

Light Measurement Report

Print date: 3-3-2025

Measurement date and time: 3-3-2025 10:05:59 – Measurement no. VFR-250303-0280-MS

Measurement tracking No. and Link: [VT250303-000432](#)

Operator:



Laboratory and Equipment

Laboratory Owner and Location

Goniospectrometer System and Type

Sensor Name, Calibr. Date and Serial No.

Spectrometer Manufacturer and Model

Viso Systems, Copenhagen V, Denmark

LabSpion – Type C, horizontal

LabSensor Model2 – 11-1-2024 – 3130191315

Ibsen Photonics, Denmark – Freedom VIS (Custom Viso)

Measurement Conditions

Number of C-planes and Resolution

γ (gamma)-Resolution

Test Distance

Input Power, Power and Displ. Factors

Input RMS Voltage and Current

Frequency of Input Power

Warm-up Time and Variation

12 planes – 30°

5°

12,10 m

14,8 W – PF 0,92 – DPF 0,94

230 V – 0,070 A

50 Hz

Lamp stabilized in 15 min 4 sec – 2,0%

Tested Light Source

Product Name

Item No. and Manufacturer

Product Description (line 1)

276734-4000K-14W

276734-4000K-14W – Dutchfulfillment

LED TL-BUIS | T8 | 105CM | 8W/11W/14W | CCT-SWITCH

Main Light Measurement Results

Output – Total Lumen (Up% / Down%)

Efficiency

Peak Intensity and Beam Angle

Correlated Color Temperature, Target/Measured

Color Rendering Index

Color Rendering TM30-18

Color Shift, CIE duv and MacAdam Steps

Flicker

1868 lm – 9,53% / 90,47%

126 lm/W

517 cd – 120,1°

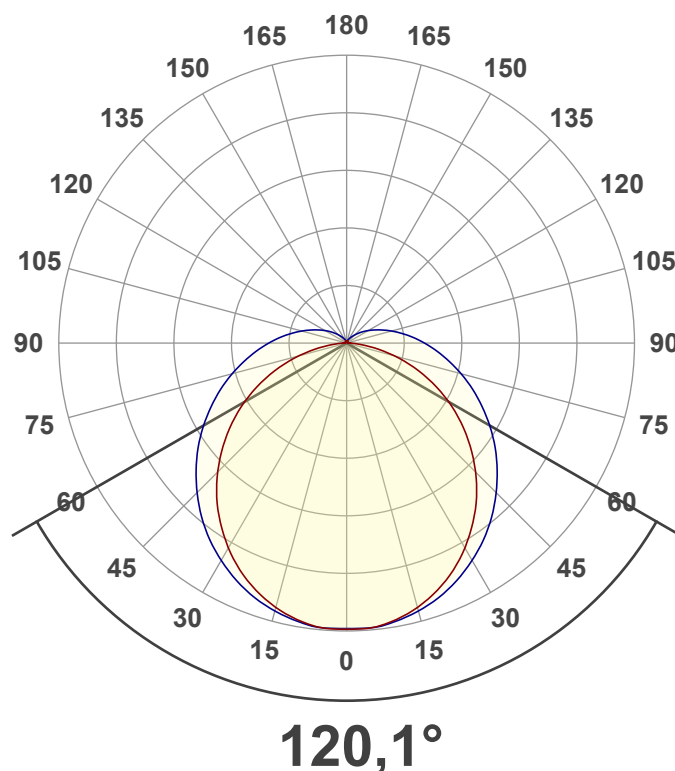
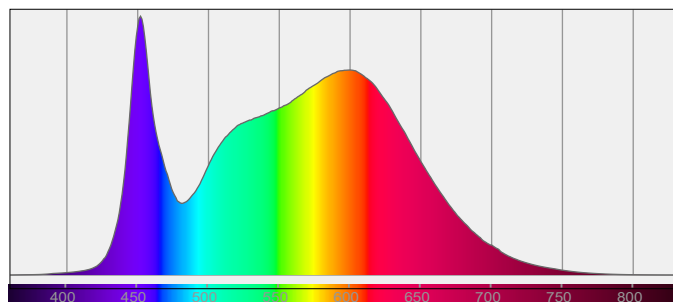
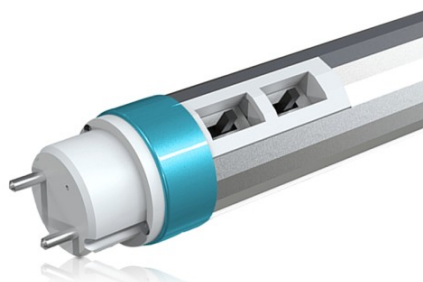
CCT = 4000 K / 4192 K

