

Classified  
Cooper Lighting Solutions Photometric Lab  
1121 Highway 74 South  
Peachtree City, GA 30269



Scaled data based on original data using  
LM-79-08 Approved Method: Electrical and Photometric Measurements of Solid-State  
Lighting Products

Test Report Prepared for  
Cooper Lighting Solutions  
(formerly Eaton)

Brand: HALO

Report Number: P96128

Luminaire Tested: **HLBFR407FS5MB-930**

Issue Date: 2/4/2025



**Test Information**

Test Method: LM-79-08  
Report Number: P96128  
Test Lab: LEADING TESTING LABORATORIES  
Issue Date: 2/4/2025  
Manufacturer: COOPER LIGHTING SOLUTIONS (FORMERLY EATON)  
Product Line: HALO  
Catalog Number: HLBFR407FS5MB-930  
Description: HALO HLBFR Fire Rated Canless 4 inch 90 CRI COLOR SELECTABLE  
FIXTURE-BLACK  
Light Source: 3000K CCT, 90 CRI LEDS  
Ballast/Driver: ELECTRONIC DRIVER

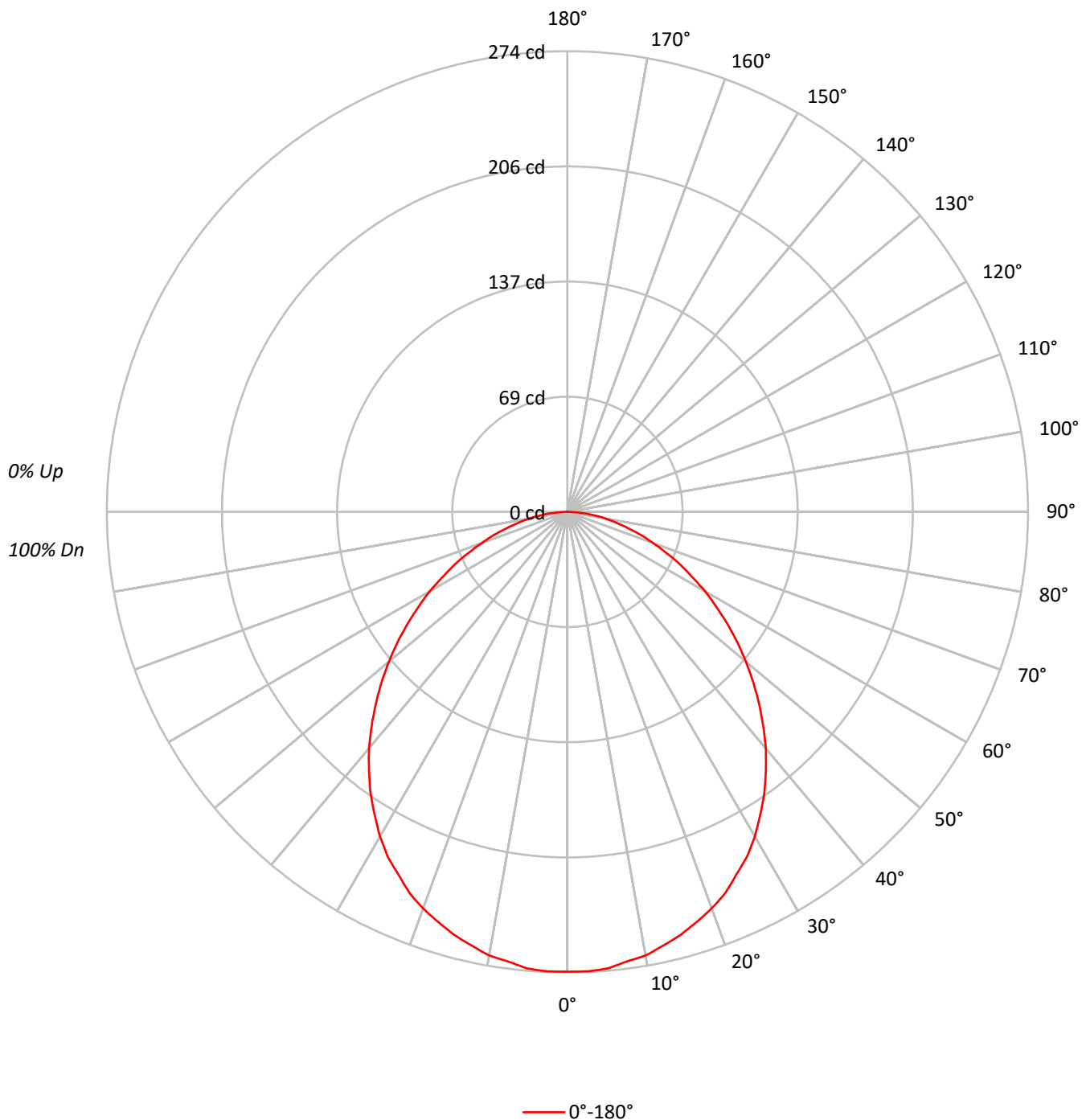
**Summary**

Lumens per Lamp: N/A  
Luminaire Lumens: 689.8 lumens  
Efficiency: N/A  
Efficacy: 82.1 lumens/watt  
Spacing Criteria (0/90/45): 1.21 / 1.21 / 1.3  
Luminous Opening: Circular (Dia: 0.3' x H: 0')  
CIE Type: Direct

Input Watts (W): 8.4  
Input Voltage (V): 120  
Input Current (Ain): NR  
Voltage Rise (V): NR  
Power Factor: NR  
Total Harmonic Distortion (THDi): NR  
Frequency (hertz): 60  
Stabilization Time: NR  
Operation Time: NR  
Ambient Temperature (°C): NR  
Test Distance: 25 FT

TEST NUMBER: P96128  
CATALOG NUMBER: HLBFR407FS5MB-930

### Luminous Intensity Polar Plot



TEST NUMBER: P96128

CATALOG NUMBER: HLBFR407FS5MB-930

**COEFFICIENT OF UTILIZATION - ZONAL CAVITY METHOD:**

|     |     |     |     |     |  |     |     |     |     |  |     |     |     |  |     |     |     |  |     |     |     |
|-----|-----|-----|-----|-----|--|-----|-----|-----|-----|--|-----|-----|-----|--|-----|-----|-----|--|-----|-----|-----|
| RF  | 20  |     |     |     |  | 20  |     |     |     |  | 20  |     |     |  |     | 20  |     |  |     |     | 20  |
| RC  | 80  |     |     |     |  | 70  |     |     |     |  | 30  |     |     |  |     | 10  |     |  |     |     | 0   |
| RW  | 70  | 50  | 30  | 10  |  | 70  | 50  | 30  | 10  |  | 50  | 30  | 10  |  | 50  | 30  | 10  |  | 50  | 30  | 10  |
| RCR |     |     |     |     |  |     |     |     |     |  |     |     |     |  |     |     |     |  |     |     |     |
| 0   | 119 | 119 | 119 | 119 |  | 116 | 116 | 116 | 116 |  | 111 | 111 | 111 |  | 106 | 106 | 106 |  | 102 | 102 | 102 |
| 1   | 109 | 105 | 101 | 97  |  | 107 | 102 | 99  | 95  |  | 98  | 95  | 92  |  | 94  | 92  | 89  |  | 91  | 89  | 87  |
| 2   | 100 | 92  | 85  | 80  |  | 97  | 90  | 84  | 79  |  | 86  | 81  | 77  |  | 83  | 79  | 75  |  | 80  | 77  | 74  |
| 3   | 91  | 81  | 73  | 67  |  | 89  | 80  | 72  | 66  |  | 77  | 70  | 65  |  | 74  | 68  | 64  |  | 71  | 67  | 63  |
| 4   | 84  | 72  | 64  | 57  |  | 82  | 71  | 63  | 57  |  | 68  | 61  | 56  |  | 66  | 60  | 55  |  | 64  | 59  | 54  |
| 5   | 77  | 65  | 56  | 50  |  | 75  | 64  | 55  | 49  |  | 62  | 54  | 49  |  | 60  | 53  | 48  |  | 58  | 52  | 48  |
| 6   | 71  | 58  | 50  | 43  |  | 70  | 58  | 49  | 43  |  | 56  | 48  | 43  |  | 54  | 48  | 43  |  | 53  | 47  | 42  |
| 7   | 66  | 53  | 45  | 39  |  | 65  | 52  | 44  | 38  |  | 51  | 44  | 38  |  | 49  | 43  | 38  |  | 48  | 42  | 38  |
| 8   | 62  | 49  | 40  | 35  |  | 60  | 48  | 40  | 34  |  | 47  | 39  | 34  |  | 45  | 39  | 34  |  | 44  | 38  | 34  |
| 9   | 58  | 45  | 37  | 31  |  | 56  | 44  | 36  | 31  |  | 43  | 36  | 31  |  | 42  | 35  | 31  |  | 41  | 35  | 31  |
| 10  | 54  | 41  | 34  | 28  |  | 53  | 41  | 33  | 28  |  | 40  | 33  | 28  |  | 39  | 33  | 28  |  | 38  | 32  | 28  |

