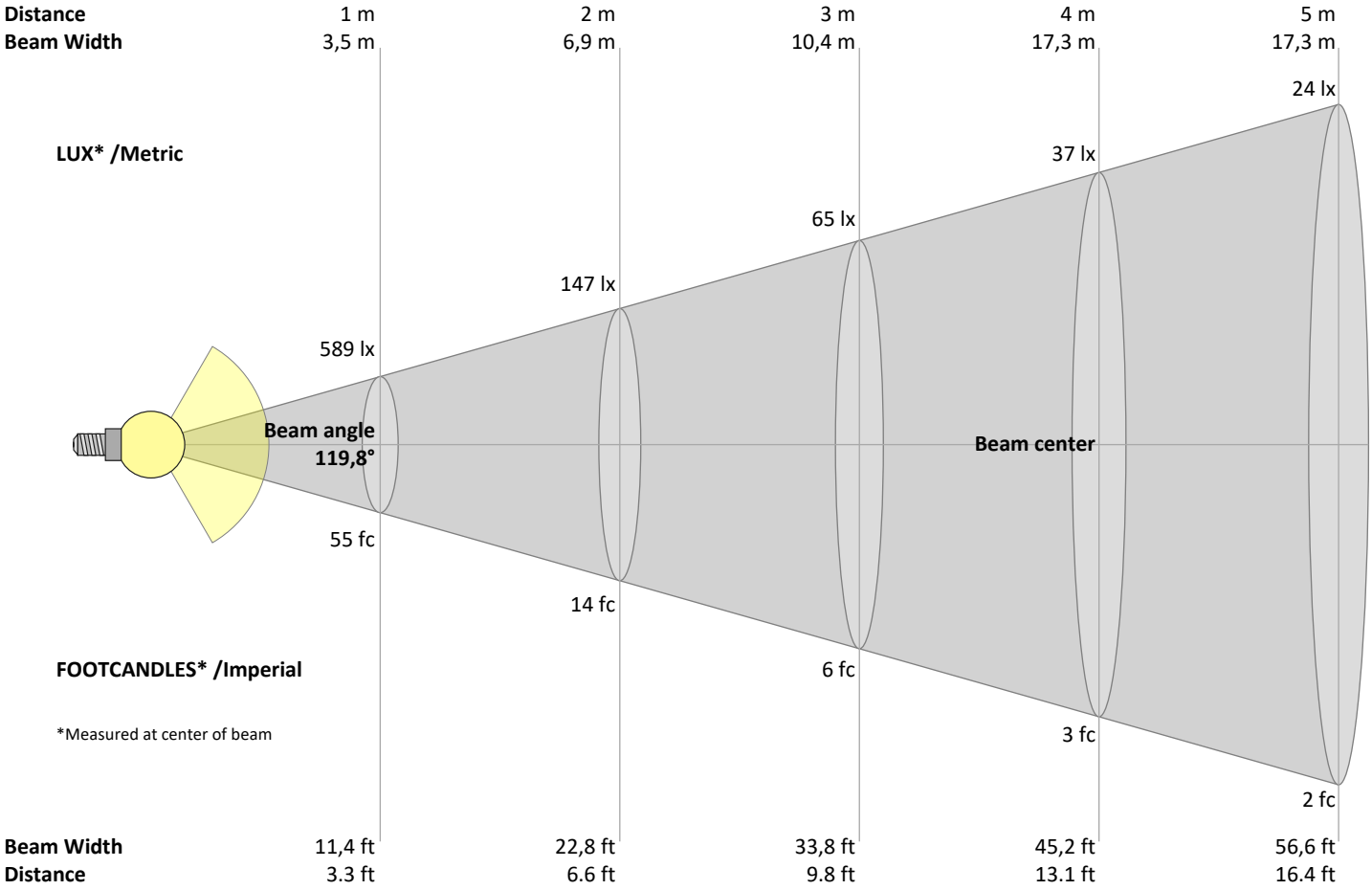
Beam Details



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
589	147	65	37	24	16	12	9	7	6	5	4	3	3	3	2	2	2	2	1	lux
54,7	13,7	6,1	3,4	2,2	1,5	1,1	0,9	0,7	0,5	0,5	0,4	0,3	0,3	0,2	0,2	0,2	0,2	0,2	0,1	fc

