

# Light Measurement Report

Print date: 29-9-2025

Measurement date and time: 29-9-2025 08:52:16 – Measurement no. VFR-250929-3412-MS

Measurement tracking No. and Link: [VT250929-007522](#)

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  
 $\gamma$  (gamma)-Resolution  
Test Distance  
Input Power, Power and Displ. Factors  
Input RMS Voltage and Current  
Frequency of Input Power  
Warm-up Time and Variation

44 planes – 8,18°  
5°  
2,89 m  
93,5 W – PF 0,98 – DPF 0,98  
230 V – 0,414 A  
50 Hz  
Lamp stabilized in 15 min 1 sec – 2,0%

## Tested Light Source

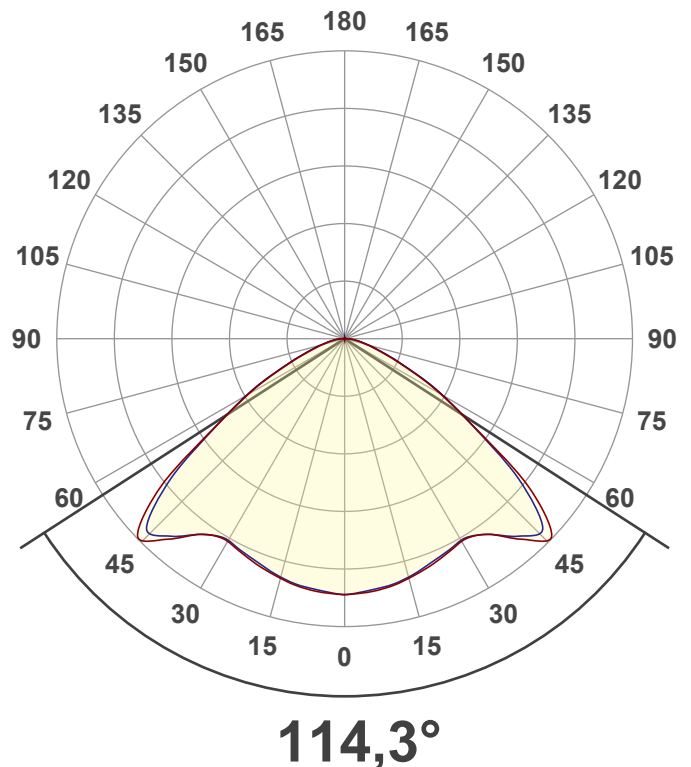
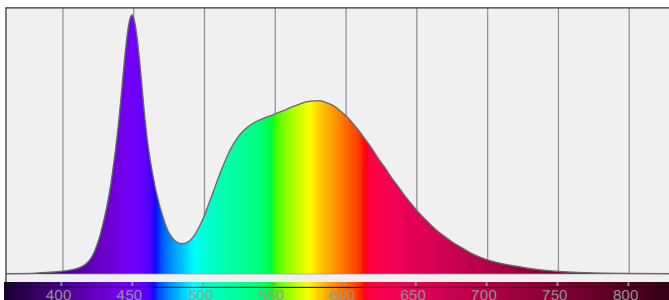
Product Name  
Item No. and Manufacturer  
Product Description (line 1)  
SWITCH

812713-5000K-100W  
812713-5000K-100W – Dutchfulfillment  
LED HIGHBAY ARGOS | 0-10V | 100W/80W/60W | 60°/90°/120° | CCT

## 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

14179 lm – 0,16% / 99,84%  
152 lm/W  
4944 cd – 114,3°  
CCT = 5000 K / 4849 K  
CRI 73,1  
 $R_f$  73,9 –  $R_g$  95,1  
Duv 0,0016 – SDCM 2,9  
SVM 0 – PstLM 0,09



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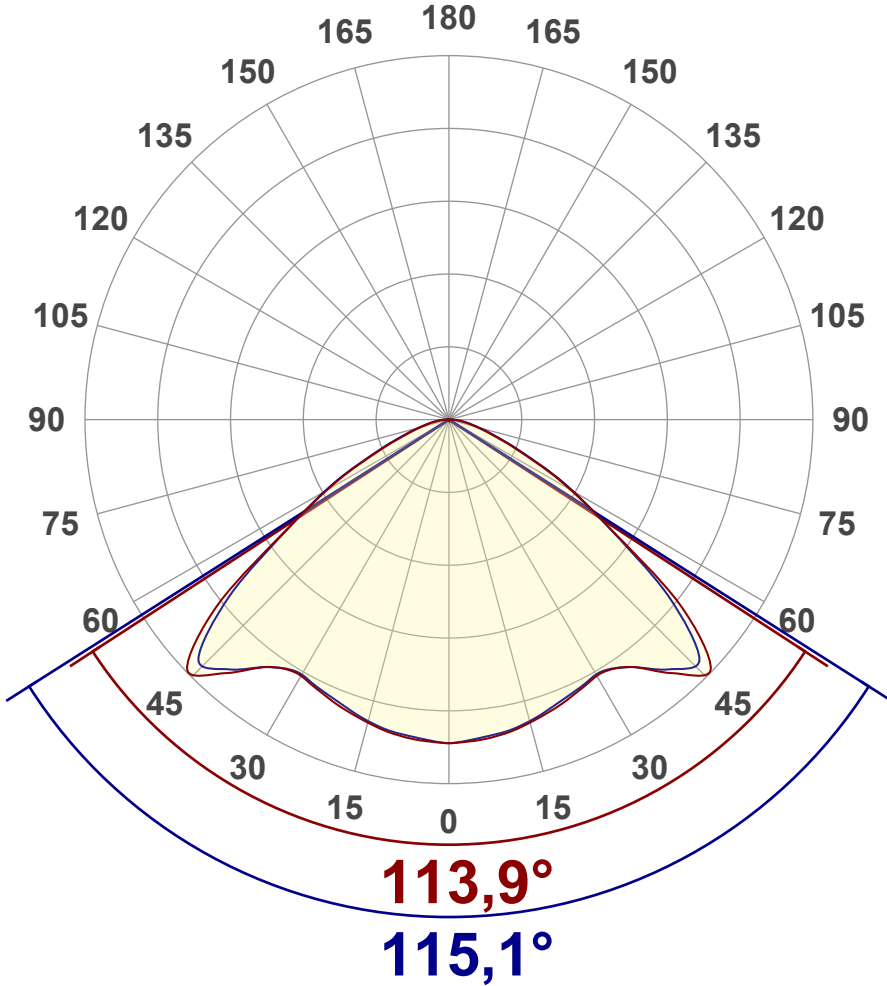
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## Luminous Intensity diagram

