Light Measurement Report

Print date: 5-11-2025
Measurement date and time: 5-11-2025 14:26:23 – Measurement no. VFR-251105-3934-MS
Measurement tracking No. and Link: VT251105-007926
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

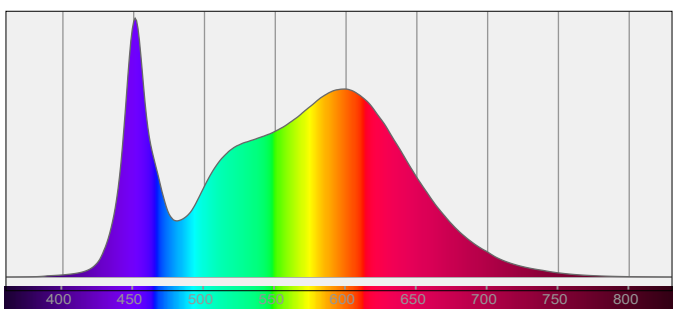
Number of C-planes and Resolution	12 planes – 30°
γ (gamma)-Resolution	5°
Test Distance	12,10 m
Input Power, Power and Displ. Factors	57,1 W – PF 0,98 – DPF 0,99
Input RMS Voltage and Current	230 V – 0,252 A
Frequency of Input Power	50 Hz
Warm-up Time and Variation	Lamp stabilized in 15 min 1 sec – 2,0%

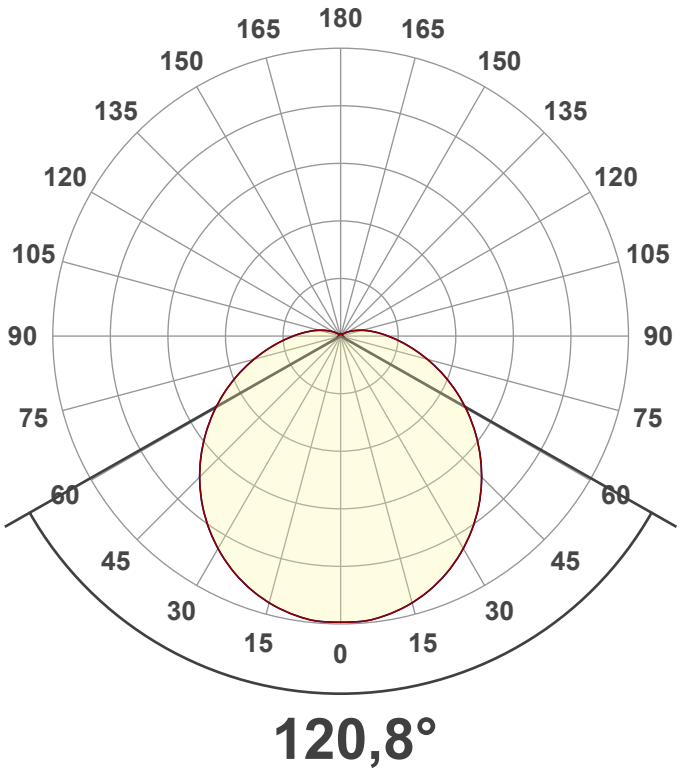
Tested Light Source

Product Name	813666-4000K
Item No. and Manufacturer	813666-4000K – Dutchfulfillment
Product Description (line 1)	LED BATTEN | CLIFF | 35-60W | 150CM | PHILIPS DRIVER | CCT-SWITCH

Main Light Measurement Results

Output – Total Lumen (Up% / Down%)	8983 lm – 8,46% / 91,54%
Efficiency	157 lm/W
Peak Intensity and Beam Angle	2467 cd – 120,8°
Correlated Color Temperature, Target/Measured	CCT = 4000 K / 4156 K
Color Rendering Index	CRI 86,6
Color Rendering TM30-18	R_f 85,0 – R_g 98,0
Color Shift, CIE duv and MacAdam Steps	Duv -0,0050 – SDCM 5,4
Flicker	SVM 0,03 – PstLM 0,01





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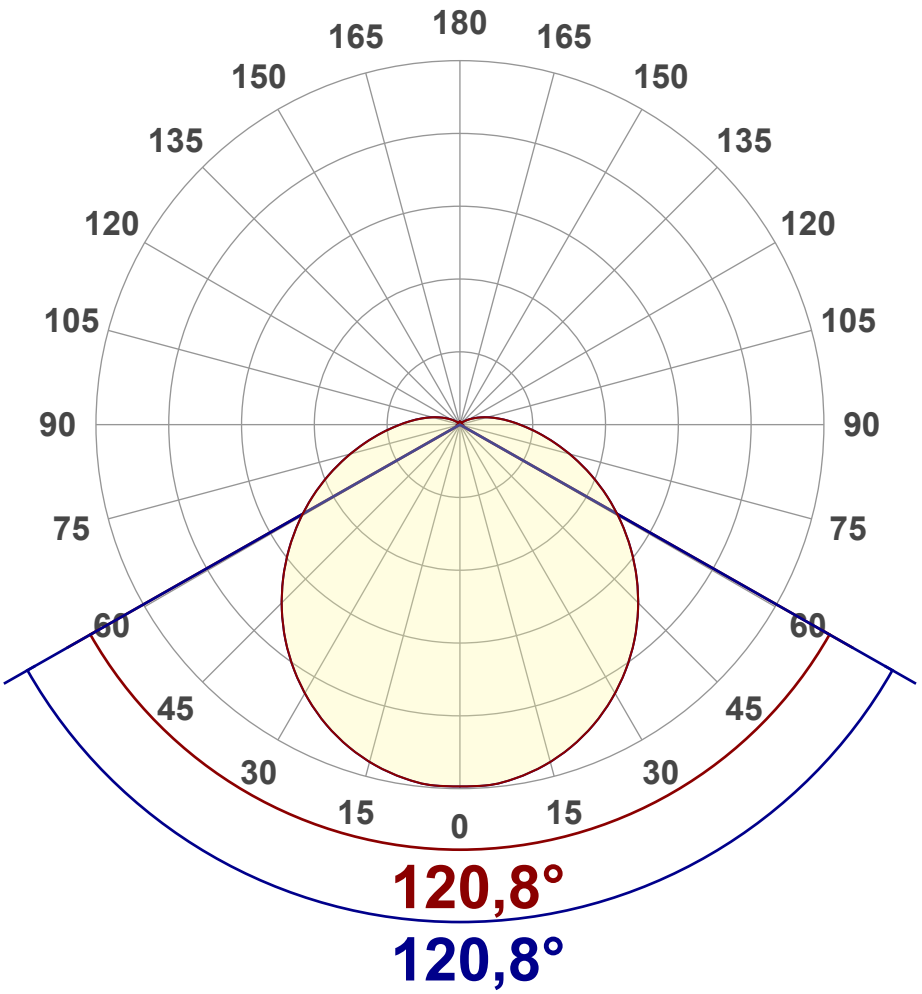
Luminous Intensity diagram Unit: 0-100% of peak intensity



