Light Measurement Report

Print date: 22-1-2025
Measurement date and time: 22-1-2025 10:11:13 – Measurement no. VFR-250122-3044-MS
Measurement tracking No. and Link: VT250122-005171
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

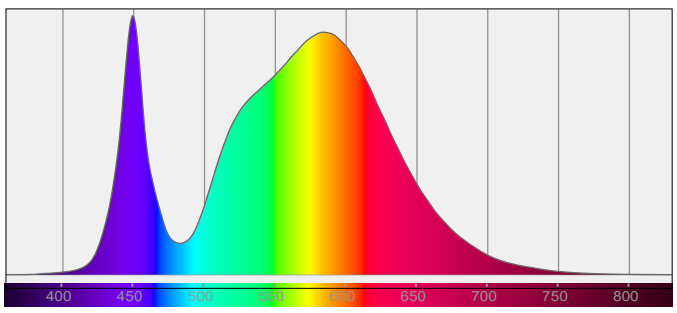
Number of C-planes and Resolution	12 planes – 30°
γ (gamma)-Resolution	5°
Test Distance	3,32 m
Input Power, Power and Displ. Factors	101,1 W – PF 0,97 – DPF 0,97
Input RMS Voltage and Current	230 V – 0,454 A
Frequency of Input Power	50 Hz
Warm-up Time and Variation	Lamp stabilized in 15 min 2 sec – 2,0%

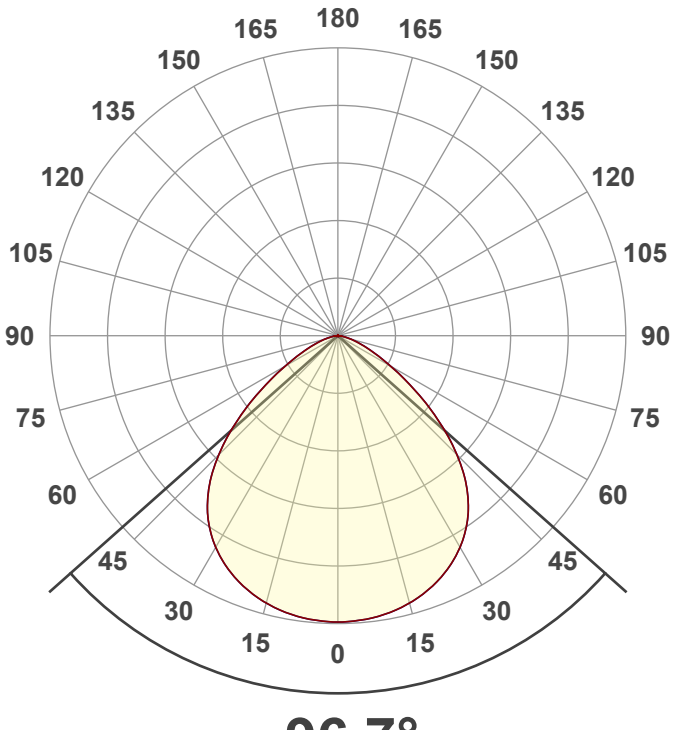
Tested Light Source

Product Name	274396-4000K
Item No. and Manufacturer	274396-4000K – Dutchfulfillment
Product Description (line 1)	LED HIGHBAY | ALBIOR | 100 WATT | 90° | DIMBAAR | MET DAGLICHT- EN
BEWEGINGSSENSOR	

Main Light Measurement Results

Output – Total Lumen (Up% / Down%)	15884 lm – 0,15% / 99,85%
Efficiency	157 lm/W
Peak Intensity and Beam Angle	7148 cd – 96,7°
Correlated Color Temperature, Target/Measured	CCT = 4000 K / 4011 K
Color Rendering Index	CRI 71,3
Color Rendering TM30-18	R_f 74,7 – R_g 92,9
Color Shift, CIE duv and MacAdam Steps	Duv 0,0044 – SDCM 3,6
Flicker	SVM 0 – PstLM 0,01





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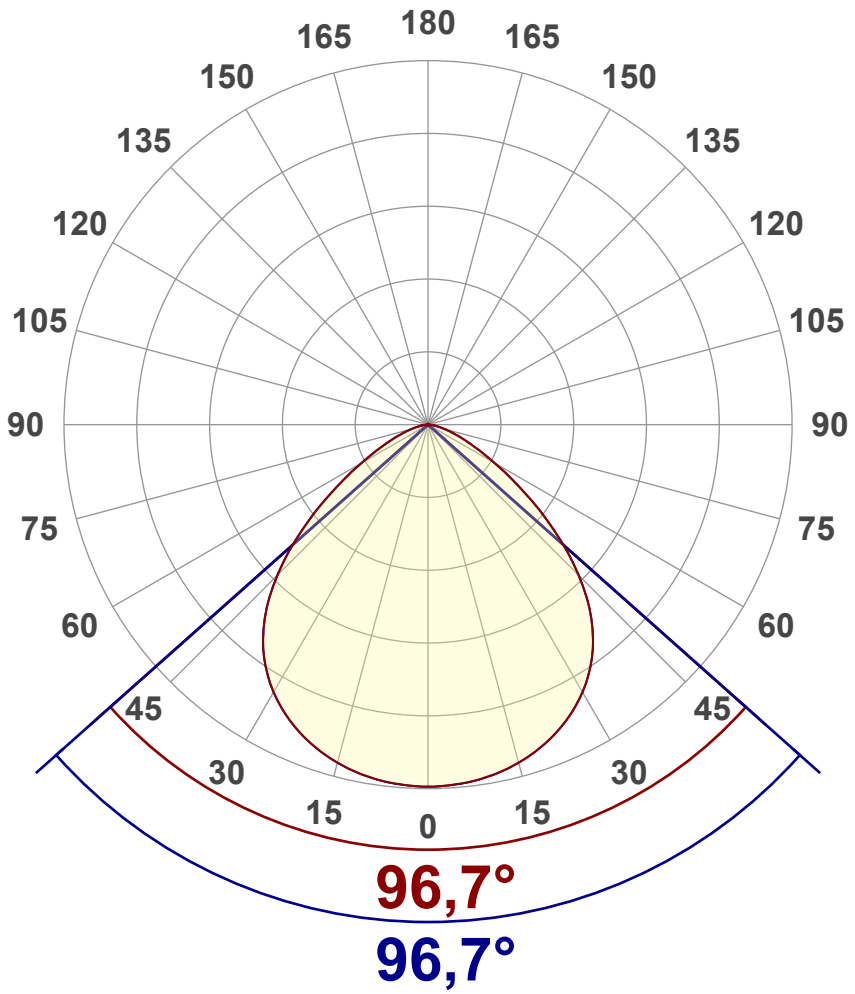
Luminous Intensity diagram Unit: 0-100% of peak intensity