Unit: 0-100% of peak intensity



## Main Values

Output (total Lumen)	14179 lm
Lumen Up% / Down%	0,16% / 99,84%
Peak Intensity	4944 cd
Beam Angle (50%)	114,3°
Beam Angle (90%)	115,1°
Beam Angle (10%)	113,6°

## Cut-off Angle

Average 2,5%	171,1°
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## Field Angle

Average 10%	147,4°
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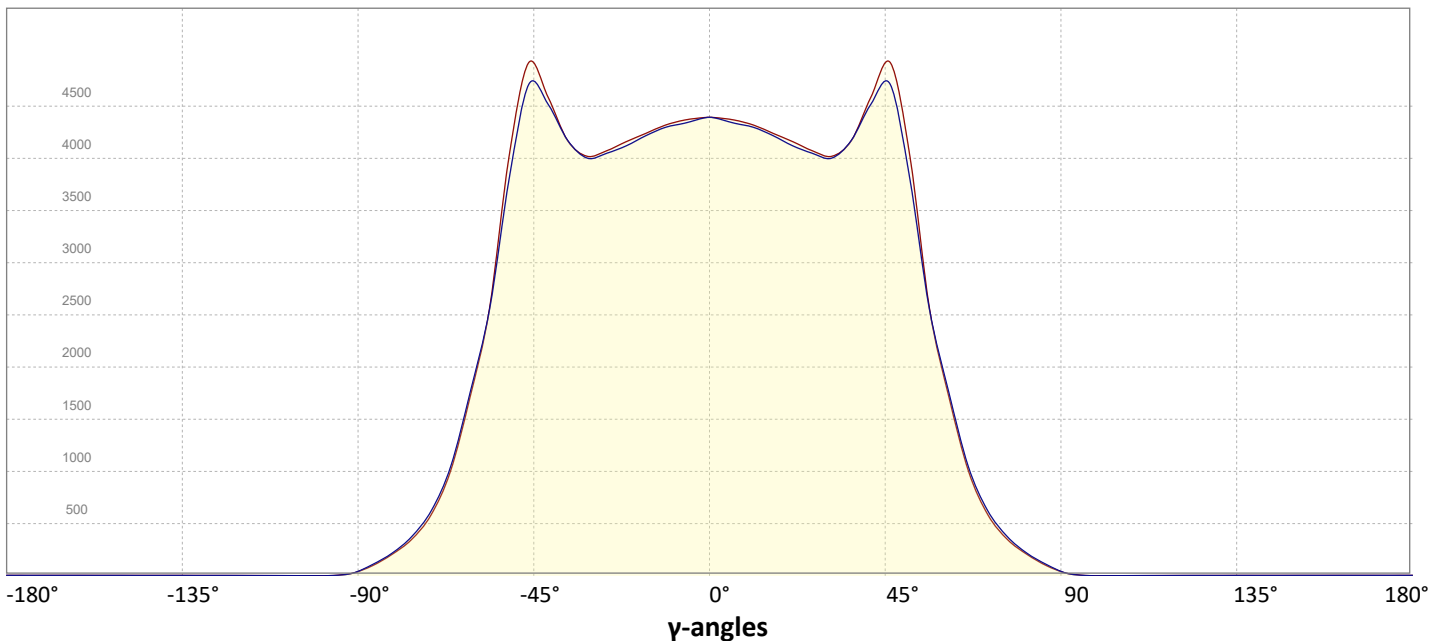
## Intensity Ratio

