

# Test report

## Laboratory and Equipment

Test lab  
Spectrometer Manufacturer and Model  
Measurement date

Viso LabSpion - serial: 3331725735 sensor serial: 3532797498 - T  
LabSpion - Type C, horizontal  
26/06/2026

## Measurement Conditions

Tested c-planes  
Tested gamma resolution  
Input Power

72 planes - 5,00°  
1,00°  
10,98 W

## Tested Light Source

Luminaire  
Basic Luminous Shape  
Item No.  
Manufacturer  
Description  
Dimensions, luminous surface  
Dimensions, light source housing

COSMO 200 2700K  
SPOT  
73911900279999  
ELECTRUM  
H/D = 3,2, W = 0, L = 4, Shape = SPOT  
H/D = 10,3, W = 0, L = 7

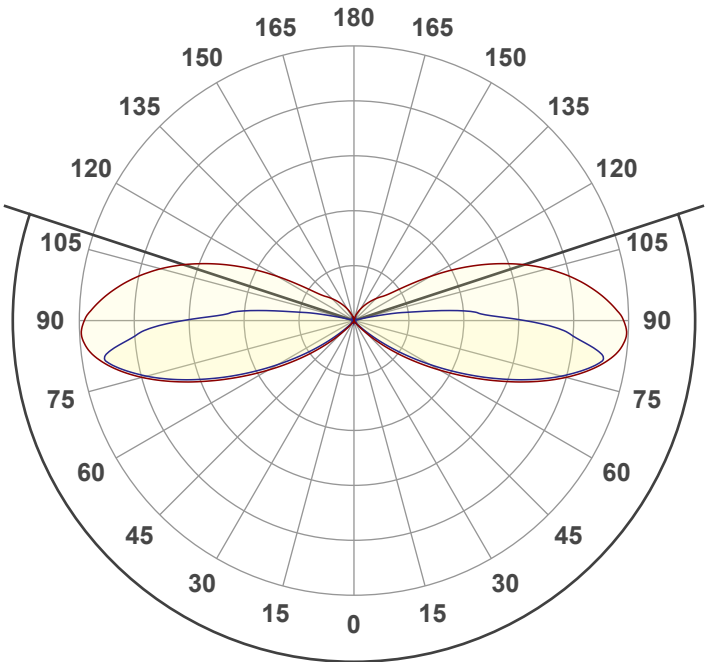
## Main Light Measurement Results

Output - Total Lumen (Up% / Down%)  
Efficiency  
Peak Intensity  
Correlated Color Temperature, CCT  
Color Rendering Index

184,4 lm - 43,09% / 56,91%  
16,79 lm/W  
40,63 cd  
2700 K  
CRI 93,0 TM30Rf 90,9 TM30 Rg 96,8

## Polar light distribution diagram

Unit: 0-100% of peak intensity



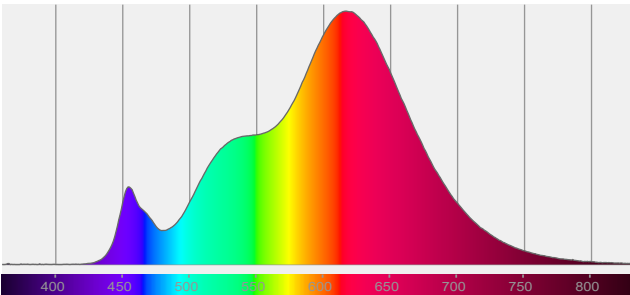
— C0 - C180  
— C90 - C270

$\eta = 100\%$

## Product photo

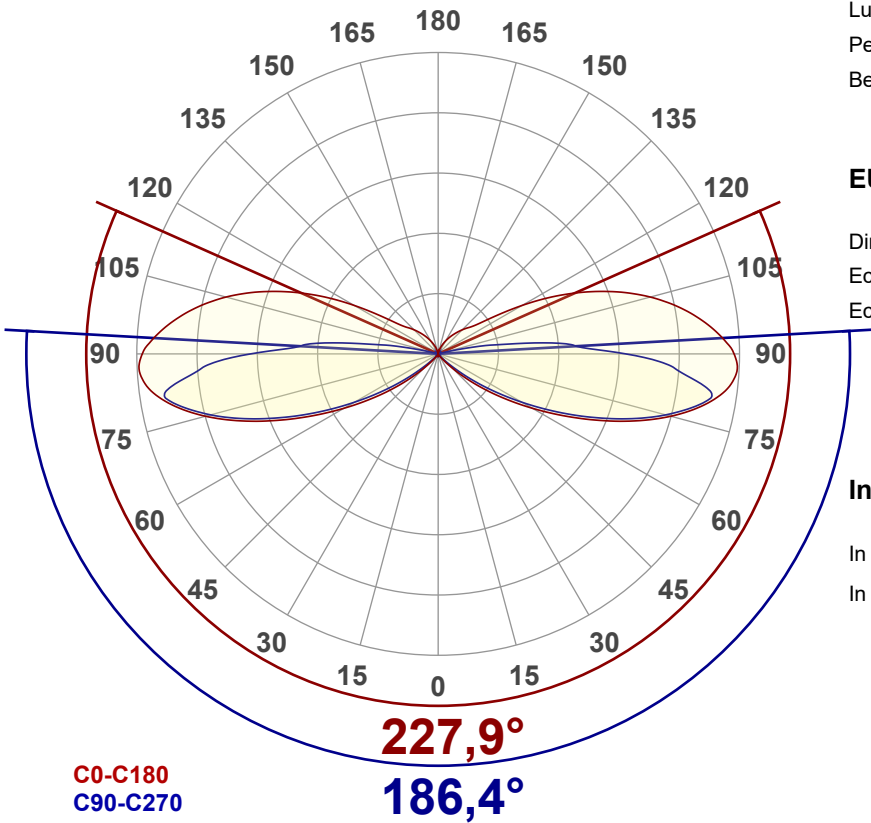


## Spectral power distribution



Luminous Intensity diagram

Unit: 0-100% of peak intensity



Main Values

|                       |                 |
|-----------------------|-----------------|
| Output (total Lumen)  | 184,4 lm        |
| Lumen Up% / Down%     | 43,09% / 56,91% |
| Peak Intensity        | 40,63 cd        |
| Beam Angle (50%-FWHM) | 216,4°          |

