

PHOTOMETRIC TEST REPORT

IO PENDANT 1000 MATT BLACK

astro

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LIGHT EFFICIENCY:

93 Lumen/Watt

LIGHT QUALITY:

CRI: 95.0

COLOR TEMPERATURE:

3028 K

OUTPUT: 1966 lm

PEAK: 336 cd

POWER: 21.1 W

PF: 0.97



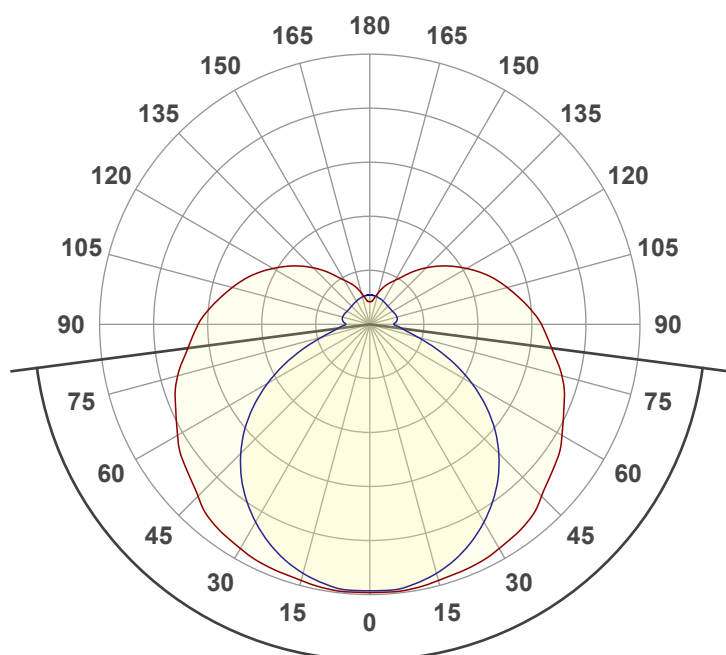
Tracking number: [n/a](#)

Product name:
io Pendant 1000 Matt Black

Item number:
1409062

Date and time:
12/10/2022 10:31:03

Description:
LED Pendant Luminaire

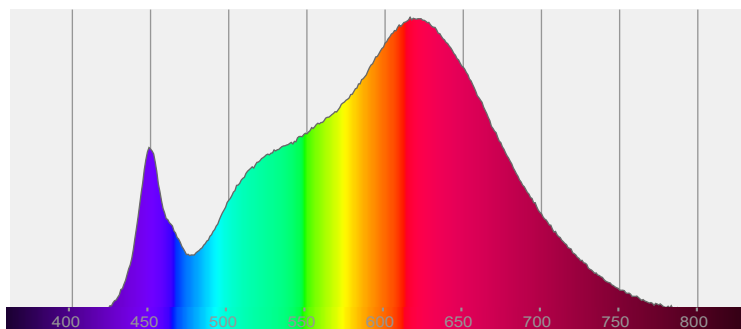


165.1°

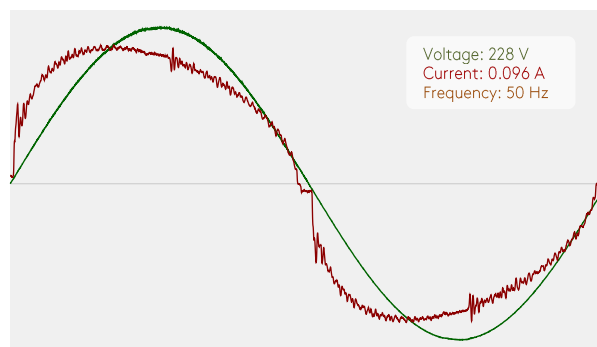


CIE 1931
x: 0.433
y: 0.398

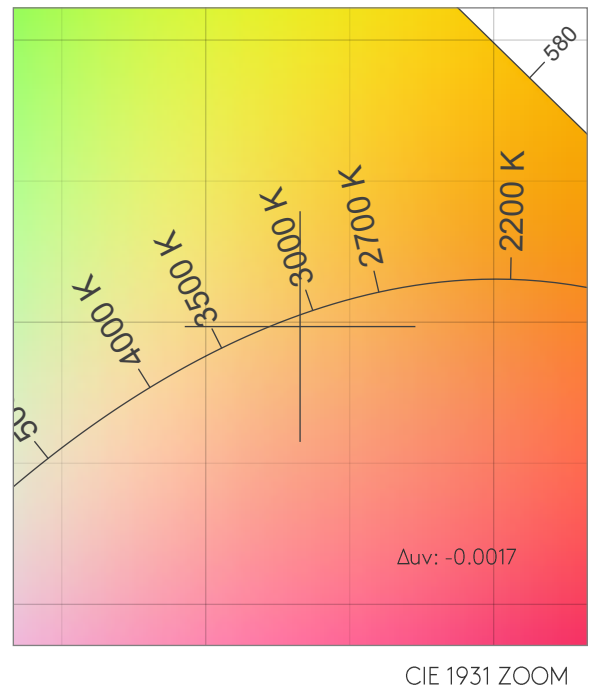
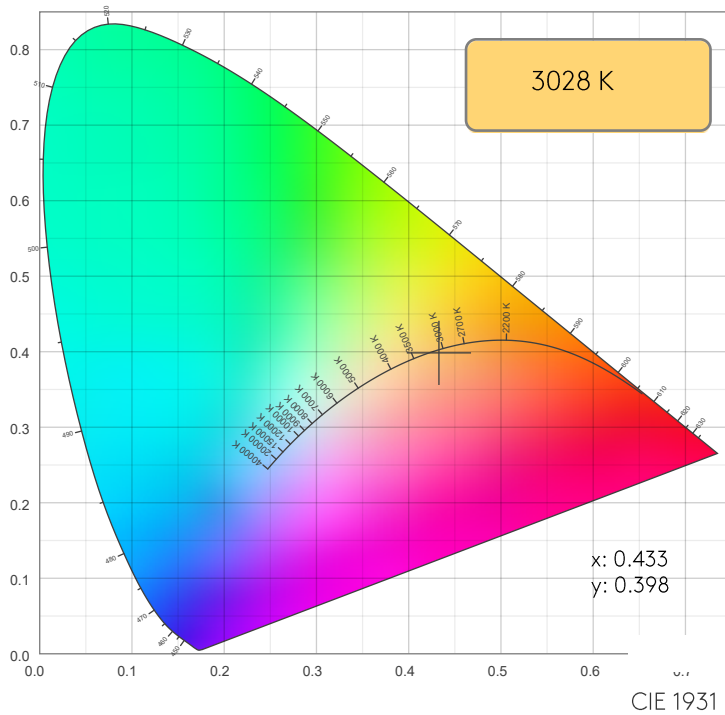
SPECTRA



