
# Proteus Lucius

## Photometric Test Report

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# C O N T E N T S

# Testing Process

### Total Lumen Measurements

Lumens are measured using a Viso Systems Lab Spion and a 2π Integrating Sphere. As a goniophotometer, the Viso calculates the field lumens of the fixture by taking multiple measurements across the light beam. The measured lumens of the 2π Integrating Sphere tends to be higher than the Viso goniophotometer due to a variety of differences in measurement principles. Therefore, sometimes both values are provided in the report.

Many lumens figures provided for entertainment lighting fixtures are only the 2π sphere values, some even emphasize the LED engine lumens. All Elation product photometric data is the actual light output from the fixture lens, never a theoretical value based on calculation or using the source lumens as the fixtures output. We advise to always compare total fixture lumens acquired with identical measurement systems when comparing lighting fixtures.

### Test Lab Equipment and Process

Elation operates an optical testing laboratory at its Los Angeles, CA headquarters to provide accurate photometric data for its lighting products. The testing lab is both light and climate- controlled and contains a variety of precise lighting measurement systems. Fixtures are analyzed with the sophisticated Viso Systems Lab Spion equipment, which measures all light and color parameters by panning the light beam at a precise speed and from different angles through a calibrated, laser aligned light and color sensor. Test data is collected and summarized by the Viso Light Inspector software. This type of measurement system is referred to as a Goniophotometer.

The Viso software calculates all relevant types of measurements, from beam angles, candela to center light intensity at a variety of distances to the latest color quality measurements like TM30 or CQS as well as accurate color temperature. This wealth of data is then processed by an Elation specific template which is included in the photometric test report for various fixture conditions such as zoom angles and color correction filters.

The Viso software also creates IES (Illuminating Engineering Society) files for each test report. IES is an industry standard file format created for the easy electronic transfer of photometric test data, which is widely used by lighting manufacturers for photometric data distribution.

Fixtures are also analyzed using an 2π Integrating Sphere. This technique takes the output of the fixture and measures the amount of light inside a sealed perfect sphere. Due to the size of most fixtures they shine into an opening on the side of the sphere. A sensor is mounted behind a glare shield to avoid direct light input and a very short measurement is taken to gather the total lumens within the sphere. Due to different measurement principles, distortion and measurement uncertainties, there is a difference in these results.

Additionally, fixtures are periodically rechecked for accuracy using various hand-held light meters including one or more of the devices listed below. This is done to ensure the test data contained in this report is as accurate as possible.

Asenstek Lighting Passport | Konica Minolta T-10 | Sekonic C700T

# Photometric Report

## Total Lumen Output*

**VISO Lab Spion** **21699 lm**

| Beam Angle 50% | Field Angle 10% | Cutoff Angle 2.5% |
|---|---|---|
| 6° | 7.6° | 7.9° |

**Color Temperature: 6561 K**

**CRI: 71.2**

**TLCI: 47**

**TM30: 71.3**

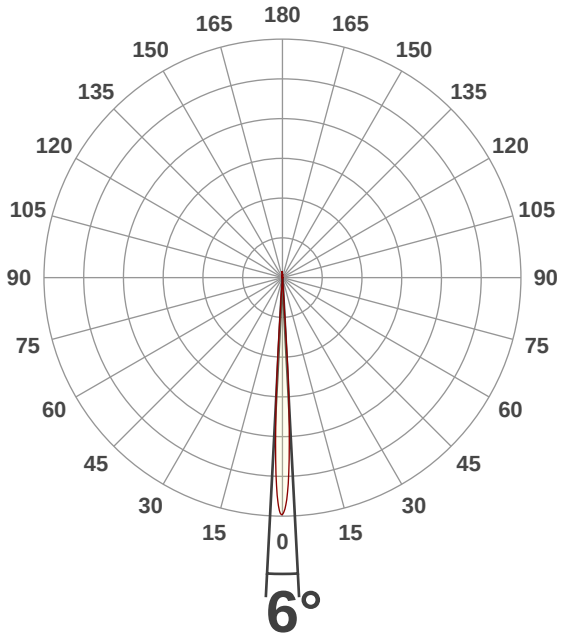
**CQS: 68.3**

**Voltage: 116 V, Current: 7.79 A**

**Power: 904 W**

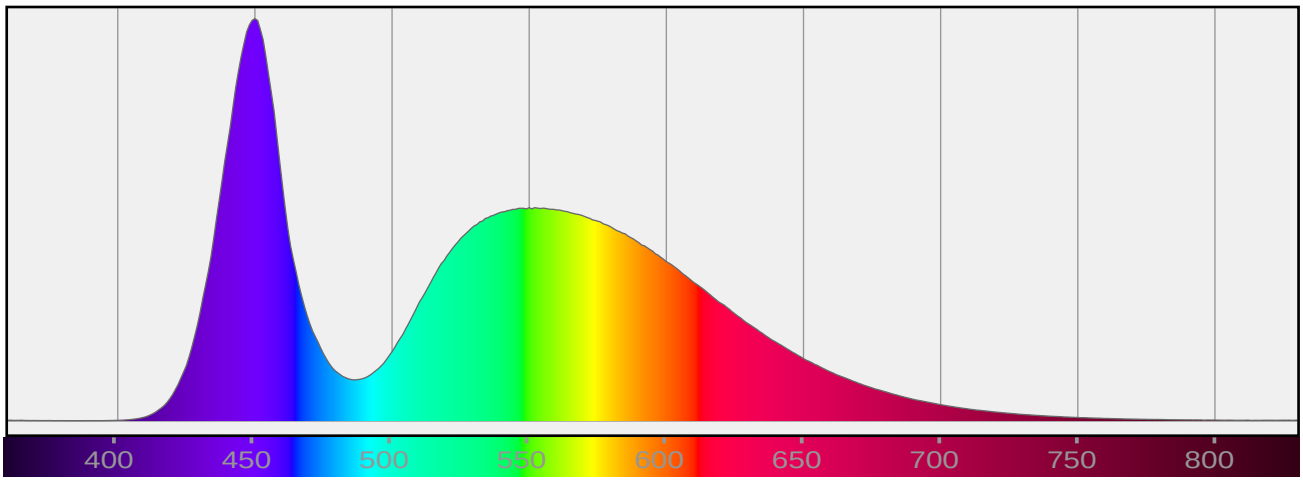
**Efficacy: 24 Lumen/Watt**

**Measurement Date: 6/11/2020**




**Spectral Distribution**

Dominant Wavelength 360 nm

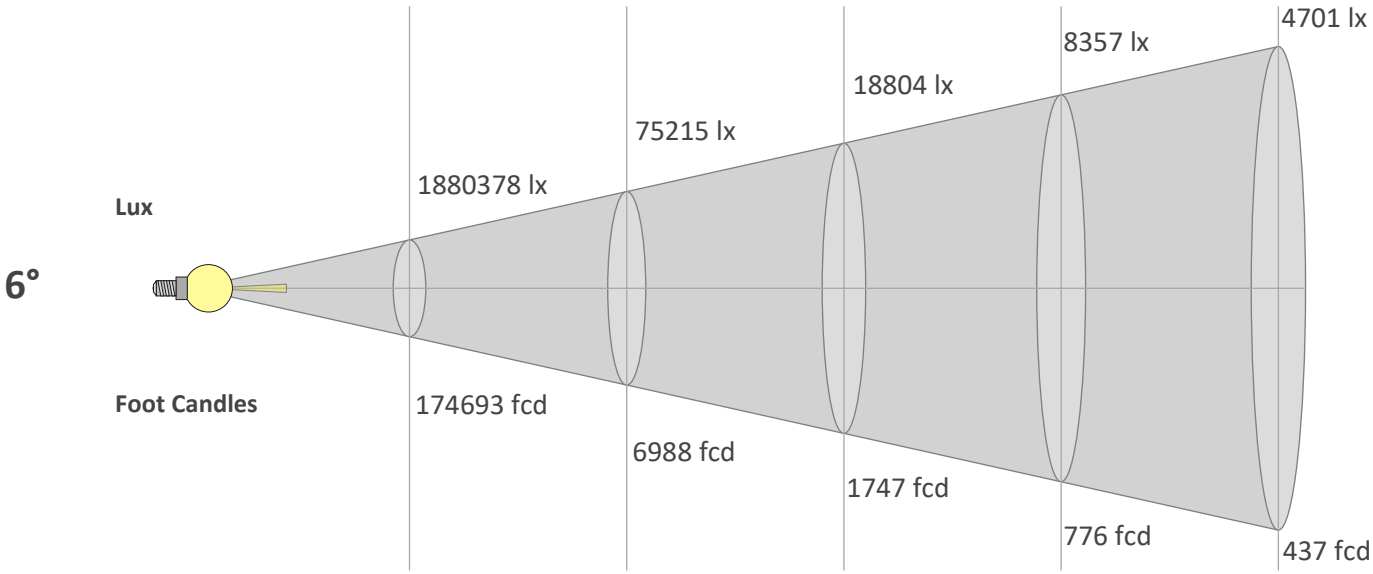



*Total Lumen measurements by calibrated Everfine 2π Integrating Sphere and Viso Systems Lab Spion

## Beam Details

| Beam Angle 50% | Field Angle 10% | Cutoff Angle 2,5% |
|---|---|---|
| 6° | 7.6° | 7.9° |

| Distance (m) | 1 | 5 | 10 | 15 | 20 |
|---|---|---|---|---|---|
| Distance (ft) | 3.3 | 16.4 | 32.8 | 49.2 | 65.6 |

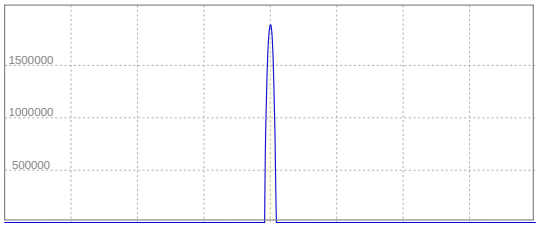



| Beam Width (m) | 0.1 | 0.5 | 1 | 1.6 | 2.1 |
|---|---|---|---|---|---|
| Beam Width (ft) | 0.3 | 1.7 | 3.4 | 5.1 | 6.8 |

**Beam Intensities from 1-20m**

| M | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| FT | 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 |
| LX | 1880378 | 470095 | 208931 | 117524 | 75215 | 52233 | 38375 | 29381 | 23215 | 18804 | 15540 | 13058 | 11126 | 9594 | 8357 | 7345 | 6506 | 5804 | 5209 | 4701 |
| FC | 174692.9 | 43673.2 | 19410.3 | 10918.3 | 6987.7 | 4852.6 | 3565.2 | 2729.6 | 2156.7 | 1746.9 | 1443.7 | 1213.1 | 1033.7 | 891.3 | 776.4 | 682.4 | 604.5 | 539.2 | 483.9 | 436.7 |

**Linear Distribution**




**Peak Candela**

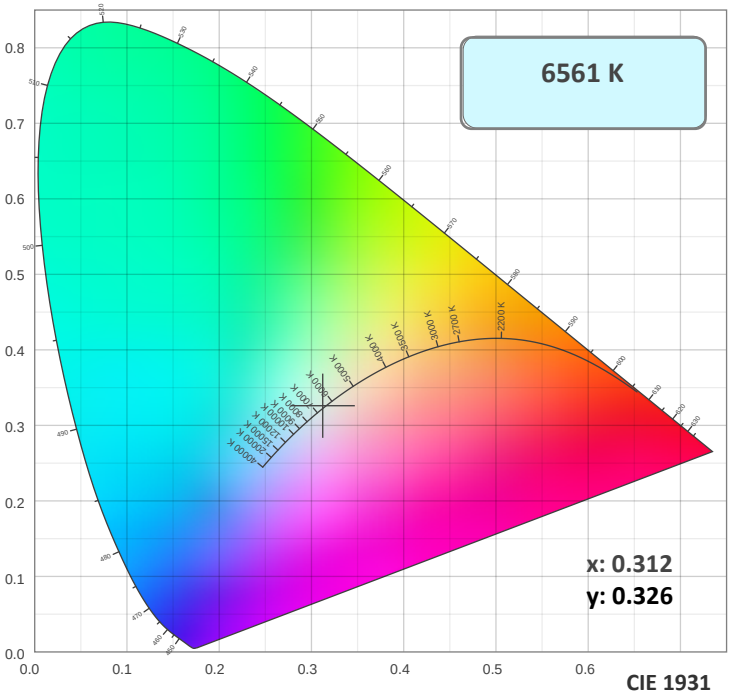
**1886675 cd**

**Calculate Center Beam Intensities**

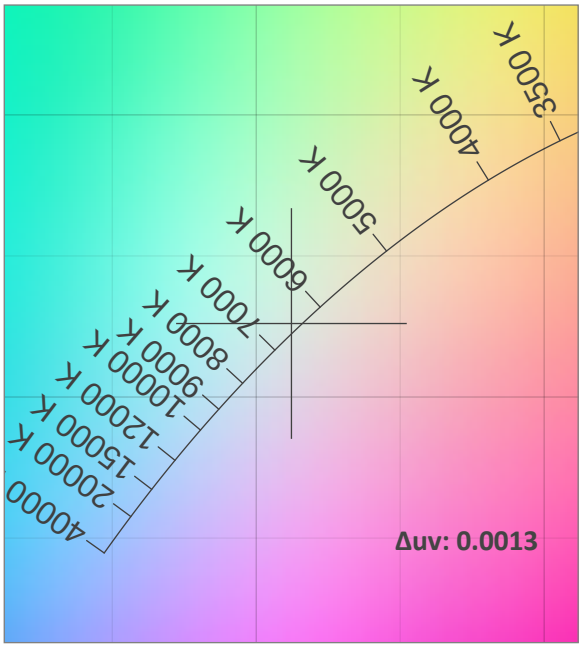
**lux = 1886675 / distance(m)²**

**fc = 1886675 / distance(ft)²**

## Color Details

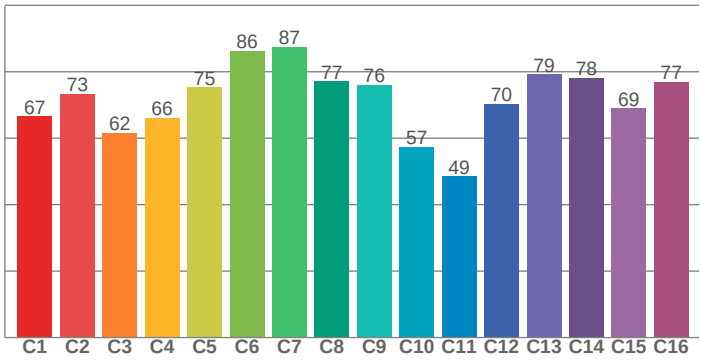



CIE 1931

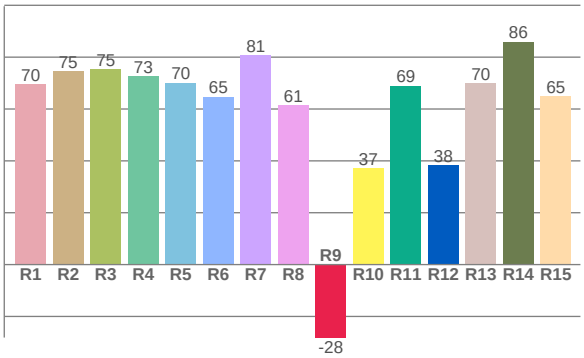



CIE 1931 ZOOM

### TM30: 71.3




### CRI: 71.2 (R1-R8)



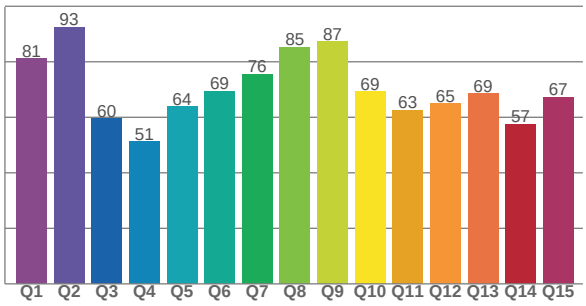

CRI R values, only R1-R8 are used to calculate final CRI value

| R1 | R2 | R3 | R4 | R5 | R6 | R7 | R8 | R9 | R10 | R11 | R12 | R13 | R14 | R15 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 69.5 | 74.7 | 75.3 | 72.7 | 70.2 | 64.7 | 80.8 | 61.4 | -28.1 | 37.1 | 69.0 | 38.4 | 70.0 | 85.9 | 65.0 |

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 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 66.6 | 73.3 | 61.6 | 66.2 | 75.3 | 86.3 | 87.5 | 77.1 | 76.0 | 57.5 | 48.5 | 70.3 | 79.3 | 78.2 | 68.9 | 77.0 |

### CQS: 68.3




CQS Q Values

| Q1 | Q2 | Q3 | Q4 | Q5 | Q6 | Q7 | Q8 | Q9 | Q10 | Q11 | Q12 | Q13 | Q14 | Q15 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 81.1 | 92.5 | 59.6 | 51.2 | 63.9 | 69.4 | 75.6 | 85.3 | 87.3 | 69.3 | 62.6 | 64.9 | 68.6 | 57.5 | 67.2 |

### 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 Diviation from Black |
|---|---|---|---|---|---|---|---|---|---|---|
| CCT | CRI | CRI R9 | TM30 Rf | TM30 Rg | CQS | x | y | u | v | Δuv |
| 6561 K | 71.2 | -28.1 | 71.3 | 92.6 | 68.3 | 0.312 | 0.326 | 0.199 | 0.311 | 0.0013 |

