

Light Measurement Report

Print date: 18-12-2024

Measurement date and time: 18-12-2024 12:04:20 – Measurement no. VFR-241218-2572-MS

Measurement tracking No. and Link: [VT241218-003288](https://www.viso-systems.com/VT241218-003288)

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

64 planes – 5,63°
5°
4,79 m
31,2 W – PF 0,98 – DPF 0,99
230 V – 0,139 A
50 Hz
Lamp stabilized in 15 min 3 sec – 2,0%

Tested Light Source

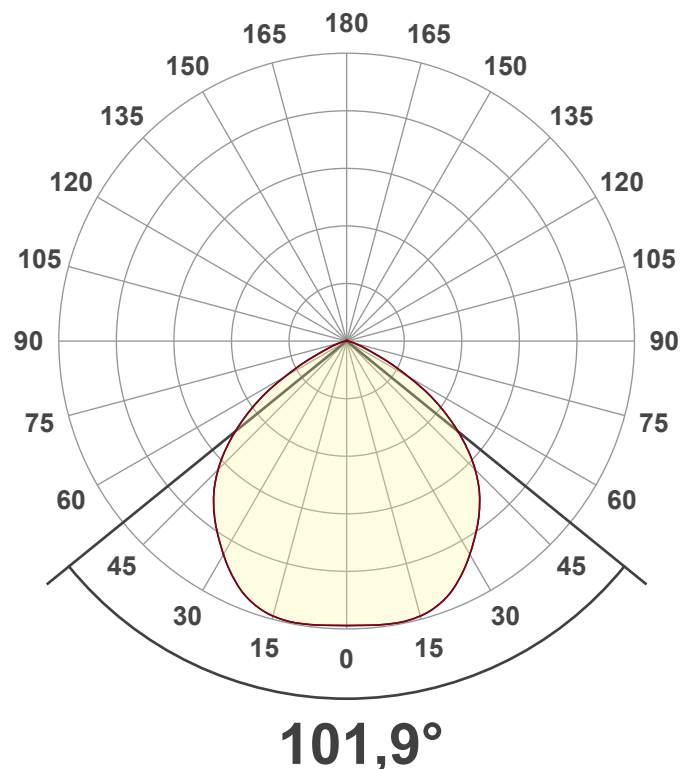
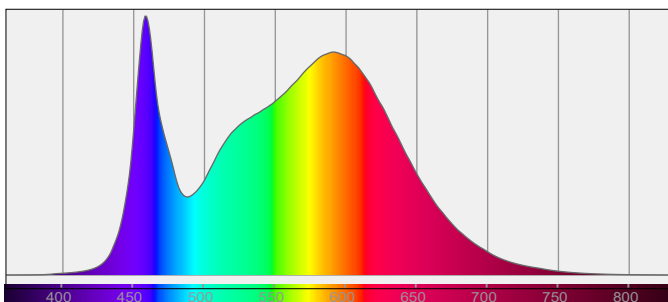
Product Name
Item No. and Manufacturer
Product Description (line 1)

808211-4000K
808211-4000K – Dutchfulfillment
LED STRAATLAMP | HERSE | 30W | MET INGEBOUWDE DAGLICHTSENSOR

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

4951 lm – 0,29% / 99,71%
159 lm/W
2140 cd – 101,9°
CCT = 4000 K / 4081 K
CRI 81,3
 R_f 80,7 – R_g 89,9
Duv 0,0028 – SDCM 2,6
SVM 4 – PstLM 0,1



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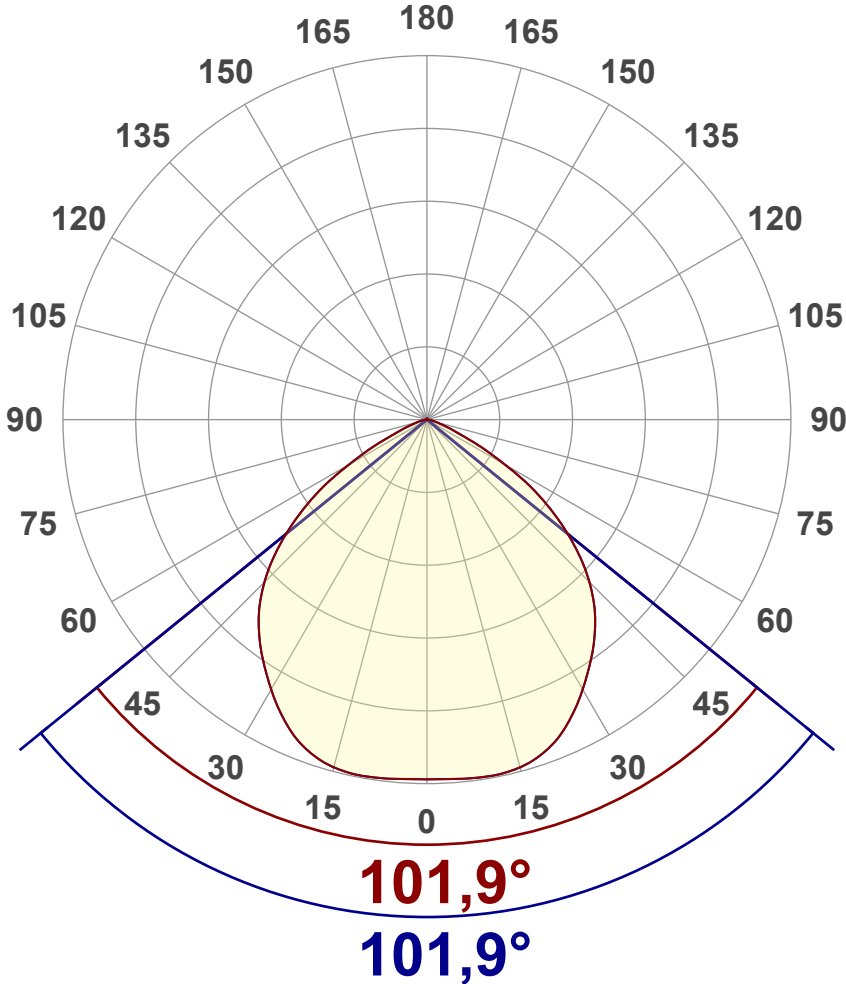
Measurement tracking No. and Link: [VT241218-003288](#)

