Light Measurement Report

Print date: 7-5-2025
Measurement date and time: 7-5-2025 14:38:13 – Measurement no. VFR-250507-1132-MS
Measurement tracking No. and Link: VT250507-004406
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

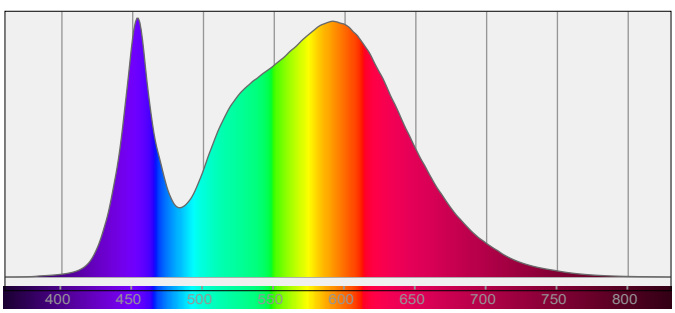
Number of C-planes and Resolution	44 planes – 8,18°
γ (gamma)-Resolution	5°
Test Distance	2,00 m
Input Power, Power and Displ. Factors	28,4 W – PF 0,97 – DPF 0,98
Input RMS Voltage and Current	230 V – 0,127 A
Frequency of Input Power	50 Hz
Warm-up Time and Variation	Lamp stabilized in 33 min 44 sec – 2,0%

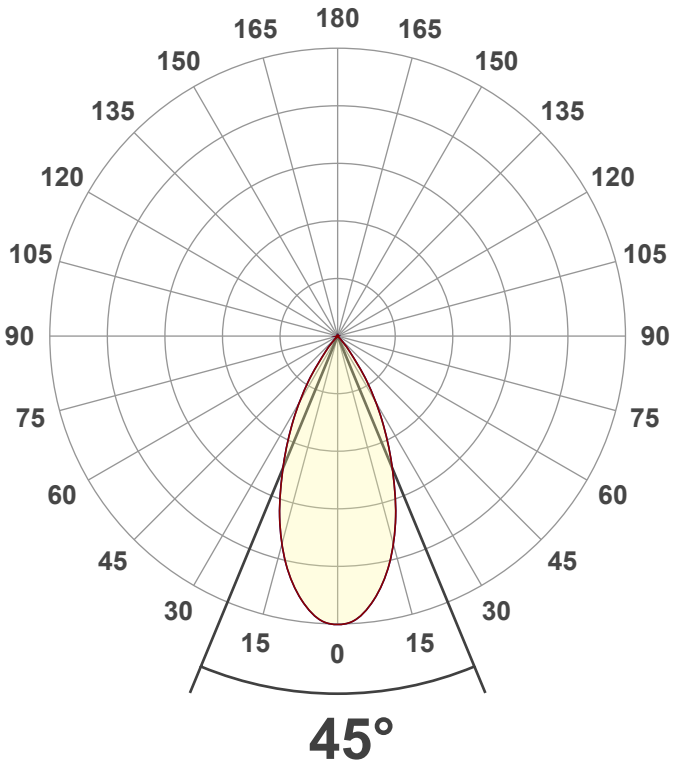
Tested Light Source

Product Name	845697-4000K
Item No. and Manufacturer	845697-4000K – Dutchfulfillment
Product Description (line 1)	3-FASE RAILSPOT ELARA 30W WIT

Main Light Measurement Results

Output – Total Lumen (Up% / Down%)	2276 lm – 0,05% / 99,95%
Efficiency	80 lm/W
Peak Intensity and Beam Angle	3899 cd – 45°
Correlated Color Temperature, Target/Measured	CCT = 4000 K / 4041 K
Color Rendering Index	CRI 81,2
Color Rendering TM30-18	R_f 82,8 – R_g 94,6
Color Shift, CIE duv and MacAdam Steps	Duv 0,0020 – SDCM 1,7
Flicker	SVM 0 – PstLM 0,02





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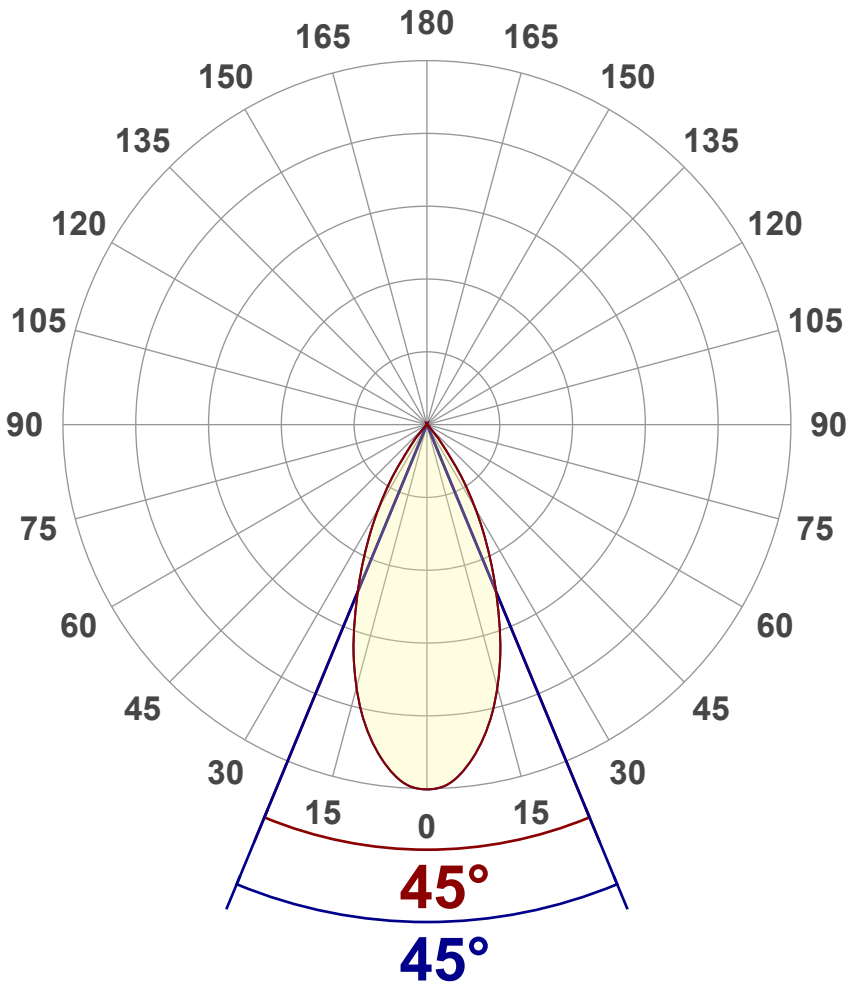
Luminous Intensity diagram Unit: 0-100% of peak intensity