Intensities in 0° c-plane

0°	9°	18°	27°	36°	45°	54°	63°	72°	81°	90°	99°	108°	117°	126°	135°	144°	153°	162°	171°	γ
589	582	557	517	466	405	339	271	205	146	99	68	46	30	20	12	8	6	4	4	cd
100%	99%	95%	88%	79%	69%	58%	46%	35%	25%	17%	11%	8%	5%	3%	2%	1%	1%	1%	1%	of 0°val

Intensities in 90° c-plane

0°	9°	18°	27°	36°	45°	54°	63°	72°	81°	90°	99°	108°	117°	126°	135°	144°	153°	162°	171°	γ
589	582	557	517	466	405	339	271	205	146	99	68	46	30	20	12	8	6	4	4	cd
100%	99%	95%	88%	79%	69%	58%	46%	35%	25%	17%	11%	8%	5%	3%	2%	1%	1%	1%	1%	of 0°val

Intensities in 180° c-plane

0°	9°	18°	27°	36°	45°	54°	63°	72°	81°	90°	99°	108°	117°	126°	135°	144°	153°	162°	171°	γ
589	582	557	517	466	405	339	271	205	146	99	68	46	30	20	12	8	6	4	4	cd
100%	99%	95%	88%	79%	69%	58%	46%	35%	25%	17%	11%	8%	5%	3%	2%	1%	1%	1%	1%	of 0°val

Intensities in 270° c-plane

0°	9°	18°	27°	36°	45°	54°	63°	72°	81°	90°	99°	108°	117°	126°	135°	144°	153°	162°	171°	γ
589	582	557	517	466	405	339	271	205	146	99	68	46	30	20	12	8	6	4	4	cd
100%	99%	95%	88%	79%	69%	58%	46%	35%	25%	17%	11%	8%	5%	3%	2%	1%	1%	1%	1%	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	20,9	22,1	21,3	22,5	23,0	19,9	21,1	20,3	21,6	22,0
	3H	22,8	24,0	23,4	24,5	24,9	21,5	22,8	22,1	23,2	23,6
	4H	23,9	25,0	24,4	25,5	25,9	22,3	23,5	22,9	23,9	24,4
	6H	25,0	26,0	25,5	26,5	27,0	23,1	24,1	23,6	24,6	25,2
	8H	25,6	26,6	26,1	27,1	27,6	23,4	24,5	23,9	24,9	25,5
	12H	26,2	27,2	26,7	27,7	28,3	23,7	24,8	24,2	25,2	25,8
4H	2H	21,3	22,5	21,9	23,0	23,4	20,6	21,8	21,2	22,3	22,7
	3H	23,6	24,6	24,1	25,1	25,7	22,6	23,6	23,1	24,0	24,7
	4H	24,7	25,7	25,3	26,2	26,9	23,4	24,4	24,0	24,9	25,6
	6H	25,9	26,8	26,6	27,3	27,9	24,3	25,2	24,9	25,7	26,2
	8H	26,6	27,4	27,2	27,9	28,5	24,7	25,5	25,3	26,0	26,6
	12H	27,3	28,0	28,0	28,6	29,2	25,1	25,7	25,7	26,3	27,0
8H	4H	25,0	25,8	25,6	26,3	26,9	23,9	24,7	24,5	25,2	25,8
	6H	26,4	27,0	27,0	27,7	28,4	25,0	25,6	25,6	26,2	26,9
	8H	27,2	27,8	27,9	28,4	29,2	25,5	26,0	26,1	26,7	27,5
	12H	28,1	28,6	28,8	29,2	30,0	26,0	26,5	26,7	27,1	27,9
12H	4H	25,0	25,7	25,6	26,3	26,9	24,0	24,6	24,6	25,2	25,8
	6H	26,5	27,1	27,2	27,7	28,5	25,1	25,7	25,8	26,3	27,1
	8H	27,3	27,8	28,0	28,5	29,2	25,7	26,2	26,4	26,9	27,6