In 120° cone	87,1%
In 90° cone	55,3%

**C000-C180**

**C090-C270**

## Linear distribution diagram - Intensity (candela) vs $\gamma$ -angle



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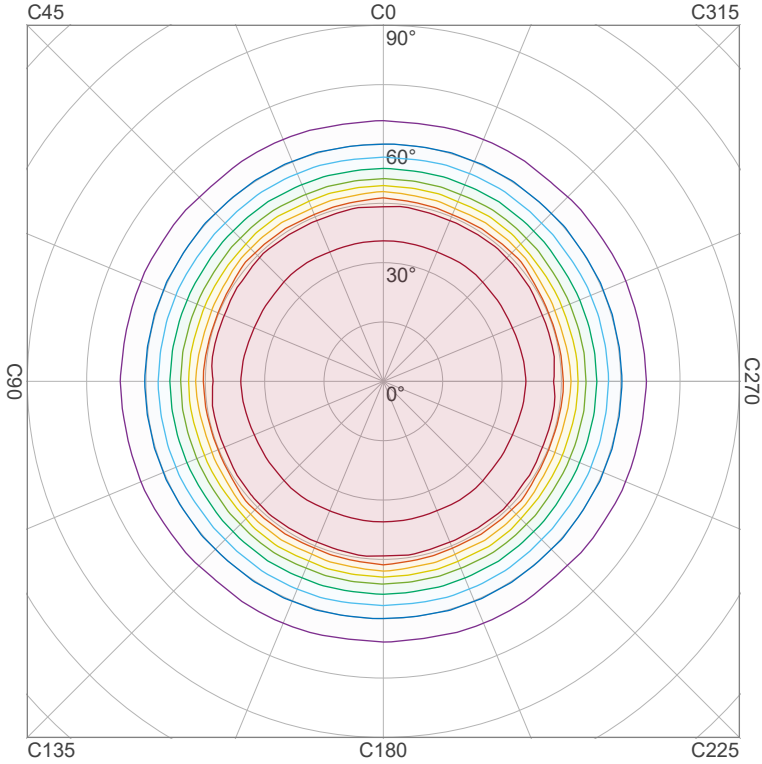
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## Iso-intensity Diagram (Iso-candela)

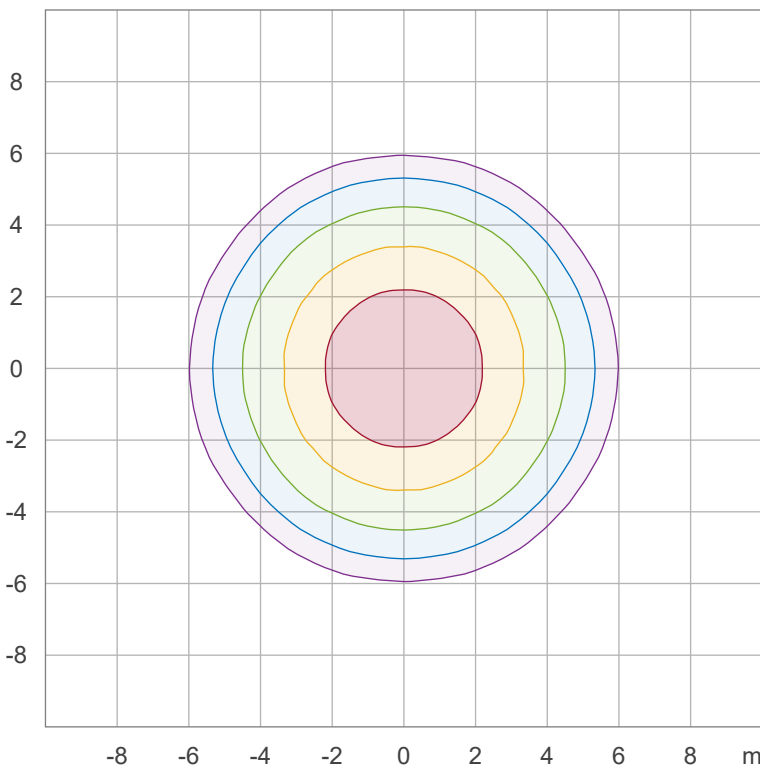


90 %	4429,8 cd
80 %	3937,6 cd
70 %	3445,4 cd
60 %	2953,2 cd
50 %	2461,0 cd
40 %	1968,8 cd
30 %	1476,6 cd
20 %	984,4 cd
10 %	492,2 cd

Peak intensity: 4922,0 cd

Number of c-planes: 44

## Iso-illuminance Diagram (Iso-lux)



50,0 %	244,0 lx
30,0 %	146,4 lx
10,0 %	48,8 lx
5,0 %	24,4 lx
3,0 %	14,6 lx

Peak illuminance: 488,1 lx

Mounting height: 3,0 m

Number of c-planes: 44

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## Color details

Correlated Color Temperature, Target CCT = 5000 K  
 Correlated Color Temperature, Measured CCT = 4849 K  
 Color Rendering Index CRI 73,1  
 Color Rendering Index, R9 (red component) R9 = -27,1  
 Color Rendering TM30-18 R<sub>f</sub> 73,9 – R<sub>g</sub> 95,1  
 Color Quality Scale CQS = 72,1

MacAdam Steps  
 Color coordinates CIE 1931 (x;y) = (0,345;0,352)  
 Color coordinate CIEs 1960 (u;v) = (0,211;0,323)  
 Color deviation from BBL Duv = 0,0016  
 Color coordinate CIEs 1976 (CIELUV) (u';v') = (0,211;0,485)

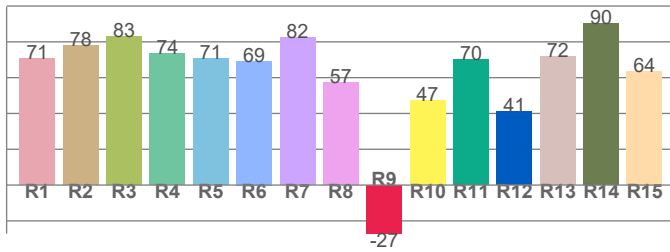
### CIE 1931



### CIE 1931 – zoomed on Planckian locus



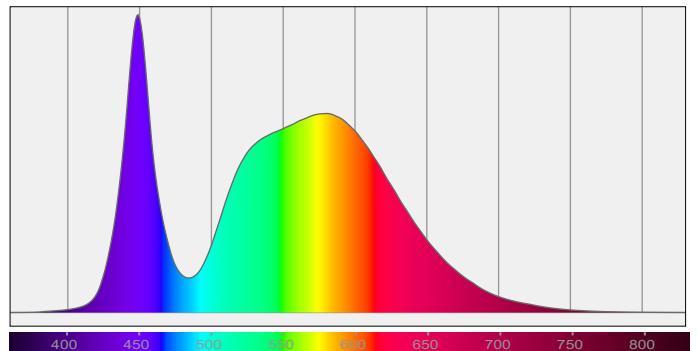
### Color Rendering Index per reference color (CIE 1995)



