

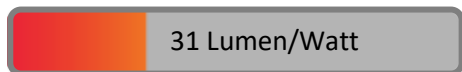
# PHOTOMETRIC TEST REPORT

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LEO UNSWITCHED LED BRONZE UL

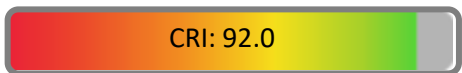
astro

## LIGHT EFFICIENCY:



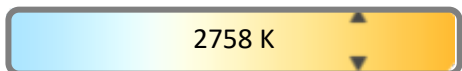
OUTPUT: 134 lm

## LIGHT QUALITY:



PEAK: 710 cd

## COLOR TEMPERATURE:



POWER: 4.3 W

PF: 0.56

Tracking number: [n/a](#)

Product name:

Leo Unswitched LED Bronze UL

Item number:

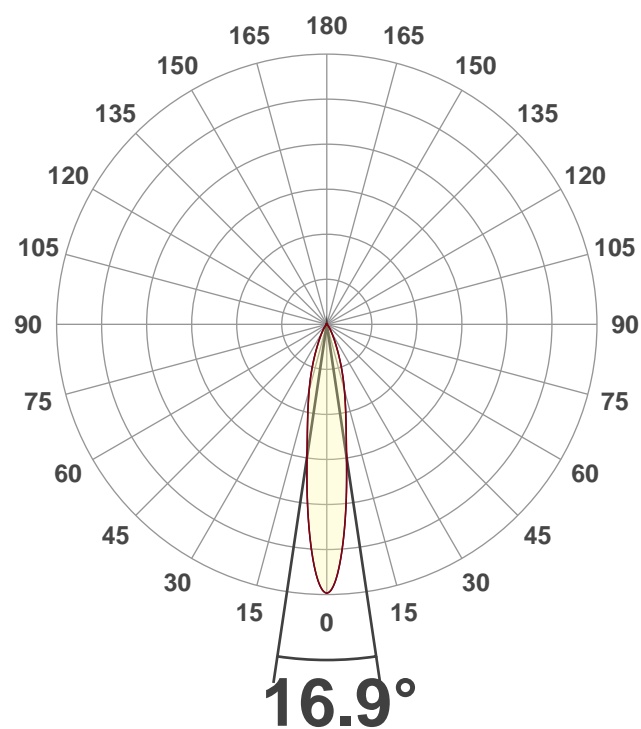
1295015

Date and time:

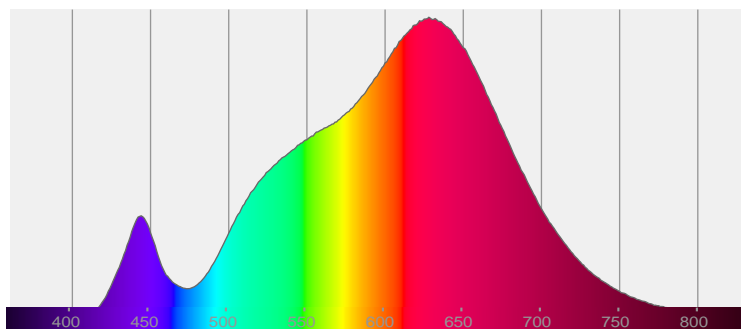
12/10/2020 12:17:25

Description:

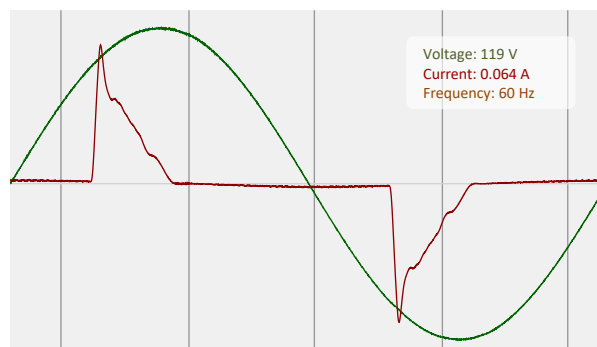
Dry Rated LED Reading Light

CIE 1931  
x: 0.457  
y: 0.413

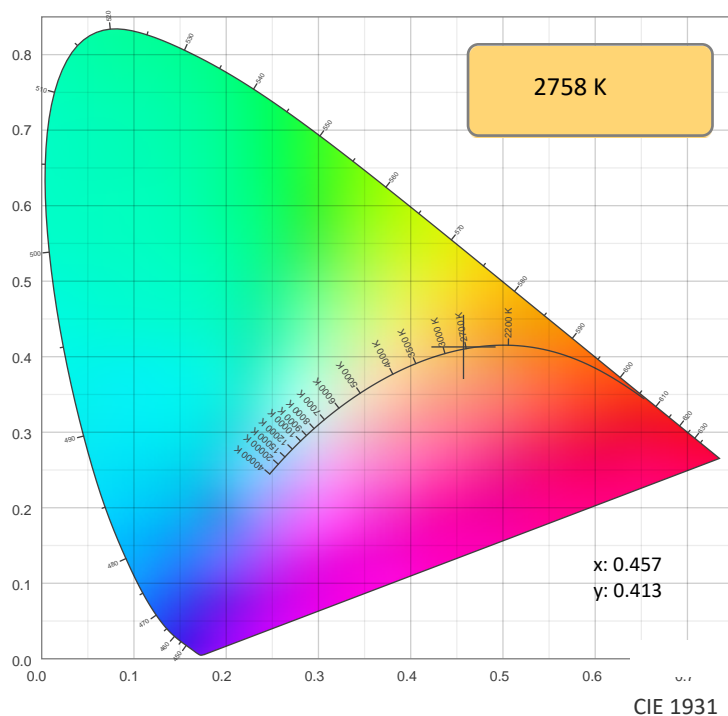
## SPECTRA



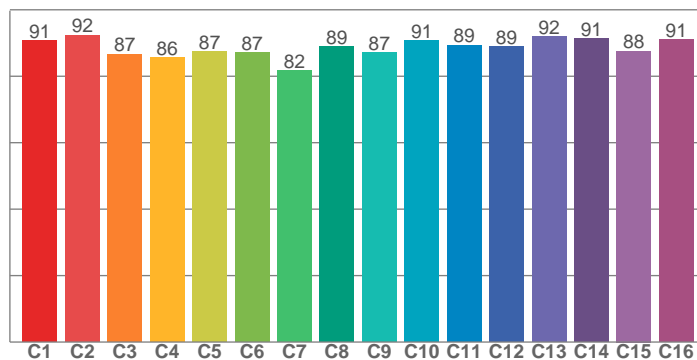
## POWER



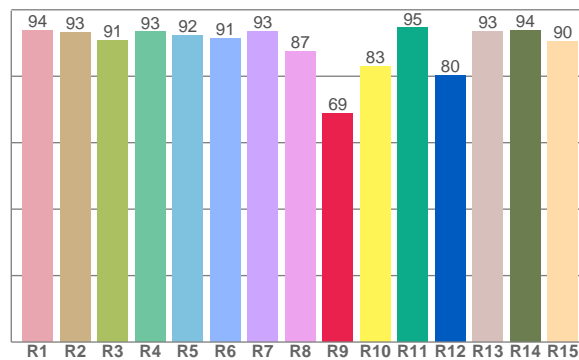
## COLOR DETAILS



TM30: 88.9



CRI: 92.0 (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  |
|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|
| 93.9 | 93.2 | 90.7 | 93.3 | 92.3 | 91.4 | 93.4 | 87.4 | 68.7 | 82.9 | 94.5 | 80.2 | 93.4 | 93.7 | 90.4 |

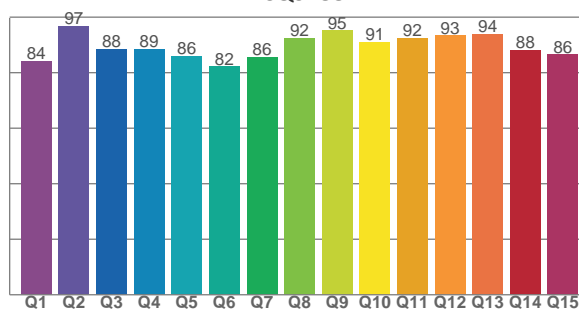
TM30 C values, 16 binned values out of total of 99 C values

| C1   | C2   | C3   | C4   | C5   | C6   | C7   | C8   | C9   | C10  | C11  | C12  | C13  | C14  | C15  | C16  |
|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|
| 90.7 | 92.4 | 86.7 | 85.7 | 87.4 | 87.1 | 81.7 | 88.8 | 87.2 | 90.7 | 89.4 | 88.8 | 92.0 | 91.5 | 87.6 | 91.0 |

CQS Q values

| Q1   | Q2   | Q3   | Q4   | Q5   | Q6   | Q7   | Q8   | Q9   | Q10  | Q11  | Q12  | Q13  | Q14  | Q15  |
|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|
| 84.2 | 96.7 | 88.4 | 88.6 | 86.0 | 82.2 | 85.6 | 92.4 | 95.2 | 91.0 | 92.5 | 93.4 | 93.9 | 88.1 | 86.5 |