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

S = 1.0H	0,1 / 0,0	0,1 / -0,1
S = 1.5H	0,1 / -0,1	0,1 / -0,1
S = 2.0H	0,3 / -0,3	0,2 / -0,3

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	117	117	117	117	113	113	113	113	106	106	106	99	99	99	93	93	93	90
1	104	99	93	89	100	95	91	86	89	85	82	83	80	78	78	76	74	71
2	94	85	77	71	90	82	75	69	77	71	66	72	67	63	67	64	60	57
3	85	74	65	58	82	71	63	57	67	60	54	63	57	52	59	54	50	47
4	78	65	56	49	75	63	54	48	59	52	46	56	49	44	52	47	43	40
5	71	58	48	42	68	56	47	41	53	45	39	50	43	38	47	41	37	34
6	66	52	43	36	63	50	42	35	48	40	34	45	38	33	42	37	32	30
7	61	47	38	32	59	46	37	31	43	36	30	41	34	29	39	33	28	26
8	57	43	34	28	54	42	33	28	39	32	27	37	31	26	36	30	25	23
9	53	39	31	25	51	38	30	25	36	29	24	35	28	24	33	27	23	21
10	50	36	28	23	48	35	28	22	34	27	22	32	26	21	30	25	21	19

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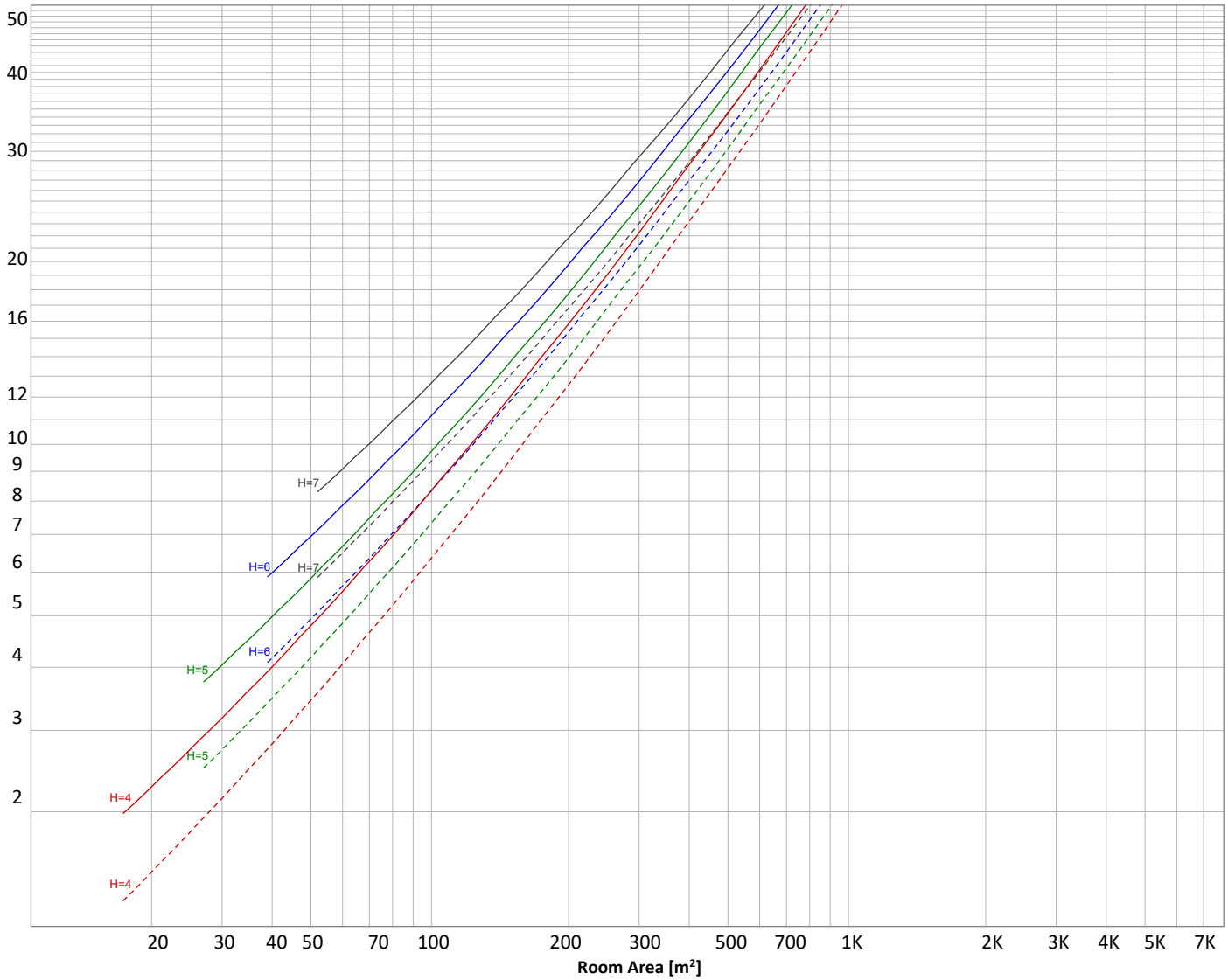
Luminaire budgetary diagram