Operator:



Luminous Intensity diagram

Unit: 0-100% of peak intensity



Main Values

Output (total Lumen)	4951 lm
Lumen Up% / Down%	0,29% / 99,71%
Peak Intensity	2140 cd
Beam Angle (50%)	101,9°
Beam Angle (90%)	101,9°
Beam Angle (10%)	101,9°

Cut-off Angle

Average 2,5%	151,7°
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Field Angle

Average 10%	133°
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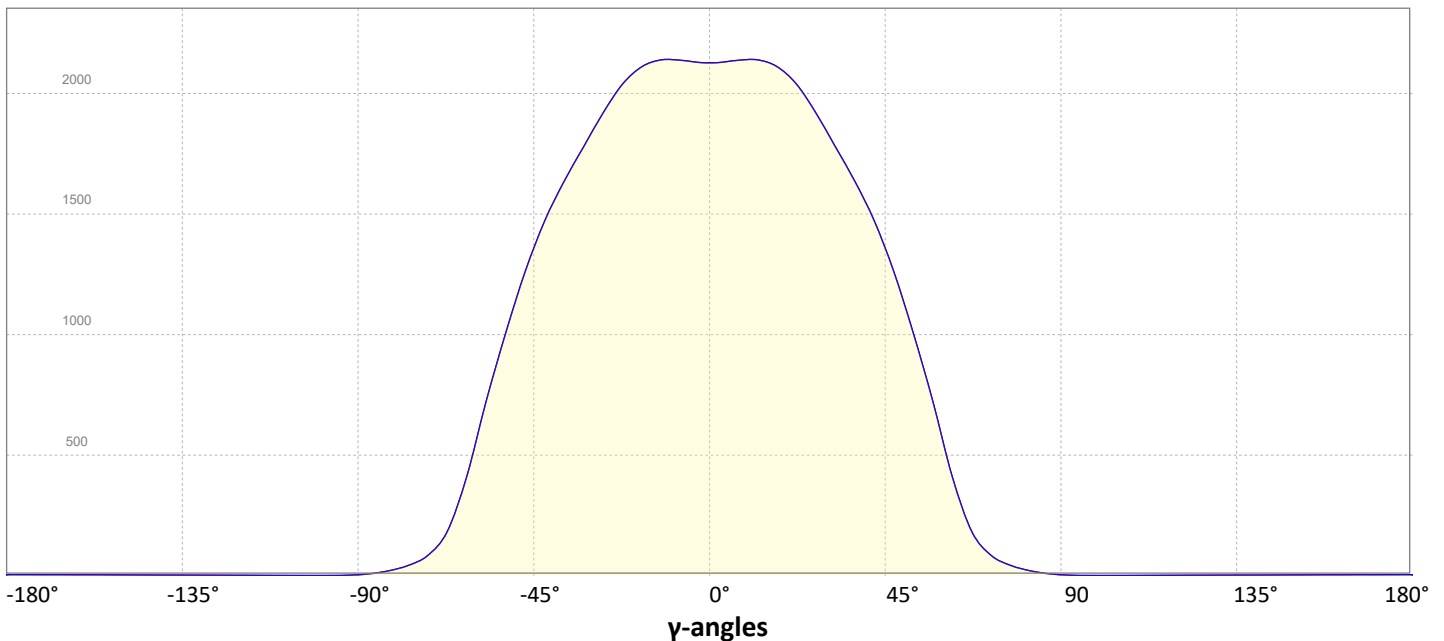
Intensity Ratio

