Light Measurement Report

Print date: 14-10-2024
Measurement date and time: 14-10-2024 12:16:47 – Measurement no. VFR-241014-1246-MS
Measurement tracking No. and Link: VT241014-006167
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

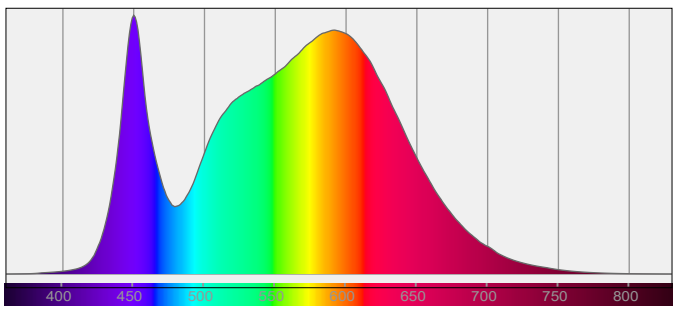
Number of C-planes and Resolution	12 planes – 30°
γ (gamma)-Resolution	5°
Test Distance	12,13 m
Input Power, Power and Displ. Factors	43,2 W – PF 0,99 – DPF 0,98
Input RMS Voltage and Current	230 V – 0,191 A
Frequency of Input Power	50 Hz
Warm-up Time and Variation	Lamp stabilized in 15 min 3 sec – 2,0%

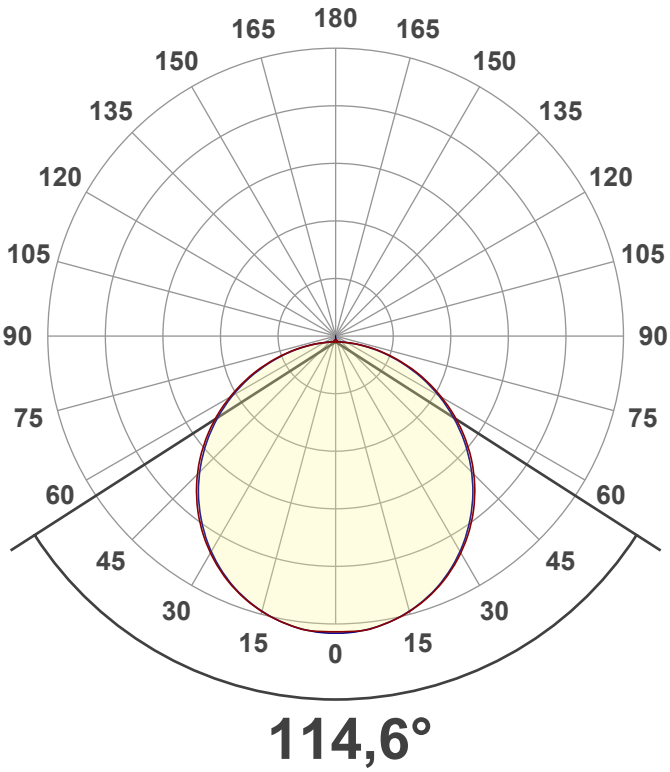
Tested Light Source

Product Name	804855-4000K
Item No. and Manufacturer	804855-4000K – Dutchfulfillment
Product Description (line 1)	BACK-LIT LED PANEEL | BRISTOL | 120×30 | 40W

Main Light Measurement Results

Output – Total Lumen (Up% / Down%)	3797 lm – 1% / 99%
Efficiency	88 lm/W
Peak Intensity and Beam Angle	1275 cd – 114,6°
Correlated Color Temperature, Target/Measured	CCT = 4000 K / 4144 K
Color Rendering Index	CRI 81,7
Color Rendering TM30-18	R_f 83,6 – R_g 95,3
Color Shift, CIE duv and MacAdam Steps	Duv 0,0026 – SDCM 3,5
Flicker	SVM 0,02 – PstLM 0,04





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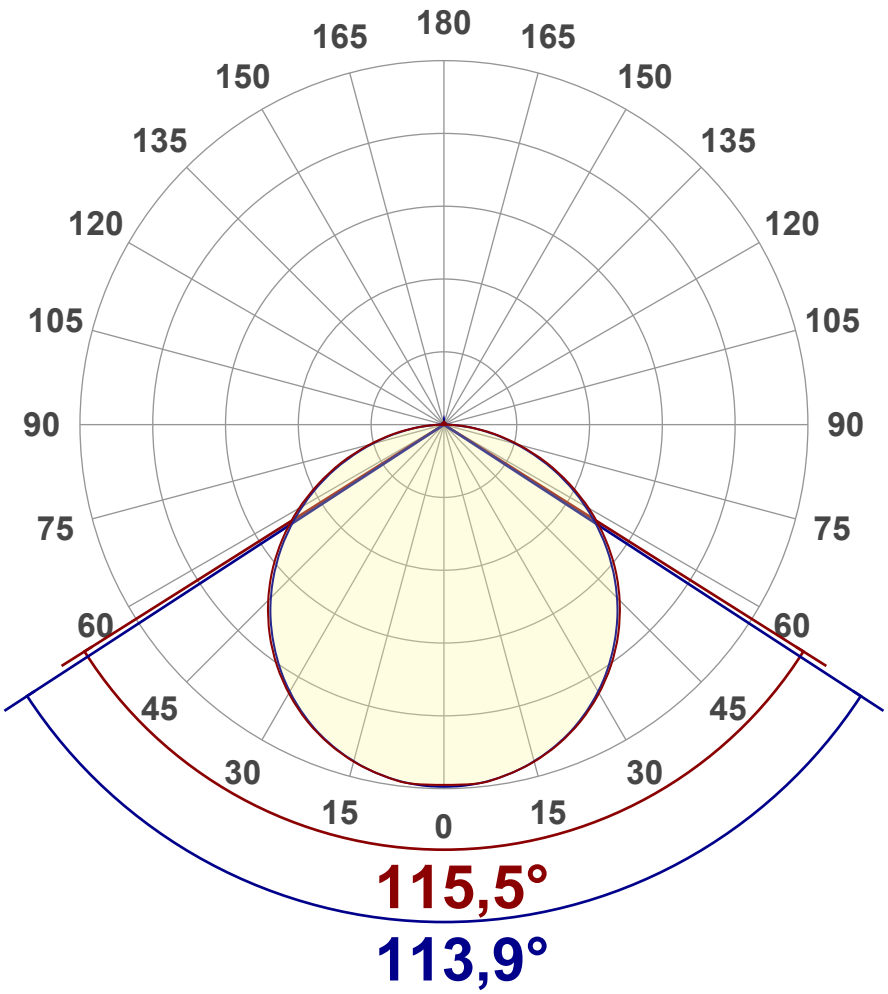
Luminous Intensity diagram Unit: 0-100% of peak intensity