POWER

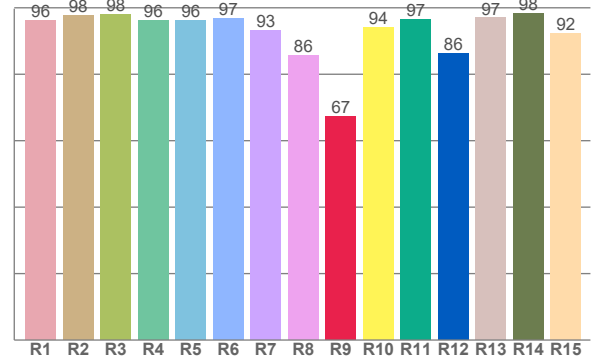
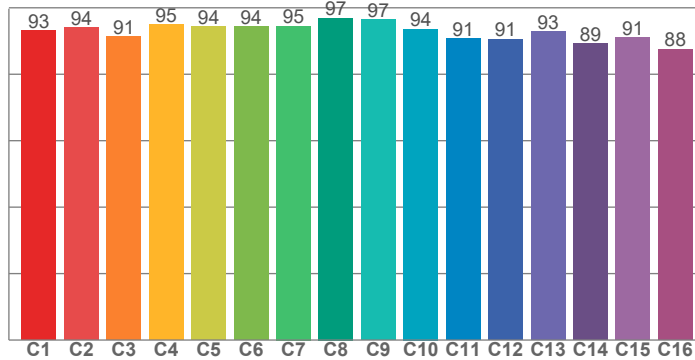


COLOR DETAILS



TM30: 93.0

CRI: 95.0 (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 |
|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|
| 96.3 | 97.7 | 98.0 | 96.2 | 96.3 | 96.7 | 93.2 | 85.7 | 67.4 | 94.1 | 96.5 | 86.3 | 96.9 | 98.3 | 92.2 |

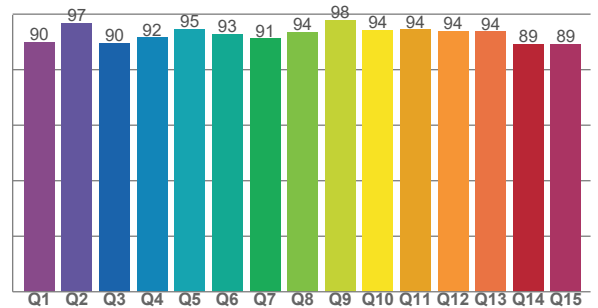
TM30 C values, 16 binned values out of total of 99 C values

| C1 | C2 | C3 | C4 | C5 | C6 | C7 | C8 | C9 | C10 | C11 | C12 | C13 | C14 | C15 | C16 |
|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|
| 93.1 | 94.1 | 91.3 | 95.0 | 94.3 | 94.3 | 94.5 | 96.9 | 96.5 | 93.6 | 90.7 | 90.6 | 92.8 | 89.3 | 91.0 | 87.6 |

CQS Q values

| Q1 | Q2 | Q3 | Q4 | Q5 | Q6 | Q7 | Q8 | Q9 | Q10 | Q11 | Q12 | Q13 | Q14 | Q15 |
|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|
| 90.0 | 96.9 | 89.6 | 91.6 | 94.5 | 92.8 | 91.2 | 93.5 | 98.0 | 94.4 | 94.4 | 93.9 | 93.8 | 89.2 | 89.2 |