Main Values

Output (total Lumen)	8983 lm
Lumen Up% / Down%	8,46% / 91,54%
Peak Intensity	2467 cd
Beam Angle (50%)	120,8°
Beam Angle (90%)	120,8°
Beam Angle (10%)	120,8°

Cut-off Angle

Average 2,5%	243,9°

Field Angle

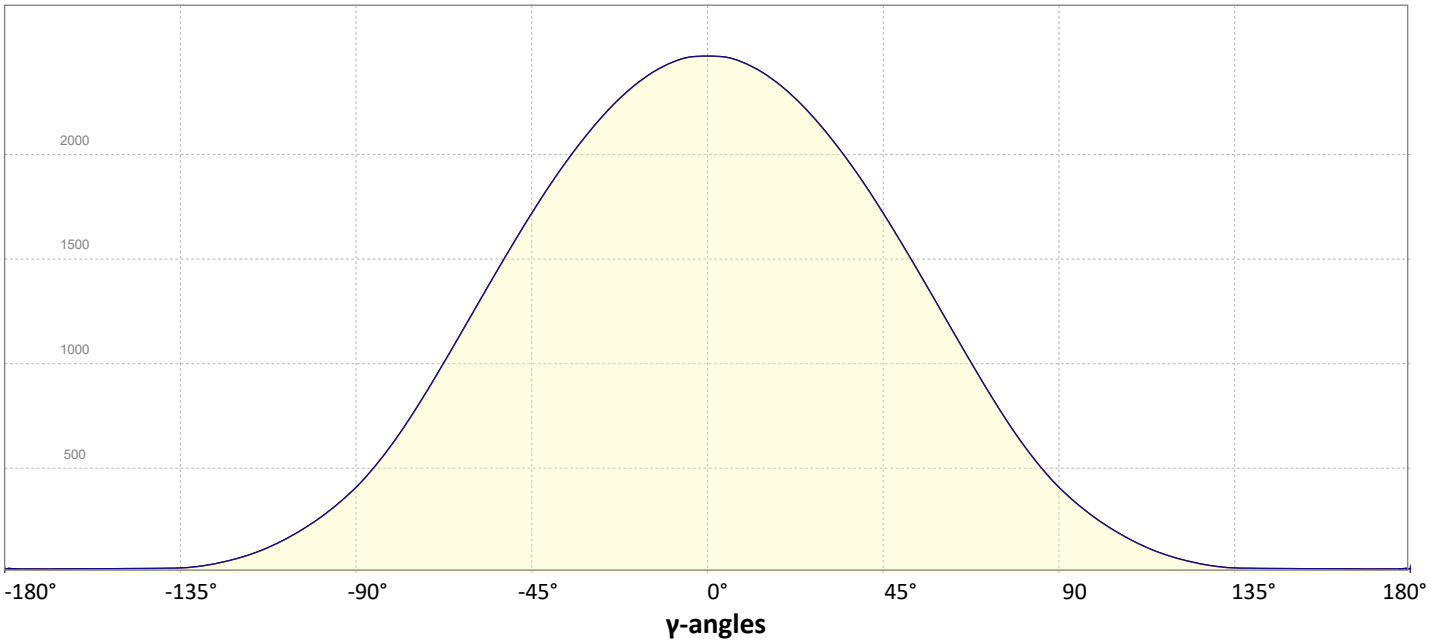
Average 10%	201,1°

Intensity Ratio

In 120° cone	64,2%
In 90° cone	42,8%

C000-C180
C090-C270

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



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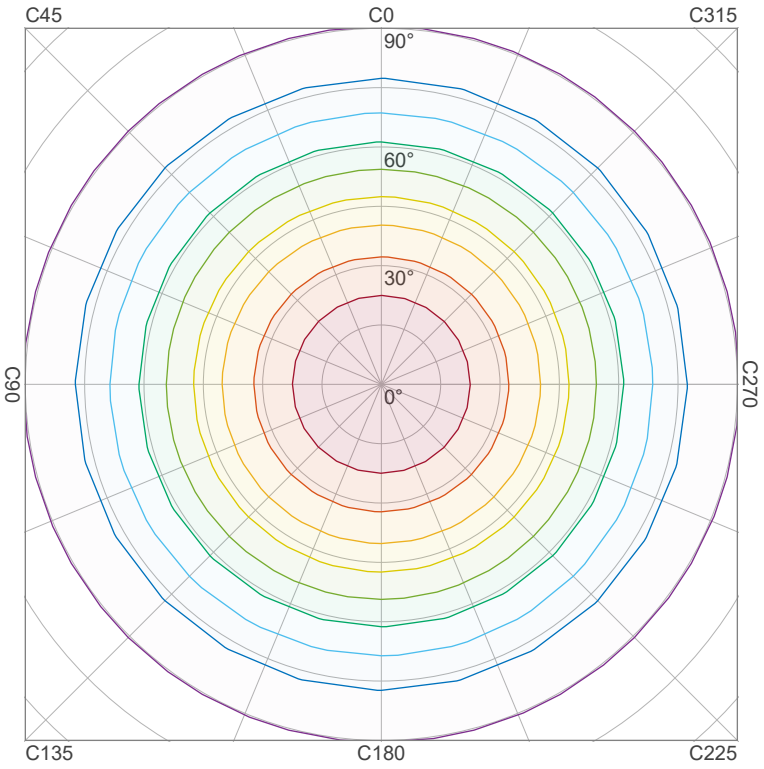
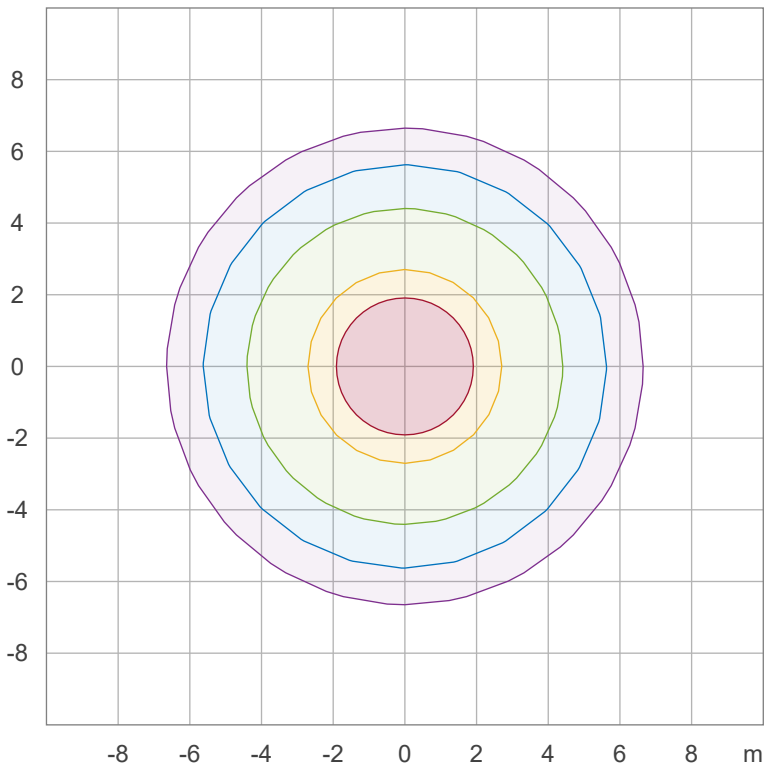