Main Values

Output (total Lumen)	3797 lm
Lumen Up% / Down%	1% / 99%
Peak Intensity	1275 cd
Beam Angle (50%)	114,6°
Beam Angle (90%)	113,9°
Beam Angle (10%)	115,5°

Cut-off Angle

Average 2,5%	176,8°

Field Angle

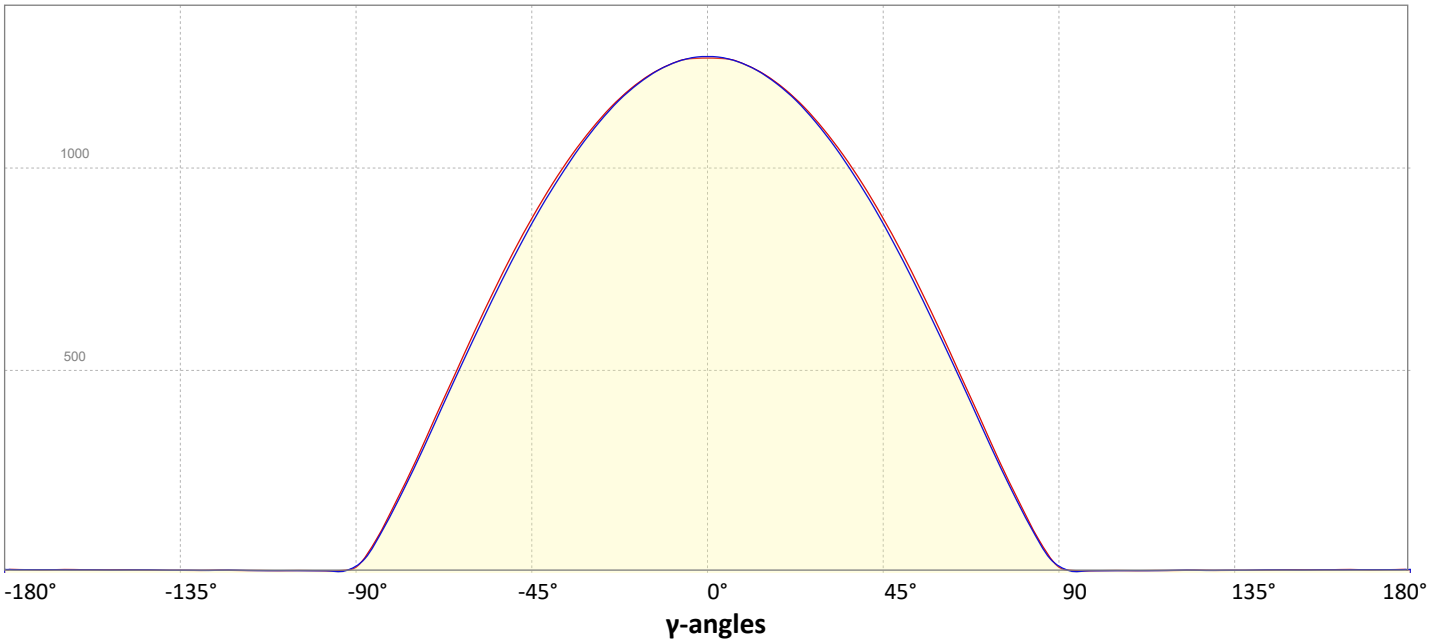
Average 10%	164,3°

Intensity Ratio

In 120° cone	76,8%
In 90° cone	52,0%

C000-C180
C090-C270

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



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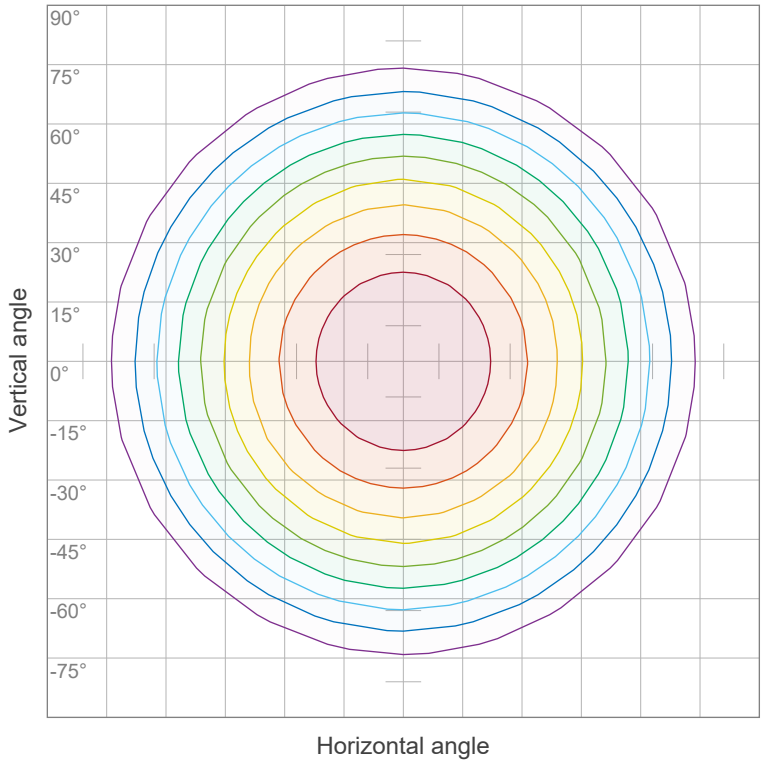
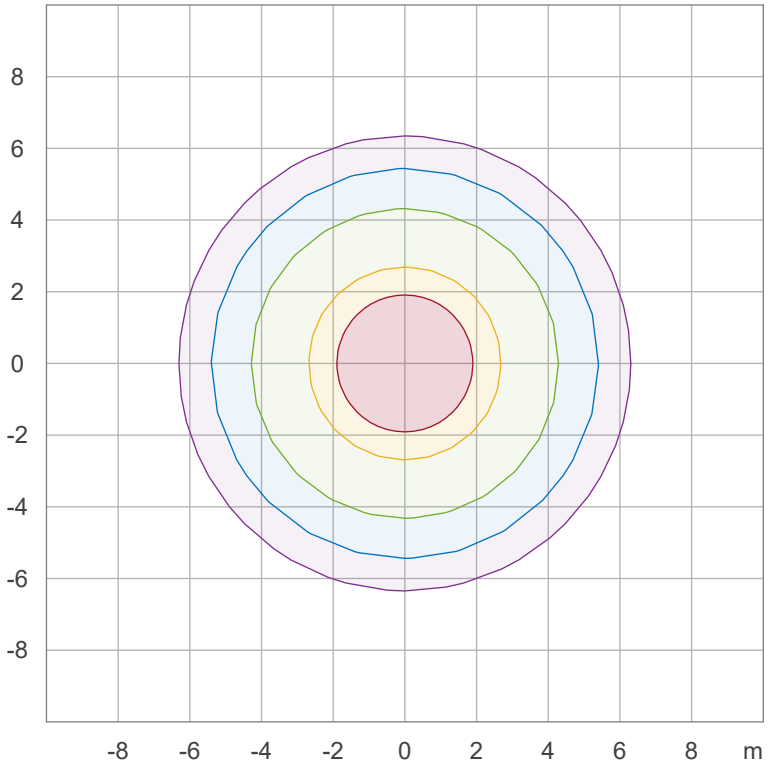
Iso-intensity Diagram (Iso-candela)



90 %	1147,1 cd
80 %	1019,7 cd
70 %	892,2 cd
60 %	764,8 cd
50 %	637,3 cd
40 %	509,8 cd
30 %	382,4 cd
20 %	254,9 cd
10 %	127,5 cd

Peak intensity: 1274,6 cd
Number of c-planes: 12