Main Values

Output (total Lumen)	15884 lm
Lumen Up% / Down%	0,15% / 99,85%
Peak Intensity	7148 cd
Beam Angle (50%)	96,7°
Beam Angle (90%)	96,7°
Beam Angle (10%)	96,7°

Cut-off Angle

Average 2,5%	159,8°

Field Angle

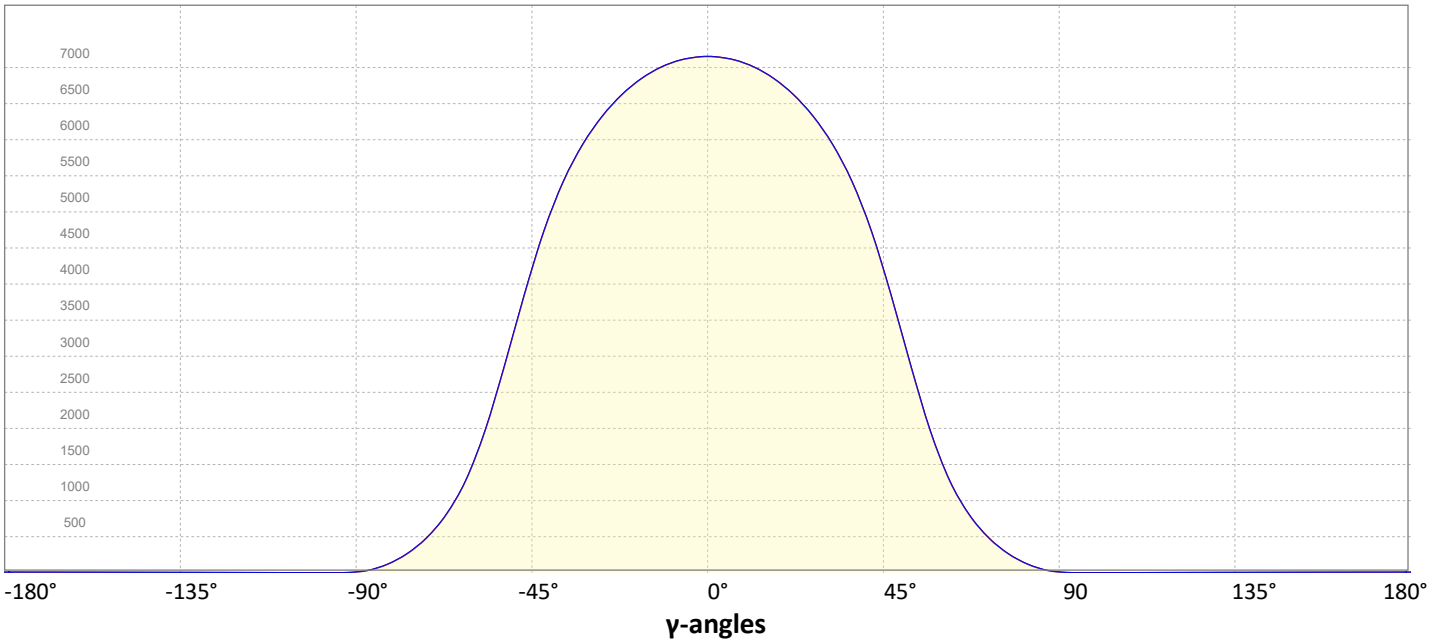
Average 10%	136,7°

Intensity Ratio

In 120° cone	90,8%
In 90° cone	68,2%

C000-C180
C090-C270

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



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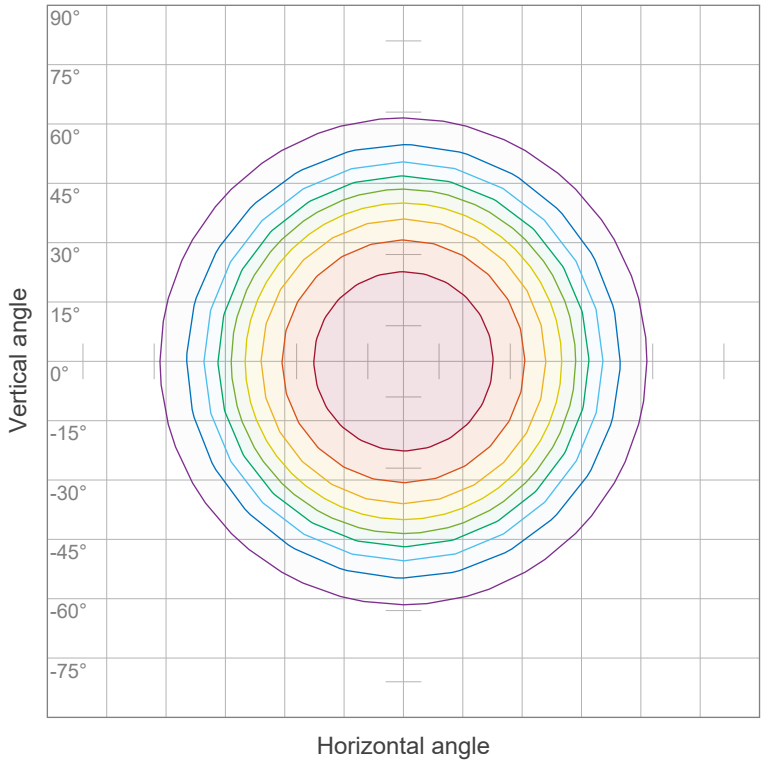
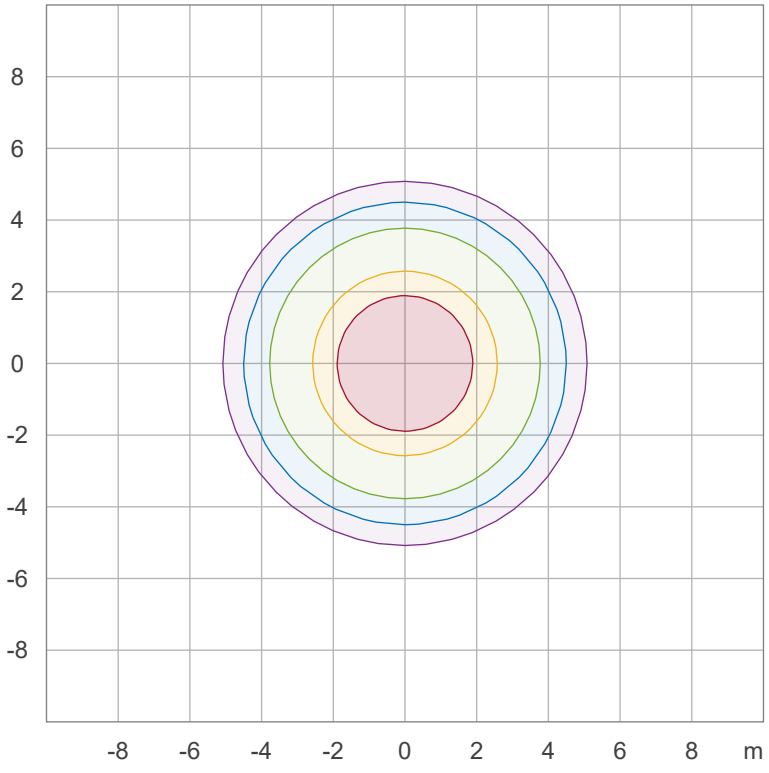
