

# Light Measurement Report

Print date: 18-8-2025

Measurement date and time: 15-8-2025 16:47:07 – Measurement no. VFR-250815-2582-MS

Measurement tracking No. and Link: [VT250815-006950](#)

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

48 planes – 7,5°  
5°  
12,10 m  
141,3 W – PF 1,0 – DPF 1,0  
230 V – 0,617 A  
50 Hz  
Lamp stabilized in 20 min 53 sec – 2,0%

## Tested Light Source

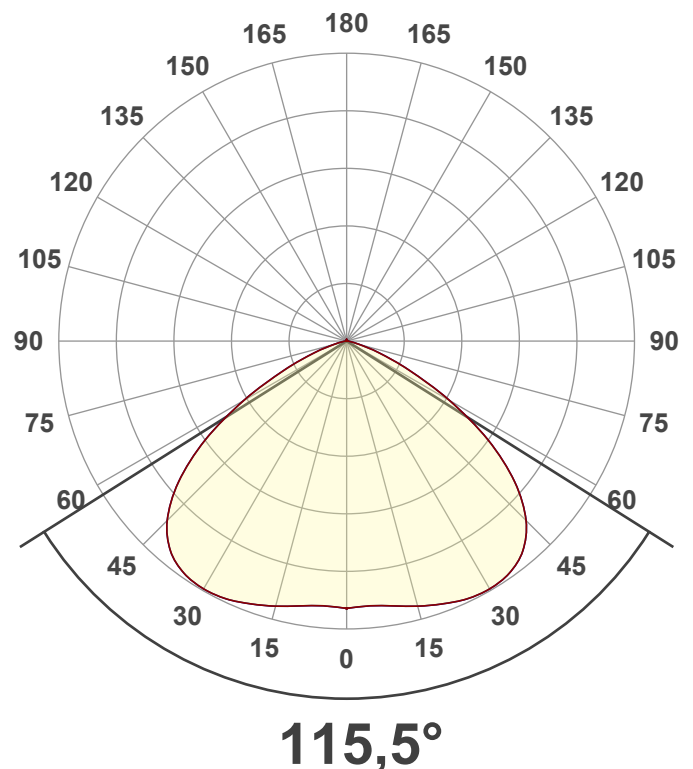
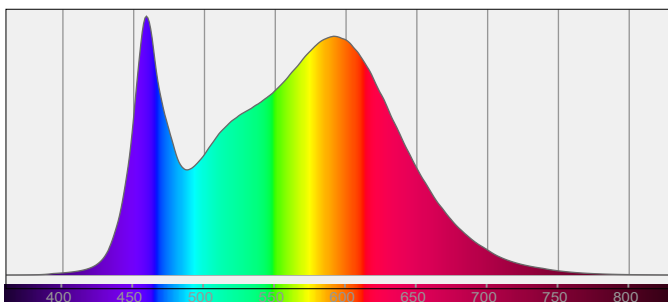
Product Name  
Item No. and Manufacturer  
Product Description (line 1)

812676-4000K  
812676-4000K – Dutchfulfillment  
LED STRAATLAMP | HERSE | 150W | 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

19226 lm – 0,72% / 99,28%  
136 lm/W  
6430 cd – 115,5°  
CCT = 4000 K / 4193 K  
CRI 82,1  
 $R_f$  81,6 –  $R_g$  89,7  
Duv 0,0029 – SDCM 4,5  
SVM 3,86 – PstLM 0,08



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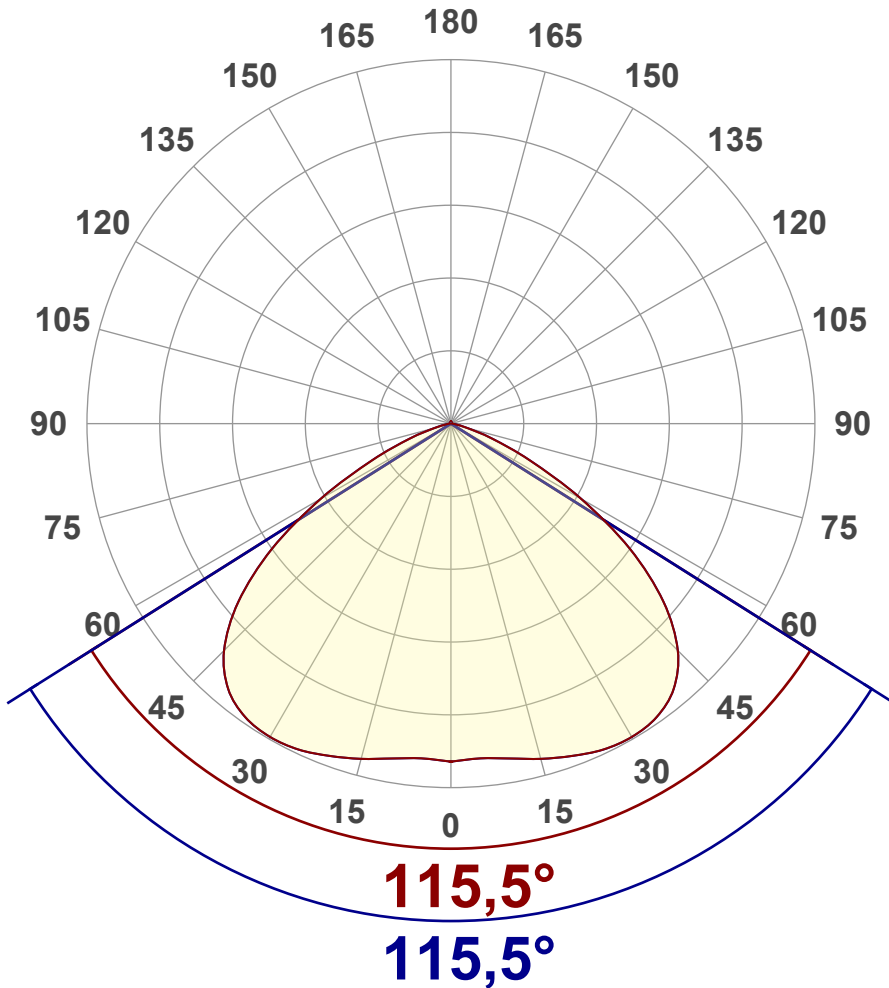
Measurement tracking No. and Link: [VT250815-006950](https://www.viso-systems.com/VT250815-006950)