CRI 87,0

R_f 86,2 – R_g 96,4

Duv -0,0006 – SDCM 4,1

SVM 2,39 – PstLM 0,11



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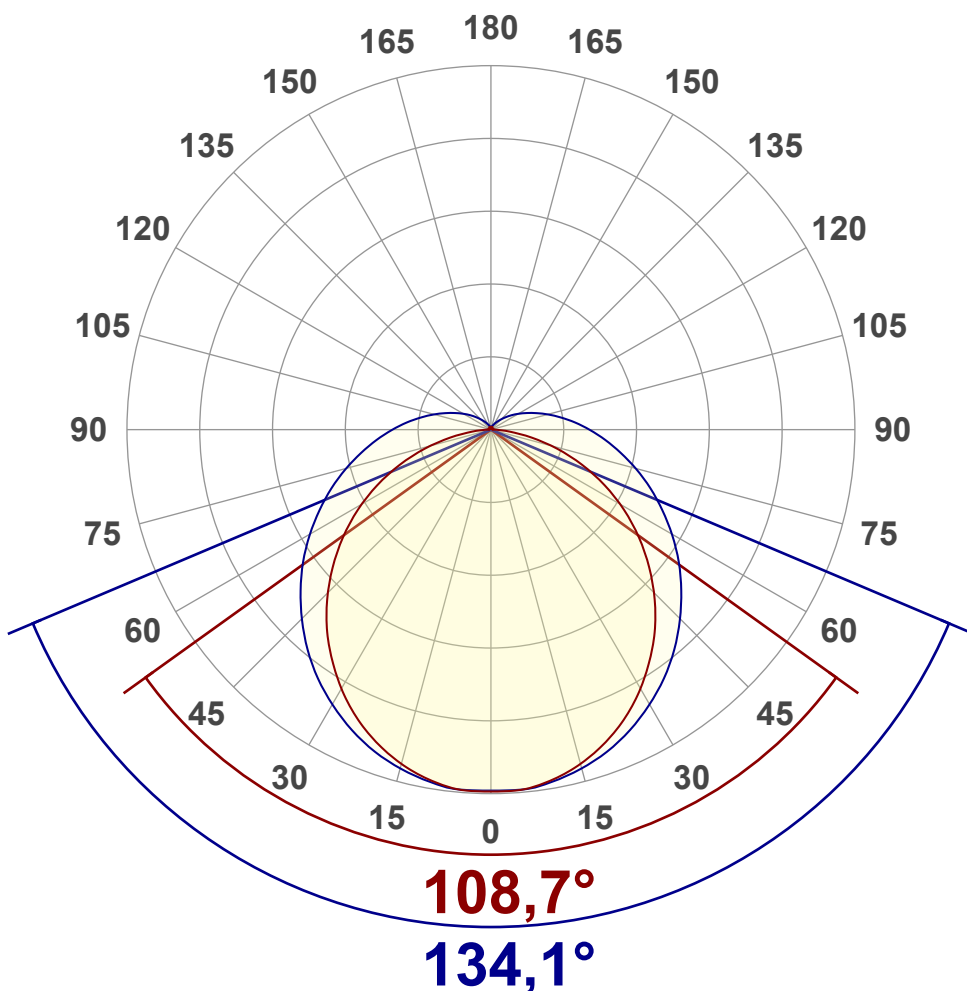
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Operator:



Luminous Intensity diagram

Unit: 0-100% of peak intensity



Main Values

Output (total Lumen)	1868 lm
Lumen Up% / Down%	9,53% / 90,47%
Peak Intensity	517 cd
Beam Angle (50%)	120,1°
Beam Angle (90%)	134,1°
Beam Angle (10%)	108,7°

Cut-off Angle

Average 2,5%	243,9°
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Field Angle

Average 10%	200,1°
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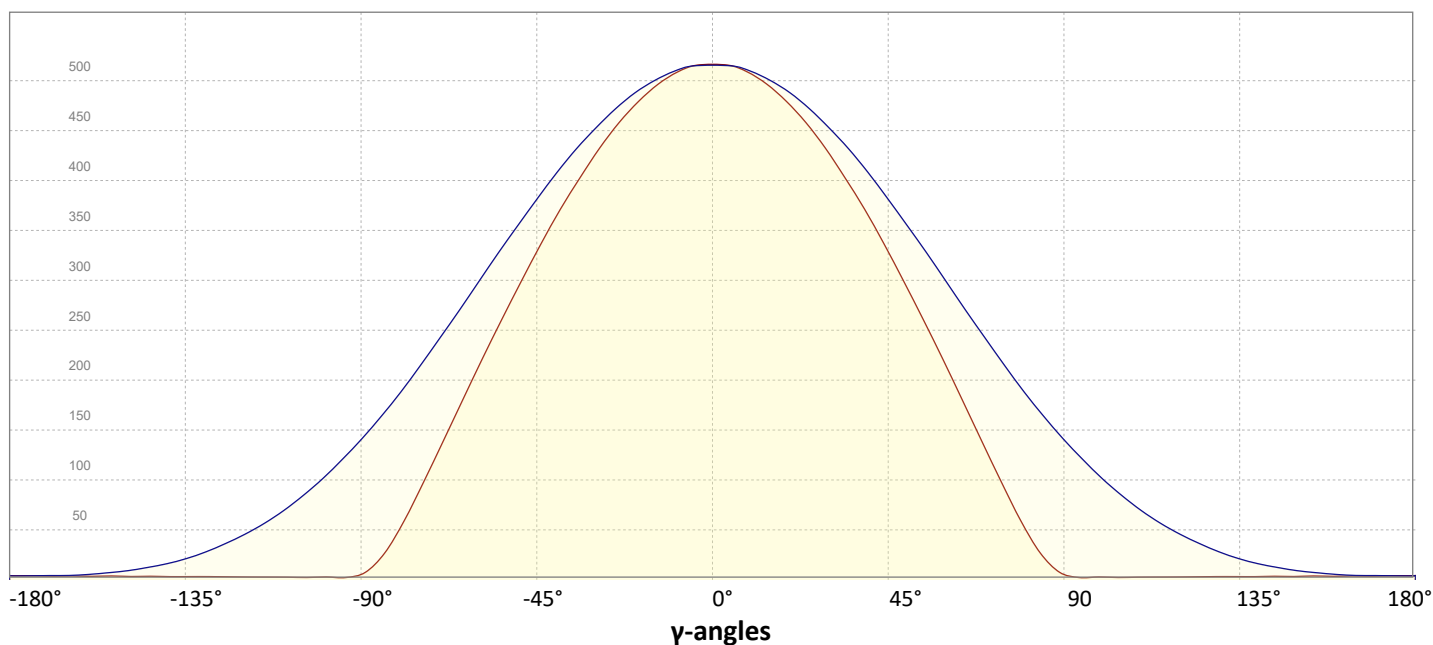
Intensity Ratio