Iso-intensity Diagram (Iso-candela)



90 %	6433,6 cd
80 %	5718,8 cd
70 %	5003,9 cd
60 %	4289,1 cd
50 %	3574,2 cd
40 %	2859,4 cd
30 %	2144,5 cd
20 %	1429,7 cd
10 %	714,8 cd

Peak intensity: 7148,5 cd
Number of c-planes: 12

Iso-illuminance Diagram (Iso-lux)



50,0 %	397,1 lx
30,0 %	238,3 lx
10,0 %	79,4 lx
5,0 %	39,7 lx
3,0 %	23,8 lx

Peak illuminance: 794,3 lx
Mounting height: 3,0 m
Number of c-planes: 12

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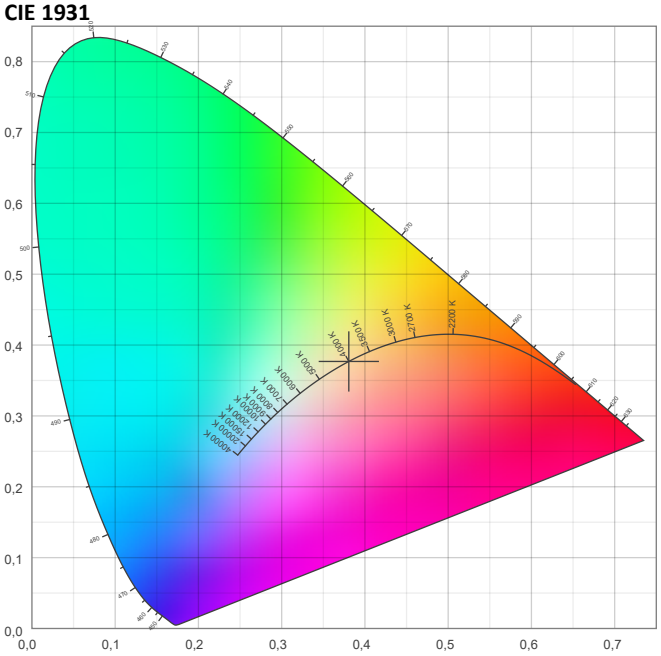
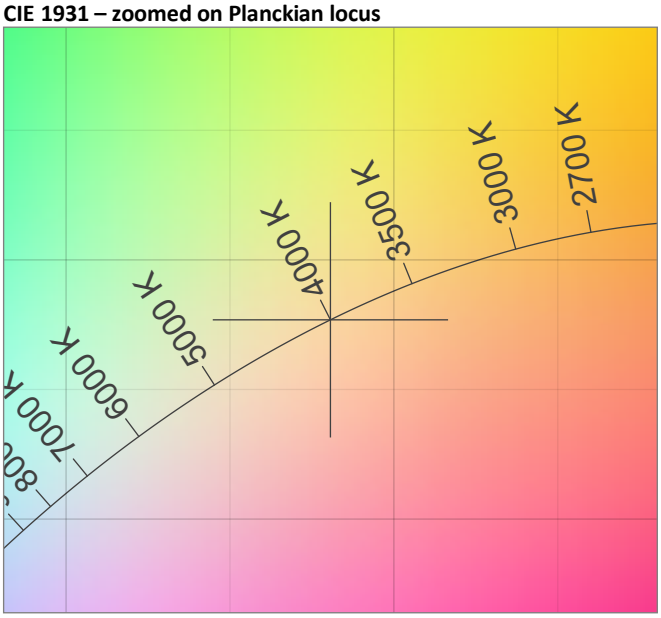
Color details

