

Light efficiency:



Light quality:



Color temperature:

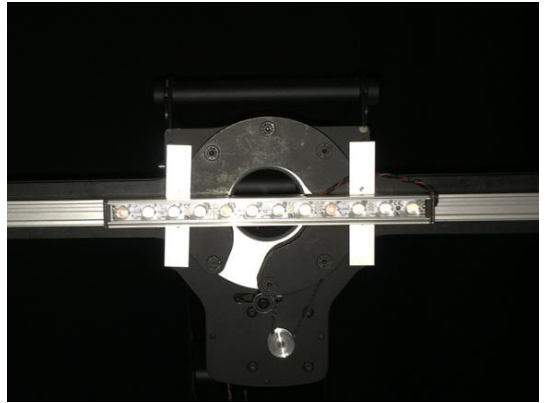


Output: 220 lm

Peak: 738 cd

Power: 7,0 W

PF: 0,82



Product name:

FLNP-F4CH-C-258-W-927-10774

Item number:

FLNP-F4CH-C-258-W-927-10774

Date and time:

18.02.2019 16:19:56

Description:

Toleranzen:

Lumen +/-4%

Candela +/-2,5%

Colour Temp +/-35 Grad K

CRI +/-0,7

Angular Resolution 1 Grad step

Last Calibration 06-06-2018

Pruefer:

Mourad Benzineb

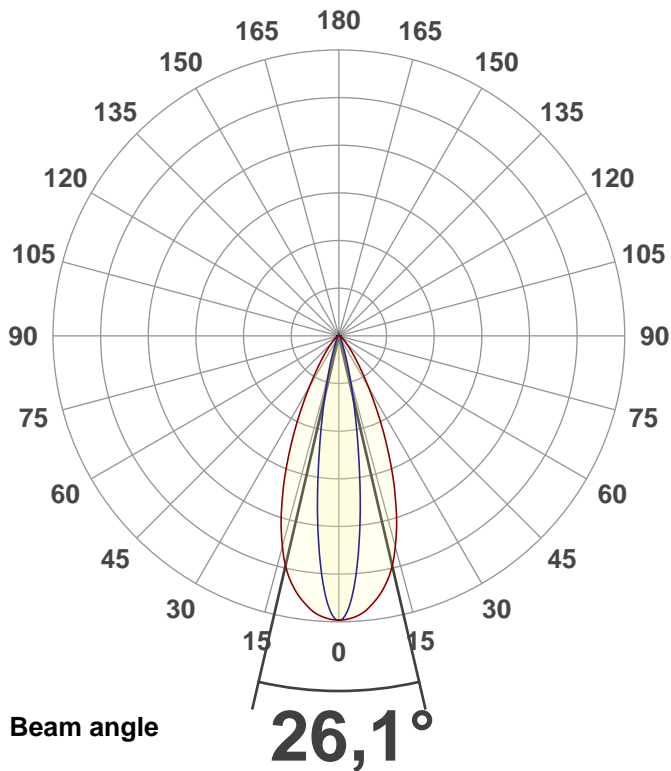
Master of Engineering

Pruefort:

Lichtlabor

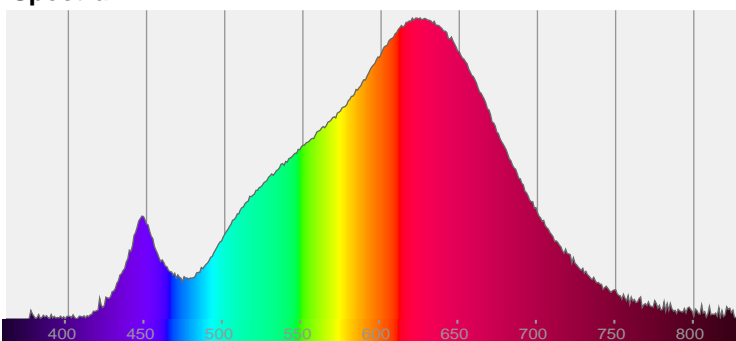
Gaustrasse13-15

55411 Bingen am Rhein

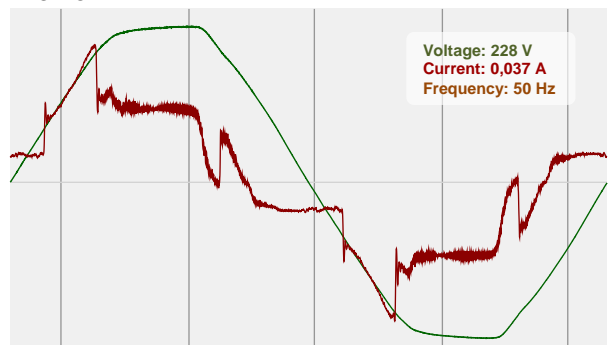


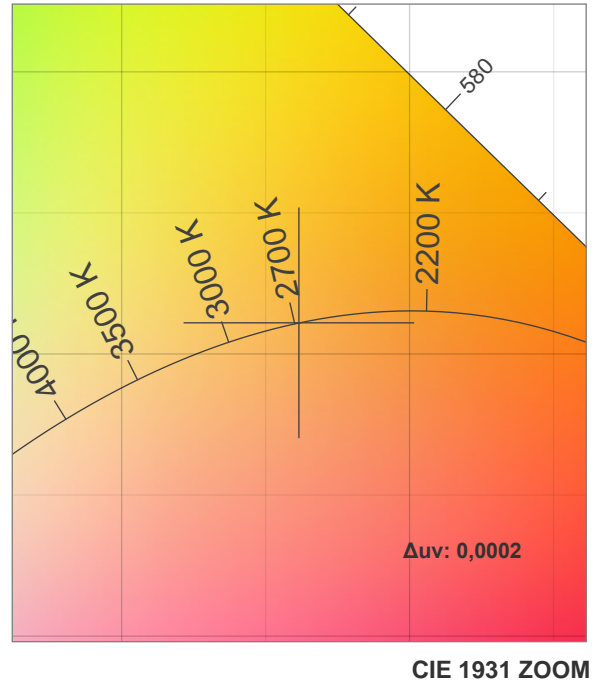
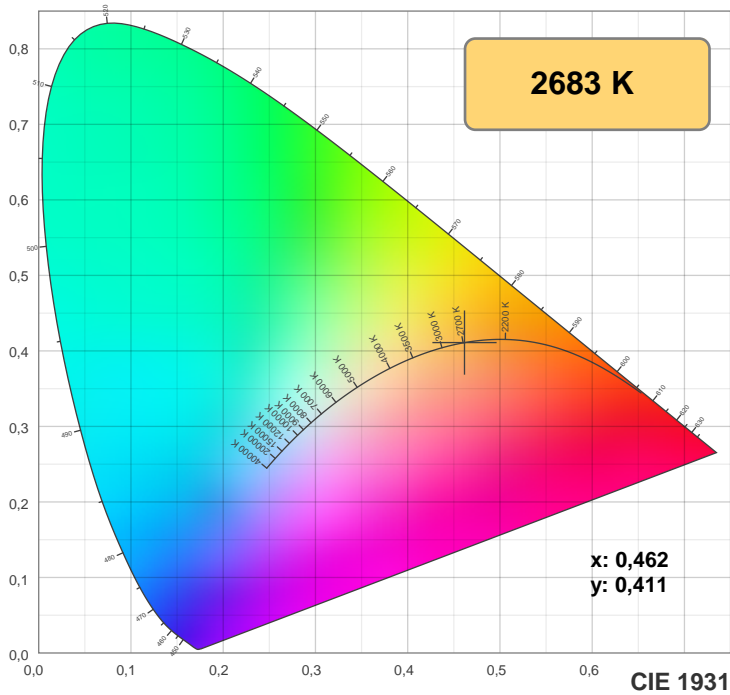
CIE 1931  
x: 0,462  
y: 0,411

Spectra

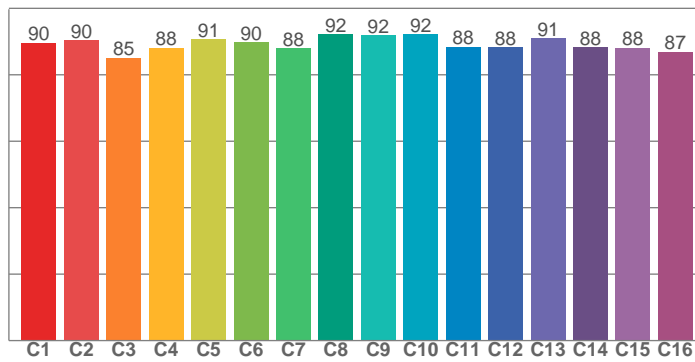


Power

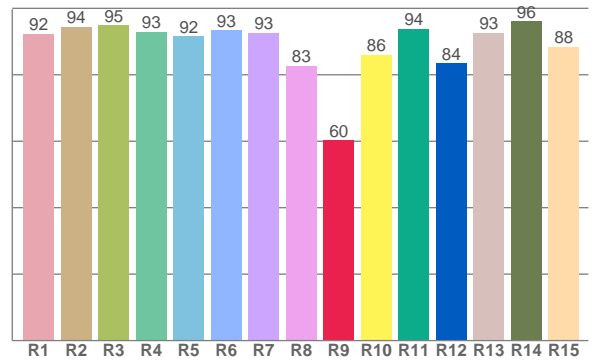




TM30: 89,3



CRI: 91,9 (R1-R8)



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  |
|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|
| 92,3 | 94,4 | 95,0 | 93,0 | 91,6 | 93,4 | 92,6 | 82,7 | 60,4 | 86,0 | 93,8 | 83,5 | 92,7 | 96,2 | 88,4 |

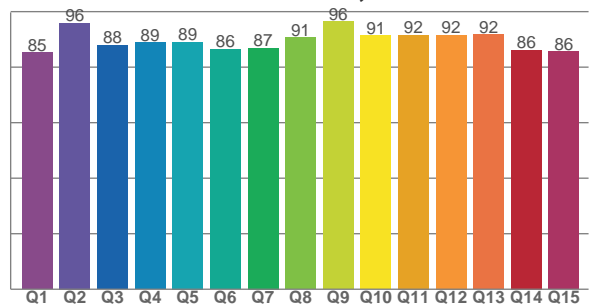
TM30 C values, 16 binned values out of total of 99 C values

| C1   | C2   | C3   | C4   | C5   | C6   | C7   | C8   | C9   | C10  | C11  | C12  | C13  | C14  | C15  | C16  |
|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|
| 89,7 | 90,4 | 85,1 | 88,1 | 90,7 | 89,8 | 87,9 | 92,1 | 91,8 | 92,2 | 88,5 | 88,2 | 91,0 | 88,2 | 88,2 | 87,0 |

CQS Q values

| Q1   | Q2   | Q3   | Q4   | Q5   | Q6   | Q7   | Q8   | Q9   | Q10  | Q11  | Q12  | Q13  | Q14  | Q15  |
|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|
| 85,3 | 96,0 | 87,9 | 88,8 | 89,0 | 86,5 | 86,8 | 90,7 | 96,4 | 91,4 | 91,6 | 91,6 | 91,8 | 86,1 | 85,6 |

CQS: 89,0



## Color parameters

| Color temperature | Color rendering index | Red component | Color fidelity | Color gamut | Color quality scale | Color coordinate cie 1931 | Color coordinate cie 1931 | Color coordinate | Color coordinate | Color deviation from black body |
|-------------------|-----------------------|---------------|----------------|-------------|---------------------|---------------------------|---------------------------|------------------|------------------|---------------------------------|
| CCT               | CRI                   | CRI R9        | TM30 Rf        | TM30 Rg     | CQS                 | x                         | y                         | u                | v                | $\Delta uv$                     |
| 2683 K            | 91,9                  | 60,4          | 89,3           | 101,7       | 89,0                | 0,462                     | 0,411                     | 0,263            | 0,352            | 0,0002                          |