In 120° cone	63,8%
In 90° cone	42,6%

C000-C180

C090-C270

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

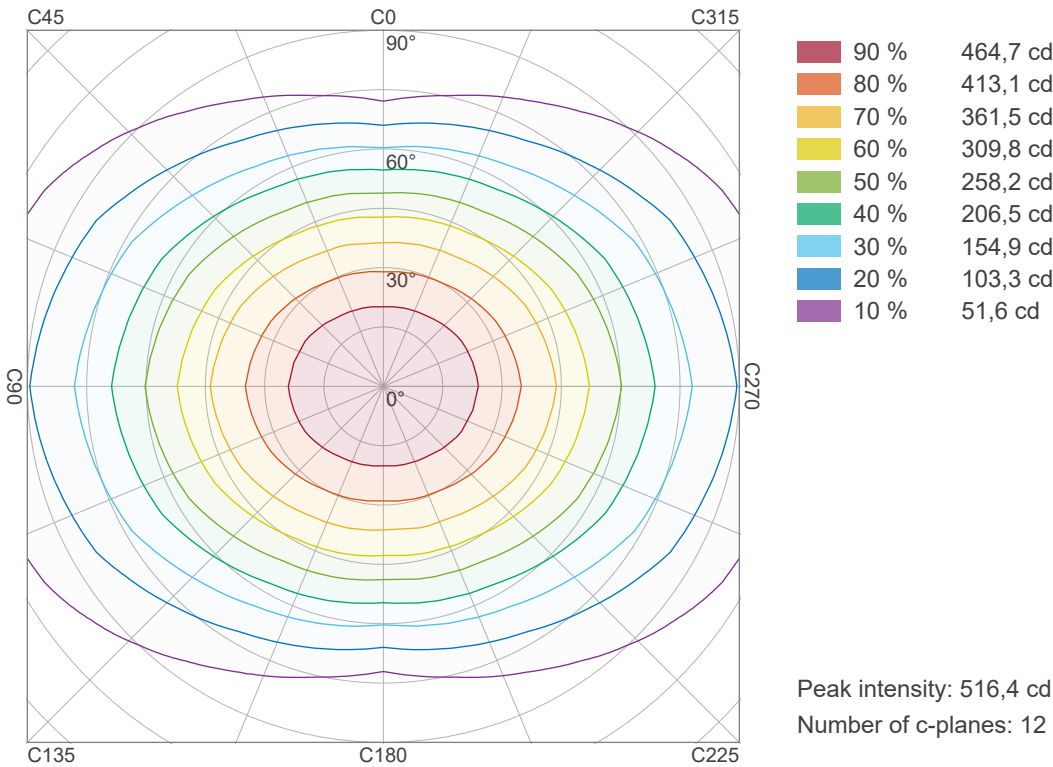


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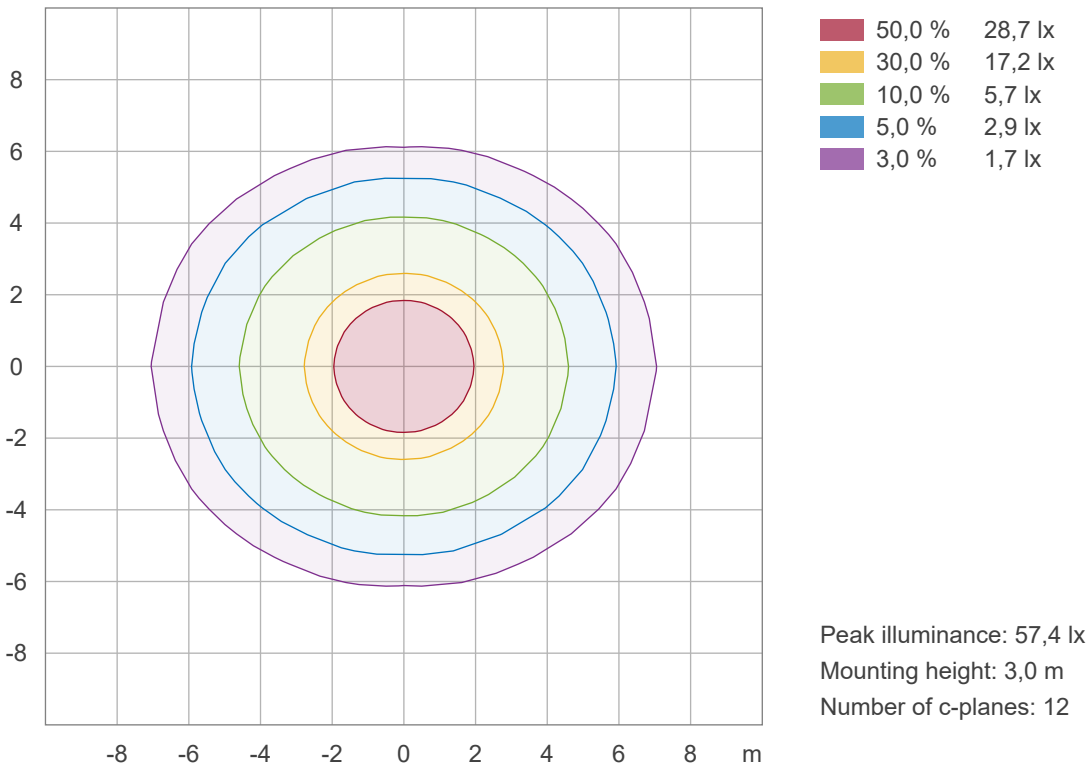
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Iso-intensity Diagram (Iso-candela)



Iso-illuminance Diagram (Iso-lux)



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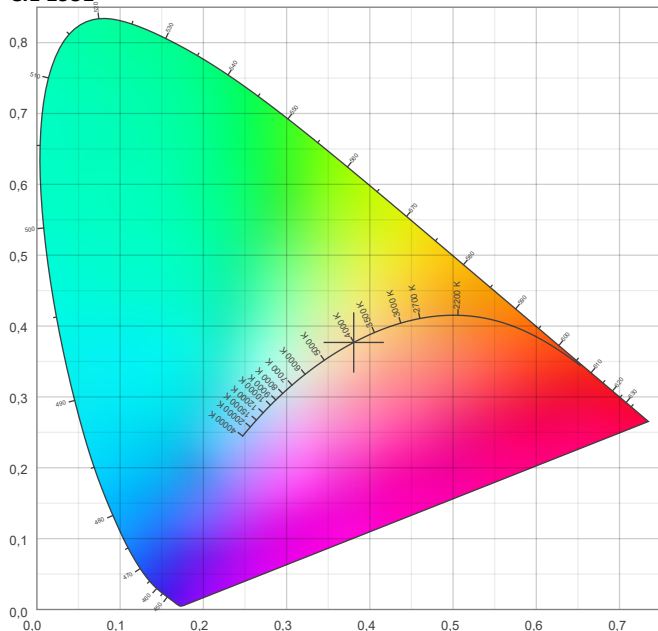