Uncorrected, comprehensive UGR table according to 117-1995

LAMPS (number of lamps)



Conditions

H = Room height	Flux = 2162 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°
55,9 lm	160 lm	243 lm	296 lm	313 lm	297 lm	254 lm	195 lm	135 lm

90°-100°	100°-110°	110°-120°	120°-130°	130°-140°	140°-150°	150°-160°	160°-170°	170°-180°
88,3 lm	55,5 lm	33,1 lm	18,7 lm	9,68 lm	4,84 lm	2,47 lm	1,20 lm	0,397 lm

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Outdoor Light Planning

Lumen per Zone

Zone (γ)	Lumen		% Total
0-10°	56	lm	2,6%
10-20°	160	lm	7,4%
20-30°	243	lm	11,2%
30-40°	296	lm	13,7%
40-50°	313	lm	14,5%
50-60°	297	lm	13,7%
60-70°	254	lm	11,7%
70-80°	195	lm	9,0%
80-90°	135	lm	6,2%
90-100°	88	lm	4,1%
100-110°	55	lm	2,6%
110-120°	33	lm	1,5%
120-130°	19	lm	0,9%
130-140°	10	lm	0,4%
140-150°	5	lm	0,2%
150-160°	2	lm	0,1%
160-170°	1	lm	0,1%
170-180°	0	lm	0,0%
Total	2162	lm	100,0%