Correlated Color Temperature, Target	CCT = 4000 K
Correlated Color Temperature, Measured	CCT = 4011 K
Color Rendering Index	CRI 71,3
Color Rendering Index, R9 (red component)	R9 = -38,7
Color Rendering TM30-18	R_f 74,7 – R_g 92,9
Color Quality Scale	CQS = 71,9
MacAdam Steps	SDCM = 3,6
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 = 0,0044
Color coordinate CIEs 1976 (CIELUV)	(u';v') = (0,225;0,502)

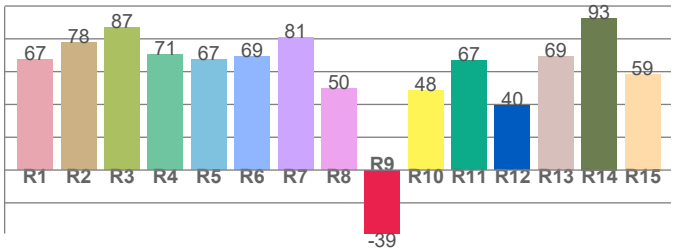
CIE 1931



CIE 1931 – zoomed on Planckian locus



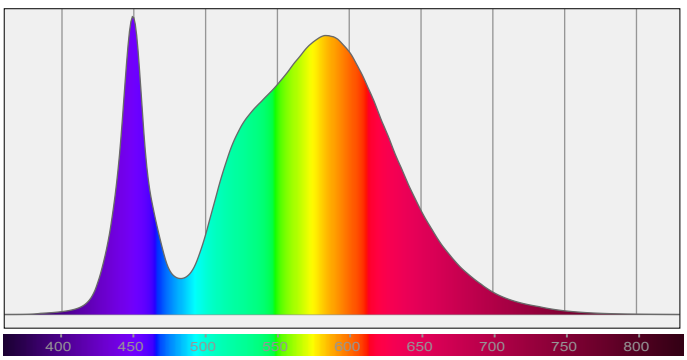
Color Rendering Index per reference color (CIE 1995)



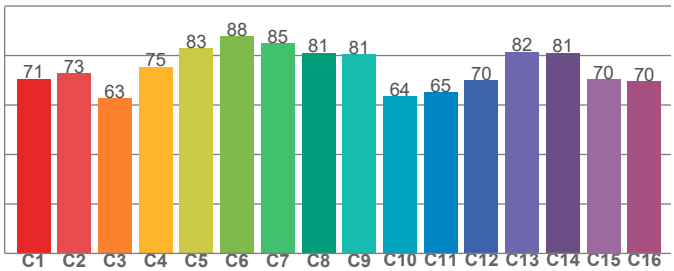
CRI R values, only R1-R8 are used to calculate final CRI value

R1	R2	R3	R4	R5	R6	R7	R8	R9	R10	R11	R12	R13	R14	R15
67,5	78,0	87,1	70,7	67,1	69,3	80,9	49,7	-38,7	48,5	66,6	39,6	69,3	92,7	58,5

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



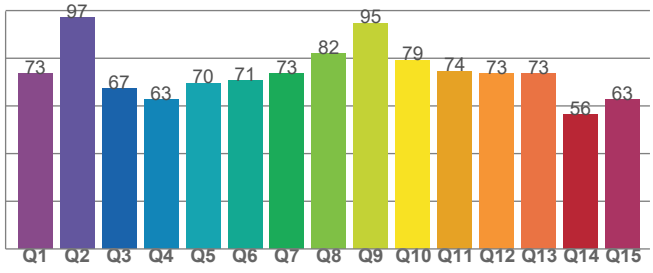
TM30-18 Rf-values per hue bin



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
70,7	72,9	62,6	75,5	82,9	87,8	85,1	81,1	80,6	63,6	65,1	69,9	81,5	81,1	70,3	69,7

Color Quality Scale by reference color



CQS Q values

Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10	Q11	Q12	Q13	Q14	Q15
73,4	97,1	67,3	62,7	69,6	70,7	73,5	82,0	94,6	79,1	74,5	73,5	73,5	56,3	62,6

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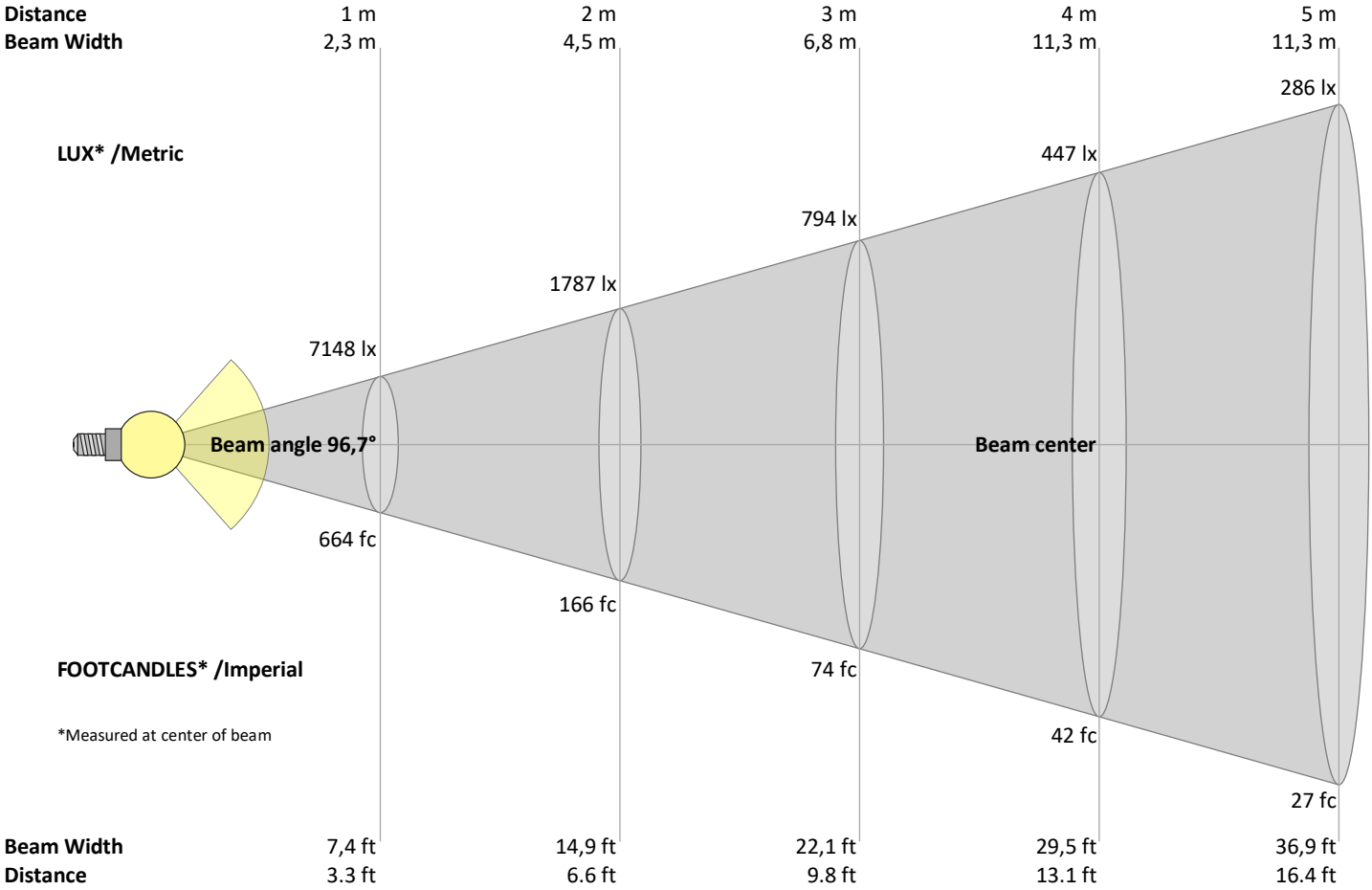
Beam Details