EU Ecodesign parameters

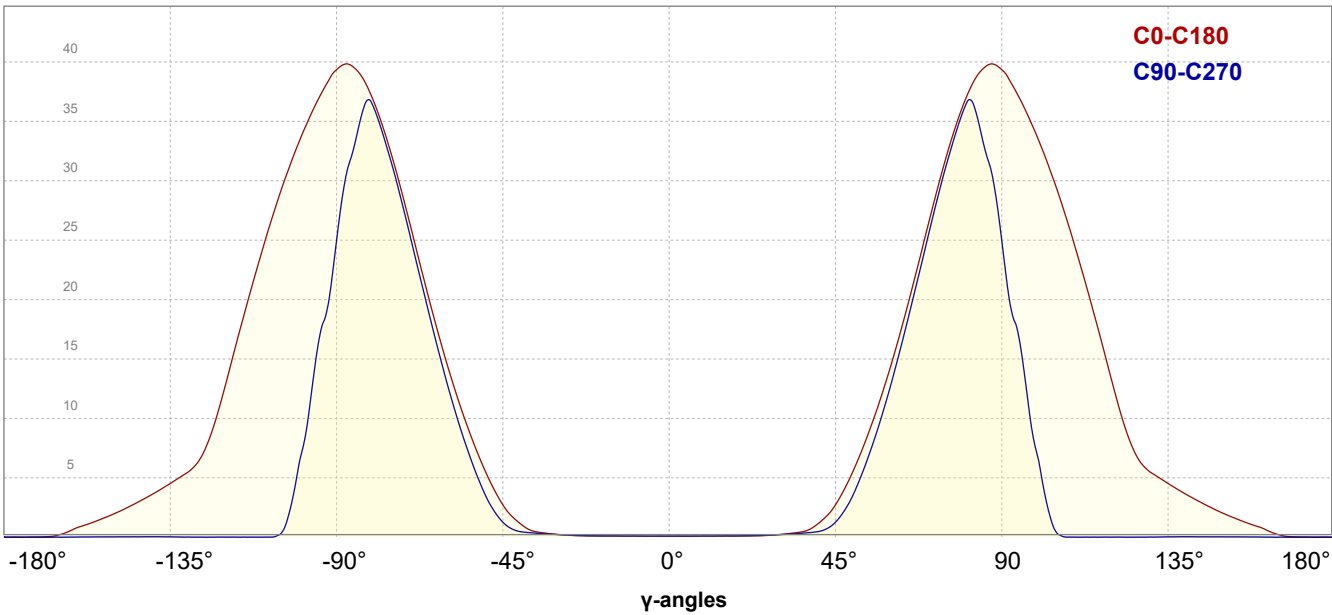
|                                |          |
|--------------------------------|----------|
| Directionality (DLS or NDLS)   | NDLS     |
| Ecodesign Useful Luminous Flux | 184,4 lm |
| Ecodesign Energy Class         | G        |

Intensity Ratio

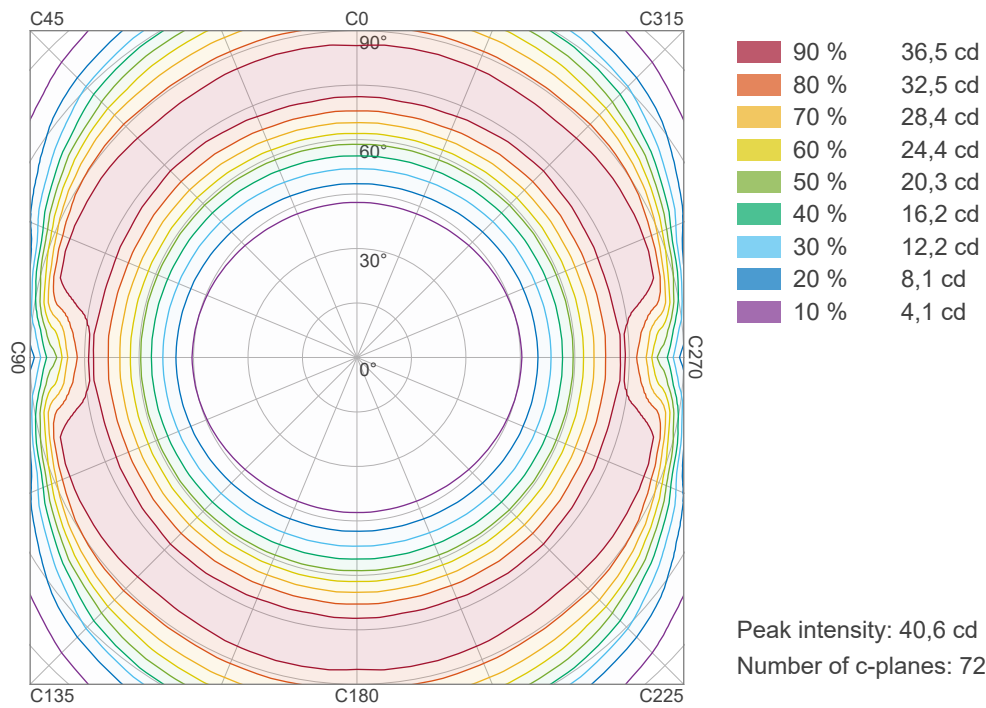
|              |         |
|--------------|---------|
| In 120° cone | 5,633%  |
| In 90° cone  | 0,4981% |

Linear distribution diagram

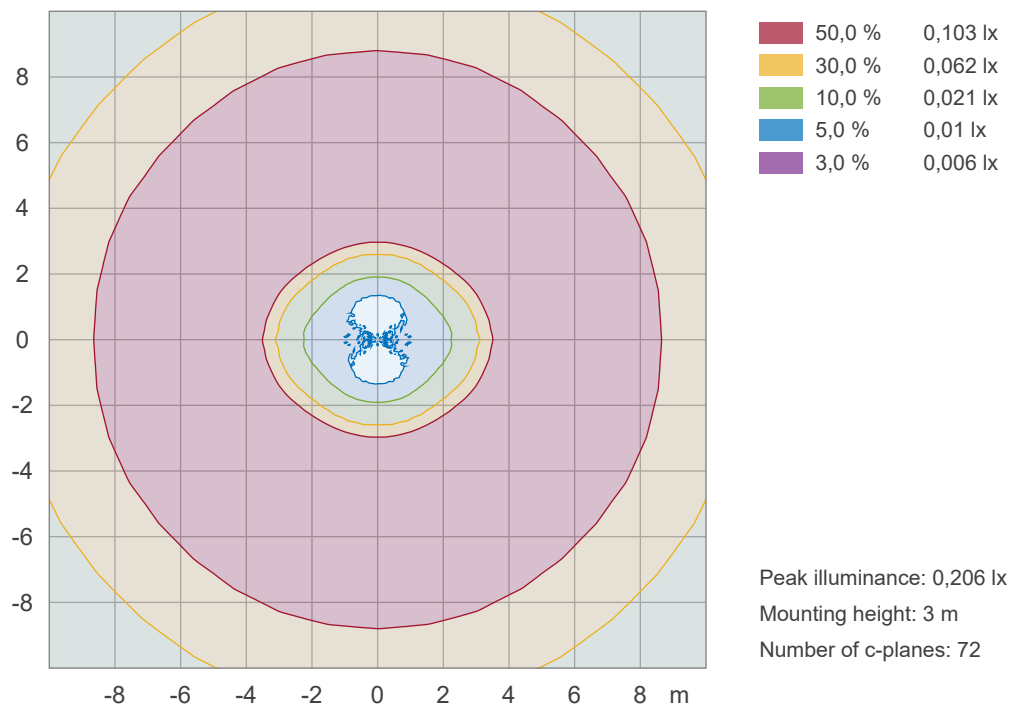
Intensity [cd]