## TM30 Details

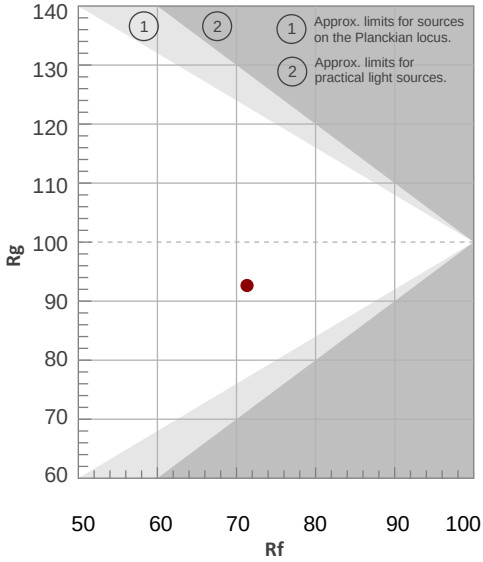
**Rf 71.3**

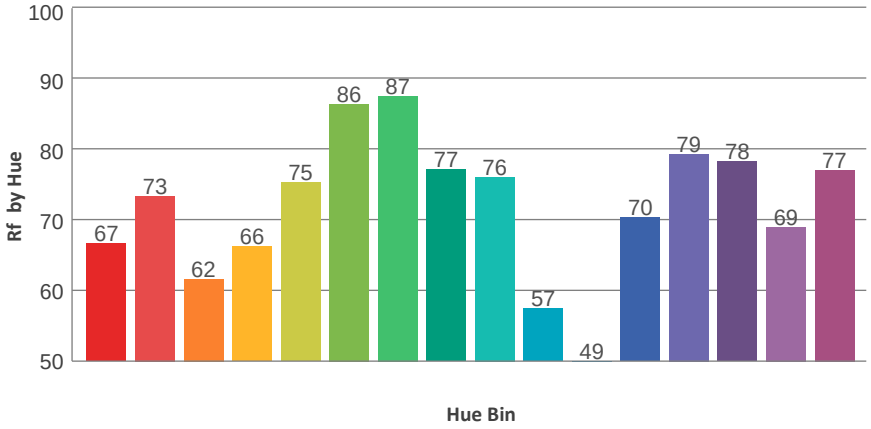
Fidelity Index Rf

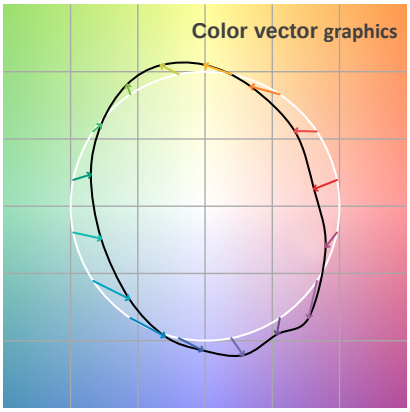
**Rg 92.6**

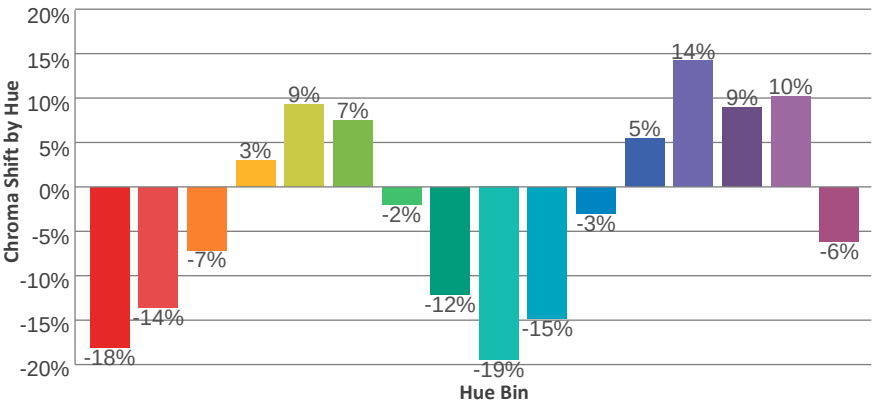
Gamut Index Rg

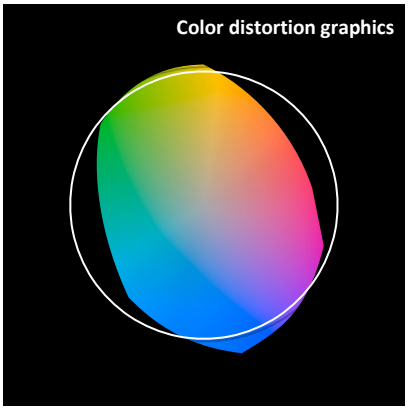
| | | Graphic shifts (%) | |
|---|---|---|---|
| Hue Bin | $R_f$ | Chroma | Hue |
| 1 | 67 | -18% | -3% |
| 2 | 73 | -14% | 9% |
| 3 | 62 | -7% | 21% |
| 4 | 66 | 3% | 21% |
| 5 | 75 | 9% | 12% |
| 6 | 86 | 7% | -2% |
| 7 | 87 | -2% | -8% |
| 8 | 77 | -12% | -7% |
| 9 | 76 | -19% | 9% |
| 10 | 57 | -15% | 26% |
| 11 | 49 | -3% | 29% |
| 12 | 70 | 5% | 19% |
| 13 | 79 | 14% | 6% |
| 14 | 78 | 9% | -9% |
| 15 | 69 | 10% | -26% |
| 16 | 77 | -6% | -12% |

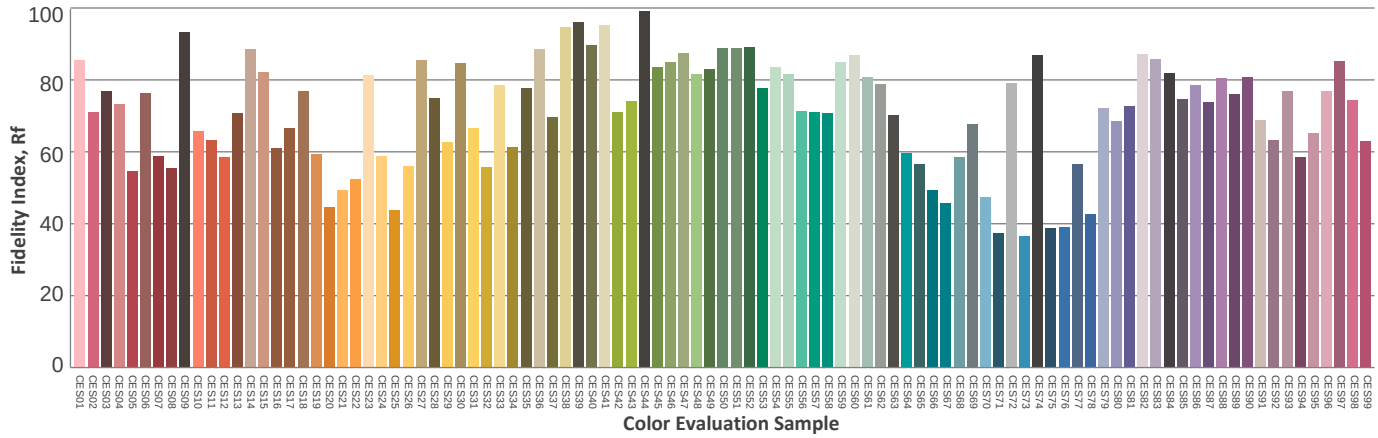


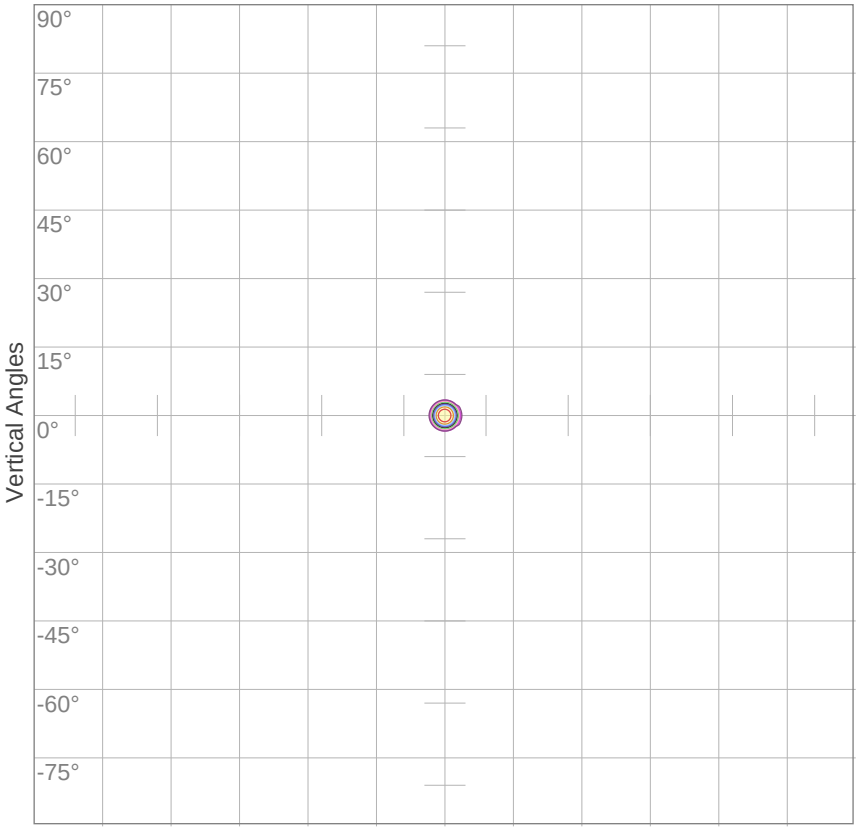



# ISO Diagrams

## ISO Candela Diagram



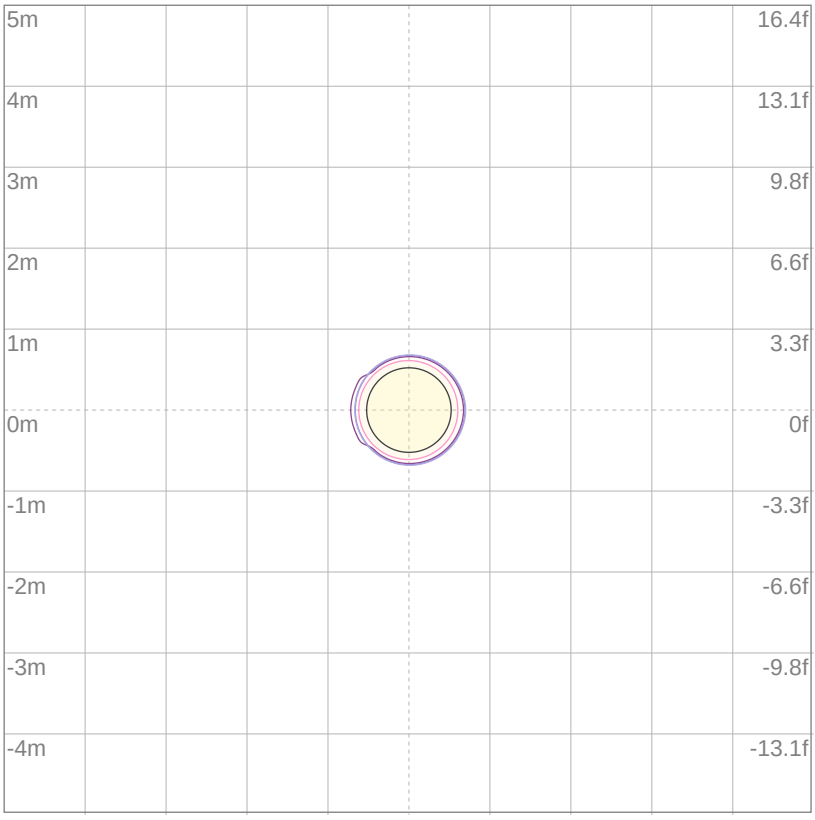

| | |
|---|---|
| 10% | 188038 cd |
| 20% | 376076 cd |
| 30% | 564114 cd |
| 40% | 752151 cd |
| 50% | 940189 cd |
| 60% | 1128227 cd |
| 70% | 1316265 cd |
| 80% | 1504303 cd |
| 90% | 1692341 cd |

Conditions:

Number of c-planes: 2

Candela at center: 1880378 cd

## ISO Lux Diagram




Mounting Height: 10 meters (33 feet)

| | |
|---|---|
| 3% | 564 lx |
| 5% | 940 lx |
| 10% | 1880 lx |
| 30% | 5641 lx |
| 50% | 9402 lx |

Conditions:

Number of c-planes: 2

Lux at center: 18.8K lx

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

# Photometric Report

## Total Lumen Output*

**VISO Lab Spion** **33514 lm**

| Beam Angle 50% | Field Angle 10% | Cutoff Angle 2.5% |
|---|---|---|
| 13.2° | 18.1° | 19.5° |

**Color Temperature: 6611 K**

**CRI: 70.8**

**TLCI: 46**

**TM30: 70.8**

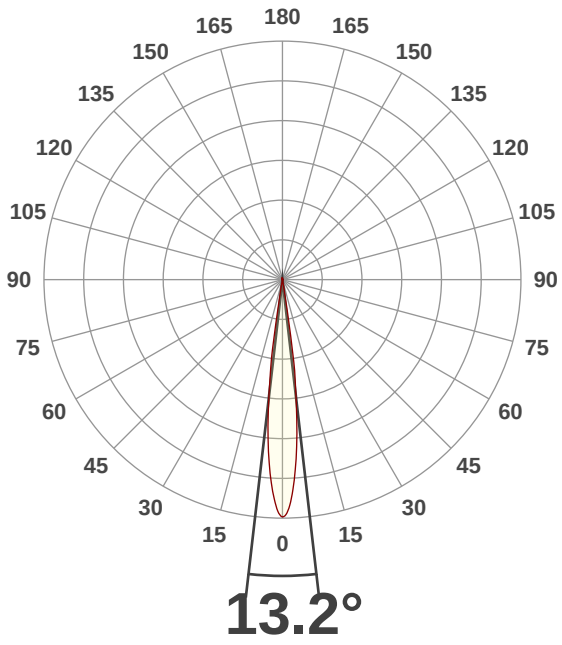
**CQS: 67.9**

**Voltage: 116 V, Current: 7.85 A**

**Power: 910 W**

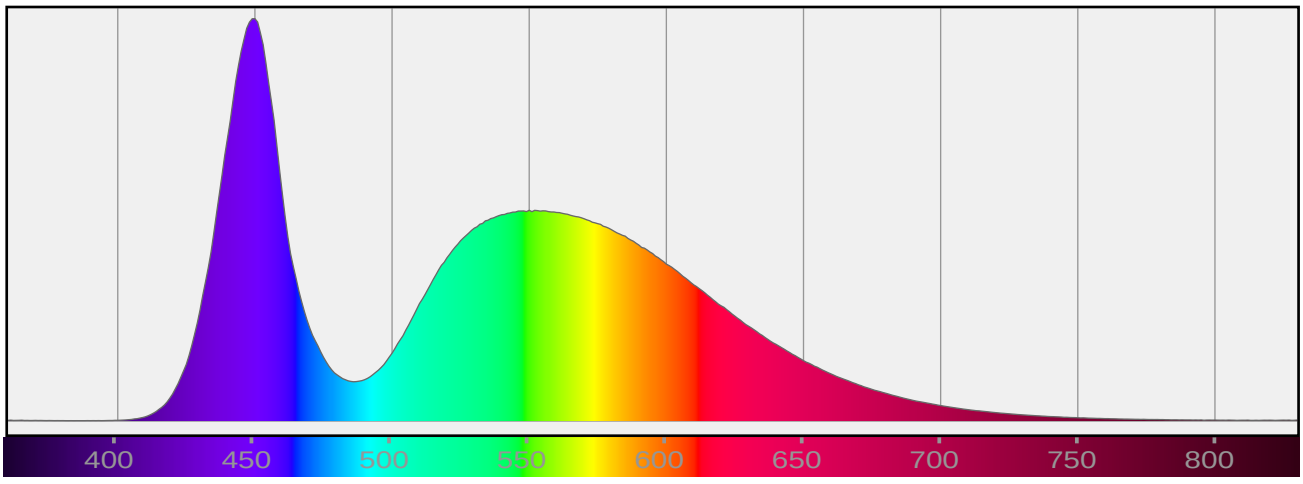
**Efficacy: 37 Lumen/Watt**

**Measurement Date: 6/11/2020**




**Spectral Distribution**

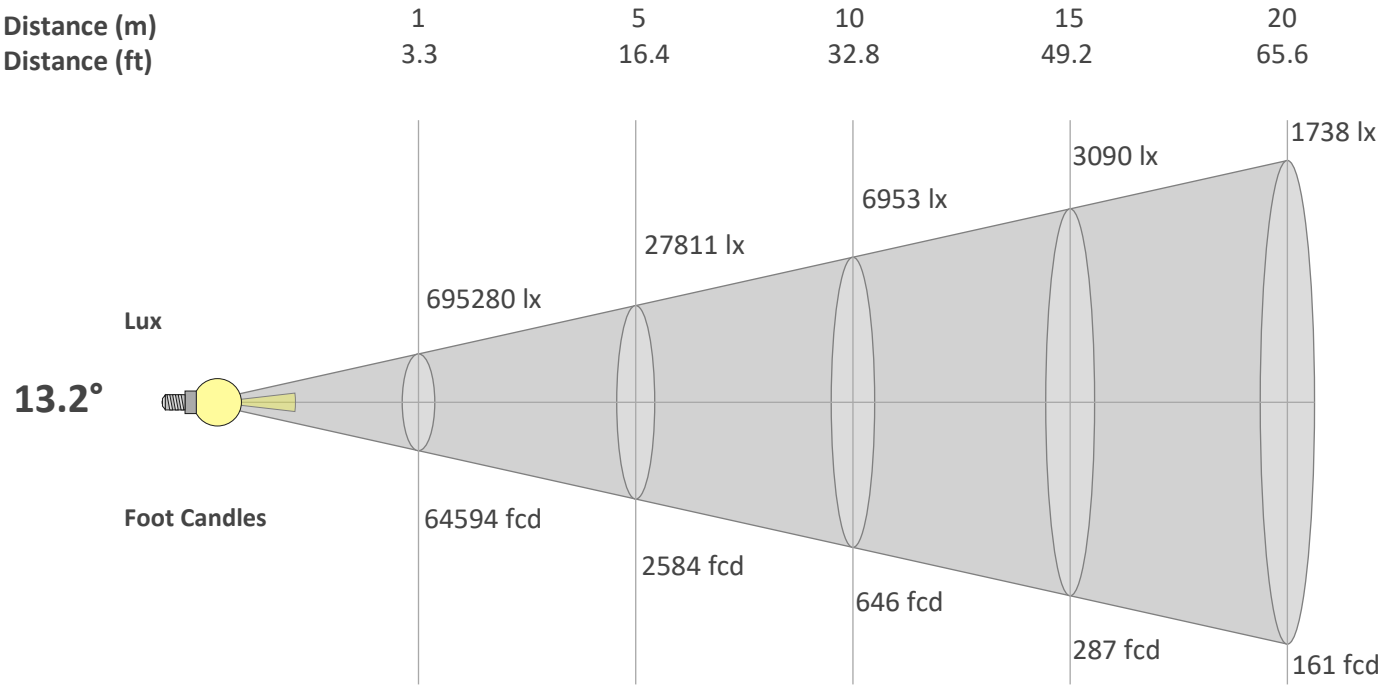
Dominant Wavelength 360 nm




*Total Lumen measurements by calibrated Everfine 2π Integrating Sphere and Viso Systems Lab Spion

