

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: FAIL-SAFE

Report Number: P734321

Luminaire Tested: **24FCZ2-35HE-HRP-B2750-W2D-CP187-2700K**

Issue Date: 1/5/2024



**Test Information**

Test Method: LM-79-08  
Report Number: P734321  
TEST IS SCALED FROM IESNA LM-79-08 TEST DATA (P295011)  
Test Lab: INNOVATIONS CENTER(G3)  
Issue Date: 1/5/2024  
Manufacturer: COOPER LIGHTING SOLUTIONS (FORMERLY EATON)  
Product Line: FAIL-SAFE  
Catalog Number: 24FCZ2-35HE-HRP-B2750-W2D-CP187-2700K  
Description: 2X4 3500 LUMEN SEALED CRUZE TROFFER WITH BIO UP LEDS AT 2700K CCT  
AND HRP LENS, WITH, CP187 BOTTOM LENS  
  
Light Source: -  
Ballast/Driver: -

**Summary**

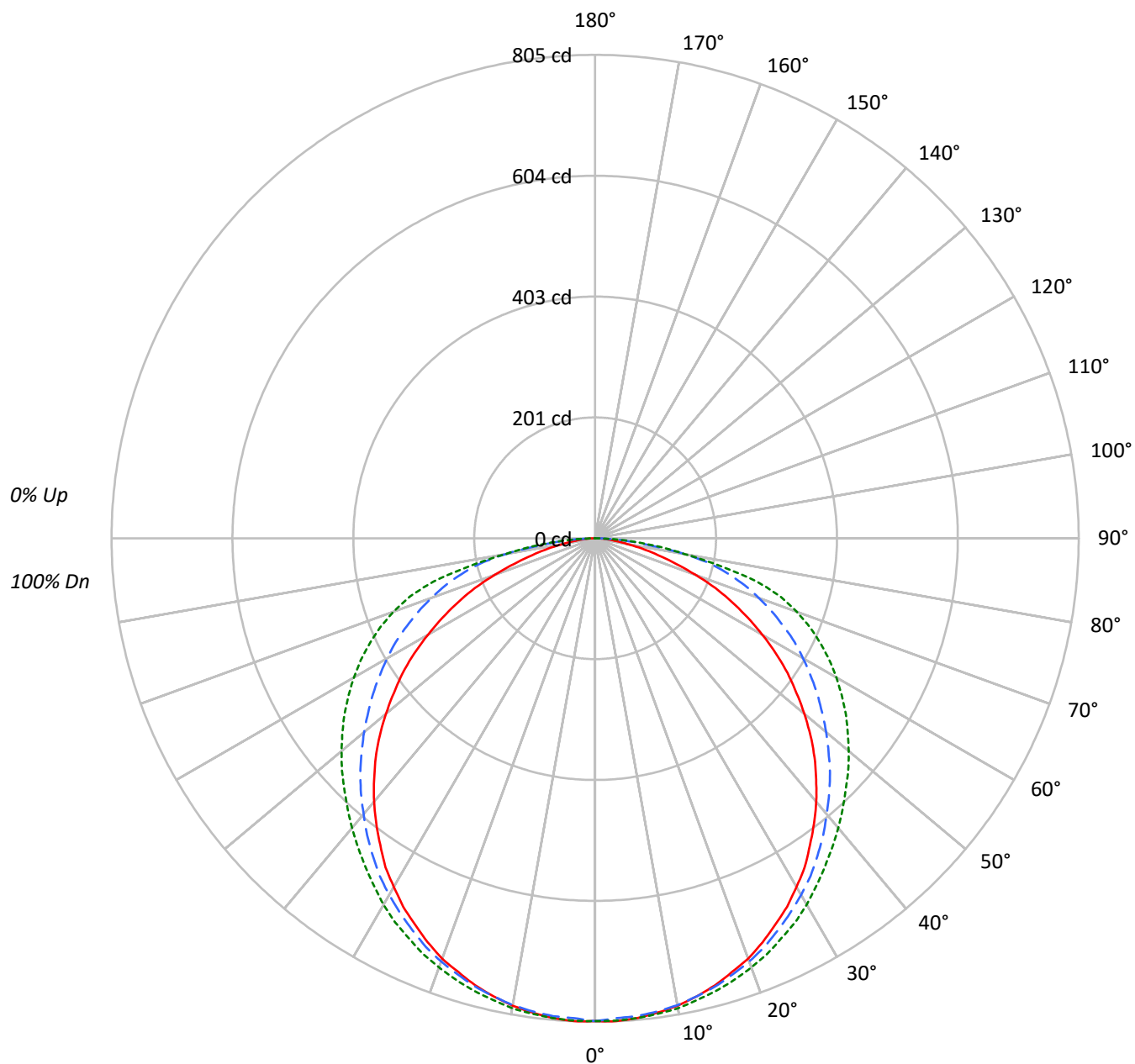
Lumens per Lamp: N/A  
Luminaire Lumens: 2478.0 lumens  
Efficiency: N/A  
Efficacy: 95.3 lumens/watt  
Spacing Criteria (0/90/45): 1.24 / 1.3 / 1.4  
Luminous Opening: Rectangular (W 1.92' x L: 3.98' x H: 0')  
CIE Type: Direct