CQS: 88.7



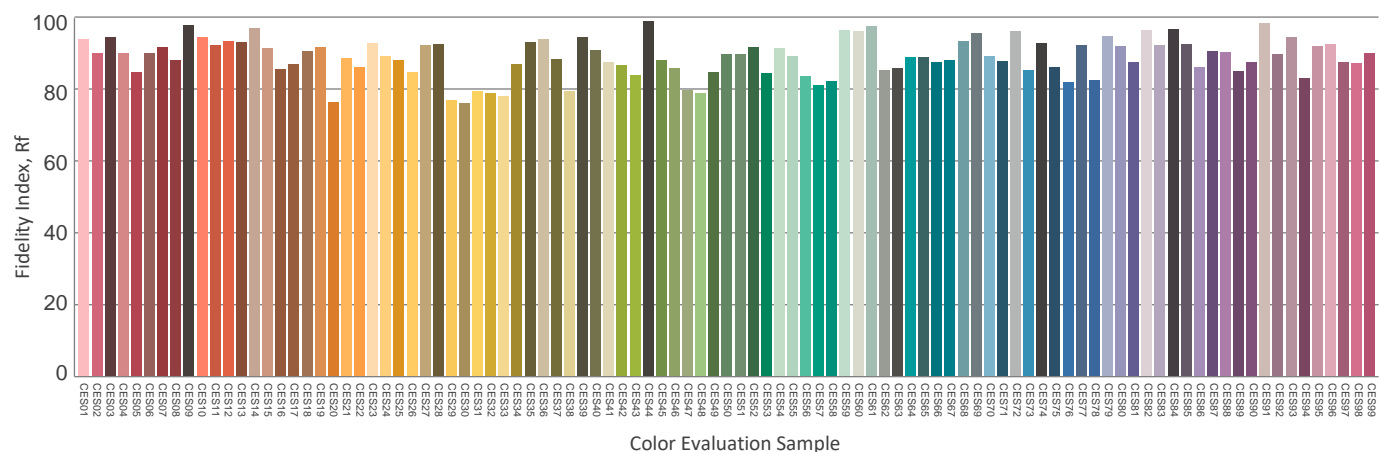
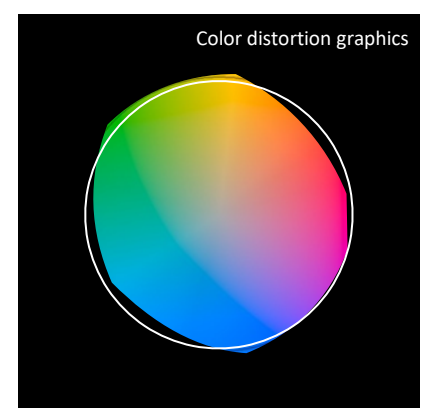
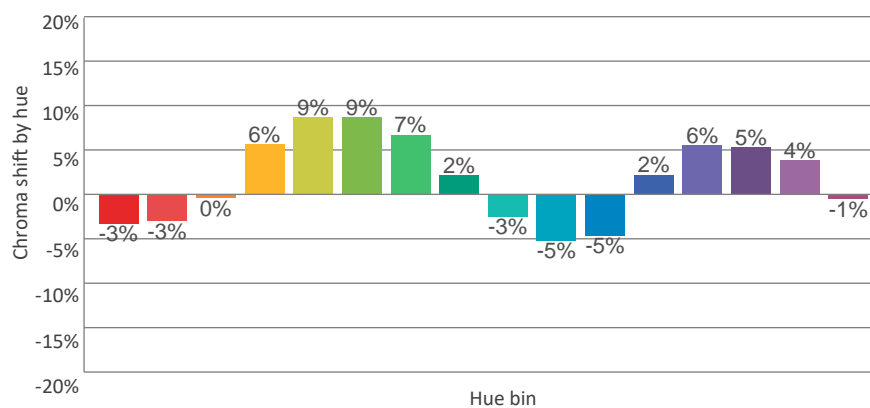
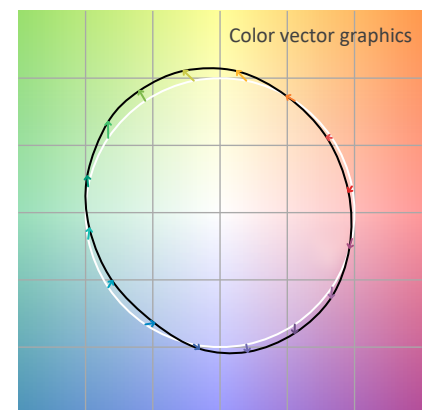
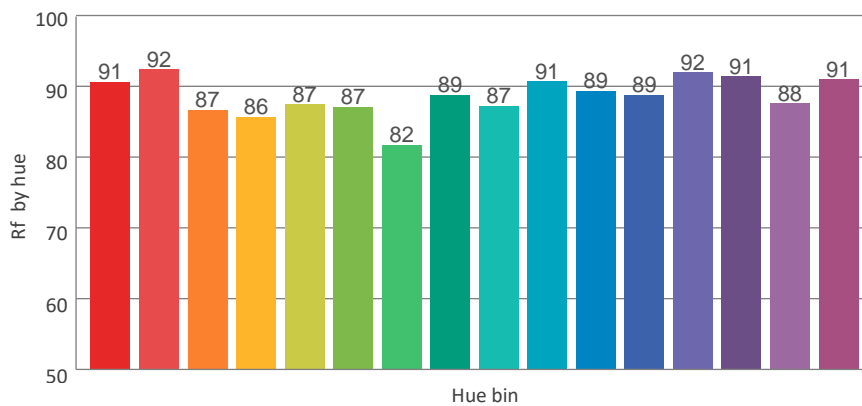
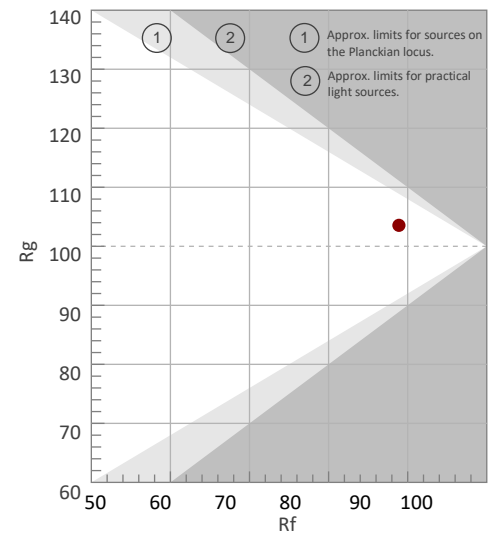
## COLOR PARAMETERS

| 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                | $\Delta uv$                     |
| 2758 K            | 92.0                  | 68.7          | 88.9           | 103.6       | 88.7                | 0.457                     | 0.413                     | 0.260            | 0.352            | 0.0011                          |