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
7148	1787	794	447	286	199	146	112	88	71	59	50	42	36	32	28	25	22	20	18	lux
664,1	166	73,8	41,5	26,6	18,4	13,6	10,4	8,2	6,6	5,5	4,6	3,9	3,4	3	2,6	2,3	2	1,8	1,7	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
7148	7121	7043	6908	6711	6443	6090	5623	4999	4193	3258	2328	1550	990	610	350	175	66	15	2	cd
100%	100%	99%	97%	94%	90%	85%	79%	70%	59%	46%	33%	22%	14%	9%	5%	2%	1%	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
7148	7121	7043	6908	6711	6443	6090	5623	4999	4193	3258	2328	1550	990	610	350	175	66	15	2	cd
100%	100%	99%	97%	94%	90%	85%	79%	70%	59%	46%	33%	22%	14%	9%	5%	2%	1%	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
7148	7121	7043	6908	6711	6443	6090	5623	4999	4193	3258	2328	1550	990	610	350	175	66	15	2	cd
100%	100%	99%	97%	94%	90%	85%	79%	70%	59%	46%	33%	22%	14%	9%	5%	2%	1%	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
7148	7121	7043	6908	6711	6443	6090	5623	4999	4193	3258	2328	1550	990	610	350	175	66	15	2	cd
100%	100%	99%	97%	94%	90%	85%	79%	70%	59%	46%	33%	22%	14%	9%	5%	2%	1%	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	29,5	30,6	29,7	30,9	31,1	29,5	30,6	29,7	30,9	31,1
	3H	29,8	30,9	30,2	31,2	31,4	29,8	30,9	30,2	31,2	31,4
	4H	29,9	30,9	30,3	31,2	31,5	29,9	30,9	30,3	31,2	31,5
	6H	30,0	30,9	30,3	31,2	31,5	30,0	30,9	30,3	31,2	31,5
	8H	30,0	30,8	30,3	31,1	31,6	30,0	30,8	30,3	31,1	31,6
	12H	29,9	30,8	30,3	31,1	31,6	29,9	30,8	30,3	31,1	31,6
4H	2H	29,6	30,7	30,1	31,0	31,2	29,6	30,7	30,1	31,0	31,2
	3H	30,2	31,0	30,5	31,4	31,8	30,2	31,0	30,5	31,4	31,8
	4H	30,3	31,0	30,7	31,5	32,0	30,3	31,0	30,7	31,5	32,0
	6H	30,3	31,1	30,8	31,4	31,8	30,3	31,1	30,8	31,4	31,8
	8H	30,3	31,0	30,8	31,4	31,7	30,3	31,0	30,8	31,4	31,7
	12H	30,3	30,9	30,8	31,3	31,8	30,3	30,9	30,8	31,3	31,8
8H	4H	30,3	30,9	30,8	31,3	31,7	30,3	30,9	30,8	31,3	31,7
	6H	30,4	30,9	30,9	31,4	31,9	30,4	30,9	30,9	31,4	31,9
	8H	30,4	30,9	31,0	31,4	32,0	30,4	30,9	31,0	31,4	32,0
	12H	30,4	30,8	31,0	31,3	31,9	30,4	30,8	31,0	31,3	31,9
12H	4H	30,2	30,8	30,7	31,2	31,7	30,2	30,8	30,7	31,2	31,7
	6H	30,4	30,8	30,9	31,3	32,0	30,4	30,8	30,9	31,3	32,0
	8H	30,4	30,8	31,0	31,3	31,9	30,4	30,8	31,0	31,3	31,9

Variations with the observer position for the luminaire spacings, S:		
S = 1.0H	0,4 / -0,6	0,4 / -0,6
S = 1.5H	1,0 / -1,7	1,0 / -1,7
S = 2.0H	2,2 / -3,0	2,2 / -3,0