## TM30 details

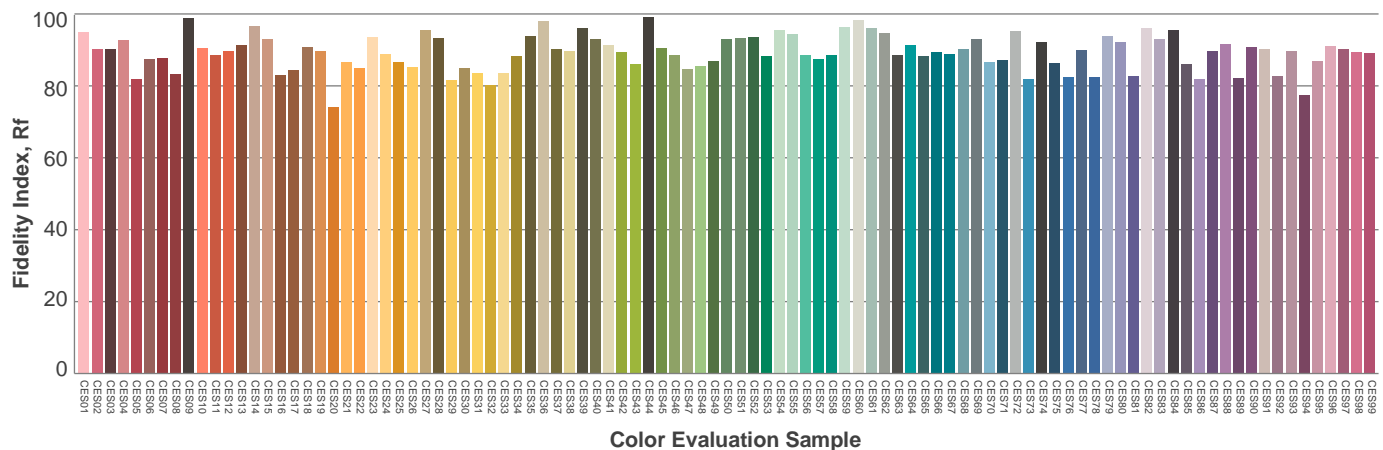
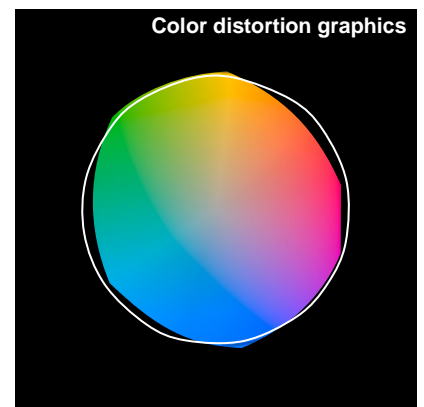
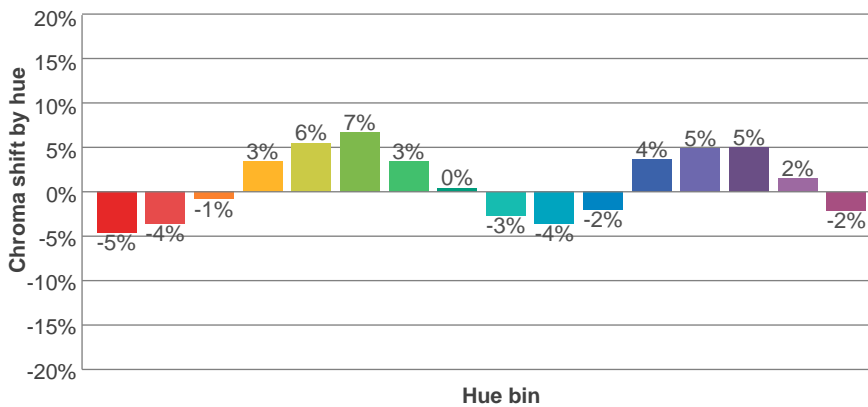
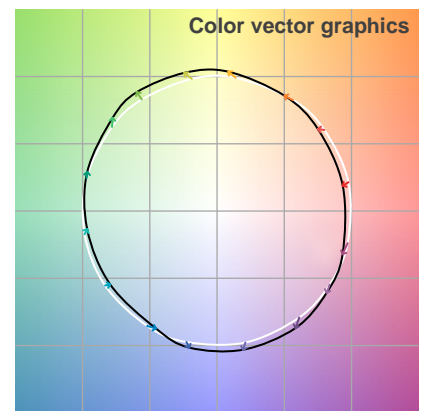
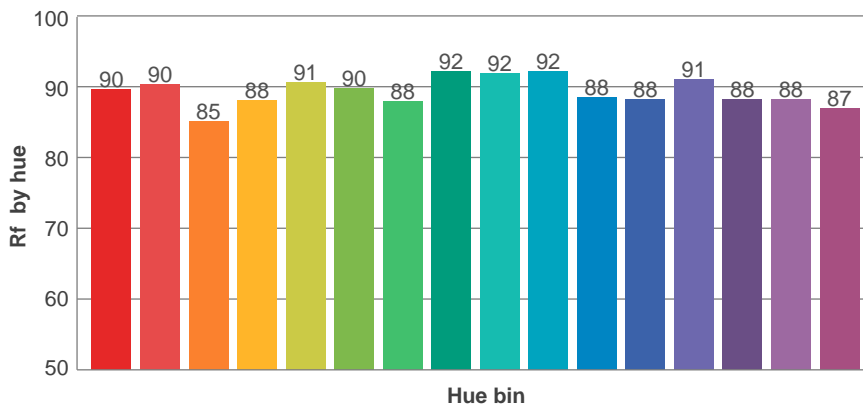
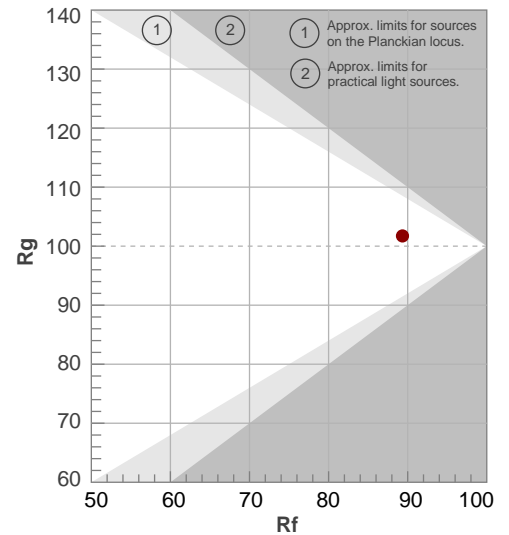
**Rf 89,3**