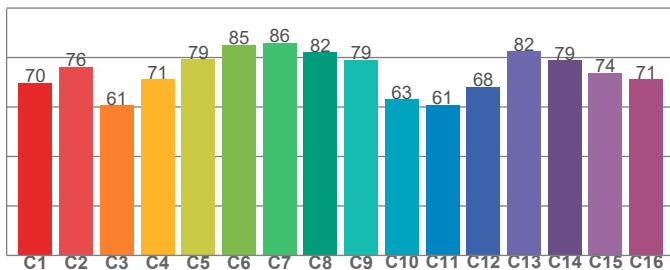
CRI R values, only R1-R8 are used to calculate final CRI value

R1	R2	R3	R4	R5	R6	R7	R8	R9	R10	R11	R12	R13	R14	R15
70,6	78,2	83,1	73,6	70,5	69,3	82,2	57,2	-27,1	47,4	70,0	40,8	71,9	90,4	63,7

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



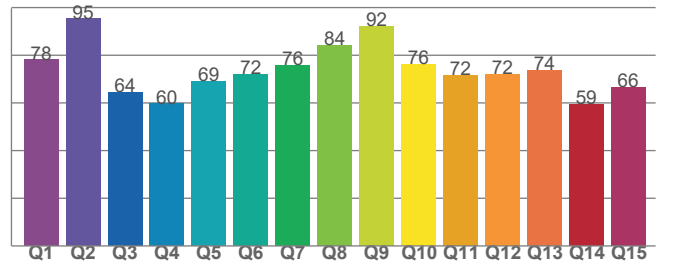
### TM30-18 R<sub>f</sub>-values per hue bin



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
69,8	76,3	60,6	71,2	79,3	85,1	86,0	82,1	79,1	63,2	60,9	68,1	82,4	78,9	73,9	71,2

### Color Quality Scale by reference color



CQS Q values

Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10	Q11	Q12	Q13	Q14	Q15
78,1	95,3	64,4	59,6	69,1	72,1	75,9	84,2	92,2	76,3	71,5	72,1	73,6	59,4	66,5

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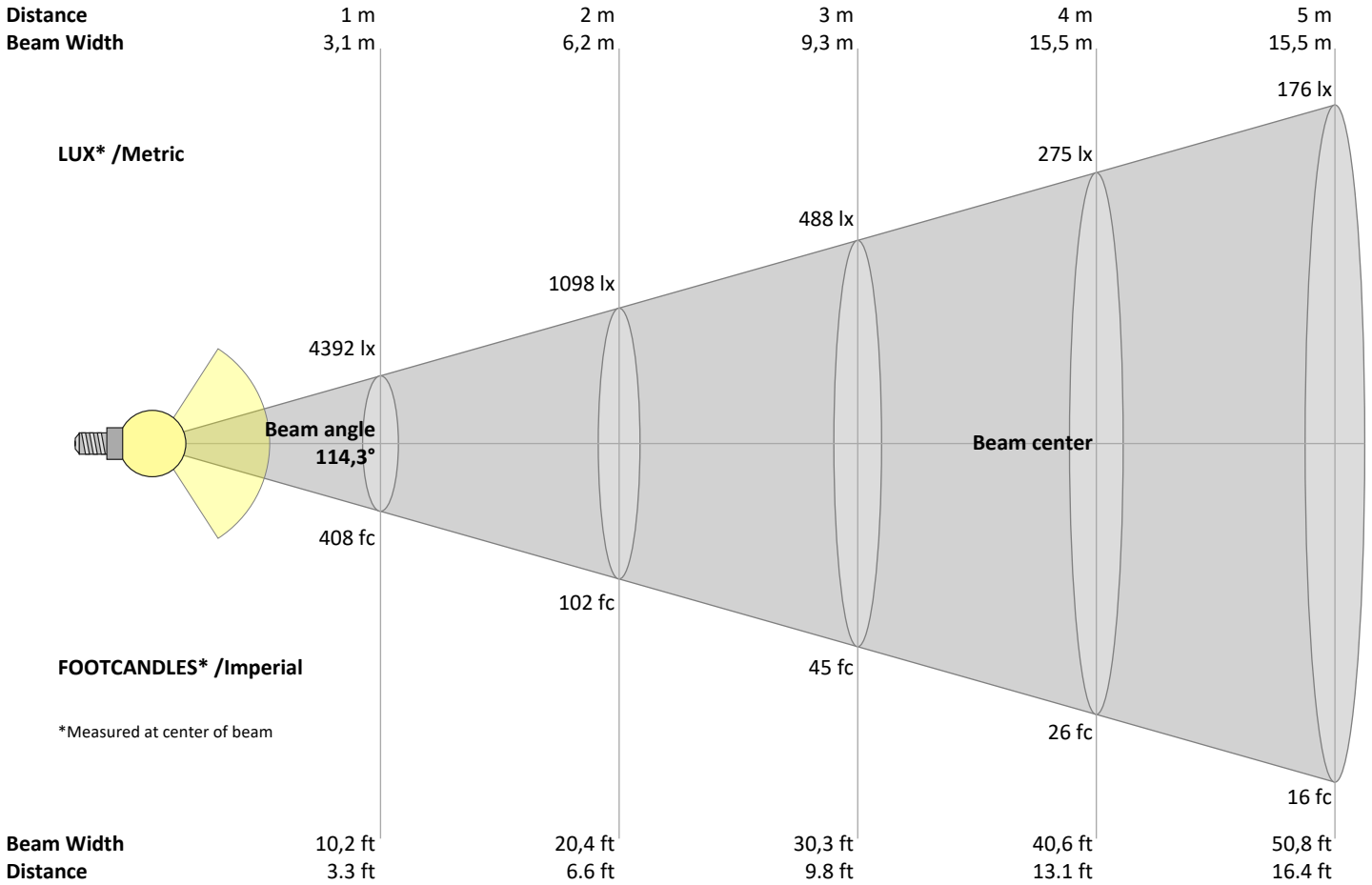
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## Beam Details



