# Test report

Light measurement results

Print date 12-10-2026

## Laboratory and Equipment

| | |
|---|---|
| Test lab | Viso LabSpion - serial: 3331725735 sensor serial: 3532797498 - T |
| Spectrometer Manufacturer and Model | LabSpion – Type C, horizontal |
| Measurement date | 09/10/2026 |

**Measurement Conditions**

| | |
|---|---|
| Tested c-planes | 72 planes – 5,00° |
| Tested gamma resolution | 1,00° |
| Input Power | 9,802 W |

**Tested Light Source**

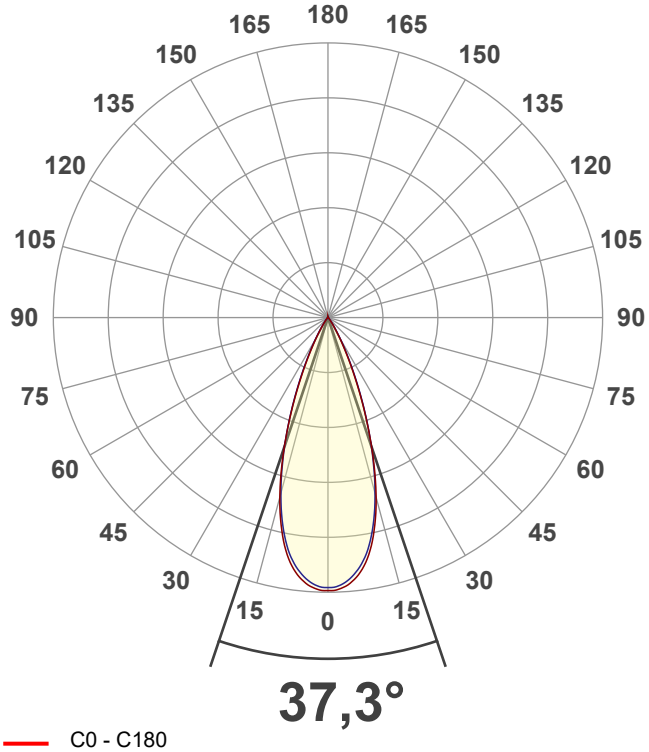
| | |
|---|---|
| Luminaire | GAMMA 10 3000K 36D WHITE |
| Basic Luminous Shape | SPOT |
| Item No. | 04068100303603 |
| Manufacturer | ELECTRUM |
| Description | 250mA\line Lente em preto |
| Dimensions, luminous surface | H/D = -1,7, W = 0, L = 3,9, Shape = SPOT |
| Dimensions, light source housing | H/D = 6,9, W = 0, L = 5,2 |

**Main Light Measurement Results**

| | |
|---|---|
| Output – Total Lumen (Up% / Down%) | 1375 lm – 0,5551% / 99,44% |
| Efficiency | 140,3 lm/W |
| Peak Intensity | 3405 cd |
| Correlated Color Temperature, CCT | 3000 K |
| Color Rendering Index | CRI 94,2 TM30Rf 90,7 TM30 Rg 101,8 |

## Polar light distribution diagram

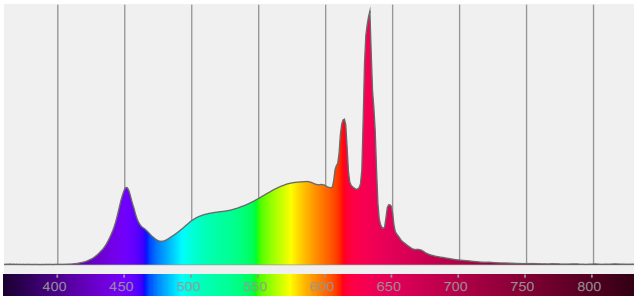
Unit: 0-100% of peak intensity




## Product photo



## Spectral power distribution



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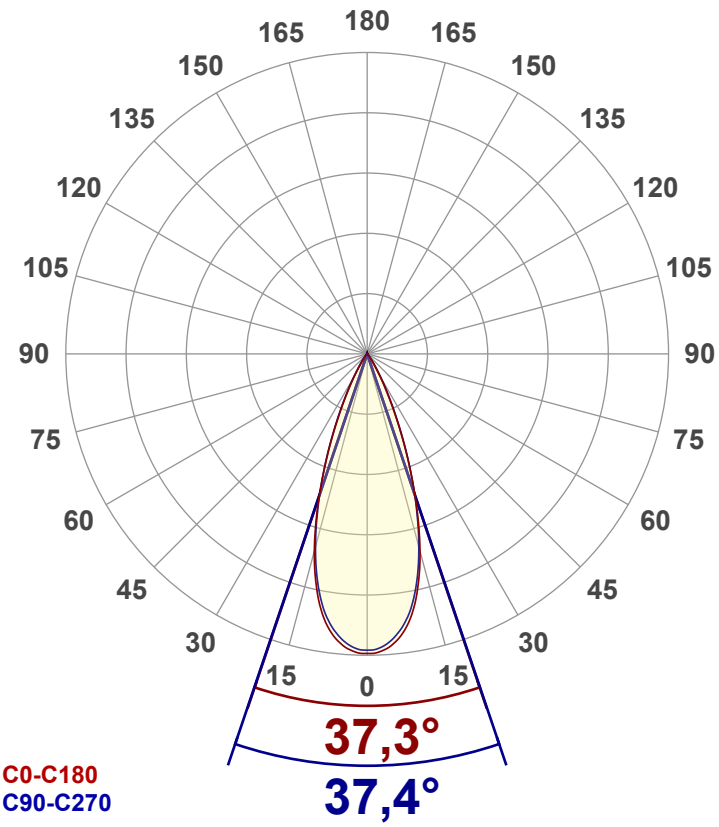
## Luminous Intensity diagram

Unit: 0-100% of peak intensity




## Main Values

| | |
|---|---|
| Output (total Lumen) | 1375 lm |
| Lumen Up% / Down% | 0,5551% / 99,44% |
| Peak Intensity | 3405 cd |
| Beam Angle (50%-FWHM) | 37,3° |