**AVERAGE LUMINANCE (cd/sqm):**

|     |       |
|-----|-------|
|     | 0°    |
| 0°  | 41648 |
| 5°  | 41670 |
| 10° | 41425 |
| 15° | 41052 |
| 20° | 40675 |
| 25° | 39972 |
| 30° | 39194 |
| 35° | 37960 |
| 40° | 36497 |
| 45° | 34694 |
| 50° | 32835 |
| 55° | 30823 |
| 60° | 28811 |
| 65° | 26664 |
| 70° | 24176 |
| 75° | 22063 |
| 80° | 20520 |
| 85° | 17996 |



TEST NUMBER: P96128  
CATALOG NUMBER: HLBFR407FS5MB-930

**ZONAL LUMENS:**

| Zone      | Lumens | % Fixture |
|-----------|--------|-----------|
| 0°-10°    | 25.8   | 3.7       |
| 10°-20°   | 73.4   | 10.6      |
| 20°-30°   | 109.7  | 15.9      |
| 30°-40°   | 127.5  | 18.5      |
| 40°-50°   | 124.3  | 18.0      |
| 50°-60°   | 103.9  | 15.1      |
| 60°-70°   | 73.1   | 10.6      |
| 70°-80°   | 40.1   | 5.8       |
| 80°-90°   | 11.9   | 1.7       |
| 90°-100°  | 0.0    | 0.0       |
| 100°-110° | 0.0    | 0.0       |
| 110°-120° | 0.0    | 0.0       |
| 120°-130° | 0.0    | 0.0       |
| 130°-140° | 0.0    | 0.0       |
| 140°-150° | 0.0    | 0.0       |
| 150°-160° | 0.0    | 0.0       |
| 160°-170° | 0.0    | 0.0       |
| 170°-180° | 0.0    | 0.0       |
| 0°-30°    | 209.0  | 30.3      |
| 0°-40°    | 336.5  | 48.8      |
| 0°-60°    | 564.7  | 81.9      |
| 0°-90°    | 689.8  | 100.0     |
| 90°-120°  | 0.0    | 0.0       |
| 90°-150°  | 0.0    | 0.0       |
| 90°-180°  | 0.0    | 0.0       |
| 0°-180°   | 689.8  | 100.0     |

**CANDELA DISTRIBUTION:**

|     | 0°  | Flux |
|-----|-----|------|
| 0°  | 274 |      |
| 5°  | 273 | 26   |
| 15° | 260 | 73   |
| 25° | 238 | 110  |
| 35° | 204 | 127  |
| 45° | 161 | 124  |
| 55° | 116 | 104  |
| 65° | 74  | 73   |
| 75° | 38  | 40   |
| 85° | 10  | 12   |
| 90° | 0   |      |



TEST NUMBER: P96128  
CATALOG NUMBER: HLBFR407FS5MB-930

**CANDELA DISTRIBUTION (FULL):**

|       | 0°    |
|-------|-------|
| 0°    | 273.5 |
| 2.5°  | 273.5 |
| 5°    | 272.6 |
| 7.5°  | 269.7 |
| 10°   | 267.9 |
| 12.5° | 264.1 |
| 15°   | 260.4 |
| 17.5° | 255.7 |
| 20°   | 251.0 |
| 22.5° | 245.4 |
| 25°   | 237.9 |
| 27.5° | 231.3 |
| 30°   | 222.9 |
| 32.5° | 213.5 |
| 35°   | 204.2 |
| 37.5° | 193.9 |
| 40°   | 183.6 |
| 42.5° | 172.3 |
| 45°   | 161.1 |
| 47.5° | 149.9 |
| 50°   | 138.6 |
| 52.5° | 127.4 |
| 55°   | 116.1 |
| 57.5° | 104.9 |
| 60°   | 94.6  |
| 62.5° | 83.4  |
| 65°   | 74.0  |
| 67.5° | 63.7  |
| 70°   | 54.3  |
| 72.5° | 45.9  |
| 75°   | 37.5  |
| 77.5° | 30.0  |
| 80°   | 23.4  |
| 82.5° | 16.9  |
| 85°   | 10.3  |
| 87.5° | 4.7   |
| 90°   | 0.0   |

LM-79-2019: Approved Method: Electrical and Photometric Measurements of Solid-State Lighting Products

Report Prepared for

Cooper Lighting Solutions

Halo Recessed

Report Number: SP1-2501-312-2

Test Date: 01/29/2025

Luminaire Tested: HLBFR609FS5-3000K

Data in this report applies to families of products including HLBFR609FS5-3000K

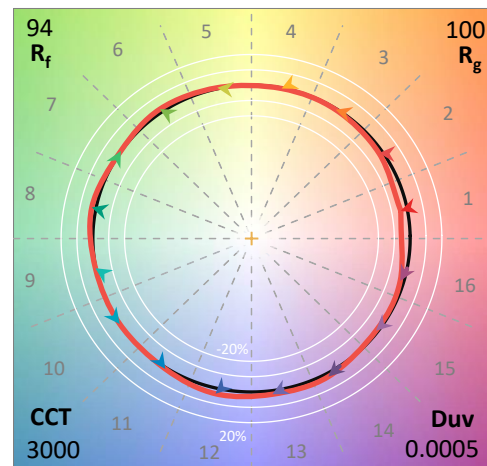
### Test Information

Test Method: LM-79-2019  
 Report Number: SP1-2501-312-2  
 Test Lab: COOPER LIGHTING SOLUTIONS  
 Photometer: SP1 - 76IN SPHERE  
 Measurement Geometry:  $4\pi$   
 Issue Date: 01/30/2025  
 Manufacturer: COOPER LIGHTING SOLUTIONS  
 Product Line: Halo Recessed  
 Catalog Number: **HLBFR609FS5-3000K**  
 Description: 6" Halo slim canless fire rated downlight White @ 3000K

### Spectral Parameters

CCT (K): 3000  
 CIE  $u'$ : 0.2504  
 CIE  $v'$ : 0.5220  
 Duv: 0.0005  
 CIE x: 0.4376  
 CIE y: 0.4055  
 CIE z: 0.1569  
 Peak Wavelength (nm): 615  
 Dominant Wavelength (nm): 582  
 Purity: 53.05694  
 R<sub>f</sub>: 94.3  
 R<sub>g</sub>: 100.2

CRI (Ra): 95.4  
 R1: 97.2  
 R2: 98.8  
 R3: 99.3  
 R4: 98.1  
 R5: 98.0  
 R6: 96.9  
 R7: 92.3  
 R8: 82.6  
 R9: 59.9  
 R10: 97.4  
 R11: 94.8  
 R12: 94.0  
 R13: 98.1  
 R14: 99.2  
 R15: 90.7