### 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
4392	1098	488	275	176	122	90	69	54	44	36	31	26	22	20	17	15	14	12	11	lux
408,1	102	45,3	25,5	16,3	11,3	8,3	6,4	5	4,1	3,4	2,8	2,4	2,1	1,8	1,6	1,4	1,3	1,1	1	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
4392	4373	4331	4260	4181	4096	4034	4131	4475	4825	4255	2950	1936	1190	693	409	242	125	44	9	cd
100%	100%	99%	97%	95%	93%	92%	94%	102%	110%	97%	67%	44%	27%	16%	9%	6%	3%	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
4392	4350	4307	4238	4145	4067	4013	4126	4427	4661	4039	2879	1964	1228	728	437	257	136	47	8	cd
100%	99%	98%	96%	94%	93%	91%	94%	101%	106%	92%	66%	45%	28%	17%	10%	6%	3%	1%	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
4392	4373	4331	4260	4181	4096	4034	4131	4475	4825	4255	2950	1936	1190	693	409	242	125	44	9	cd
100%	100%	99%	97%	95%	93%	92%	94%	102%	110%	97%	67%	44%	27%	16%	9%	6%	3%	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
4392	4350	4307	4238	4145	4067	4013	4126	4427	4661	4039	2879	1964	1228	728	437	257	136	47	8	cd
100%	99%	98%	96%	94%	93%	91%	94%	101%	106%	92%	66%	45%	28%	17%	10%	6%	3%	1%	0%	of 0°val

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## Light Planning – UGR table

Uncorrected, comprehensive UGR table according to 117-1995

Reflectances		70	70	50	50	30	70	70	50	50	30
	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	32,1	33,3	32,3	33,6	33,8	32,0	33,2	32,2	33,5	33,7
	3H	32,4	33,7	32,9	33,9	34,1	32,4	33,6	32,8	33,9	34,1
	4H	32,6	33,7	33,0	34,0	34,2	32,5	33,7	32,9	33,9	34,2
	6H	32,7	33,7	33,0	34,0	34,4	32,7	33,7	33,0	33,9	34,3
	8H	32,7	33,7	33,0	34,0	34,4	32,7	33,6	33,0	34,0	34,4
	12H	32,7	33,6	33,1	34,0	34,4	32,7	33,6	33,0	34,0	34,4
4H	2H	32,3	33,4	32,7	33,7	34,0	32,2	33,3	32,6	33,6	33,9
	3H	32,9	33,8	33,3	34,2	34,6	32,8	33,8	33,2	34,1	34,6
	4H	33,0	33,9	33,4	34,3	34,8	33,0	33,8	33,4	34,2	34,8
	6H	33,1	34,0	33,6	34,3	34,7	33,1	33,9	33,6	34,3	34,7
	8H	33,2	33,9	33,7	34,3	34,7	33,2	33,9	33,7	34,3	34,7
	12H	33,2	33,8	33,7	34,3	34,7	33,2	33,8	33,7	34,2	34,7
8H	4H	33,0	33,8	33,5	34,1	34,5	33,0	33,7	33,5	34,1	34,5
	6H	33,2	33,8	33,8	34,3	34,8	33,2	33,8	33,7	34,2	34,8
	8H	33,4	33,9	33,9	34,4	35,0	33,4	33,8	33,9	34,4	35,0
	12H	33,5	33,9	34,0	34,4	35,0	33,4	33,9	34,0	34,4	35,0
12H	4H	33,0	33,6	33,5	34,0	34,5	33,0	33,6	33,5	34,0	34,5
	6H	33,3	33,8	33,8	34,3	34,9	33,3	33,7	33,8	34,3	34,9
	8H	33,4	33,8	34,0	34,3	34,9	33,4	33,8	34,0	34,3	34,9

### Variations with the observer position for the luminaire spacings, S:

S = 1.0H	0,4 / -0,4	0,3 / -0,3
S = 1.5H	1,2 / -1,2	1,1 / -1,1
S = 2.0H	2,3 / -2,3	2,1 / -2,3

## 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	106	106	106	102	102	102	100	100
1	110	105	102	98	107	103	100	96	99	96	93	95	93	90	91	90	88	86
2	100	93	86	81	98	91	85	80	87	82	78	84	80	76	81	78	75	72
3	92	82	74	68	89	80	73	67	77	71	66	74	69	65	72	67	63	61
4	84	72	64	57	82	71	63	57	68	61	56	66	60	55	64	59	54	52
5	77	64	55	49	75	63	55	49	61	54	48	59	53	48	57	52	47	45
6	71	58	49	42	69	57	48	42	55	47	42	53	46	41	52	46	41	39
7	65	52	43	37	64	51	43	37	50	42	37	48	41	36	47	41	36	34
8	61	47	39	33	59	46	38	33	45	38	32	44	37	32	43	36	32	30
9	56	43	35	29	55	42	34	29	41	34	29	40	33	29	39	33	29	27
10	53	39	31	26	51	39	31	26	38	31	26	37	30	26	36	30	26	24