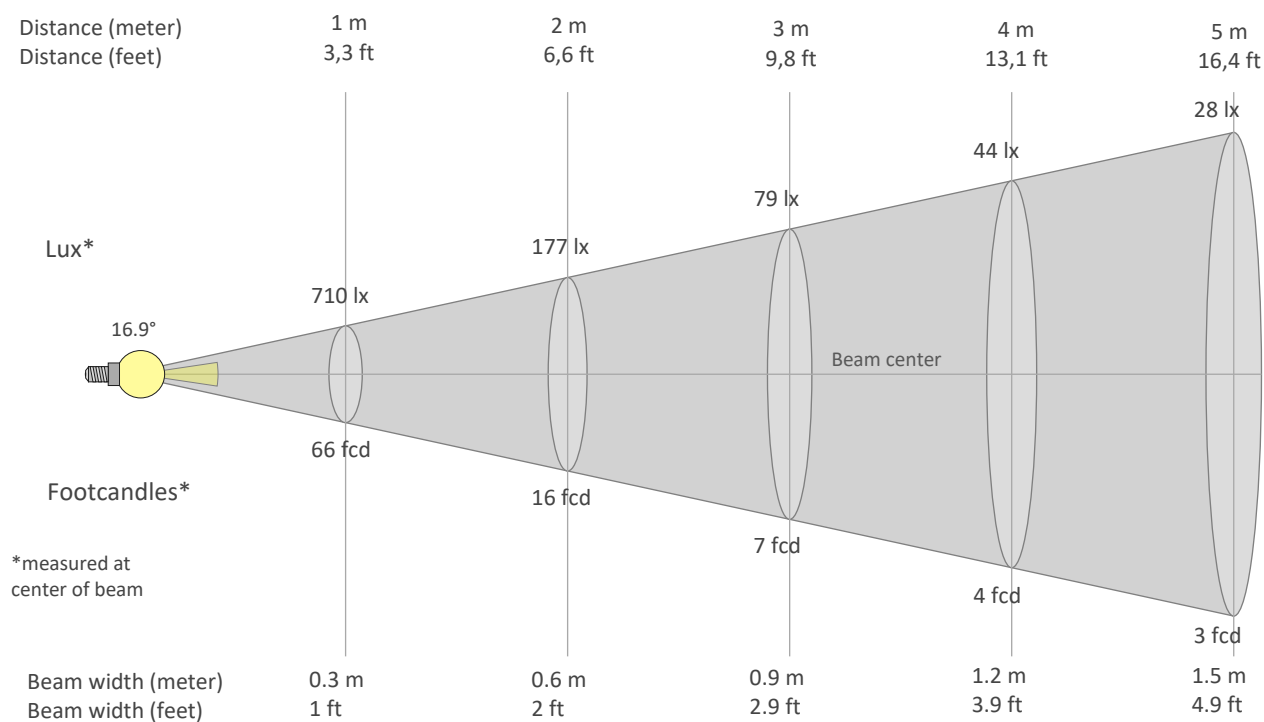
**Rf 88.9**  
Fidelity index Rf

**Rg 103.6**  
Gammut index Rg

| Hue Bin | Graphic shifts (%) |        |      |
|---------|--------------------|--------|------|
|         | R <sub>f</sub>     | Chroma | Hue  |
| 1       | 91                 | -3%    | -3%  |
| 2       | 92                 | -3%    | 3%   |
| 3       | 87                 | 0%     | 7%   |
| 4       | 86                 | 6%     | 8%   |
| 5       | 87                 | 9%     | 6%   |
| 6       | 87                 | 9%     | 0%   |
| 7       | 82                 | 7%     | -10% |
| 8       | 89                 | 2%     | -7%  |
| 9       | 87                 | -3%    | -7%  |
| 10      | 91                 | -5%    | -2%  |
| 11      | 89                 | -5%    | 5%   |
| 12      | 89                 | 2%     | 4%   |
| 13      | 92                 | 6%     | 0%   |
| 14      | 91                 | 5%     | -4%  |
| 15      | 88                 | 4%     | -7%  |
| 16      | 91                 | -1%    | -7%  |



## 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 |
| 710lx   | 177lx   | 79lx   | 44lx   | 28lx   | 20lx   | 14lx   | 11lx   | 9lx    | 7lx    | 6lx    | 5lx    | 4lx    | 4lx    | 3lx    | 3lx    | 2lx    | 2lx    | 2lx    | 2lx    |
| 65.9fcd | 16.5fcd | 7.3fcd | 4.1fcd | 2.6fcd | 1.8fcd | 1.3fcd | 1fcd   | 0.8fcd | 0.7fcd | 0.5fcd | 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° |
|------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| 710  | 676 | 591 | 484 | 377 | 296 | 241 | 198 | 162 | 131 | 102 | 78  | 59  | 45  | 34  | 26  | 20  | 16  | 13  | 10  |
| 100% | 95% | 83% | 68% | 53% | 42% | 34% | 28% | 23% | 18% | 14% | 11% | 8%  | 6%  | 5%  | 4%  | 3%  | 2%  | 2%  | 1%  |

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° |
|------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| 710  | 676 | 591 | 484 | 377 | 296 | 241 | 198 | 162 | 131 | 102 | 78  | 59  | 45  | 34  | 26  | 20  | 16  | 13  | 10  |
| 100% | 95% | 83% | 68% | 53% | 42% | 34% | 28% | 23% | 18% | 14% | 11% | 8%  | 6%  | 5%  | 4%  | 3%  | 2%  | 2%  | 1%  |