Input Watts (W): 26  
Input Voltage (V): NR  
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

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CATALOG NUMBER: 24FCZ2-35HE-HRP-B2750-W2D-CP187-2700K

### Luminous Intensity Polar Plot





TEST NUMBER: P734321

CATALOG NUMBER: 24FCZ2-35HE-HRP-B2750-W2D-CP187-2700K

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

|     |     |     |     |     |  |     |     |     |     |  |     |     |     |  |     |     |     |  |     |     |     |
|-----|-----|-----|-----|-----|--|-----|-----|-----|-----|--|-----|-----|-----|--|-----|-----|-----|--|-----|-----|-----|
| RF  | 20  |     |     |     |  | 20  |     |     |     |  | 20  |     |     |  |     | 20  |     |  |     |     | 20  |
| RC  | 80  |     |     |     |  | 70  |     |     |     |  | 50  |     |     |  |     | 30  |     |  |     |     | 10  |
| 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   | 108 | 103 | 98  | 94  |  | 105 | 101 | 96  | 93  |  | 96  | 93  | 90  |  | 92  | 90  | 87  |  | 89  | 86  | 84  |
| 2   | 98  | 89  | 82  | 76  |  | 95  | 87  | 80  | 75  |  | 83  | 78  | 73  |  | 80  | 75  | 71  |  | 77  | 73  | 70  |
| 3   | 89  | 78  | 69  | 62  |  | 86  | 76  | 68  | 62  |  | 73  | 66  | 61  |  | 70  | 64  | 59  |  | 68  | 63  | 58  |
| 4   | 81  | 68  | 59  | 52  |  | 79  | 67  | 59  | 52  |  | 65  | 57  | 51  |  | 62  | 56  | 50  |  | 60  | 54  | 50  |
| 5   | 74  | 61  | 52  | 45  |  | 72  | 60  | 51  | 45  |  | 58  | 50  | 44  |  | 56  | 49  | 44  |  | 54  | 48  | 43  |
| 6   | 69  | 55  | 46  | 39  |  | 67  | 54  | 45  | 39  |  | 52  | 44  | 38  |  | 50  | 43  | 38  |  | 49  | 42  | 38  |
| 7   | 63  | 50  | 41  | 34  |  | 62  | 49  | 40  | 34  |  | 47  | 39  | 34  |  | 46  | 39  | 34  |  | 44  | 38  | 33  |
| 8   | 59  | 45  | 36  | 30  |  | 57  | 44  | 36  | 30  |  | 43  | 36  | 30  |  | 42  | 35  | 30  |  | 41  | 34  | 30  |
| 9   | 55  | 41  | 33  | 27  |  | 54  | 41  | 33  | 27  |  | 40  | 32  | 27  |  | 39  | 32  | 27  |  | 38  | 31  | 27  |
| 10  | 52  | 38  | 30  | 25  |  | 50  | 38  | 30  | 25  |  | 37  | 30  | 25  |  | 36  | 29  | 24  |  | 35  | 29  | 24  |