## Beam Details

| Beam Angle 50% | Field Angle 10% | Cutoff Angle 2,5% |
|---|---|---|
| **13.2°** | **18.1°** | **19.5°** |




**Beam Intensities from 1-20m**

| M | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| FT | 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 |
| LX | 695280 | 173820 | 77253 | 43455 | 27811 | 19313 | 14189 | 10864 | 8584 | 6953 | 5746 | 4828 | 4114 | 3547 | 3090 | 2716 | 2406 | 2146 | 1926 | 1738 |
| FC | 64593.6 | 16148.4 | 7177.1 | 4037.1 | 2583.7 | 1794.3 | 1318.2 | 1009.3 | 797.5 | 645.9 | 533.8 | 448.6 | 382.2 | 329.6 | 287.1 | 252.3 | 223.5 | 199.4 | 178.9 | 161.5 |

**Linear Distribution**


**Peak Candela**

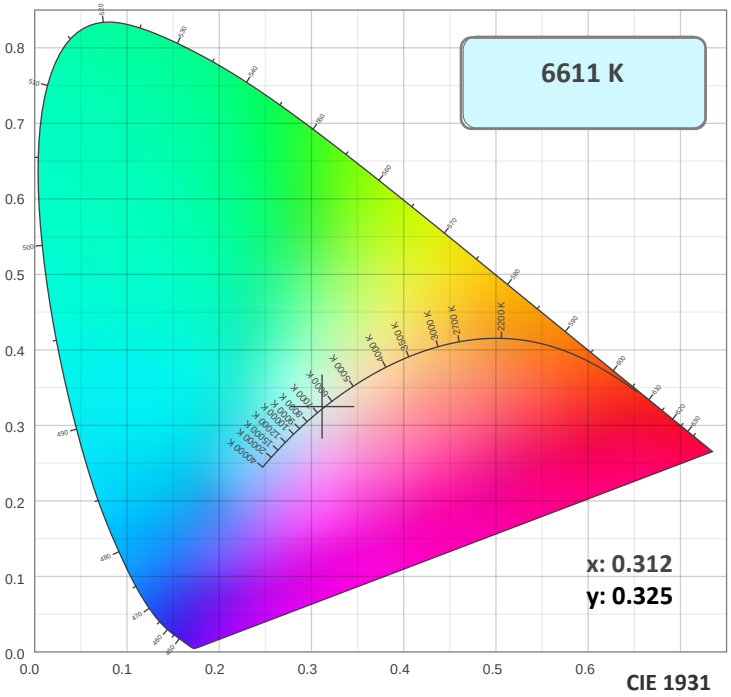
**696163 cd**

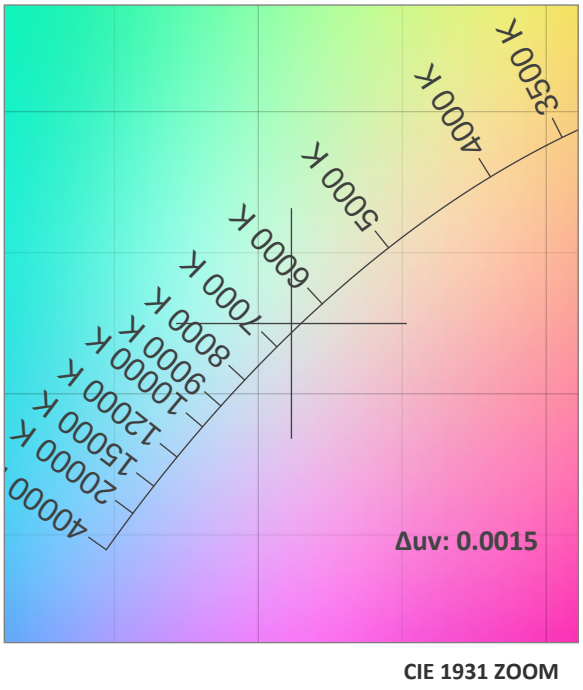
**Calculate Center Beam Intensities**

**lux = 696163 / distance(m)²**

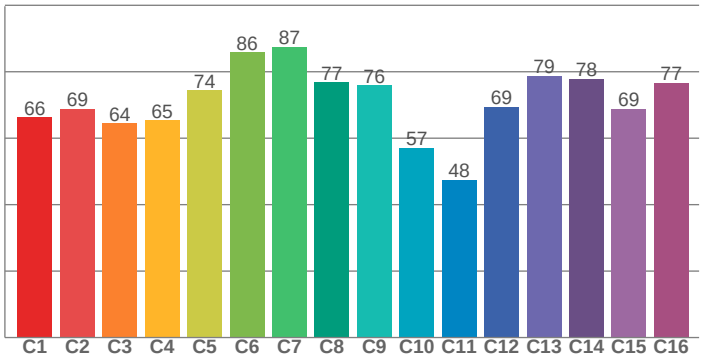
**fc = 696163 / distance(ft)²**

## Color Details

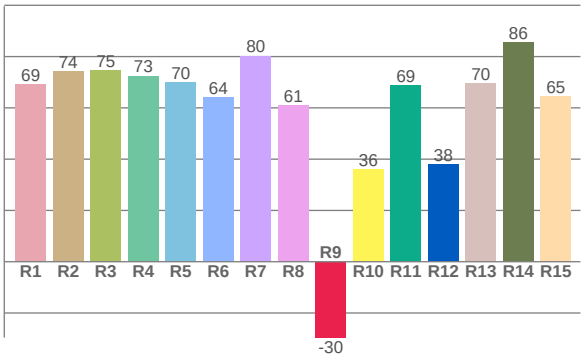



### TM30: 70.8




### CRI: 70.8 (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 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 69.2 | 74.2 | 74.7 | 72.5 | 70.0 | 64.2 | 80.3 | 61.1 | -29.6 | 36.0 | 68.9 | 38.1 | 69.6 | 85.6 | 64.6 |

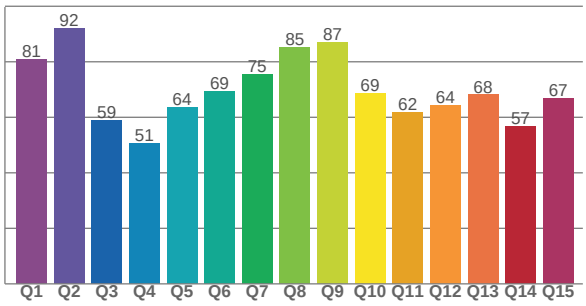
TM30 C Values, 16 binned values out of total of 99 C values

| C1 | C2 | C3 | C4 | C5 | C6 | C7 | C8 | C9 | C10 | C11 | C12 | C13 | C14 | C15 | C16 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 66.3 | 68.9 | 64.4 | 65.3 | 74.4 | 85.8 | 87.4 | 76.8 | 75.9 | 57.1 | 47.5 | 69.4 | 78.8 | 77.9 | 68.9 | 76.7 |

CQS Q Values

| Q1 | Q2 | Q3 | Q4 | Q5 | Q6 | Q7 | Q8 | Q9 | Q10 | Q11 | Q12 | Q13 | Q14 | Q15 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 80.9 | 92.2 | 59.1 | 50.7 | 63.7 | 69.3 | 75.5 | 85.3 | 87.0 | 68.7 | 61.9 | 64.3 | 68.1 | 56.9 | 66.9 |

### CQS: 67.9




### 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 |
|---|---|---|---|---|---|---|---|---|---|---|
| CCT | CRI | CRI R9 | TM30 Rf | TM30 Rg | CQS | x | y | u | v | Δuv |
| 6611 K | 70.8 | -29.6 | 70.8 | 92.7 | 67.9 | 0.312 | 0.325 | 0.199 | 0.311 | 0.0015 |

## TM30 Details

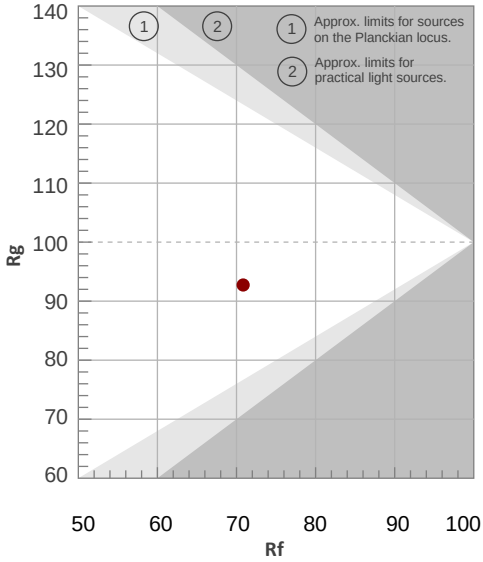
**Rf 70.8**

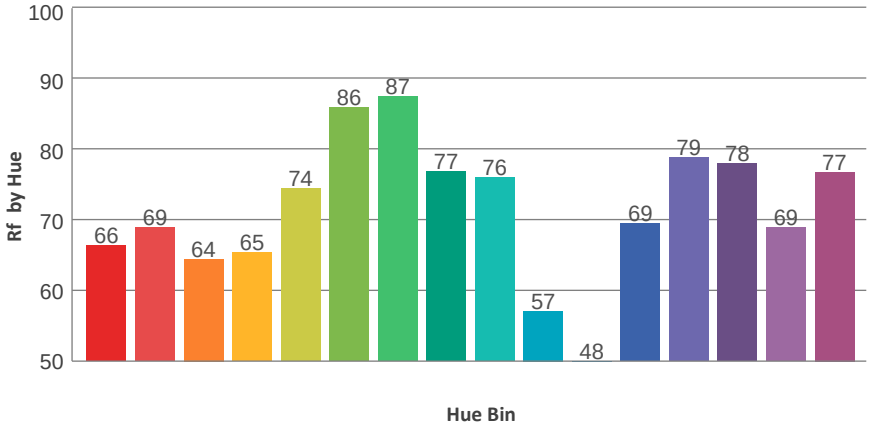
Fidelity Index Rf

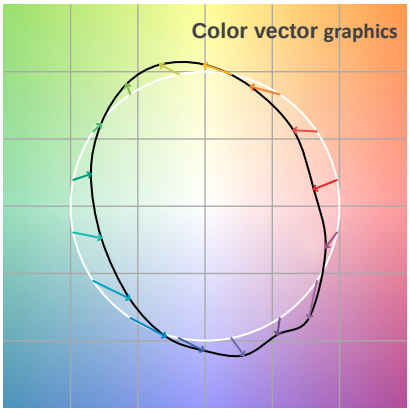
**Rg 92.7**

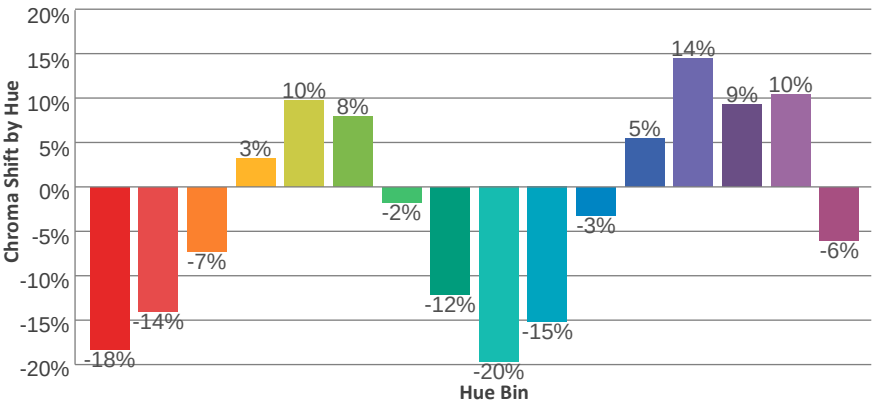
Gamut Index Rg

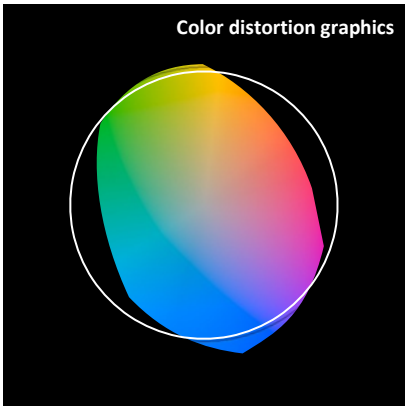
| | | Graphic shifts (%) | |
|---|---|---|---|
| Hue Bin | $R_f$ | Chroma | Hue |
| 1 | 66 | -18% | -3% |
| 2 | 69 | -14% | 10% |
| 3 | 64 | -7% | 21% |
| 4 | 65 | 3% | 21% |
| 5 | 74 | 10% | 12% |
| 6 | 86 | 8% | -2% |
| 7 | 87 | -2% | -8% |
| 8 | 77 | -12% | -7% |
| 9 | 76 | -20% | 8% |
| 10 | 57 | -15% | 26% |
| 11 | 48 | -3% | 30% |
| 12 | 69 | 5% | 20% |
| 13 | 79 | 14% | 7% |
| 14 | 78 | 9% | -8% |
| 15 | 69 | 10% | -26% |
| 16 | 77 | -6% | -13% |