Main Values

Output (total Lumen)	2276 lm
Lumen Up% / Down%	0,05% / 99,95%
Peak Intensity	3899 cd
Beam Angle (50%)	45°
Beam Angle (90%)	45°
Beam Angle (10%)	45°

Cut-off Angle

Average 2,5%	83,6°

Field Angle

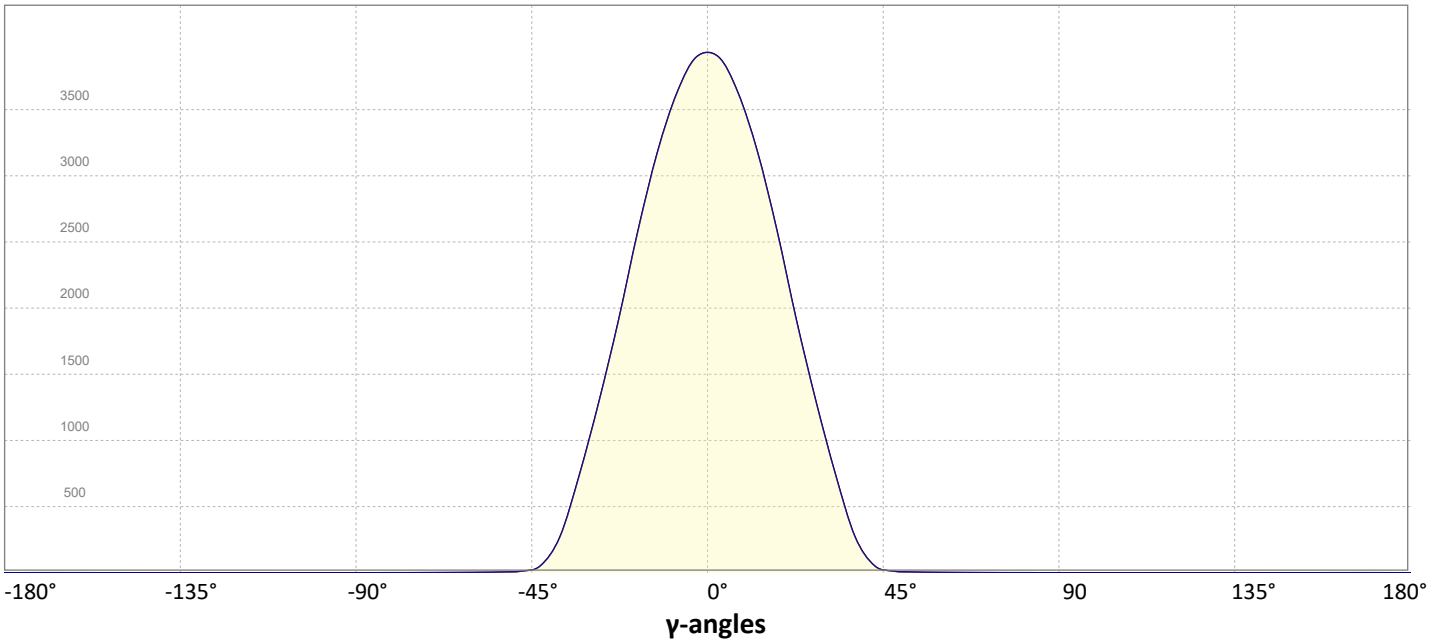
Average 10%	73,1°

Intensity Ratio

In 120° cone	99,7%
In 90° cone	99,3%

C000-C180
C090-C270

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



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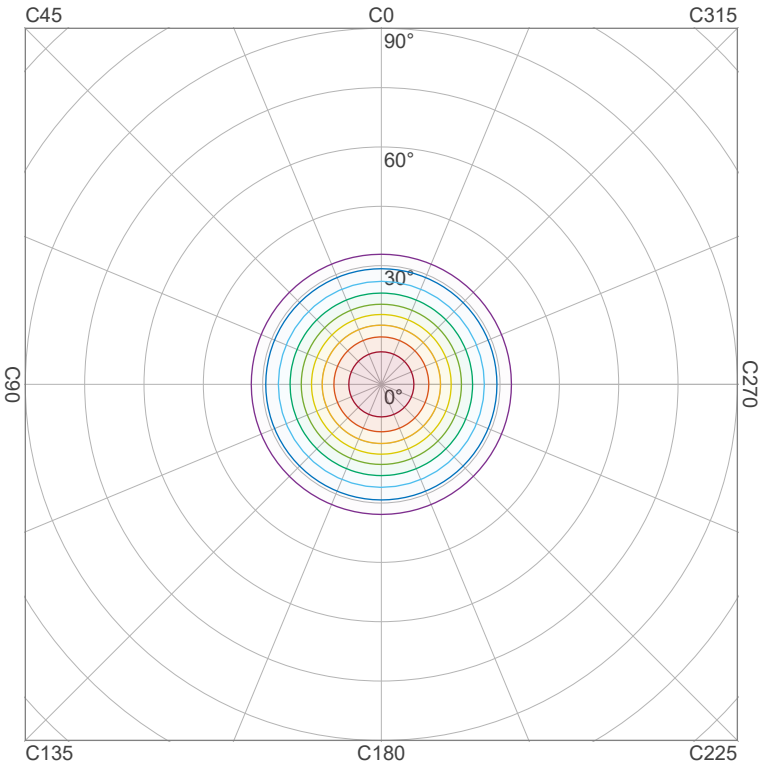
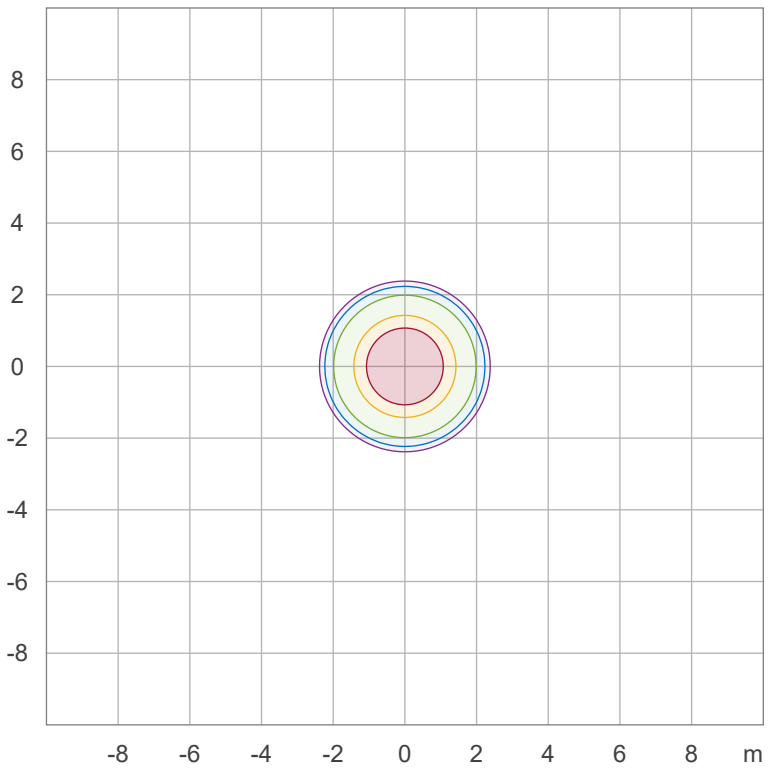
Iso-intensity Diagram (Iso-candela)



90 %	3509,2 cd
80 %	3119,3 cd
70 %	2729,4 cd
60 %	2339,5 cd
50 %	1949,6 cd
40 %	1559,7 cd
30 %	1169,7 cd
20 %	779,8 cd
10 %	389,9 cd

Peak intensity: 3899,1 cd
Number of c-planes: 44