Iso-illuminance Diagram (Iso-lux)



50,0 %	70,8 lx
30,0 %	42,5 lx
10,0 %	14,2 lx
5,0 %	7,1 lx
3,0 %	4,2 lx

Peak illuminance: 141,6 lx
Mounting height: 3,0 m
Number of c-planes: 12

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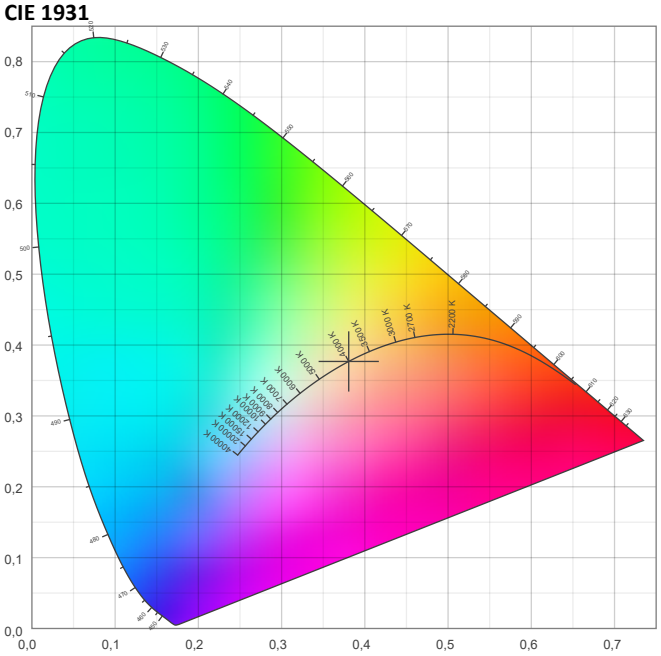
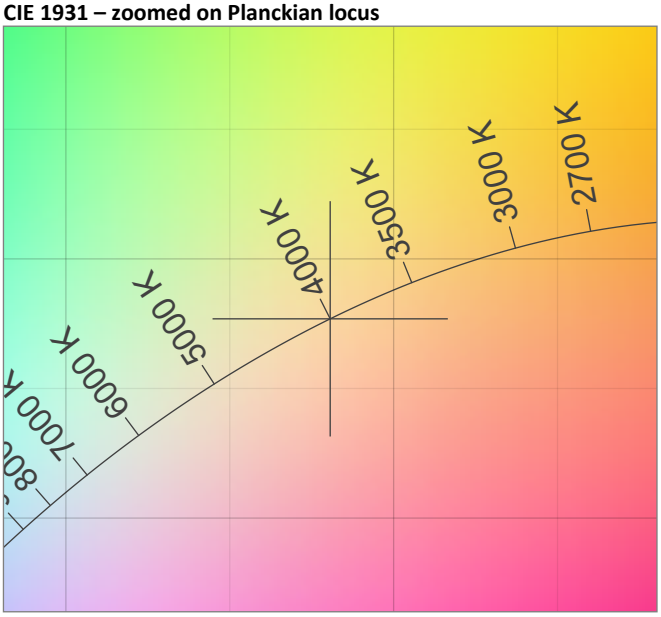
Color details

Correlated Color Temperature, Target	CCT = 4000 K
Correlated Color Temperature, Measured	CCT = 4144 K
Color Rendering Index	CRI 81,7
Color Rendering Index, R9 (red component)	R9 = 1,0
Color Rendering TM30-18	R_f 83,6 – R_g 95,3
Color Quality Scale	CQS = 81,7
MacAdam Steps	SDCM = 3,5
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 = 0,0026
Color coordinate CIEs 1976 (CIELUV)	(u';v') = (0,225;0,502)