Operator:



## Luminous Intensity diagram

Unit: 0-100% of peak intensity



### Main Values

Output (total Lumen)	19226 lm
Lumen Up% / Down%	0,72% / 99,28%
Peak Intensity	6430 cd
Beam Angle (50%)	115,5°
Beam Angle (90%)	115,5°
Beam Angle (10%)	115,5°

### Cut-off Angle

Average 2,5%	157,3°
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### Field Angle

Average 10%	142,9°
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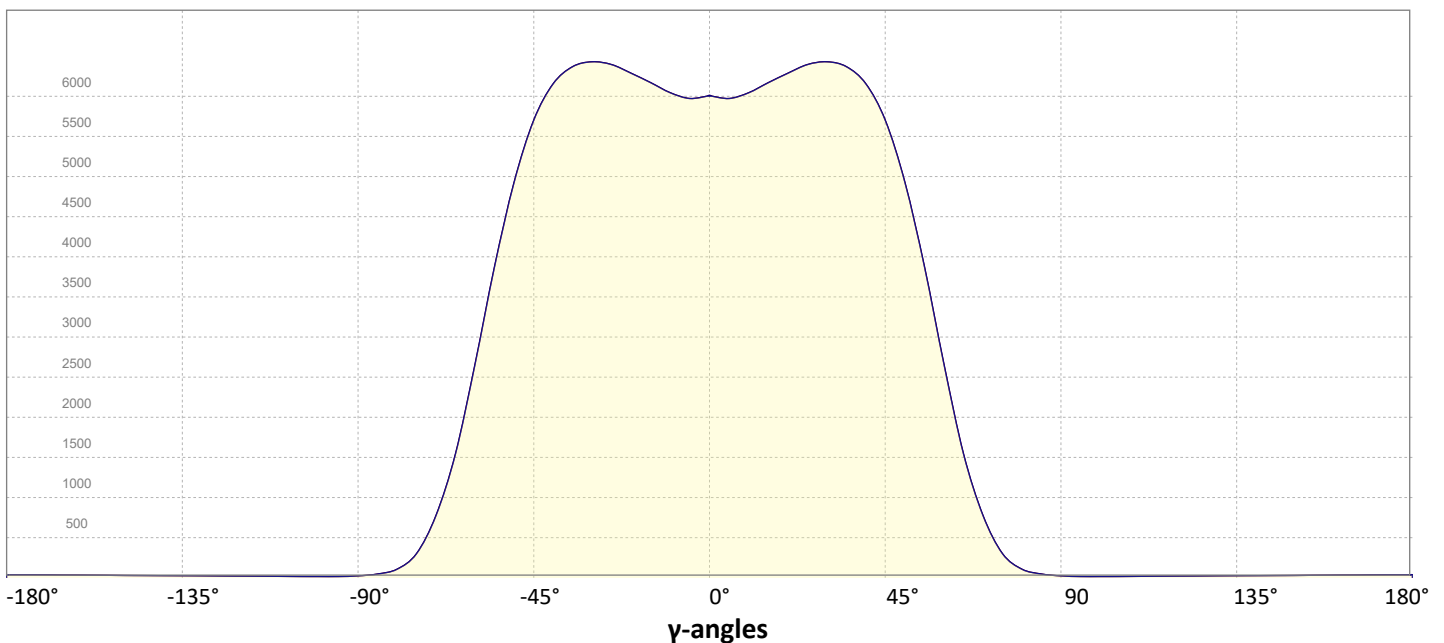
### Intensity Ratio