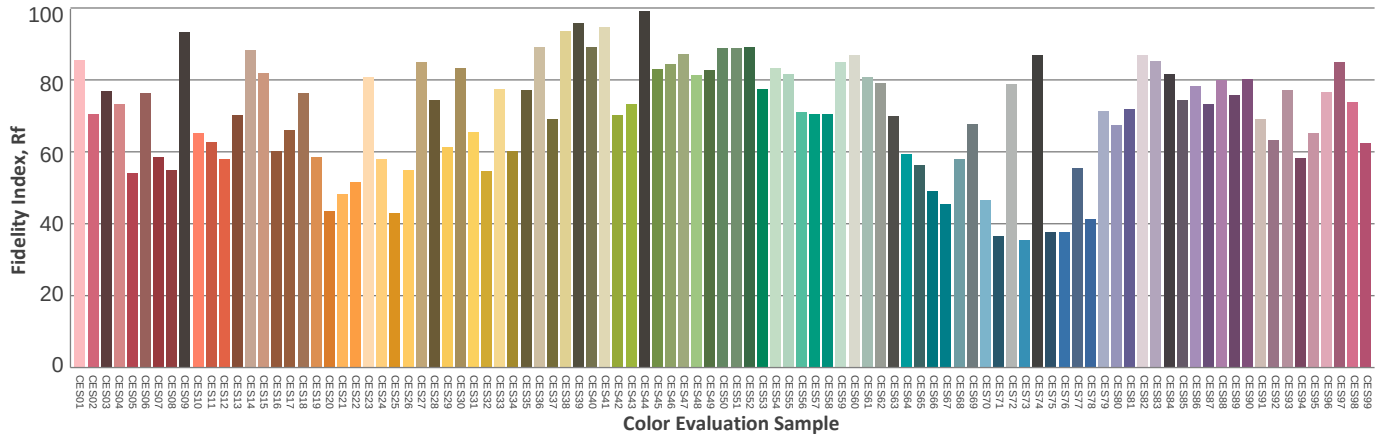


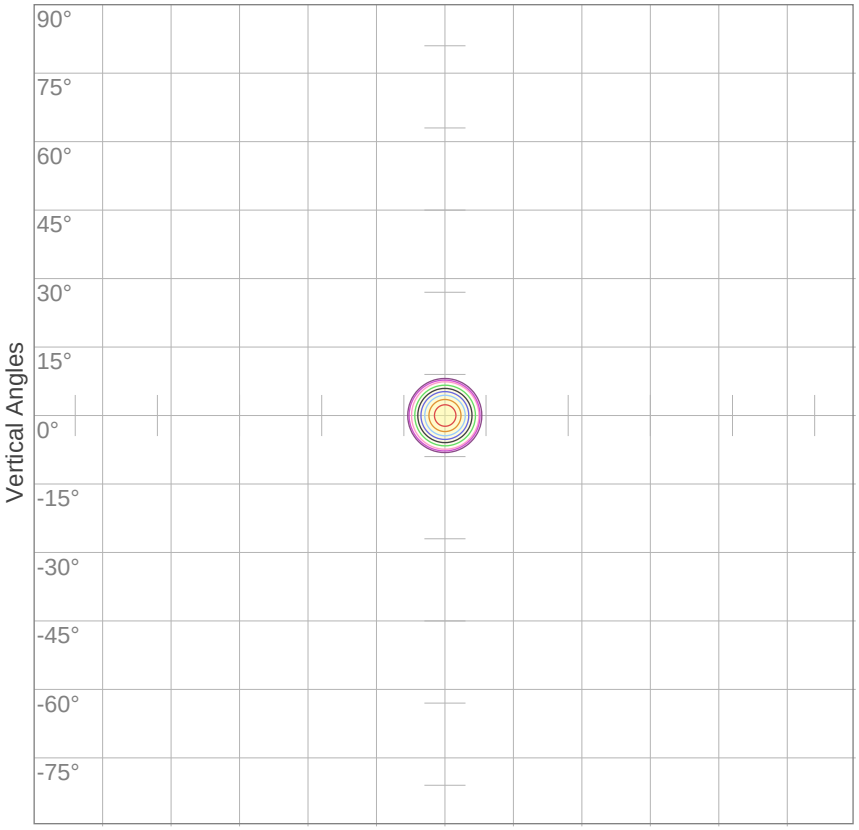



# ISO Diagrams

## ISO Candela Diagram



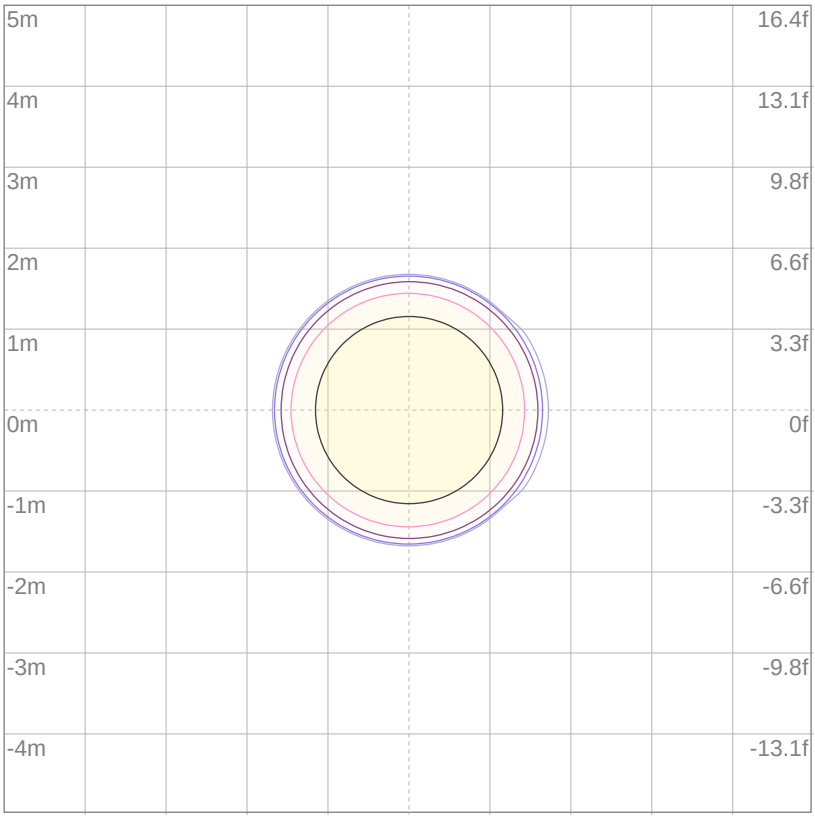

| | |
|---|---|
| 10% | 69528 cd |
| 20% | 139056 cd |
| 30% | 208584 cd |
| 40% | 278112 cd |
| 50% | 347640 cd |
| 60% | 417168 cd |
| 70% | 486696 cd |
| 80% | 556224 cd |
| 90% | 625752 cd |

Conditions:

Number of c-planes: 2

Candela at center: 695280 cd

## ISO Lux Diagram




Mounting Height: 10 meters (33 feet)

| | |
|---|---|
| 3% | 209 lx |
| 5% | 348 lx |
| 10% | 695 lx |
| 30% | 2086 lx |
| 50% | 3476 lx |

Conditions:

Number of c-planes: 2

Lux at center: 6953 lx

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

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# Photometric Report

## Total Lumen Output*

**VISO Lab Spion** **33000 lm**

| Beam Angle 50% | Field Angle 10% | Cutoff Angle 2.5% |
|---|---|---|
| 36.7° | 51.3° | 53.4° |

**Color Temperature: 6614 K**

**CRI: 70.9**

**TLCI: 46**

**TM30: 71.0**

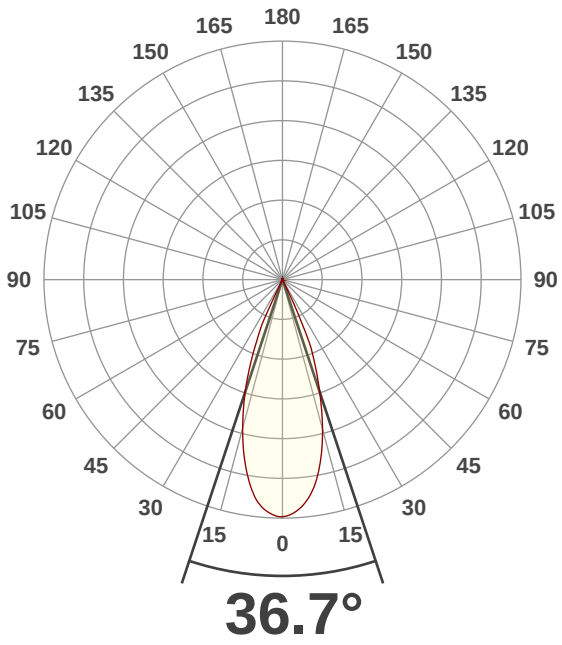
**CQS: 68.0**

**Voltage: 116 V, Current: 7.80 A**

**Power: 905 W**

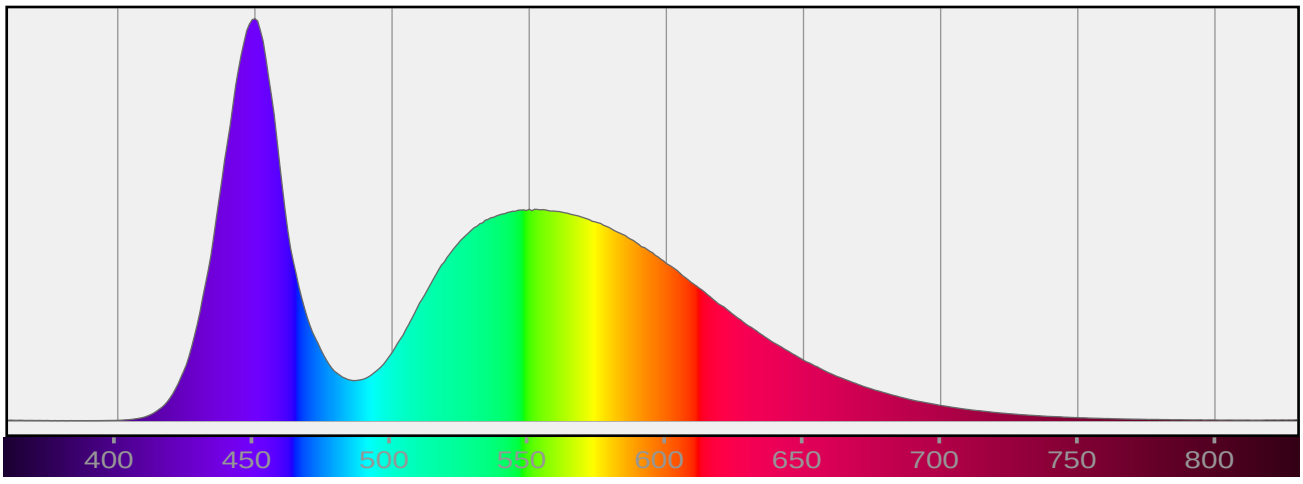
**Efficacy: 36 Lumen/Watt**

**Measurement Date: 6/11/2020**




**Spectral Distribution**

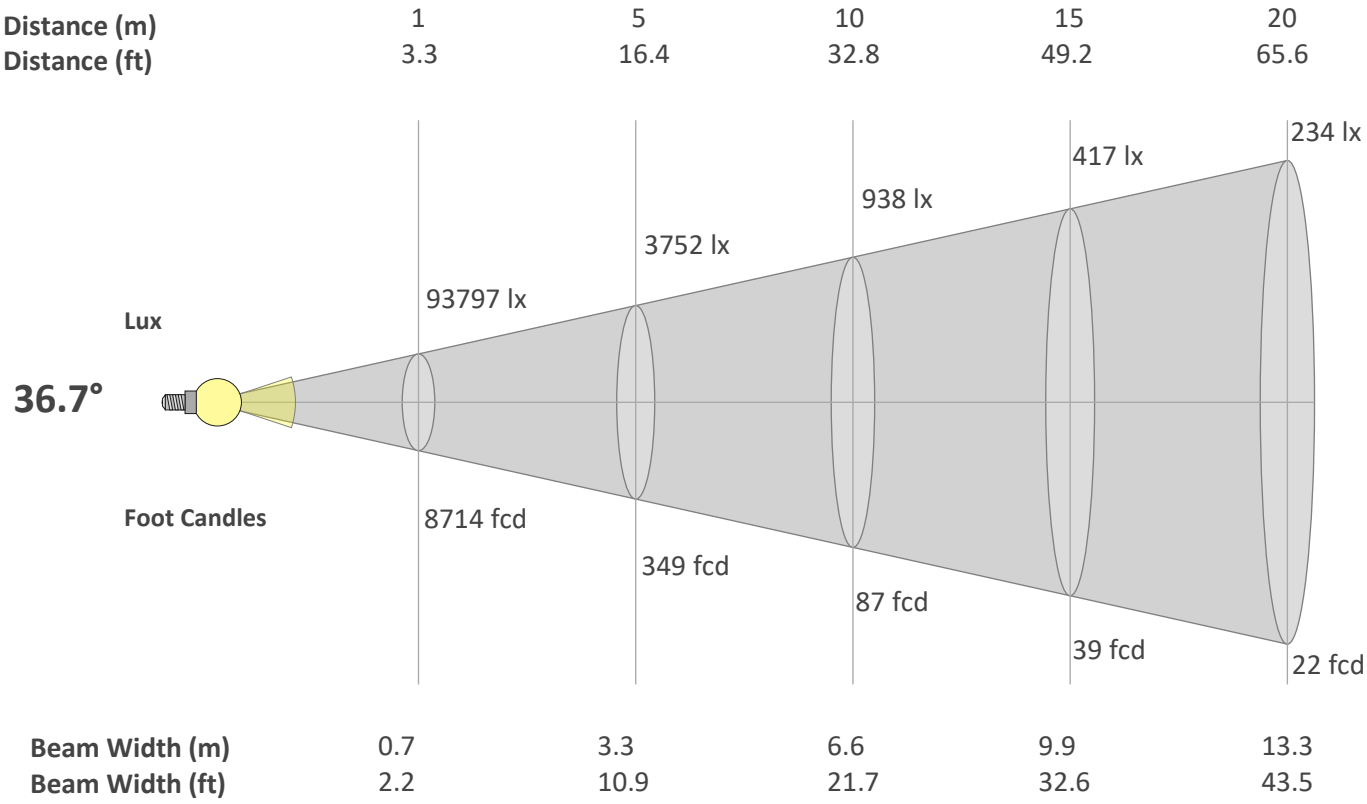
Dominant Wavelength 360 nm




*Total Lumen measurements by calibrated Everfine 2π Integrating Sphere and Viso Systems Lab Spion

## Beam Details

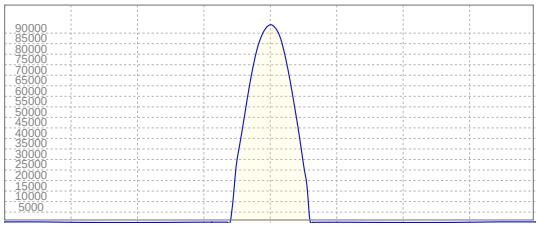
| Beam Angle 50% | Field Angle 10% | Cutoff Angle 2,5% |
|---|---|---|
| **36.7°** | **51.3°** | **53.4°** |




**Beam Intensities from 1-20m**

| M | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| FT | 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 |
| LX | 93797 | 23449 | 10422 | 5862 | 3752 | 2605 | 1914 | 1466 | 1158 | 938 | 775 | 651 | 555 | 479 | 417 | 366 | 325 | 289 | 260 | 234 |
| FC | 8714 | 2178.5 | 968.2 | 544.6 | 348.6 | 242.1 | 177.8 | 136.2 | 107.6 | 87.1 | 72 | 60.5 | 51.6 | 44.5 | 38.7 | 34 | 30.2 | 26.9 | 24.1 | 21.8 |

**Linear Distribution**




**Peak Candela**

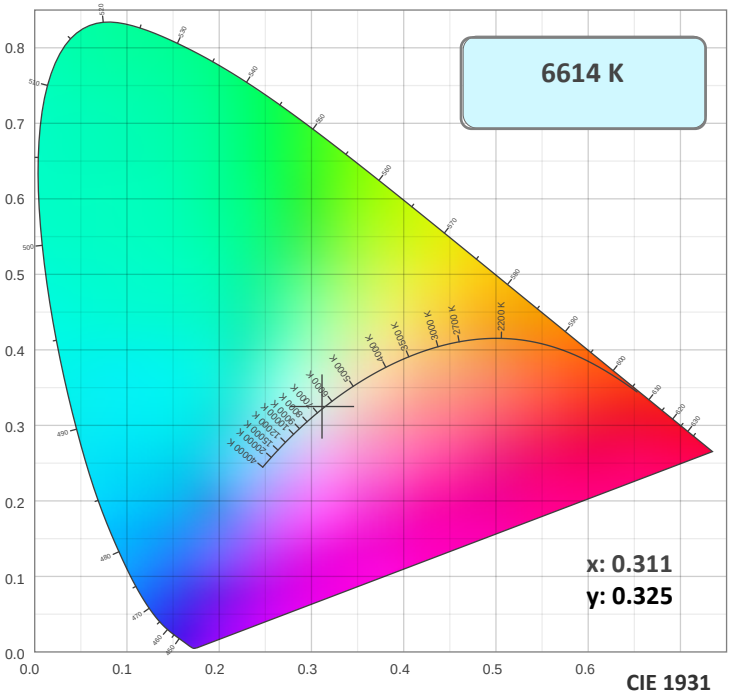
**93931 cd**

**Calculate Center Beam Intensities**

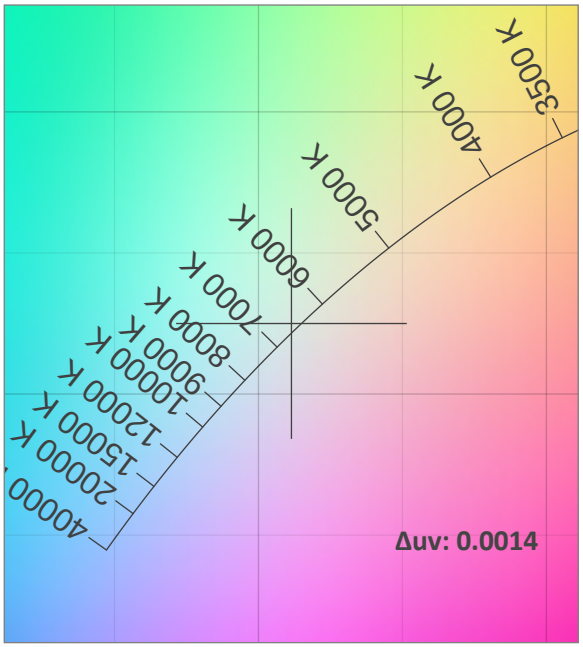
**lux = 93931 / distance(m)²**

**fc = 93931 / distance(ft)²**

## Color Details

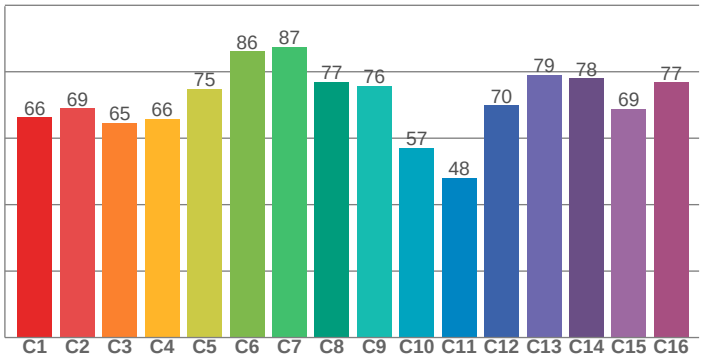



CIE 1931

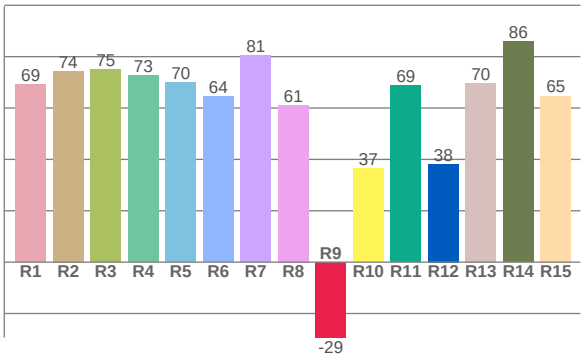



CIE 1931 ZOOM

### TM30: 71.0




### CRI: 70.9 (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 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 69.3 | 74.4 | 75.1 | 72.5 | 70.0 | 64.4 | 80.6 | 61.2 | -29.4 | 36.5 | 68.8 | 38.2 | 69.7 | 85.8 | 64.7 |