Color details

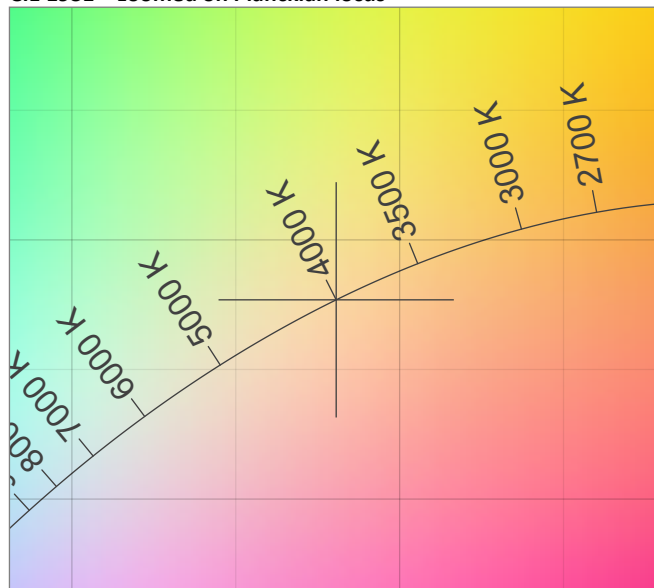
Correlated Color Temperature, Target CCT = 4000 K
Correlated Color Temperature, Measured CCT = 4192 K
Color Rendering Index CRI 87,0
Color Rendering Index, R9 (red component) R9 = 26,4
Color Rendering TM30-18 R_f 86,2 – R_g 96,4
Color Quality Scale CQS = 85,3

MacAdam Steps
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 = -0,0006
Color coordinate CIEs 1976 (CIELUV) (u';v') = (0,225;0,502)

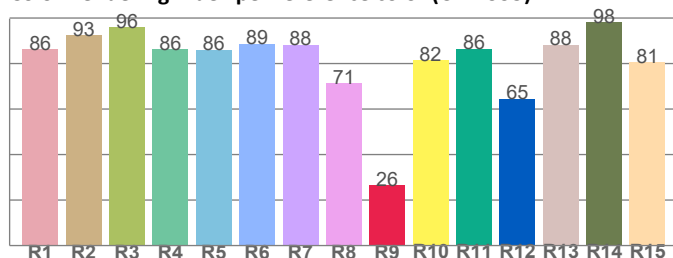
CIE 1931



CIE 1931 – zoomed on Planckian locus



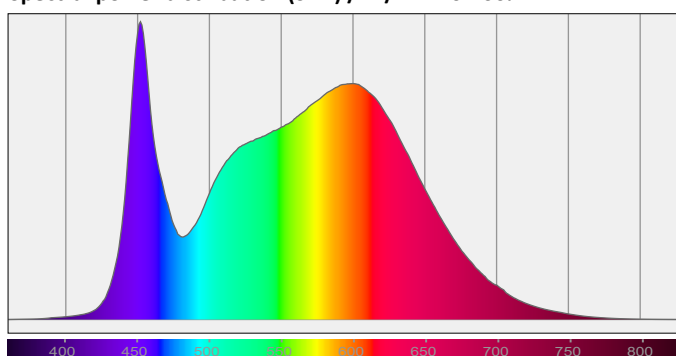
Color Rendering Index per reference color (CIE 1995)



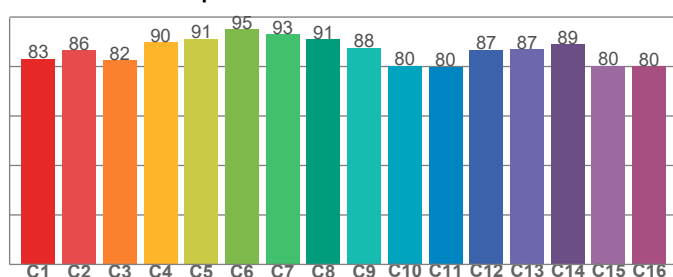
CRI R values, only R1-R8 are used to calculate final CRI value

R1	R2	R3	R4	R5	R6	R7	R8	R9	R10	R11	R12	R13	R14	R15
86,4	92,5	96,0	86,4	86,0	88,7	88,3	71,4	26,4	81,5	86,4	64,5	88,3	98,1	80,6

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



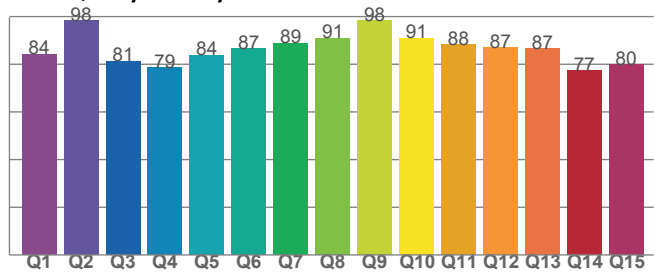
TM30-18 Rf-values per hue bin



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
83,1	86,5	82,4	89,7	91,2	95,1	92,9	91,1	87,6	80,3	79,8	86,8	87,0	89,0	80,3	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
84,1	98,3	81,2	78,5	83,9	86,6	88,7	91,0	98,2	90,9	88,1	87,0	86,6	77,2	79,8