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

|     | 0°   | 45°  | 90°  |
|-----|------|------|------|
| 0°  | 1135 | 1135 | 1135 |
| 5°  | 1136 | 1132 | 1136 |
| 10° | 1133 | 1131 | 1139 |
| 15° | 1126 | 1129 | 1140 |
| 20° | 1119 | 1126 | 1142 |
| 25° | 1105 | 1121 | 1144 |
| 30° | 1092 | 1117 | 1148 |
| 35° | 1074 | 1112 | 1149 |
| 40° | 1055 | 1105 | 1160 |
| 45° | 1031 | 1104 | 1178 |
| 50° | 998  | 1102 | 1210 |
| 55° | 962  | 1110 | 1253 |
| 60° | 908  | 1127 | 1309 |
| 65° | 839  | 1154 | 1382 |
| 70° | 732  | 1194 | 1473 |
| 75° | 594  | 1256 | 1521 |
| 80° | 438  | 1231 | 1231 |
| 85° | 337  | 908  | 1023 |



TEST NUMBER: P734321

CATALOG NUMBER: 24FCZ2-35HE-HRP-B2750-W2D-CP187-2700K

**ZONAL LUMENS:**

| Zone      | Lumens | % Fixture |
|-----------|--------|-----------|
| 0°-10°    | 76.2   | 3.1       |
| 10°-20°   | 218.7  | 8.8       |
| 20°-30°   | 333.0  | 13.4      |
| 30°-40°   | 404.3  | 16.3      |
| 40°-50°   | 427.1  | 17.2      |
| 50°-60°   | 403.0  | 16.3      |
| 60°-70°   | 335.1  | 13.5      |
| 70°-80°   | 220.5  | 8.9       |
| 80°-90°   | 60.1   | 2.4       |
| 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°    | 627.8  | 25.3      |
| 0°-40°    | 1032.1 | 41.7      |
| 0°-60°    | 1862.3 | 75.2      |
| 0°-90°    | 2478.0 | 100.0     |
| 90°-120°  | 0.0    | 0.0       |
| 90°-150°  | 0.0    | 0.0       |
| 90°-180°  | 0.0    | 0.0       |
| 0°-180°   | 2478.0 | 100.0     |

**CANDELA DISTRIBUTION:**

|     | 0°  | 22.5° | 45° | 67.5° | 90° | Flux |
|-----|-----|-------|-----|-------|-----|------|
| 0°  | 804 | 804   | 804 | 804   | 804 |      |
| 5°  | 802 | 802   | 799 | 802   | 802 | 76   |
| 15° | 771 | 772   | 773 | 780   | 780 | 217  |
| 25° | 710 | 714   | 720 | 732   | 734 | 327  |
| 35° | 624 | 631   | 645 | 662   | 667 | 390  |
| 45° | 517 | 527   | 553 | 580   | 590 | 398  |
| 55° | 391 | 408   | 451 | 494   | 509 | 348  |
| 65° | 251 | 280   | 346 | 396   | 414 | 248  |
| 75° | 109 | 159   | 230 | 273   | 279 | 117  |
| 85° | 21  | 46    | 56  | 62    | 63  | 25   |
| 90° | 0   | 0     | 0   | 0     | 0   |      |