Iso-illuminance Diagram (Iso-lux)



50,0 %	216,6 lx
30,0 %	130,0 lx
10,0 %	43,3 lx
5,0 %	21,7 lx
3,0 %	13,0 lx

Peak illuminance: 433,2 lx
Mounting height: 3,0 m
Number of c-planes: 44

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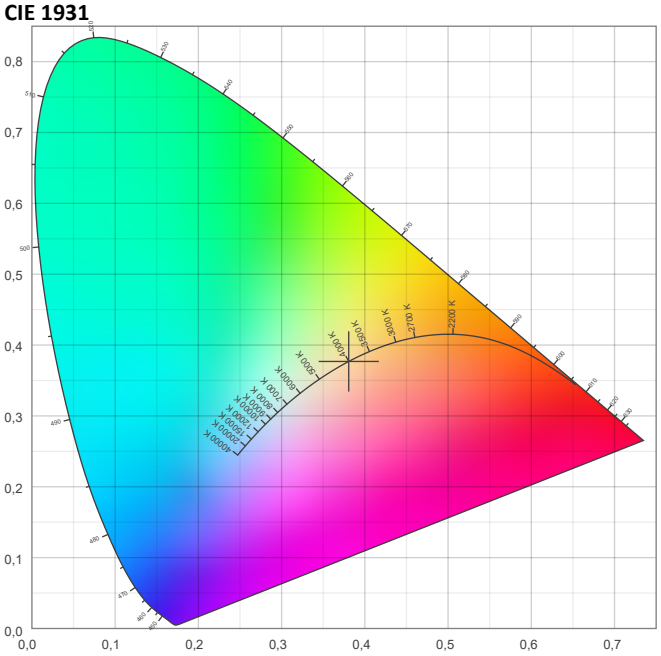
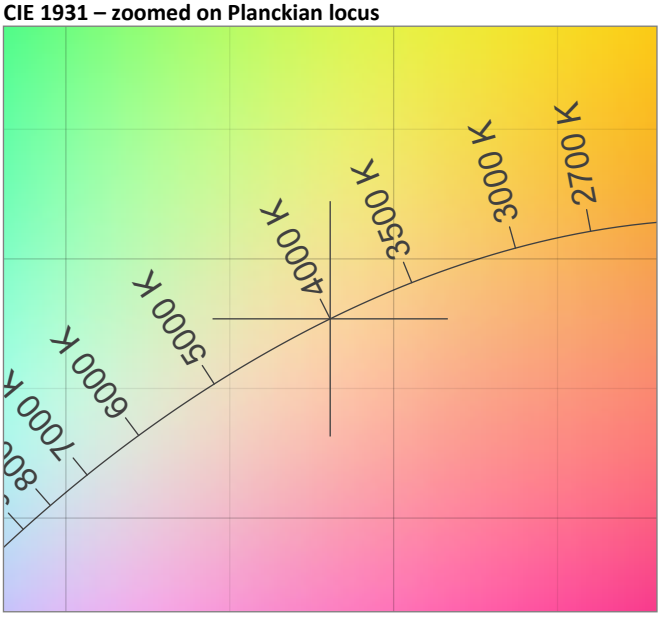
Color details

Correlated Color Temperature, Target	CCT = 4000 K
Correlated Color Temperature, Measured	CCT = 4041 K
Color Rendering Index	CRI 81,2
Color Rendering Index, R9 (red component)	R9 = 2,9
Color Rendering TM30-18	R_f 82,8 – R_g 94,6
Color Quality Scale	CQS = 80,6
MacAdam Steps	SDCM = 1,7
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 = 0,0020
Color coordinate CIEs 1976 (CIELUV)	(u';v') = (0,225;0,502)