## EU Ecodesign parameters

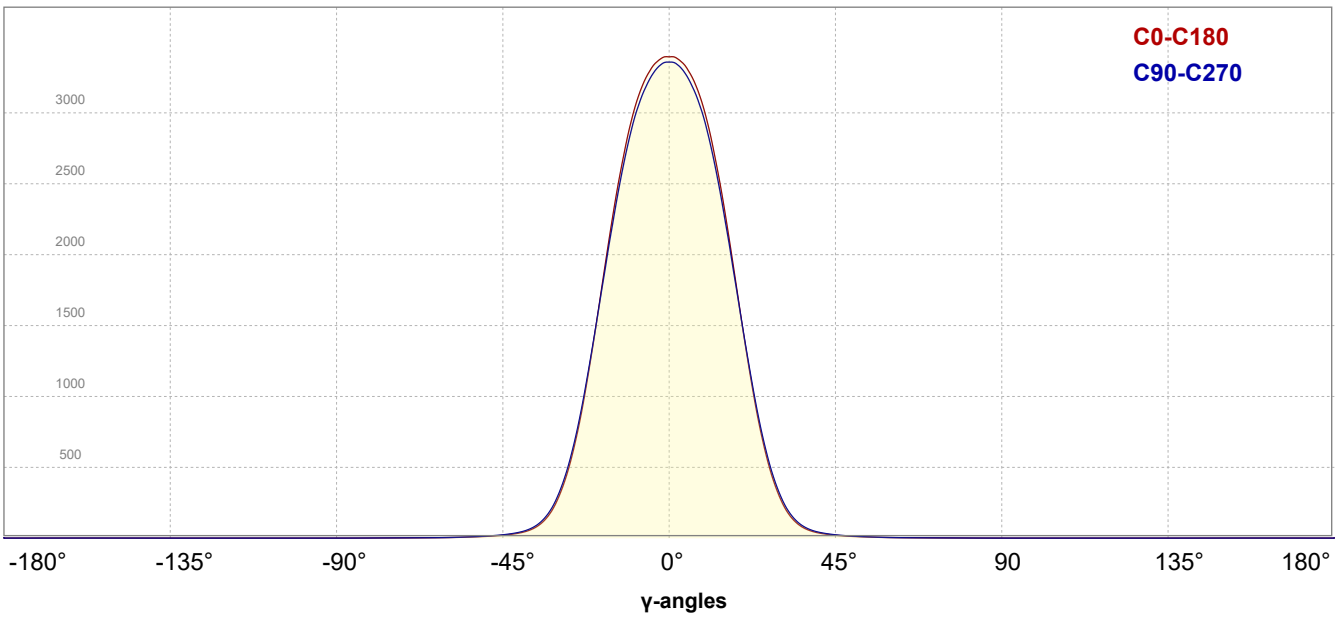
| | |
|---|---|
| Directionality (DLS or NDLS) | DLS |
| Ecodesign Useful Luminous Flux | 1345 lm |
| Ecodesign Energy Class | C |

## Intensity Ratio

| | |
|---|---|
| In 120° cone | 98,88% |
| In 90° cone | 97,8% |

## Linear distribution diagram

Intensity [cd]



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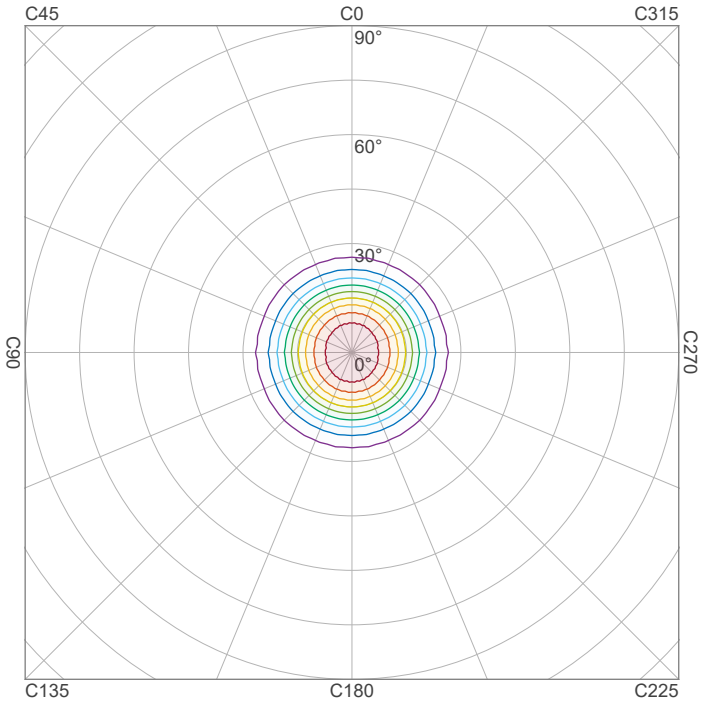
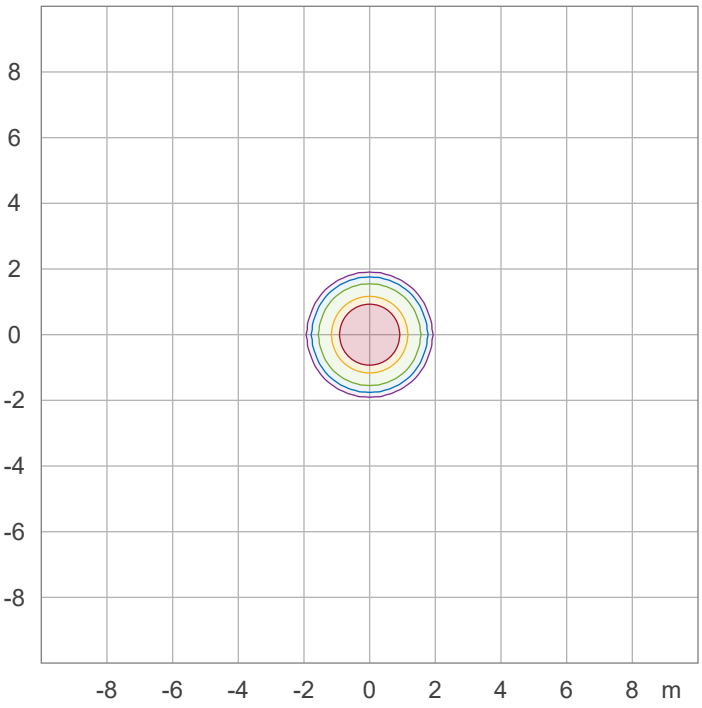
## Iso-intensity Diagram (Iso-candela)




| | |
|---|---|
| 90 % | 3060,9 cd |
| 80 % | 2720,8 cd |
| 70 % | 2380,7 cd |
| 60 % | 2040,6 cd |
| 50 % | 1700,5 cd |
| 40 % | 1360,4 cd |
| 30 % | 1020,3 cd |
| 20 % | 680,2 cd |
| 10 % | 340,1 cd |