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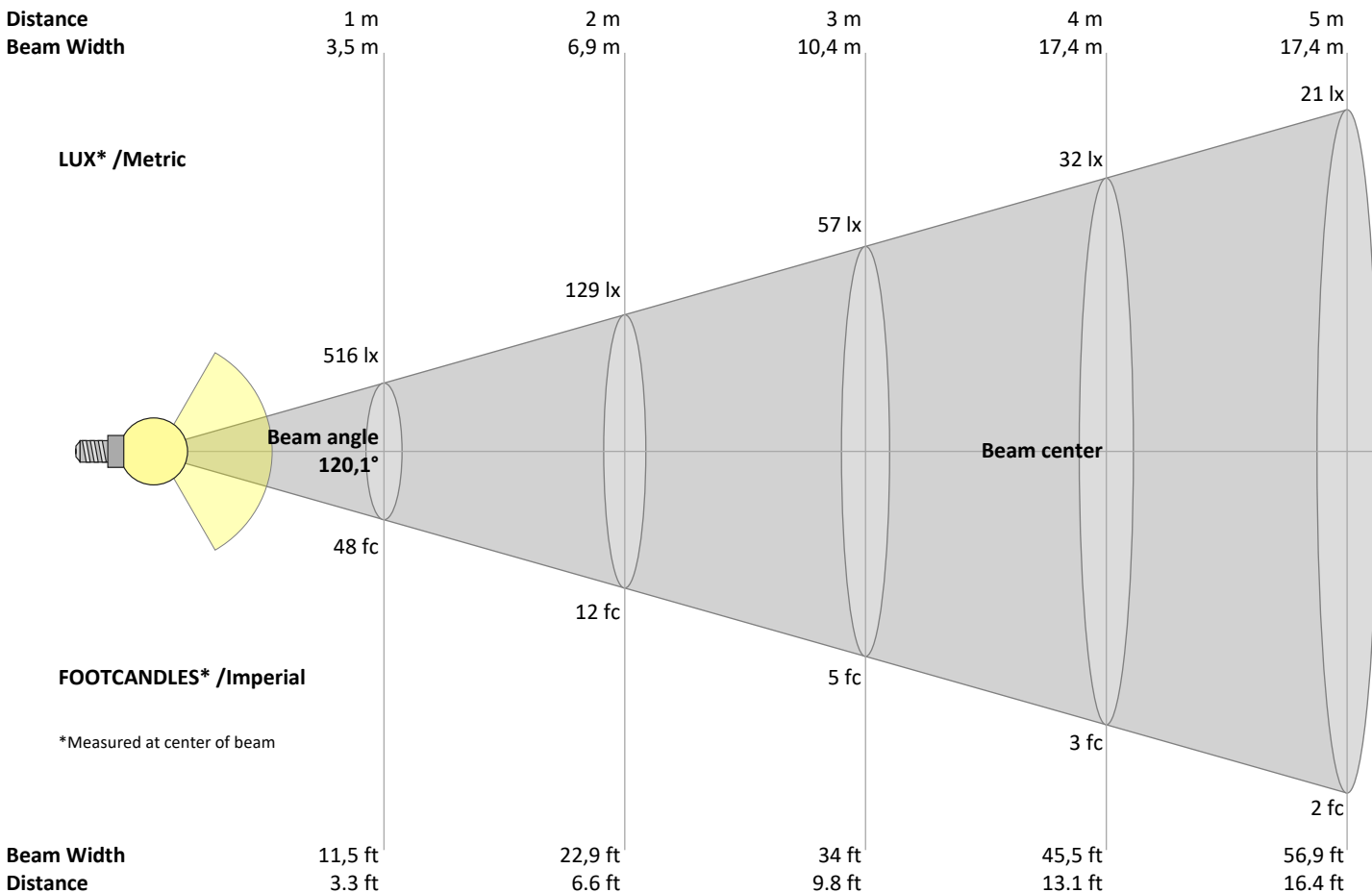
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Beam Details



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
516	129	57	32	21	14	11	8	6	5	4	4	3	3	2	2	2	2	1	1	lux
48	12	5,3	3	1,9	1,3	1	0,7	0,6	0,5	0,4	0,3	0,3	0,2	0,2	0,2	0,2	0,1	0,1	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
516	509	482	442	390	328	260	188	114	46	6	3	3	3	3	3	3	4	4	4	cd
100%	99%	93%	86%	75%	64%	50%	36%	22%	9%	1%	1%	0%	1%	1%	1%	1%	1%	1%	1%	of 0°va

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
516	510	492	464	426	381	332	280	230	182	140	104	75	52	34	21	13	8	5	4	cd
100%	99%	95%	90%	83%	74%	64%	54%	45%	35%	27%	20%	14%	10%	7%	4%	2%	1%	1%	1%	of 0°va

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
516	509	482	442	390	328	260	188	114	46	6	3	3	3	3	3	3	4	4	4	cd
100%	99%	93%	86%	75%	64%	50%	36%	22%	9%	1%	1%	0%	1%	1%	1%	1%	1%	1%	1%	of 0°va

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
516	510	492	464	426	381	332	280	230	182	140	104	75	52	34	21	13	8	5	4	cd
100%	99%	95%	90%	83%	74%	64%	54%	45%	35%	27%	20%	14%	10%	7%	4%	2%	1%	1%	1%	of 0°va

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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		Viewed Crosswise					Viewed Endwise				
H = mounting height above eye level		(Viewing direction orthogonal to lamp length axis)					(Viewing direction parallel to lamp length axis)				
X	Y										
2H	2H	21,0	22,2	21,4	22,6	23,1	21,4	22,6	21,8	23,1	23,5
	3H	22,4	23,7	23,0	24,1	24,5	23,3	24,5	23,8	25,0	25,4
	4H	23,1	24,2	23,6	24,7	25,1	24,3	25,4	24,8	25,9	26,3
	6H	23,6	24,6	24,0	25,1	25,6	25,3	26,3	25,7	26,8	27,3
	8H	23,7	24,8	24,2	25,2	25,8	25,7	26,8	26,2	27,2	27,8
	12H	23,8	24,8	24,3	25,3	25,9	26,2	27,2	26,7	27,7	28,3
4H	2H	21,6	22,8	22,2	23,2	23,7	22,0	23,1	22,5	23,6	24,0
	3H	23,4	24,4	23,9	24,9	25,5	24,2	25,2	24,7	25,7	26,3
	4H	24,1	25,1	24,7	25,6	26,3	25,2	26,3	25,8	26,7	27,4
	6H	24,7	25,6	25,3	26,1	26,6	26,4	27,3	27,0	27,8	28,3
	8H	24,9	25,7	25,5	26,2	26,8	26,9	27,7	27,6	28,3	28,8
	12H	25,1	25,7	25,7	26,3	27,0	27,5	28,1	28,1	28,7	29,4
8H	4H	24,6	25,3	25,2	25,9	26,4	25,6	26,4	26,2	26,9	27,4
	6H	25,4	26,0	26,0	26,6	27,3	26,9	27,6	27,6	28,2	28,9
	8H	25,7	26,3	26,4	27,0	27,7	27,7	28,2	28,3	28,9	29,6
	12H	26,0	26,5	26,7	27,1	27,9	28,4	28,8	29,1	29,5	30,2
12H	4H	24,7	25,3	25,3	25,9	26,5	25,6	26,3	26,2	26,8	27,5
	6H	25,6	26,1	26,2	26,8	27,6	27,0	27,6	27,7	28,3	29,0
	8H	26,0	26,5	26,7	27,1	27,9	27,8	28,3	28,5	28,9	29,7
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 / -0,2					0,1 / -0,1				
S = 2.0H		0,3 / -0,4					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	99	99	99	93	93	93	90
1	104	99	94	89	101	95	91	87	89	86	82	84	81	78	79	76	74	71
2	94	85	77	71	91	82	75	69	77	71	66	72	68	63	68	64	61	58
3	85	74	65	58	82	72	64	57	67	60	55	63	57	53	59	55	51	48
4	78	65	56	49	75	63	55	48	59	52	46	56	50	45	53	47	43	40
5	72	58	49	42	69	56	48	41	53	46	40	50	44	38	47	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	23	34	27	22	32	26	22	31	25	21	19