TEST NUMBER: P734321

CATALOG NUMBER: 24FCZ2-35HE-HRP-B2750-W2D-CP187-2700K

**CANDELA DISTRIBUTION (FULL):**

|       | 0°    | 22.5° | 45°   | 67.5° | 90°   |
|-------|-------|-------|-------|-------|-------|
| 0°    | 804.0 | 804.0 | 804.0 | 804.0 | 804.0 |
| 2.5°  | 805.0 | 804.0 | 799.8 | 804.0 | 804.0 |
| 5°    | 802.0 | 802.0 | 798.8 | 802.0 | 802.0 |
| 7.5°  | 796.7 | 796.7 | 794.7 | 798.8 | 798.8 |
| 10°   | 790.5 | 790.5 | 789.4 | 794.7 | 794.7 |
| 12.5° | 781.2 | 782.2 | 781.2 | 787.3 | 787.3 |
| 15°   | 770.8 | 771.8 | 772.8 | 780.2 | 780.2 |
| 17.5° | 757.3 | 759.4 | 761.4 | 769.8 | 770.8 |
| 20°   | 744.9 | 745.9 | 750.0 | 759.4 | 760.4 |
| 22.5° | 728.2 | 731.4 | 736.5 | 745.9 | 749.0 |
| 25°   | 709.6 | 713.7 | 720.0 | 732.4 | 734.5 |
| 27.5° | 691.9 | 695.1 | 703.3 | 716.8 | 721.0 |
| 30°   | 670.2 | 675.3 | 685.7 | 699.2 | 704.3 |
| 32.5° | 649.4 | 654.6 | 667.0 | 681.6 | 685.7 |
| 35°   | 623.5 | 630.7 | 645.3 | 661.9 | 667.0 |
| 37.5° | 598.6 | 605.8 | 623.5 | 642.1 | 648.4 |
| 40°   | 572.6 | 580.9 | 599.6 | 621.5 | 629.7 |
| 42.5° | 544.6 | 556.0 | 576.8 | 600.7 | 610.0 |
| 45°   | 516.6 | 527.0 | 552.9 | 579.9 | 590.3 |
| 47.5° | 486.5 | 498.9 | 527.0 | 559.1 | 571.6 |
| 50°   | 454.4 | 469.9 | 502.1 | 537.4 | 550.9 |
| 52.5° | 422.2 | 439.8 | 476.1 | 515.6 | 530.1 |
| 55°   | 391.0 | 407.7 | 451.2 | 493.8 | 509.3 |
| 57.5° | 356.9 | 377.6 | 425.3 | 471.0 | 486.5 |
| 60°   | 321.6 | 344.5 | 399.4 | 447.1 | 463.7 |
| 62.5° | 286.4 | 312.3 | 374.5 | 422.2 | 439.8 |
| 65°   | 251.1 | 280.1 | 345.5 | 396.3 | 413.9 |
| 67.5° | 216.8 | 249.0 | 318.4 | 369.4 | 386.9 |
| 70°   | 177.4 | 217.8 | 289.4 | 339.2 | 356.9 |
| 72.5° | 141.1 | 187.8 | 261.5 | 308.2 | 323.7 |
| 75°   | 108.9 | 158.7 | 230.3 | 272.9 | 279.0 |
| 77.5° | 79.9  | 129.7 | 198.1 | 212.7 | 213.7 |
| 80°   | 53.9  | 103.8 | 151.5 | 149.3 | 151.5 |
| 82.5° | 35.3  | 77.7  | 95.5  | 106.9 | 107.9 |
| 85°   | 20.8  | 45.7  | 56.1  | 62.2  | 63.2  |
| 87.5° | 10.4  | 15.5  | 19.8  | 20.8  | 22.8  |
| 90°   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   |



Report Generated By 670246072 / DESKTOP-50001EG





— 0°-180°    - - 45°-225°    - - - 90°-270°







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

Report Prepared for

Cooper Lighting Solutions

(formerly Eaton)

METALUX

Report Number: SP1-2210-795-1

Test Date: 10/06/2022

Luminaire Tested: 9WP217084MDER4AM-2700K-315MA

Data in this report applies to families of products including 9WP217084MDER4AM-2700K.