Peak intensity: 3401,0 cd
Number of c-planes: 72

## Iso-illuminance Diagram (Iso-lux)




| | |
|---|---|
| 50,0 % | 189 lx |
| 30,0 % | 113 lx |
| 10,0 % | 37,8 lx |
| 5,0 % | 18,9 lx |
| 3,0 % | 11,3 lx |

Peak illuminance: 378 lx
Mounting height: 3 m
Number of c-planes: 72

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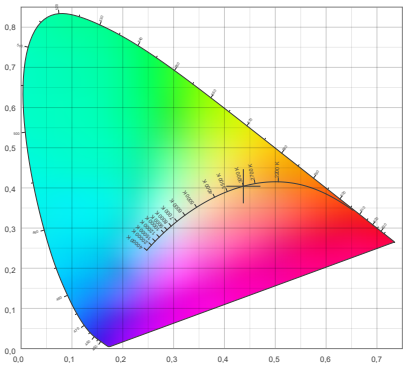
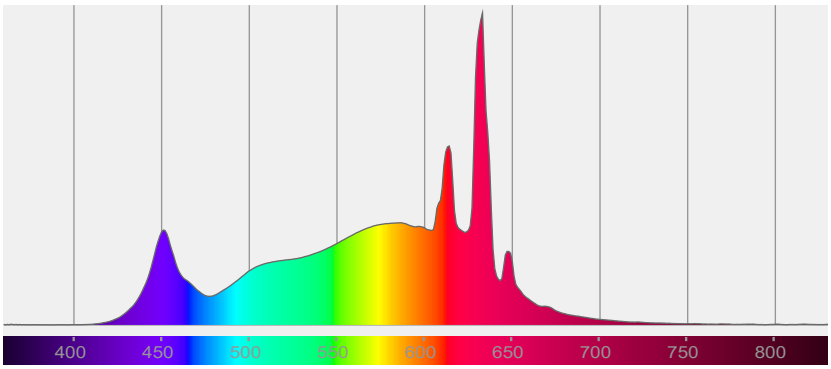
## Color details

| | | | |
|---|---|---|---|
| Correlated Color Temperature, Target | CCT = 3000 K | MacAdam Steps | SDCM = 7,1 |
| Correlated Color Temperature, Measured | CCT = 3131 K | Color deviation from BBL | Duv = -0,0049 |
| Color Rendering Index | CRI 94,2 | Color coordinates CIE 1931 | (x;y) = (0,4372;0,4042) |
| Color Rendering Index, R9 (red) | R9 = 66,9 | Color coordinate CIEs 1960 | (u;v) = (0,2507;0,3476) |
| Color Rendering TM30-18 | Rf 90,7 | Color coordinate CIEs 1976 | (u';v') = (0,2507;0,5215) |
| | Rg 101,8 | Color Quality Scale | CQS = 90,3 |