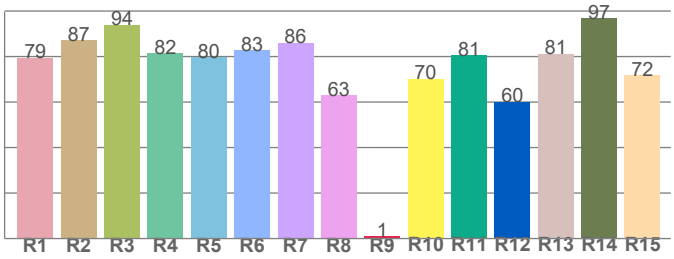
CIE 1931



CIE 1931 – zoomed on Planckian locus



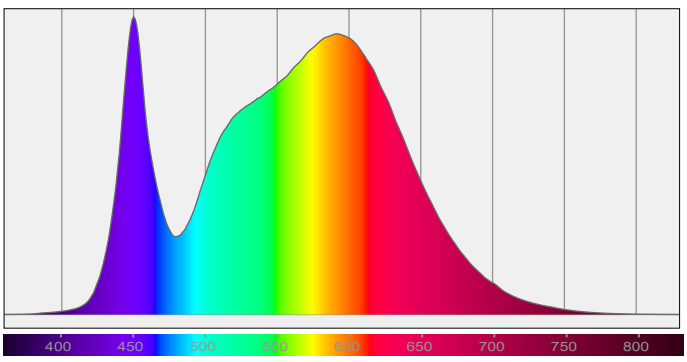
Color Rendering Index per reference color (CIE 1995)



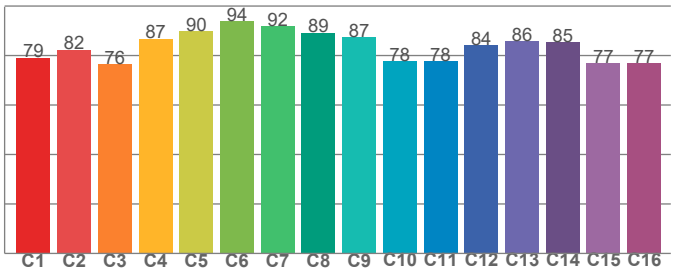
CRI R values, only R1-R8 are used to calculate final CRI value

R1	R2	R3	R4	R5	R6	R7	R8	R9	R10	R11	R12	R13	R14	R15
79,4	87,2	93,9	81,5	79,6	82,9	86,1	63,1	1,0	70,3	80,7	60,2	81,3	96,7	71,7

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



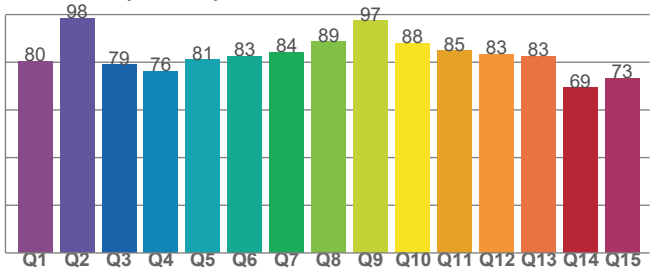
TM30-18 Rf-values per hue bin



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
79,1	82,3	76,4	86,8	89,7	93,8	91,7	89,3	87,5	77,8	77,8	84,1	85,9	85,4	77,0	77,0

Color Quality Scale by reference color



CQS Q values

Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10	Q11	Q12	Q13	Q14	Q15
80,4	98,4	79,0	76,3	81,1	82,5	84,3	88,6	97,4	87,9	84,9	83,4	82,6	69,4	73,4

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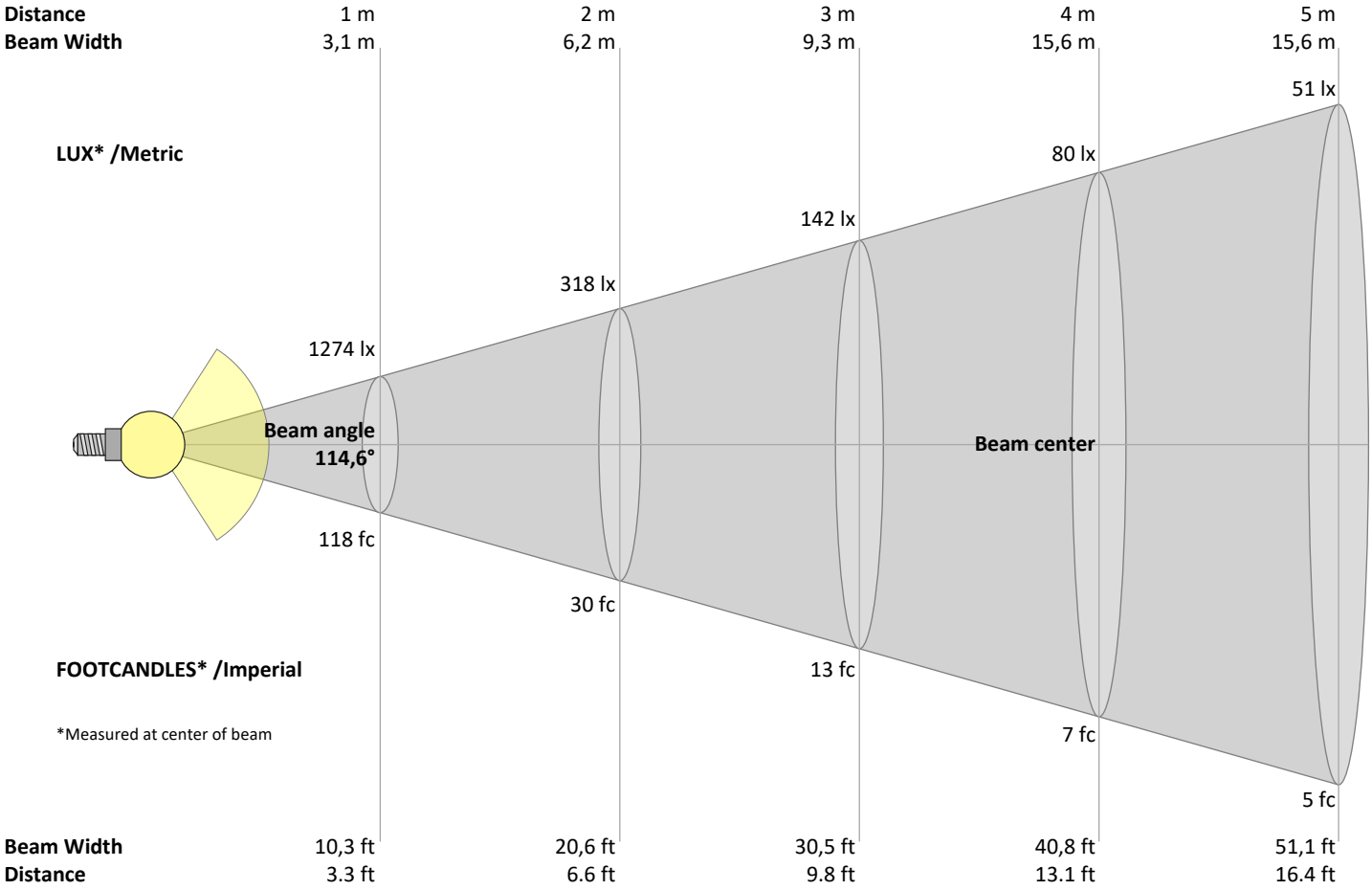
Beam Details