Iso-intensity Diagram (Iso-candela)



	90 %	2220,7 cd
	80 %	1974,0 cd
	70 %	1727,2 cd
	60 %	1480,5 cd
	50 %	1233,7 cd
	40 %	987,0 cd
	30 %	740,2 cd
	20 %	493,5 cd
	10 %	246,7 cd

Peak intensity: 2467,5 cd
Number of c-planes: 12

Iso-illuminance Diagram (Iso-lux)



	50,0 %	137,1 lx
	30,0 %	82,2 lx
	10,0 %	27,4 lx
	5,0 %	13,7 lx
	3,0 %	8,2 lx

Peak illuminance: 274,2 lx
Mounting height: 3,0 m
Number of c-planes: 12

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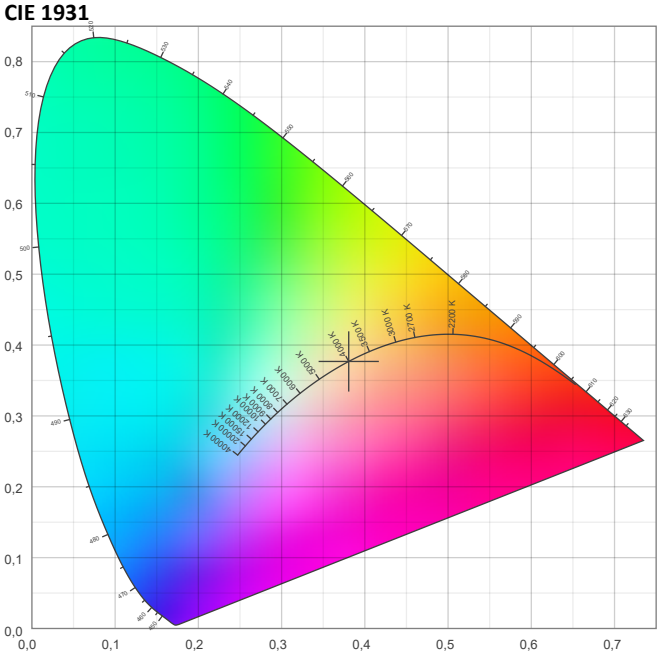
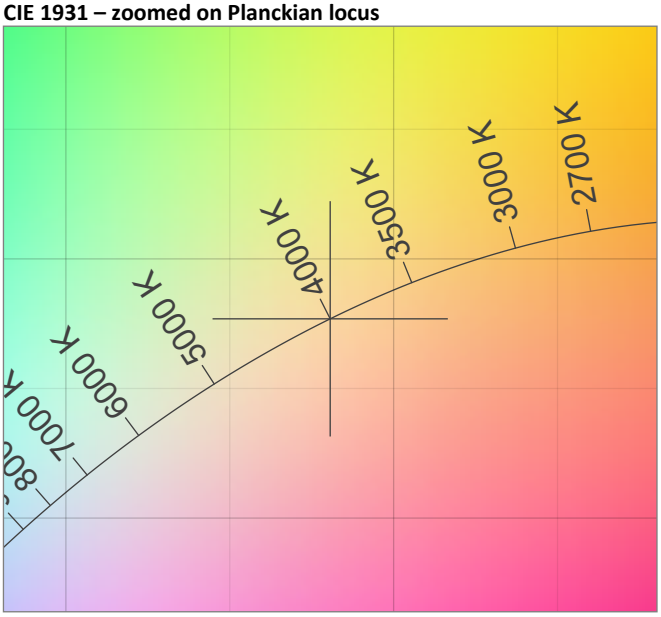
Color details