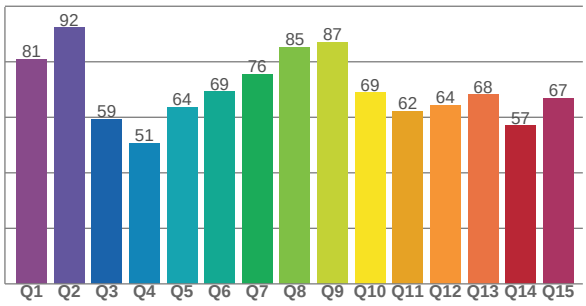
TM30 C Values, 16 binned values out of total of 99 C values

| C1 | C2 | C3 | C4 | C5 | C6 | C7 | C8 | C9 | C10 | C11 | C12 | C13 | C14 | C15 | C16 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 66.3 | 69.0 | 64.7 | 65.8 | 74.9 | 86.2 | 87.4 | 76.9 | 75.8 | 57.1 | 48.0 | 69.9 | 79.0 | 78.0 | 68.8 | 76.8 |

CQS Q Values

| Q1 | Q2 | Q3 | Q4 | Q5 | Q6 | Q7 | Q8 | Q9 | Q10 | Q11 | Q12 | Q13 | Q14 | Q15 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 81.0 | 92.4 | 59.3 | 50.7 | 63.6 | 69.2 | 75.5 | 85.2 | 87.2 | 68.9 | 62.1 | 64.5 | 68.2 | 57.0 | 66.9 |

### CQS: 68.0




### 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 Diviation from Black |
|---|---|---|---|---|---|---|---|---|---|---|
| CCT | CRI | CRI R9 | TM30 Rf | TM30 Rg | CQS | x | y | u | v | Δuv |
| 6614 K | 70.9 | -29.4 | 71.0 | 92.6 | 68.0 | 0.311 | 0.325 | 0.198 | 0.311 | 0.0014 |

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## TM30 Details

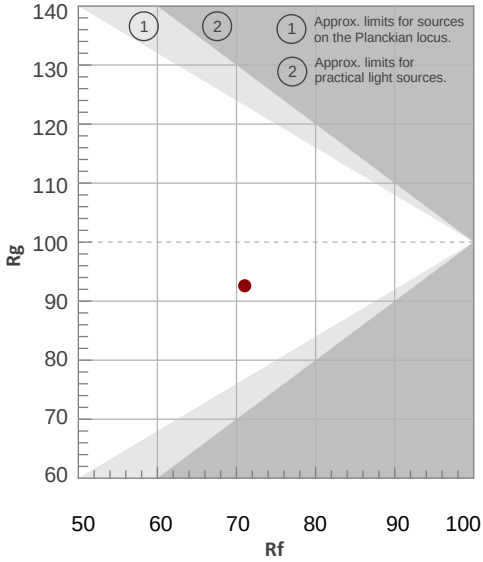
**Rf 71.0**

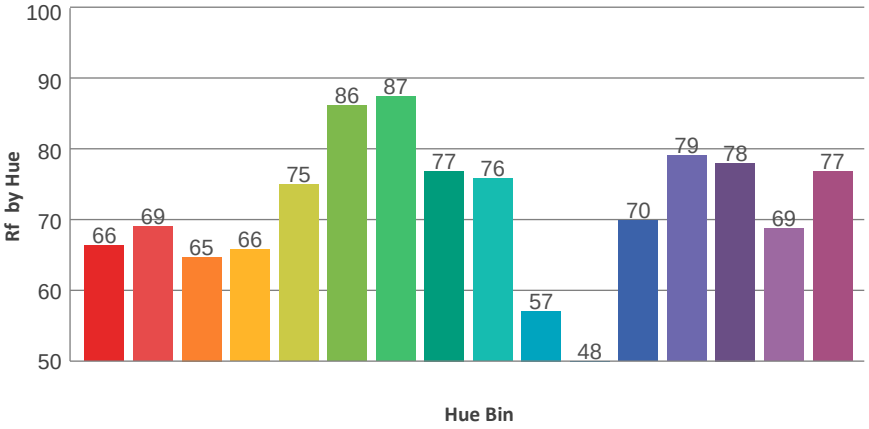
Fidelity Index Rf

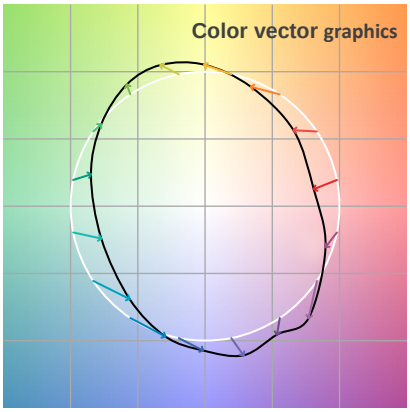
**Rg 92.6**

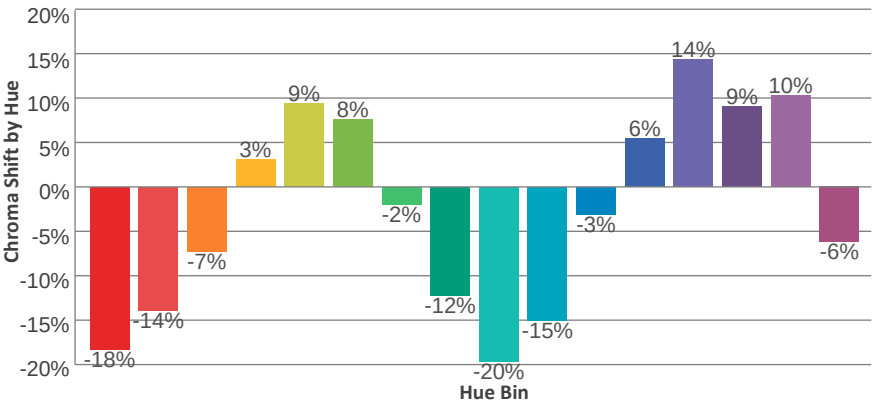
Gamut Index Rg

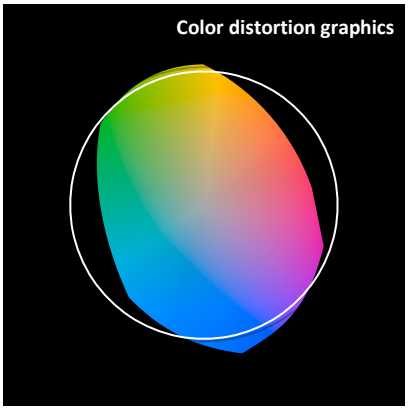
| | | Graphic shifts (%) | |
|---|---|---|---|
| Hue Bin | $R_f$ | Chroma | Hue |
| 1 | 66 | -18% | -3% |
| 2 | 69 | -14% | 10% |
| 3 | 65 | -7% | 21% |
| 4 | 66 | 3% | 21% |
| 5 | 75 | 9% | 12% |
| 6 | 86 | 8% | -2% |
| 7 | 87 | -2% | -8% |
| 8 | 77 | -12% | -7% |
| 9 | 76 | -20% | 9% |
| 10 | 57 | -15% | 26% |
| 11 | 48 | -3% | 29% |
| 12 | 70 | 6% | 20% |
| 13 | 79 | 14% | 6% |
| 14 | 78 | 9% | -9% |
| 15 | 69 | 10% | -26% |
| 16 | 77 | -6% | -12% |

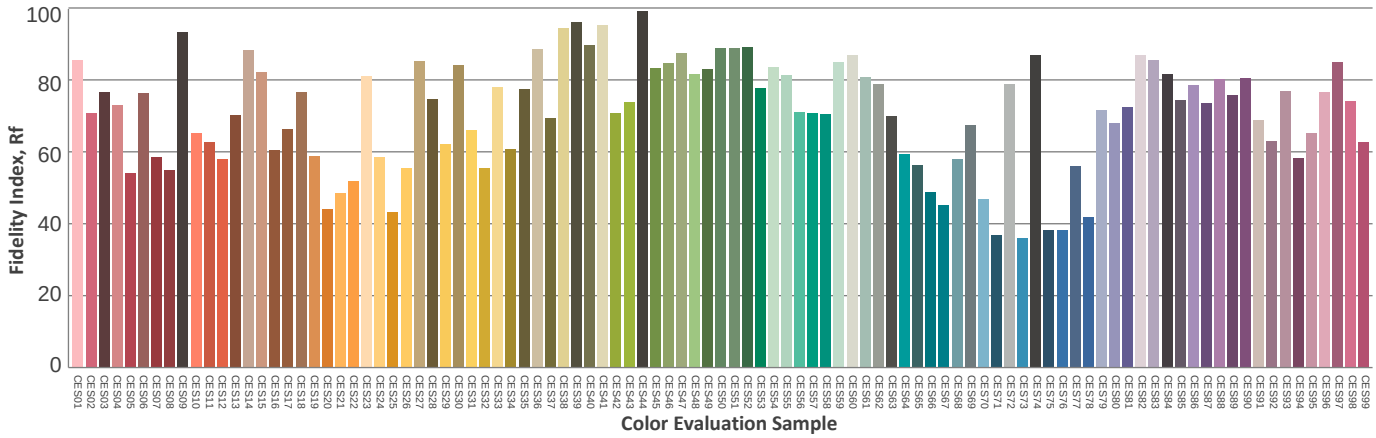


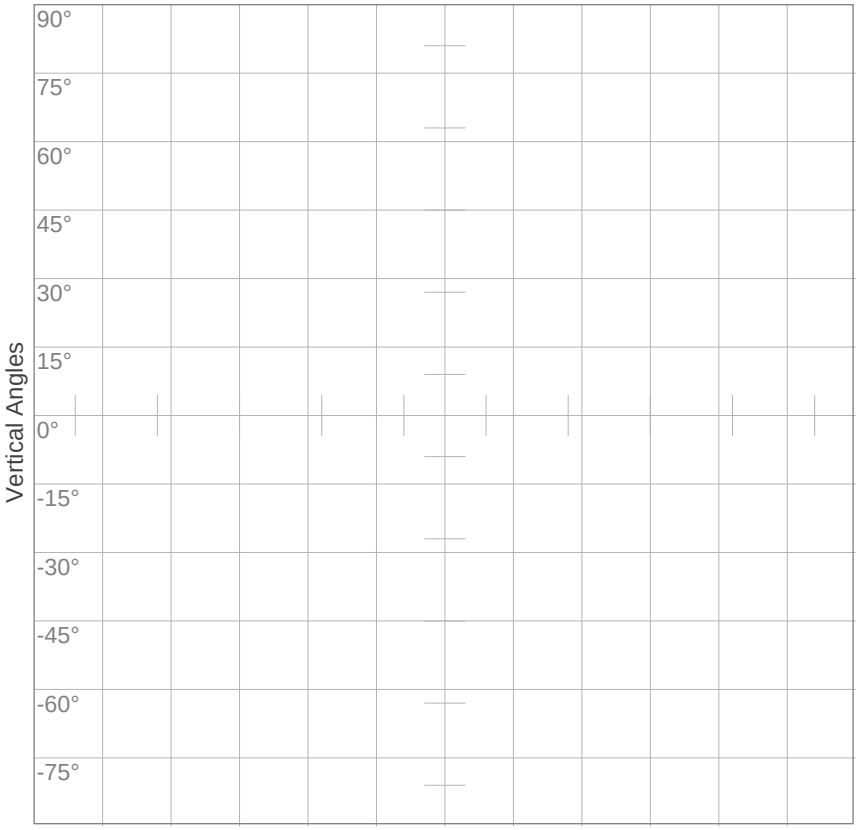



# ISO Diagrams

## ISO Candela Diagram



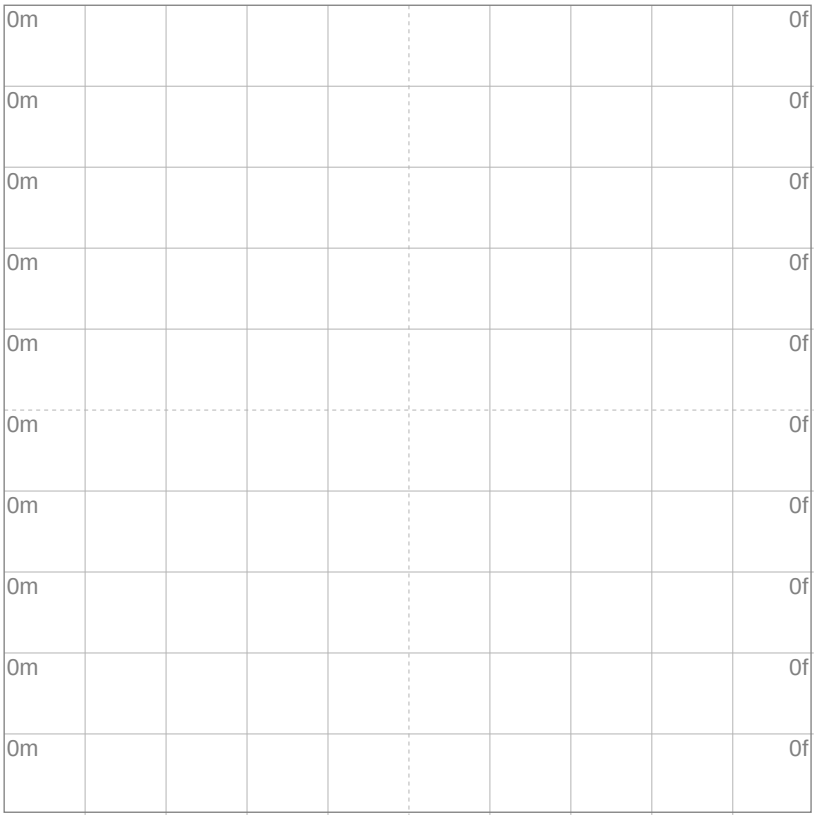

| | |
|---|---|
| 10% | 9380 cd |
| 20% | 18759 cd |
| 30% | 28139 cd |
| 40% | 37519 cd |
| 50% | 46898 cd |
| 60% | 56278 cd |
| 70% | 65658 cd |
| 80% | 75037 cd |
| 90% | 84417 cd |

Conditions:

Number of c-planes: 2

Candela at center: 93797 cd

## ISO Lux Diagram




Mounting Height: 10 meters (33 feet)

| | |
|---|---|
| 3% | 28.1 lx |
| 5% | 46.9 lx |
| 10% | 93.8 lx |
| 30% | 281 lx |
| 50% | 469 lx |

Conditions:

Number of c-planes: 2

Lux at center: 938 lx

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

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# Photometric Report

## Total Lumen Output*

**VISO Lab Spion** **23025 lm**

| Beam Angle 50% | Field Angle 10% | Cutoff Angle 2.5% |
|---|---|---|
| 13.2° | 18.1° | 18.8° |