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
1274	318	142	80	51	35	26	20	16	13	11	9	8	6	6	5	4	4	4	3	lux
118,3	29,6	13,1	7,4	4,7	3,3	2,4	1,8	1,5	1,2	1	0,8	0,7	0,6	0,5	0,5	0,4	0,4	0,3	0,3	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
1274	1269	1254	1228	1193	1147	1092	1029	956	875	787	690	589	483	378	270	171	80	15	5	cd
100%	100%	98%	96%	94%	90%	86%	81%	75%	69%	62%	54%	46%	38%	30%	21%	13%	6%	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
1274	1269	1253	1226	1189	1142	1085	1018	944	861	771	675	575	471	366	262	164	78	21	5	cd
100%	100%	98%	96%	93%	90%	85%	80%	74%	68%	61%	53%	45%	37%	29%	21%	13%	6%	2%	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
1274	1269	1254	1228	1193	1147	1092	1029	956	875	787	690	589	483	378	270	171	80	15	5	cd
100%	100%	98%	96%	94%	90%	86%	81%	75%	69%	62%	54%	46%	38%	30%	21%	13%	6%	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
1274	1269	1253	1226	1189	1142	1085	1018	944	861	771	675	575	471	366	262	164	78	21	5	cd
100%	100%	98%	96%	93%	90%	85%	80%	74%	68%	61%	53%	45%	37%	29%	21%	13%	6%	2%	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	17,4	18,6	17,6	18,9	19,2	17,2	18,4	17,4	18,8	19,0
	3H	18,9	20,2	19,3	20,5	20,7	18,7	19,9	19,1	20,2	20,5
	4H	19,6	20,8	20,0	21,1	21,4	19,3	20,5	19,7	20,8	21,1
	6H	20,2	21,3	20,5	21,6	22,0	19,8	20,9	20,2	21,2	21,6
	8H	20,4	21,4	20,7	21,7	22,2	20,0	21,0	20,3	21,3	21,8
	12H	20,5	21,5	20,9	21,8	22,3	20,1	21,1	20,5	21,4	21,9
4H	2H	18,0	19,2	18,4	19,5	19,8	17,8	19,0	18,2	19,3	19,6
	3H	19,8	20,8	20,2	21,2	21,7	19,6	20,6	20,0	21,0	21,4
	4H	20,5	21,5	21,0	21,9	22,5	20,3	21,2	20,7	21,6	22,2
	6H	21,2	22,1	21,7	22,5	22,9	20,9	21,8	21,4	22,1	22,5
	8H	21,4	22,2	22,0	22,6	23,0	21,1	21,9	21,6	22,3	22,7
	12H	21,6	22,3	22,1	22,7	23,2	21,2	21,9	21,7	22,3	22,8
8H	4H	20,8	21,6	21,4	22,0	22,4	20,6	21,4	21,1	21,8	22,2
	6H	21,6	22,3	22,2	22,7	23,3	21,4	22,0	21,9	22,5	23,0
	8H	22,0	22,5	22,5	23,1	23,7	21,7	22,2	22,2	22,7	23,4
	12H	22,2	22,7	22,8	23,2	23,9	21,9	22,3	22,5	22,8	23,5
12H	4H	20,8	21,5	21,4	22,0	22,5	20,6	21,3	21,1	21,7	22,2
	6H	21,7	22,3	22,3	22,8	23,5	21,4	22,0	22,0	22,5	23,2
	8H	22,1	22,5	22,7	23,1	23,7	21,8	22,2	22,4	22,7	23,4

Variations with the observer position for the luminaire spacings, S:		
S = 1.0H	0,1 / -0,1	0,1 / -0,1
S = 1.5H	0,1 / -0,2	0,1 / -0,2
S = 2.0H	0,4 / -0,4	0,4 / -0,5

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	101	101	101	99
1	108	103	99	95	105	101	97	93	96	93	90	92	90	87	89	86	84	82
2	98	90	83	77	95	88	81	76	84	79	74	81	76	72	77	74	70	68
3	89	79	70	64	87	77	69	63	74	67	62	71	65	60	68	63	59	57
4	82	69	61	54	79	68	60	53	65	58	52	63	57	52	61	55	51	49
5	75	62	53	46	73	61	52	46	59	51	45	56	50	45	54	49	44	42
6	69	56	47	40	67	55	46	40	53	45	39	51	44	39	49	43	39	37
7	64	50	42	35	62	50	41	35	48	40	35	46	40	35	45	39	34	32
8	60	46	37	32	58	45	37	31	44	36	31	43	36	31	41	35	31	29
9	56	42	34	28	54	42	34	28	40	33	28	39	33	28	38	32	28	26
10	52	39	31	26	51	38	31	26	37	30	25	36	30	25	35	29	25	23