CQS: 92.3



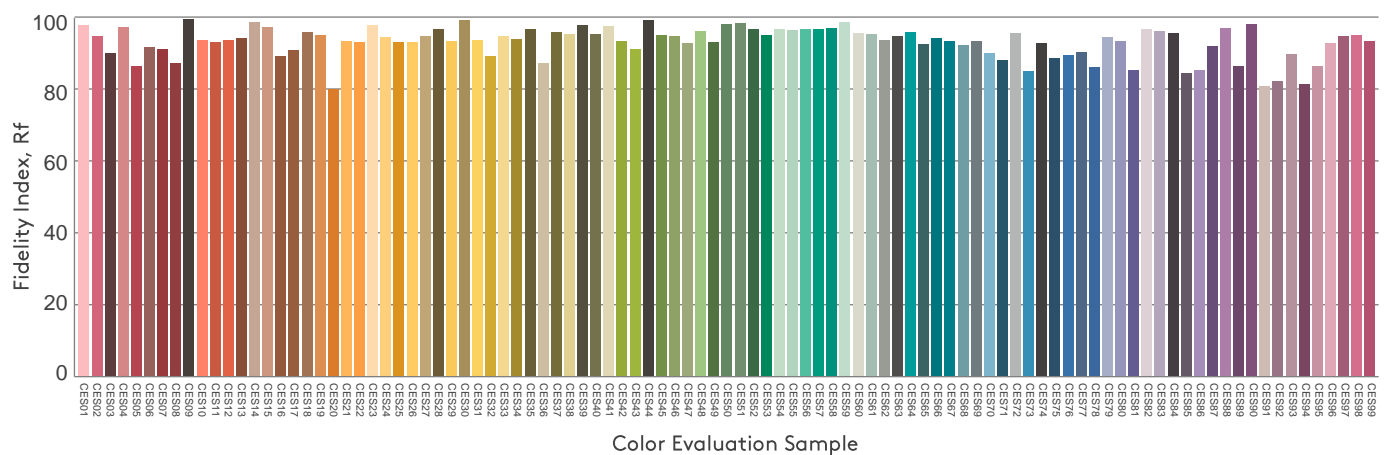
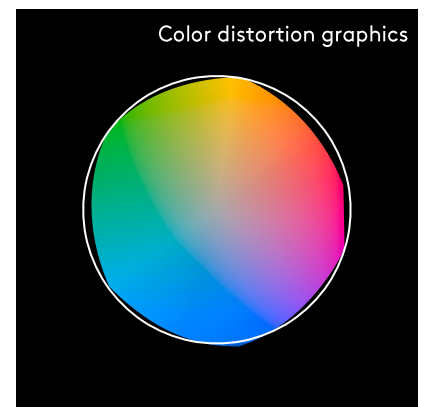
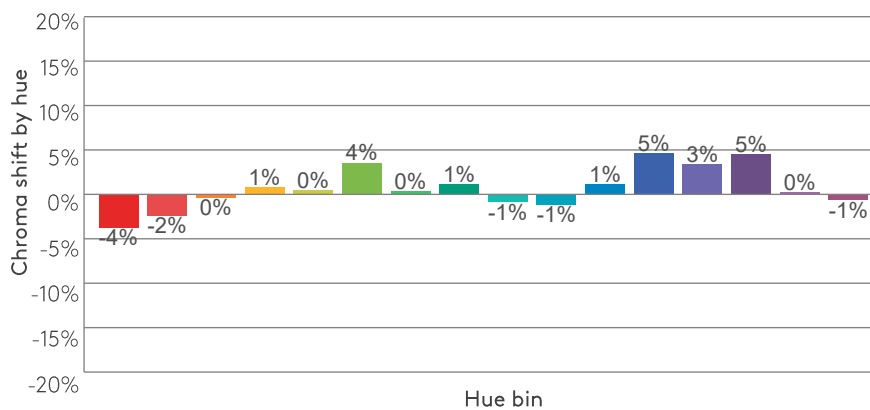
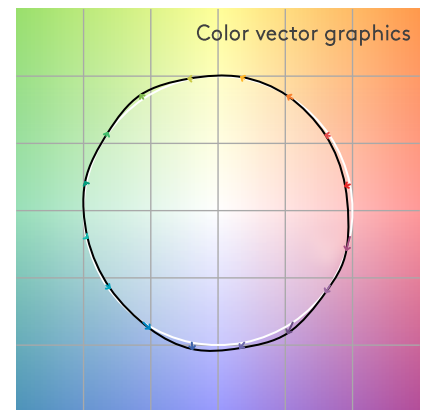
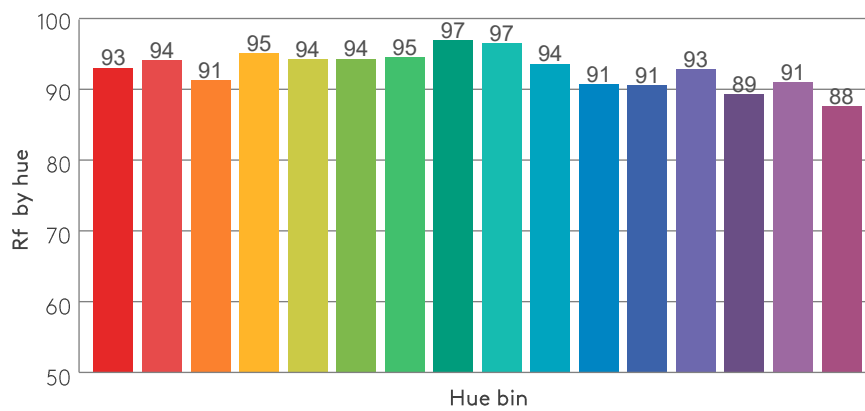
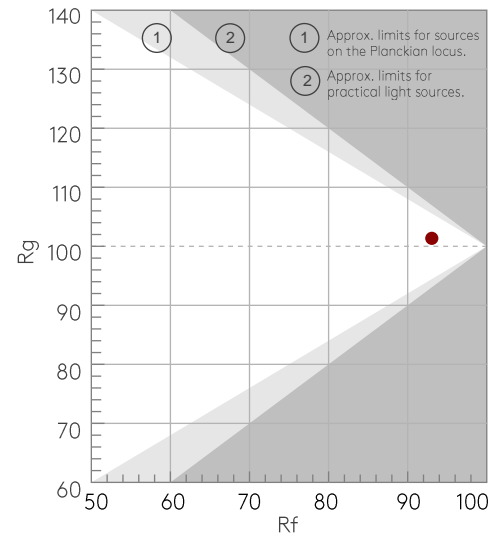
COLOR PARAMETERS

| 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 | Δuv |
| 3028 K | 95.0 | 67.4 | 93.0 | 101.4 | 92.3 | 0.433 | 0.398 | 0.250 | 0.346 | -0.0017 |