**Color Temperature: 6329 K**

**CRI: 85.0**

**TLCI: 59**

**TM30: 78.3**

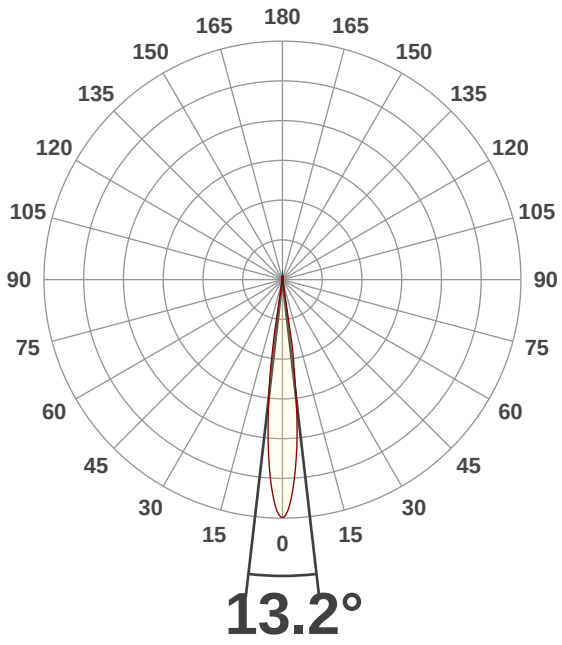
**CQS: 75.6**

**Voltage: 115 V, Current: 7.74 A**

**Power: 893 W**

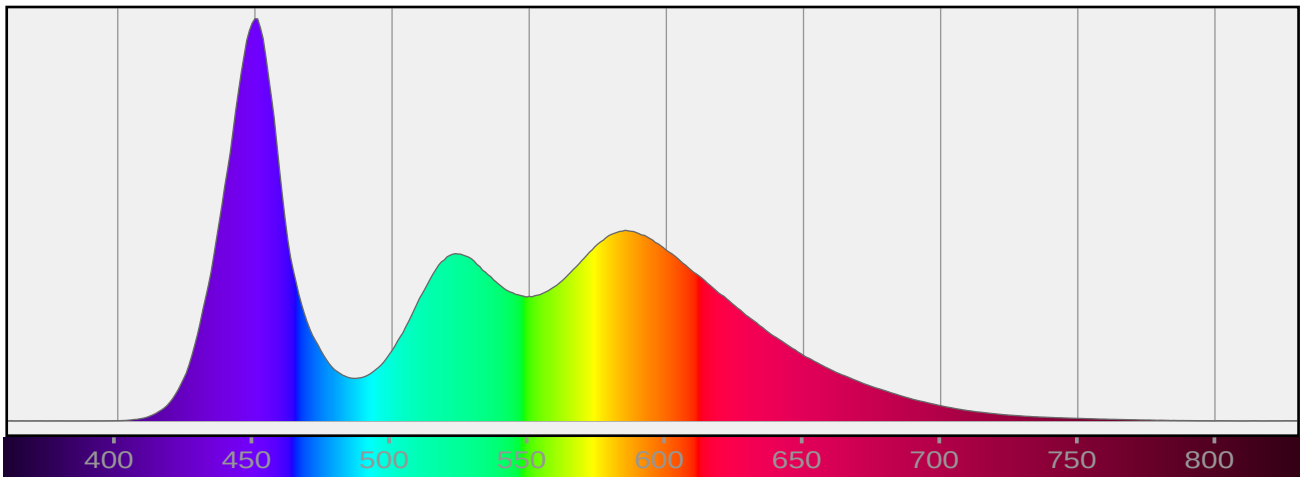
**Efficacy: 26 Lumen/Watt**

**Measurement Date: 6/22/2020**




**Spectral Distribution**

Dominant Wavelength 360 nm

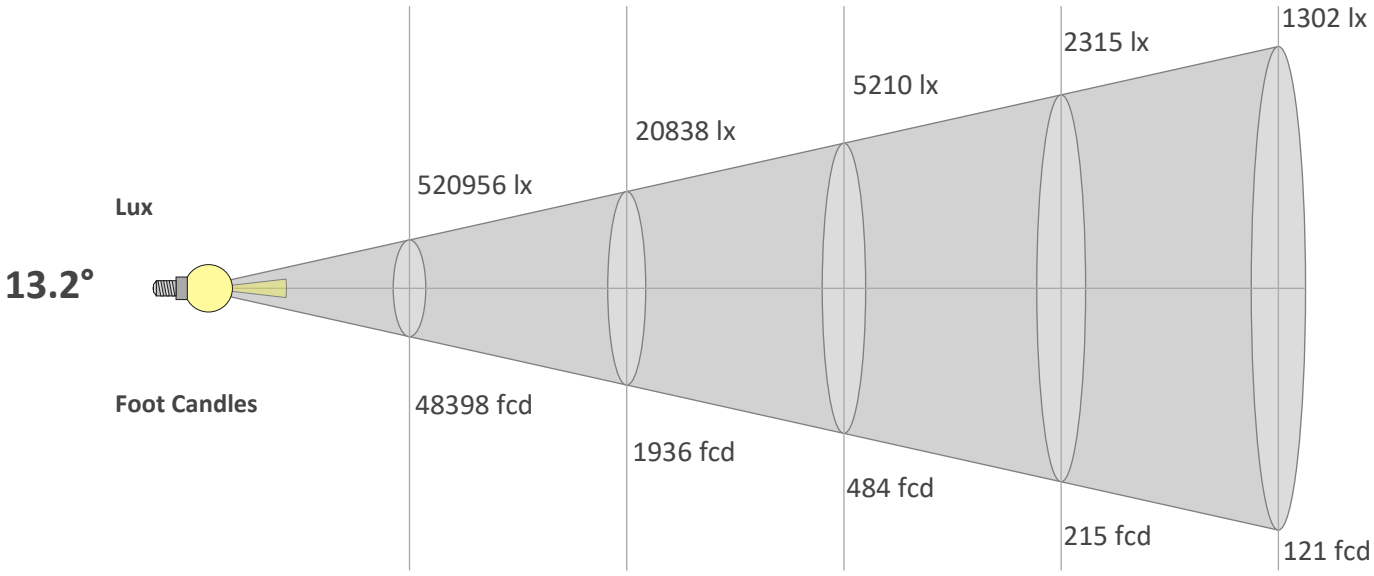



*Total Lumen measurements by calibrated Everfine 2π Integrating Sphere and Viso Systems Lab Spion

## Beam Details

| Beam Angle 50% | Field Angle 10% | Cutoff Angle 2,5% |
|---|---|---|
| **13.2°** | **18.1°** | **18.8°** |

| Distance (m) | 1 | 5 | 10 | 15 | 20 |
|---|---|---|---|---|---|
| Distance (ft) | 3.3 | 16.4 | 32.8 | 49.2 | 65.6 |

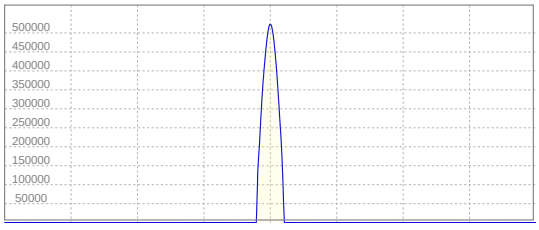



| Beam Width (m) | 0.2 | 1.2 | 2.3 | 3.5 | 4.6 |
|---|---|---|---|---|---|
| Beam Width (ft) | 0.8 | 3.8 | 7.6 | 11.4 | 15.2 |

**Beam Intensities from 1-20m**

| M | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| FT | 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 |
| LX | 520956 | 130239 | 57884 | 32560 | 20838 | 14471 | 10632 | 8140 | 6432 | 5210 | 4305 | 3618 | 3083 | 2658 | 2315 | 2035 | 1803 | 1608 | 1443 | 1302 |
| FC | 48398.4 | 12099.6 | 5377.6 | 3024.9 | 1935.9 | 1344.4 | 987.7 | 756.2 | 597.5 | 484 | 400 | 336.1 | 286.4 | 246.9 | 215.1 | 189.1 | 167.5 | 149.4 | 134.1 | 121 |

**Linear Distribution**




**Peak Candela**

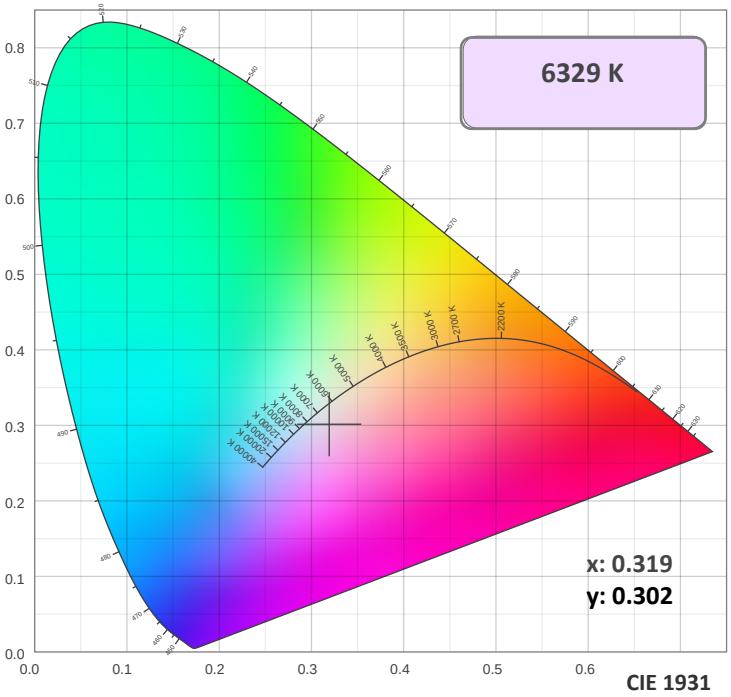
**521309 cd**

**Calculate Center Beam Intensities**

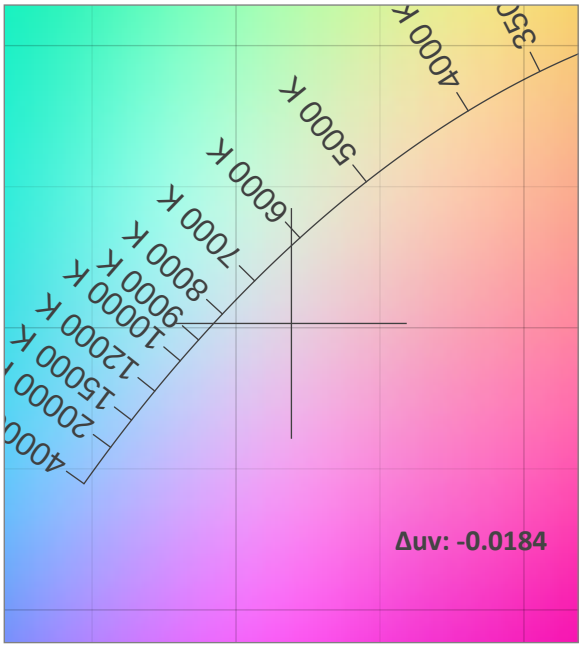
**lux = 521309 / distance(m)$^2$**

**fc = 521309 / distance(ft)$^2$**

## Color Details

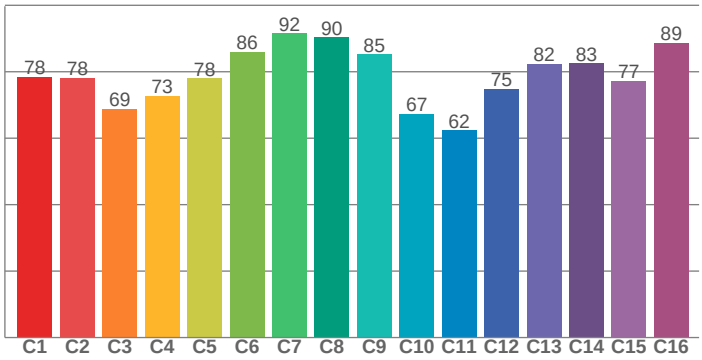



CIE 1931

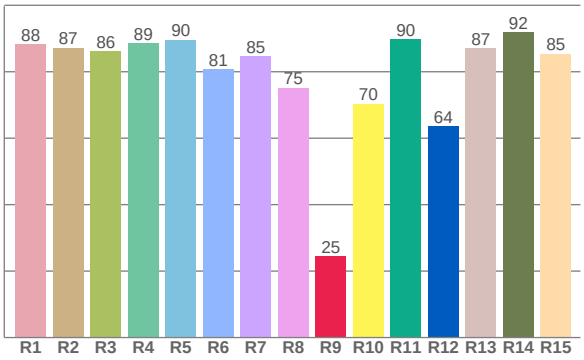



CIE 1931 ZOOM

### TM30: 78.3




### CRI: 85.0 (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 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 88.3 | 87.2 | 86.1 | 88.5 | 89.7 | 80.8 | 84.6 | 75.1 | 24.5 | 70.3 | 89.9 | 63.6 | 87.1 | 91.9 | 85.4 |

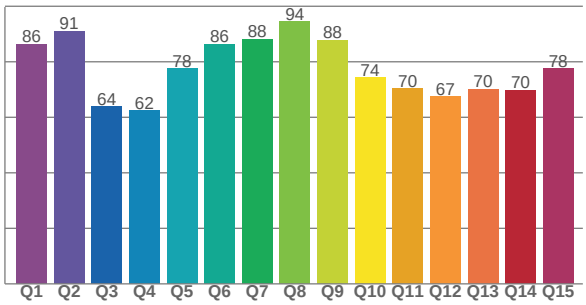
TM30 C Values, 16 binned values out of total of 99 C values

| C1 | C2 | C3 | C4 | C5 | C6 | C7 | C8 | C9 | C10 | C11 | C12 | C13 | C14 | C15 | C16 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 78.4 | 78.2 | 68.8 | 72.7 | 78.0 | 86.0 | 91.5 | 90.3 | 85.2 | 67.3 | 62.4 | 74.9 | 82.4 | 82.5 | 77.2 | 88.7 |

CQS Q Values

| Q1 | Q2 | Q3 | Q4 | Q5 | Q6 | Q7 | Q8 | Q9 | Q10 | Q11 | Q12 | Q13 | Q14 | Q15 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 86.3 | 91.1 | 63.8 | 62.4 | 77.6 | 86.4 | 88.2 | 94.4 | 87.7 | 74.3 | 70.3 | 67.4 | 70.1 | 69.8 | 77.5 |

### CQS: 75.6




### 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 |
|---|---|---|---|---|---|---|---|---|---|---|
| CCT | CRI | CRI R9 | TM30 Rf | TM30 Rg | CQS | x | y | u | v | Δuv |
| 6329 K | 85.0 | 24.5 | 78.3 | 101.5 | 75.6 | 0.319 | 0.302 | 0.214 | 0.303 | -0.0184 |

## TM30 Details

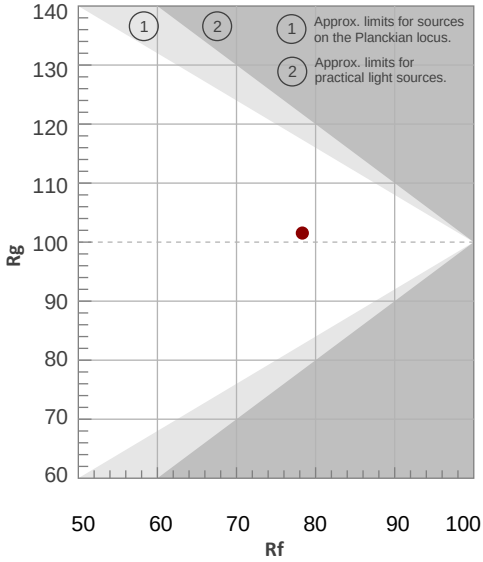
**Rf 78.3**

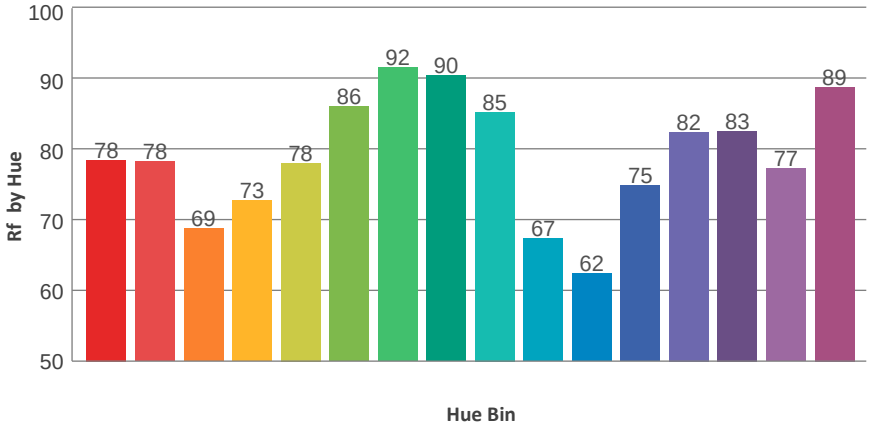
Fidelity Index Rf

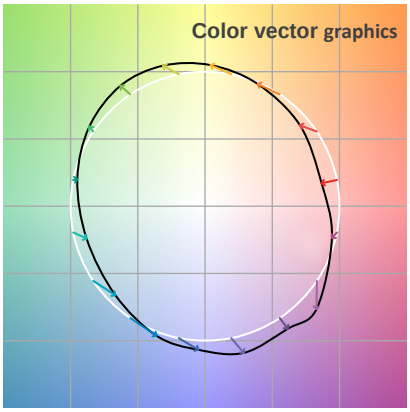
**Rg 101.5**

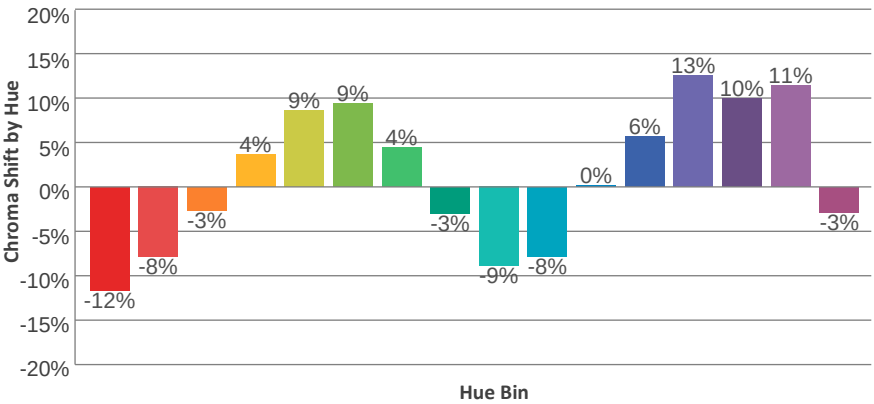
Gamut Index Rg

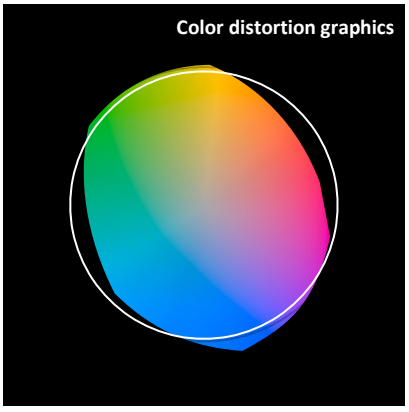
| | | Graphic shifts (%) | |
|---|---|---|---|
| Hue Bin | $R_f$ | Chroma | Hue |
| 1 | 78 | -12% | 0% |
| 2 | 78 | -8% | 11% |
| 3 | 69 | -3% | 18% |
| 4 | 73 | 4% | 16% |
| 5 | 78 | 9% | 10% |
| 6 | 86 | 9% | 3% |
| 7 | 92 | 4% | -1% |
| 8 | 90 | -3% | -1% |
| 9 | 85 | -9% | 6% |
| 10 | 67 | -8% | 18% |
| 11 | 62 | 0% | 23% |
| 12 | 75 | 6% | 16% |
| 13 | 82 | 13% | 7% |
| 14 | 83 | 10% | 0% |
| 15 | 77 | 11% | -18% |
| 16 | 89 | -3% | -5% |