In 120° cone	92,4%
In 90° cone	67,0%

C000-C180

C090-C270

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



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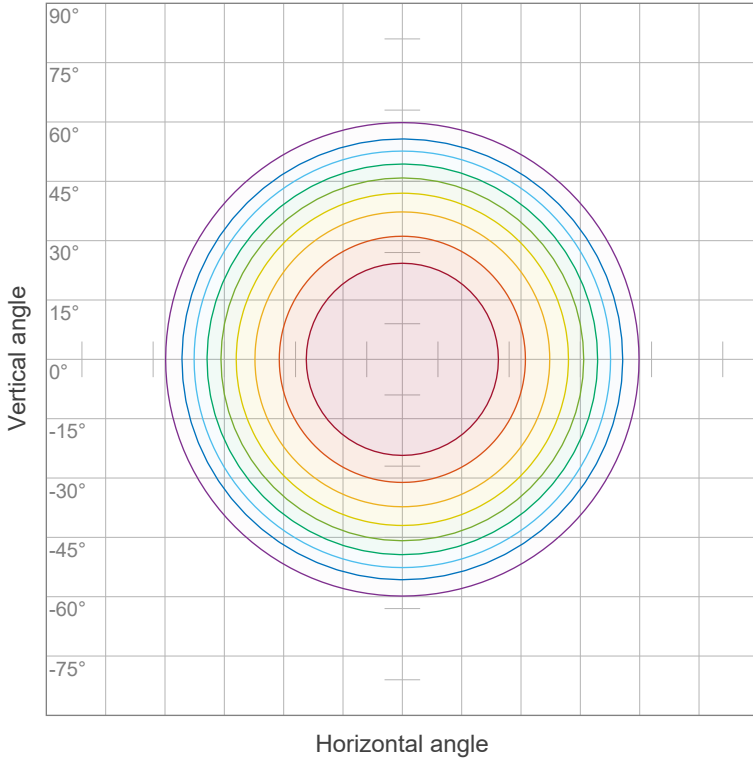
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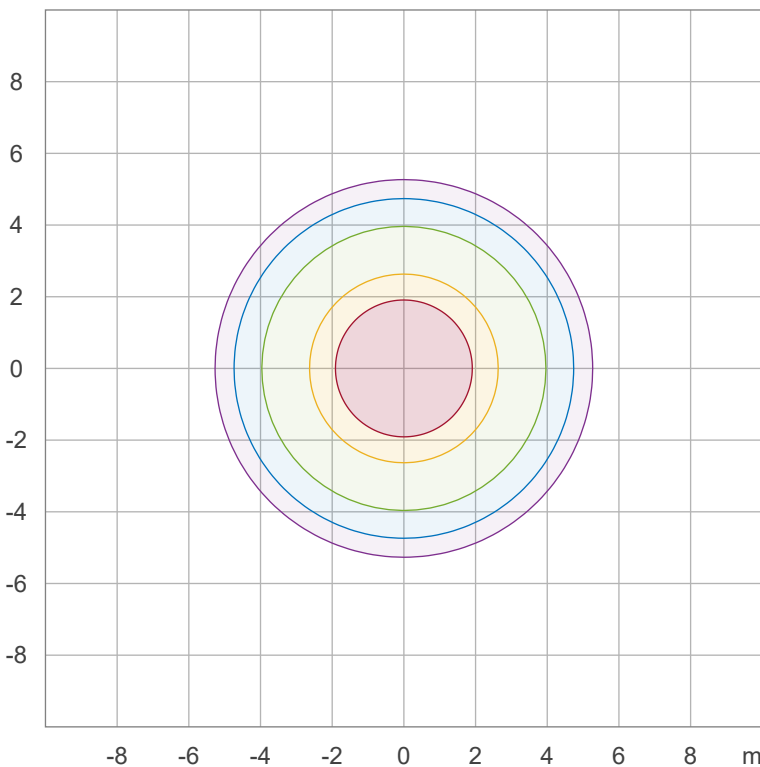
Iso-intensity Diagram (Iso-candela)



90 %	1925,5 cd
80 %	1711,6 cd
70 %	1497,6 cd
60 %	1283,7 cd
50 %	1069,7 cd
40 %	855,8 cd
30 %	641,8 cd
20 %	427,9 cd
10 %	213,9 cd

Peak intensity: 2139,5 cd
Number of c-planes: 64

Iso-illuminance Diagram (Iso-lux)



50,0 %	118,2 lx
30,0 %	70,9 lx
10,0 %	23,6 lx
5,0 %	11,8 lx
3,0 %	7,1 lx

Peak illuminance: 236,4 lx
Mounting height: 3,0 m
Number of c-planes: 64

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Color details

Correlated Color Temperature, Target CCT = 4000 K
 Correlated Color Temperature, Measured CCT = 4081 K
 Color Rendering Index CRI 81,3
 Color Rendering Index, R9 (red component) R9 = -0,9
 Color Rendering TM30-18 R_f 80,7 – R_g 89,9
 Color Quality Scale CQS = 80,1

MacAdam Steps SDCM = 2,6
 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 = 0,0028
 Color coordinate CIEs 1976 (CIELUV) (u';v') = (0,225;0,502)

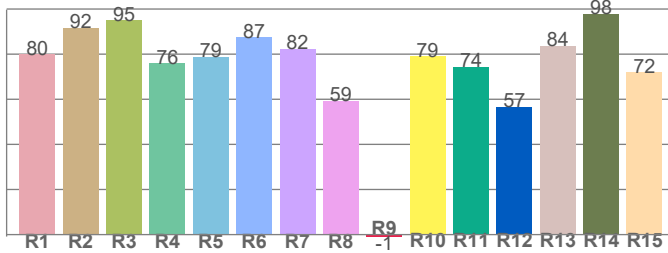
CIE 1931



CIE 1931 – zoomed on Planckian locus



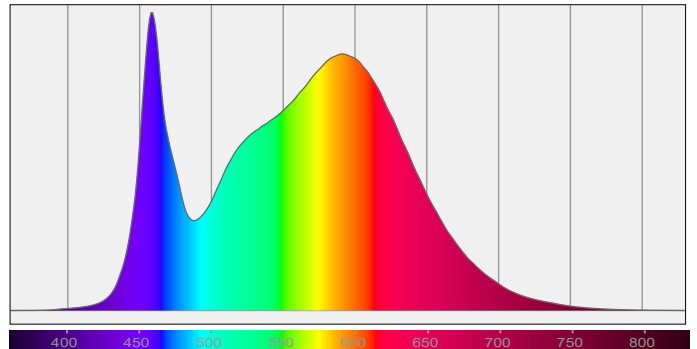
Color Rendering Index per reference color (CIE 1995)



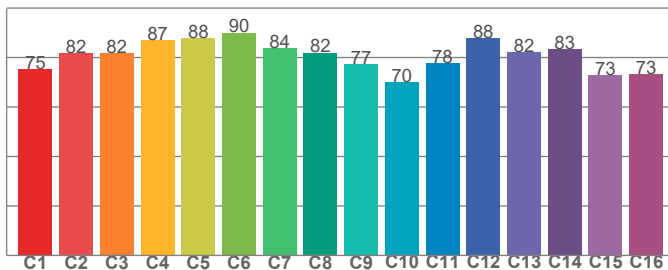
CRI R values, only R1-R8 are used to calculate final CRI value