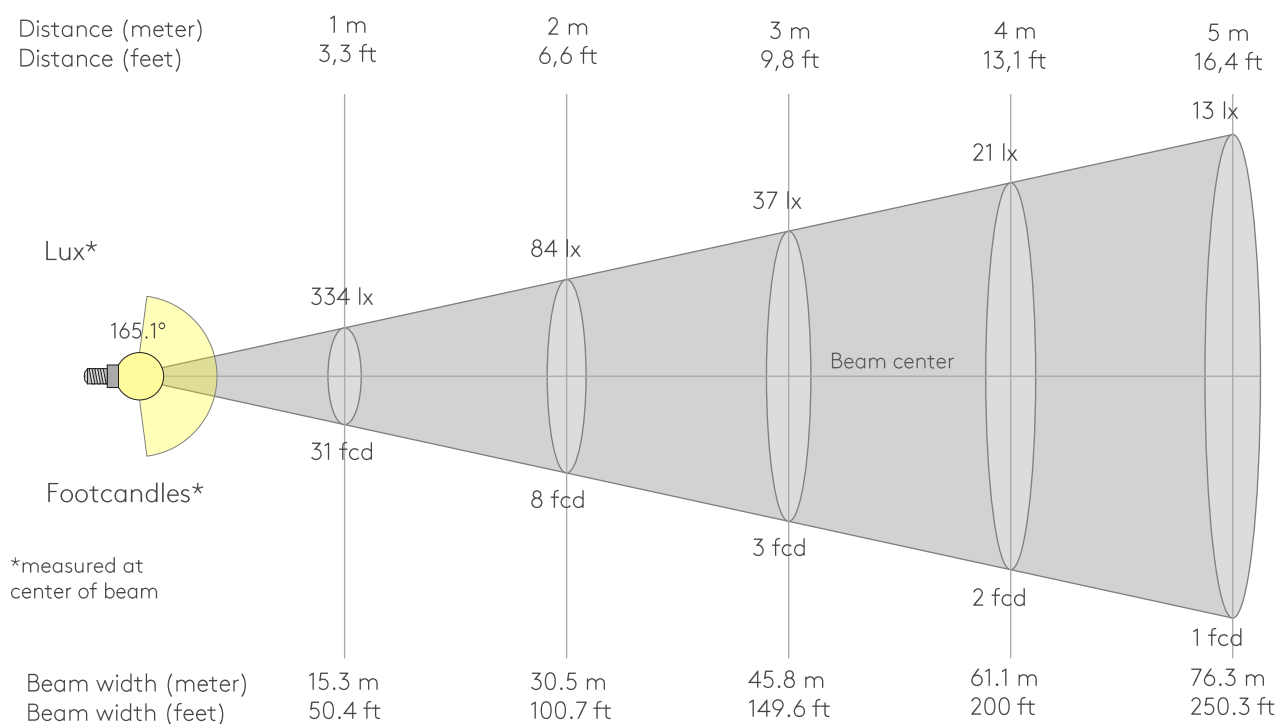
Rf 93.0
Fidelity index Rf

Rg 101.4
Gammut index Rg

| Hue Bin | R _f | Graphic shifts (%) | |
|---------|----------------|--------------------|------|
| | | Chroma | Hue |
| 1 | 93 | -4% | -1% |
| 2 | 94 | -2% | 2% |
| 3 | 91 | 0% | 4% |
| 4 | 95 | 1% | 3% |
| 5 | 94 | 0% | 2% |
| 6 | 94 | 4% | 0% |
| 7 | 95 | 0% | -2% |
| 8 | 97 | 1% | -2% |
| 9 | 97 | -1% | 1% |
| 10 | 94 | -1% | 3% |
| 11 | 91 | 1% | 6% |
| 12 | 91 | 5% | 1% |
| 13 | 93 | 3% | -4% |
| 14 | 89 | 5% | -7% |
| 15 | 91 | 0% | -6% |
| 16 | 88 | -1% | -10% |



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 |
| 334lx | 84lx | 37lx | 21lx | 13lx | 9lx | 7lx | 5lx | 4lx | 3lx | 3lx | 2lx | 2lx | 2lx | 1lx | 1lx | 1lx | 1lx | 1lx | 1lx |
| 31.1fcd | 7.8fcd | 3.5fcd | 1.9fcd | 1.2fcd | 0.9fcd | 0.6fcd | 0.5fcd | 0.4fcd | 0.3fcd | 0.3fcd | 0.2fcd | 0.2fcd | 0.2fcd | 0.1fcd | 0.1fcd | 0.1fcd | 0.1fcd | 0.1fcd | 0.1fcd |

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° |
|------|------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|------|------|------|------|------|------|------|
| 334 | 335 | 330 | 326 | 319 | 304 | 289 | 271 | 255 | 233 | 214 | 193 | 171 | 148 | 124 | 100 | 76 | 59 | 46 | 32 |
| 100% | 100% | 99% | 98% | 95% | 91% | 86% | 81% | 76% | 70% | 64% | 58% | 51% | 44% | 37% | 30% | 23% | 18% | 14% | 10% |

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° |
|------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|------|------|------|------|------|------|------|
| 334 | 330 | 316 | 294 | 265 | 228 | 182 | 129 | 78 | 44 | 30 | 35 | 35 | 33 | 32 | 32 | 33 | 34 | 35 | 36 |
| 100% | 99% | 95% | 88% | 79% | 68% | 54% | 39% | 23% | 13% | 9% | 10% | 10% | 10% | 10% | 10% | 10% | 10% | 10% | 11% |