Intensities in 180° c-plane

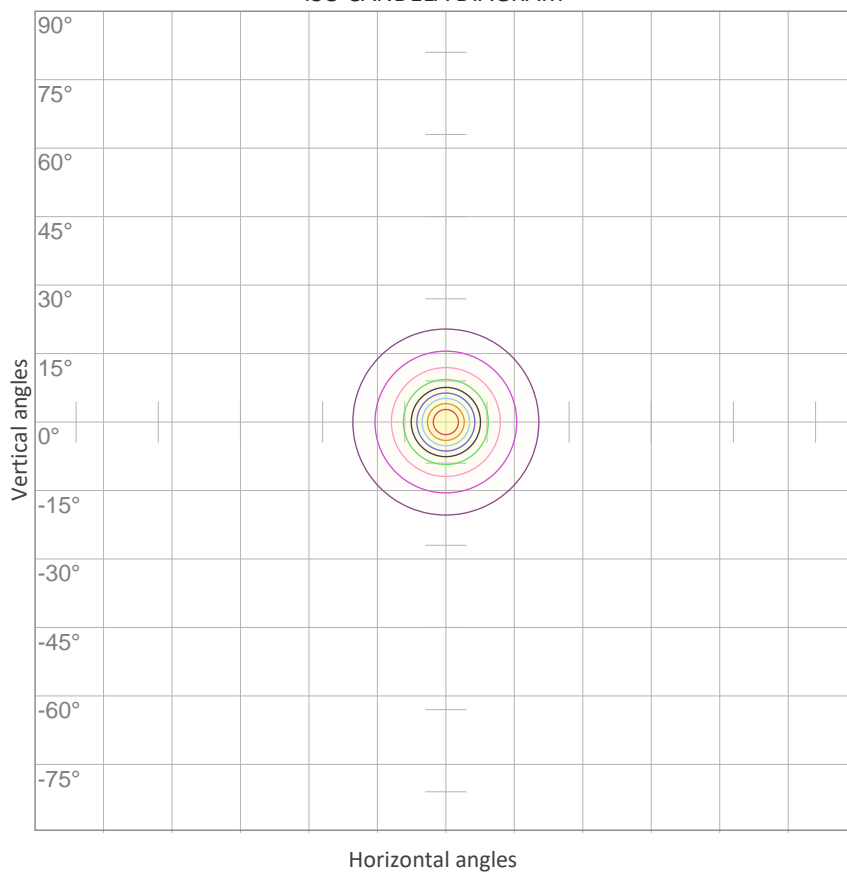
| 0°   | 2°  | 4°  | 6°  | 8°  | 10° | 12° | 14° | 16° | 18° | 20° | 22° | 24° | 26° | 28° | 30° | 32° | 34° | 36° | 38° |
|------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| 710  | 676 | 591 | 484 | 377 | 296 | 241 | 198 | 162 | 131 | 102 | 78  | 59  | 45  | 34  | 26  | 20  | 16  | 13  | 10  |
| 100% | 95% | 83% | 68% | 53% | 42% | 34% | 28% | 23% | 18% | 14% | 11% | 8%  | 6%  | 5%  | 4%  | 3%  | 2%  | 2%  | 1%  |

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° |
|------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| 710  | 676 | 591 | 484 | 377 | 296 | 241 | 198 | 162 | 131 | 102 | 78  | 59  | 45  | 34  | 26  | 20  | 16  | 13  | 10  |
| 100% | 95% | 83% | 68% | 53% | 42% | 34% | 28% | 23% | 18% | 14% | 11% | 8%  | 6%  | 5%  | 4%  | 3%  | 2%  | 2%  | 1%  |

| Beam angle 50% | Field angle 10% | Cutoff angle 2,5% | Intensity ratio in 120° cone | Intensity ratio in 90° cone |
|----------------|-----------------|-------------------|------------------------------|-----------------------------|
| 16.9°          | 45.3°           | 66°               | 98.7%                        | 96.4%                       |

ISO CANDELA DIAGRAM



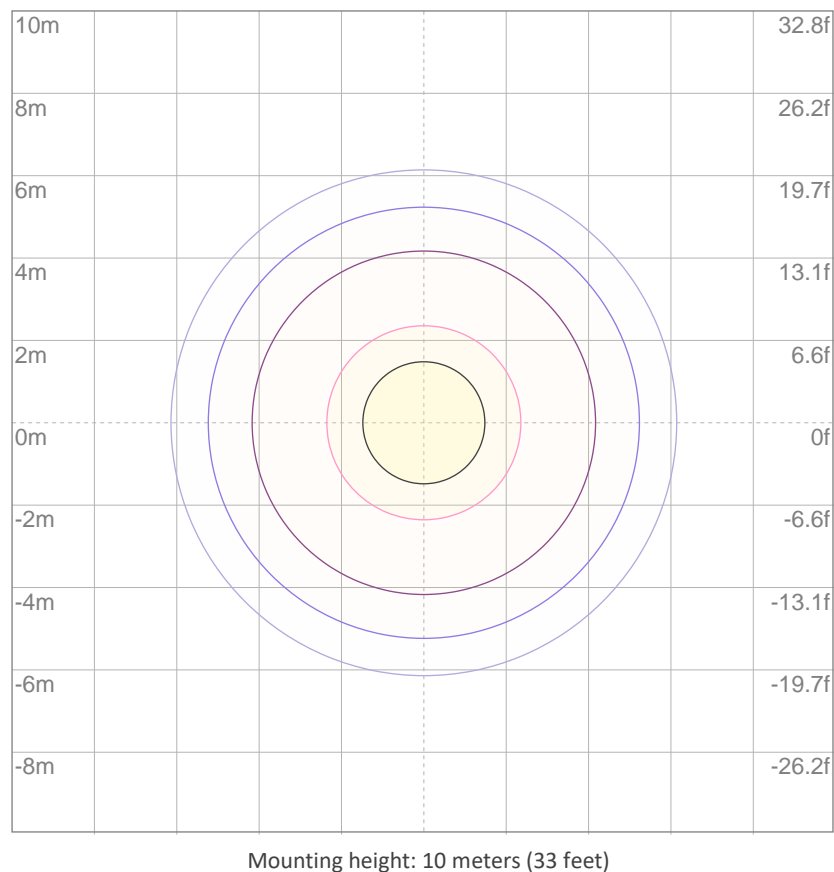
|     |        |
|-----|--------|
| 10% | 71 cd  |
| 20% | 142 cd |
| 30% | 213 cd |
| 40% | 284 cd |
| 50% | 355 cd |
| 60% | 426 cd |
| 70% | 497 cd |
| 80% | 568 cd |
| 90% | 639 cd |