In 120° cone	88,5%
In 90° cone	59,5%

**C000-C180**

**C090-C270**

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



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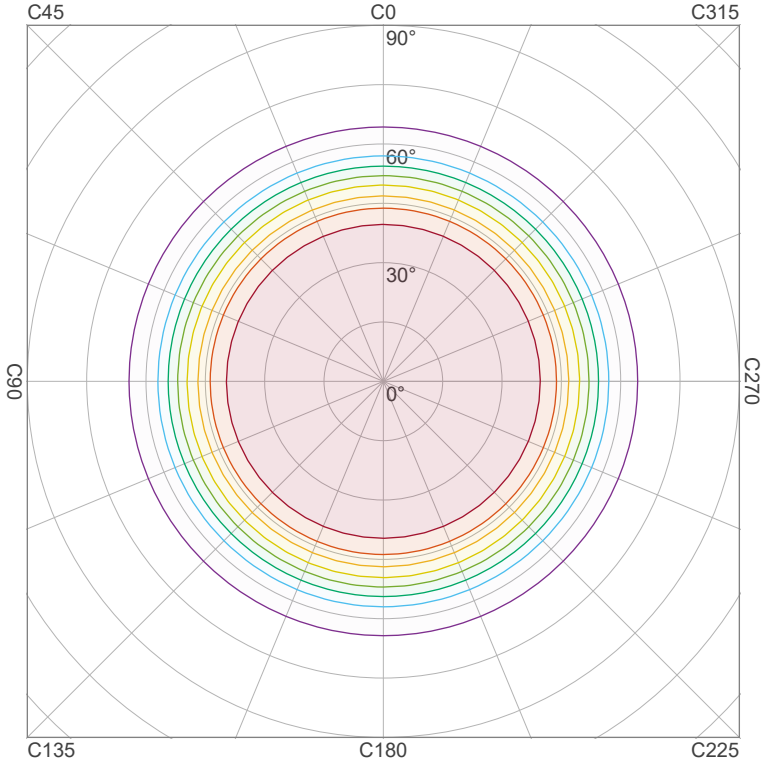
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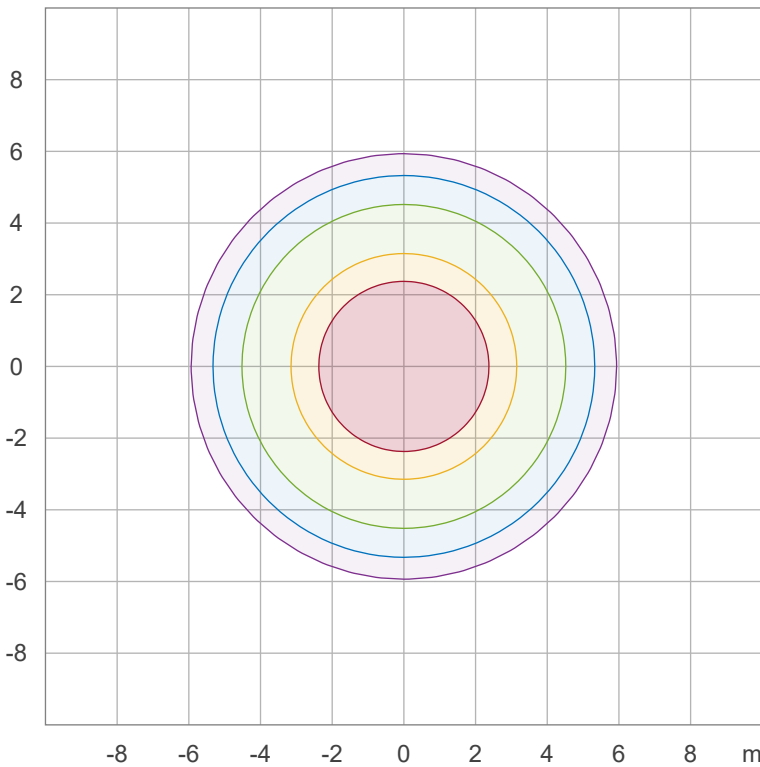
## Iso-intensity Diagram (Iso-candela)



90 %	5786,5 cd
80 %	5143,5 cd
70 %	4500,6 cd
60 %	3857,6 cd
50 %	3214,7 cd
40 %	2571,8 cd
30 %	1928,8 cd
20 %	1285,9 cd
10 %	642,9 cd

Peak intensity: 6429,4 cd  
Number of c-planes: 48

## Iso-illuminance Diagram (Iso-lux)



50,0 %	333,7 lx
30,0 %	200,2 lx
10,0 %	66,7 lx
5,0 %	33,4 lx
3,0 %	20,0 lx

Peak illuminance: 667,4 lx  
Mounting height: 3,0 m  
Number of c-planes: 48

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## Color details

Correlated Color Temperature, Target CCT = 4000 K  
 Correlated Color Temperature, Measured CCT = 4193 K  
 Color Rendering Index CRI 82,1  
 Color Rendering Index, R9 (red component) R9 = 1,5  
 Color Rendering TM30-18 R<sub>f</sub> 81,6 – R<sub>g</sub> 89,7  
 Color Quality Scale CQS = 81,2

MacAdam Steps SDCM = 4,5  
 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 = 0,0029  
 Color coordinate CIEs 1976 (CIELUV) (u';v') = (0,225;0,502)

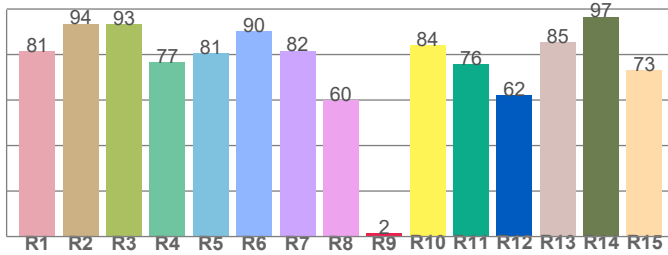
### CIE 1931



### CIE 1931 – zoomed on Planckian locus



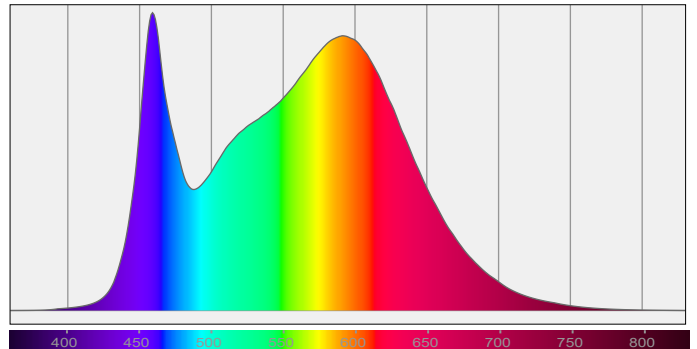
### Color Rendering Index per reference color (CIE 1995)