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	103	100	108	105	102	99	101	98	96	97	95	93	93	91	90	88
2	102	95	90	85	100	94	88	84	90	86	82	87	83	80	84	81	78	76
3	94	85	78	73	92	84	77	72	81	75	71	78	74	70	76	72	69	67
4	87	77	69	63	85	75	68	63	73	67	62	71	65	61	69	64	60	58
5	81	69	61	55	79	68	61	55	66	60	54	64	58	54	63	57	53	51
6	75	63	55	49	73	62	54	49	60	53	48	59	53	48	57	52	48	46
7	70	57	49	44	68	57	49	44	55	48	43	54	48	43	52	47	43	41
8	65	53	45	39	64	52	44	39	51	44	39	49	43	39	48	43	39	37
9	61	48	41	36	60	48	41	36	47	40	35	46	40	35	45	39	35	33
10	57	45	37	32	56	44	37	32	43	37	32	42	36	32	42	36	32	30

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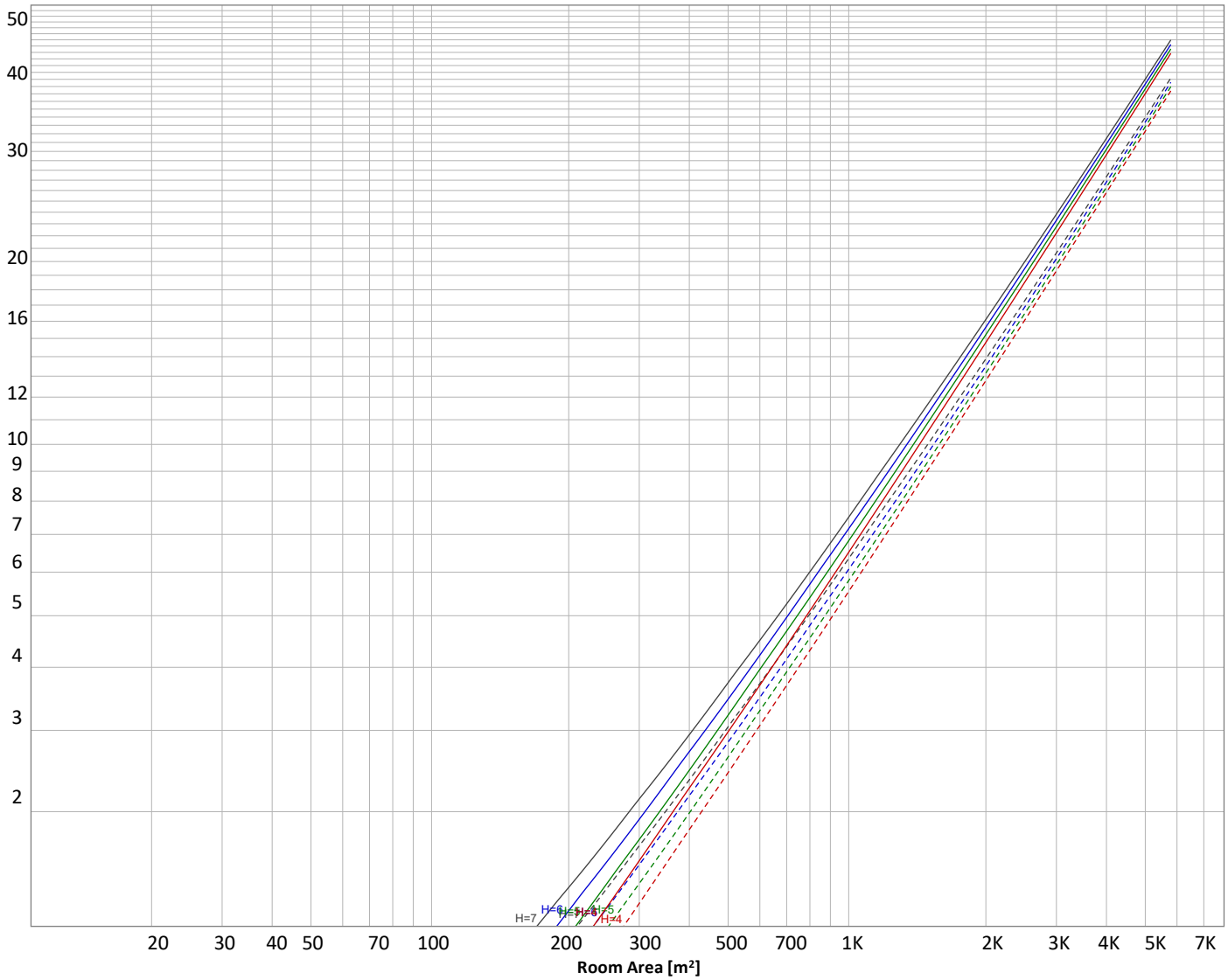
Luminaire budgetary diagram

Uncorrected, comprehensive UGR table according to 117-1995

LAMPS (number of lamps)



Conditions

H = Room height	Flux = 15884 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°
678 lm	1953 lm	2972 lm	3513 lm	3225 lm	2085 lm	985 lm	373 lm	75,7 lm

90°-100°	100°-110°	110°-120°	120°-130°	130°-140°	140°-150°	150°-160°	160°-170°	170°-180°
2,24 lm	1,23 lm	2,39 lm	3,44 lm	3,99 lm	3,84 lm	3,28 lm	2,23 lm	0,801 lm

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Outdoor Light Planning

Lumen per Zone

Zone (γ)	Lumen	% Total
0-10°	678 lm	4,3%
10-20°	1953 lm	12,3%
20-30°	2972 lm	18,7%
30-40°	3513 lm	22,1%
40-50°	3225 lm	20,3%
50-60°	2085 lm	13,1%
60-70°	985 lm	6,2%
70-80°	373 lm	2,4%
80-90°	76 lm	0,5%
90-100°	2 lm	0,0%
100-110°	1 lm	0,0%
110-120°	2 lm	0,0%
120-130°	3 lm	0,0%
130-140°	4 lm	0,0%
140-150°	4 lm	0,0%
150-160°	3 lm	0,0%
160-170°	2 lm	0,0%
170-180°	1 lm	0,0%
Total	15884 lm	100,0%