Correlated Color Temperature, Target	CCT = 4000 K
Correlated Color Temperature, Measured	CCT = 4156 K
Color Rendering Index	CRI 86,6
Color Rendering Index, R9 (red component)	R9 = 25,5
Color Rendering TM30-18	R_f 85,0 – R_g 98,0
Color Quality Scale	CQS = 83,5
MacAdam Steps	SDCM = 5,4
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 = -0,0050
Color coordinate CIEs 1976 (CIELUV)	(u';v') = (0,225;0,502)

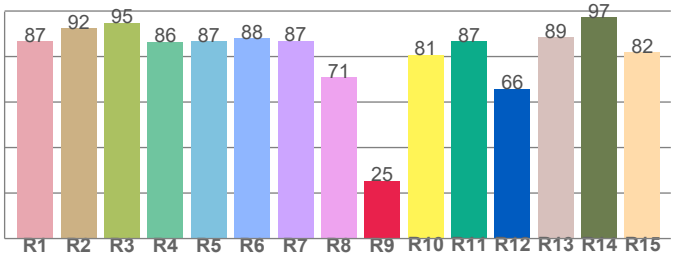
CIE 1931



CIE 1931 – zoomed on Planckian locus



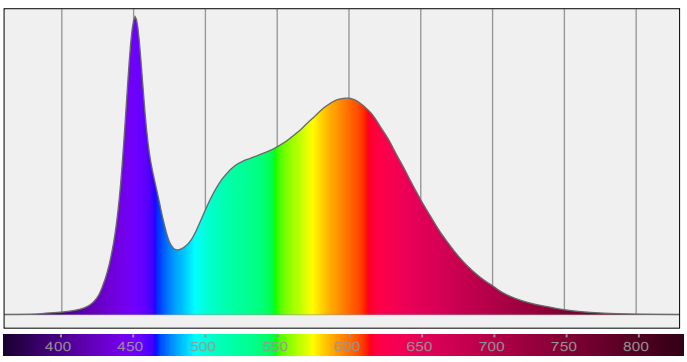
Color Rendering Index per reference color (CIE 1995)



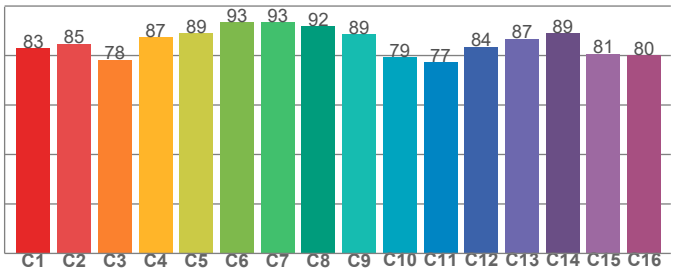
CRI R values, only R1-R8 are used to calculate final CRI value

R1	R2	R3	R4	R5	R6	R7	R8	R9	R10	R11	R12	R13	R14	R15
86,7	92,3	94,8	86,5	86,6	87,9	87,0	70,8	25,5	80,8	86,6	65,8	88,5	97,3	81,8

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



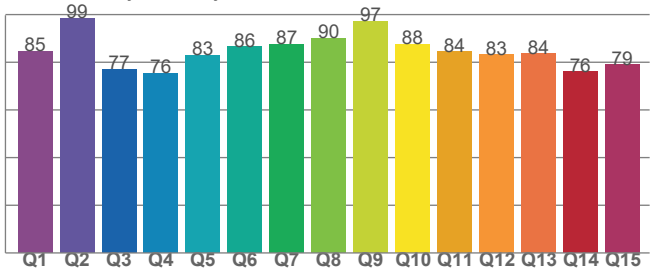
TM30-18 Rf-values per hue bin



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
83,0	84,8	78,3	87,3	89,1	93,4	93,5	91,7	88,7	79,4	77,3	83,6	86,8	89,0	80,7	80,1

Color Quality Scale by reference color



CQS Q values

Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10	Q11	Q12	Q13	Q14	Q15
84,5	98,6	77,0	75,5	82,9	86,5	87,5	90,1	97,3	87,6	84,4	83,1	83,6	76,0	79,1

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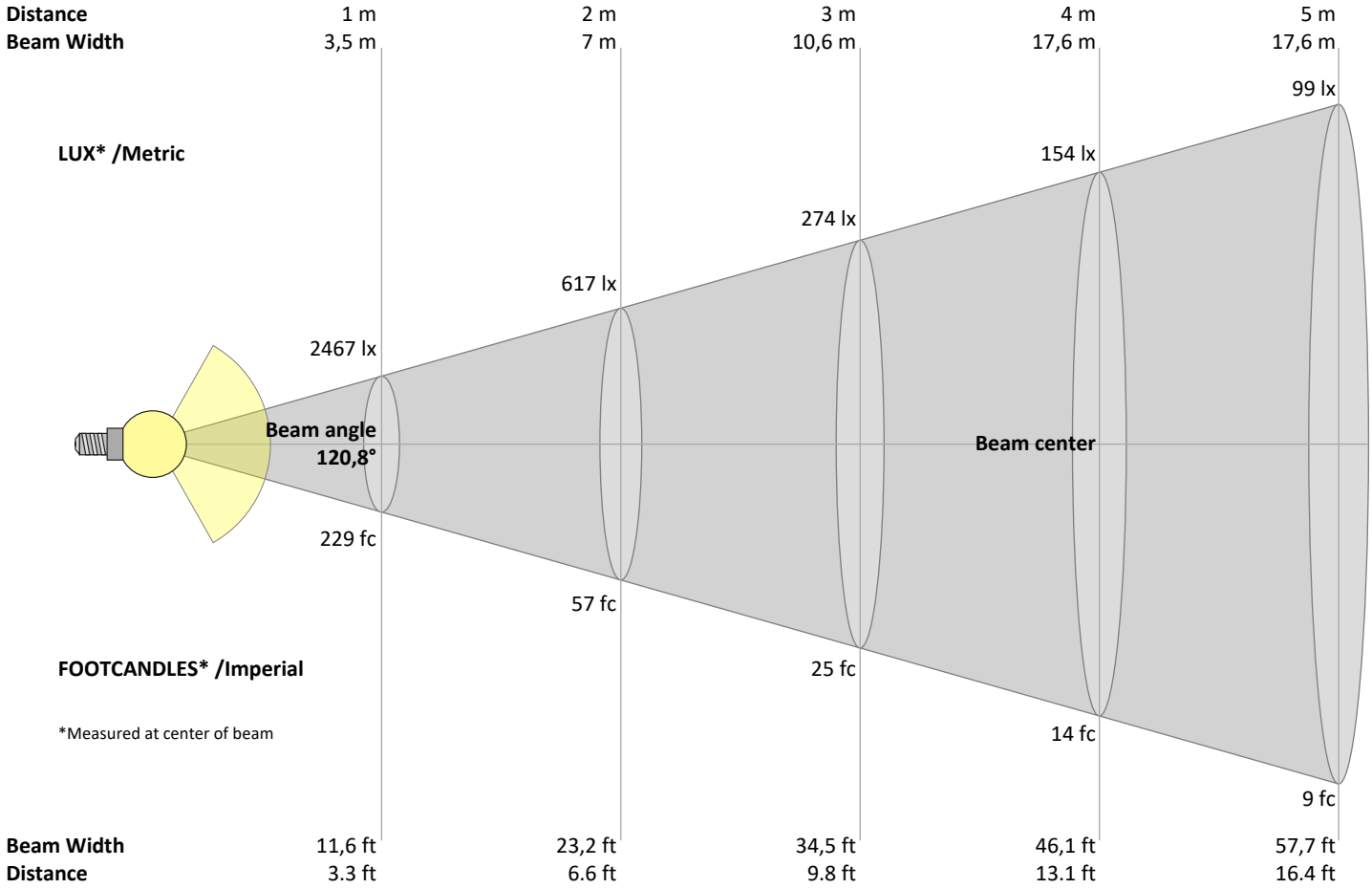
Beam Details