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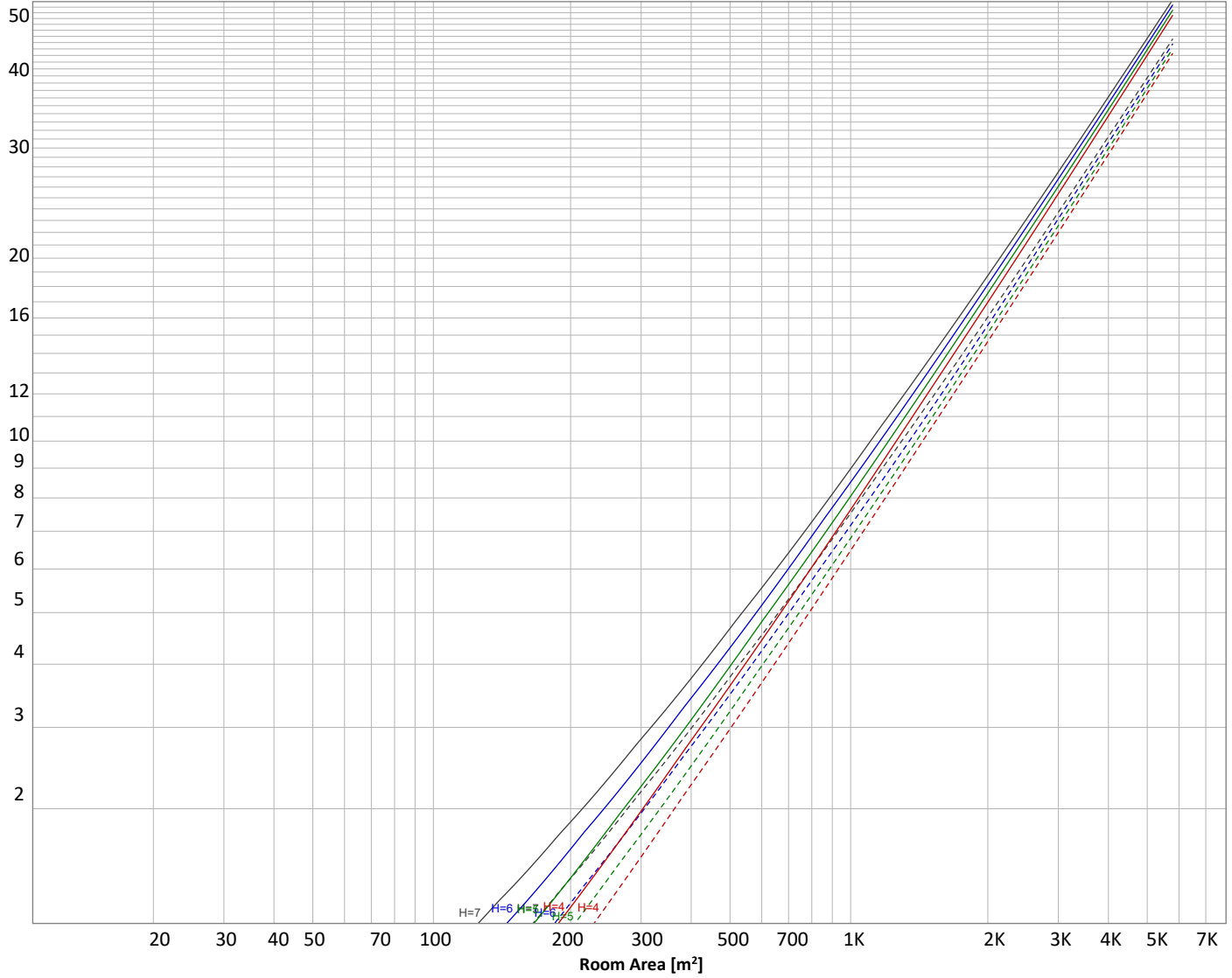
Operator:



## Luminaire budgetary diagram

Uncorrected, comprehensive UGR table according to 117-1995

LAMPS (number of lamps)



### Conditions

H = Room height	Flux = 14179 lm			
H <sub>down</sub> = Lamp distance from ceiling =	0.00 m	Line type	Ceiling reflectance	ρ(%) Wall reflectance
H <sub>work</sub> = Work area height from floor =	0.00 m	-----	70	50
E <sub>work</sub> = 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°
416 lm	1202 lm	1887 lm	2605 lm	3655 lm	2582 lm	1215 lm	450 lm	144 lm
90°-100°	100°-110°	110°-120°	120°-130°	130°-140°	140°-150°	150°-160°	160°-170°	170°-180°
8,40 lm	1,06 lm	2,05 lm	2,55 lm	2,57 lm	2,24 lm	1,70 lm	1,06 lm	0,369 lm

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## Outdoor Light Planning

### Lumen per Zone

Zone (γ)	Lumen	% Total
0-10°	416 lm	2,9%
10-20°	1202 lm	8,5%
20-30°	1887 lm	13,3%
30-40°	2605 lm	18,4%
40-50°	3655 lm	25,8%
50-60°	2582 lm	18,2%
60-70°	1215 lm	8,6%
70-80°	450 lm	3,2%
80-90°	144 lm	1,0%
90-100°	8 lm	0,1%
100-110°	1 lm	0,0%
110-120°	2 lm	0,0%
120-130°	3 lm	0,0%
130-140°	3 lm	0,0%
140-150°	2 lm	0,0%
150-160°	2 lm	0,0%
160-170°	1 lm	0,0%
170-180°	0 lm	0,0%
<b>Total</b>	<b>14179 lm</b>	<b>100,0%</b>