Fidelity index Rf

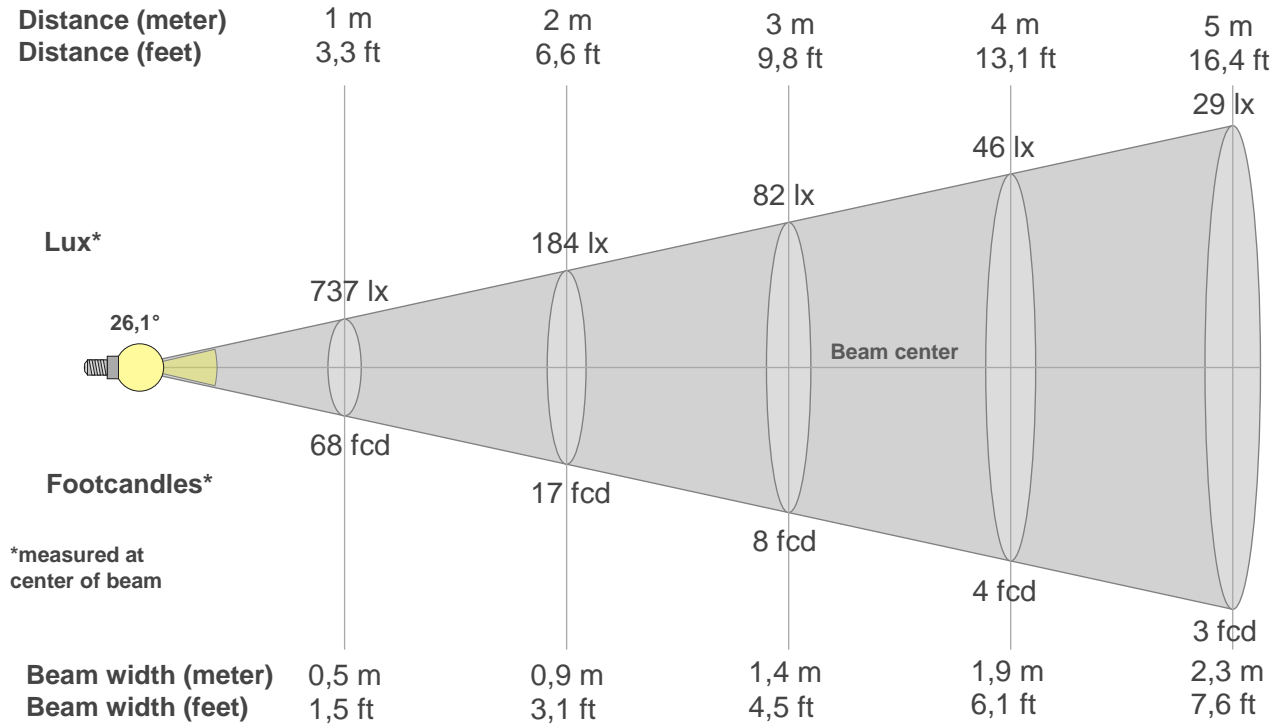
**Rg 101,7**

Gammut index Rg

| Hue Bin | R <sub>f</sub> | Graphic shifts (%) |     |
|---------|----------------|--------------------|-----|
|         |                | Chroma             | Hue |
| 1       | 90             | -5%                | -2% |
| 2       | 90             | -4%                | 3%  |
| 3       | 85             | -1%                | 7%  |
| 4       | 88             | 3%                 | 6%  |
| 5       | 91             | 6%                 | 5%  |
| 6       | 90             | 7%                 | 0%  |
| 7       | 88             | 3%                 | -6% |
| 8       | 92             | 0%                 | -5% |
| 9       | 92             | -3%                | -3% |
| 10      | 92             | -4%                | 1%  |
| 11      | 88             | -2%                | 7%  |
| 12      | 88             | 4%                 | 3%  |
| 13      | 91             | 5%                 | -3% |
| 14      | 88             | 5%                 | -7% |
| 15      | 88             | 2%                 | -6% |
| 16      | 87             | -2%                | -9% |



## Beam details



### Beam intensities from 1-20m

| 1m      | 2m      | 3m     | 4m     | 5m     | 6m     | 7m     | 8m     | 9m     | 10m    | 11m    | 12m    | 13m    | 14m    | 15m    | 16m    | 17m    | 18m    | 19m    | 20m    |
|---------|---------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|
| 3,3ft   | 6,6ft   | 9,8ft  | 13,1ft | 16,4ft | 19,7ft | 23ft   | 26,2ft | 29,5ft | 32,8ft | 36,1ft | 39,4ft | 42,7ft | 45,9ft | 49,2ft | 52,5ft | 55,8ft | 59,1ft | 62,3ft | 65,6ft |
| 737lx   | 184lx   | 82lx   | 46lx   | 29lx   | 20lx   | 15lx   | 12lx   | 9lx    | 7lx    | 6lx    | 5lx    | 4lx    | 4lx    | 3lx    | 3lx    | 3lx    | 2lx    | 2lx    | 2lx    |
| 68,5fcd | 17,1fcd | 7,6fcd | 4,3fcd | 2,7fcd | 1,9fcd | 1,4fcd | 1,1fcd | 0,8fcd | 0,7fcd | 0,6fcd | 0,5fcd | 0,4fcd | 0,3fcd | 0,3fcd | 0,3fcd | 0,2fcd | 0,2fcd | 0,2fcd | 0,2fcd |