R1	R2	R3	R4	R5	R6	R7	R8	R9	R10	R11	R12	R13	R14	R15
80,0	91,7	95,0	76,0	78,8	87,5	82,4	59,4	-0,9	79,1	74,4	56,6	83,6	97,9	72,0

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



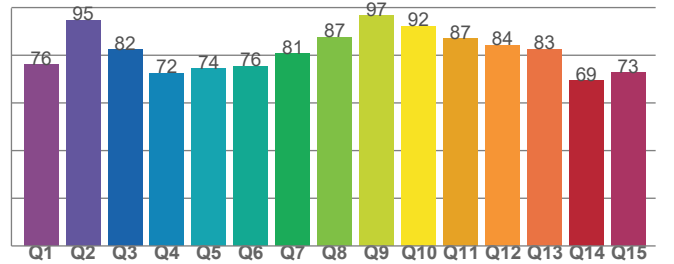
TM30-18 R_f-values per hue bin



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
75,3	81,7	81,7	86,9	87,8	90,1	83,7	81,9	77,3	70,1	77,6	87,7	82,1	83,2	72,7	73,2

Color Quality Scale by reference color



CQS Q values

Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10	Q11	Q12	Q13	Q14	Q15
76,0	94,7	82,3	72,5	74,4	75,5	80,7	87,5	96,5	92,2	86,9	84,3	82,6	69,2	72,6

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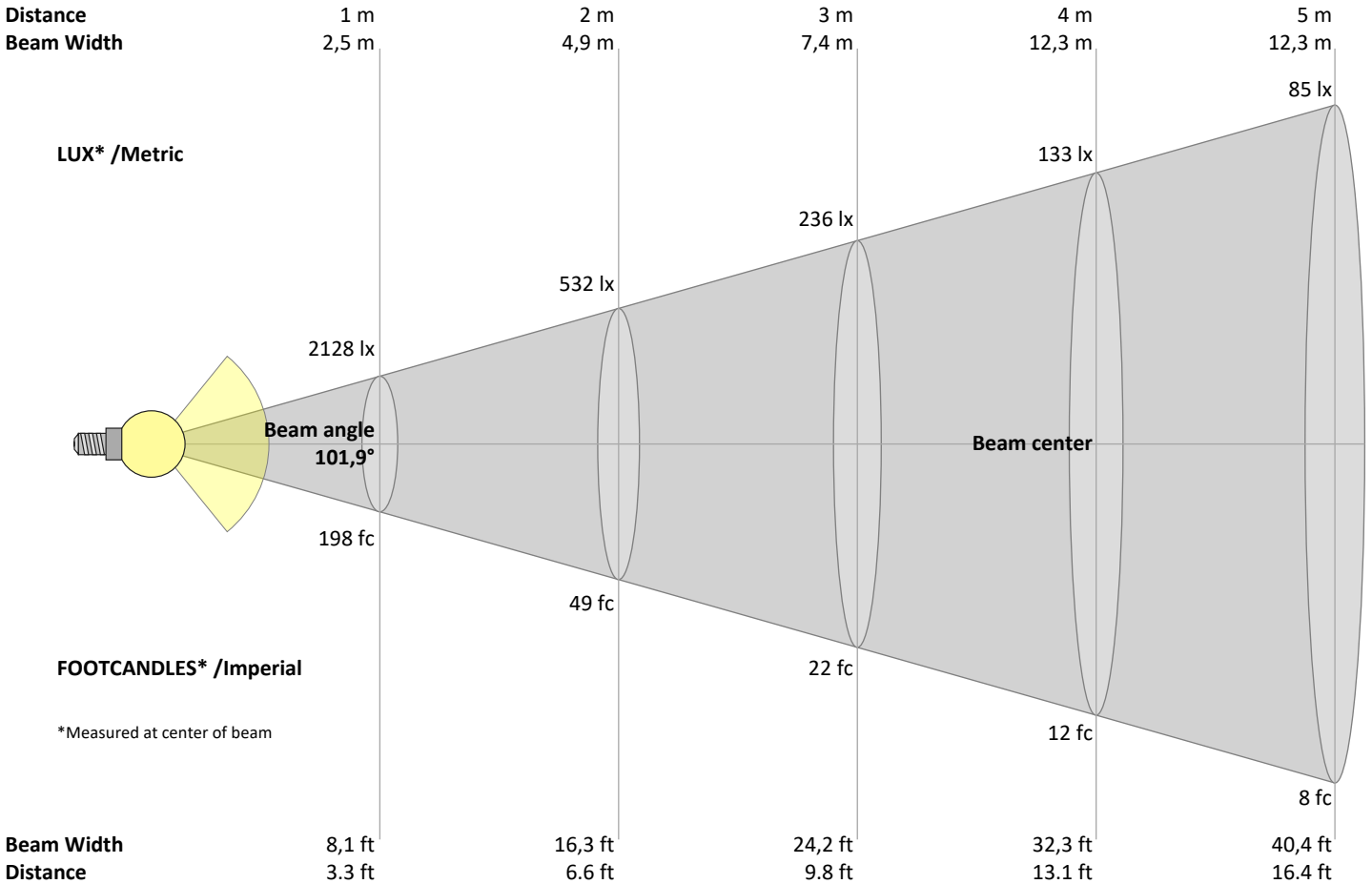
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Beam Details