### Intensity peaks

Max intensity	4944 cd
Intensity, 90°	44 cd
Intensity, 0°	4392 cd

### Zonal Lumen summary

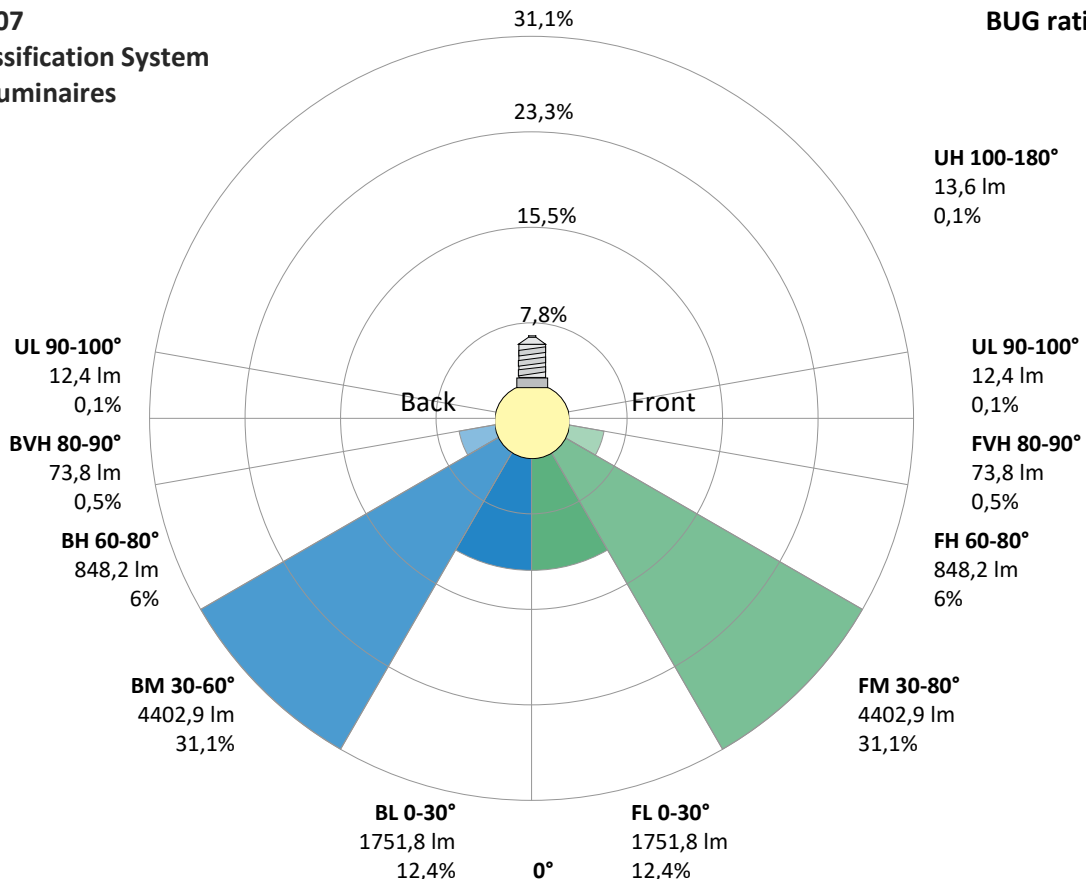
Zone (γ)	Lumen	% Total
0-30°	3504 lm	24,7%
0-40°	6110 lm	43,1%
0-60°	12348 lm	87,1%
60-90°	1809 lm	12,8%
70-100°	603 lm	4,2%
90-120°	12 lm	0,1%
0-90°	14157 lm	99,8%
90-180°	22 lm	0,2%
0-180°	14179 lm	100,0%

### BUG rating

	Lumen	% Total
<b>Forward light</b>		
Low(0-30°)	1752 lm	12,4%
Medium(30-60°)	4403 lm	31,1%
High(60-80°)	848 lm	6,0%
Very high(80-90°)	74 lm	0,5%
<b>Back light</b>		
Low(0-30°)	1752 lm	12,4%
Medium(30-60°)	4403 lm	31,1%
High(60-80°)	848 lm	6,0%
Very high(80-90°)	74 lm	0,5%
<b>Uplight</b>		
Low(90-100°)	12 lm	0,1%
High(100-180°)	14 lm	0,1%

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

**BUG rating B3 U2 G1**



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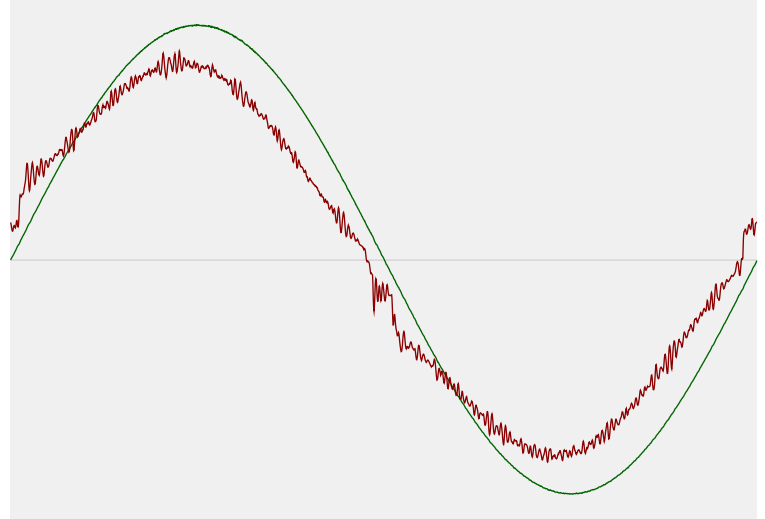