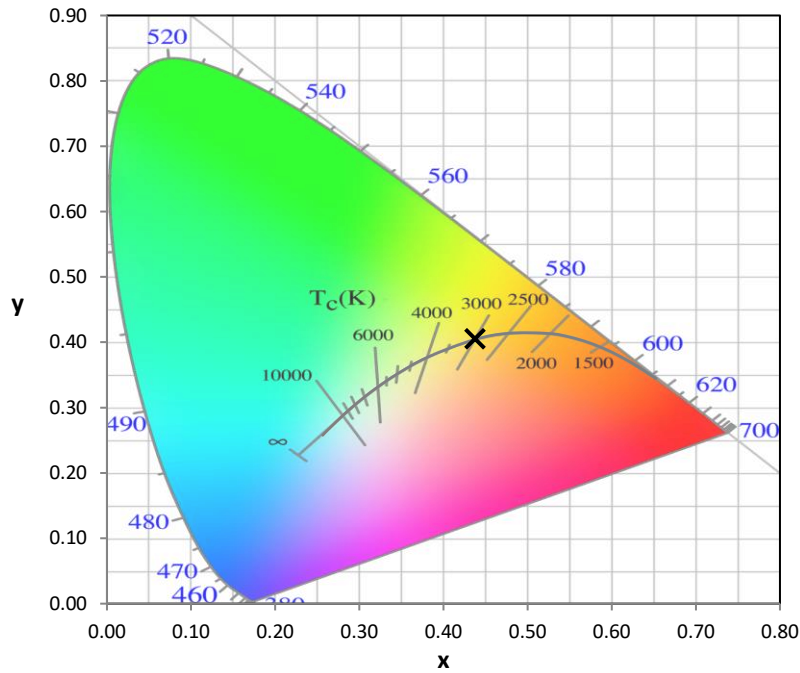


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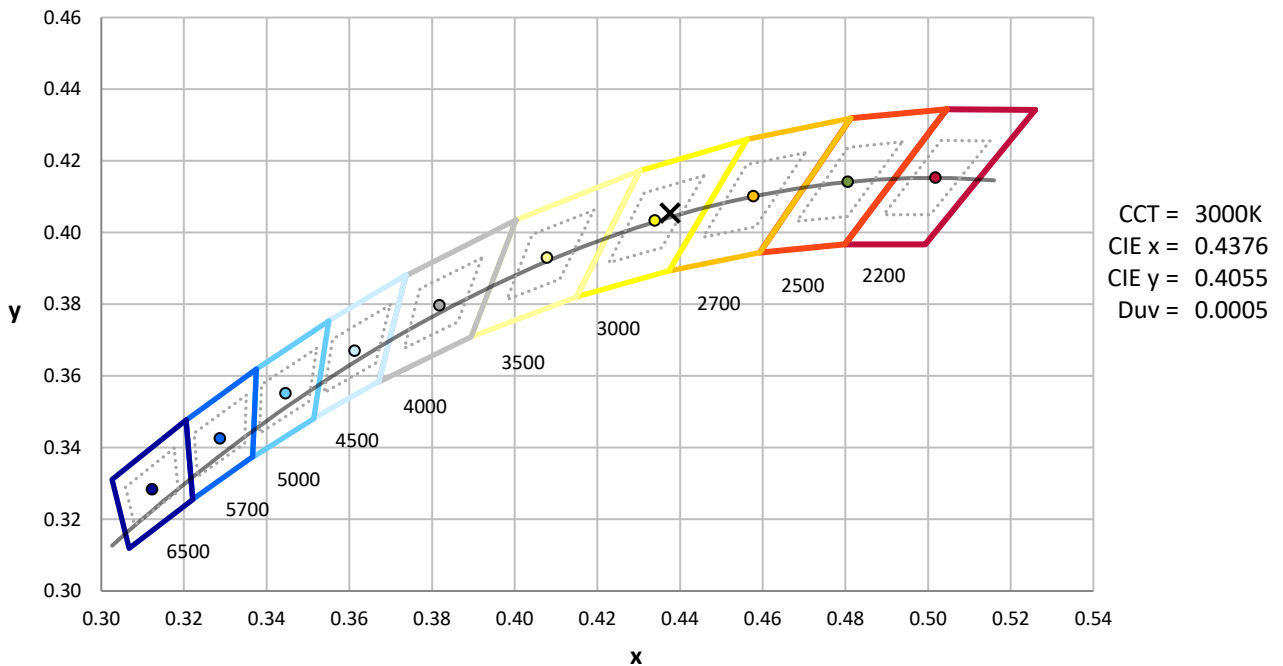
| Measurement and Test Equipment |                       |                  |                      |
|--------------------------------|-----------------------|------------------|----------------------|
| Instrument                     | Identification Number | Calibration Date | Calibration Due Date |
| Photometer                     | IN0058                | 12/16/2024       | 6/16/2025            |
| Power Meter                    | INXT2011004           | 1/21/2025        | 1/21/2026            |
| AC Power Source                | IN0063                | 10/22/2024       | 10/22/2025           |
| DC Power Source                | IN0208                | 10/22/2024       | 10/22/2025           |
| Sphere Thermometer             | IN0085                | 10/22/2024       | 10/22/2025           |
| Room Thermometer               | IN0046                | 10/22/2024       | 10/22/2025           |

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**CIE 1931 Chromaticity Diagram**



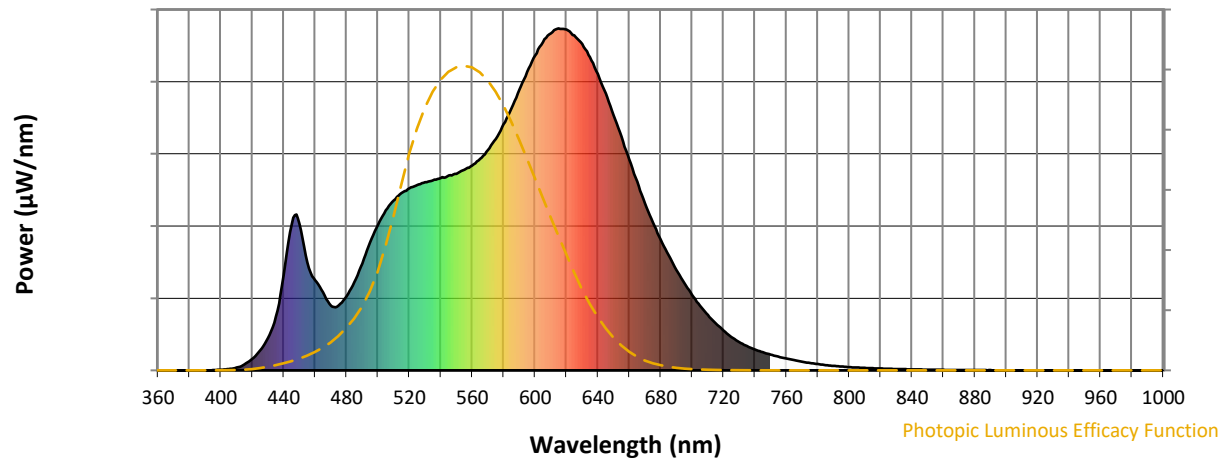
**CIE 1931 Chromaticity Diagram with 2017 ANSI 7-Step and 4-Step Quadrangles**



Point lies inside the ANSI 3000K 4-step quadrangle

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### Photopic Flux vs. Wavelength