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
2128	532	236	133	85	59	43	33	26	21	18	15	13	11	9	8	7	7	6	5	lux
197,7	49,4	22	12,4	7,9	5,5	4	3,1	2,4	2	1,6	1,4	1,2	1	0,9	0,8	0,7	0,6	0,5	0,5	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
2128	2133	2139	2124	2072	1973	1842	1699	1544	1354	1118	847	547	282	127	60	30	13	5	2	cd
100%	100%	101%	100%	97%	93%	87%	80%	73%	64%	53%	40%	26%	13%	6%	3%	1%	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
2128	2133	2139	2124	2072	1973	1842	1699	1544	1354	1118	847	547	282	127	60	30	13	5	2	cd
100%	100%	101%	100%	97%	93%	87%	80%	73%	64%	53%	40%	26%	13%	6%	3%	1%	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
2128	2133	2139	2124	2072	1973	1842	1699	1544	1354	1118	847	547	282	127	60	30	13	5	2	cd
100%	100%	101%	100%	97%	93%	87%	80%	73%	64%	53%	40%	26%	13%	6%	3%	1%	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
2128	2133	2139	2124	2072	1973	1842	1699	1544	1354	1118	847	547	282	127	60	30	13	5	2	cd
100%	100%	101%	100%	97%	93%	87%	80%	73%	64%	53%	40%	26%	13%	6%	3%	1%	1%	0%	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	27,5	28,6	27,7	28,9	29,1	27,4	28,5	27,6	28,8	29,0
	3H	27,6	28,7	28,0	28,9	29,1	27,4	28,5	27,9	28,8	29,0
	4H	27,6	28,6	28,0	28,9	29,1	27,4	28,5	27,8	28,7	29,0
	6H	27,6	28,5	27,9	28,8	29,1	27,4	28,3	27,8	28,6	29,0
	8H	27,5	28,4	27,9	28,7	29,1	27,4	28,3	27,7	28,6	29,0
	12H	27,5	28,3	27,9	28,7	29,1	27,4	28,2	27,7	28,5	29,0
4H	2H	27,6	28,6	28,0	28,9	29,1	27,5	28,5	27,9	28,8	29,1
	3H	27,8	28,7	28,2	29,0	29,5	27,7	28,6	28,1	28,9	29,3
	4H	27,8	28,5	28,2	28,9	29,5	27,6	28,4	28,1	28,8	29,4
	6H	27,7	28,5	28,2	28,8	29,2	27,6	28,4	28,1	28,7	29,1
	8H	27,7	28,4	28,2	28,7	29,1	27,6	28,3	28,1	28,6	29,0
	12H	27,7	28,2	28,2	28,6	29,1	27,5	28,1	28,0	28,5	29,0
8H	4H	27,7	28,4	28,2	28,7	29,1	27,6	28,2	28,1	28,6	29,0
	6H	27,7	28,2	28,2	28,6	29,2	27,6	28,1	28,1	28,5	29,1
	8H	27,7	28,1	28,2	28,6	29,3	27,6	28,0	28,1	28,5	29,2
	12H	27,7	28,0	28,2	28,5	29,1	27,5	27,9	28,1	28,4	29,0
12H	4H	27,6	28,2	28,1	28,6	29,1	27,5	28,1	28,0	28,5	29,0
	6H	27,7	28,1	28,2	28,6	29,3	27,6	28,0	28,1	28,5	29,1
	8H	27,7	28,0	28,2	28,5	29,1	27,5	27,9	28,1	28,4	29,0

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

S = 1.0H	0,3 / -0,5	0,3 / -0,6
S = 1.5H	1,3 / -2,6	1,2 / -2,6
S = 2.0H	2,7 / -5,5	2,7 / -5,5

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	106	106	106	102	102	102	100	100	
1	111	107	104	101	108	105	102	99	101	98	96	97	95	93	93	92	90	88	88
2	103	96	90	85	100	94	89	84	90	86	82	87	84	80	84	81	79	77	77
3	95	86	79	73	92	84	78	72	81	76	71	79	74	70	76	72	69	67	67
4	87	77	69	63	85	76	68	63	73	67	62	71	65	61	69	64	60	58	58
5	81	69	61	55	79	68	61	55	66	60	54	64	58	54	62	57	53	51	51
6	75	63	55	49	73	62	54	49	60	53	48	58	52	48	57	52	47	45	45
7	70	57	49	43	68	56	49	43	55	48	43	54	47	43	52	47	42	41	41
8	65	52	44	39	63	52	44	39	50	44	39	49	43	38	48	42	38	36	36
9	61	48	40	35	59	48	40	35	46	40	35	45	39	35	44	39	35	33	33
10	57	45	37	32	56	44	37	32	43	36	32	42	36	32	41	36	32	30	30