Intensity peaks

Max intensity	589	cd
Intensity, 90°	99	cd
Intensity, 0°	589	cd

Zonal Lumen summary

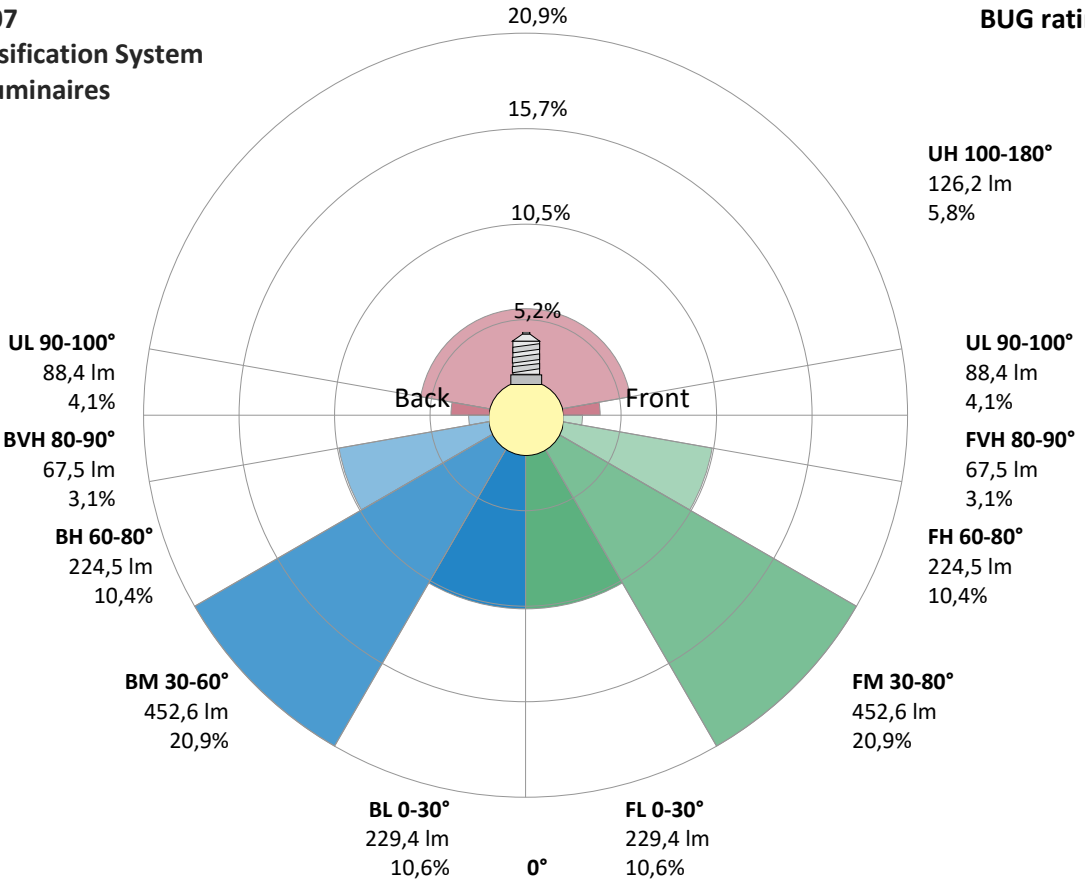
Zone (γ)	Lumen		% Total
0-30°	459	lm	21,2%
0-40°	755	lm	34,9%
0-60°	1365	lm	63,1%
60-90°	584	lm	27,0%
70-100°	418	lm	19,3%
90-120°	177	lm	8,2%
0-90°	1948	lm	90,1%
90-180°	214	lm	9,9%
0-180°	2162	lm	100,0%

BUG rating

	Lumen		% Total
Forward light			
Low(0-30°)	229	lm	10,6%
Medium(30-60°)	453	lm	20,9%
High(60-80°)	224	lm	10,4%
Very high(80-90°)	67	lm	3,1%
Back light			
Low(0-30°)	229	lm	10,6%
Medium(30-60°)	453	lm	20,9%
High(60-80°)	224	lm	10,4%
Very high(80-90°)	67	lm	3,1%
Uplight			
Low(90-100°)	88	lm	4,1%
High(100-180°)	126	lm	5,8%