Intensities in 180° c-plane

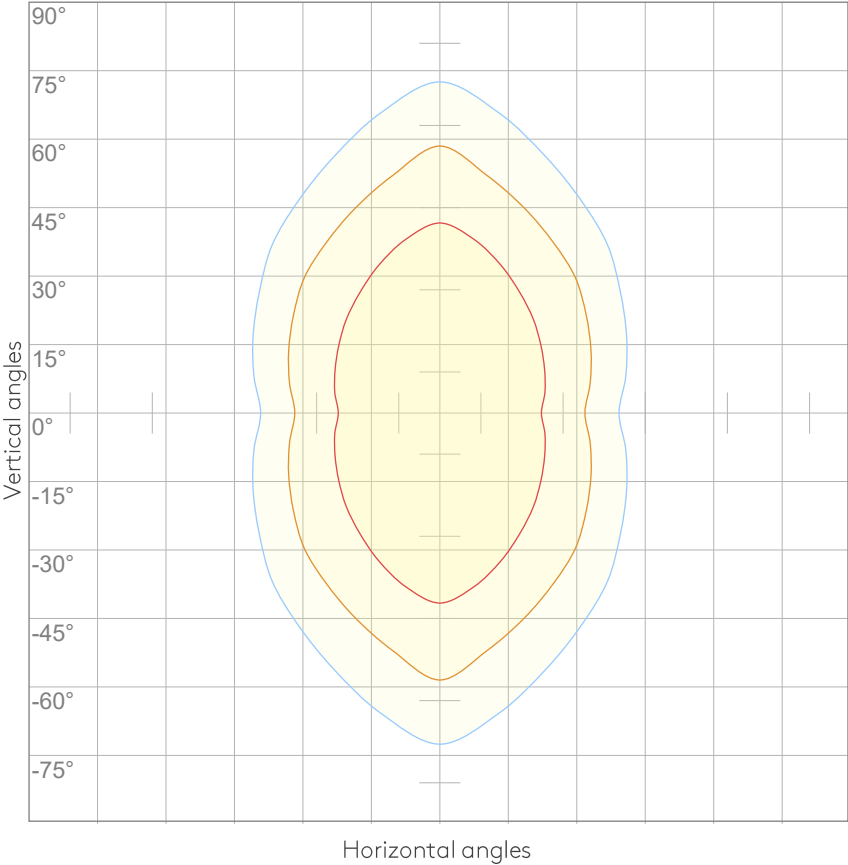
| 0° | 9° | 18° | 27° | 36° | 45° | 54° | 63° | 72° | 81° | 90° | 99° | 108° | 117° | 126° | 135° | 144° | 153° | 162° | 171° |
|------|------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|------|------|------|------|------|------|------|
| 334 | 335 | 330 | 326 | 319 | 304 | 289 | 271 | 255 | 233 | 214 | 193 | 171 | 148 | 124 | 100 | 76 | 59 | 46 | 32 |
| 100% | 100% | 99% | 98% | 95% | 91% | 86% | 81% | 76% | 70% | 64% | 58% | 51% | 44% | 37% | 30% | 23% | 18% | 14% | 10% |

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° |
|------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|------|------|------|------|------|------|------|
| 334 | 330 | 316 | 294 | 265 | 228 | 182 | 129 | 78 | 44 | 30 | 35 | 35 | 33 | 32 | 32 | 33 | 34 | 35 | 36 |
| 100% | 99% | 95% | 88% | 79% | 68% | 54% | 39% | 23% | 13% | 9% | 10% | 10% | 10% | 10% | 10% | 10% | 10% | 10% | 11% |

| Beam angle 50% | Field angle 10% | Cutoff angle 2,5% | Intensity ratio in 120° cone | Intensity ratio in 90° cone |
|----------------|-----------------|-------------------|------------------------------|-----------------------------|
| 165.1° | 344.1° | 360° | 44.5% | 28.3% |

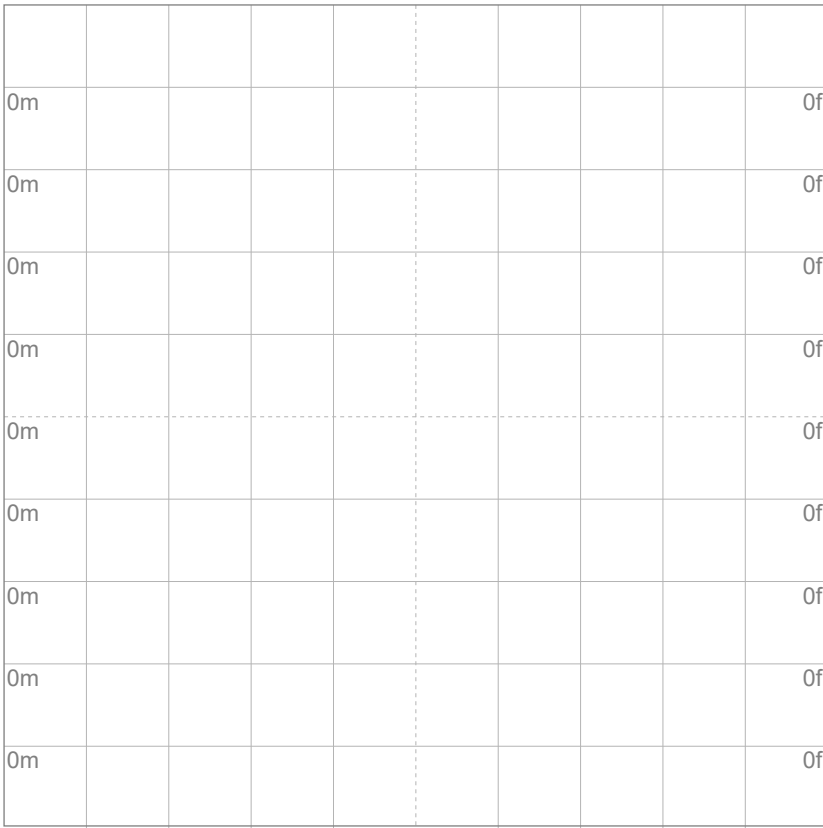
ISO CANDELA DIAGRAM



| | |
|-----|--------|
| 10% | 33 cd |
| 20% | 67 cd |
| 30% | 100 cd |
| 40% | 134 cd |
| 50% | 167 cd |
| 60% | 201 cd |
| 70% | 234 cd |
| 80% | 267 cd |
| 90% | 301 cd |