Intensity peaks

Max intensity	7148 cd
Intensity, 90°	15 cd
Intensity, 0°	7148 cd

Zonal Lumen summary

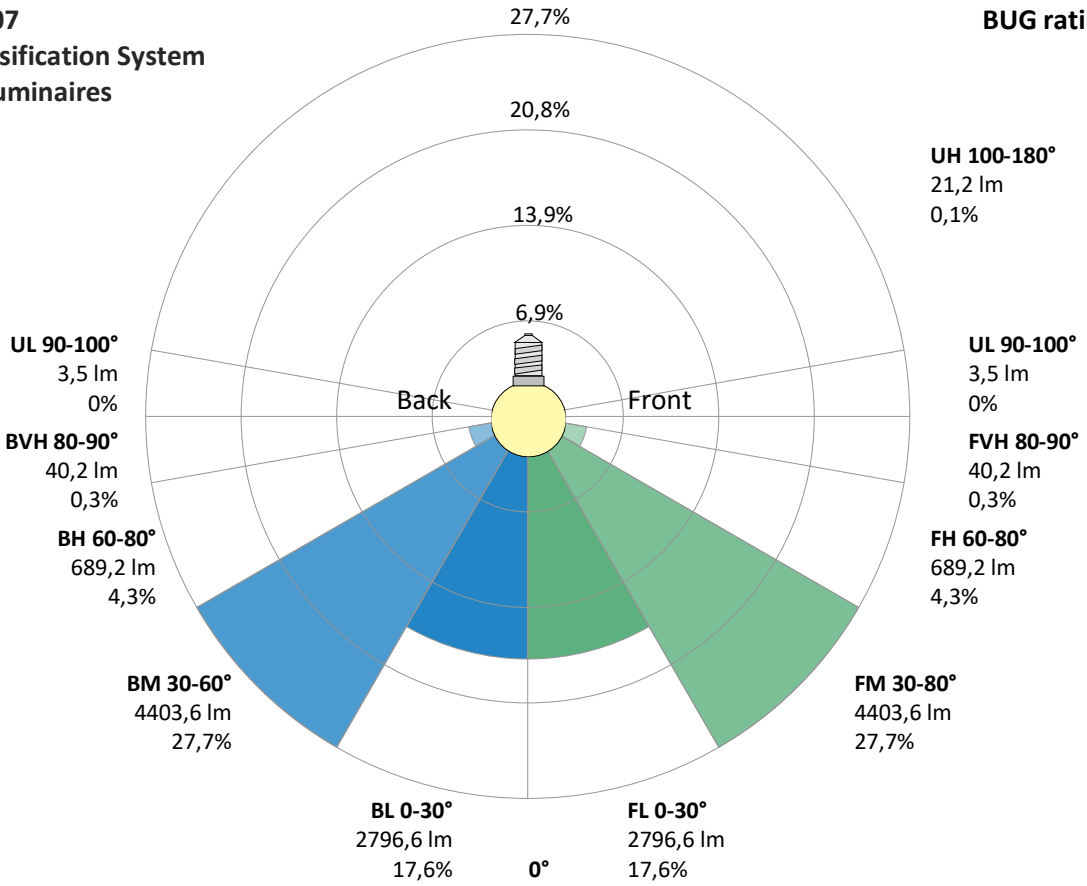
Zone (γ)	Lumen	% Total
0-30°	5603 lm	35,3%
0-40°	9116 lm	57,4%
0-60°	14426 lm	90,8%
60-90°	1434 lm	9,0%
70-100°	451 lm	2,8%
90-120°	6 lm	0,0%
0-90°	15860 lm	99,9%
90-180°	23 lm	0,1%
0-180°	15884 lm	100,0%

BUG rating

	Lumen	% Total
Forward light		
Low(0-30°)	2797 lm	17,6%
Medium(30-60°)	4404 lm	27,7%
High(60-80°)	689 lm	4,3%
Very high(80-90°)	40 lm	0,3%
Back light		
Low(0-30°)	2797 lm	17,6%
Medium(30-60°)	4404 lm	27,7%
High(60-80°)	689 lm	4,3%
Very high(80-90°)	40 lm	0,3%
Uplight		
Low(90-100°)	3 lm	0,0%
High(100-180°)	21 lm	0,1%

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

BUG rating B4 U2 G1



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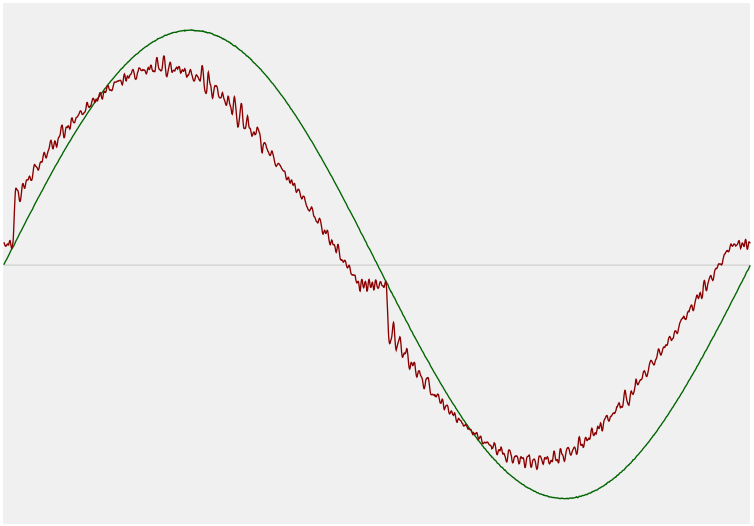
Power Details

Input Power

Power feed to light source	101,1 W
Frequency of input power	50 Hz
RMS Input voltage feed, V_{RMS}	230 V
RMS Input current feed, I_{RMS}	0,454 A
Volt-Ampere or apparent power = V_{RMS}*I_{RMS}	104,54 VA
Displacement factor of AC power feed	0,97
Power factor of AC current feed	0,97
Total harmonic distortion of the current	5,15%
Total harmonic distortion of the voltage	0,07%