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

BUG rating B1 U3 G1



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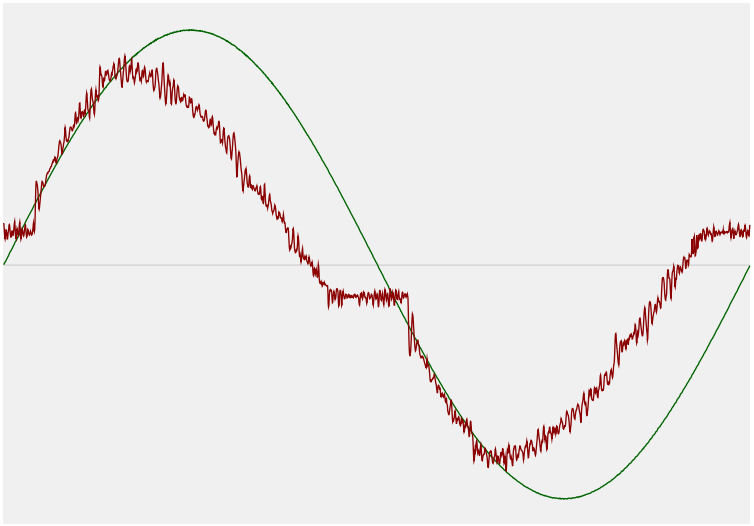
Power Details

Input Power

Power feed to light source	17,2 W
Frequency of input power	50 Hz
RMS Input voltage feed, V_{RMS}	230 V
RMS Input current feed, I_{RMS}	0,083 A
Volt-Ampere or apparent power = V_{RMS}*I_{RMS}	19,19 VA
Displacement factor of AC power feed	0,92
Power factor of AC current feed	0,9
Total harmonic distortion of the current	20,75%
Total harmonic distortion of the voltage	0,07%