Iso-intensity Diagram (Iso-candela)



Iso-illuminance Diagram (Iso-lux)



# Test report

## Color details

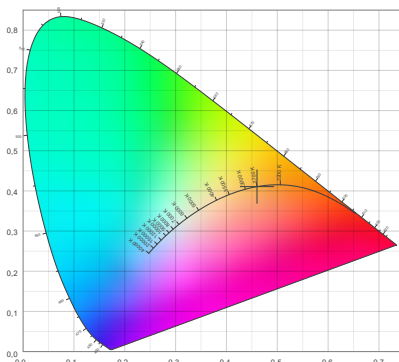
Correlated Color Temperature, Target  
Correlated Color Temperature, Measured  
Color Rendering Index  
Color Rendering Index, R9 (red)  
Color Rendering TM30-18

CCT = 2700 K  
CCT = 2619 K  
CRI 93,0  
R9 = 48,6  
Rf 90,9  
Rg 96,8

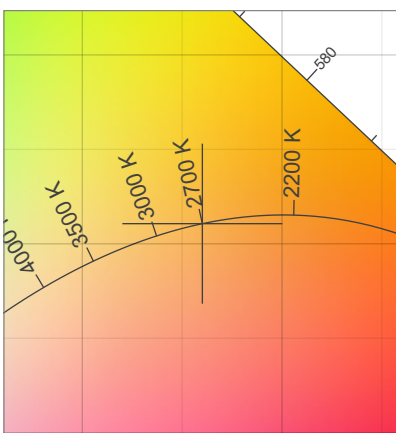
MacAdam Steps  
Color deviation from BBL  
Color coordinates CIE 1931  
Color coordinate CIEs 1960  
Color coordinate CIEs 1976  
Color Quality Scale

SDCM = 5,2  
Duv = 0,0028  
(x;y) = (0,4601;0,4107)  
(u;v) = (0,2626;0,3516)  
(u';v') = (0,2626;0,5274)  
CQS = 89,5

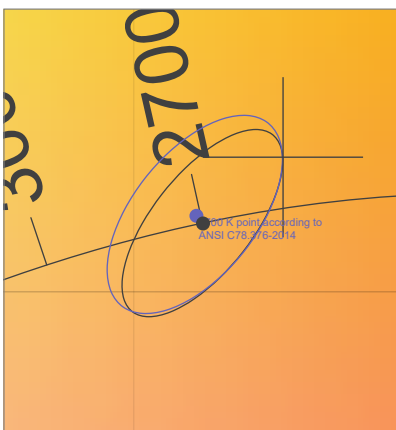
## CIE 1931 Chromaticity diagram



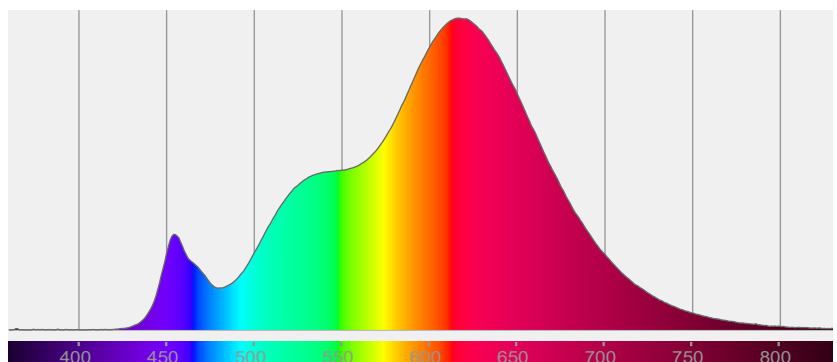
## CIE 1931 Chromaticity - zoomed



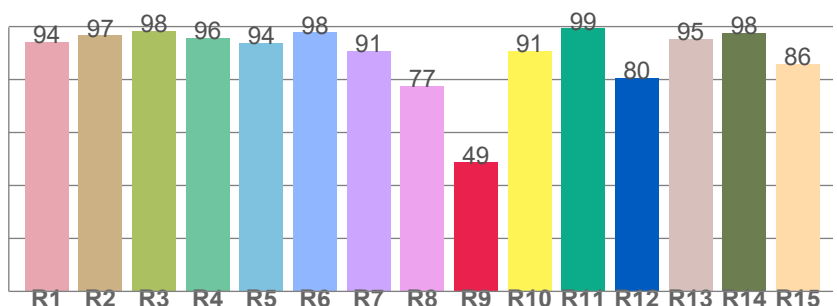
## CIE 1931 Chromaticity - SDCM



## Spectral power distribution



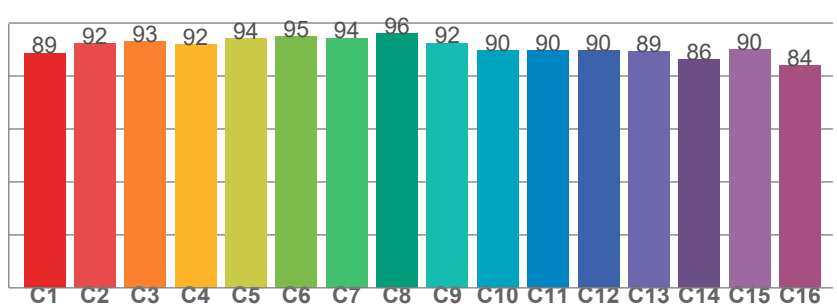
## Color Rendering Index per reference color (CIE 1995)