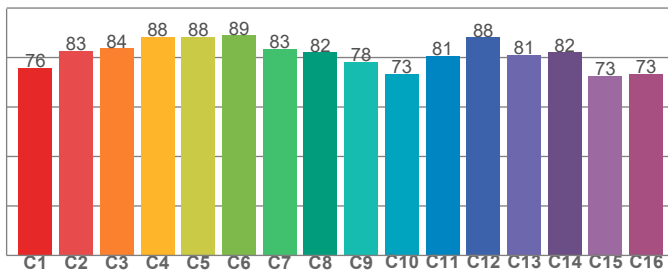
CRI R values, only R1-R8 are used to calculate final CRI value

R1	R2	R3	R4	R5	R6	R7	R8	R9	R10	R11	R12	R13	R14	R15
81,4	93,6	93,2	76,5	80,6	90,2	81,7	59,9	1,5	84,1	75,8	62,0	85,3	96,7	73,0

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



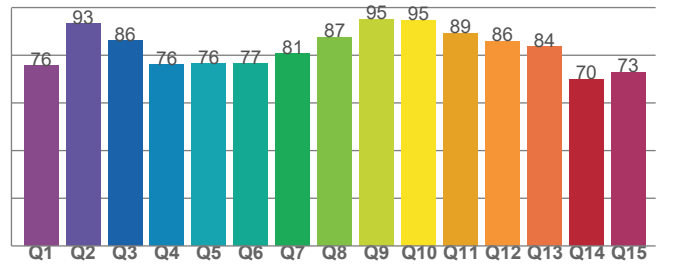
### TM30-18 R<sub>f</sub>-values per hue bin



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
75,9	82,7	83,7	88,4	88,4	88,9	83,5	82,2	78,3	73,5	80,7	88,2	81,2	82,3	72,6	73,5

### Color Quality Scale by reference color



CQS Q values

Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10	Q11	Q12	Q13	Q14	Q15
75,6	93,3	86,2	76,0	76,4	76,5	80,7	87,5	95,2	94,7	89,2	85,9	83,5	70,0	73,0

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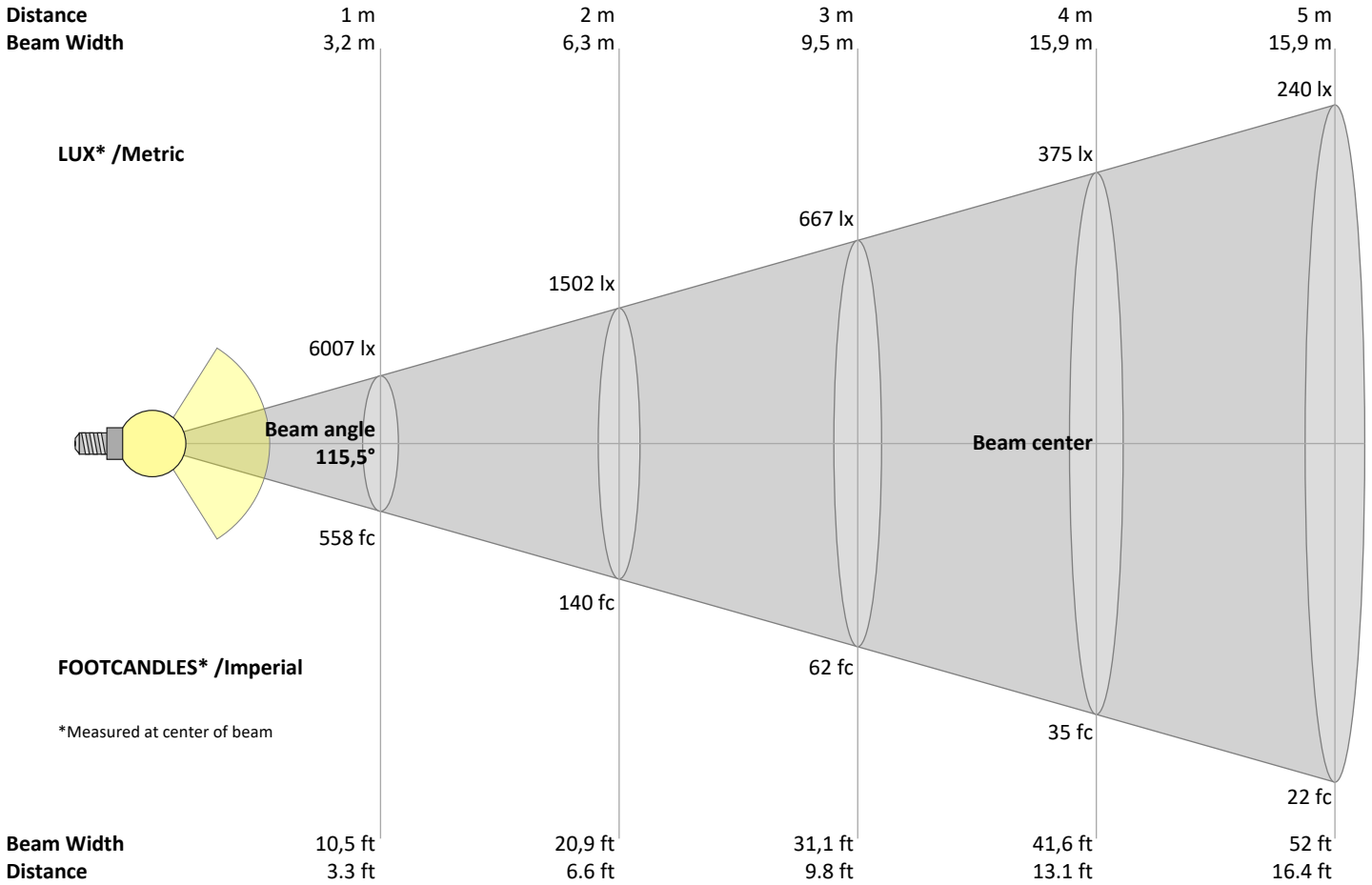
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## Beam Details