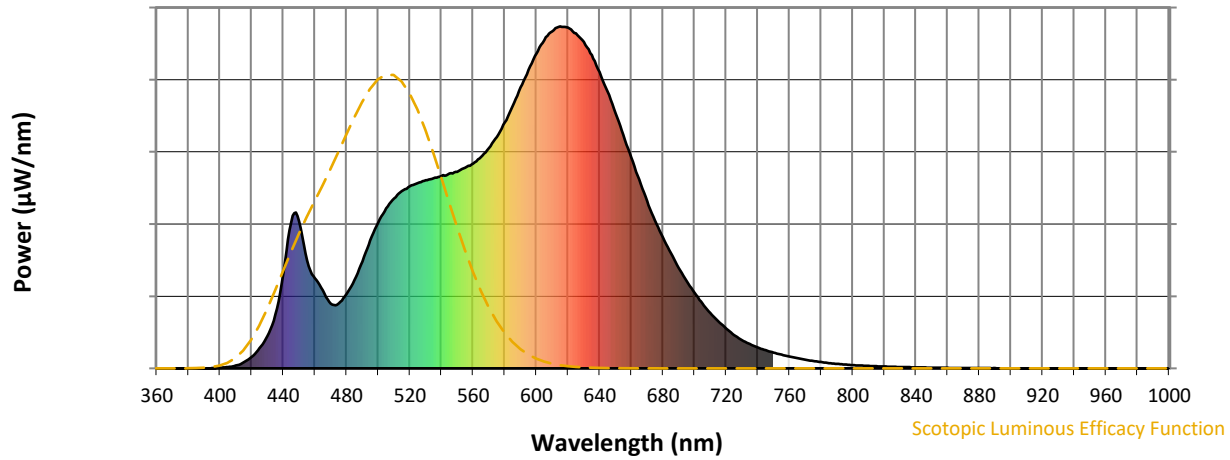


### Photopic Lumens: NR

| $\lambda$<br>(nm) | Power<br>$\text{W}/\text{nm}$ | Lumens<br>( $\phi/\text{nm}$ ) | $\lambda$<br>(nm) | Power<br>$\text{W}/\text{nm}$ | Lumens<br>( $\phi/\text{nm}$ ) | $\lambda$<br>(nm) | Power<br>$\text{W}/\text{nm}$ | Lumens<br>( $\phi/\text{nm}$ ) | $\lambda$<br>(nm) | Power<br>$\text{W}/\text{nm}$ | Lumens<br>( $\phi/\text{nm}$ ) | $\lambda$<br>(nm) | Power<br>$\text{W}/\text{nm}$ | Lumens<br>( $\phi/\text{nm}$ ) |
|-------------------|-------------------------------|--------------------------------|-------------------|-------------------------------|--------------------------------|-------------------|-------------------------------|--------------------------------|-------------------|-------------------------------|--------------------------------|-------------------|-------------------------------|--------------------------------|
| 360               | 0                             | NR                             | 490               | 313                           | NR                             | 620               | 997                           | NR                             | 750               | 46                            | NR                             | 880               | 1                             | NR                             |
| 365               | 0                             | NR                             | 495               | 375                           | NR                             | 625               | 980                           | NR                             | 755               | 40                            | NR                             | 885               | 1                             | NR                             |
| 370               | 0                             | NR                             | 500               | 425                           | NR                             | 630               | 955                           | NR                             | 760               | 35                            | NR                             | 890               | 1                             | NR                             |
| 375               | 0                             | NR                             | 505               | 468                           | NR                             | 635               | 916                           | NR                             | 765               | 30                            | NR                             | 895               | 0                             | NR                             |
| 380               | 0                             | NR                             | 510               | 497                           | NR                             | 640               | 866                           | NR                             | 770               | 25                            | NR                             | 900               | 0                             | NR                             |
| 385               | 0                             | NR                             | 515               | 518                           | NR                             | 645               | 810                           | NR                             | 775               | 21                            | NR                             | 905               | 0                             | NR                             |
| 390               | 0                             | NR                             | 520               | 533                           | NR                             | 650               | 746                           | NR                             | 780               | 18                            | NR                             | 910               | 0                             | NR                             |
| 395               | 1                             | NR                             | 525               | 541                           | NR                             | 655               | 683                           | NR                             | 785               | 15                            | NR                             | 915               | 0                             | NR                             |
| 400               | 2                             | NR                             | 530               | 550                           | NR                             | 660               | 617                           | NR                             | 790               | 13                            | NR                             | 920               | 0                             | NR                             |
| 405               | 4                             | NR                             | 535               | 556                           | NR                             | 665               | 552                           | NR                             | 795               | 11                            | NR                             | 925               | 0                             | NR                             |
| 410               | 8                             | NR                             | 540               | 563                           | NR                             | 670               | 489                           | NR                             | 800               | 10                            | NR                             | 930               | 0                             | NR                             |
| 415               | 17                            | NR                             | 545               | 570                           | NR                             | 675               | 432                           | NR                             | 805               | 8                             | NR                             | 935               | 0                             | NR                             |
| 420               | 34                            | NR                             | 550               | 575                           | NR                             | 680               | 383                           | NR                             | 810               | 7                             | NR                             | 940               | 0                             | NR                             |
| 425               | 59                            | NR                             | 555               | 586                           | NR                             | 685               | 337                           | NR                             | 815               | 6                             | NR                             | 945               | 0                             | NR                             |
| 430               | 94                            | NR                             | 560               | 599                           | NR                             | 690               | 294                           | NR                             | 820               | 5                             | NR                             | 950               | 0                             | NR                             |
| 435               | 158                           | NR                             | 565               | 618                           | NR                             | 695               | 256                           | NR                             | 825               | 5                             | NR                             | 955               | 0                             | NR                             |
| 440               | 279                           | NR                             | 570               | 644                           | NR                             | 700               | 220                           | NR                             | 830               | 4                             | NR                             | 960               | 0                             | NR                             |
| 445               | 426                           | NR                             | 575               | 677                           | NR                             | 705               | 189                           | NR                             | 835               | 3                             | NR                             | 965               | 0                             | NR                             |
| 450               | 430                           | NR                             | 580               | 719                           | NR                             | 710               | 162                           | NR                             | 840               | 3                             | NR                             | 970               | 0                             | NR                             |
| 455               | 316                           | NR                             | 585               | 766                           | NR                             | 715               | 138                           | NR                             | 845               | 3                             | NR                             | 975               | 0                             | NR                             |
| 460               | 264                           | NR                             | 590               | 821                           | NR                             | 720               | 117                           | NR                             | 850               | 2                             | NR                             | 980               | 0                             | NR                             |
| 465               | 229                           | NR                             | 595               | 873                           | NR                             | 725               | 98                            | NR                             | 855               | 2                             | NR                             | 985               | 0                             | NR                             |
| 470               | 189                           | NR                             | 600               | 921                           | NR                             | 730               | 82                            | NR                             | 860               | 1                             | NR                             | 990               | 0                             | NR                             |
| 475               | 190                           | NR                             | 605               | 959                           | NR                             | 735               | 71                            | NR                             | 865               | 1                             | NR                             | 995               | 0                             | NR                             |
| 480               | 217                           | NR                             | 610               | 985                           | NR                             | 740               | 61                            | NR                             | 870               | 1                             | NR                             | 1000              | 0                             | NR                             |
| 485               | 258                           | NR                             | 615               | 1000                          | NR                             | 745               | 53                            | NR                             | 875               | 1                             | NR                             |                   |                               |                                |

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### Scotopic Flux vs. Wavelength