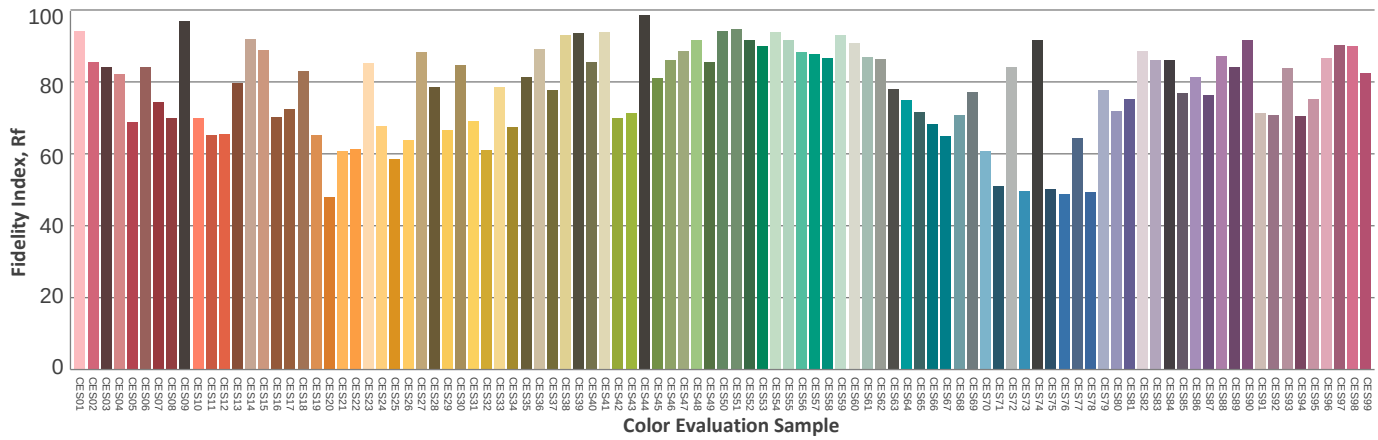


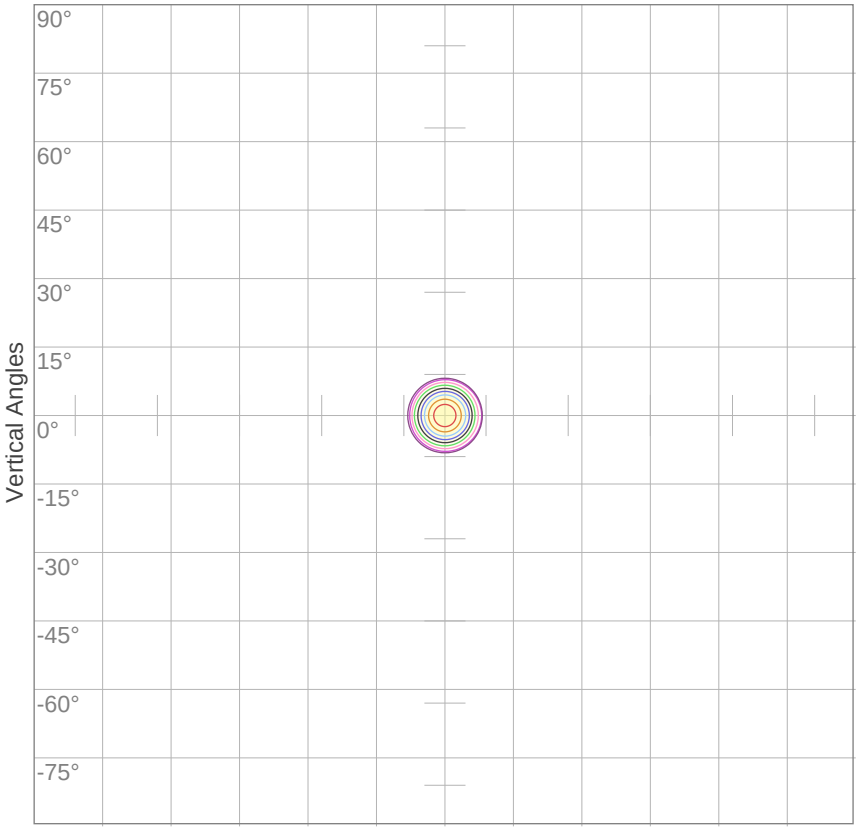



# ISO Diagrams

## ISO Candela Diagram



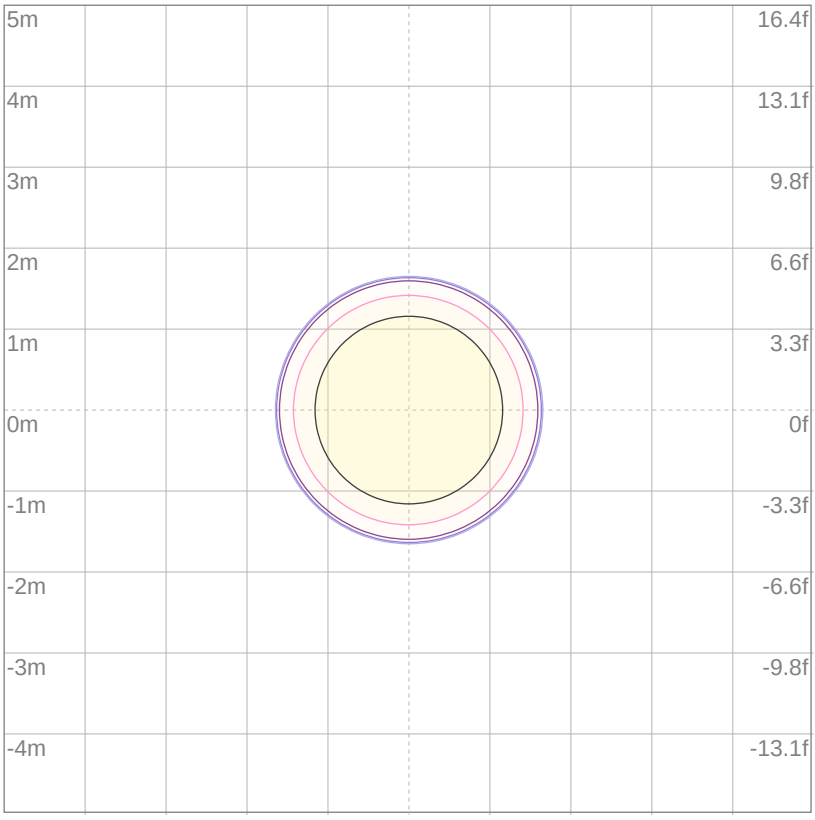

| | |
|---|---|
| 10% | 52096 cd |
| 20% | 104191 cd |
| 30% | 156287 cd |
| 40% | 208382 cd |
| 50% | 260478 cd |
| 60% | 312573 cd |
| 70% | 364669 cd |
| 80% | 416765 cd |
| 90% | 468860 cd |

Conditions:

Number of c-planes: 2

Candela at center: 520956 cd

## ISO Lux Diagram




Mounting Height: 10 meters (33 feet)

| | |
|---|---|
| 3% | 156 lx |
| 5% | 260 lx |
| 10% | 521 lx |
| 30% | 1563 lx |
| 50% | 2605 lx |

Conditions:

Number of c-planes: 2

Lux at center: 5210 lx

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

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# Photometric Report

## Total Lumen Output*

**VISO Lab Spion** **10397 lm**

| Beam Angle 50% | Field Angle 10% | Cutoff Angle 2.5% |
|---|---|---|
| 13.6° | 18.2° | 19.2° |

**Color Temperature: 2861 K**

**CRI: 62.4**

**TLCI: 30**

**TM30: 64.0**

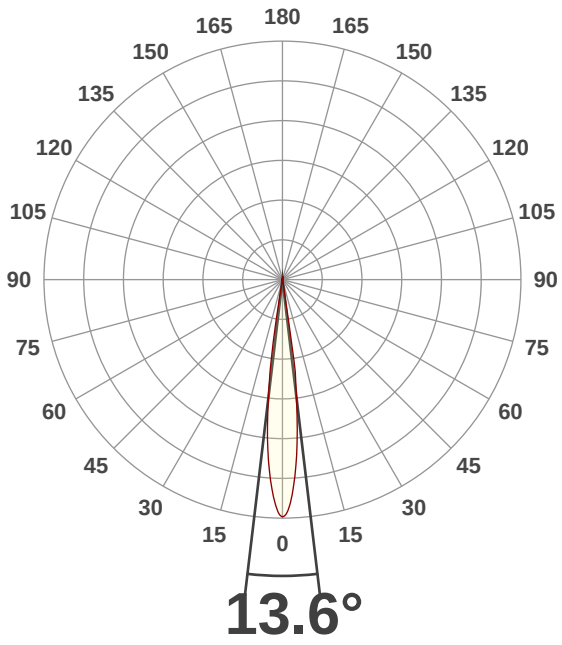
**CQS: 60.9**

**Voltage: 116 V, Current: 7.76 A**

**Power: 900 W**

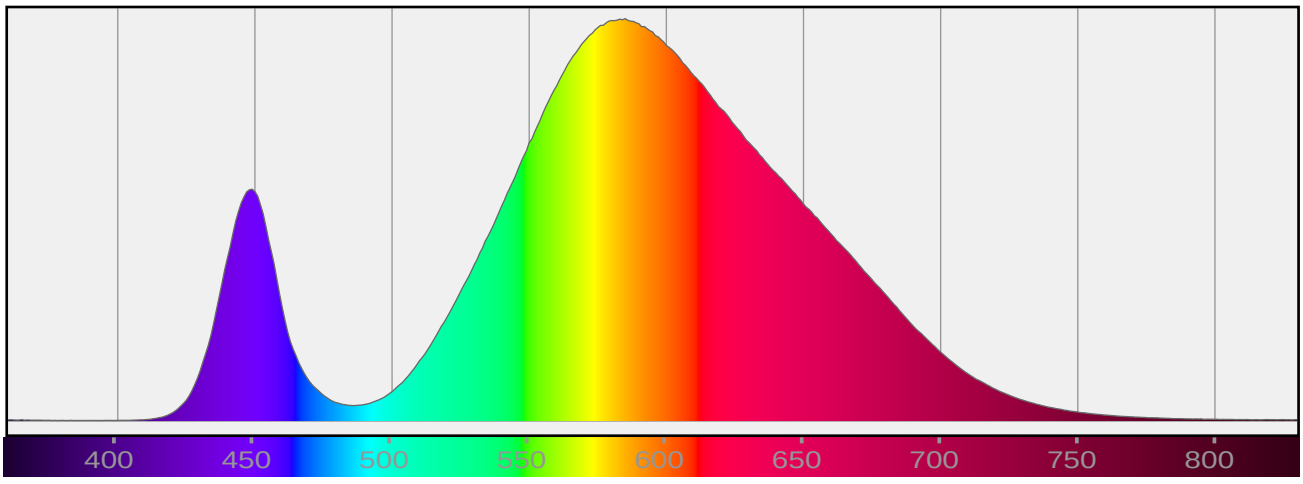
**Efficacy: 12 Lumen/Watt**

**Measurement Date: 6/11/2020**




**Spectral Distribution**

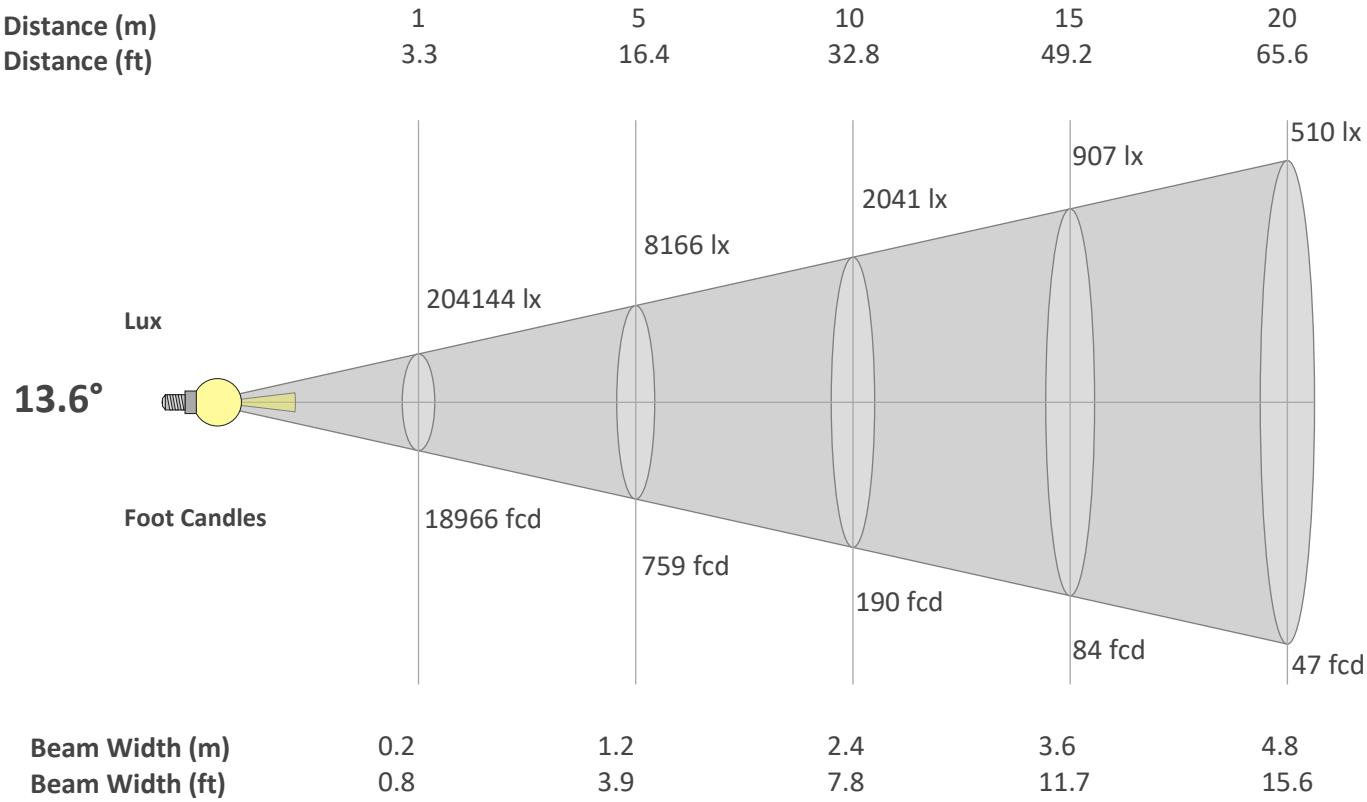
Dominant Wavelength 585 nm




*Total Lumen measurements by calibrated Everfine 2π Integrating Sphere and Viso Systems Lab Spion

## Beam Details

| Beam Angle 50% | Field Angle 10% | Cutoff Angle 2,5% |
|---|---|---|
| **13.6°** | **18.2°** | **19.2°** |




**Beam Intensities from 1-20m**

| M | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| FT | 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 |
| LX | 204144 | 51036 | 22683 | 12759 | 8166 | 5671 | 4166 | 3190 | 2520 | 2041 | 1687 | 1418 | 1208 | 1042 | 907 | 797 | 706 | 630 | 565 | 510 |
| FC | 18965.6 | 4741.4 | 2107.3 | 1185.4 | 758.6 | 526.8 | 387.1 | 296.3 | 234.1 | 189.7 | 156.7 | 131.7 | 112.2 | 96.8 | 84.3 | 74.1 | 65.6 | 58.5 | 52.5 | 47.4 |