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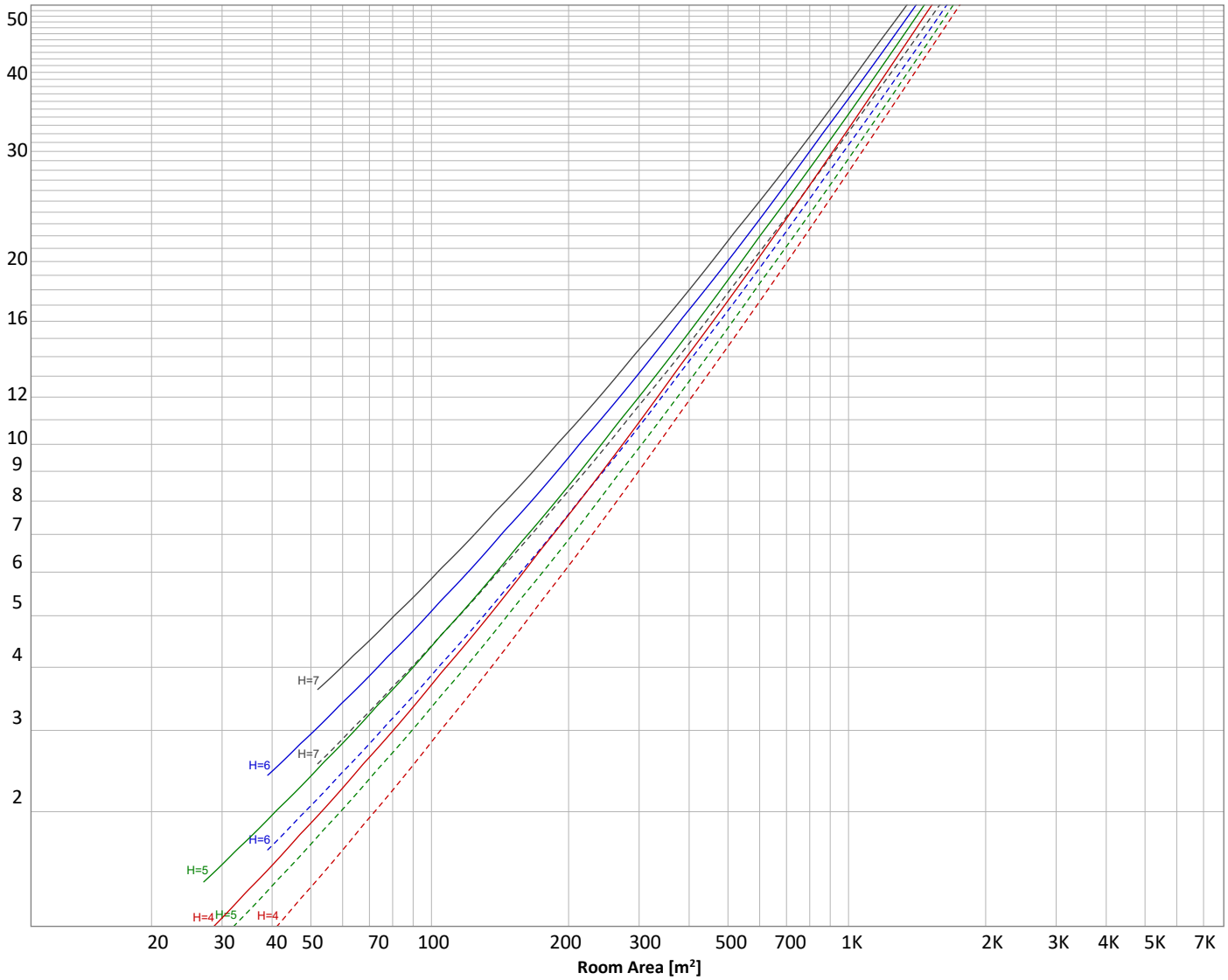
Luminaire budgetary diagram

Uncorrected, comprehensive UGR table according to 117-1995

LAMPS (number of lamps)



Conditions

H = Room height	Flux = 3797 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°
121 lm	347 lm	528 lm	643 lm	669 lm	610 lm	472 lm	282 lm	88,1 lm

90°-100°	100°-110°	110°-120°	120°-130°	130°-140°	140°-150°	150°-160°	160°-170°	170°-180°
6,39 lm	5,32 lm	5,50 lm	5,37 lm	4,85 lm	4,21 lm	3,35 lm	2,13 lm	0,728 lm

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Outdoor Light Planning

Lumen per Zone

Zone (γ)	Lumen	% Total
0-10°	121 lm	3,2%
10-20°	347 lm	9,1%
20-30°	528 lm	13,9%
30-40°	643 lm	16,9%
40-50°	669 lm	17,6%
50-60°	610 lm	16,1%
60-70°	472 lm	12,4%
70-80°	282 lm	7,4%
80-90°	88 lm	2,3%
90-100°	6 lm	0,2%
100-110°	5 lm	0,1%
110-120°	6 lm	0,1%
120-130°	5 lm	0,1%
130-140°	5 lm	0,1%
140-150°	4 lm	0,1%
150-160°	3 lm	0,1%
160-170°	2 lm	0,1%
170-180°	1 lm	0,0%
Total	3797 lm	100,0%