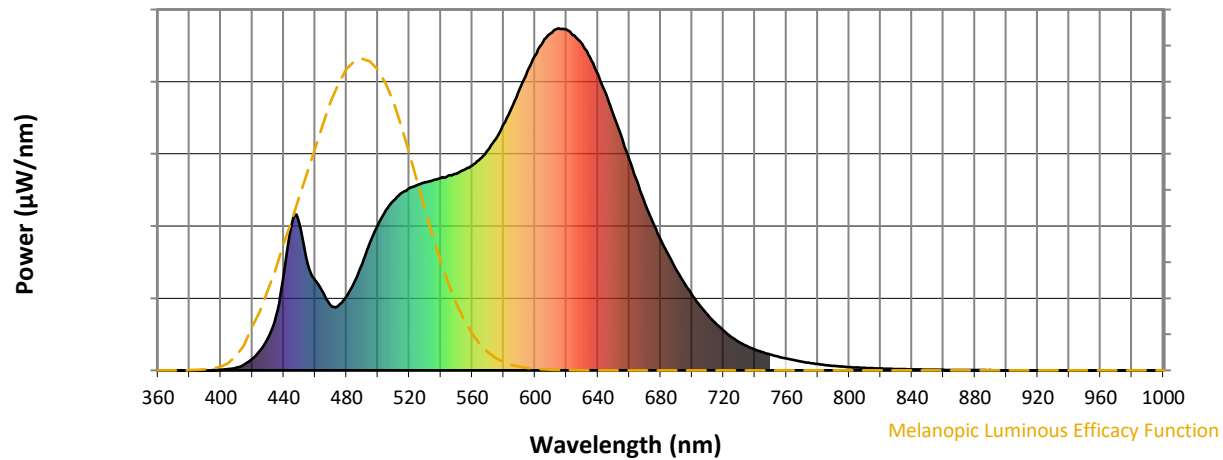
Scotopic Lumens: NR

S/P: 1.46

| λ<br>(nm) | Power<br>W <sup>^</sup> /nm | Lumens<br>(φ/nm) | λ<br>(nm) | Power<br>W <sup>^</sup> /nm | Lumens<br>(φ/nm) | λ<br>(nm) | Power<br>W <sup>^</sup> /nm | Lumens<br>(φ/nm) | λ<br>(nm) | Power<br>W <sup>^</sup> /nm | Lumens<br>(φ/nm) | λ<br>(nm) | Power<br>W <sup>^</sup> /nm | Lumens<br>(φ/nm) |
|-----------|-----------------------------|------------------|-----------|-----------------------------|------------------|-----------|-----------------------------|------------------|-----------|-----------------------------|------------------|-----------|-----------------------------|------------------|
| 360       | 0                           | NR               | 490       | 313                         | NR               | 620       | 997                         | NR               | 750       | 46                          | NR               | 880       | 1                           | NR               |
| 365       | 0                           | NR               | 495       | 375                         | NR               | 625       | 980                         | NR               | 755       | 40                          | NR               | 885       | 1                           | NR               |
| 370       | 0                           | NR               | 500       | 425                         | NR               | 630       | 955                         | NR               | 760       | 35                          | NR               | 890       | 1                           | NR               |
| 375       | 0                           | NR               | 505       | 468                         | NR               | 635       | 916                         | NR               | 765       | 30                          | NR               | 895       | 0                           | NR               |
| 380       | 0                           | NR               | 510       | 497                         | NR               | 640       | 866                         | NR               | 770       | 25                          | NR               | 900       | 0                           | NR               |
| 385       | 0                           | NR               | 515       | 518                         | NR               | 645       | 810                         | NR               | 775       | 21                          | NR               | 905       | 0                           | NR               |
| 390       | 0                           | NR               | 520       | 533                         | NR               | 650       | 746                         | NR               | 780       | 18                          | NR               | 910       | 0                           | NR               |
| 395       | 1                           | NR               | 525       | 541                         | NR               | 655       | 683                         | NR               | 785       | 15                          | NR               | 915       | 0                           | NR               |
| 400       | 2                           | NR               | 530       | 550                         | NR               | 660       | 617                         | NR               | 790       | 13                          | NR               | 920       | 0                           | NR               |
| 405       | 4                           | NR               | 535       | 556                         | NR               | 665       | 552                         | NR               | 795       | 11                          | NR               | 925       | 0                           | NR               |
| 410       | 8                           | NR               | 540       | 563                         | NR               | 670       | 489                         | NR               | 800       | 10                          | NR               | 930       | 0                           | NR               |
| 415       | 17                          | NR               | 545       | 570                         | NR               | 675       | 432                         | NR               | 805       | 8                           | NR               | 935       | 0                           | NR               |
| 420       | 34                          | NR               | 550       | 575                         | NR               | 680       | 383                         | NR               | 810       | 7                           | NR               | 940       | 0                           | NR               |
| 425       | 59                          | NR               | 555       | 586                         | NR               | 685       | 337                         | NR               | 815       | 6                           | NR               | 945       | 0                           | NR               |
| 430       | 94                          | NR               | 560       | 599                         | NR               | 690       | 294                         | NR               | 820       | 5                           | NR               | 950       | 0                           | NR               |
| 435       | 158                         | NR               | 565       | 618                         | NR               | 695       | 256                         | NR               | 825       | 5                           | NR               | 955       | 0                           | NR               |
| 440       | 279                         | NR               | 570       | 644                         | NR               | 700       | 220                         | NR               | 830       | 4                           | NR               | 960       | 0                           | NR               |
| 445       | 426                         | NR               | 575       | 677                         | NR               | 705       | 189                         | NR               | 835       | 3                           | NR               | 965       | 0                           | NR               |
| 450       | 430                         | NR               | 580       | 719                         | NR               | 710       | 162                         | NR               | 840       | 3                           | NR               | 970       | 0                           | NR               |
| 455       | 316                         | NR               | 585       | 766                         | NR               | 715       | 138                         | NR               | 845       | 3                           | NR               | 975       | 0                           | NR               |
| 460       | 264                         | NR               | 590       | 821                         | NR               | 720       | 117                         | NR               | 850       | 2                           | NR               | 980       | 0                           | NR               |
| 465       | 229                         | NR               | 595       | 873                         | NR               | 725       | 98                          | NR               | 855       | 2                           | NR               | 985       | 0                           | NR               |
| 470       | 189                         | NR               | 600       | 921                         | NR               | 730       | 82                          | NR               | 860       | 1                           | NR               | 990       | 0                           | NR               |
| 475       | 190                         | NR               | 605       | 959                         | NR               | 735       | 71                          | NR               | 865       | 1                           | NR               | 995       | 0                           | NR               |
| 480       | 217                         | NR               | 610       | 985                         | NR               | 740       | 61                          | NR               | 870       | 1                           | NR               | 1000      | 0                           | NR               |
| 485       | 258                         | NR               | 615       | 1000                        | NR               | 745       | 53                          | NR               | 875       | 1                           | NR               |           |                             |                  |

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### Melanopic Flux vs. Wavelength