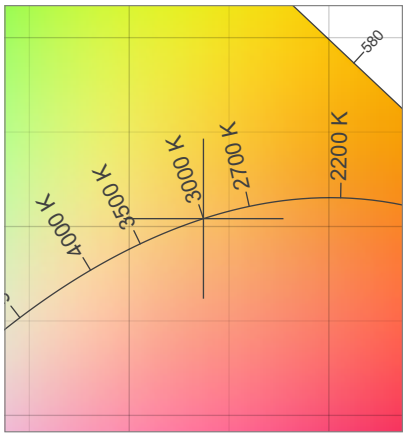
### CIE 1931 Chromaticity diagram



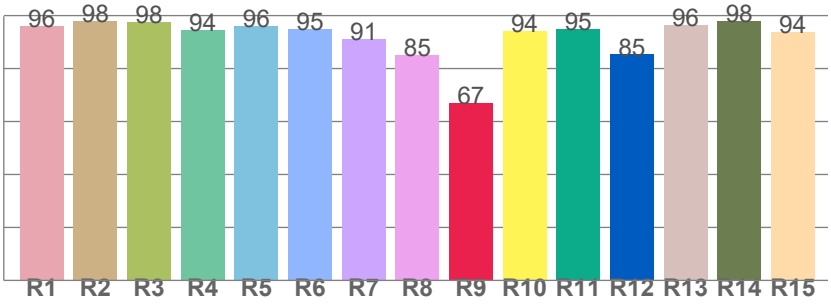
### Spectral power distribution




### CIE 1931 Chromaticity - zoomed



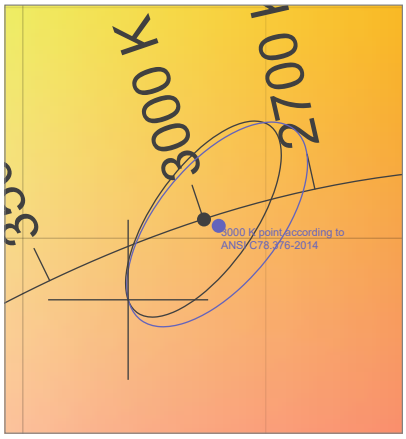

### Color Rendering Index per reference color (CIE 1995)



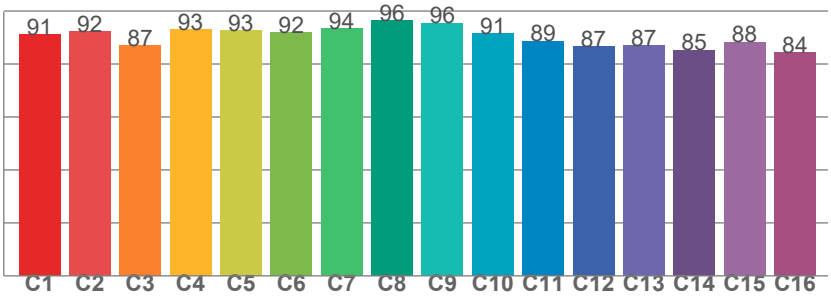

CRI R values, only R1-R8 are used to calculate final CRI value

| R1 | R2 | R3 | R4 | R5 | R6 | R7 | R8 | R9 | R10 | R11 | R12 | R13 | R14 | R15 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 96,1 | 97,9 | 97,6 | 94,4 | 96,1 | 95,0 | 91,0 | 85,1 | 66,9 | 94,1 | 95,1 | 85,3 | 96,5 | 98,0 | 93,6 |

### CIE 1931 Chromaticity - SDCM




### TM30-18 Rf-values per hue bin

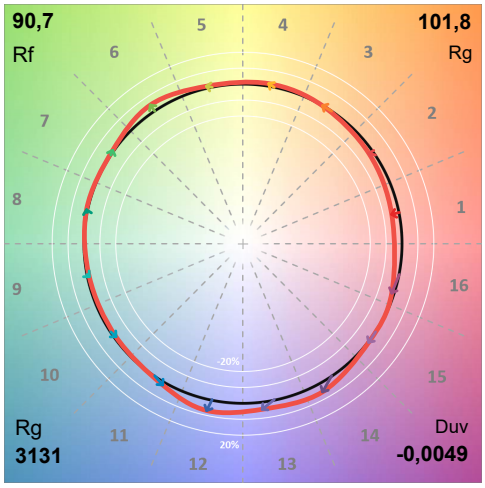



TM30-18 Rf-values per hue bin

| C1 | C2 | C3 | C4 | C5 | C6 | C7 | C8 | C9 | C10 | C11 | C12 | C13 | C14 | C15 | C16 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 91,2 | 92,4 | 87,0 | 92,9 | 92,6 | 92,0 | 93,5 | 96,5 | 95,5 | 91,4 | 88,7 | 86,7 | 86,9 | 85,3 | 88,3 | 84,3 |

## Color details - ANSI/IES TM-30-18 Color Rendition Report

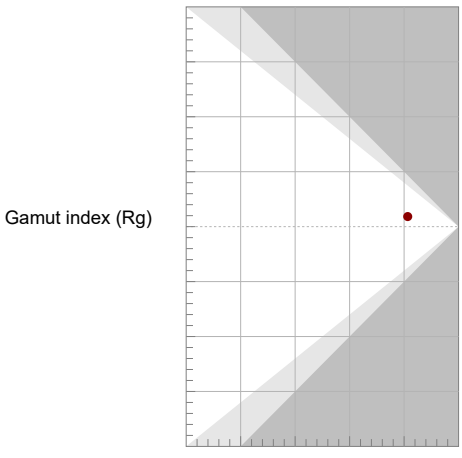
### Color Vector Graphic



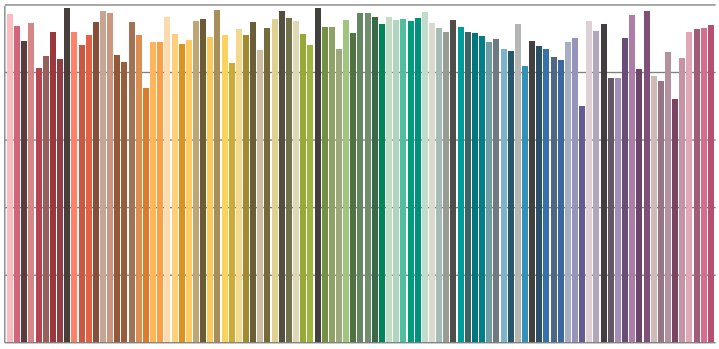

### Color Distortion Graphic



### Gamut Index vs. Fidelity Index

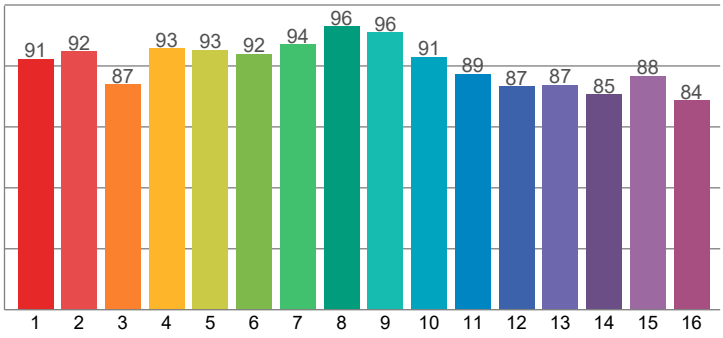



### Color Rendition by Color Evaluation Sample (CES)

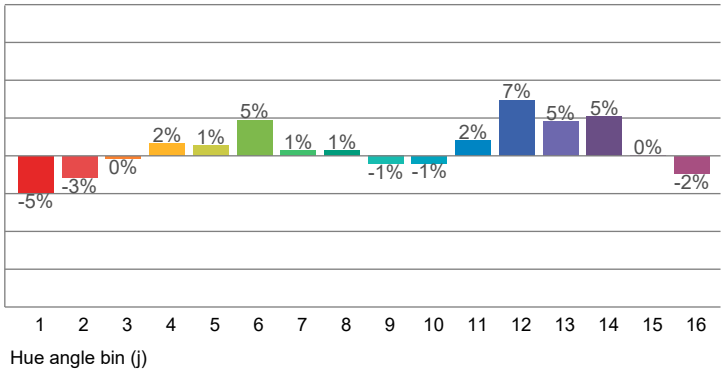


Color evaluation sample CES01 through CES99

### Local Color Fidelity (per hue bin)




### Local Chroma Shift (per hue bin)




| | |
|---|---|
| CIE x | 0,4372 |
| CIE y | 0,4372 |
| CIE u' | 0,2507 |
| CIE v' | 0,5215 |