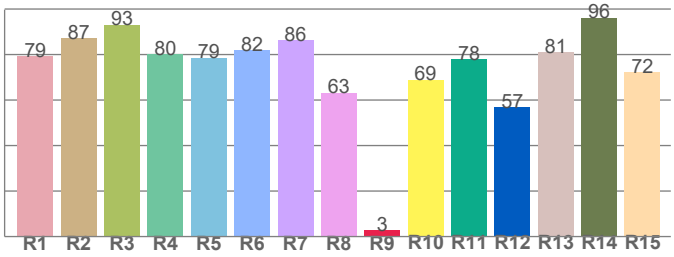
CIE 1931



CIE 1931 – zoomed on Planckian locus



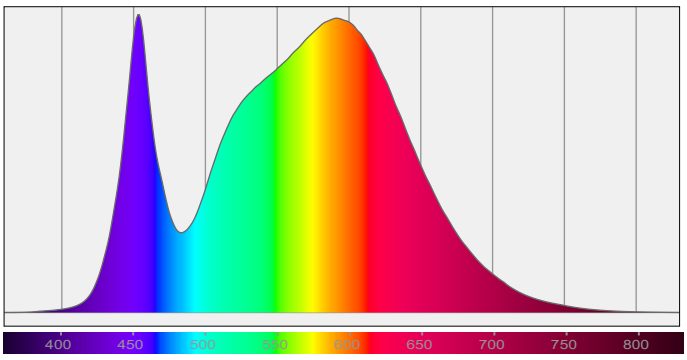
Color Rendering Index per reference color (CIE 1995)



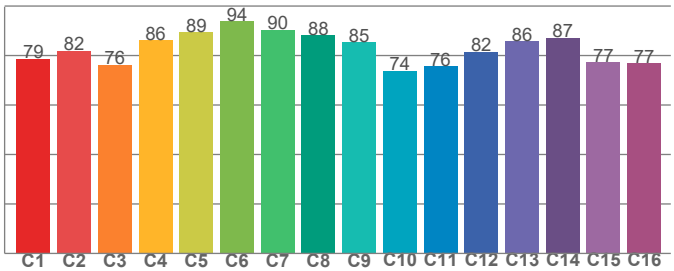
CRI R values, only R1-R8 are used to calculate final CRI value

R1	R2	R3	R4	R5	R6	R7	R8	R9	R10	R11	R12	R13	R14	R15
79,1	87,2	93,1	80,0	78,6	82,0	86,2	63,3	2,9	69,0	77,9	56,9	81,1	96,1	72,3

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



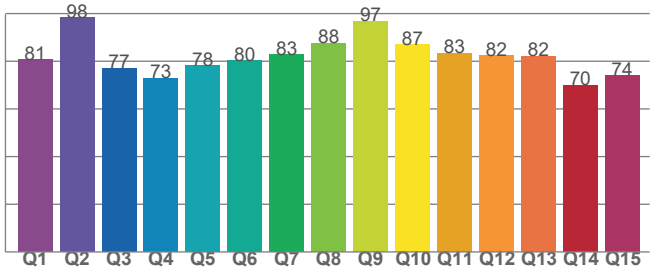
TM30-18 Rf-values per hue bin



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
78,8	82,0	76,3	86,1	89,3	93,8	90,5	88,1	85,3	73,9	75,6	81,6	85,7	87,2	77,2	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
80,7	98,3	77,1	72,9	78,2	80,2	82,8	87,6	96,9	86,9	83,4	82,4	82,1	70,0	73,9

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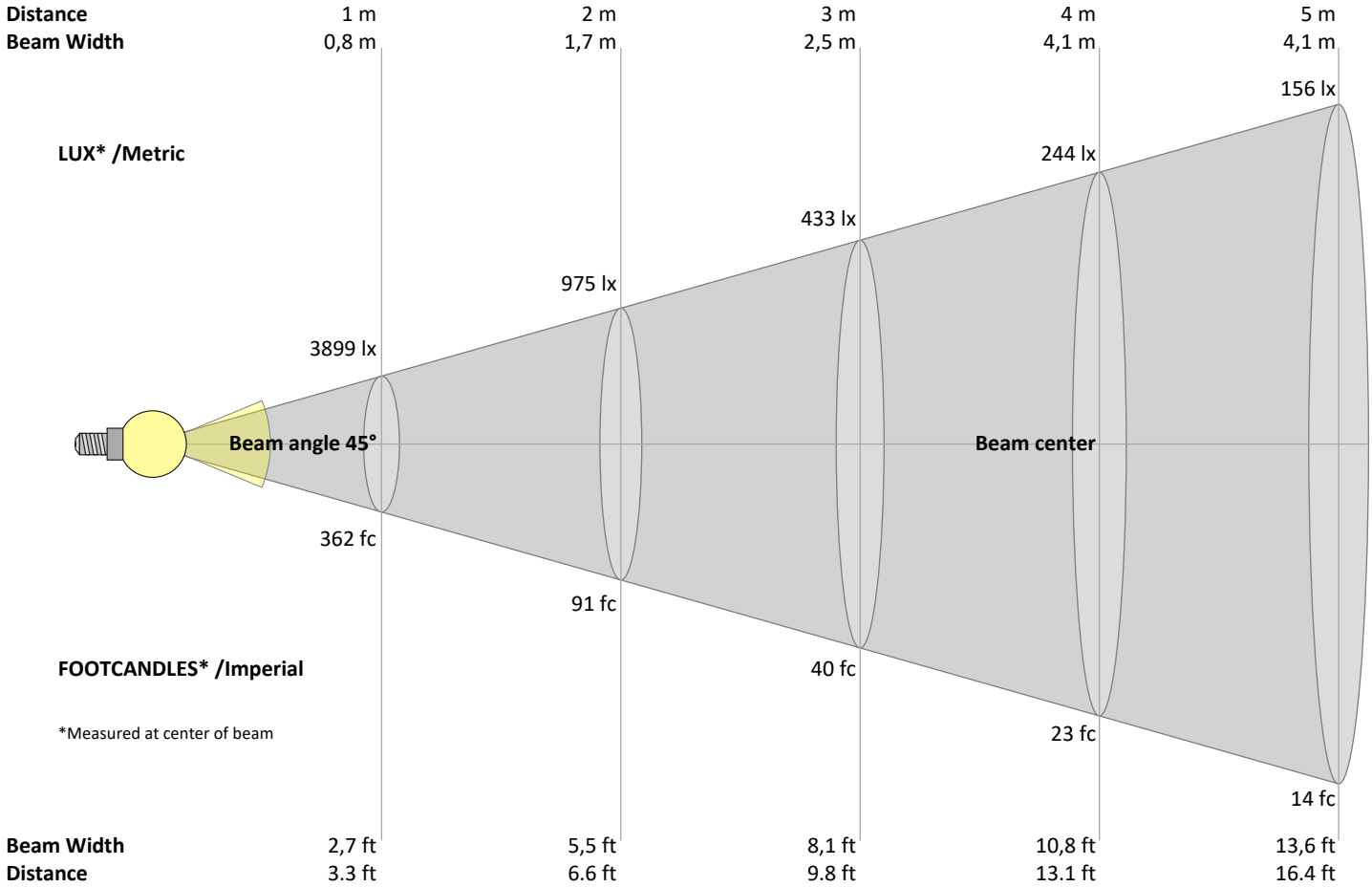
Beam Details