### 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° |
|------|------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| 737  | 736  | 728 | 713 | 692 | 667 | 634 | 592 | 540 | 483 | 422 | 360 | 300 | 245 | 195 | 154 | 121 | 95  | 75  | 59  |
| 100% | 100% | 99% | 97% | 94% | 90% | 86% | 80% | 73% | 66% | 57% | 49% | 41% | 33% | 26% | 21% | 16% | 13% | 10% | 8%  |

### 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° |
|------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| 737  | 708 | 627 | 516 | 395 | 285 | 198 | 136 | 92  | 62  | 41  | 29  | 22  | 18  | 15  | 13  | 11  | 10  | 10  | 9   |
| 100% | 96% | 85% | 70% | 54% | 39% | 27% | 18% | 12% | 8%  | 6%  | 4%  | 3%  | 2%  | 2%  | 2%  | 2%  | 1%  | 1%  | 1%  |

### Intensities in 180° c-plane

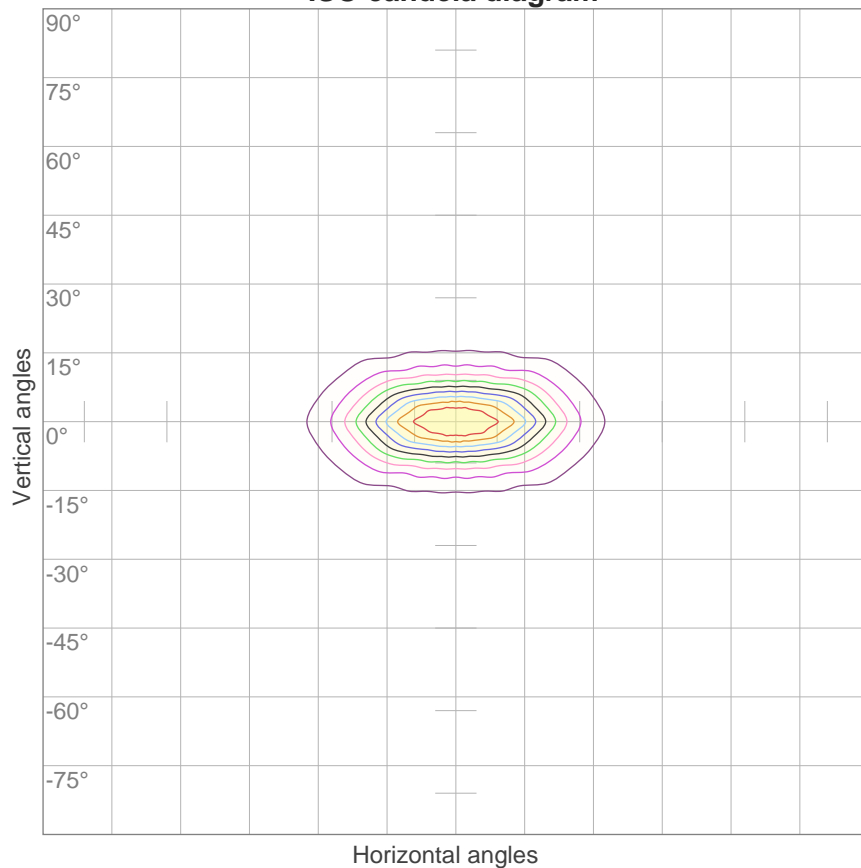
| 0°   | 2°   | 4°  | 6°  | 8°  | 10° | 12° | 14° | 16° | 18° | 20° | 22° | 24° | 26° | 28° | 30° | 32° | 34° | 36° | 38° |
|------|------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| 737  | 736  | 728 | 713 | 692 | 667 | 634 | 592 | 540 | 483 | 422 | 360 | 300 | 245 | 195 | 154 | 121 | 95  | 75  | 59  |
| 100% | 100% | 99% | 97% | 94% | 90% | 86% | 80% | 73% | 66% | 57% | 49% | 41% | 33% | 26% | 21% | 16% | 13% | 10% | 8%  |

### 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° |
|------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| 737  | 708 | 627 | 516 | 395 | 285 | 198 | 136 | 92  | 62  | 41  | 29  | 22  | 18  | 15  | 13  | 11  | 10  | 10  | 9   |
| 100% | 96% | 85% | 70% | 54% | 39% | 27% | 18% | 12% | 8%  | 6%  | 4%  | 3%  | 2%  | 2%  | 2%  | 2%  | 1%  | 1%  | 1%  |

| Beam angle 50% | Field angle 10% | Cutoff angle 2,5% | Intensity ratio in 120° cone | Intensity ratio in 90° cone |
|----------------|-----------------|-------------------|------------------------------|-----------------------------|
| 26,1°          | 48,5°           | 69,9°             | 95,9%                        | 90,5%                       |

ISO candela diagram



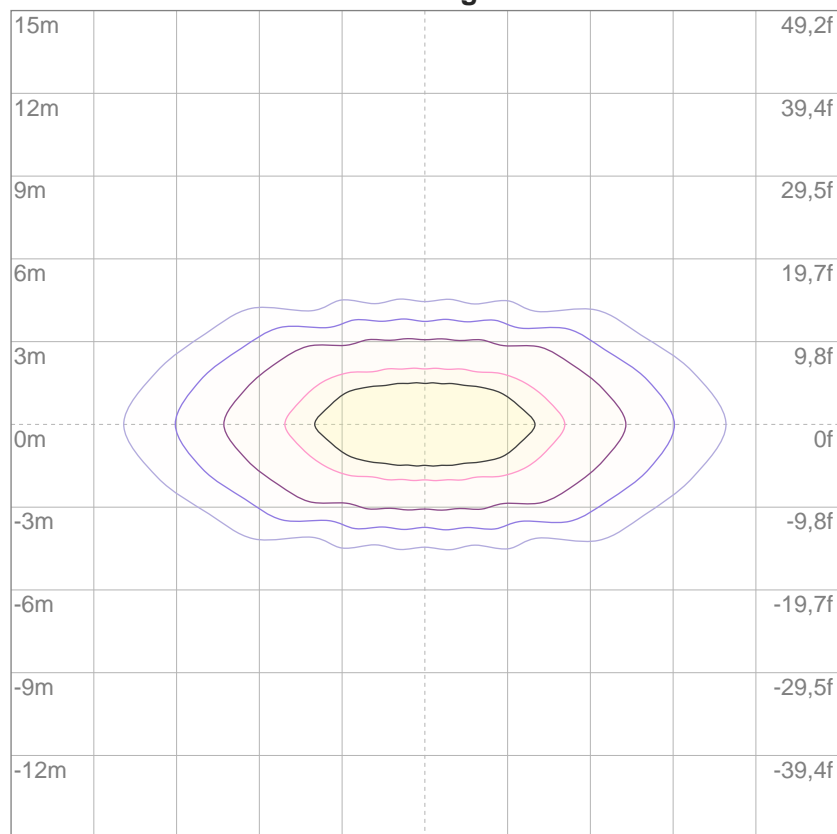
|     |        |
|-----|--------|
| 10% | 74 cd  |
| 20% | 147 cd |
| 30% | 221 cd |
| 40% | 295 cd |
| 50% | 368 cd |
| 60% | 442 cd |
| 70% | 516 cd |
| 80% | 590 cd |
| 90% | 663 cd |