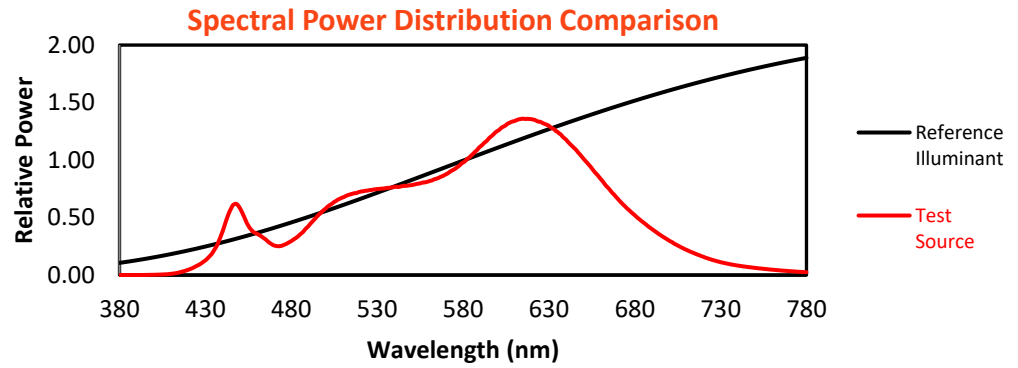
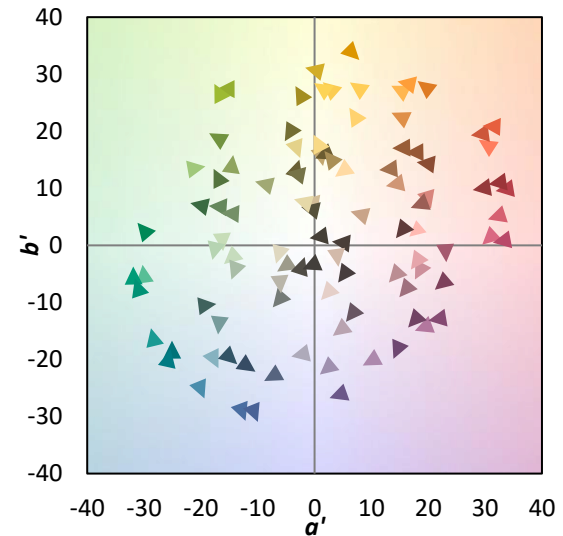
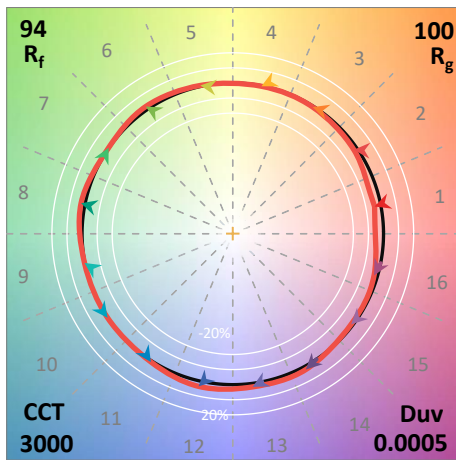
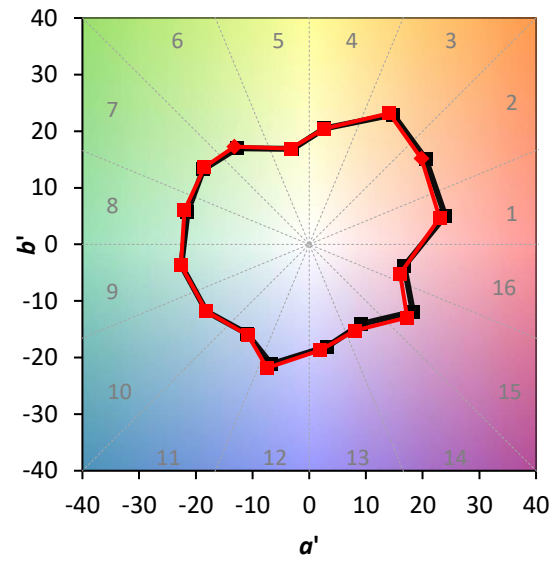
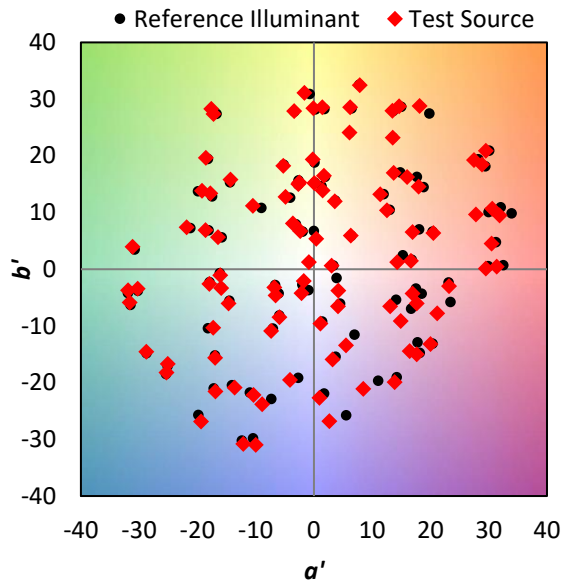