Conditions:
Number of c-planes: 8
Candela at center: 334 cd

ISO LUX DIAGRAM



| | |
|-----|----------------|
| 3% | 0.100 lx |
| 5% | 0.167 lx |
| 10% | 0.334 lx |
| 30% | 1.00 lx |
| 50% | {LUX_10M50} lx |

Conditions:
Number of c-planes: 8
Lux at center: 3.34 lx

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

Mounting height: 10 meters (33 feet)

UGR

GLARE EVALUATION ACCORDING TO UGR

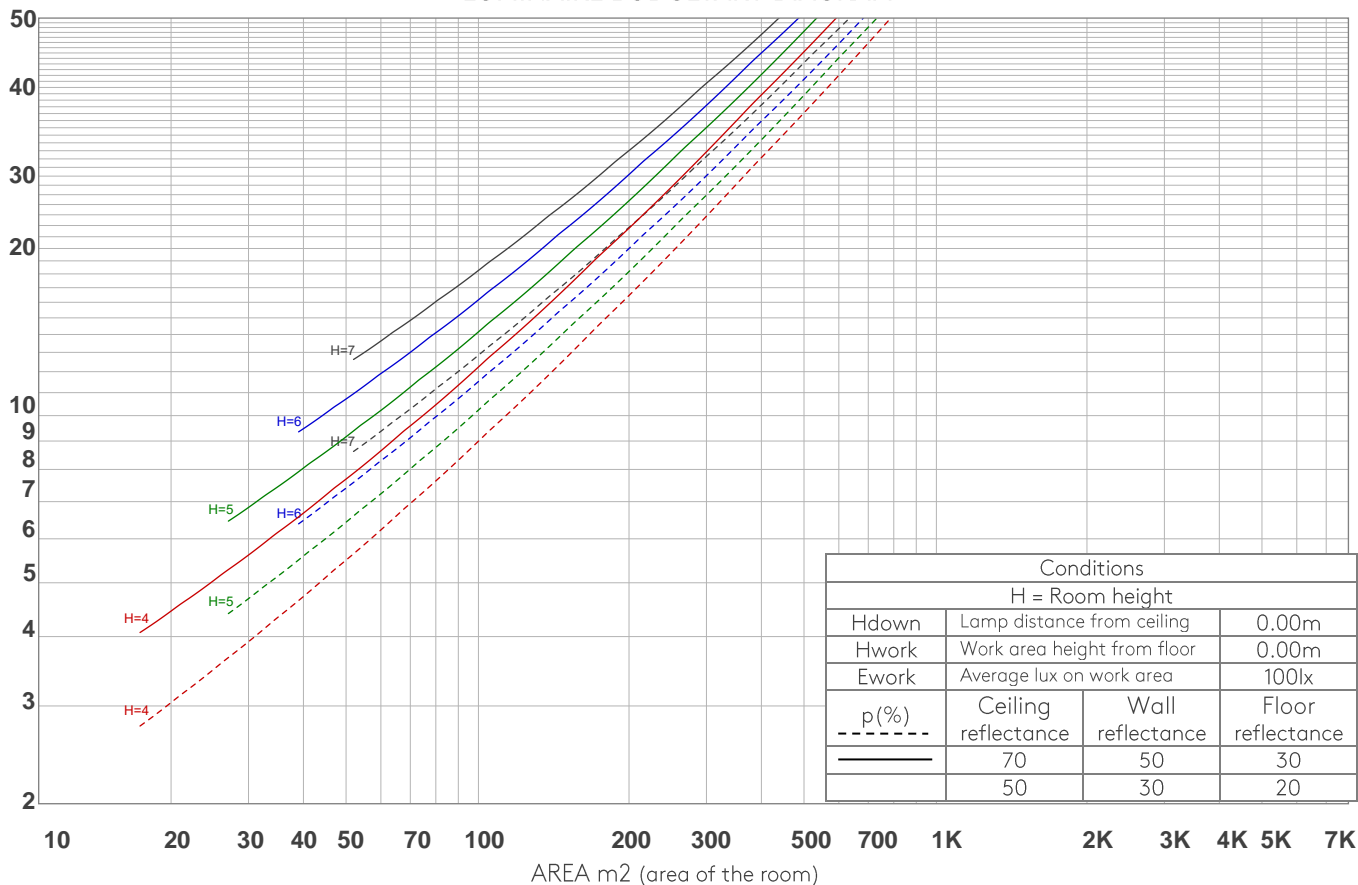
| | | | | | | | | | | | |
|--|-----|--|------|------|------|------|---|------|------|------|------|
| p Ceiling | | 70 | 70 | 50 | 50 | 30 | 70 | 70 | 50 | 50 | 30 |
| p Walls | | 50 | 30 | 50 | 30 | 30 | 50 | 30 | 50 | 30 | 30 |
| p Floor | | 20 | 20 | 20 | 20 | 20 | 20 | 20 | 20 | 20 | 20 |
| Room size X Y | | Viewing direction at right angles to lamp axis | | | | | Viewing direction parallel to lamp axis | | | | |
| 2H | 2H | 18.5 | 19.6 | 19.1 | 20.2 | 21.0 | 17.8 | 18.9 | 18.5 | 19.6 | 20.4 |
| | 3H | 20.7 | 21.8 | 21.5 | 22.5 | 23.3 | 19.3 | 20.4 | 20.1 | 21.1 | 21.9 |
| | 4H | 22.0 | 23.0 | 22.7 | 23.7 | 24.4 | 20.0 | 21.0 | 20.7 | 21.7 | 22.5 |
| | 6H | 23.2 | 24.1 | 23.9 | 24.8 | 25.6 | 20.6 | 21.5 | 21.3 | 22.2 | 23.1 |
| | 8H | 23.8 | 24.7 | 24.5 | 25.4 | 26.2 | 20.9 | 21.8 | 21.6 | 22.5 | 23.4 |
| | 12H | 24.3 | 25.3 | 25.1 | 26.0 | 26.8 | 21.2 | 22.2 | 21.9 | 22.8 | 23.7 |
| 4H | 2H | 19.1 | 20.1 | 19.8 | 20.8 | 21.6 | 18.6 | 19.6 | 19.4 | 20.3 | 21.1 |
| | 3H | 21.6 | 22.6 | 22.4 | 23.2 | 24.1 | 20.5 | 21.5 | 21.2 | 22.1 | 23.0 |
| | 4H | 22.9 | 24.0 | 23.7 | 24.5 | 25.5 | 21.3 | 22.4 | 22.0 | 22.9 | 23.8 |
| | 6H | 24.3 | 25.1 | 25.1 | 25.8 | 26.6 | 22.0 | 22.8 | 22.8 | 23.5 | 24.4 |
| | 8H | 25.0 | 25.6 | 25.8 | 26.4 | 27.3 | 22.4 | 23.1 | 23.2 | 23.9 | 24.7 |
| | 12H | 25.7 | 26.2 | 26.4 | 27.0 | 27.9 | 22.8 | 23.4 | 23.6 | 24.2 | 25.1 |
| 8H | 4H | 23.3 | 24.0 | 24.1 | 24.7 | 25.6 | 21.9 | 22.6 | 22.7 | 23.4 | 24.2 |
| | 6H | 24.9 | 25.4 | 25.7 | 26.3 | 27.2 | 23.0 | 23.5 | 23.8 | 24.4 | 25.3 |