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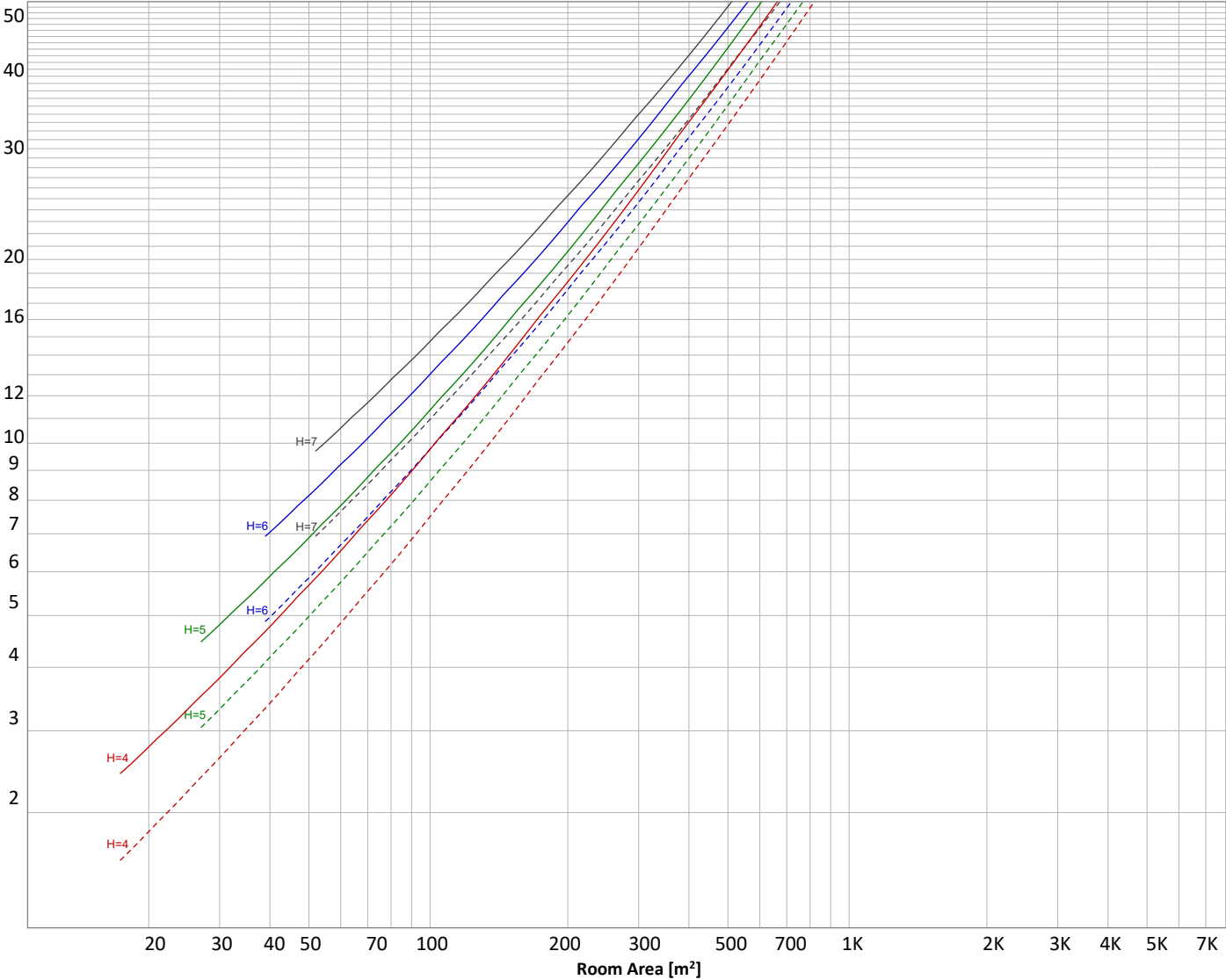
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Luminaire budgetary diagram

Uncorrected, comprehensive UGR table according to 117-1995

LAMPS (number of lamps)



Conditions

H = Room height	Flux = 1868 lm	p(%)		
H _{down} = Lamp distance from ceiling =	0.00 m	Line type	Ceiling reflectance	Wall reflectance
H _{work} = Work area height from floor =	0.00 m	-----	70	50
E _{work} = Average lux on work area =	100 lx	_____	50	30
				Floor reflectance
				20

Zonal Lumen Summary

0°-10°	10°-20°	20°-30°	30°-40°	40°-50°	50°-60°	60°-70°	70°-80°	80°-90°
48,8 lm	140 lm	213 lm	258 lm	273 lm	258 lm	220 lm	166 lm	113 lm
90°-100°	100°-110°	110°-120°	120°-130°	130°-140°	140°-150°	150°-160°	160°-170°	170°-180°
72,9 lm	46,0 lm	27,5 lm	15,5 lm	8,23 lm	4,24 lm	2,16 lm	1,10 lm	0,365 lm

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Outdoor Light Planning

Lumen per Zone

Zone (γ)	Lumen	% Total
0-10°	49 lm	2,6%
10-20°	140 lm	7,5%
20-30°	213 lm	11,4%
30-40°	258 lm	13,8%
40-50°	273 lm	14,6%
50-60°	258 lm	13,8%
60-70°	220 lm	11,8%
70-80°	166 lm	8,9%
80-90°	113 lm	6,0%
90-100°	73 lm	3,9%
100-110°	46 lm	2,5%
110-120°	27 lm	1,5%
120-130°	16 lm	0,8%
130-140°	8 lm	0,4%
140-150°	4 lm	0,2%
150-160°	2 lm	0,1%
160-170°	1 lm	0,1%
170-180°	0 lm	0,0%
Total	1868 lm	100,0%