Conditions:

Number of c-planes: 16

Candela at center: 737 cd

ISO lux diagram



|     |          |
|-----|----------|
| 3%  | 0,221 lx |
| 5%  | 0,368 lx |
| 10% | 0,737 lx |
| 30% | 2,21 lx  |
| 50% | 3,68 lx  |

Conditions:

Number of c-planes: 16

Lux at center: 7,37 lx

*Lux distribution on a surface  
when lamp is mounted at 10  
meters from the surface.*

## Glare Evaluation According to UGR

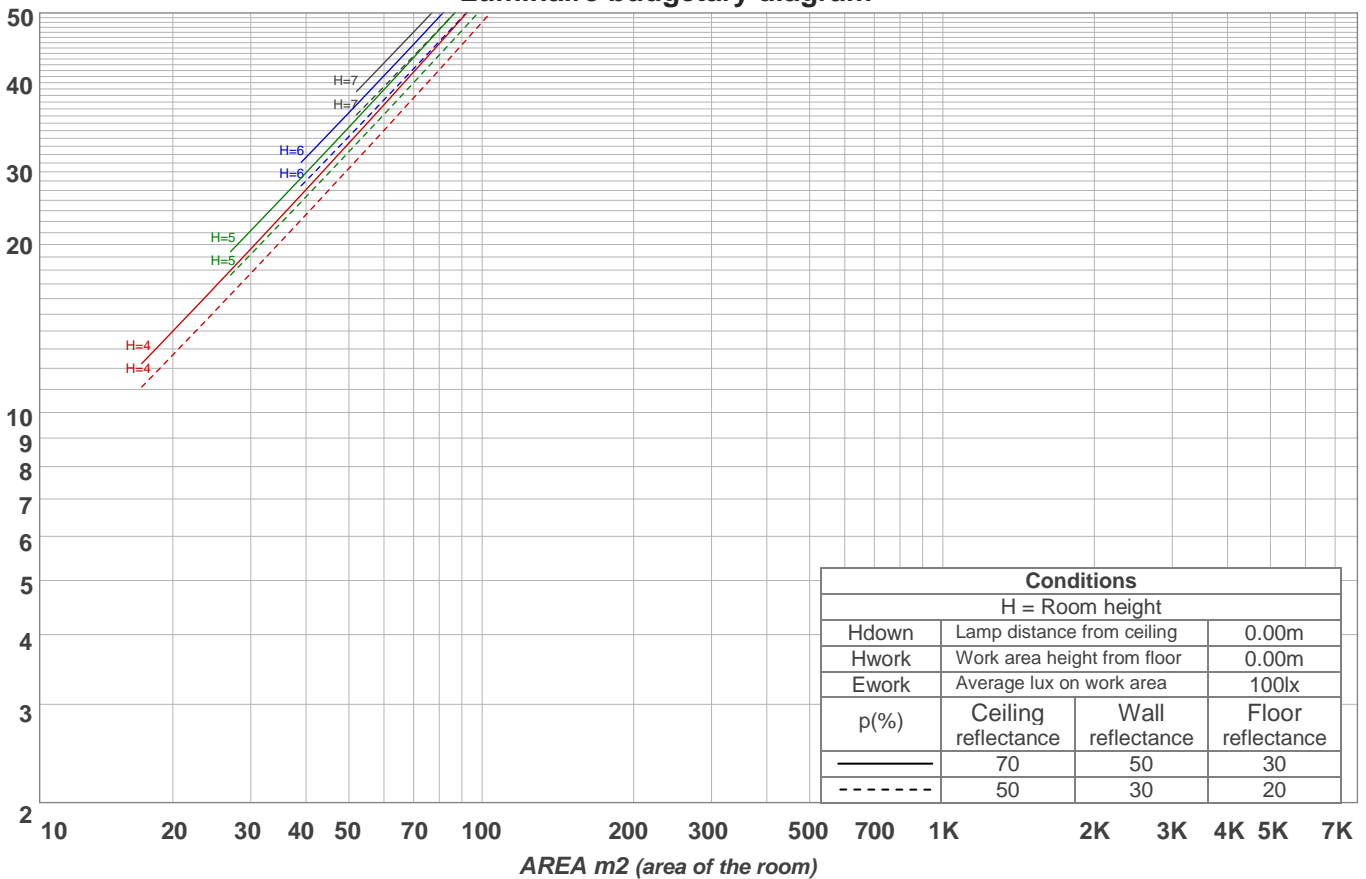
|   |     |   |      |      |      |      |   |      |      |      |      |
|---|-----|---|------|------|------|------|---|------|------|------|------|
| p Ceiling   |     | 70  | 70   | 50   | 50   | 30   | 70                                      | 70   | 50   | 50   | 30   |
| p Walls   |     | 50  | 30   | 50   | 30   | 30   | 50                                      | 30   | 50   | 30   | 30   |
| p Floor   |     | 20  | 20   | 20   | 20   | 20   | 20                                      | 20   | 20   | 20   | 20   |
| Room size<br>X      Y   |     | Viewing direction at right angles to<br>lamp axis |      |      |      |      | Viewing direction parallel to lamp axis |      |      |      |      |
| 2H  | 2H  | 13,9  | 14,6 | 14,1 | 14,8 | 15,0 | 9,1                                     | 9,9  | 9,4  | 10,1 | 10,3 |
|   | 3H  | 14,6  | 15,3 | 14,9 | 15,5 | 15,8 | 10,4                                    | 11,1 | 10,7 | 11,3 | 11,6 |
|   | 4H  | 14,9  | 15,6 | 15,2 | 15,8 | 16,1 | 10,9                                    | 11,6 | 11,2 | 11,9 | 12,1 |
|   | 6H  | 15,1  | 15,7 | 15,4 | 16,0 | 16,3 | 11,4                                    | 12,0 | 11,7 | 12,2 | 12,5 |
|   | 8H  | 15,1  | 15,7 | 15,5 | 16,0 | 16,3 | 11,5                                    | 12,1 | 11,9 | 12,4 | 12,7 |
|   | 12H | 15,2  | 15,7 | 15,5 | 16,1 | 16,4 | 11,7                                    | 12,2 | 12,0 | 12,5 | 12,9 |
| 4H  | 2H  | 14,0  | 14,6 | 14,3 | 14,9 | 15,1 | 10,0                                    | 10,7 | 10,3 | 10,9 | 11,2 |
|   | 3H  | 14,9  | 15,4 | 15,2 | 15,8 | 16,1 | 11,4                                    | 12,0 | 11,8 | 12,3 | 12,6 |
|   | 4H  | 15,3  | 15,8 | 15,7 | 16,1 | 16,5 | 12,1                                    | 12,5 | 12,4 | 12,9 | 13,2 |
|   | 6H  | 15,6  | 16,0 | 16,0 | 16,4 | 16,8 | 12,5                                    | 13,0 | 12,9 | 13,3 | 13,7 |
|   | 8H  | 15,7  | 16,1 | 16,2 | 16,5 | 16,9 | 12,8                                    | 13,1 | 13,2 | 13,5 | 13,9 |
|   | 12H | 15,8  | 16,2 | 16,3 | 16,6 | 17,0 | 13,0                                    | 13,3 | 13,4 | 13,7 | 14,1 |
| 8H  | 4H  | 15,4  | 15,8 | 15,8 | 16,1 | 16,5 | 12,4                                    | 12,8 | 12,8 | 13,2 | 13,6 |
|   | 6H  | 15,8  | 16,1 | 16,3 | 16,5 | 17,0 | 13,0                                    | 13,3 | 13,5 | 13,8 | 14,2 |
|   | 8H  | 16,0  | 16,3 | 16,5 | 16,7 | 17,2 | 13,3                                    | 13,6 | 13,8 | 14,0 | 14,5 |
|   | 12H | 16,2  | 16,4 | 16,7 | 16,9 | 17,4 | 13,7                                    | 13,9 | 14,2 | 14,3 | 14,8 |
| 12H   | 4H  | 15,4  | 15,7 | 15,8 | 16,1 | 16,5 | 12,5                                    | 12,8 | 12,9 | 13,2 | 13,6 |
|   | 6H  | 15,8  | 16,1 | 16,3 | 16,5 | 17,0 | 13,2                                    | 13,4 | 13,6 | 13,8 | 14,3 |
|   | 8H  | 16,1  | 16,3 | 16,6 | 16,7 | 17,2 | 13,5                                    | 13,7 | 14,0 | 14,2 | 14,7 |
| Variation of the observer position for the luminaire distance S |     |   |      |      |      |      |   |      |      |      |      |
| S = 1,0H  |     | +1,9 / -0,7                                       |      |      |      |      | +0,2 / -0,2                             |      |      |      |      |
| S = 1,5H  |     | +3,7 / -1,2                                       |      |      |      |      | +0,3 / -0,5                             |      |      |      |      |
| S = 2,0H  |     | +5,3 / -1,5                                       |      |      |      |      | +0,5 / -0,9                             |      |      |      |      |
| Standard table  |     | BK03  |      |      |      |      | BK05                                    |      |      |      |      |
| Correction<br>summand   |     | -2,0  |      |      |      |      | -4,3                                    |      |      |      |      |
| Corrected glare indices referring to 220 lm total luminous flux |     |   |      |      |      |      |   |      |      |      |      |