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  |
|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|
| 94,1 | 96,6 | 98,3 | 95,8 | 93,6 | 97,7 | 90,8 | 77,4 | 48,6 | 90,6 | 99,2 | 80,4 | 95,3 | 97,6 | 85,8 |

## TM30-18 Rf-values per hue bin

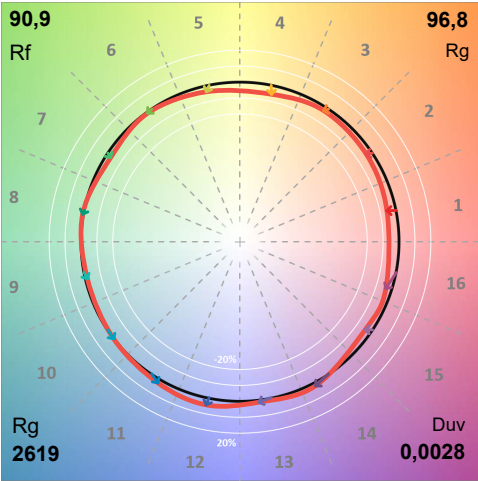


TM30-18 Rf-values per hue bin

| C1   | C2   | C3   | C4   | C5   | C6   | C7   | C8   | C9   | C10  | C11  | C12  | C13  | C14  | C15  | C16  |
|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|
| 88,7 | 92,4 | 93,2 | 91,8 | 94,1 | 94,8 | 94,4 | 96,0 | 92,5 | 89,7 | 89,6 | 89,6 | 89,4 | 86,4 | 90,1 | 84,0 |

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

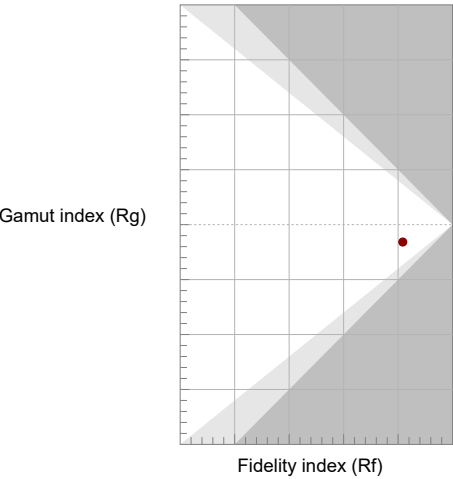
Color Vector Graphic



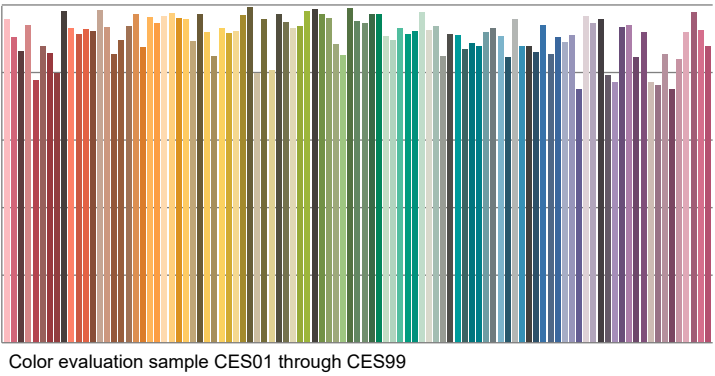
Color Distortion Graphic



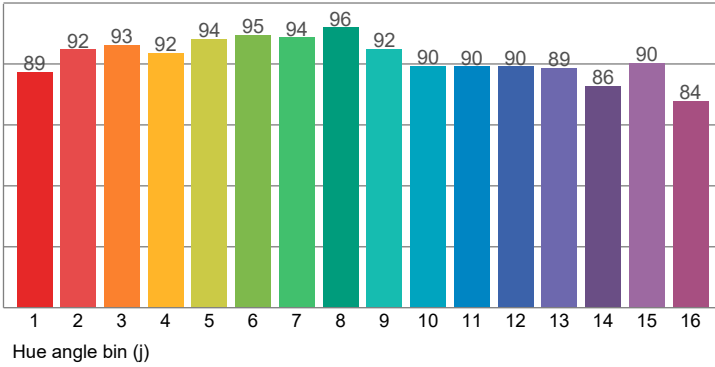
Gamut Index vs. Fidelity Index



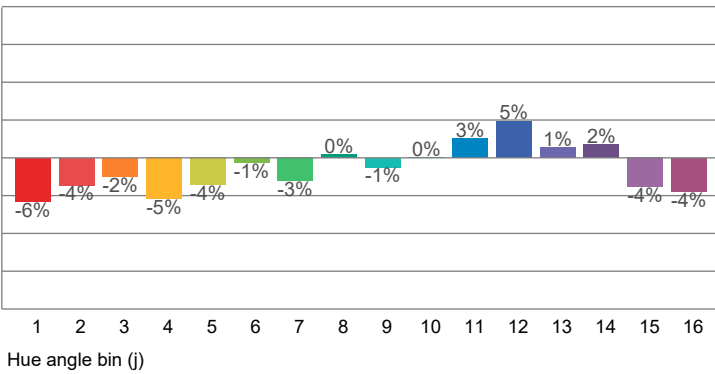
Color Rendition by Color Evaluation Sample (CES)



Local Color Fidelity (per hue bin)



Local Chroma Shift (per hue bin)