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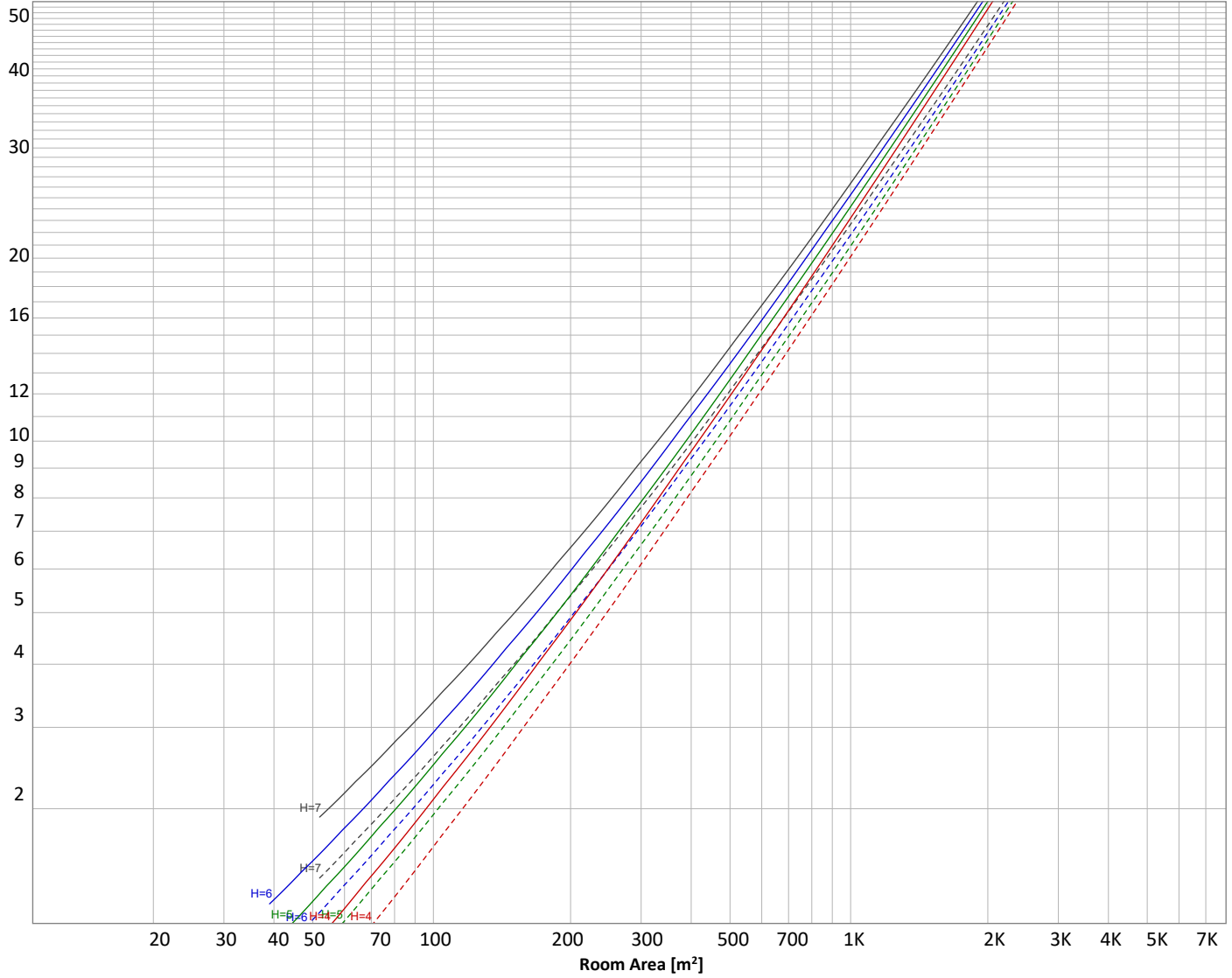
Operator:



Luminaire budgetary diagram

Uncorrected, comprehensive UGR table according to 117-1995

LAMPS (number of lamps)



Conditions

H = Room height	Flux = 4951 lm	$\rho(\%)$			
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°
204 lm	601 lm	910 lm	1064 lm	1043 lm	755 lm	281 lm	64,4 lm	14,7 lm
90°-100°	100°-110°	110°-120°	120°-130°	130°-140°	140°-150°	150°-160°	160°-170°	170°-180°
1,95 lm	1,33 lm	1,72 lm	2,04 lm	2,10 lm	1,93 lm	1,70 lm	1,15 lm	0,408 lm

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Outdoor Light Planning

Lumen per Zone

Zone (γ)	Lumen	% Total
0-10°	{LUM00-10} lm	#VALUE!
10-20°	{LUM10-20} lm	#VALUE!
20-30°	{LUM20-30} lm	#VALUE!
30-40°	{LUM30-40} lm	#VALUE!
40-50°	{LUM40-50} lm	#VALUE!
50-60°	{LUM50-60} lm	#VALUE!
60-70°	{LUM60-70} lm	#VALUE!
70-80°	{LUM70-80} lm	#VALUE!
80-90°	{LUM80-90} lm	#VALUE!
90-100°	{LUM90-100} lm	#VALUE!
100-110°	{LUM100-110} lm	#VALUE!
110-120°	{LUM110-120} lm	#VALUE!
120-130°	{LUM120-130} lm	#VALUE!
130-140°	{LUM130-140} lm	#VALUE!
140-150°	{LUM140-150} lm	#VALUE!
150-160°	{LUM150-160} lm	#VALUE!
160-170°	{LUM160-170} lm	#VALUE!
170-180°	{LUM170-180} lm	#VALUE!
Total	0 lm	#VALUE!