Intensity peaks

Max intensity	517 cd
Intensity, 90°	6 cd
Intensity, 0°	516 cd

Zonal Lumen summary

Zone (γ)	Lumen	% Total
0-30°	401 lm	21,5%
0-40°	660 lm	35,3%
0-60°	1191 lm	63,8%
60-90°	499 lm	26,7%
70-100°	352 lm	18,9%
90-120°	146 lm	7,8%
0-90°	1690 lm	90,5%
90-180°	178 lm	9,5%
0-180°	1868 lm	100,0%

BUG rating

	Lumen	% Total
Forward light		
Low(0-30°)	201 lm	10,7%
Medium(30-60°)	395 lm	21,1%
High(60-80°)	193 lm	10,3%
Very high(80-90°)	56 lm	3,0%
Back light		
Low(0-30°)	201 lm	10,7%
Medium(30-60°)	395 lm	21,1%
High(60-80°)	193 lm	10,3%
Very high(80-90°)	56 lm	3,0%

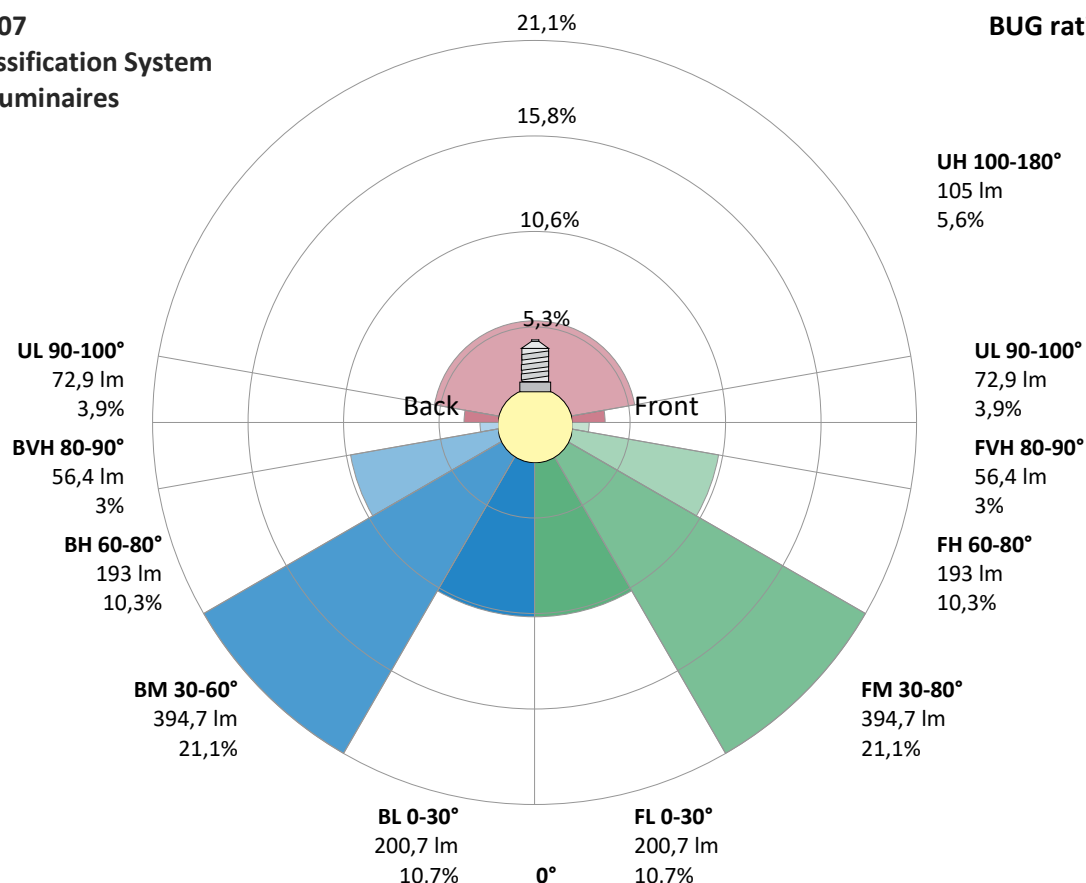
Uplight

Low(90-100°)	73 lm	3,9%
High(100-180°)	105 lm	5,6%

IESNA TM-15-07

Luminaire Classification System For Outdoor Luminaires

BUG rating B1 U3 G1



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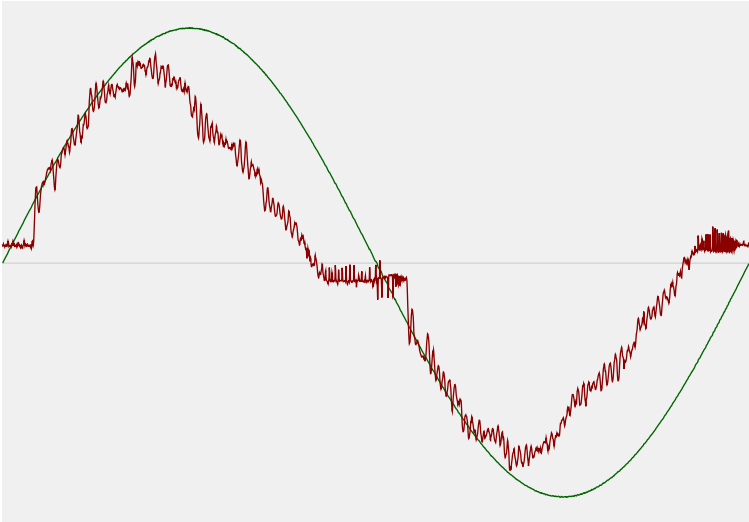


Power Details

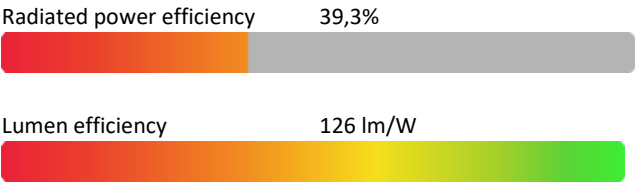
Input Power

Power feed to light source	14,8 W
Frequency of input power	50 Hz
RMS Input voltage feed, V_{RMS}	230 V
RMS Input current feed, I_{RMS}	0,070 A
Volt-Ampere or apparent power = $V_{RMS} * I_{RMS}$	16,16 VA
Displacement factor of AC power feed	0,94
Power factor of AC current feed	0,92
Total harmonic distortion of the current	22,49%
Total harmonic distortion of the voltage	0,06%