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
3899	975	433	244	156	108	80	61	48	39	32	27	23	20	17	15	13	12	11	10	lux
362,2	90,6	40,2	22,6	14,5	10,1	7,4	5,7	4,5	3,6	3	2,5	2,1	1,8	1,6	1,4	1,3	1,1	1	0,9	fc

Intensities in 0° c-plane

0°	2°	4°	6°	8°	10°	12°	14°	16°	18°	20°	22°	24°	26°	28°	30°	32°	34°	36°	38°	γ
3899	3899	3834	3726	3611	3432	3253	3039	2801	2560	2288	2016	1760	1515	1272	1051	830	629	441	263	cd
100%	100%	98%	96%	93%	88%	83%	78%	72%	66%	59%	52%	45%	39%	33%	27%	21%	16%	11%	7%	of 0°val

Intensities in 90° c-plane

0°	2°	4°	6°	8°	10°	12°	14°	16°	18°	20°	22°	24°	26°	28°	30°	32°	34°	36°	38°	γ
3899	3899	3834	3726	3611	3432	3253	3039	2801	2560	2288	2016	1760	1515	1272	1051	830	629	441	263	cd
100%	100%	98%	96%	93%	88%	83%	78%	72%	66%	59%	52%	45%	39%	33%	27%	21%	16%	11%	7%	of 0°val

Intensities in 180° c-plane

0°	2°	4°	6°	8°	10°	12°	14°	16°	18°	20°	22°	24°	26°	28°	30°	32°	34°	36°	38°	γ
3899	3899	3834	3726	3611	3432	3253	3039	2801	2560	2288	2016	1760	1515	1272	1051	830	629	441	263	cd
100%	100%	98%	96%	93%	88%	83%	78%	72%	66%	59%	52%	45%	39%	33%	27%	21%	16%	11%	7%	of 0°val

Intensities in 270° c-plane

0°	2°	4°	6°	8°	10°	12°	14°	16°	18°	20°	22°	24°	26°	28°	30°	32°	34°	36°	38°	γ
3899	3899	3834	3726	3611	3432	3253	3039	2801	2560	2288	2016	1760	1515	1272	1051	830	629	441	263	cd
100%	100%	98%	96%	93%	88%	83%	78%	72%	66%	59%	52%	45%	39%	33%	27%	21%	16%	11%	7%	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	18,7	19,3	18,8	19,5	19,7	18,7	19,3	18,8	19,5	19,7
	3H	18,4	19,1	18,8	19,3	19,5	18,4	19,1	18,8	19,3	19,5
	4H	18,4	19,0	18,8	19,3	19,5	18,4	19,0	18,8	19,3	19,5
	6H	18,4	18,9	18,7	19,2	19,6	18,4	18,9	18,7	19,2	19,6
	8H	18,3	18,9	18,6	19,2	19,6	18,3	18,9	18,6	19,2	19,6
	12H	18,3	18,8	18,6	19,1	19,6	18,3	18,8	18,6	19,1	19,6
4H	2H	18,4	19,0	18,8	19,3	19,5	18,4	19,0	18,8	19,3	19,5
	3H	18,3	18,8	18,6	19,1	19,6	18,3	18,8	18,6	19,1	19,6
	4H	18,1	18,6	18,5	19,0	19,5	18,1	18,6	18,5	19,0	19,5
	6H	18,0	18,6	18,5	18,9	19,2	18,0	18,6	18,5	18,9	19,2
	8H	18,0	18,5	18,5	18,8	19,2	18,0	18,5	18,5	18,8	19,2
	12H	17,9	18,3	18,4	18,7	19,2	17,9	18,3	18,4	18,7	19,2
8H	4H	18,0	18,5	18,5	18,8	19,2	18,0	18,5	18,5	18,8	19,2
	6H	17,9	18,2	18,4	18,7	19,2	17,9	18,2	18,4	18,7	19,2
	8H	17,9	18,2	18,4	18,7	19,3	17,9	18,2	18,4	18,7	19,3
	12H	17,8	18,0	18,4	18,6	19,2	17,8	18,0	18,4	18,6	19,2
12H	4H	17,9	18,3	18,4	18,7	19,1	17,9	18,3	18,4	18,7	19,1
	6H	17,9	18,2	18,4	18,7	19,3	17,9	18,2	18,4	18,7	19,3
	8H	17,8	18,0	18,4	18,6	19,2	17,8	18,0	18,4	18,6	19,2

Variations with the observer position for the luminaire spacings, S:		
S = 1.0H	5,9 / -17,9	5,9 / -17,9
S = 1.5H	8,7 / -18,6	8,7 / -18,6
S = 2.0H	10,7 / -19,0	10,7 / -19,0