## Power Details

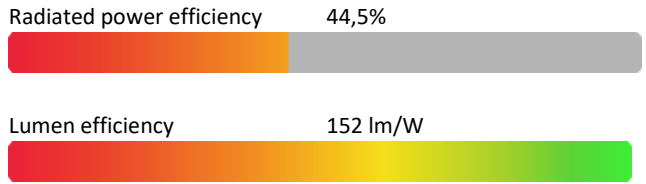
### Input Power

Power feed to light source	93,5 W
Frequency of input power	50 Hz
RMS Input voltage feed, $V_{RMS}$	230 V
RMS Input current feed, $I_{RMS}$	0,414 A
Volt-Ampere or apparent power = $V_{RMS} * I_{RMS}$	95,24 VA
Displacement factor of AC power feed	0,98
Power factor of AC current feed	0,98
Total harmonic distortion of the current	4,25%
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	4994 K
CCT shift	+6 K
CCT end	5000 K

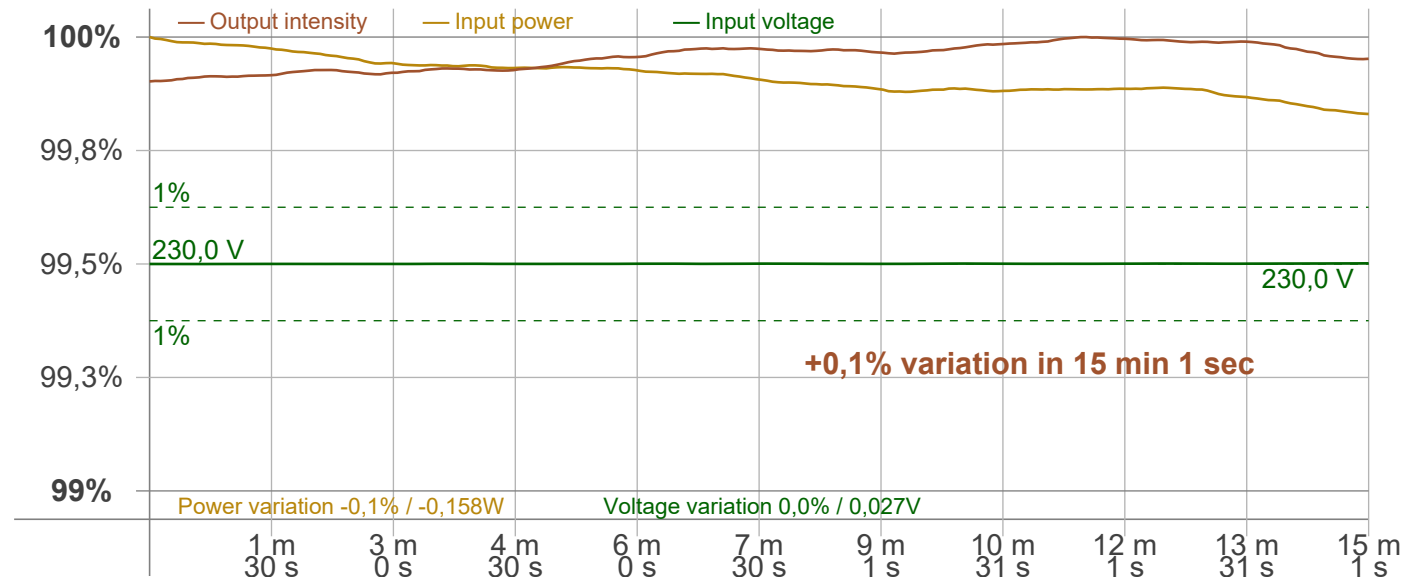
### Warmup Result

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

### Output Change

Output start	14171 lm
Output change	+8 lm
Output end	14179 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 555,56 Hz  
 Percent Flicker 0,33 %  
 Flicker index 0

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

JA8/10 40 Hz 0,18 %  
 JA8/10 90 Hz 0,19 %  
 JA8/10 200 Hz 0,21 %  
 JA8/10 400 Hz 0,22 %  
 JA8/10 1000 Hz 0,32 %

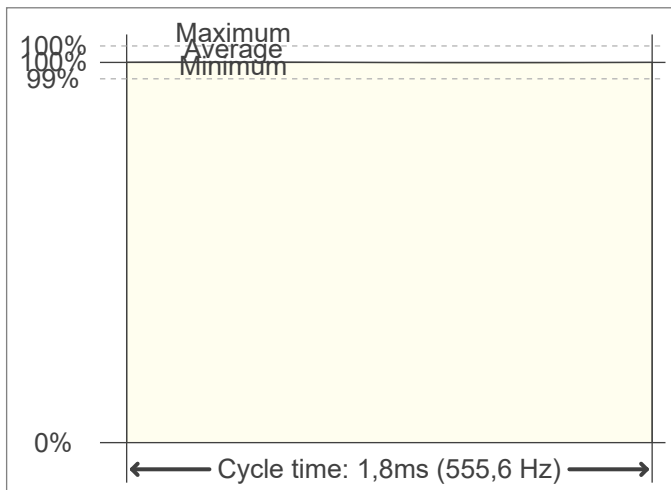
### TLA indices (re IEC TR 61547-1, IEC 61000-3-3 and IEC 61000-4-15)

PstLM value (F < 80 Hz) 0,09  
 SVM value (80 < F < 2000 Hz) 0

### Flicker indices according to Lighting Research Center (2015)

Perception metric, Assist Mp 0,03

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



### Flicker FFT (flicker curve in frequency domain)



### IEEE 1789 Frequency/modulation plot