Intensity peaks

Max intensity	{PEAK} cd
Intensity, 90°	{INT90} cd
Intensity, 0°	{INT0} cd

Zonal Lumen summary

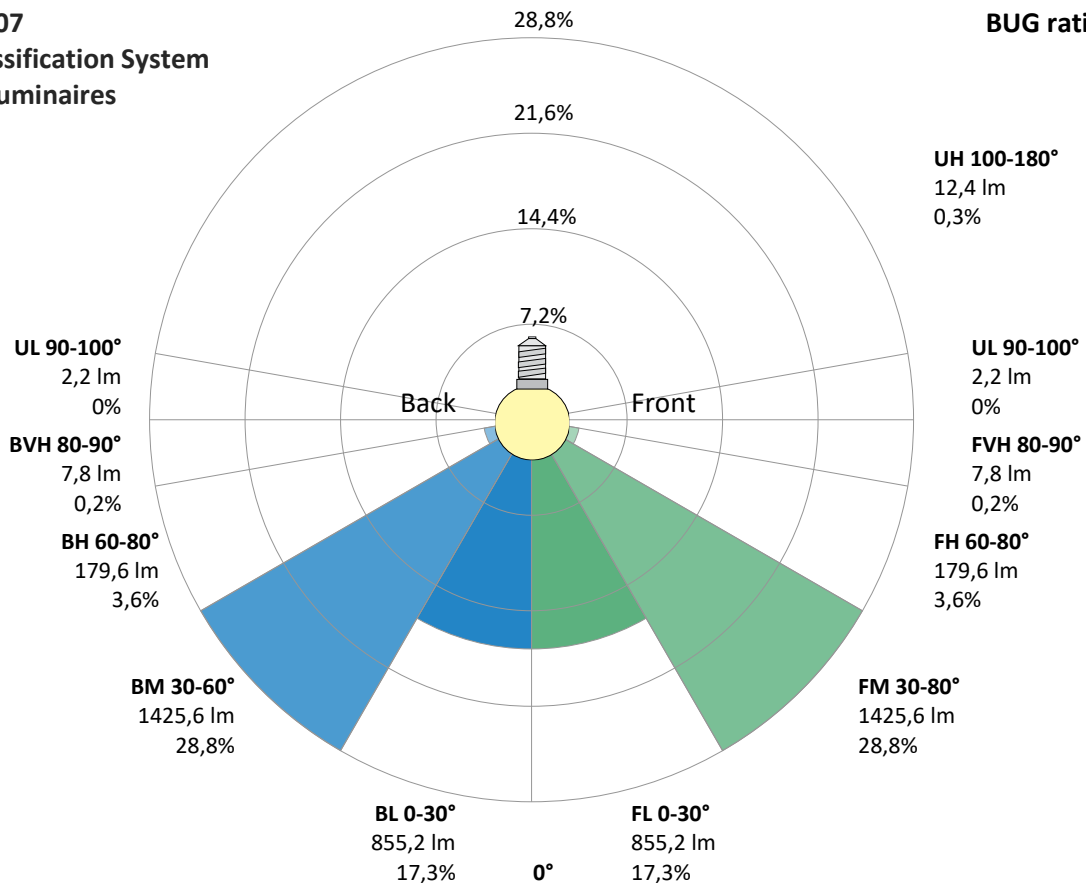
Zone (γ)	Lumen	% Total
0-30°	{LUM00-30} lm	#VALUE!
0-40°	{LUM00-40} lm	#VALUE!
0-60°	{LUM00-60} lm	#VALUE!
60-90°	{LUM60-90} lm	#VALUE!
70-100°	{LUM70-100} lm	#VALUE!
90-120°	{LUM90-120} lm	#VALUE!
0-90°	{LUM00-90} lm	#VALUE!
90-180°	{LUM90-180} lm	#VALUE!
0-180°	{LUM00-180} lm	#VALUE!

BUG rating

	Lumen	% Total
Forward light		
Low(0-30°)	{BUG0} lm	#VALUE!
Medium(30-60°)	{BUG1} lm	#VALUE!
High(60-80°)	{BUG2} lm	#VALUE!
Very high(80-90°)	{BUG3} lm	#VALUE!
Back light		
Low(0-30°)	{BUG4} lm	#VALUE!
Medium(30-60°)	{BUG5} lm	#VALUE!
High(60-80°)	{BUG6} lm	#VALUE!
Very high(80-90°)	{BUG7} lm	#VALUE!
Uplight		
Low(90-100°)	{BUG8} lm	#VALUE!
High(100-180°)	{BUG9} lm	#VALUE!

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

BUG rating B2 U2 G0



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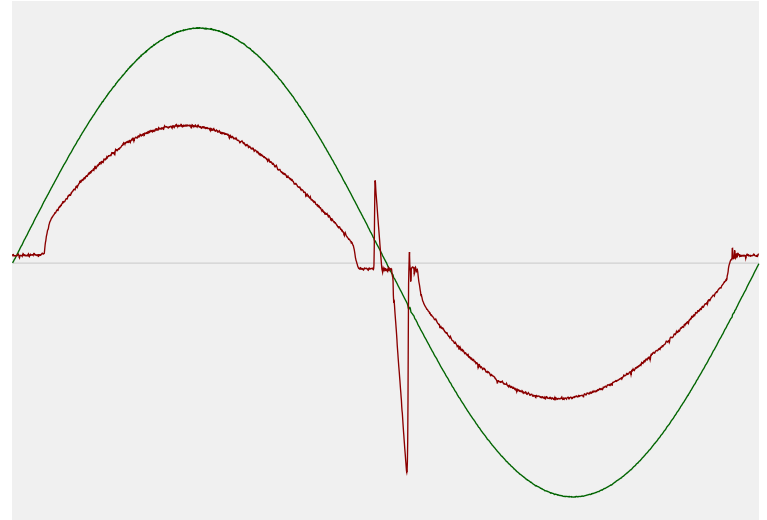


Power Details

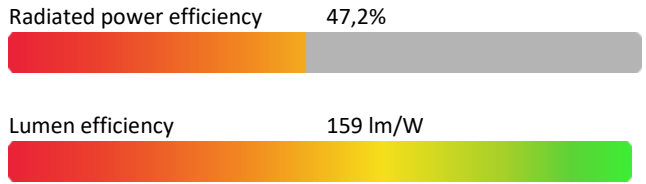
Input Power

Power feed to light source	31,2 W
Frequency of input power	50 Hz
RMS Input voltage feed, V_{RMS}	230 V
RMS Input current feed, I_{RMS}	0,139 A
Volt-Ampere or apparent power = $V_{RMS} * I_{RMS}$	31,91 VA
Displacement factor of AC power feed	0,99
Power factor of AC current feed	0,98
Total harmonic distortion of the current	18%
Total harmonic distortion of the voltage	0,07%

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	3993 K
CCT shift	+7 K
CCT end	4000 K