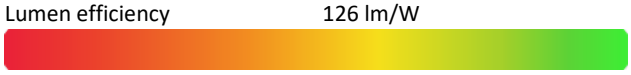
Input Power Curve



Efficiency

Radiated power efficiency 40,1%

Lumen efficiency 126 lm/W



Stabilization Details

Warmup Conditions

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

Color Temperature Change

CCT start	5991 K
CCT shift	+9 K
CCT end	6000 K

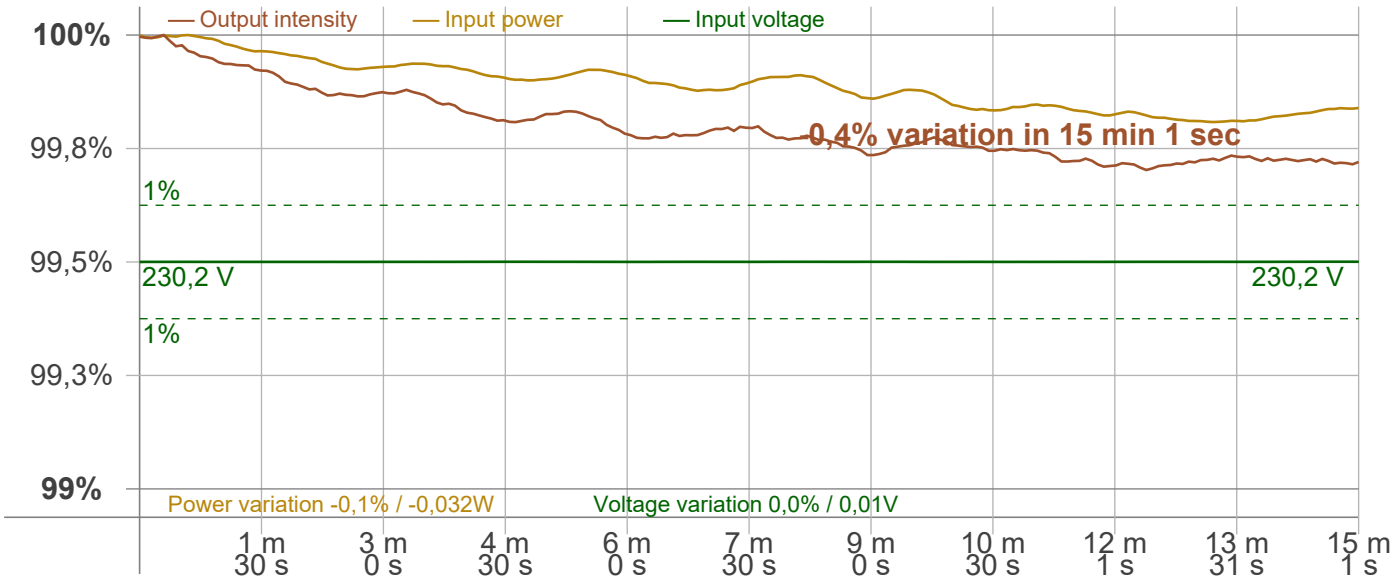
Warmup Result

Total warmup time	Lamp stabilized in 15 min 1 sec
Warmup variation	-0,4%

Output Change

Output start	2168 lm
Output change	-5 lm
Output end	2162 lm

Stabilization Curve



Light Measurement Report

Print date: 21-2-2025
Measurement date and time: 21-2-2025 13:53:03 – Measurement no. VFR-250221-0113-MS
Measurement tracking No. and Link: VT250221-006769
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	59,18 %
Flicker index	0,19

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

PstLM value (F < 80 Hz)	0,08
SVM value (80 < F < 2000 Hz)	2,3

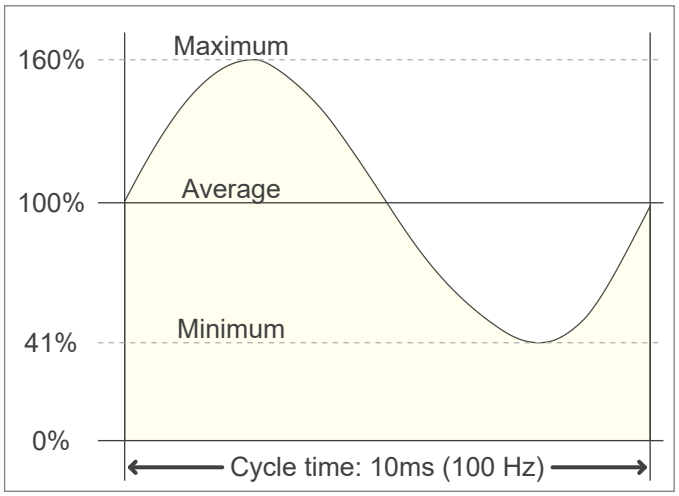
Flicker indices according to California Energy Commission (CEC) 2016b

JA8/10 40 Hz	0,14 %
JA8/10 90 Hz	0,57 %
JA8/10 200 Hz	59 %
JA8/10 400 Hz	59,13 %
JA8/10 1000 Hz	59,22 %

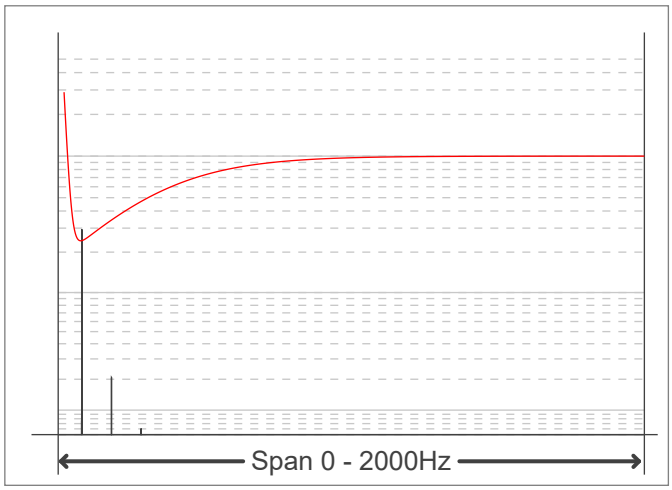
Flicker indices according to Lighting Research Center (2015)

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