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
2467	617	274	154	99	69	50	39	30	25	20	17	15	13	11	10	9	8	7	6	lux
229,2	57,3	25,5	14,3	9,2	6,4	4,7	3,6	2,8	2,3	1,9	1,6	1,4	1,2	1	0,9	0,8	0,7	0,6	0,6	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
2467	2441	2339	2179	1969	1719	1440	1150	865	611	410	266	162	89	45	23	21	20	19	18	cd
100%	99%	95%	88%	80%	70%	58%	47%	35%	25%	17%	11%	7%	4%	2%	1%	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
2467	2441	2339	2179	1969	1719	1440	1150	865	611	410	266	162	89	45	23	21	20	19	18	cd
100%	99%	95%	88%	80%	70%	58%	47%	35%	25%	17%	11%	7%	4%	2%	1%	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
2467	2441	2339	2179	1969	1719	1440	1150	865	611	410	266	162	89	45	23	21	20	19	18	cd
100%	99%	95%	88%	80%	70%	58%	47%	35%	25%	17%	11%	7%	4%	2%	1%	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
2467	2441	2339	2179	1969	1719	1440	1150	865	611	410	266	162	89	45	23	21	20	19	18	cd
100%	99%	95%	88%	80%	70%	58%	47%	35%	25%	17%	11%	7%	4%	2%	1%	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	22,0	23,2	22,3	23,6	24,0	22,5	23,7	22,9	24,1	24,5
	3H	23,7	24,9	24,2	25,3	25,7	24,4	25,7	24,9	26,1	26,5
	4H	24,5	25,7	25,1	26,2	26,6	25,5	26,6	26,0	27,1	27,5
	6H	25,4	26,5	25,8	26,9	27,4	26,6	27,6	27,0	28,1	28,6
	8H	25,8	26,8	26,2	27,3	27,8	27,1	28,2	27,6	28,6	29,2
	12H	26,1	27,2	26,6	27,6	28,2	27,7	28,8	28,2	29,2	29,8
4H	2H	22,7	23,9	23,2	24,3	24,7	23,1	24,2	23,6	24,7	25,1
	3H	24,7	25,7	25,2	26,2	26,8	25,3	26,4	25,8	26,8	27,4
	4H	25,6	26,7	26,2	27,1	27,8	26,4	27,5	27,0	27,9	28,6
	6H	26,6	27,5	27,2	28,0	28,5	27,7	28,6	28,3	29,0	29,6
	8H	27,1	27,9	27,7	28,4	28,9	28,3	29,1	28,9	29,6	30,2
	12H	27,5	28,2	28,1	28,8	29,4	29,0	29,7	29,6	30,3	30,9
8H	4H	26,1	26,9	26,7	27,4	28,0	26,8	27,6	27,4	28,1	28,6
	6H	27,3	27,9	27,9	28,5	29,2	28,2	28,9	28,8	29,5	30,1
	8H	27,9	28,5	28,5	29,1	29,9	29,0	29,6	29,7	30,2	31,0
	12H	28,5	29,0	29,2	29,6	30,4	29,9	30,4	30,6	31,0	31,8
12H	4H	26,2	26,9	26,8	27,4	28,1	26,8	27,5	27,4	28,1	28,7
	6H	27,5	28,1	28,1	28,7	29,5	28,4	28,9	29,0	29,6	30,3
	8H	28,2	28,7	28,9	29,3	30,0	29,2	29,7	29,9	30,3	31,1

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

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	100	100	100	94	94	94	92
1	105	99	94	89	101	96	91	87	90	86	82	84	81	78	79	77	75	72
2	94	85	77	71	91	82	75	69	77	71	66	73	68	64	68	64	61	58
3	85	74	65	58	82	72	64	57	67	61	55	64	58	53	60	55	51	48
4	78	65	56	49	75	63	55	48	60	52	46	56	50	45	53	48	43	41
5	72	58	49	42	69	56	48	41	53	46	40	50	44	38	48	42	37	35
6	66	52	43	36	63	51	42	36	48	40	35	45	39	34	43	37	33	30
7	61	47	38	32	59	46	37	31	43	36	30	41	35	30	39	33	29	27
8	57	43	34	28	55	42	34	28	40	32	27	38	31	26	36	30	26	24
9	53	39	31	25	51	38	30	25	37	29	24	35	28	24	33	27	23	21
10	50	36	28	23	48	35	28	22	34	27	22	32	26	21	31	25	21	19