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	114	112	109	107	112	109	107	106	105	104	102	102	100	99	98	97	96	95
2	109	105	101	98	107	103	100	97	100	97	95	97	95	93	94	93	91	89
3	104	99	94	91	103	97	93	90	95	91	89	92	90	87	90	88	86	84
4	100	93	88	85	98	92	88	84	90	86	83	88	85	82	86	84	81	80
5	96	88	83	79	94	87	83	79	86	81	78	84	80	78	83	79	77	76
6	92	84	78	75	90	83	78	74	82	77	74	80	76	73	79	76	73	72
7	88	80	74	70	87	79	74	70	78	73	70	77	73	70	75	72	69	68
8	84	76	70	67	83	75	70	67	74	70	66	73	69	66	72	69	66	65
9	81	72	67	63	80	72	67	63	71	66	63	70	66	63	69	65	63	61
10	78	69	64	60	77	69	64	60	68	63	60	67	63	60	66	62	60	59

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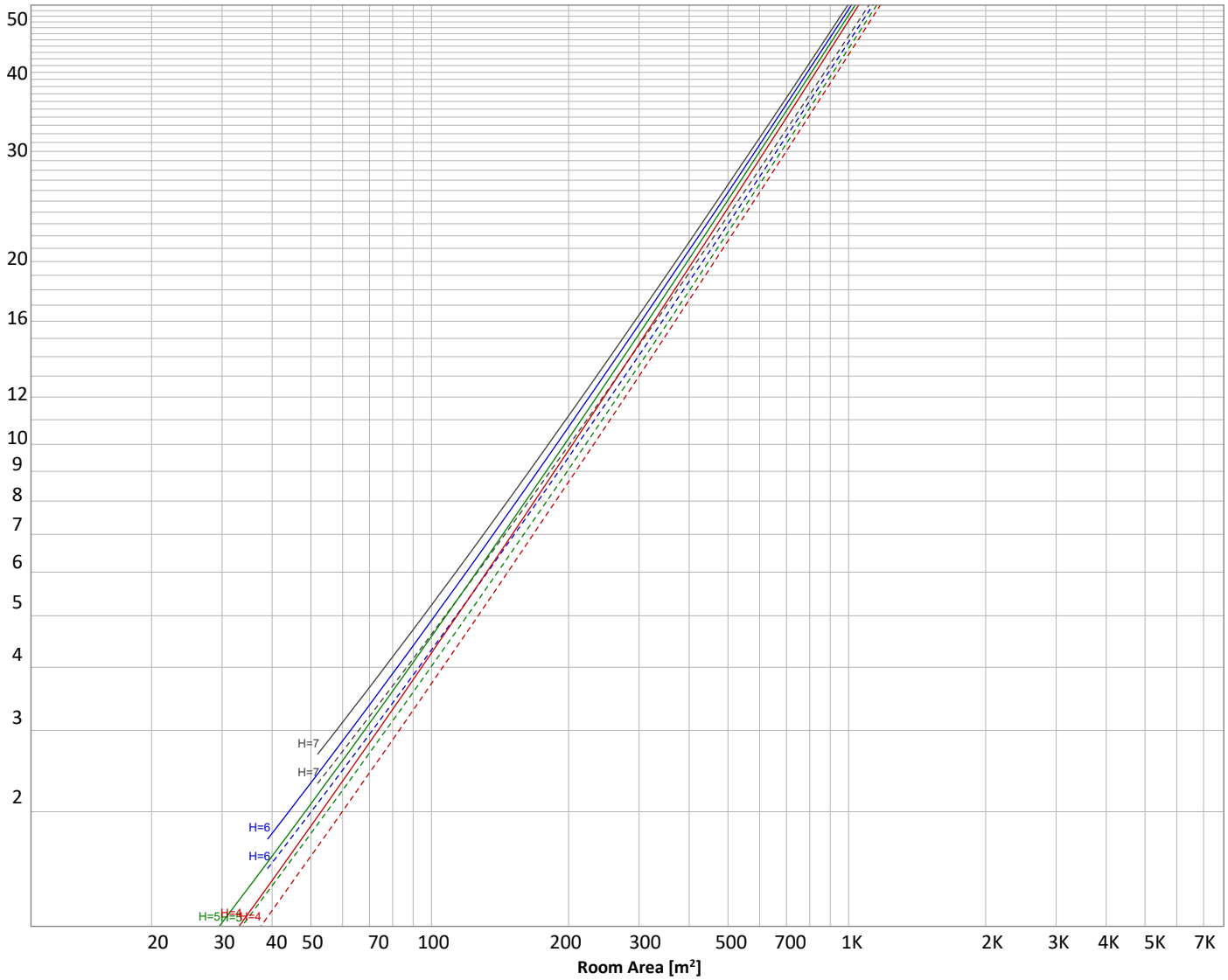
Luminaire budgetary diagram

Uncorrected, comprehensive UGR table according to 117-1995

LAMPS (number of lamps)



Conditions

H = Room height	Flux = 2276 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°
354 lm	812 lm	744 lm	327 lm	29,8 lm	4,34 lm	2,38 lm	1,40 lm	0,831 lm

90°-100°	100°-110°	110°-120°	120°-130°	130°-140°	140°-150°	150°-160°	160°-170°	170°-180°
0,025 lm	0,000 lm	0,004 lm	0,001 lm	0,070 lm	0,234 lm	0,366 lm	0,292 lm	0,090 lm

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Outdoor Light Planning

Lumen per Zone

Zone (γ)	Lumen	% Total
0-10°	354 lm	15,5%
10-20°	812 lm	35,7%
20-30°	744 lm	32,7%
30-40°	327 lm	14,4%
40-50°	30 lm	1,3%
50-60°	4 lm	0,2%
60-70°	2 lm	0,1%
70-80°	1 lm	0,1%
80-90°	1 lm	0,0%
90-100°	0 lm	0,0%
100-110°	0 lm	0,0%
110-120°	0 lm	0,0%
120-130°	0 lm	0,0%
130-140°	0 lm	0,0%
140-150°	0 lm	0,0%
150-160°	0 lm	0,0%
160-170°	0 lm	0,0%
170-180°	0 lm	0,0%
Total	2276 lm	100,0%