Intensity peaks

Max intensity	1275 cd
Intensity, 90°	15 cd
Intensity, 0°	1274 cd

Zonal Lumen summary

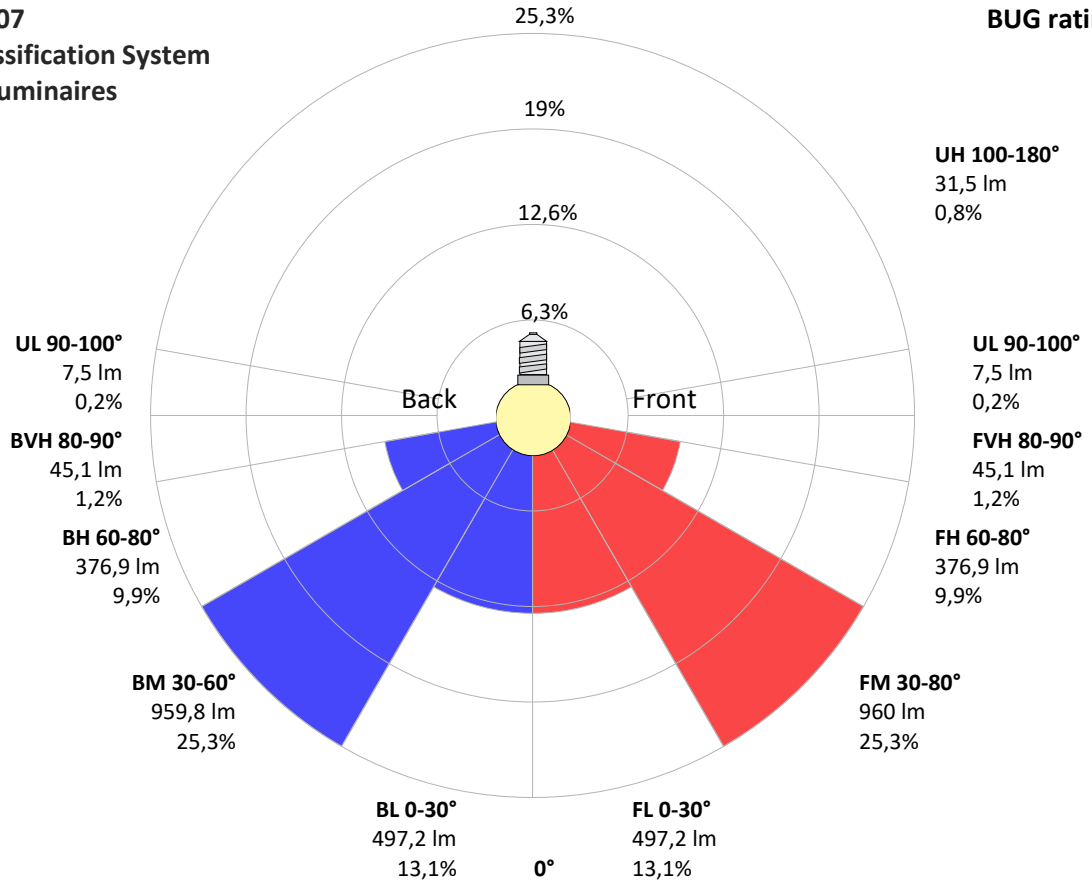
Zone (γ)	Lumen	% Total
0-30°	995 lm	26,2%
0-40°	1638 lm	43,1%
0-60°	2917 lm	76,8%
60-90°	842 lm	22,2%
70-100°	376 lm	9,9%
90-120°	17 lm	0,5%
0-90°	3759 lm	99,0%
90-180°	38 lm	1,0%
0-180°	3797 lm	100,0%

BUG rating

	Lumen	% Total
Forward light		
Low(0-30°)	497 lm	13,1%
Medium(30-60°)	960 lm	25,3%
High(60-80°)	377 lm	9,9%
Very high(80-90°)	45 lm	1,2%
Back light		
Low(0-30°)	497 lm	13,1%
Medium(30-60°)	960 lm	25,3%
High(60-80°)	377 lm	9,9%
Very high(80-90°)	45 lm	1,2%
Uplight		
Low(90-100°)	7 lm	0,2%
High(100-180°)	31 lm	0,8%

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

BUG rating B1 U2 G1



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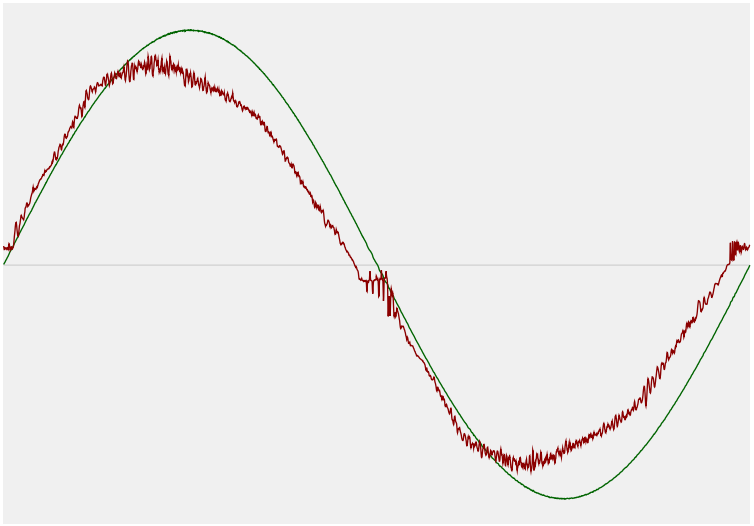
Power Details

Input Power

Power feed to light source	43,2 W
Frequency of input power	50 Hz
RMS Input voltage feed, V_{RMS}	230 V
RMS Input current feed, I_{RMS}	0,191 A
Volt-Ampere or apparent power = V_{RMS}*I_{RMS}	43,85 VA
Displacement factor of AC power feed	0,98
Power factor of AC current feed	0,99
Total harmonic distortion of the current	6,44%
Total harmonic distortion of the voltage	0,07%