Melanopic Lumens: NR

M/P: 2.85

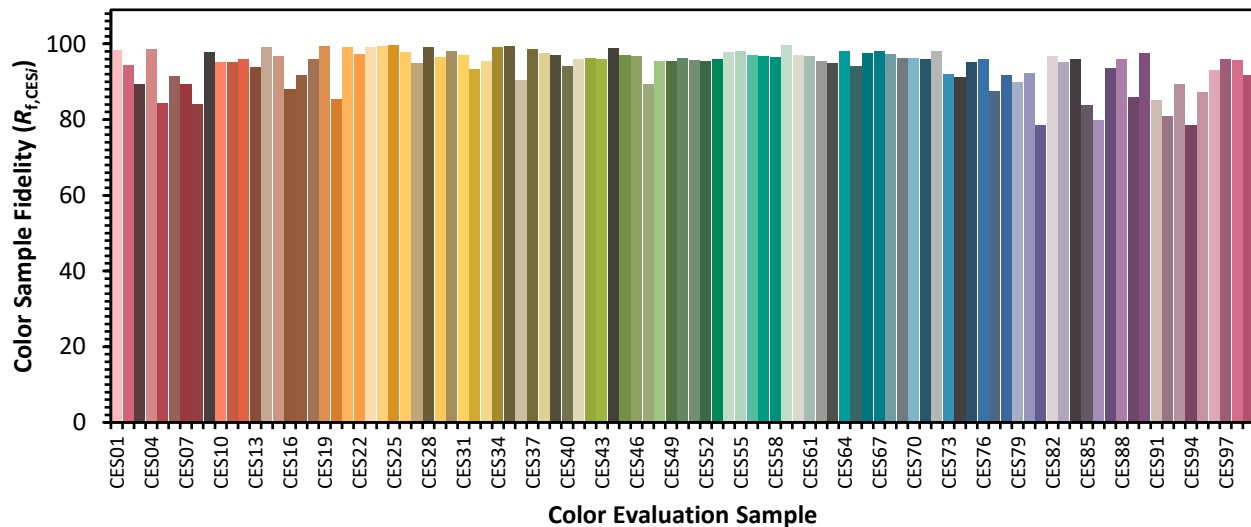
| $\lambda$<br>(nm) | Power<br>$\text{W}^{\wedge}/\text{nm}$ | Lumens<br>( $\phi/\text{nm}$ ) | $\lambda$<br>(nm) | Power<br>$\text{W}^{\wedge}/\text{nm}$ | Lumens<br>( $\phi/\text{nm}$ ) | $\lambda$<br>(nm) | Power<br>$\text{W}^{\wedge}/\text{nm}$ | Lumens<br>( $\phi/\text{nm}$ ) | $\lambda$<br>(nm) | Power<br>$\text{W}^{\wedge}/\text{nm}$ | Lumens<br>( $\phi/\text{nm}$ ) | $\lambda$<br>(nm) | Power<br>$\text{W}^{\wedge}/\text{nm}$ | Lumens<br>( $\phi/\text{nm}$ ) |
|-------------------|----------------------------------------|--------------------------------|-------------------|----------------------------------------|--------------------------------|-------------------|----------------------------------------|--------------------------------|-------------------|----------------------------------------|--------------------------------|-------------------|----------------------------------------|--------------------------------|
| 360               | 0                                      | NR                             | 490               | 313                                    | NR                             | 620               | 997                                    | NR                             | 750               | 46                                     | NR                             | 880               | 1                                      | NR                             |
| 365               | 0                                      | NR                             | 495               | 375                                    | NR                             | 625               | 980                                    | NR                             | 755               | 40                                     | NR                             | 885               | 1                                      | NR                             |
| 370               | 0                                      | NR                             | 500               | 425                                    | NR                             | 630               | 955                                    | NR                             | 760               | 35                                     | NR                             | 890               | 1                                      | NR                             |
| 375               | 0                                      | NR                             | 505               | 468                                    | NR                             | 635               | 916                                    | NR                             | 765               | 30                                     | NR                             | 895               | 0                                      | NR                             |
| 380               | 0                                      | NR                             | 510               | 497                                    | NR                             | 640               | 866                                    | NR                             | 770               | 25                                     | NR                             | 900               | 0                                      | NR                             |
| 385               | 0                                      | NR                             | 515               | 518                                    | NR                             | 645               | 810                                    | NR                             | 775               | 21                                     | NR                             | 905               | 0                                      | NR                             |
| 390               | 0                                      | NR                             | 520               | 533                                    | NR                             | 650               | 746                                    | NR                             | 780               | 18                                     | NR                             | 910               | 0                                      | NR                             |
| 395               | 1                                      | NR                             | 525               | 541                                    | NR                             | 655               | 683                                    | NR                             | 785               | 15                                     | NR                             | 915               | 0                                      | NR                             |
| 400               | 2                                      | NR                             | 530               | 550                                    | NR                             | 660               | 617                                    | NR                             | 790               | 13                                     | NR                             | 920               | 0                                      | NR                             |
| 405               | 4                                      | NR                             | 535               | 556                                    | NR                             | 665               | 552                                    | NR                             | 795               | 11                                     | NR                             | 925               | 0                                      | NR                             |
| 410               | 8                                      | NR                             | 540               | 563                                    | NR                             | 670               | 489                                    | NR                             | 800               | 10                                     | NR                             | 930               | 0                                      | NR                             |
| 415               | 17                                     | NR                             | 545               | 570                                    | NR                             | 675               | 432                                    | NR                             | 805               | 8                                      | NR                             | 935               | 0                                      | NR                             |
| 420               | 34                                     | NR                             | 550               | 575                                    | NR                             | 680               | 383                                    | NR                             | 810               | 7                                      | NR                             | 940               | 0                                      | NR                             |
| 425               | 59                                     | NR                             | 555               | 586                                    | NR                             | 685               | 337                                    | NR                             | 815               | 6                                      | NR                             | 945               | 0                                      | NR                             |
| 430               | 94                                     | NR                             | 560               | 599                                    | NR                             | 690               | 294                                    | NR                             | 820               | 5                                      | NR                             | 950               | 0                                      | NR                             |
| 435               | 158                                    | NR                             | 565               | 618                                    | NR                             | 695               | 256                                    | NR                             | 825               | 5                                      | NR                             | 955               | 0                                      | NR                             |
| 440               | 279                                    | NR                             | 570               | 644                                    | NR                             | 700               | 220                                    | NR                             | 830               | 4                                      | NR                             | 960               | 0                                      | NR                             |
| 445               | 426                                    | NR                             | 575               | 677                                    | NR                             | 705               | 189                                    | NR                             | 835               | 3                                      | NR                             | 965               | 0                                      | NR                             |
| 450               | 430                                    | NR                             | 580               | 719                                    | NR                             | 710               | 162                                    | NR                             | 840               | 3                                      | NR                             | 970               | 0                                      | NR                             |
| 455               | 316                                    | NR                             | 585               | 766                                    | NR                             | 715               | 138                                    | NR                             | 845               | 3                                      | NR                             | 975               | 0                                      | NR                             |
| 460               | 264                                    | NR                             | 590               | 821                                    | NR                             | 720               | 117                                    | NR                             | 850               | 2                                      | NR                             | 980               | 0                                      | NR                             |
| 465               | 229                                    | NR                             | 595               | 873                                    | NR                             | 725               | 98                                     | NR                             | 855               | 2                                      | NR                             | 985               | 0                                      | NR                             |
| 470               | 189                                    | NR                             | 600               | 921                                    | NR                             | 730               | 82                                     | NR                             | 860               | 1                                      | NR                             | 990               | 0                                      | NR                             |
| 475               | 190                                    | NR                             | 605               | 959                                    | NR                             | 735               | 71                                     | NR                             | 865               | 1                                      | NR                             | 995               | 0                                      | NR                             |
| 480               | 217                                    | NR                             | 610               | 985                                    | NR                             | 740               | 61                                     | NR                             | 870               | 1                                      | NR                             | 1000              | 0                                      | NR                             |
| 485               | 258                                    | NR                             | 615               | 1000                                   | NR                             | 745               | 53                                     | NR                             | 875               | 1                                      | NR                             |                   |                                        |                                |

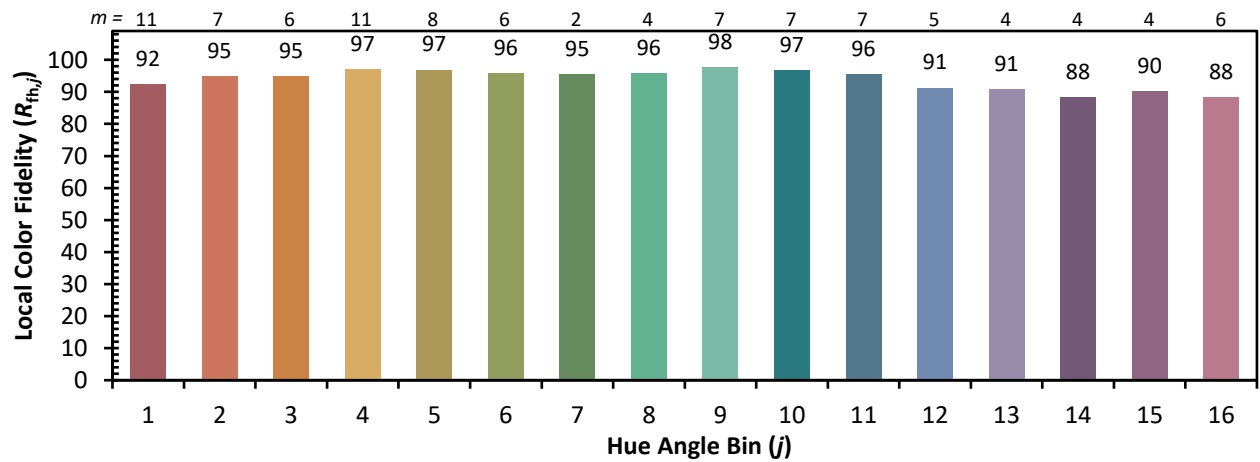
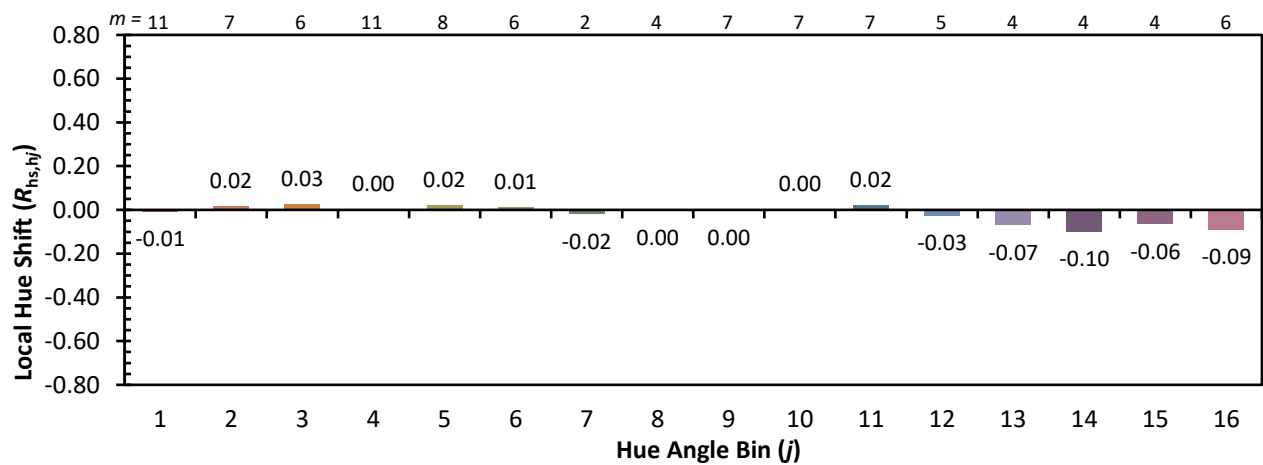
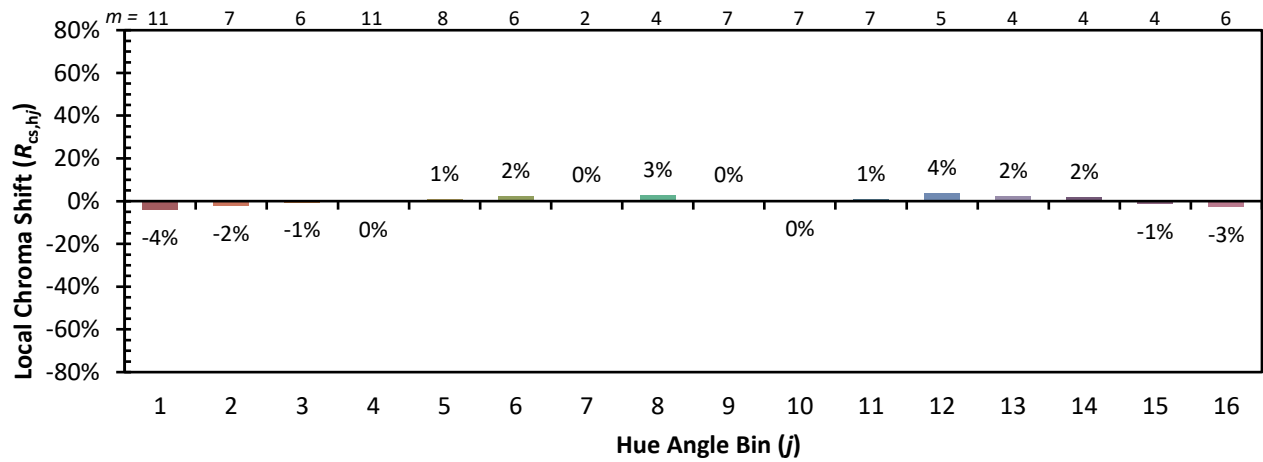
REPORT NUMBER: SP1-2501-312-2