Zonal Lumen summary

Zone (γ)	Lumen	% Total
0-30°	1909 lm	83,9%
0-40°	2236 lm	98,3%
0-60°	2270 lm	99,7%
60-90°	5 lm	0,2%
70-100°	2 lm	0,1%
90-120°	0 lm	0,0%
0-90°	2275 lm	100,0%
90-180°	1 lm	0,0%
0-180°	2276 lm	100,0%

Intensity peaks

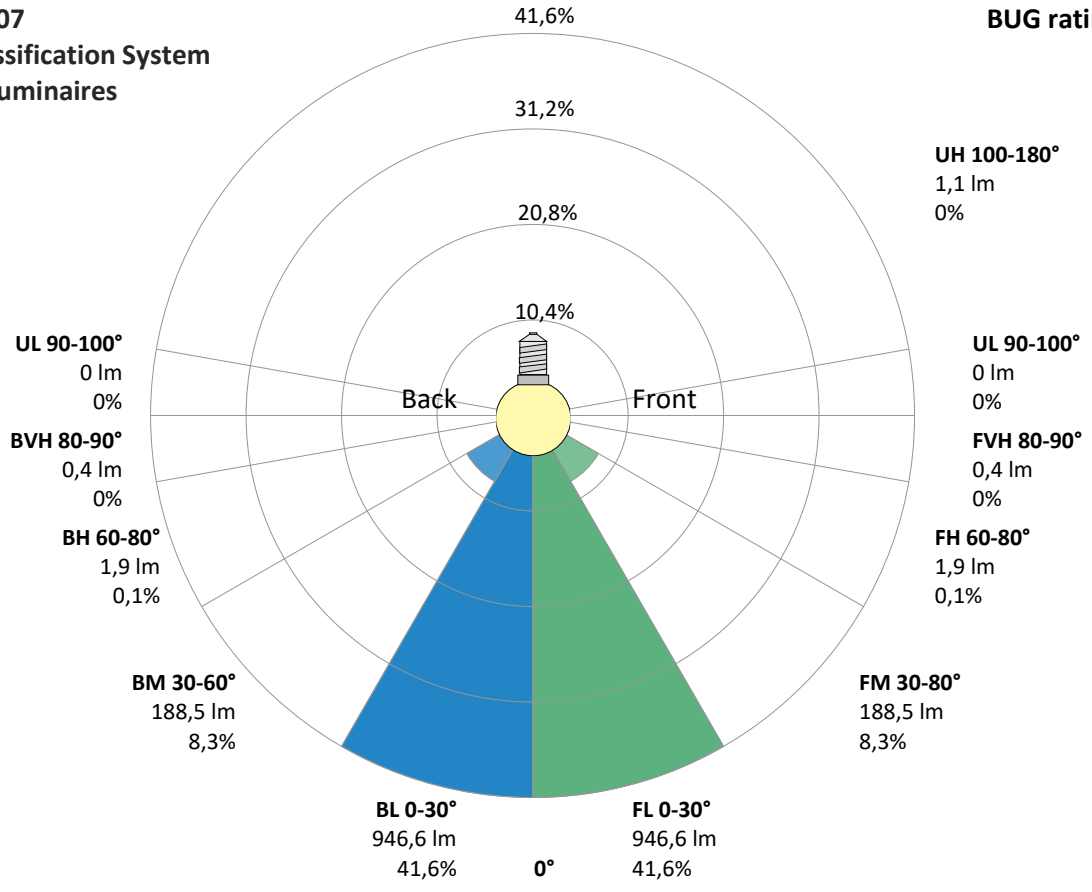
Max intensity	3899 cd
Intensity, 90°	0 cd
Intensity, 0°	3899 cd

BUG rating

	Lumen	% Total
Forward light		
Low(0-30°)	947 lm	41,6%
Medium(30-60°)	189 lm	8,3%
High(60-80°)	2 lm	0,1%
Very high(80-90°)	0 lm	0,0%
Back light		
Low(0-30°)	947 lm	41,6%
Medium(30-60°)	189 lm	8,3%
High(60-80°)	2 lm	0,1%
Very high(80-90°)	0 lm	0,0%
Uplight		
Low(90-100°)	0 lm	0,0%
High(100-180°)	1 lm	0,0%

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

BUG rating B2 U1 G0



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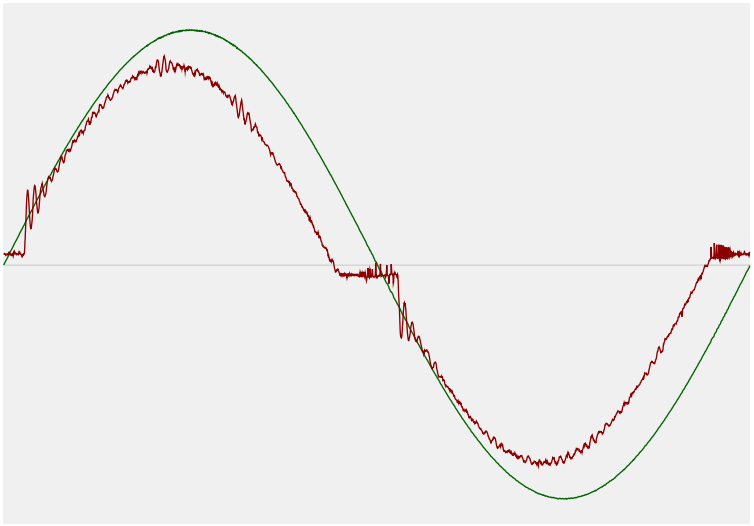
Power Details

Input Power

Power feed to light source	28,4 W
Frequency of input power	50 Hz
RMS Input voltage feed, V_{RMS}	230 V
RMS Input current feed, I_{RMS}	0,127 A
Volt-Ampere or apparent power = V_{RMS}*I_{RMS}	29,21 VA
Displacement factor of AC power feed	0,98
Power factor of AC current feed	0,97
Total harmonic distortion of the current	13,05%
Total harmonic distortion of the voltage	0,08%