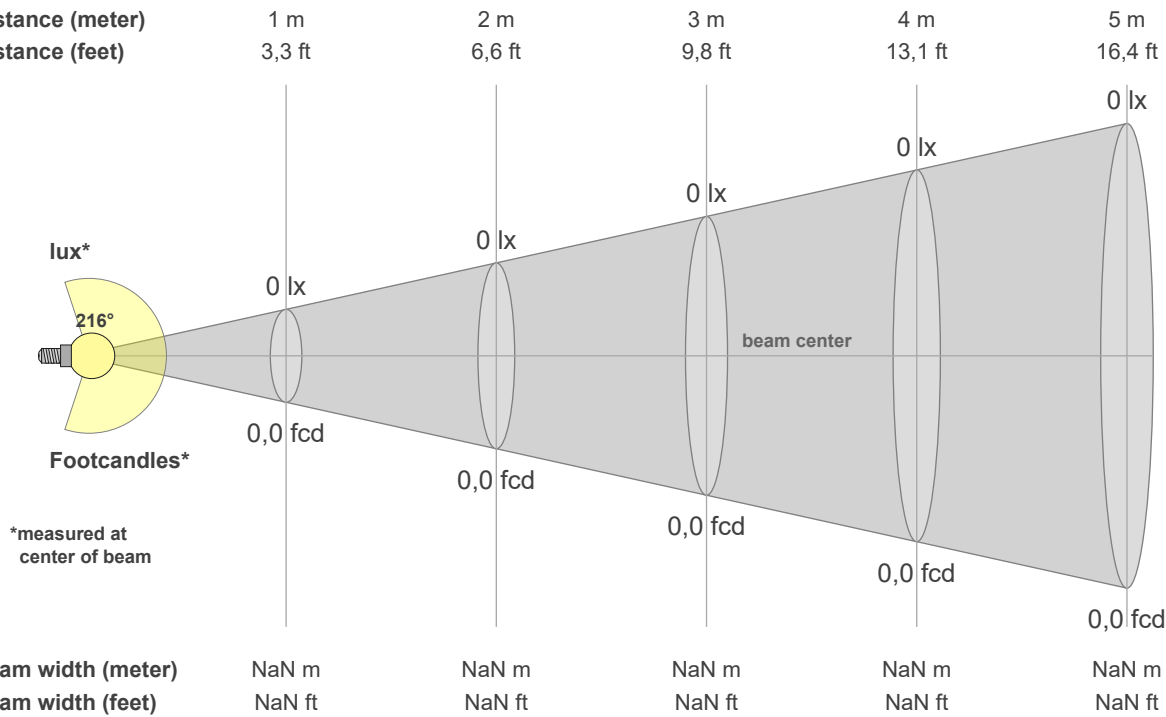
CIE x 0,4601  
CIE y 0,4601  
CIE u' 0,2626  
CIE v' 0,5274

CIE 13.3-1995

Ra 93,0  
R9 48,6

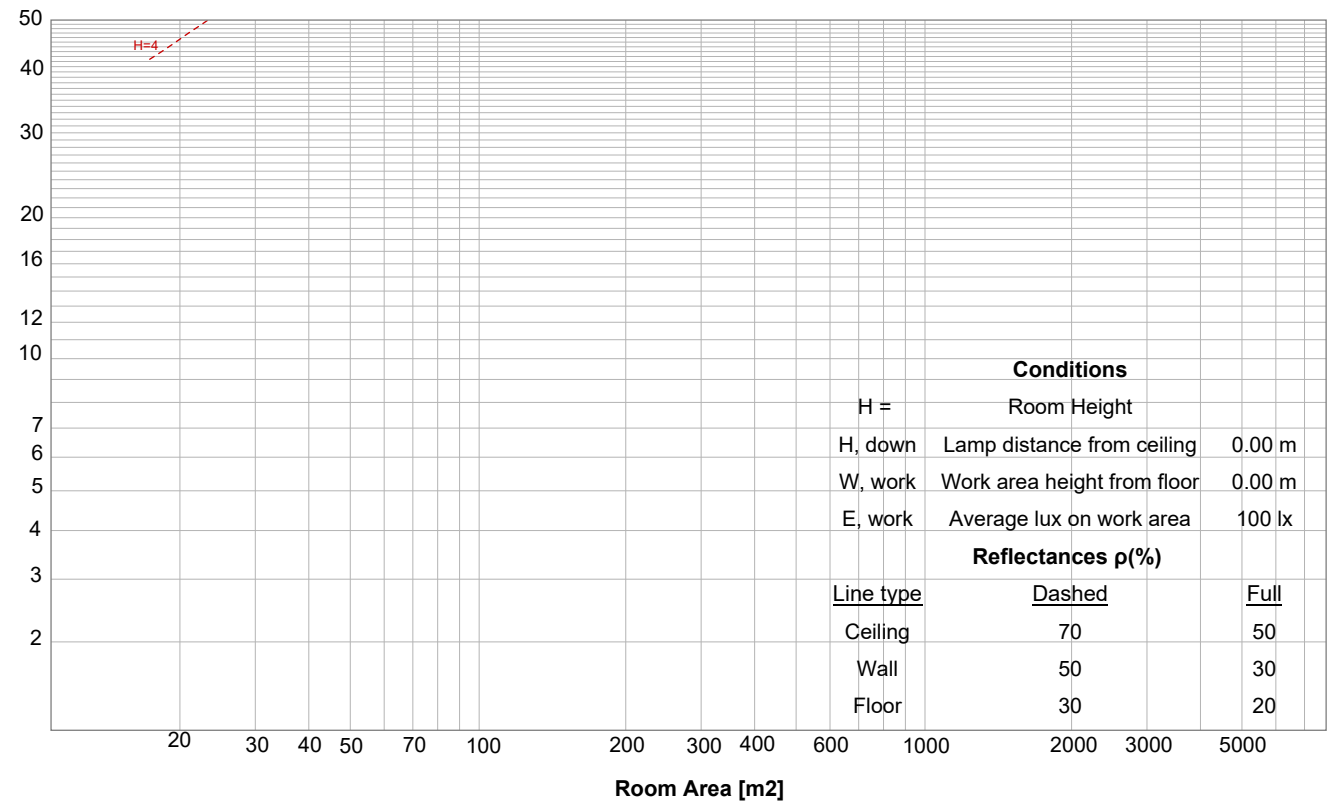
# Test report

## Beam details



## Luminaire budgetary diagram

LAMPS (number of lamps)



# Test report

Light measurement results



Print date 29-06-2026

## 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  |
| 0   | 0   | 0   | 0    | 0    | 0    | 0  | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | lux |
| 0   | 0   | 0   | 0    | 0    | 0    | 0  | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | fc  |

## Intensities in 0° c-plane

| 0°   | 9°  | 18°  | 27°  | 36°  | 45°   | 54°   | 63°    | 72°    | 81°    | 90°    | 99°    | 108°   | 117°   | 126°  | 135°  | 144°  | 153°  | 162° | 171° | γ        |
|------|-----|------|------|------|-------|-------|--------|--------|--------|--------|--------|--------|--------|-------|-------|-------|-------|------|------|----------|
| 0,1  | 0,1 | 0,1  | 0,2  | 0,5  | 2,7   | 8,8   | 17,7   | 28,6   | 37,4   | 39,3   | 34,1   | 26,3   | 16,4   | 7,1   | 4,5   | 2,9   | 1,6   | 0,6  | 0,0  | cd       |
| 100% | 98% | 100% | 182% | 516% | 3047% | 9859% | 19811% | 31957% | 41823% | 43949% | 38125% | 29402% | 18368% | 7964% | 5051% | 3255% | 1803% | 616% | 21%  | of 0°val |