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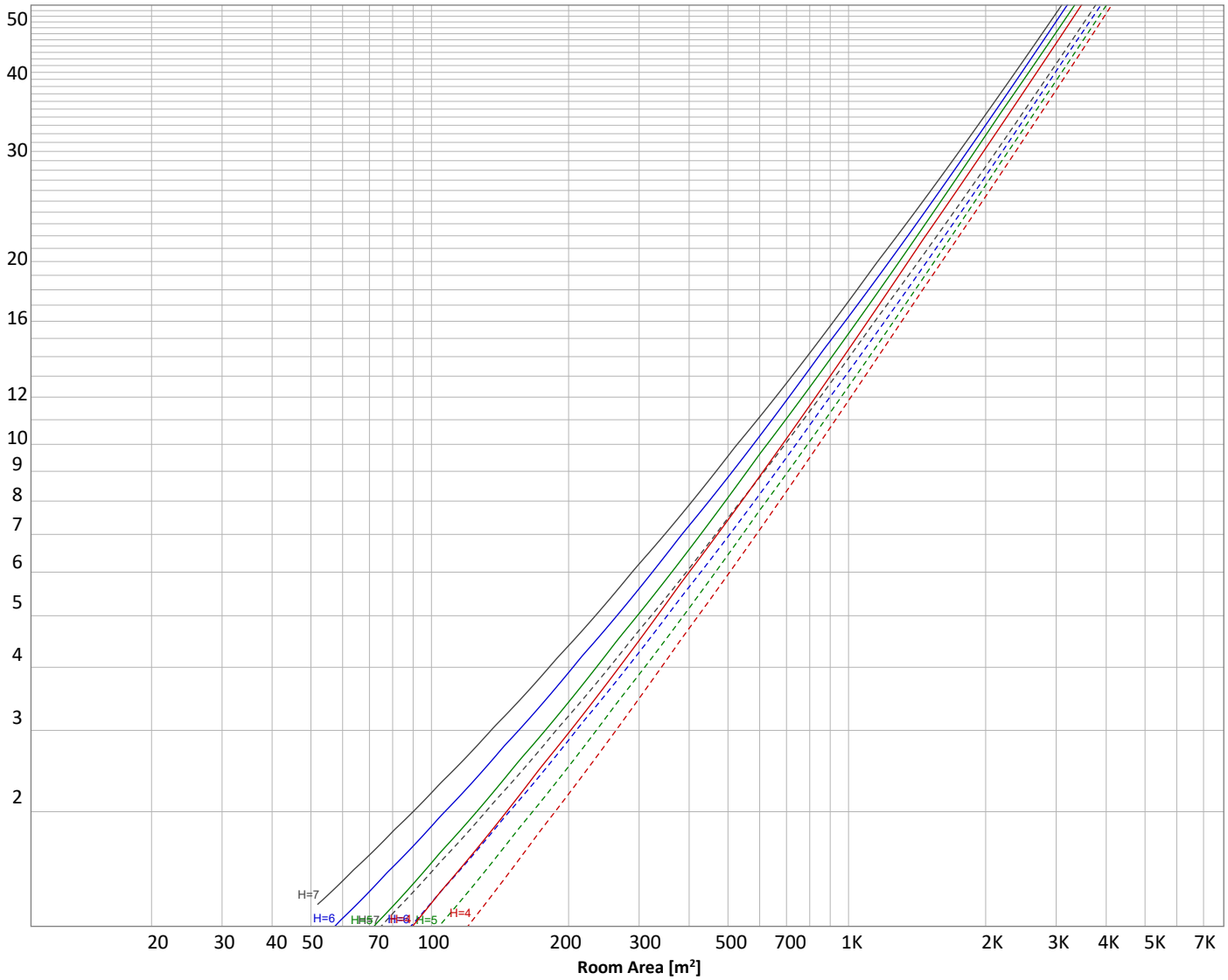
Luminaire budgetary diagram

Uncorrected, comprehensive UGR table according to 117-1995

LAMPS (number of lamps)



Conditions

H = Room height	Flux = 8983 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°
234 lm	672 lm	1023 lm	1248 lm	1326 lm	1260 lm	1075 lm	821 lm	563 lm

90°-100°	100°-110°	110°-120°	120°-130°	130°-140°	140°-150°	150°-160°	160°-170°	170°-180°
357 lm	207 lm	104 lm	44,5 lm	19,1 lm	12,9 lm	9,00 lm	5,29 lm	1,75 lm

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Outdoor Light Planning

Lumen per Zone

Zone (γ)	Lumen		% Total
0-10°	{LUM00-10}	lm	#VALUE!
10-20°	{LUM10-20}	lm	#VALUE!
20-30°	{LUM20-30}	lm	#VALUE!
30-40°	{LUM30-40}	lm	#VALUE!
40-50°	{LUM40-50}	lm	#VALUE!
50-60°	{LUM50-60}	lm	#VALUE!
60-70°	{LUM60-70}	lm	#VALUE!
70-80°	{LUM70-80}	lm	#VALUE!
80-90°	{LUM80-90}	lm	#VALUE!
90-100°	{LUM90-100}	lm	#VALUE!
100-110°	{LUM100-110}	lm	#VALUE!
110-120°	{LUM110-120}	lm	#VALUE!
120-130°	{LUM120-130}	lm	#VALUE!
130-140°	{LUM130-140}	lm	#VALUE!
140-150°	{LUM140-150}	lm	#VALUE!
150-160°	{LUM150-160}	lm	#VALUE!
160-170°	{LUM160-170}	lm	#VALUE!
170-180°	{LUM170-180}	lm	#VALUE!
Total	0	lm	#VALUE!

Zonal Lumen summary

Zone (γ)	Lumen		% Total
0-30°	{LUM00-30}	lm	#VALUE!
0-40°	{LUM00-40}	lm	#VALUE!
0-60°	{LUM00-60}	lm	#VALUE!
60-90°	{LUM60-90}	lm	#VALUE!
70-100°	{LUM70-100}	lm	#VALUE!
90-120°	{LUM90-120}	lm	#VALUE!
0-90°	{LUM00-90}	lm	#VALUE!
90-180°	{LUM90-180}	lm	#VALUE!
0-180°	{LUM00-180}	lm	#VALUE!