Input Power Curve



Efficiency

Radiated power efficiency 43,8%

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	3981 K
CCT shift	+19 K
CCT end	4000 K

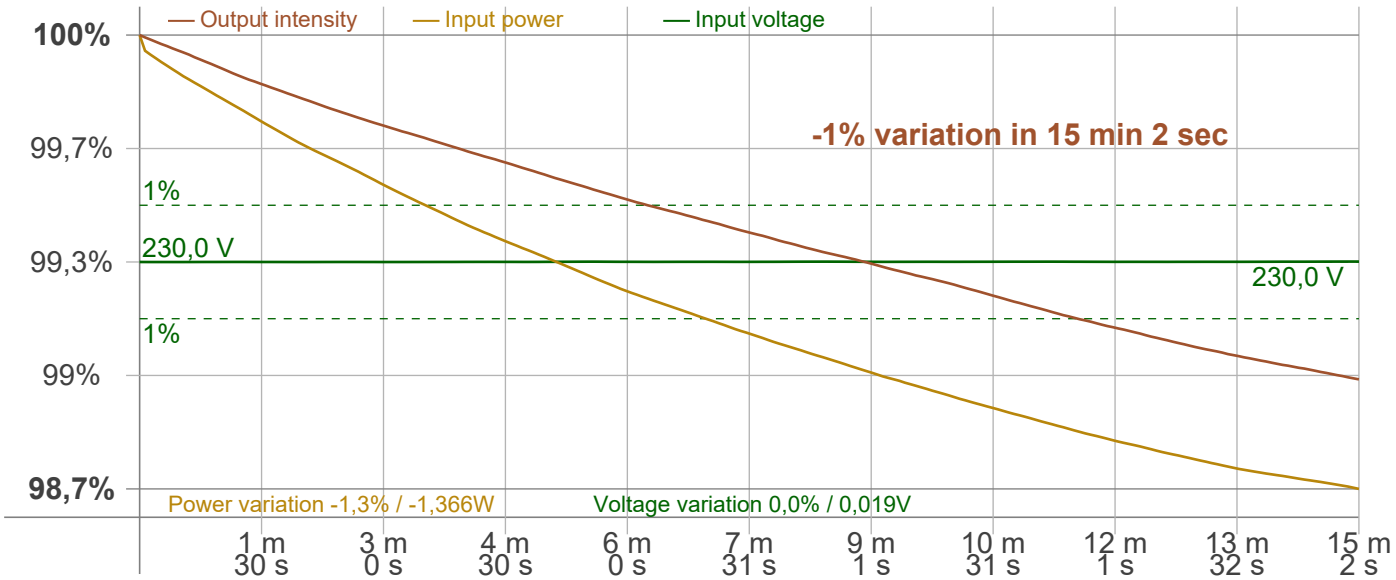
Warmup Result

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

Output Change

Output start	16045 lm
Output change	-161 lm
Output end	15884 lm

Stabilization Curve



Light Measurement Report

Print date: 22-1-2025
Measurement date and time: 22-1-2025 10:11:13 – Measurement no. VFR-250122-3044-MS
Measurement tracking No. and Link: VT250122-005171
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	0,13 %
Flicker index	0

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

JA8/10 40 Hz	0,01 %
JA8/10 90 Hz	0,01 %
JA8/10 200 Hz	0,12 %
JA8/10 400 Hz	0,12 %
JA8/10 1000 Hz	0,12 %

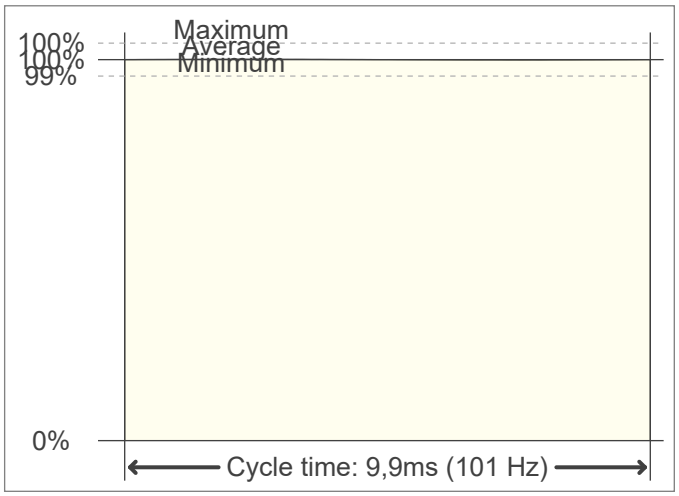
TLA indices (re IEC TR 61547-1, IEC 61000-3-3 and IEC 61000-4-15)

PstLM value (F < 80 Hz)	0,01
SVM value (80 < F < 2000 Hz)	0

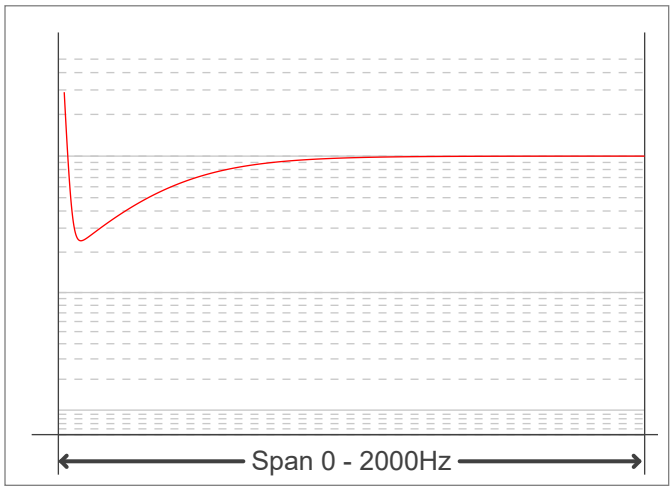
Flicker indices according to Lighting Research Center (2015)

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