### 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
6007	1502	667	375	240	167	123	94	74	60	50	42	36	31	27	23	21	19	17	15	lux
558,1	139,5	62	34,9	22,3	15,5	11,4	8,7	6,9	5,6	4,6	3,9	3,3	2,8	2,5	2,2	1,9	1,7	1,5	1,4	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
6007	5973	6044	6168	6286	6394	6429	6370	6157	5702	4934	3888	2672	1555	782	304	108	47	23	15	cd
100%	99%	101%	103%	105%	106%	107%	106%	103%	95%	82%	65%	44%	26%	13%	5%	2%	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
6007	5973	6044	6168	6286	6394	6429	6370	6157	5702	4934	3888	2672	1555	782	304	108	47	23	15	cd
100%	99%	101%	103%	105%	106%	107%	106%	103%	95%	82%	65%	44%	26%	13%	5%	2%	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
6007	5973	6044	6168	6286	6394	6429	6370	6157	5702	4934	3888	2672	1555	782	304	108	47	23	15	cd
100%	99%	101%	103%	105%	106%	107%	106%	103%	95%	82%	65%	44%	26%	13%	5%	2%	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
6007	5973	6044	6168	6286	6394	6429	6370	6157	5702	4934	3888	2672	1555	782	304	108	47	23	15	cd
100%	99%	101%	103%	105%	106%	107%	106%	103%	95%	82%	65%	44%	26%	13%	5%	2%	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	31,2	32,4	31,5	32,7	32,9	31,3	32,4	31,5	32,7	33,0
	3H	31,5	32,6	31,9	32,9	33,1	31,6	32,7	32,0	33,0	33,2
	4H	31,5	32,6	31,9	32,9	33,1	31,6	32,7	32,0	32,9	33,2
	6H	31,5	32,5	31,8	32,7	33,1	31,6	32,5	31,9	32,8	33,2
	8H	31,5	32,4	31,8	32,7	33,1	31,5	32,5	31,9	32,8	33,2
	12H	31,4	32,3	31,8	32,7	33,1	31,5	32,4	31,9	32,7	33,2
4H	2H	31,4	32,5	31,9	32,8	33,1	31,5	32,6	31,9	32,9	33,1
	3H	31,9	32,8	32,3	33,1	33,6	31,9	32,8	32,3	33,2	33,6
	4H	31,8	32,7	32,3	33,1	33,6	31,9	32,7	32,4	33,2	33,7
	6H	31,8	32,6	32,3	32,9	33,3	31,9	32,7	32,4	33,0	33,4
	8H	31,8	32,5	32,3	32,9	33,2	31,8	32,6	32,4	32,9	33,3
	12H	31,7	32,3	32,2	32,7	33,2	31,8	32,4	32,3	32,8	33,3
8H	4H	31,8	32,5	32,3	32,9	33,3	31,8	32,6	32,4	32,9	33,3
	6H	31,8	32,3	32,3	32,8	33,3	31,8	32,4	32,4	32,8	33,4
	8H	31,8	32,2	32,3	32,8	33,4	31,8	32,3	32,4	32,8	33,5
	12H	31,7	32,1	32,3	32,6	33,2	31,8	32,2	32,4	32,7	33,3
12H	4H	31,7	32,3	32,2	32,7	33,2	31,8	32,4	32,3	32,8	33,3
	6H	31,8	32,2	32,3	32,7	33,4	31,8	32,3	32,4	32,8	33,5
	8H	31,7	32,1	32,3	32,6	33,2	31,8	32,2	32,4	32,7	33,3

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

S = 1.0H	0,3 / -0,3	0,3 / -0,3
S = 1.5H	1,1 / -1,7	1,1 / -1,7
S = 2.0H	2,2 / -4,0	2,2 / -4,0

## 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	101	101	101	99
1	110	106	102	99	107	104	100	97	99	97	94	96	93	91	92	90	88	86
2	101	94	88	82	99	92	86	81	88	84	79	85	81	78	82	79	76	74
3	93	83	75	69	90	81	74	69	78	72	67	75	70	66	73	69	65	63
4	85	74	65	59	83	72	65	59	70	63	58	67	62	57	65	60	56	54
5	78	66	57	51	76	65	57	51	62	55	50	60	54	49	59	53	49	47
6	72	59	50	44	70	58	50	44	56	49	44	55	48	43	53	47	43	41
7	67	53	45	39	65	53	44	39	51	44	38	49	43	38	48	42	38	36
8	62	49	40	34	60	48	40	34	46	39	34	45	39	34	44	38	34	32
9	58	44	36	31	56	44	36	31	43	35	31	41	35	30	40	34	30	28
10	54	41	33	28	53	40	33	28	39	32	28	38	32	27	37	31	27	25