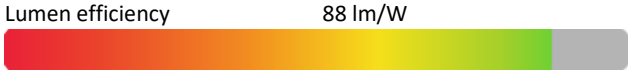
Input Power Curve



Efficiency

Radiated power efficiency 26,2%

Lumen efficiency 88 lm/W



Stabilization Details

Warmup Conditions

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

Color Temperature Change

CCT start	3998 K
CCT shift	+2 K
CCT end	4000 K

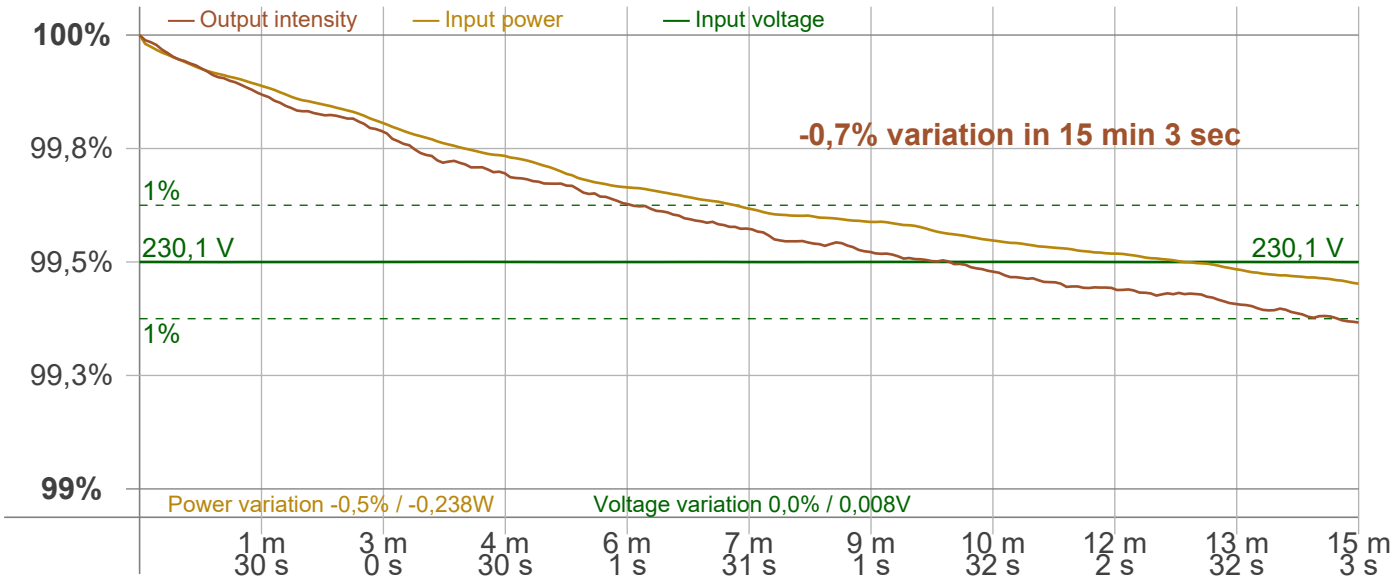
Warmup Result

Total warmup time	Lamp stabilized in 15 min 3 sec
Warmup variation	-0,7%

Output Change

Output start	3822 lm
Output change	-25 lm
Output end	3797 lm

Stabilization Curve



Light Measurement Report

Print date: 14-10-2024
Measurement date and time: 14-10-2024 12:16:47 – Measurement no. VFR-241014-1246-MS
Measurement tracking No. and Link: VT241014-006167
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	100,5 Hz
Percent Flicker	0,54 %
Flicker index	0

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

PstLM value (F < 80 Hz)	0,04
SVM value (80 < F < 2000 Hz)	0,02

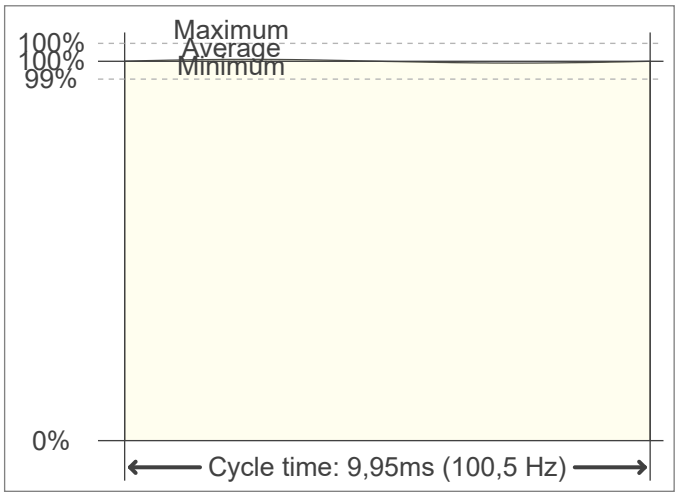
Flicker indices according to California Energy Commission (CEC) 2016b

JA8/10 40 Hz	0,04 %
JA8/10 90 Hz	0,04 %
JA8/10 200 Hz	0,53 %
JA8/10 400 Hz	0,54 %
JA8/10 1000 Hz	0,54 %

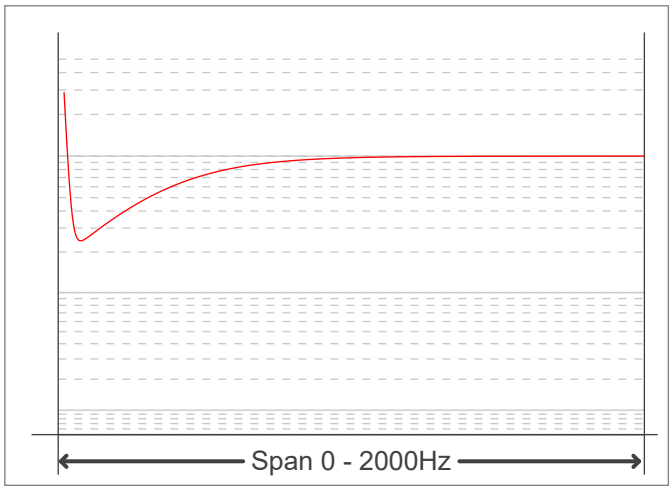
Flicker indices according to Lighting Research Center (2015)

Perception metric, Assist Mp	0,02

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



Flicker FFT (flicker curve in frequency domain)



IEEE 1789 Frequency/modulation plot