Conditions:

Number of c-planes: 8

Candela at center: 710 cd

ISO LUX DIAGRAM



|     |                |
|-----|----------------|
| 3%  | 0.213 lx       |
| 5%  | 0.355 lx       |
| 10% | 0.710 lx       |
| 30% | 2.13 lx        |
| 50% | {LUX_10M50} lx |

Conditions:

Number of c-planes: 8

Lux at center: 7.10 lx

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

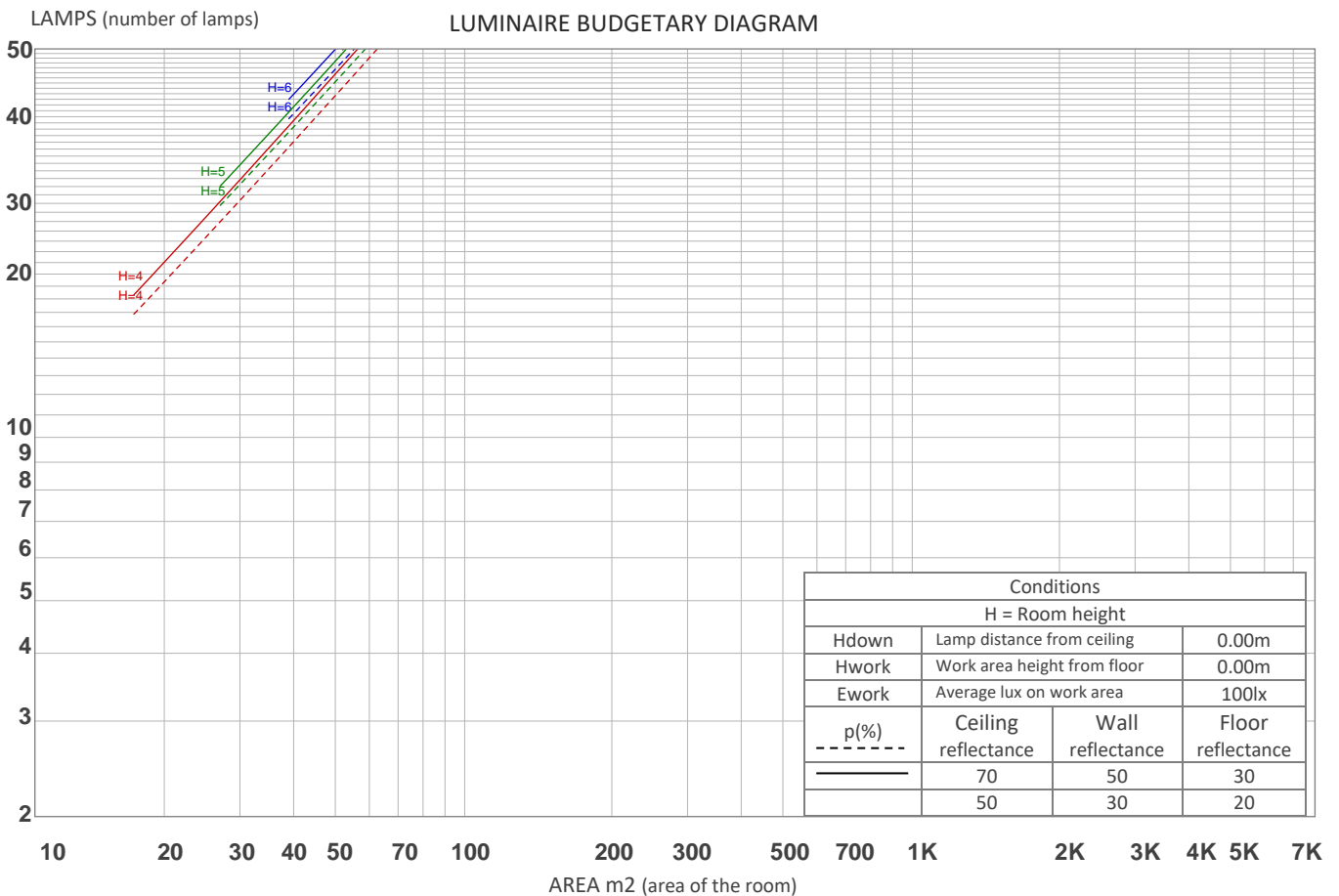
## UGR

## 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 lamp axis |      |      |      |      | Viewing direction parallel to lamp axis |      |      |      |      |
| 2H  | 2H  | 10.7   | 11.1 | 10.8 | 11.3 | 11.5 | 10.7                                    | 11.1 | 10.8 | 11.3 | 11.5 |
|   | 3H  | 10.5   | 11.1 | 10.9 | 11.3 | 11.5 | 10.5                                    | 11.1 | 10.9 | 11.3 | 11.5 |
|   | 4H  | 10.4   | 11.1 | 10.8 | 11.3 | 11.5 | 10.4                                    | 11.1 | 10.8 | 11.3 | 11.5 |
|   | 6H  | 10.5   | 10.9 | 10.7 | 11.2 | 11.6 | 10.5                                    | 10.9 | 10.7 | 11.2 | 11.6 |
|   | 8H  | 10.4   | 10.9 | 10.7 | 11.2 | 11.6 | 10.4                                    | 10.9 | 10.7 | 11.2 | 11.6 |
|   | 12H | 10.3   | 10.8 | 10.7 | 11.2 | 11.6 | 10.3                                    | 10.8 | 10.7 | 11.2 | 11.6 |
| 4H  | 2H  | 10.4   | 11.0 | 10.8 | 11.2 | 11.5 | 10.4                                    | 11.0 | 10.8 | 11.2 | 11.5 |
|   | 3H  | 10.5   | 10.9 | 10.8 | 11.3 | 11.7 | 10.5                                    | 10.9 | 10.8 | 11.3 | 11.7 |
|   | 4H  | 10.4   | 10.8 | 10.8 | 11.2 | 11.7 | 10.4                                    | 10.8 | 10.8 | 11.2 | 11.7 |
|   | 6H  | 10.3   | 10.8 | 10.8 | 11.1 | 11.5 | 10.3                                    | 10.8 | 10.8 | 11.1 | 11.5 |
|   | 8H  | 10.2   | 10.7 | 10.7 | 11.0 | 11.4 | 10.2                                    | 10.7 | 10.7 | 11.0 | 11.4 |
|   | 12H | 10.2   | 10.5 | 10.7 | 10.9 | 11.4 | 10.2                                    | 10.5 | 10.7 | 10.9 | 11.4 |
| 8H  | 4H  | 10.2   | 10.7 | 10.8 | 11.0 | 11.4 | 10.2                                    | 10.7 | 10.8 | 11.0 | 11.4 |
|   | 6H  | 10.2   | 10.5 | 10.7 | 10.9 | 11.5 | 10.2                                    | 10.5 | 10.7 | 10.9 | 11.5 |
|   | 8H  | 10.2   | 10.4 | 10.7 | 10.9 | 11.5 | 10.2                                    | 10.4 | 10.7 | 10.9 | 11.5 |
|   | 12H | 10.1   | 10.3 | 10.7 | 10.8 | 11.4 | 10.1                                    | 10.3 | 10.7 | 10.8 | 11.4 |
| 12H   | 4H  | 10.2   | 10.5 | 10.7 | 10.9 | 11.4 | 10.2                                    | 10.5 | 10.7 | 10.9 | 11.4 |