| | |
|---|---|
| **CIE** | **13.3-1995** |
| Ra | 94,2 |
| R9 | 66,9 |

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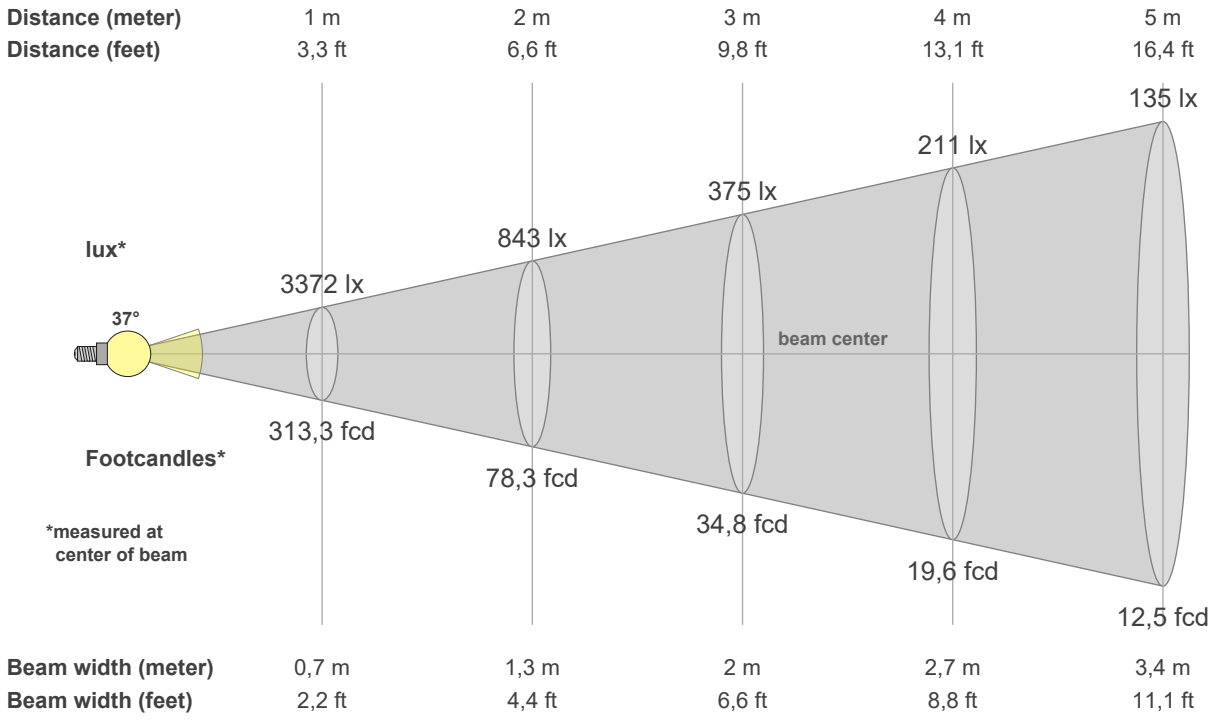
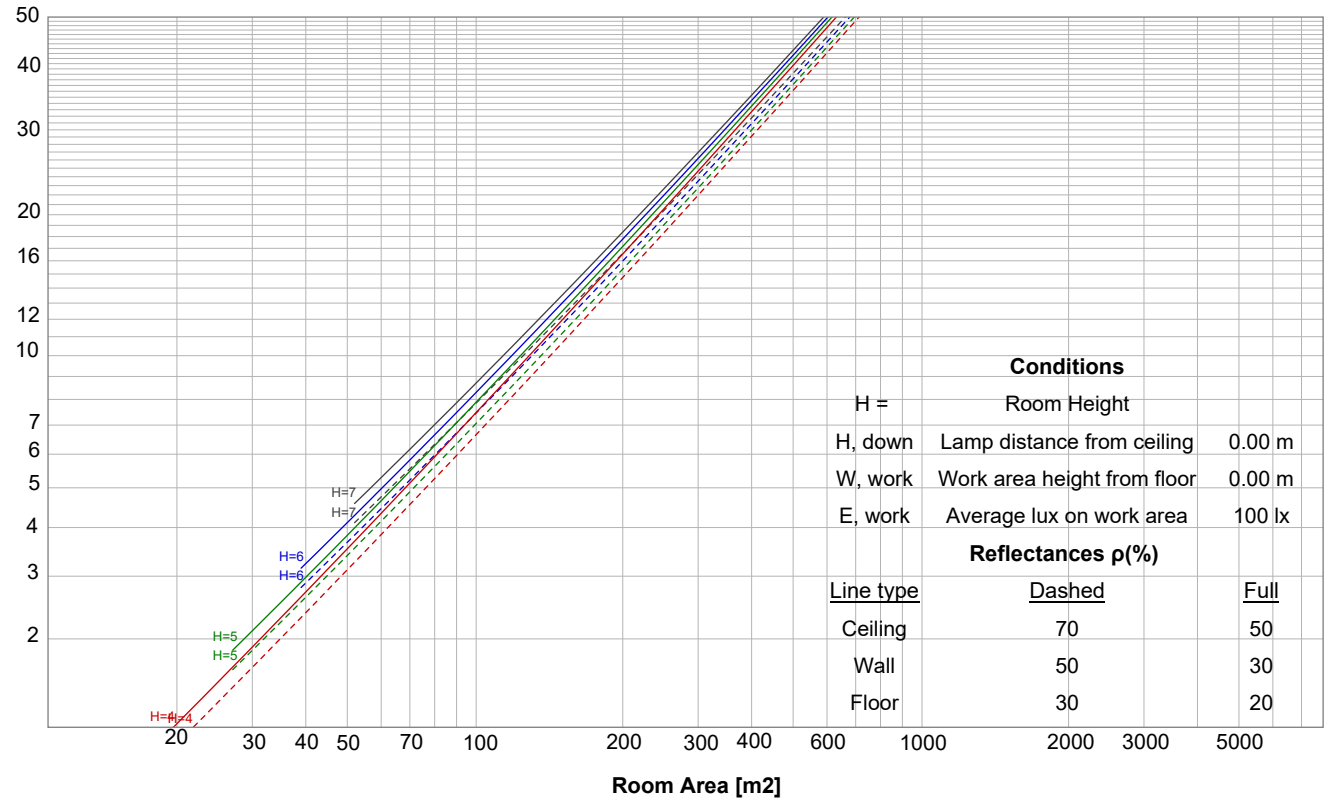
## Beam details