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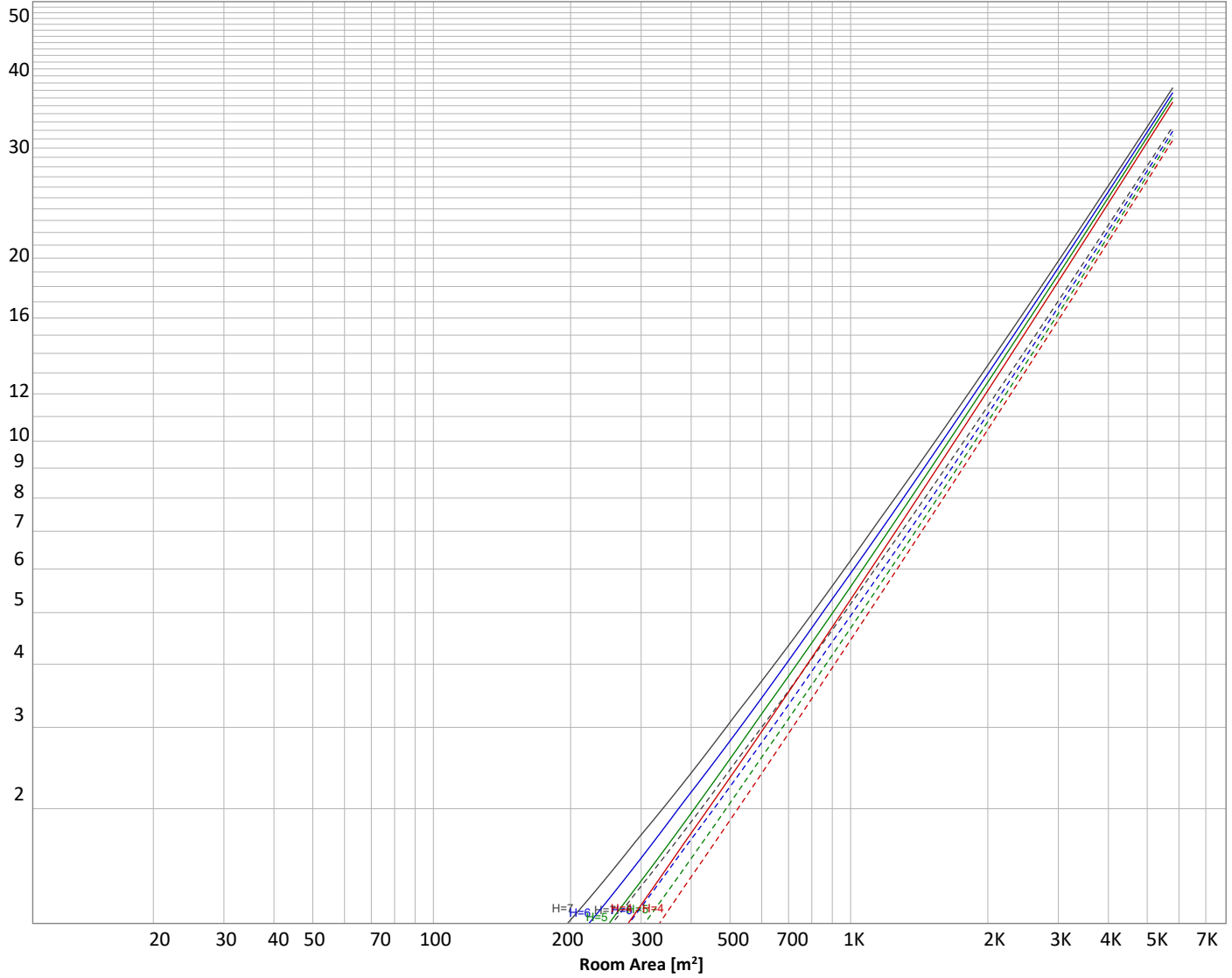
Operator:



## Luminaire budgetary diagram

Uncorrected, comprehensive UGR table according to 117-1995

LAMPS (number of lamps)



### Conditions

H = Room height	Flux = 19226 lm				
H <sub>down</sub> = Lamp distance from ceiling =	0.00 m	Line type	Ceiling reflectance	ρ(%) Wall reflectance	Floor reflectance
H <sub>work</sub> = Work area height from floor =	0.00 m	-----	70	50	30
E <sub>work</sub> = 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°
573 lm	1752 lm	2953 lm	3974 lm	4341 lm	3428 lm	1614 lm	392 lm	60,8 lm
90°-100°	100°-110°	110°-120°	120°-130°	130°-140°	140°-150°	150°-160°	160°-170°	170°-180°
18,8 lm	16,9 lm	19,1 lm	19,6 lm	19,3 lm	17,2 lm	14,2 lm	9,53 lm	3,42 lm

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## Outdoor Light Planning

### Lumen per Zone

Zone (γ)	Lumen	% Total
0-10°	573 lm	3,0%
10-20°	1752 lm	9,1%
20-30°	2953 lm	15,4%
30-40°	3974 lm	20,7%
40-50°	4341 lm	22,6%
50-60°	3428 lm	17,8%
60-70°	1614 lm	8,4%
70-80°	392 lm	2,0%
80-90°	61 lm	0,3%
90-100°	19 lm	0,1%
100-110°	17 lm	0,1%
110-120°	19 lm	0,1%
120-130°	20 lm	0,1%
130-140°	19 lm	0,1%
140-150°	17 lm	0,1%
150-160°	14 lm	0,1%
160-170°	10 lm	0,0%
170-180°	3 lm	0,0%
<b>Total</b>	<b>19226 lm</b>	<b>100,0%</b>