| | 8H | 25.7 | 26.2 | 26.6 | 27.1 | 28.1 | 23.6 | 24.0 | 24.4 | 24.9 | 25.9 |
| | 12H | 26.6 | 27.0 | 27.5 | 27.9 | 28.8 | 24.1 | 24.5 | 25.0 | 25.4 | 26.3 |
| 12H | 4H | 23.3 | 23.9 | 24.1 | 24.7 | 25.6 | 22.1 | 22.6 | 22.9 | 23.4 | 24.3 |
| | 6H | 25.0 | 25.5 | 25.9 | 26.4 | 27.4 | 23.3 | 23.7 | 24.1 | 24.6 | 25.6 |
| | 8H | 25.9 | 26.3 | 26.8 | 27.2 | 28.2 | 23.9 | 24.4 | 24.8 | 25.2 | 26.2 |
| Variation of the observer position for the luminaire distance S | | | | | | | | | | | |
| S = 1.0H | | 0.1 / 0.0 | | | | | 0.1 / -0.1 | | | | |
| S = 1.5H | | 0.1 / -0.1 | | | | | 0.1 / -0.1 | | | | |
| S = 2.0H | | 0.2 / -0.2 | | | | | 0.2 / -0.3 | | | | |
| Standard table | | n/a | | | | | n/a | | | | |
| Correction summand | | n/a | | | | | n/a | | | | |
| Corrected glare indices referring to 1966 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 | 112 | 112 | 112 | 112 | 106 | 106 | 106 | 106 | 96 | 96 | 96 | 85 | 85 | 85 | 76 | 76 | 76 | 72 |
| 1 | 99 | 93 | 87 | 83 | 93 | 88 | 83 | 79 | 78 | 74 | 71 | 70 | 67 | 64 | 62 | 59 | 57 | 53 |
| 2 | 89 | 79 | 71 | 65 | 83 | 75 | 68 | 62 | 67 | 61 | 56 | 59 | 55 | 51 | 52 | 49 | 45 | 42 |
| 3 | 80 | 69 | 60 | 52 | 75 | 65 | 57 | 50 | 58 | 51 | 46 | 51 | 46 | 41 | 45 | 41 | 37 | 34 |
| 4 | 73 | 60 | 51 | 43 | 68 | 57 | 48 | 42 | 51 | 44 | 38 | 45 | 39 | 35 | 40 | 35 | 31 | 28 |
| 5 | 67 | 53 | 44 | 37 | 63 | 50 | 42 | 35 | 45 | 38 | 32 | 40 | 34 | 29 | 36 | 31 | 27 | 24 |
| 6 | 61 | 48 | 38 | 32 | 58 | 45 | 37 | 30 | 40 | 33 | 28 | 36 | 30 | 25 | 32 | 27 | 23 | 20 |
| 7 | 57 | 43 | 34 | 28 | 53 | 41 | 32 | 26 | 37 | 29 | 24 | 33 | 27 | 22 | 29 | 24 | 20 | 18 |
| 8 | 53 | 39 | 30 | 24 | 49 | 37 | 29 | 23 | 33 | 26 | 21 | 30 | 24 | 20 | 27 | 22 | 18 | 16 |
| 9 | 49 | 35 | 27 | 21 | 46 | 34 | 26 | 21 | 30 | 24 | 19 | 27 | 22 | 18 | 25 | 20 | 16 | 14 |
| 10 | 46 | 32 | 25 | 19 | 43 | 31 | 24 | 19 | 28 | 22 | 17 | 25 | 20 | 16 | 23 | 18 | 15 | 13 |