## Luminaire budgetary diagram

**LAMPS (number of lamps)**



## Intensity 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 |
| 3372 | 843 | 375 | 211 | 135 | 94 | 69 | 53 | 42 | 34 | 28 | 23 | 20 | 17 | 15 | 13 | 12 | 10 | 9 | 8 | lux |
| 313,3 | 78,3 | 34,8 | 19,6 | 12,5 | 8,7 | 6,4 | 4,9 | 3,9 | 3,1 | 2,6 | 2,2 | 1,9 | 1,6 | 1,4 | 1,2 | 1,1 | 1 | 0,9 | 0,8 | 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 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 3372 | 3385 | 3342 | 3260 | 3139 | 2967 | 2738 | 2465 | 2150 | 1809 | 1465 | 1141 | 851 | 613 | 425 | 285 | 185 | 120 | 79 | 55 | cd |
| 100% | 100% | 99% | 97% | 93% | 88% | 81% | 73% | 64% | 54% | 43% | 34% | 25% | 18% | 13% | 8% | 5% | 4% | 2% | 2% | 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 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 3372 | 3343 | 3290 | 3199 | 3073 | 2901 | 2676 | 2409 | 2110 | 1790 | 1468 | 1160 | 877 | 641 | 451 | 308 | 203 | 134 | 90 | 63 | cd |
| 100% | 99% | 98% | 95% | 91% | 86% | 79% | 71% | 63% | 53% | 44% | 34% | 26% | 19% | 13% | 9% | 6% | 4% | 3% | 2% | 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 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 3372 | 3385 | 3342 | 3260 | 3139 | 2967 | 2738 | 2465 | 2150 | 1809 | 1465 | 1141 | 851 | 613 | 425 | 285 | 185 | 120 | 79 | 55 | cd |
| 100% | 100% | 99% | 97% | 93% | 88% | 81% | 73% | 64% | 54% | 43% | 34% | 25% | 18% | 13% | 8% | 5% | 4% | 2% | 2% | 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 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 3372 | 3343 | 3290 | 3199 | 3073 | 2901 | 2676 | 2409 | 2110 | 1790 | 1468 | 1160 | 877 | 641 | 451 | 308 | 203 | 134 | 90 | 63 | cd |
| 100% | 99% | 98% | 95% | 91% | 86% | 79% | 71% | 63% | 53% | 44% | 34% | 26% | 19% | 13% | 9% | 6% | 4% | 3% | 2% | of 0°val |

## UGR Table

*Corrected, comprehensive UGR table according to 117-1995, S/H ratio=0.25*

| **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** | | **Viewed Crosswise** | | | | | **Viewed Endwise** | | | | |
| H = mouting height above eye level | | (Viewing direction orthogonal to lamp length axis) | | | | | (Viewing direction parallel to lamp length axis) | | | | |
| **X** | **Y** | | | | | | | | | | |
| 2H | 2H | 15,7 | 16,2 | 15,8 | 16,4 | 16,6 | 15,9 | 16,4 | 16,0 | 16,6 | 16,8 |
| | 3H | 15,5 | 16,2 | 15,9 | 16,4 | 16,6 | 15,7 | 16,4 | 16,1 | 16,6 | 16,7 |
| | 4H | 15,6 | 16,2 | 16,0 | 16,4 | 16,7 | 15,8 | 16,4 | 16,2 | 16,6 | 16,8 |
| | 6H | 15,7 | 16,2 | 16,0 | 16,5 | 16,9 | 15,9 | 16,4 | 16,2 | 16,7 | 17,1 |
| | 8H | 15,8 | 16,2 | 16,1 | 16,6 | 17,0 | 15,9 | 16,4 | 16,3 | 16,8 | 17,1 |
| | 12H | 15,8 | 16,3 | 16,2 | 16,6 | 17,1 | 16,0 | 16,5 | 16,3 | 16,8 | 17,2 |
| 4H | 2H | 15,4 | 16,0 | 15,8 | 16,2 | 16,5 | 15,6 | 16,2 | 16,0 | 16,4 | 16,7 |
| | 3H | 15,5 | 16,0 | 15,9 | 16,4 | 16,8 | 15,7 | 16,2 | 16,1 | 16,5 | 17,0 |
| | 4H | 15,6 | 16,0 | 16,0 | 16,4 | 17,0 | 15,7 | 16,2 | 16,2 | 16,6 | 17,1 |
| | 6H | 15,7 | 16,2 | 16,2 | 16,5 | 16,9 | 15,9 | 16,4 | 16,4 | 16,7 | 17,1 |
| | 8H | 15,8 | 16,3 | 16,3 | 16,6 | 17,0 | 16,0 | 16,4 | 16,5 | 16,8 | 17,1 |
| | 12H | 15,9 | 16,3 | 16,5 | 16,7 | 17,2 | 16,1 | 16,4 | 16,6 | 16,9 | 17,3 |
| 8H | 4H | 15,5 | 16,0 | 16,1 | 16,3 | 16,7 | 15,7 | 16,2 | 16,2 | 16,5 | 16,9 |
| | 6H | 15,8 | 16,1 | 16,3 | 16,6 | 17,1 | 16,0 | 16,2 | 16,5 | 16,7 | 17,2 |
| | 8H | 16,0 | 16,3 | 16,6 | 16,8 | 17,4 | 16,2 | 16,4 | 16,7 | 16,9 | 17,5 |
| | 12H | 16,3 | 16,5 | 16,9 | 17,0 | 17,6 | 16,4 | 16,6 | 17,0 | 17,1 | 17,7 |
| 12H | 4H | 15,5 | 15,8 | 16,0 | 16,3 | 16,7 | 15,7 | 16,0 | 16,2 | 16,4 | 16,9 |
| | 6H | 15,9 | 16,1 | 16,4 | 16,6 | 17,2 | 16,0 | 16,2 | 16,5 | 16,8 | 17,4 |
| | 8H | 16,1 | 16,3 | 16,7 | 16,8 | 17,4 | 16,2 | 16,4 | 16,8 | 16,9 | 17,5 |
| Variations with the observer position for the luminaire spacings, S: | | | | | | | | | | | |
| S = 1.0H | | 4,1 / -2,4 | | | | | 4,1 / -2,5 | | | | |
| S = 1.5H | | 6,5 / -2,8 | | | | | 6,6 / -2,9 | | | | |
| S = 2.0H | | 8,4 / -3,1 | | | | | 8,4 / -3,2 | | | | |