|   | 6H  | 10.2   | 10.4 | 10.7 | 10.9 | 11.5 | 10.2                                    | 10.4 | 10.7 | 10.9 | 11.5 |
|   | 8H  | 10.1   | 10.3 | 10.7 | 10.8 | 11.4 | 10.1                                    | 10.3 | 10.7 | 10.8 | 11.4 |
| Variation of the observer position for the luminaire distance S |     |  |      |      |      |      |   |      |      |      |      |
| S = 1.0H  |     | 4.3 / -4.9                                     |      |      |      |      | 4.3 / -4.9                              |      |      |      |      |
| S = 1.5H  |     | 6.8 / -6.0                                     |      |      |      |      | 6.8 / -6.0                              |      |      |      |      |
| S = 2.0H  |     | 8.7 / -7.7                                     |      |      |      |      | 8.7 / -7.7                              |      |      |      |      |
| Standard table  |     | n/a  |      |      |      |      | n/a                                     |      |      |      |      |
| Correction summand  |     | n/a  |      |      |      |      | n/a                                     |      |      |      |      |
| Corrected glare indices referring to 134 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  | 112 | 110 | 108 | 112 | 110 | 108 | 106 | 106 | 104 | 103 | 102 | 101 | 100 | 99  | 98  | 97  | 95  |
| 2                   | 110  | 106 | 103 | 100 | 108 | 104 | 101 | 99  | 101 | 99  | 97  | 98  | 96  | 95  | 96  | 94  | 93  | 91  |
| 3                   | 106  | 101 | 97  | 94  | 104 | 100 | 96  | 93  | 97  | 94  | 92  | 95  | 92  | 90  | 92  | 90  | 89  | 87  |
| 4                   | 102  | 96  | 92  | 89  | 101 | 95  | 91  | 88  | 93  | 90  | 87  | 91  | 88  | 86  | 89  | 87  | 85  | 84  |
| 5                   | 99   | 92  | 88  | 84  | 97  | 91  | 87  | 84  | 90  | 86  | 83  | 88  | 85  | 82  | 87  | 84  | 82  | 81  |
| 6                   | 95   | 89  | 84  | 81  | 94  | 88  | 83  | 80  | 86  | 83  | 80  | 85  | 82  | 79  | 84  | 81  | 79  | 78  |
| 7                   | 92   | 85  | 81  | 77  | 91  | 85  | 80  | 77  | 83  | 80  | 77  | 82  | 79  | 76  | 81  | 78  | 76  | 75  |
| 8                   | 90   | 82  | 78  | 75  | 88  | 82  | 77  | 74  | 81  | 77  | 74  | 80  | 76  | 74  | 79  | 76  | 73  | 72  |
| 9                   | 87   | 79  | 75  | 72  | 86  | 79  | 75  | 72  | 78  | 74  | 72  | 77  | 74  | 71  | 77  | 73  | 71  | 70  |
| 10                  | 84   | 77  | 73  | 70  | 83  | 77  | 72  | 70  | 76  | 72  | 69  | 75  | 72  | 69  | 74  | 71  | 69  | 68  |