### Intensity peaks

Max intensity	6430 cd
Intensity, 90°	23 cd
Intensity, 0°	6007 cd

### Zonal Lumen summary

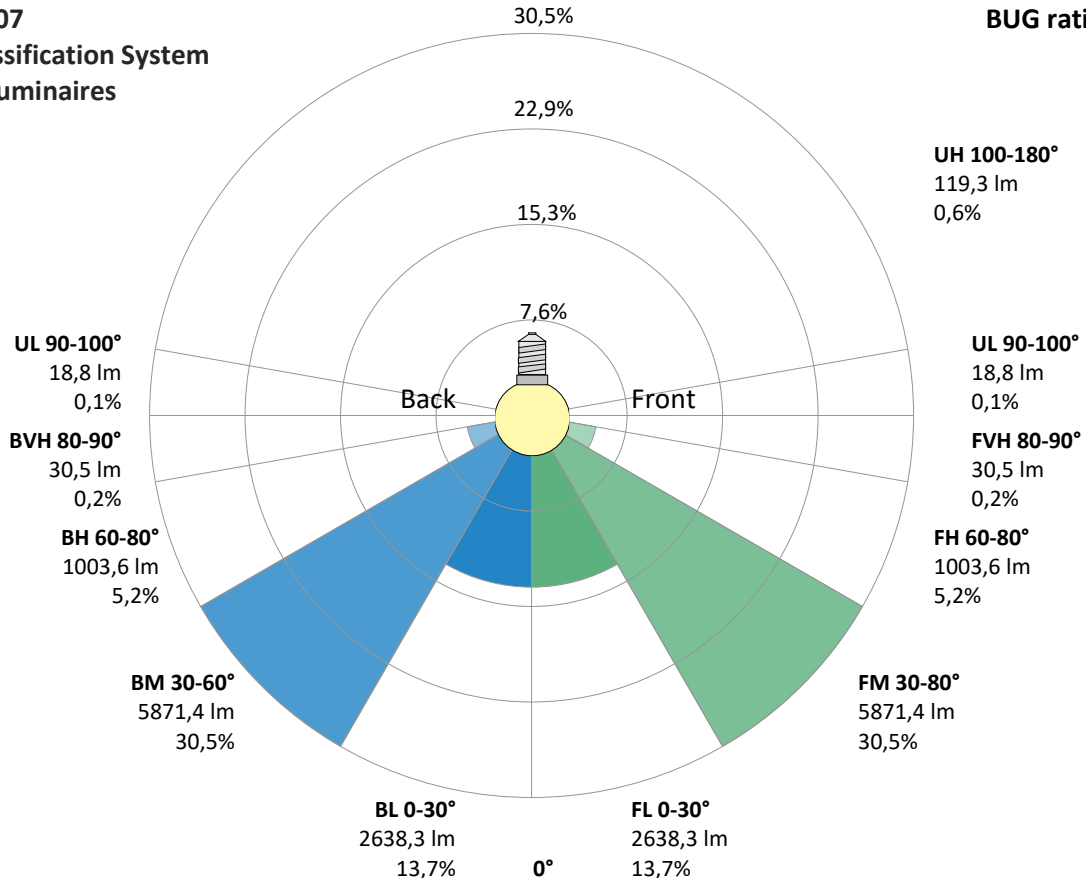
Zone (γ)	Lumen	% Total
0-30°	5279 lm	27,5%
0-40°	9253 lm	48,1%
0-60°	17021 lm	88,5%
60-90°	2066 lm	10,7%
70-100°	471 lm	2,5%
90-120°	55 lm	0,3%
0-90°	19088 lm	99,3%
90-180°	138 lm	0,7%
0-180°	19226 lm	100,0%

### BUG rating

	Lumen	% Total
<b>Forward light</b>		
Low(0-30°)	2638 lm	13,7%
Medium(30-60°)	5871 lm	30,5%
High(60-80°)	1004 lm	5,2%
Very high(80-90°)	30 lm	0,2%
<b>Back light</b>		
Low(0-30°)	2638 lm	13,7%
Medium(30-60°)	5871 lm	30,5%
High(60-80°)	1004 lm	5,2%
Very high(80-90°)	30 lm	0,2%
<b>Uplight</b>		
Low(90-100°)	19 lm	0,1%
High(100-180°)	119 lm	0,6%

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

**BUG rating B4 U3 G1**



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## Power Details

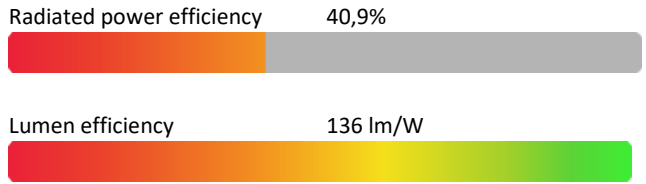
### Input Power

Power feed to light source	141,3 W
Frequency of input power	50 Hz
RMS Input voltage feed, $V_{RMS}$	230 V
RMS Input current feed, $I_{RMS}$	0,617 A
Volt-Ampere or apparent power = $V_{RMS} * I_{RMS}$	141,95 VA
Displacement factor of AC power feed	1,0
Power factor of AC current feed	1,0
Total harmonic distortion of the current	8,86%
Total harmonic distortion of the voltage	0,1%