Intensity peaks

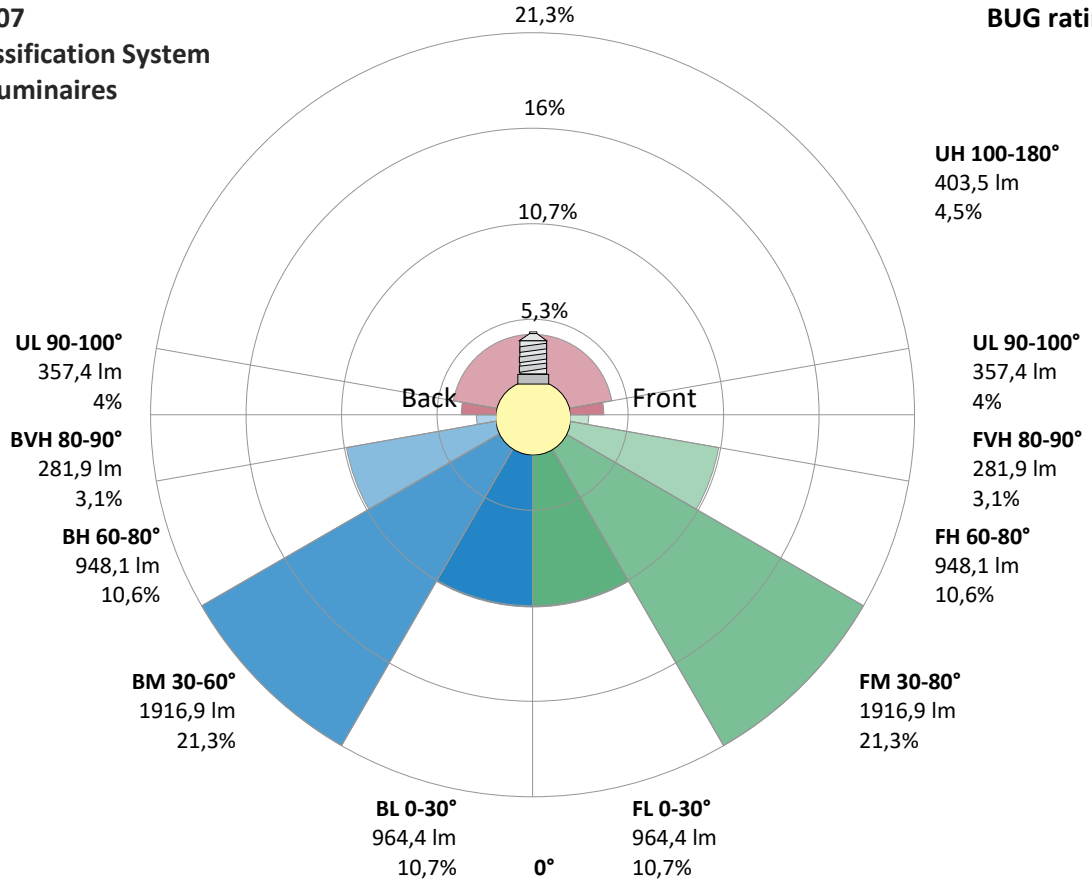
Max intensity	{PEAK}	cd
Intensity, 90°	{INT90}	cd
Intensity, 0°	{INT0}	cd

BUG rating

	Lumen		% Total
Forward light			
Low(0-30°)	{BUG0}	lm	#VALUE!
Medium(30-60°)	{BUG1}	lm	#VALUE!
High(60-80°)	{BUG2}	lm	#VALUE!
Very high(80-90°)	{BUG3}	lm	#VALUE!
Back light			
Low(0-30°)	{BUG4}	lm	#VALUE!
Medium(30-60°)	{BUG5}	lm	#VALUE!
High(60-80°)	{BUG6}	lm	#VALUE!
Very high(80-90°)	{BUG7}	lm	#VALUE!
Uplight			
Low(90-100°)	{BUG8}	lm	#VALUE!
High(100-180°)	{BUG9}	lm	#VALUE!

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

BUG rating B2 U3 G3



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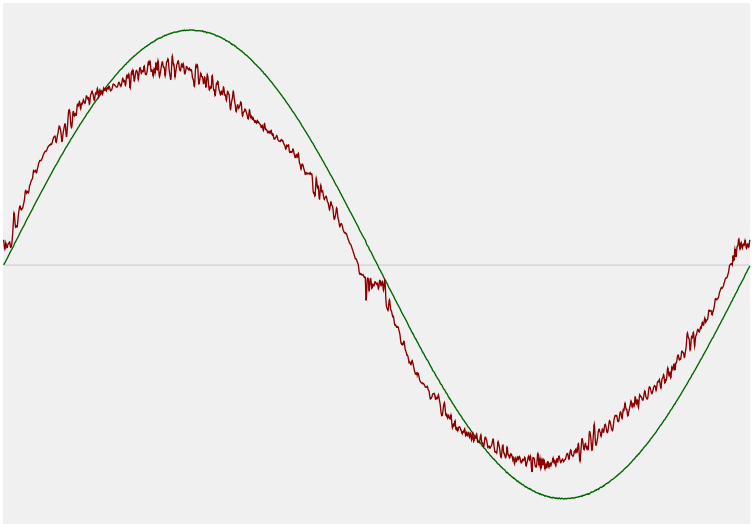
Power Details

Input Power

Power feed to light source	57,1 W
Frequency of input power	50 Hz
RMS Input voltage feed, V_{RMS}	230 V
RMS Input current feed, I_{RMS}	0,252 A
Volt-Ampere or apparent power = V_{RMS}*I_{RMS}	58,02 VA
Displacement factor of AC power feed	0,99
Power factor of AC current feed	0,98
Total harmonic distortion of the current	6,17%
Total harmonic distortion of the voltage	0,05%