## ZONAL LUMEN SUMMARY

| 0°-10°   | 10°-20°   | 20°-30°   | 30°-40°   | 40°-50°   | 50°-60°   | 60°-70°   | 70°-80°   | 80°-90°   |
|----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|
| 42.9 lm  | 49.7 lm   | 24.6 lm   | 9.22 lm   | 3.73 lm   | 1.60 lm   | 0.986 lm  | 0.316 lm  | 0.054 lm  |
| 90°-100° | 100°-110° | 110°-120° | 120°-130° | 130°-140° | 140°-150° | 150°-160° | 160°-170° | 170°-180° |
| 0.027 lm | 0.026 lm  | 0.034 lm  | 0.038 lm  | 0.061 lm  | 0.085 lm  | 0.088 lm  | 0.063 lm  | 0.016 lm  |

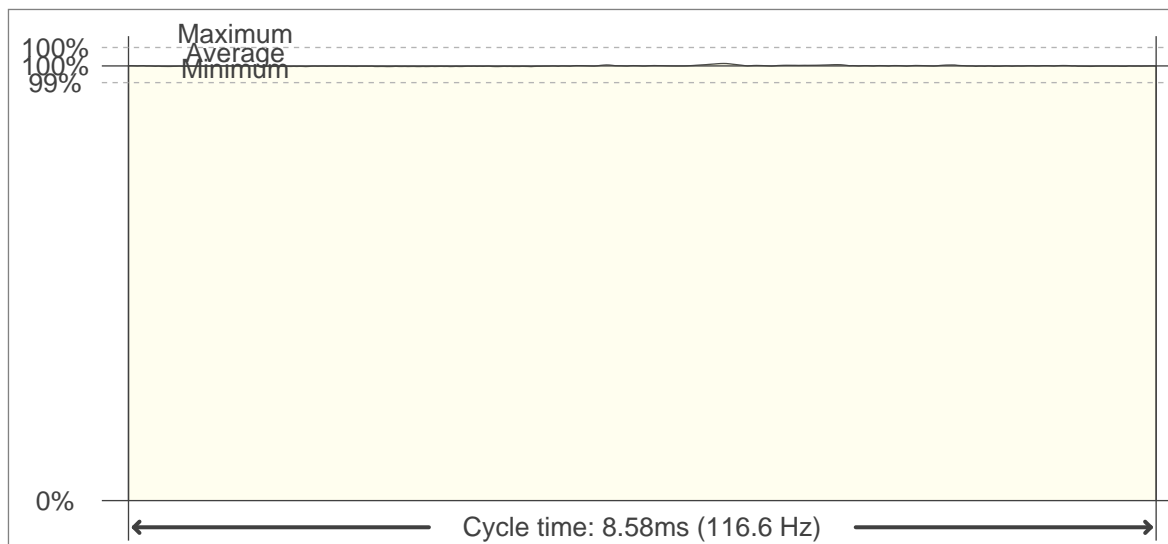


## FLICKER

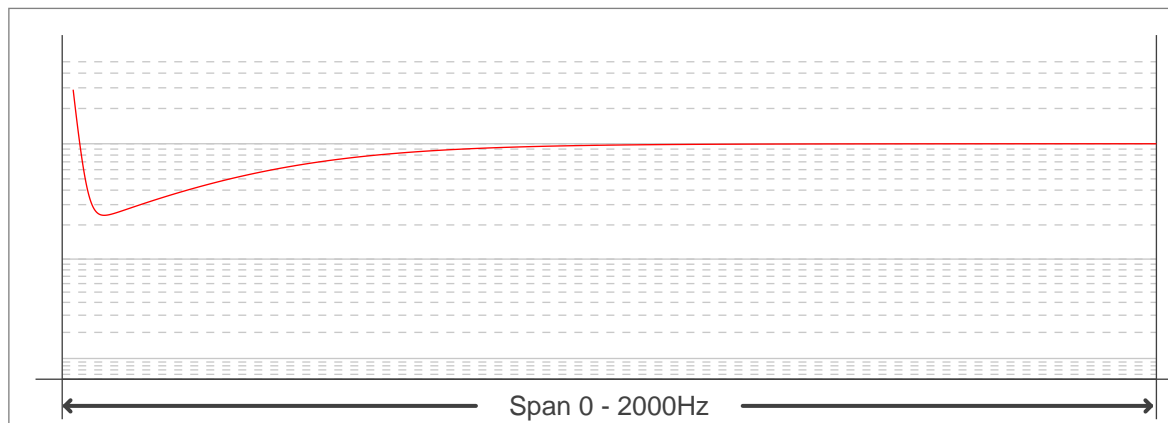
FLICKER CURVE (COMPLETE SAMPLED FLICKER)



FLICKER FRAME (FRAME OF ONE FLICKER PERIOD)



FLICKER FFT (FREQUENCY SCOPE OF FLICKER CURVE)



## FLICKER RESULTS:

|                       |           |
|-----------------------|-----------|
| Flicker frequency:    | 116.62 Hz |
| Flicker index:        | 0         |
| Flicker percentage:   | 0.48 %    |
| SVM: (Visual flicker) | 0         |

## FLICKER CONDITIONS:

|              |                      |
|--------------|----------------------|
| Sample rate: | 40000 samples/second |
|--------------|----------------------|