## 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 | 20 |
| RCR | (Room Cavity Ratio) | | | | Room values are expressed as percentage of Lumen delivered to the task surface | | | | | | | | | | | | | |
| 0 | 118,9 | 118,9 | 118,9 | 118,9 | 116,1 | 116,1 | 116,1 | 116,1 | 110,8 | 110,8 | 110,8 | 106,0 | 106,0 | 106,0 | 101,5 | 101,5 | 101,5 | 99,4 |
| 1 | 114,3 | 111,9 | 109,8 | 107,9 | 111,8 | 109,7 | 107,9 | 106,1 | 105,6 | 104,2 | 102,8 | 101,9 | 100,7 | 99,6 | 98,4 | 97,5 | 96,7 | 94,9 |
| 2 | 109,9 | 105,8 | 102,5 | 99,7 | 107,8 | 104,1 | 101,1 | 98,5 | 100,9 | 98,4 | 96,3 | 97,9 | 95,9 | 94,2 | 95,1 | 93,6 | 92,2 | 90,6 |
| 3 | 105,7 | 100,5 | 96,4 | 93,2 | 103,8 | 99,1 | 95,4 | 92,4 | 96,5 | 93,4 | 90,9 | 94,1 | 91,6 | 89,4 | 91,9 | 89,8 | 88,0 | 86,6 |
| 4 | 101,8 | 95,7 | 91,2 | 87,8 | 100,1 | 94,6 | 90,4 | 87,3 | 92,5 | 89,0 | 86,2 | 90,5 | 87,6 | 85,2 | 88,7 | 86,2 | 84,2 | 82,8 |
| 5 | 98,1 | 91,4 | 86,7 | 83,2 | 96,6 | 90,5 | 86,1 | 82,8 | 88,7 | 85,0 | 82,1 | 87,1 | 83,9 | 81,3 | 85,6 | 82,8 | 80,6 | 79,4 |
| 6 | 94,6 | 87,4 | 82,7 | 79,2 | 93,2 | 86,7 | 82,2 | 78,9 | 85,2 | 81,3 | 78,4 | 83,9 | 80,5 | 77,9 | 82,6 | 79,7 | 77,3 | 76,1 |
| 7 | 91,2 | 83,8 | 79,1 | 75,7 | 90,1 | 83,2 | 78,7 | 75,5 | 82,0 | 78,0 | 75,1 | 80,9 | 77,3 | 74,7 | 79,8 | 76,7 | 74,3 | 73,1 |
| 8 | 88,1 | 80,5 | 75,8 | 72,5 | 87,0 | 80,0 | 75,5 | 72,3 | 79,0 | 74,9 | 72,0 | 78,0 | 74,4 | 71,7 | 77,1 | 73,8 | 71,4 | 70,3 |
| 9 | 85,2 | 77,5 | 72,8 | 69,6 | 84,2 | 77,0 | 72,5 | 69,5 | 76,1 | 72,1 | 69,2 | 75,3 | 71,6 | 69,0 | 74,5 | 71,2 | 68,8 | 67,7 |
| 10 | 82,4 | 74,6 | 70,0 | 66,9 | 81,5 | 74,2 | 69,8 | 66,9 | 73,5 | 69,4 | 66,7 | 72,8 | 69,1 | 66,5 | 72,1 | 68,7 | 66,3 | 65,2 |

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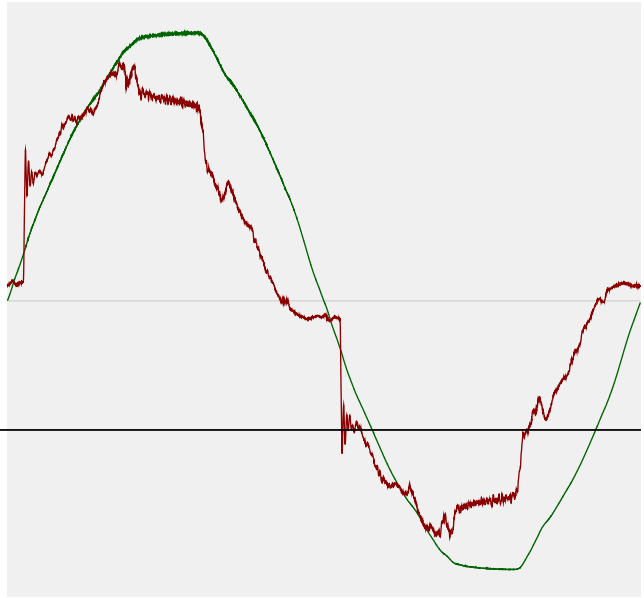
## Power details

| Input power | |
|---|---|
| Frequency of input power | 50,0 Hz |
| Power feed to light source | 9,802 W |
| RMS Input voltage feed V,RMS | 234,1 V |
| RMS Input current feed I,RMS | 0,04 A |
| Volt-Amp or apparent power = V,RMS*I,RMS | 10,5 VA |
| Displacement factor of AC power feed | 0,95 |
| Power factor of AC current feed | 0,94 |
| Total harmonic distortion of the current | 14,29% |
| Total harmonic distortion of the voltage | 2,726% |