**TM-30-18**
**Summary**
 $R_f = 94.3$   
 $R_g = 100.2$   
 CIE  $R_a = 95.4$   
 $R_9 = 59.9$ 

**Color Vector Graphics**


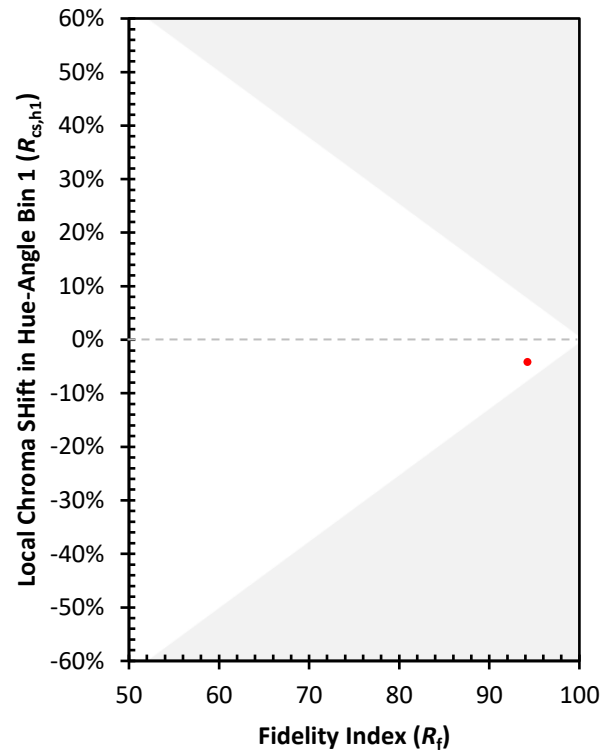
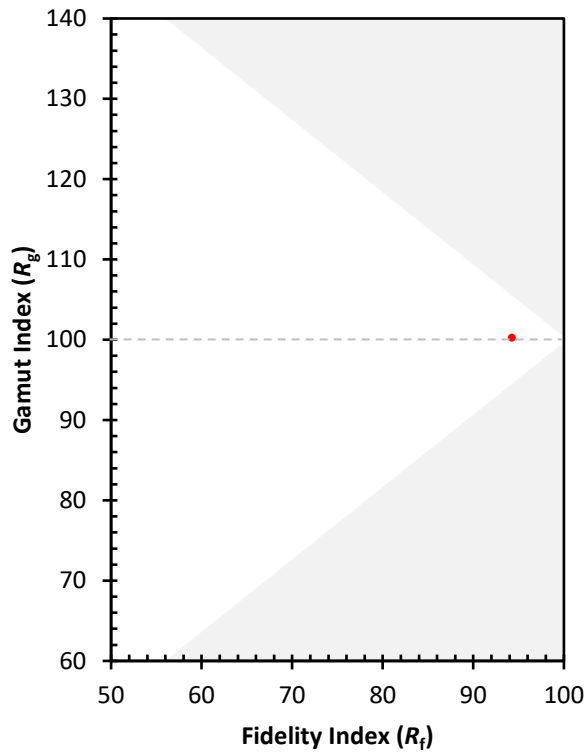
**Individual Sample Fidelity Index ( $R_{f,i}$ )**

|            |            |             |            |
|------------|------------|-------------|------------|
| CES01 = 86 | CES26 = 98 | CES51 = 96  | CES76 = 96 |
| CES02 = 63 | CES27 = 95 | CES52 = 95  | CES77 = 88 |
| CES03 = 32 | CES28 = 99 | CES53 = 96  | CES78 = 92 |
| CES04 = 70 | CES29 = 96 | CES54 = 98  | CES79 = 90 |
| CES05 = 51 | CES30 = 98 | CES55 = 98  | CES80 = 92 |
| CES06 = 51 | CES31 = 97 | CES56 = 97  | CES81 = 78 |
| CES07 = 43 | CES32 = 93 | CES57 = 97  | CES82 = 97 |
| CES08 = 42 | CES33 = 95 | CES58 = 97  | CES83 = 95 |
| CES09 = 29 | CES34 = 99 | CES59 = 100 | CES84 = 96 |
| CES10 = 76 | CES35 = 99 | CES60 = 97  | CES85 = 84 |
| CES11 = 59 | CES36 = 91 | CES61 = 97  | CES86 = 80 |
| CES12 = 65 | CES37 = 99 | CES62 = 96  | CES87 = 94 |
| CES13 = 44 | CES38 = 98 | CES63 = 95  | CES88 = 96 |
| CES14 = 74 | CES39 = 97 | CES64 = 98  | CES89 = 86 |
| CES15 = 72 | CES40 = 94 | CES65 = 94  | CES90 = 97 |
| CES16 = 48 | CES41 = 96 | CES66 = 98  | CES91 = 85 |
| CES17 = 50 | CES42 = 96 | CES67 = 98  | CES92 = 81 |
| CES18 = 57 | CES43 = 96 | CES68 = 97  | CES93 = 89 |
| CES19 = 72 | CES44 = 99 | CES69 = 96  | CES94 = 79 |
| CES20 = 67 | CES45 = 97 | CES70 = 96  | CES95 = 87 |
| CES21 = 86 | CES46 = 97 | CES71 = 96  | CES96 = 93 |
| CES22 = 79 | CES47 = 89 | CES72 = 98  | CES97 = 96 |
| CES23 = 91 | CES48 = 95 | CES73 = 92  | CES98 = 96 |
| CES24 = 90 | CES49 = 95 | CES74 = 91  | CES99 = 92 |
| CES25 = 71 | CES50 = 96 | CES75 = 95  |            |



**Color Rendition by Hue-Angle Bin**


**Measure Comparisons**



(END OF REPORT)