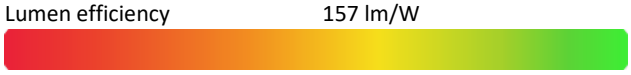
Input Power Curve



Efficiency

Radiated power efficiency 49,5%

Lumen efficiency 157 lm/W



Stabilization Details

Warmup Conditions

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

Color Temperature Change

CCT start	3988 K
CCT shift	+12 K
CCT end	4000 K

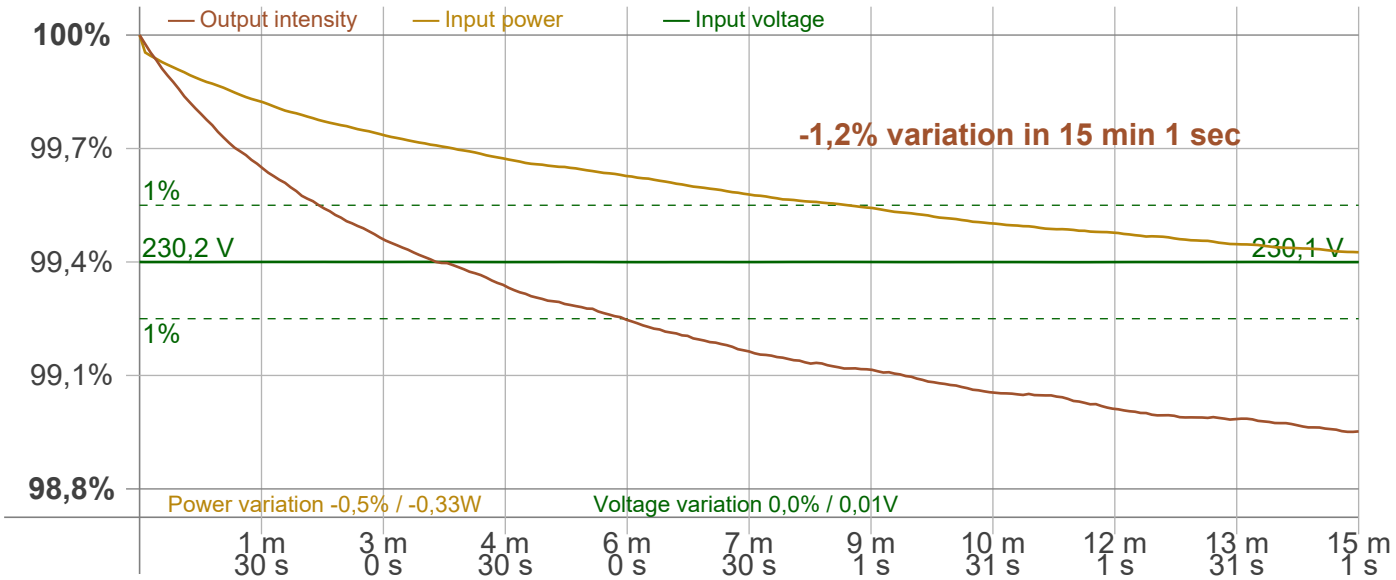
Warmup Result

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

Output Change

Output start	9085 lm
Output change	-101 lm
Output end	8983 lm

Stabilization Curve



Light Measurement Report

Print date: 5-11-2025
Measurement date and time: 5-11-2025 14:26:23 – Measurement no. VFR-251105-3934-MS
Measurement tracking No. and Link: VT251105-007926
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	101,01 Hz
Percent Flicker	0,71 %
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

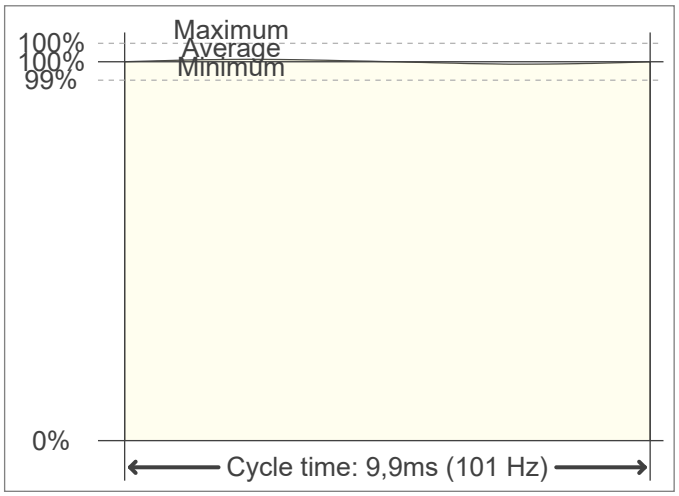
Flicker indices according to California Energy Commission (CEC) 2016b

JA8/10 40 Hz	0,01 %
JA8/10 90 Hz	0,04 %
JA8/10 200 Hz	0,68 %
JA8/10 400 Hz	0,7 %
JA8/10 1000 Hz	0,71 %

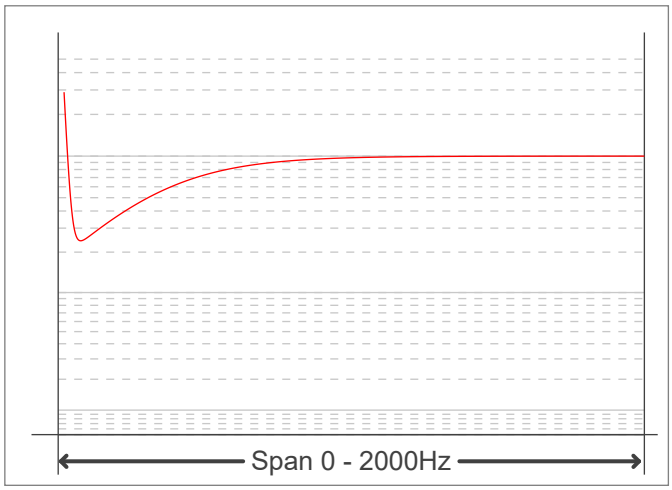
Flicker indices according to Lighting Research Center (2015)

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