Input Power Curve



Efficiency



Stabilization Details

Warmup Conditions

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

Color Temperature Change

CCT start	3997 K
CCT shift	+3 K
CCT end	4000 K

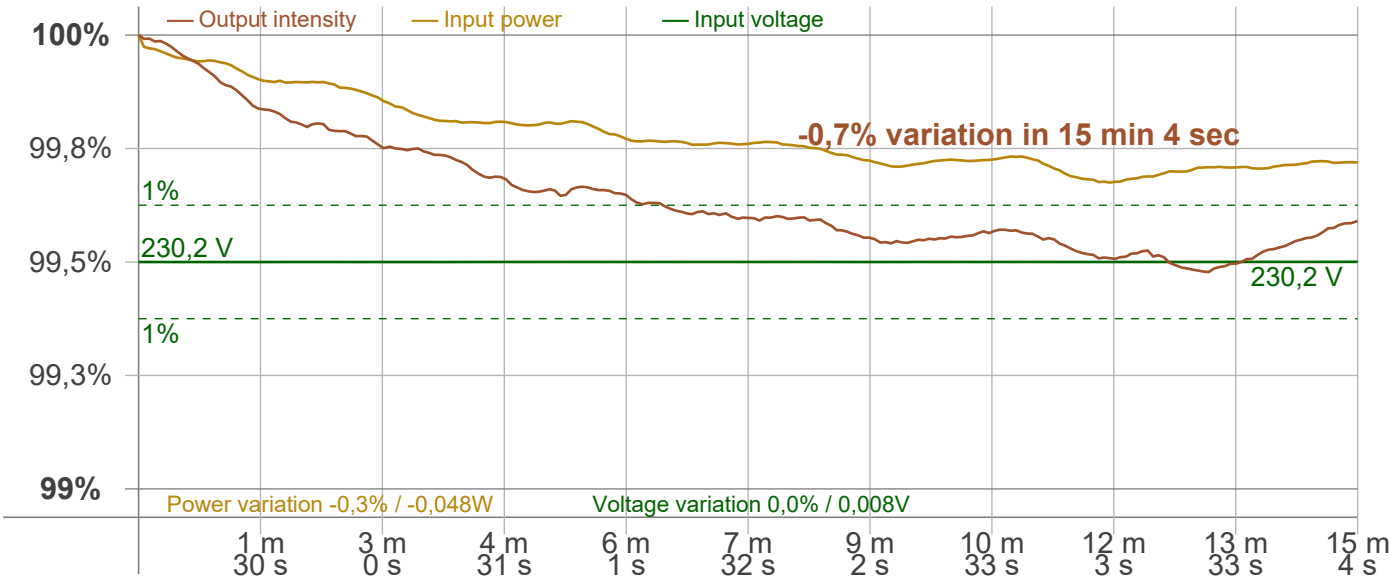
Warmup Result

Total warmup time	Lamp stabilized in 15 min 4 sec
Warmup variation	-0,7%

Output Change

Output start	1876 lm
Output change	-9 lm
Output end	1868 lm

Stabilization Curve



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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 60,16 %
Flicker index 0,2

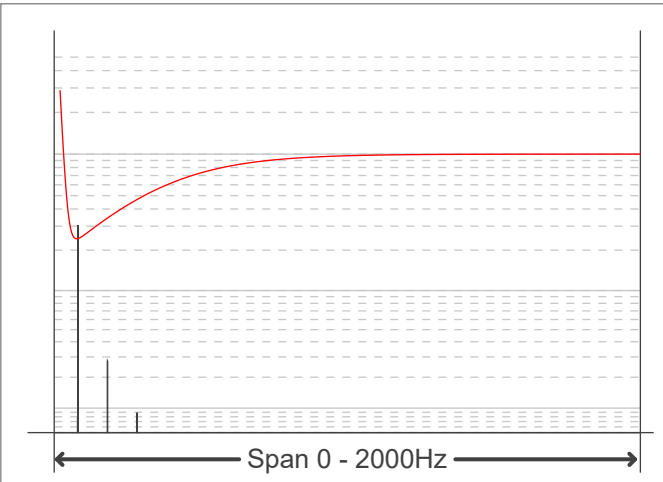
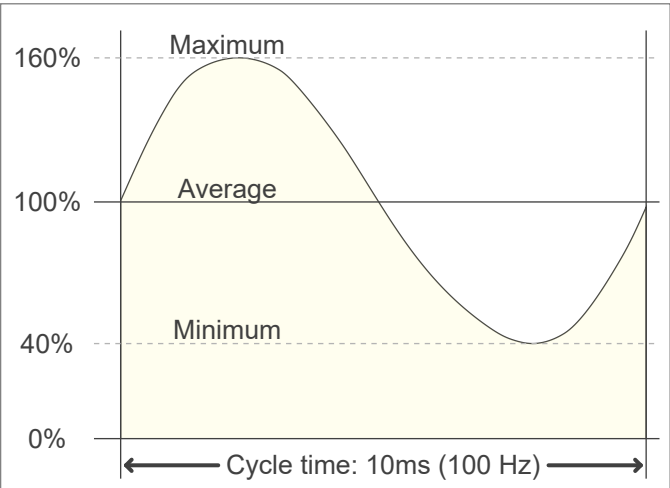
Flicker indices according to California Energy Commission (CEC) 2016b
JA8/10 40 Hz 0,16 %
JA8/10 90 Hz 0,48 %
JA8/10 200 Hz 61,1 %
JA8/10 400 Hz 60,05 %
JA8/10 1000 Hz 60,05 %

TLA indices (re IEC TR 61547-1, IEC 61000-3-3 and IEC 61000-4-15)
PstLM value (F < 80 Hz) 0,11
SVM value (80 < F < 2000 Hz) 2,39

Flicker indices according to Lighting Research Center (2015)
Perception metric, Assist Mp 0,08

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

Flicker FFT (flicker curve in frequency domain)



IEEE 1789 Frequency/modulation plot