## Intensities in 90° c-plane

| 0°   | 9°   | 18°  | 27°  | 36°  | 45°   | 54°   | 63°    | 72°    | 81°    | 90°    | 99°   | 108° | 117° | 126° | 135° | 144° | 153° | 162° | 171° | γ        |
|------|------|------|------|------|-------|-------|--------|--------|--------|--------|-------|------|------|------|------|------|------|------|------|----------|
| 0,1  | 0,1  | 0,1  | 0,2  | 0,3  | 1,3   | 6,9   | 16,4   | 27,8   | 36,8   | 24,9   | 7,7   | 0,0  | 0,0  | 0,0  | 0,0  | 0,0  | 0,0  | 0,0  | 0,0  | cd       |
| 100% | 113% | 126% | 197% | 378% | 1413% | 7668% | 18272% | 31018% | 41095% | 27860% | 8560% | 14%  | 14%  | 12%  | 38%  | 37%  | 34%  | 15%  | 9%   | of 0°val |

## Intensities in 180° c-plane

| 0°   | 9°  | 18°  | 27°  | 36°  | 45°   | 54°   | 63°    | 72°    | 81°    | 90°    | 99°    | 108°   | 117°   | 126°  | 135°  | 144°  | 153°  | 162° | 171° | γ        |
|------|-----|------|------|------|-------|-------|--------|--------|--------|--------|--------|--------|--------|-------|-------|-------|-------|------|------|----------|
| 0,1  | 0,1 | 0,1  | 0,2  | 0,5  | 2,7   | 8,8   | 17,7   | 28,6   | 37,4   | 39,3   | 34,1   | 26,3   | 16,4   | 7,1   | 4,5   | 2,9   | 1,6   | 0,6  | 0,0  | cd       |
| 100% | 98% | 100% | 182% | 516% | 3047% | 9859% | 19811% | 31957% | 41823% | 43949% | 38125% | 29402% | 18368% | 7964% | 5051% | 3255% | 1803% | 616% | 21%  | of 0°val |

## Intensities in 270° c-plane

| 0°   | 9°   | 18°  | 27°  | 36°  | 45°   | 54°   | 63°    | 72°    | 81°    | 90°    | 99°   | 108° | 117° | 126° | 135° | 144° | 153° | 162° | 171° | γ        |
|------|------|------|------|------|-------|-------|--------|--------|--------|--------|-------|------|------|------|------|------|------|------|------|----------|
| 0,1  | 0,1  | 0,1  | 0,2  | 0,3  | 1,3   | 6,9   | 16,4   | 27,8   | 36,8   | 24,9   | 7,7   | 0,0  | 0,0  | 0,0  | 0,0  | 0,0  | 0,0  | 0,0  | 0,0  | cd       |
| 100% | 113% | 126% | 197% | 378% | 1413% | 7668% | 18272% | 31018% | 41095% | 27860% | 8560% | 14%  | 14%  | 12%  | 38%  | 37%  | 34%  | 15%  | 9%   | of 0°val |

# Test report

## 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 = mounting height above eye level                                  |           |   | (Viewing direction orthogonal to lamp length axis) |      |      |      |      | (Viewing direction parallel to lamp length axis) |      |      |      |      |
|                                                                      | X         | Y |                                                    |      |      |      |      |                                                  |      |      |      |      |
| 2H                                                                   | 2H        |   | 15,4                                               | 16,6 | 16,3 | 17,5 | 18,6 | 14,8                                             | 16,0 | 15,7 | 16,9 | 18,0 |
|                                                                      | 3H        |   | 21,1                                               | 22,2 | 21,9 | 23,1 | 24,2 | 20,8                                             | 21,9 | 21,7 | 22,8 | 23,9 |
|                                                                      | 4H        |   | 23,7                                               | 24,8 | 24,6 | 25,7 | 26,8 | 23,5                                             | 24,6 | 24,4 | 25,5 | 26,6 |
|                                                                      | 6H        |   | 26,2                                               | 27,2 | 27,1 | 28,2 | 29,3 | 26,1                                             | 27,1 | 26,9 | 28,0 | 29,1 |
|                                                                      | 8H        |   | 27,4                                               | 28,4 | 28,2 | 29,3 | 30,4 | 27,2                                             | 28,2 | 28,0 | 29,1 | 30,2 |
|                                                                      | 12H       |   | 28,4                                               | 29,6 | 29,3 | 30,3 | 31,4 | 28,0                                             | 29,2 | 28,9 | 30,0 | 31,1 |
| 4H                                                                   | 2H        |   | 17,3                                               | 18,4 | 18,2 | 19,3 | 20,4 | 17,0                                             | 18,1 | 17,9 | 19,0 | 20,1 |
|                                                                      | 3H        |   | 22,6                                               | 23,8 | 23,5 | 24,5 | 25,7 | 22,4                                             | 23,6 | 23,3 | 24,3 | 25,5 |
|                                                                      | 4H        |   | 25,2                                               | 26,6 | 26,2 | 27,1 | 28,3 | 25,1                                             | 26,5 | 26,0 | 27,0 | 28,2 |
|                                                                      | 6H        |   | 27,8                                               | 28,7 | 28,7 | 29,6 | 30,7 | 27,7                                             | 28,6 | 28,6 | 29,5 | 30,6 |
|                                                                      | 8H        |   | 29,0                                               | 29,7 | 29,9 | 30,7 | 31,8 | 28,8                                             | 29,6 | 29,7 | 30,6 | 31,7 |
|                                                                      | 12H       |   | 30,1                                               | 30,8 | 31,0 | 31,8 | 32,9 | 29,8                                             | 30,5 | 30,7 | 31,5 | 32,6 |
| 8H                                                                   | 4H        |   | 26,2                                               | 26,9 | 27,1 | 27,9 | 29,0 | 26,1                                             | 26,8 | 27,0 | 27,8 | 28,9 |
|                                                                      | 6H        |   | 28,9                                               | 29,5 | 29,8 | 30,5 | 31,7 | 28,8                                             | 29,5 | 29,7 | 30,5 | 31,6 |
|                                                                      | 8H        |   | 30,2                                               | 30,8 | 31,1 | 31,8 | 33,0 | 30,1                                             | 30,7 | 31,0 | 31,7 | 32,9 |
|                                                                      | 12H       |   | 31,4                                               | 32,0 | 32,4 | 33,0 | 34,1 | 31,3                                             | 31,8 | 32,2 | 32,8 | 34,0 |
| 12H                                                                  | 4H        |   | 26,4                                               | 27,1 | 27,3 | 28,1 | 29,2 | 26,3                                             | 27,0 | 27,2 | 28,0 | 29,1 |
|                                                                      | 6H        |   | 29,2                                               | 29,8 | 30,1 | 30,8 | 32,0 | 29,1                                             | 29,7 | 30,1 | 30,7 | 31,9 |
|                                                                      | 8H        |   | 30,6                                               | 31,1 | 31,5 | 32,1 | 33,3 | 30,5                                             | 31,1 | 31,5 | 32,1 | 33,2 |
| Variations with the observer position for the luminaire spacings, S: |           |   |                                                    |      |      |      |      |                                                  |      |      |      |      |
| S = 1.0H                                                             |           |   | 0,1 / -0,1                                         |      |      |      |      | 0,1 / -0,1                                       |      |      |      |      |
| S = 1.5H                                                             |           |   | 0,1 / -0,1                                         |      |      |      |      | 0,1 / -0,1                                       |      |      |      |      |
| S = 2.0H                                                             |           |   | 0,1 / -0,2                                         |      |      |      |      | 0,1 / -0,1                                       |      |      |      |      |