## 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 Lumens delivered to the task surface |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |
| 0                   | 119  | 119 | 119 | 119 | 116 | 116 | 116 | 116 | 111 | 111 | 111 | 106 | 106 | 106 | 102 | 102 | 102 | 100 |
| 1                   | 114  | 111 | 108 | 106 | 111 | 109 | 106 | 104 | 105 | 103 | 101 | 101 | 99  | 98  | 97  | 96  | 95  | 94  |
| 2                   | 108  | 104 | 100 | 97  | 106 | 102 | 98  | 96  | 99  | 96  | 93  | 96  | 93  | 91  | 93  | 91  | 89  | 88  |
| 3                   | 104  | 98  | 93  | 89  | 102 | 96  | 92  | 88  | 94  | 90  | 87  | 91  | 88  | 86  | 89  | 86  | 84  | 83  |
| 4                   | 99   | 92  | 87  | 83  | 97  | 91  | 86  | 83  | 89  | 85  | 82  | 87  | 84  | 81  | 85  | 82  | 80  | 78  |
| 5                   | 95   | 88  | 82  | 78  | 94  | 87  | 82  | 78  | 85  | 81  | 77  | 83  | 80  | 77  | 82  | 79  | 76  | 75  |
| 6                   | 91   | 83  | 78  | 74  | 90  | 83  | 78  | 74  | 81  | 77  | 74  | 80  | 76  | 73  | 79  | 75  | 73  | 71  |
| 7                   | 88   | 80  | 74  | 71  | 87  | 79  | 74  | 71  | 78  | 73  | 70  | 77  | 73  | 70  | 76  | 72  | 69  | 68  |
| 8                   | 85   | 76  | 71  | 68  | 84  | 76  | 71  | 67  | 75  | 70  | 67  | 74  | 70  | 67  | 73  | 69  | 67  | 65  |
| 9                   | 82   | 73  | 68  | 65  | 81  | 73  | 68  | 65  | 72  | 68  | 65  | 71  | 67  | 64  | 70  | 67  | 64  | 63  |
| 10                  | 79   | 71  | 66  | 62  | 78  | 70  | 66  | 62  | 70  | 65  | 62  | 69  | 65  | 62  | 68  | 64  | 62  | 61  |