**Linear Distribution**


**Peak Candela**

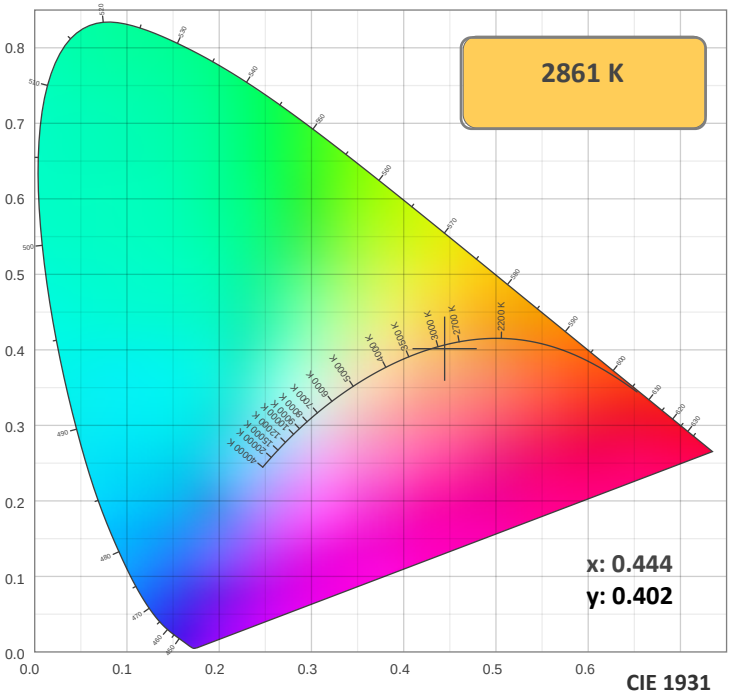
**204448 cd**

**Calculate Center Beam Intensities**

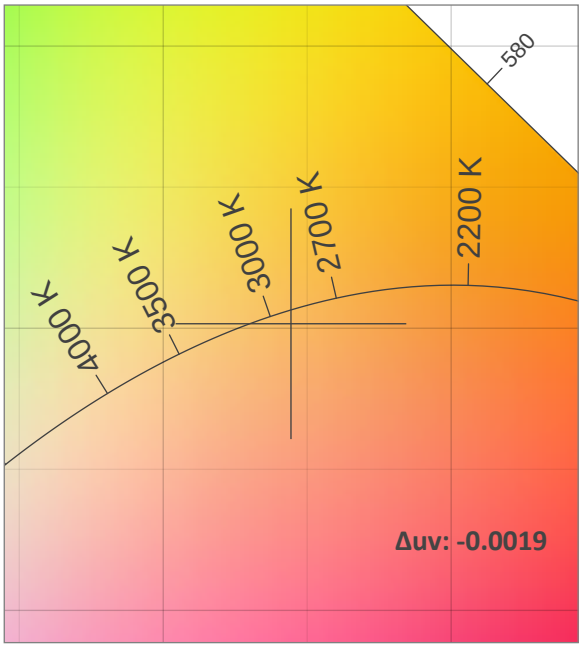
**lux = 204448 / distance(m)²**

**fc = 204448 / distance(ft)²**

## Color Details

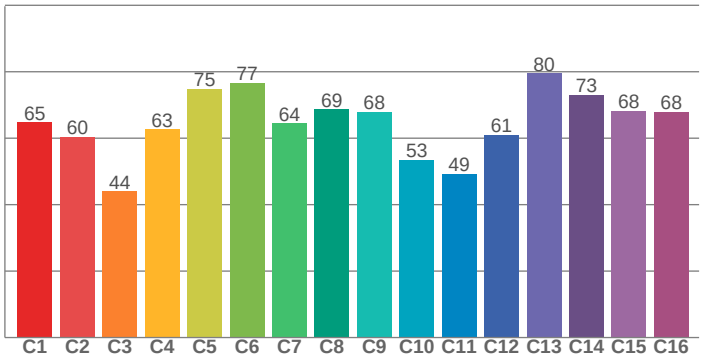



CIE 1931

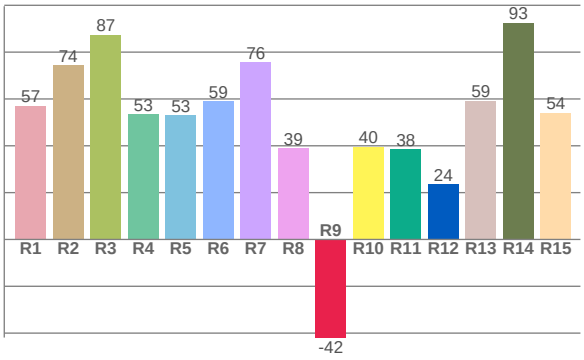



CIE 1931 ZOOM

### TM30: 64.0




### CRI: 62.4 (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 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 57.1 | 74.4 | 87.4 | 53.4 | 53.1 | 59.0 | 75.6 | 39.1 | -41.9 | 39.6 | 38.4 | 23.7 | 59.3 | 92.5 | 54.2 |

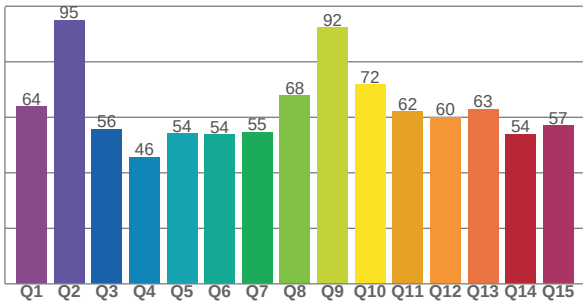
TM30 C Values, 16 binned values out of total of 99 C values

| C1 | C2 | C3 | C4 | C5 | C6 | C7 | C8 | C9 | C10 | C11 | C12 | C13 | C14 | C15 | C16 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 64.8 | 60.4 | 44.0 | 62.7 | 74.8 | 76.6 | 64.5 | 68.7 | 67.9 | 53.4 | 49.3 | 60.9 | 79.5 | 73.0 | 68.2 | 67.9 |

CQS Q Values

| Q1 | Q2 | Q3 | Q4 | Q5 | Q6 | Q7 | Q8 | Q9 | Q10 | Q11 | Q12 | Q13 | Q14 | Q15 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 63.9 | 94.9 | 55.8 | 45.6 | 54.1 | 53.7 | 54.6 | 67.8 | 92.3 | 71.7 | 62.1 | 60.1 | 63.0 | 54.0 | 57.1 |

### CQS: 60.9




### 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 |
|---|---|---|---|---|---|---|---|---|---|---|
| CCT | CRI | CRI R9 | TM30 Rf | TM30 Rg | CQS | x | y | u | v | Δuv |
| 2861 K | 62.4 | -41.9 | 64.0 | 92.3 | 60.9 | 0.444 | 0.402 | 0.256 | 0.348 | -0.0019 |

## TM30 Details

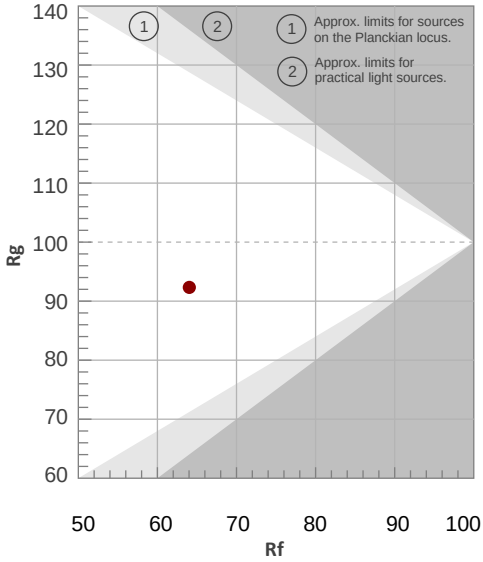
**Rf 64.0**

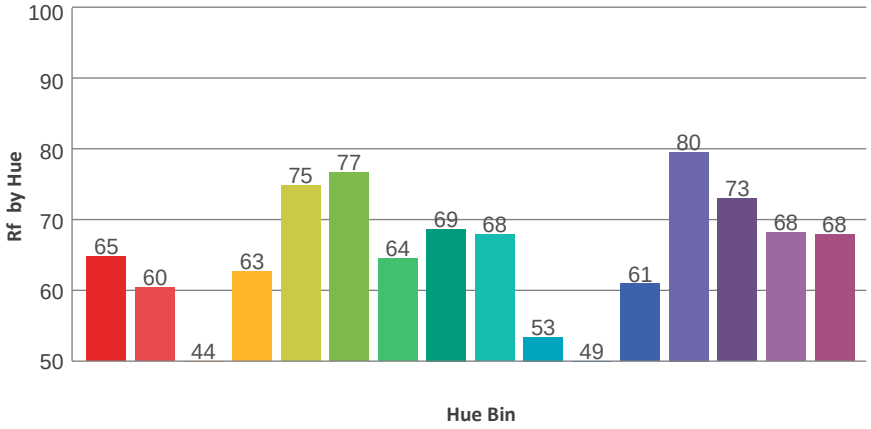
Fidelity Index Rf

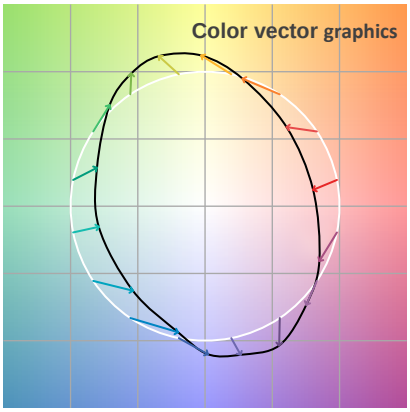
**Rg 92.3**

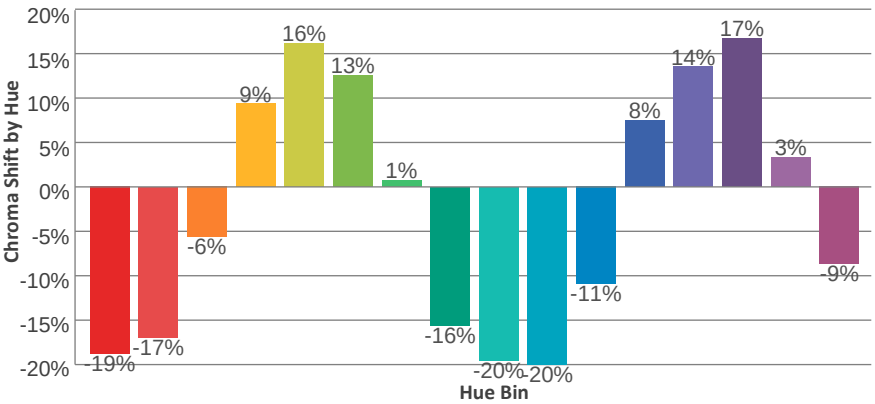
Gamut Index Rg

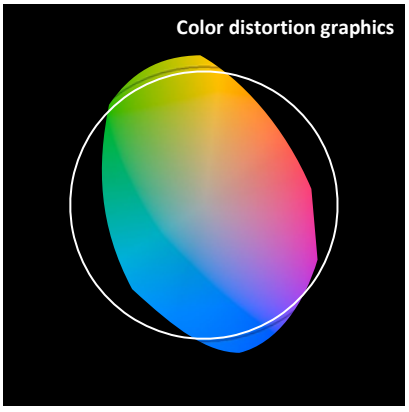
| | | Graphic shifts (%) | |
|---|---|---|---|
| Hue Bin | $R_f$ | Chroma | Hue |
| 1 | 65 | -19% | -4% |
| 2 | 60 | -17% | 15% |
| 3 | 44 | -6% | 29% |
| 4 | 63 | 9% | 25% |
| 5 | 75 | 16% | 12% |
| 6 | 77 | 13% | -9% |
| 7 | 64 | 1% | -23% |
| 8 | 69 | -16% | -12% |
| 9 | 68 | -20% | 0% |
| 10 | 53 | -20% | 22% |
| 11 | 49 | -11% | 35% |
| 12 | 61 | 8% | 24% |
| 13 | 80 | 14% | 4% |
| 14 | 73 | 17% | -12% |
| 15 | 68 | 3% | -19% |
| 16 | 68 | -9% | -23% |

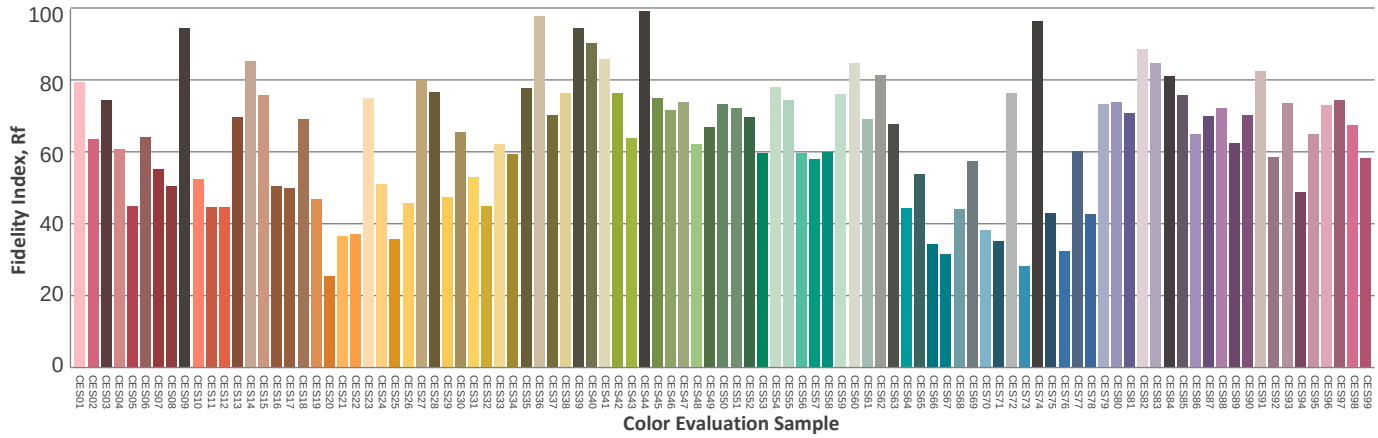


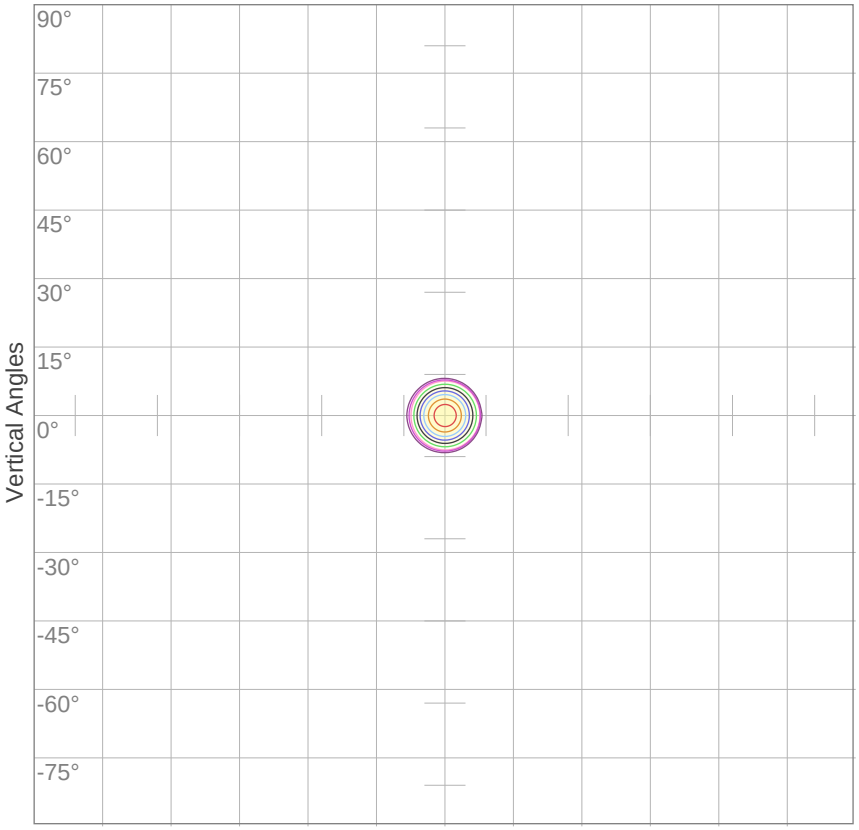



# ISO Diagrams

## ISO Candela Diagram



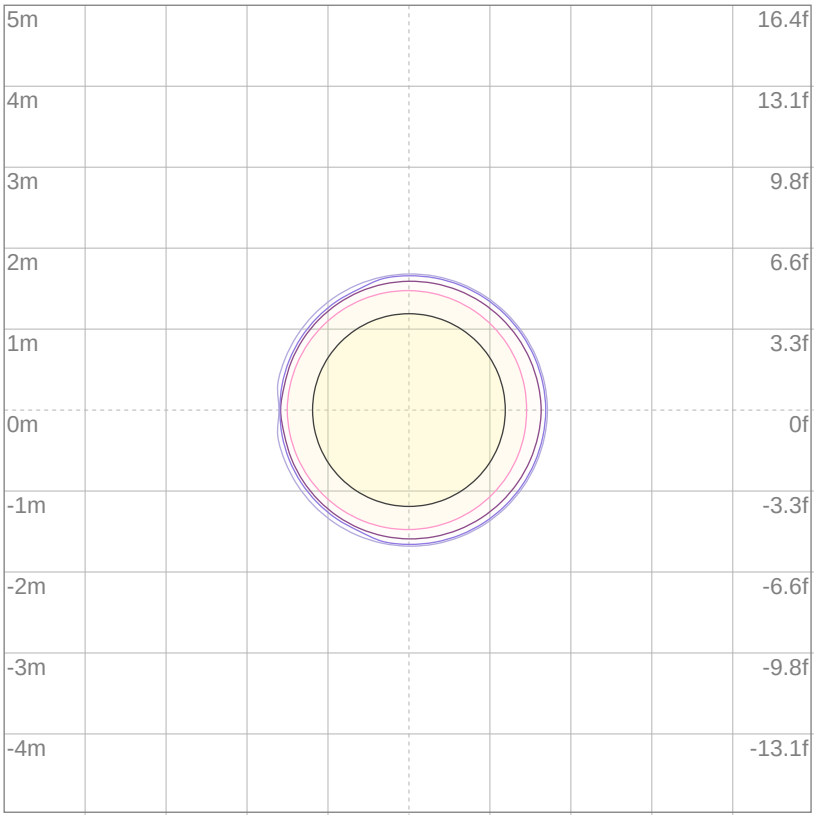

| | | |
|---|---|---|
| 10% | 20414 cd |
| 20% | 40829 cd |
| 30% | 61243 cd |
| 40% | 81658 cd |
| 50% | 102072 cd |
| 60% | 122486 cd |
| 70% | 142901 cd |
| 80% | 163315 cd |
| 90% | 183730 cd |

Conditions:

Number of c-planes: 2

Candela at center: 204144 cd

## ISO Lux Diagram




Mounting Height: 10 meters (33 feet)

| | |
|---|---|
| 3% | 61.2 lx |
| 5% | 102 lx |
| 10% | 204 lx |
| 30% | 612 lx |
| 50% | 1021 lx |

Conditions:

Number of c-planes: 2

Lux at center: 2041 lx

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