## 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                   | 108,8 | 108,8               | 108,8 | 108,8 | 101,2 | 101,2                                                                          | 101,2 | 101,2 | 87,2 | 87,2 | 87,2 | 74,3 | 74,3 | 74,3 | 62,5 | 62,5 | 62,5 | 56,9 |
| 1                   | 88,0  | 78,8                | 70,6  | 63,2  | 80,3  | 72,1                                                                           | 64,7  | 58,0  | 59,6 | 53,7 | 48,2 | 48,1 | 43,3 | 39,0 | 37,4 | 33,8 | 30,3 | 24,7 |
| 2                   | 76,4  | 63,5                | 52,9  | 44,0  | 69,2  | 57,7                                                                           | 48,2  | 40,1  | 46,8 | 39,1 | 32,5 | 36,8 | 30,6 | 25,2 | 27,5 | 22,7 | 18,3 | 13,2 |
| 3                   | 67,7  | 53,1                | 41,9  | 32,9  | 61,1  | 48,1                                                                           | 37,9  | 29,7  | 38,7 | 30,4 | 23,6 | 29,9 | 23,3 | 17,7 | 21,8 | 16,6 | 12,1 | 7,5  |
| 4                   | 61,0  | 45,6                | 34,4  | 25,7  | 55,0  | 41,3                                                                           | 31,1  | 23,2  | 33,1 | 24,7 | 18,2 | 25,4 | 18,7 | 13,3 | 18,3 | 13,0 | 8,5  | 4,5  |
| 5                   | 55,5  | 39,8                | 28,9  | 20,9  | 50,0  | 36,1                                                                           | 26,1  | 18,7  | 28,9 | 20,8 | 14,5 | 22,2 | 15,6 | 10,4 | 16,0 | 10,7 | 6,4  | 2,8  |
| 6                   | 50,8  | 35,3                | 24,8  | 17,3  | 45,9  | 32,0                                                                           | 22,4  | 15,5  | 25,7 | 17,8 | 12,0 | 19,8 | 13,4 | 8,5  | 14,3 | 9,1  | 5,0  | 1,8  |
| 7                   | 46,9  | 31,5                | 21,6  | 14,7  | 42,3  | 28,6                                                                           | 19,6  | 13,1  | 23,1 | 15,6 | 10,1 | 17,9 | 11,7 | 7,1  | 13,0 | 8,0  | 4,1  | 1,2  |
| 8                   | 43,4  | 28,5                | 19,1  | 12,6  | 39,3  | 25,9                                                                           | 17,3  | 11,3  | 20,9 | 13,8 | 8,6  | 16,3 | 10,4 | 6,0  | 12,0 | 7,1  | 3,5  | 0,8  |
| 9                   | 40,4  | 25,9                | 17,0  | 10,9  | 36,6  | 23,6                                                                           | 15,4  | 9,8   | 19,1 | 12,3 | 7,5  | 15,0 | 9,3  | 5,2  | 11,1 | 6,4  | 3,0  | 0,6  |
| 10                  | 37,7  | 23,6                | 15,2  | 9,6   | 34,3  | 21,6                                                                           | 13,8  | 8,6   | 17,6 | 11,1 | 6,6  | 13,9 | 8,4  | 4,6  | 10,4 | 5,8  | 2,6  | 0,4  |

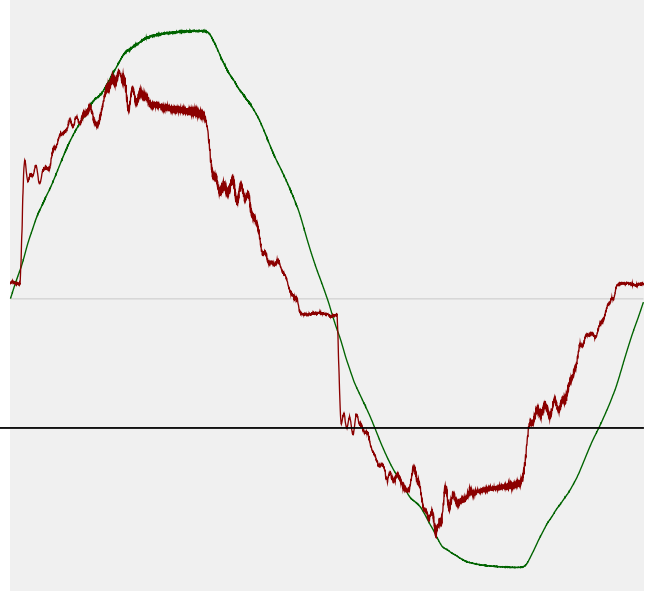
# Test report

## Power details

### Input power

|                                          |         |
|------------------------------------------|---------|
| Frequency of input power                 | 50,1 Hz |
| Power feed to light source               | 10,98 W |
| RMS Input voltage feed V,RMS             | 235,1 V |
| RMS Input current feed I,RMS             | 0,05 A  |
| Volt-Amp or apparent power = V,RMS*I,RMS | 11,7 VA |
| Displacement factor of AC power feed     | 0,95    |
| Power factor of AC current feed          | 0,94    |
| Total harmonic distortion of the current | 11,79%  |
| Total harmonic distortion of the voltage | 3,383%  |

### Input power curve



### Efficiency

Radiated power efficiency 5,594

Lumen efficiency 16,79 lm/W

## Stabilization details

### Warmup Conditions

|                   |        |
|-------------------|--------|
| Stable period     | 15 min |
| Stable change max | 2%     |
| Minimum time      | 15 min |