LAMPS (number of lamps)

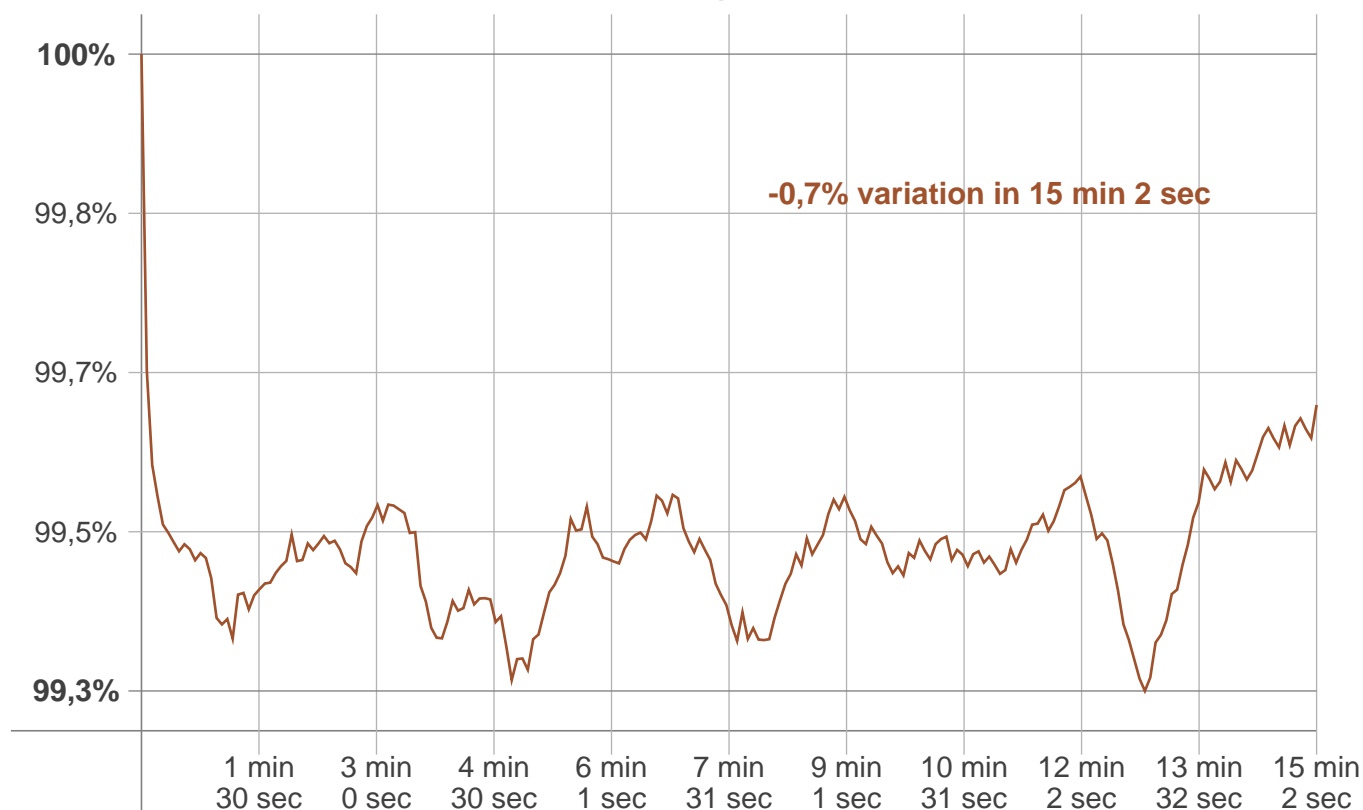
## Luminaire budgetary diagram



## Zonal Lumen Summary

| 0°-10°    | 10°-20°   | 20°-30°   | 30°-40°   | 40°-50°   | 50°-60°   | 60°-70°   | 70°-80°   | 80°-90°   |
|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|
| {LUM0-10} | 77,8 lm   | 42,6 lm   | 18,3 lm   | 10,3 lm   | 7,31 lm   | 4,92 lm   | 2,68 lm   | 1,03 lm   |
| 90°-100°  | 100°-110° | 110°-120° | 120°-130° | 130°-140° | 140°-150° | 150°-160° | 160°-170° | 170°-180° |
| 0,155 lm  | 0,091 lm  | 0,086 lm  | 0,077 lm  | 0,030 lm  | 0,000 lm  | 0,000 lm  | 0,000 lm  | 0,000 lm  |

Warmup curve



Warmup result

|                  |              |
|------------------|--------------|
| Warmup time:     | 15 min 2 sec |
| Warmup variation | -0,7%        |

Warmup conditions

|                    |        |
|--------------------|--------|
| Stable period:     | 15 min |
| Stable change max: | 2,0%   |
| Minimum time:      | 15 min |

Color temperature change

|           |            |         |
|-----------|------------|---------|
| CCT start | CCT change | CCT end |
| 2685 K    | -2 K       | 2683 K  |

Output change

|              |               |            |
|--------------|---------------|------------|
| Output start | Output change | Output end |
| 221 lm       | 1m            | 220 lm     |



## Flicker curve (complete sampled flicker signal)



## Flicker frame (frame of one flicker period)



## Flicker FFT (frequency scope of flicker curve)



## Flicker results:

|                       |        |
|-----------------------|--------|
| Flicker frequency:    | n/a Hz |
| Flicker index:        | n/a    |
| Flicker percentage:   | n/a %  |
| SVM: (Visual flicker) | n/a    |

## Flicker conditions:

|              |                       |
|--------------|-----------------------|
| Sample rate: | 60.000 samples/second |
|--------------|-----------------------|