**Input power curve**



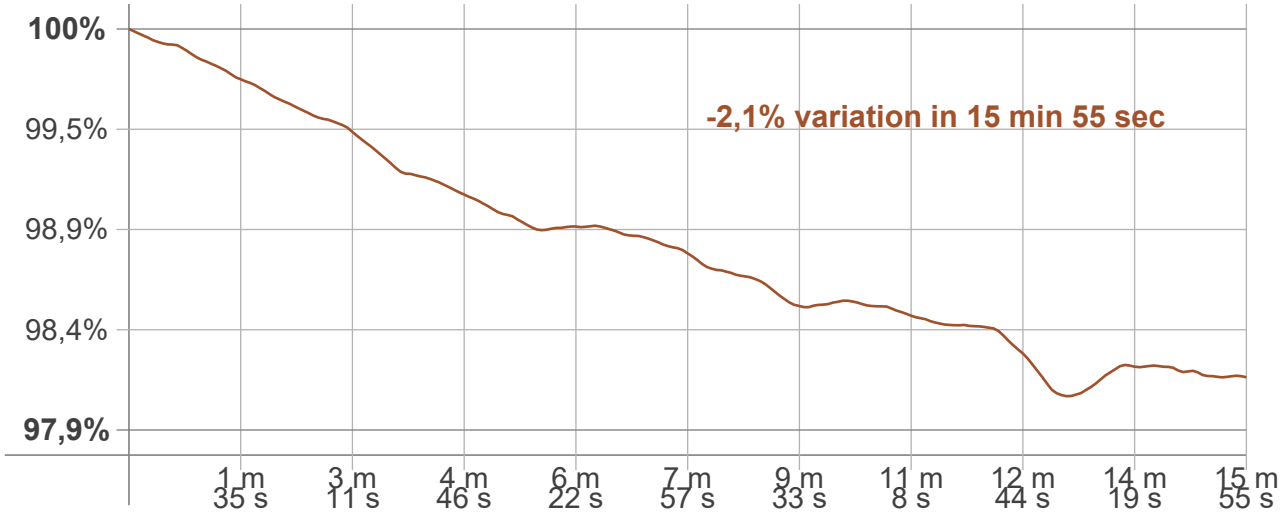
### Efficiency

| | |
|---|---|
| Radiated power efficiency | 41,84 |
| Lumen efficiency | 140,3 lm/W |

## Stabilization details

| Warmup Conditions | | Color Temperature Change | |
|---|---|---|---|
| Stable period | 15 min | CCT start | 3023 K |
| Stable change max | 2% | CCT shift | -23 K |
| Minimum time | 15 min | CCT end | 3000 K |
| **Warmup Result** | | **Output Change** | |
| Total warmup time | Lamp stabilized in | Output start | 1403 lm |
| Warmup variation | -2,1445% | Output change | -27,665 lm |
| | | Output end | 1375 lm |

## Stabilization Curve



## Flicker TLA details

| | |
|---|---|
| Flicker Meter Type | Viso Systems LabFlicker |
| Frequency of input power | 50,0 Hz |
| Flicker/TLA sample rate | 20,0 samples/s |

**Measurement time**

| | |
|---|---|
| PstLM | 180 sec. |
| All other indices | 1,5 sec, |

**Flicker indices according to Illuminating Engineering Society (IES)**

| | |
|---|---|
| Flicker frequency | 100,0 Hz |
| Percent Flicker | 4,147 % |
| Flicker index | 0,0 |

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

| | |
|---|---|
| PstLM value (F < 80 Hz) | 1,80 |
| SVM value (80 < F < 2000 Hz) | 0,02 |

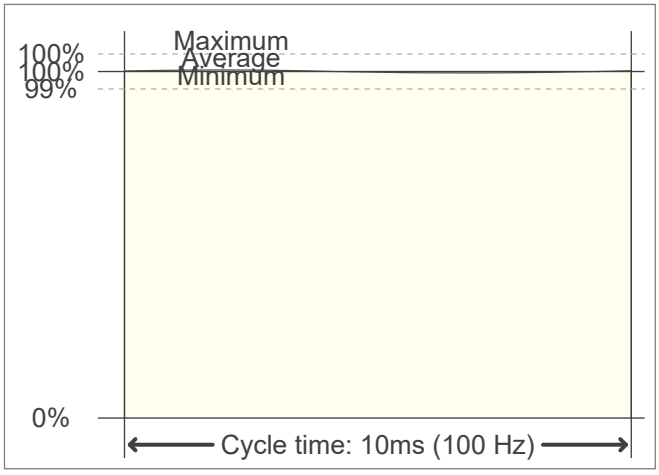
**Flicker indices according to California Energy Commission (CEC) 2016b**

| | |
|---|---|
| JA8/10 40 Hz | 3,733 % |
| JA8/10 90 Hz | 3,733 % |
| JA8/10 200 Hz | 4,15 % |
| JA8/10 400 Hz | 4,137 % |
| JA8/10 1000 Hz | 4,139 % |

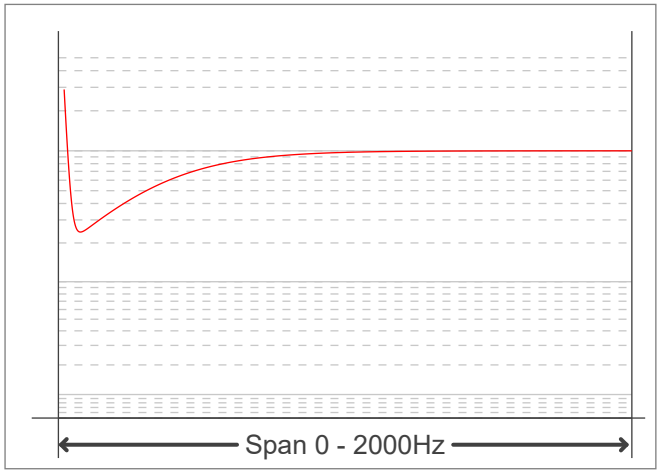
**Flicker indices according to Lighting Research Center (2015)**

| | |
|---|---|
| Perception metric, Assist Mp | 1,08 |

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




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




**IEEE 1789 Frequency/modulation plot**