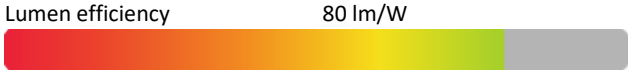
Input Power Curve



Efficiency

Radiated power efficiency 24,1%

Lumen efficiency 80 lm/W



Stabilization Details

Warmup Conditions

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

Color Temperature Change

CCT start	3958 K
CCT shift	+42 K
CCT end	4000 K

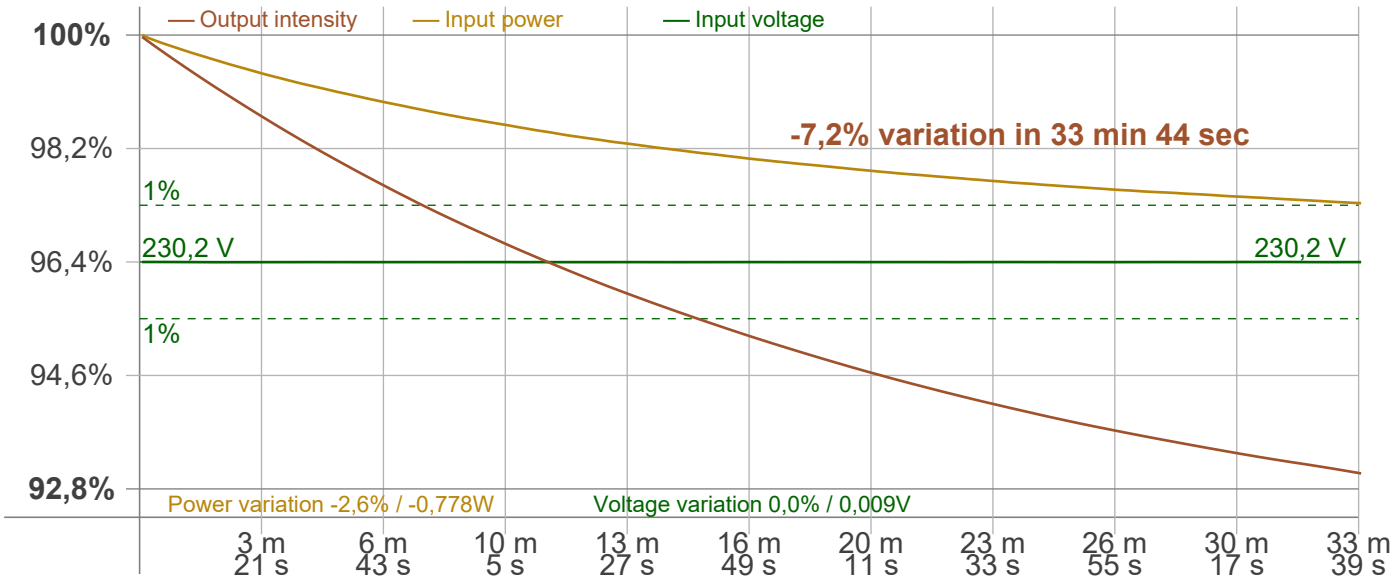
Warmup Result

Total warmup time	Lamp stabilized in 33 min 44 sec
Warmup variation	-7,2%

Output Change

Output start	2450 lm
Output change	-174 lm
Output end	2276 lm

Stabilization Curve



Light Measurement Report

Print date: 7-5-2025
Measurement date and time: 7-5-2025 14:38:13 – Measurement no. VFR-250507-1132-MS
Measurement tracking No. and Link: VT250507-004406
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	0,08 %
Flicker index	0

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

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

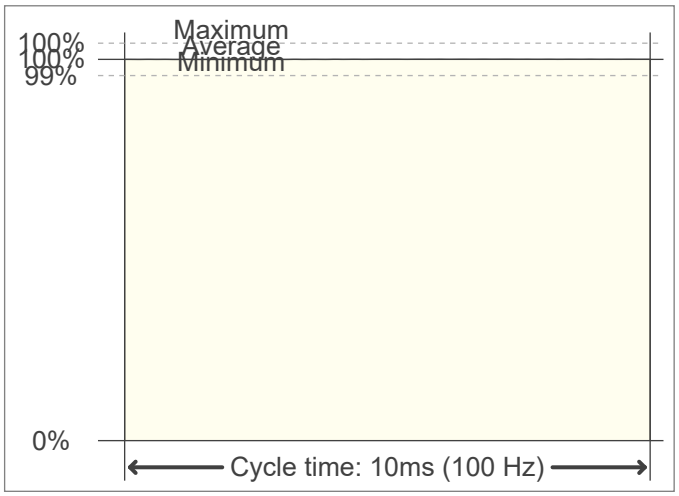
Flicker indices according to California Energy Commission (CEC) 2016b

JA8/10 40 Hz	0,02 %
JA8/10 90 Hz	0,02 %
JA8/10 200 Hz	0,05 %
JA8/10 400 Hz	0,06 %
JA8/10 1000 Hz	0,06 %

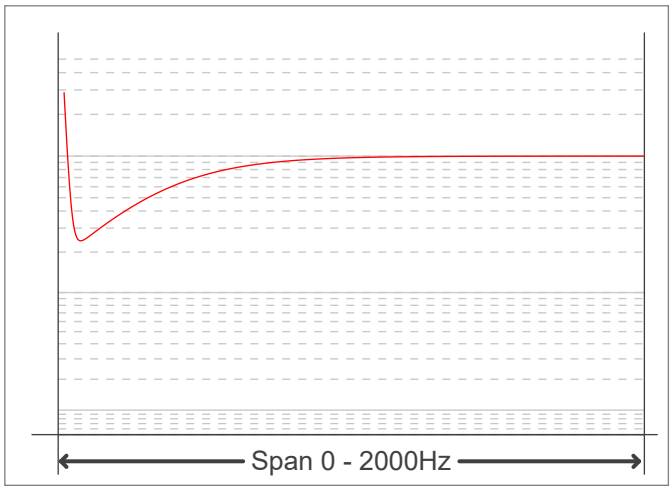
Flicker indices according to Lighting Research Center (2015)

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