LAMPS (number of lamps)

LUMINAIRE BUDGETARY DIAGRAM



ZONAL LUMEN SUMMARY

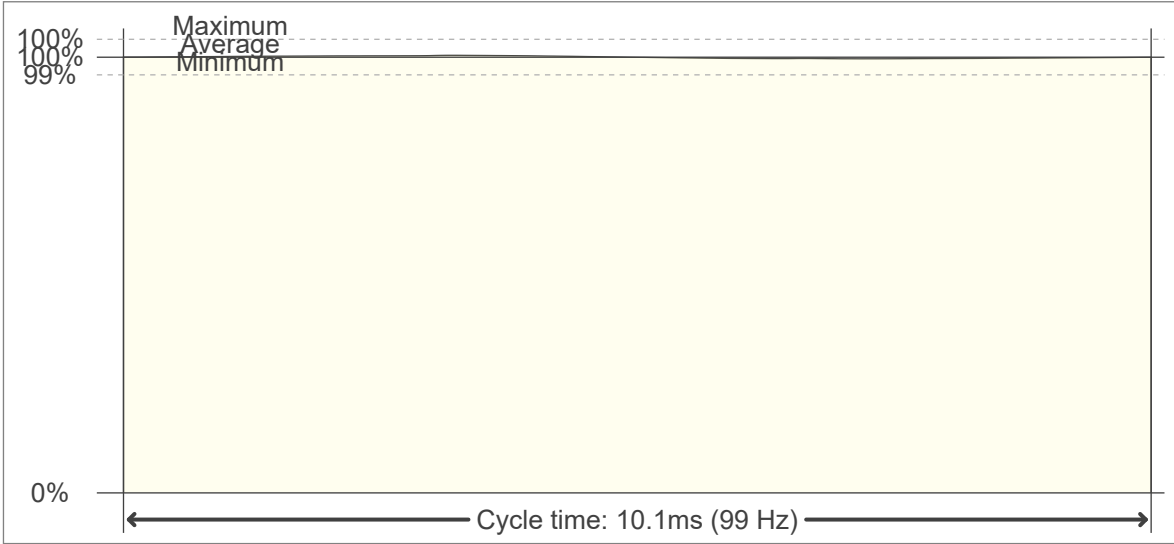
| 0°-10° | 10°-20° | 20°-30° | 30°-40° | 40°-50° | 50°-60° | 60°-70° | 70°-80° | 80°-90° |
|----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|
| 31.8 lm | 92.4 lm | 145 lm | 185 lm | 208 lm | 212 lm | 201 lm | 180 lm | 159 lm |
| 90°-100° | 100°-110° | 110°-120° | 120°-130° | 130°-140° | 140°-150° | 150°-160° | 160°-170° | 170°-180° |
| 141 lm | 122 lm | 98.0 lm | 72.7 lm | 50.7 lm | 33.1 lm | 20.8 lm | 10.6 lm | 3.10 lm |

FLICKER

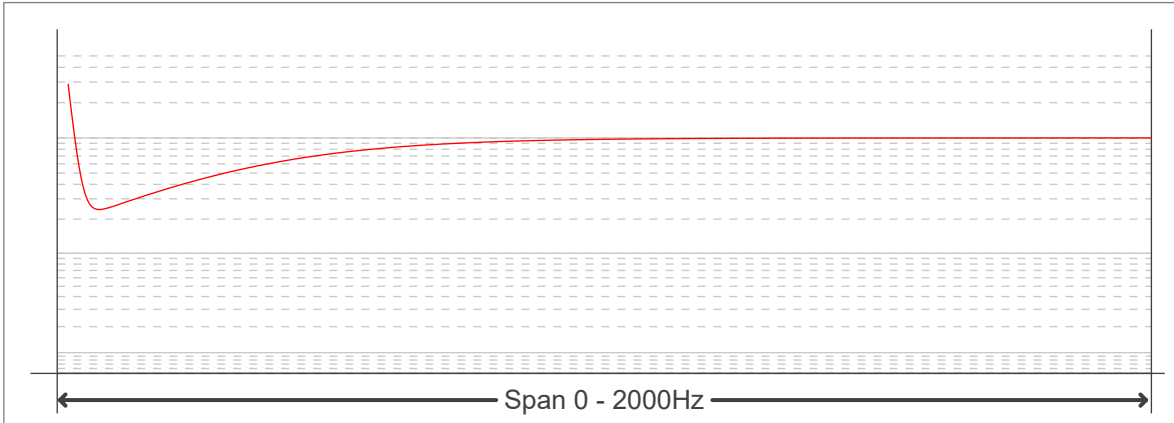
FLICKER CURVE (COMPLETE SAMPLED)



FLICKER FRAME (FRAME OF ONE FLICKER)



FLICKER FFT (FREQUENCY SCOPE OF FLICKER)



FLICKER RESULTS:

| | |
|-----------------------|----------|
| Flicker frequency: | 99.01 Hz |
| Flicker index: | 0 |
| Flicker percentage: | 0.44 % |
| SVM: (Visual flicker) | 0.01 |

FLICKER CONDITIONS:

| | |
|--------------|----------------------|
| Sample rate: | 20000 samples/second |
|--------------|----------------------|