### 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	3967 K
CCT shift	+33 K
CCT end	4000 K

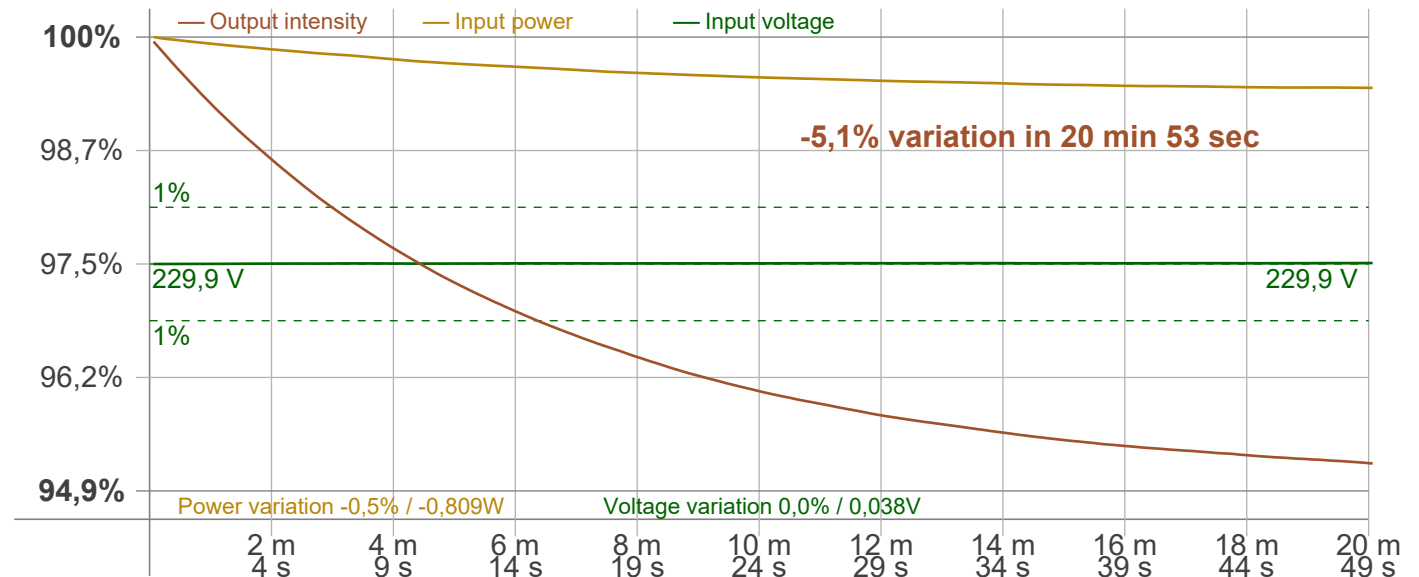
### Warmup Result

Total warmup time	Lamp stabilized in 20 min 53 sec
Warmup variation	-5,1%

### Output Change

Output start	20234 lm
Output change	-1009 lm
Output end	19226 lm

### Stabilization Curve



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Operator:



## Flicker /TLA details

Flicker Meter Type: Viso Systems LabFlicker  
 Frequency of input power: 50 Hz  
 Flicker/TLA sample rate: 40000 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: 99,93 %  
 Flicker index: 0,32

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

JA8/10 40 Hz: n/a %  
 JA8/10 90 Hz: n/a %  
 JA8/10 200 Hz: n/a %  
 JA8/10 400 Hz: n/a %  
 JA8/10 1000 Hz: n/a %

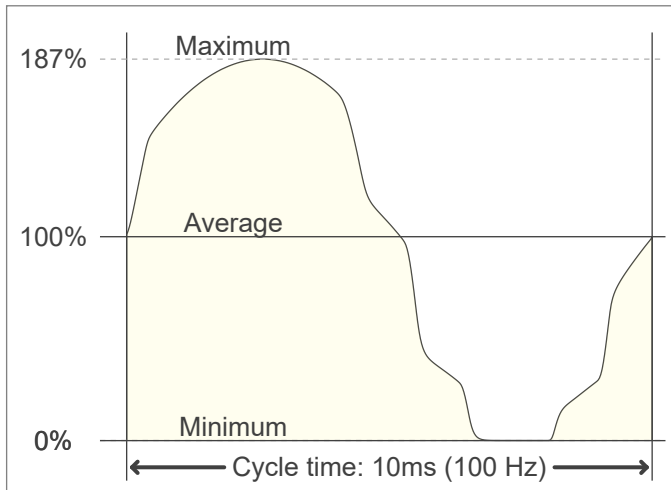
### TLA indices (re IEC TR 61547-1, IEC 61000-3-3 and IEC 61000-4-15)

PstLM value (F < 80 Hz): 0,08  
 SVM value (80 < F < 2000 Hz): 3,86

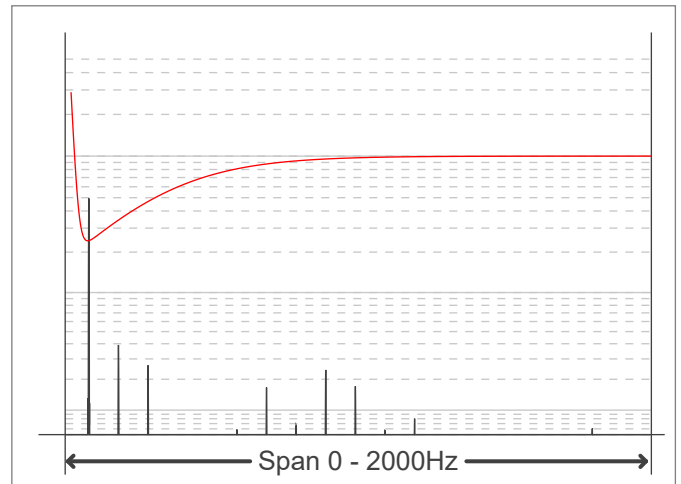
### Flicker indices according to Lighting Research Center (2015)

Perception metric, Assist Mp: n/a

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



Flicker FFT (flicker curve in frequency domain)



IEEE 1789 Frequency/modulation plot