### Color Temperature Change

|           |        |
|-----------|--------|
| CCT start | 2700 K |
| CCT shift | 0 K    |
| CCT end   | 2700 K |

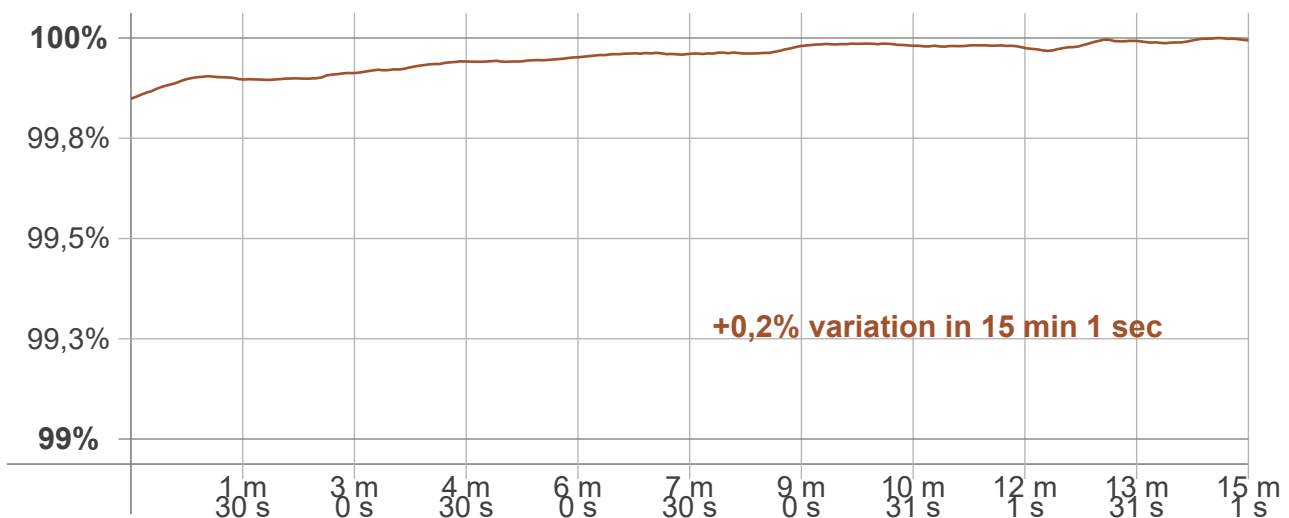
### Warmup Result

|                   |                    |
|-------------------|--------------------|
| Total warmup time | Lamp stabilized in |
| Warmup variation  | 0,1995%            |

### Output Change

|               |           |
|---------------|-----------|
| Output start  | 184,1 lm  |
| Output change | 0,3167 lm |
| Output end    | 184,4 lm  |

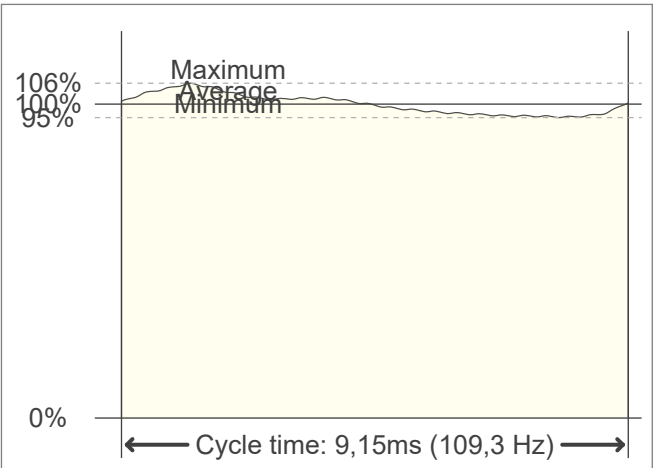
## Stabilization Curve



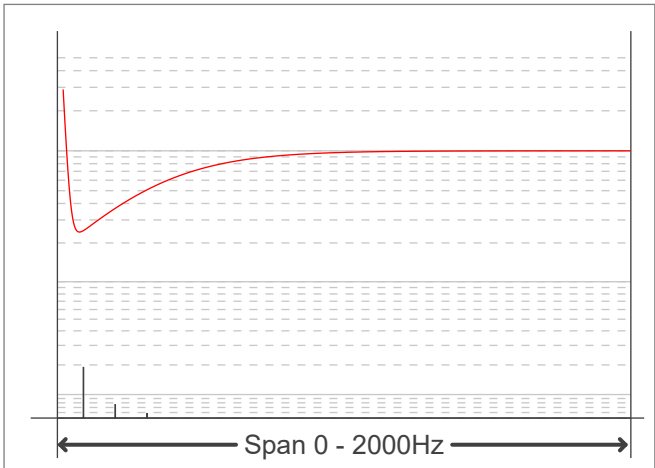
Flicker TLA details

|                                                                     |                         |                                                                       |          |
|---------------------------------------------------------------------|-------------------------|-----------------------------------------------------------------------|----------|
| Flicker Meter Type                                                  | Viso Systems LabFlicker | Measurement time                                                      |          |
| Frequency of input power                                            | 50,1 Hz                 | PstLM                                                                 | 180 sec. |
| Flicker/TLA sample rate                                             | 20,0 samples/s          | All other indices                                                     | 1,5 sec, |
| Flicker indices according to Illuminating Engineering Society (IES) |                         | Flicker indices according to California Energy Commission (CEC) 2016b |          |
| Flicker frequency                                                   | 109,3 Hz                | JA8/10 40 Hz                                                          | 8,243 %  |
| Percent Flicker                                                     | 13,52 %                 | JA8/10 90 Hz                                                          | 8,199 %  |
| Flicker index                                                       | 0,0                     | JA8/10 200 Hz                                                         | 11,55 %  |
| TLA indices (re IEC TR 61547-1, IEC 61000-3-3 and IEC 61000-4-15)   |                         | JA8/10 400 Hz                                                         | 12,99 %  |
| PstLM value (F < 80 Hz)                                             | 6,69                    | JA8/10 1000 Hz                                                        | 13,13 %  |
| SVM value (80 < F < 2000 Hz)                                        | 0,14                    | Flicker indices according to Lighting Research Center (2015)          |          |
|                                                                     |                         | Perception metric, Assist Mp                                          | 2,58     |

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



Flicker FFT (flicker curve in frequency domain)



IEEE 1789 Frequency/modulation plot