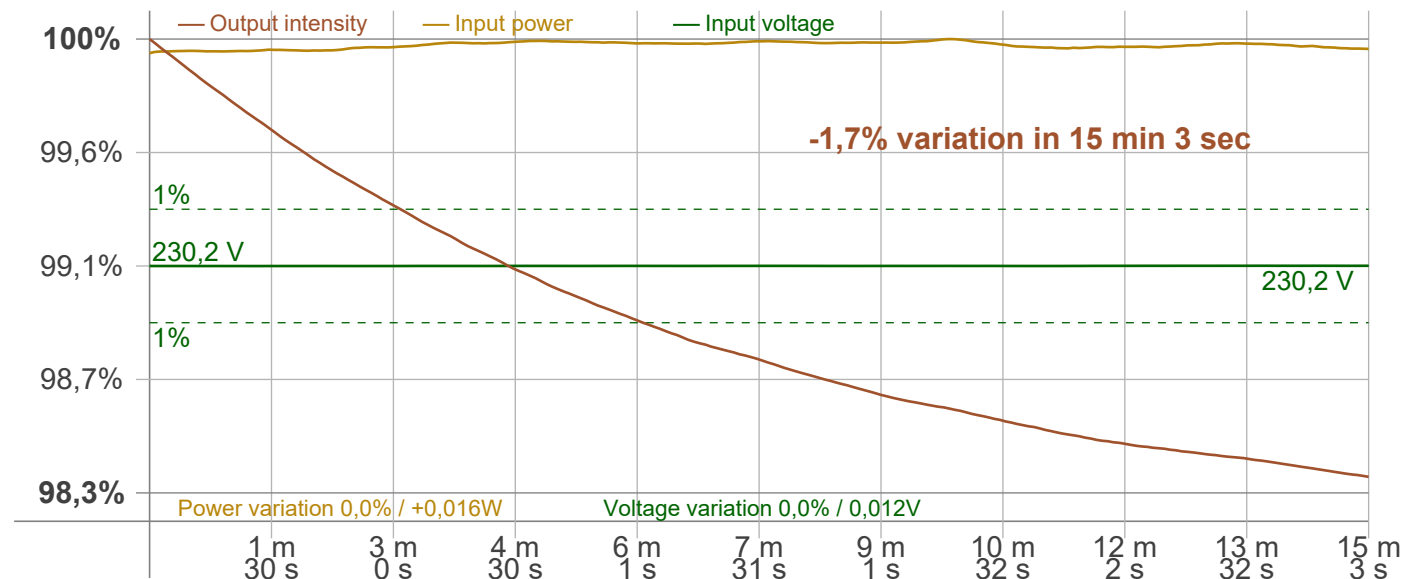
Warmup Result

Total warmup time	Lamp stabilized in 15 min 3 sec
Warmup variation	-1,7%

Output Change

Output start	5037 lm
Output change	-86 lm
Output end	4951 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: 99,96 %
 Flicker index: 0,34

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

JA8/10 40 Hz: 0,2 %
 JA8/10 90 Hz: 0,84 %
 JA8/10 200 Hz: 105,37 %
 JA8/10 400 Hz: 101,34 %
 JA8/10 1000 Hz: 101,56 %

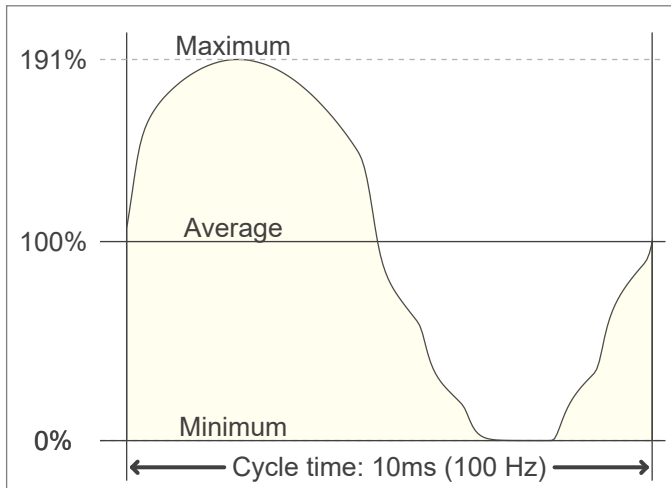
TLA indices (re IEC TR 61547-1, IEC 61000-3-3 and IEC 61000-4-15)

PstLM value (F < 80 Hz): 0,1
 SVM value (80 < F < 2000 Hz): 4

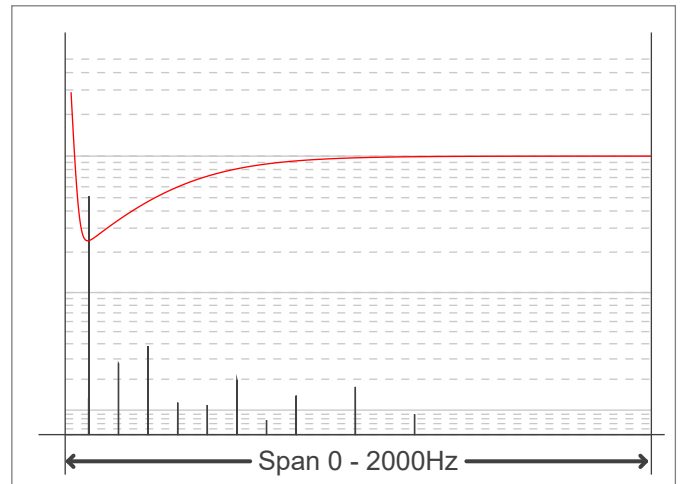
Flicker indices according to Lighting Research Center (2015)

Perception metric, Assist Mp: 0,04

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



Flicker FFT (flicker curve in frequency domain)



IEEE 1789 Frequency/modulation plot