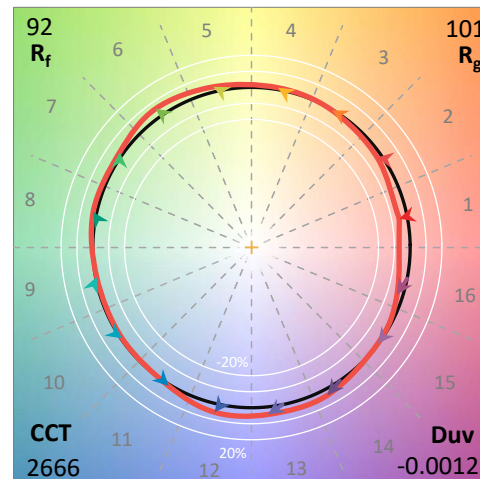
### Test Information

Test Method: LM-79-2019  
 Report Number: SP1-2210-795-1  
 Test Lab: COOPER LIGHTING SOLUTIONS  
 Photometer: SP1 - 76IN SPHERE  
 Measurement Geometry:  $4\pi$   
 Issue Date: 10/06/2022  
 Manufacturer: COOPER LIGHTING SOLUTIONS (FORMERLY EATON)  
 Product Line: METALUX  
 Catalog Number: **9WP217084MDER4AM-2700K-315MA**  
 Description: METALUX

TUNABLE BOARD, 2700K-315MA, PROGRAMMED @0Vdc

### Spectral Parameters

|                           |         |           |      |      |      |
|---------------------------|---------|-----------|------|------|------|
| CCT (K):                  | 2666    | CRI (Ra): | 94.1 |      |      |
| CIE u':                   | 0.2643  | R1:       | 96.2 | R9:  | 58.8 |
| CIE v':                   | 0.5262  | R2:       | 97.9 | R10: | 93.6 |
| Duv:                      | -0.0012 | R3:       | 98.1 | R11: | 96.6 |
| CIE x:                    | 0.4604  | R4:       | 96.1 | R12: | 90.2 |
| CIE y:                    | 0.4075  | R5:       | 96.2 | R13: | 96.8 |
| CIE z:                    | 0.1321  | R6:       | 96.5 | R14: | 97.5 |
| Peak Wavelength (nm):     | 632     | R7:       | 90.7 |      |      |
| Dominant Wavelength (nm): | 584     | R8:       | 81.4 |      |      |
| Purity:                   | 61      |           |      |      |      |
| Rf:                       | 91.5    |           |      |      |      |
| Rg:                       | 101.3   |           |      |      |      |



### Test Conditions

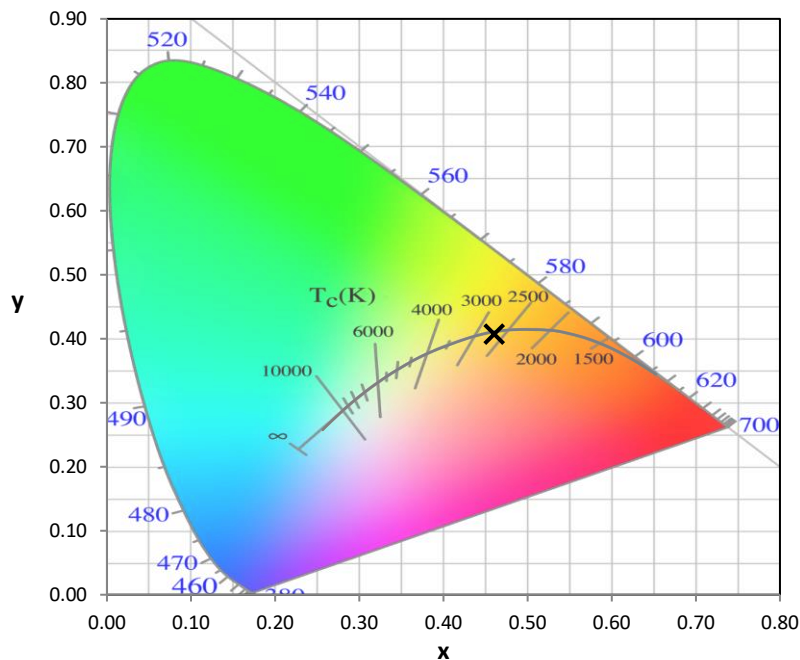
Stabilization Time: 146M  
 Operation Time: 12H  
 Room Temperature (°C) / RH%: 24.0/38%  
 Sphere Temperature (°C): 24.4

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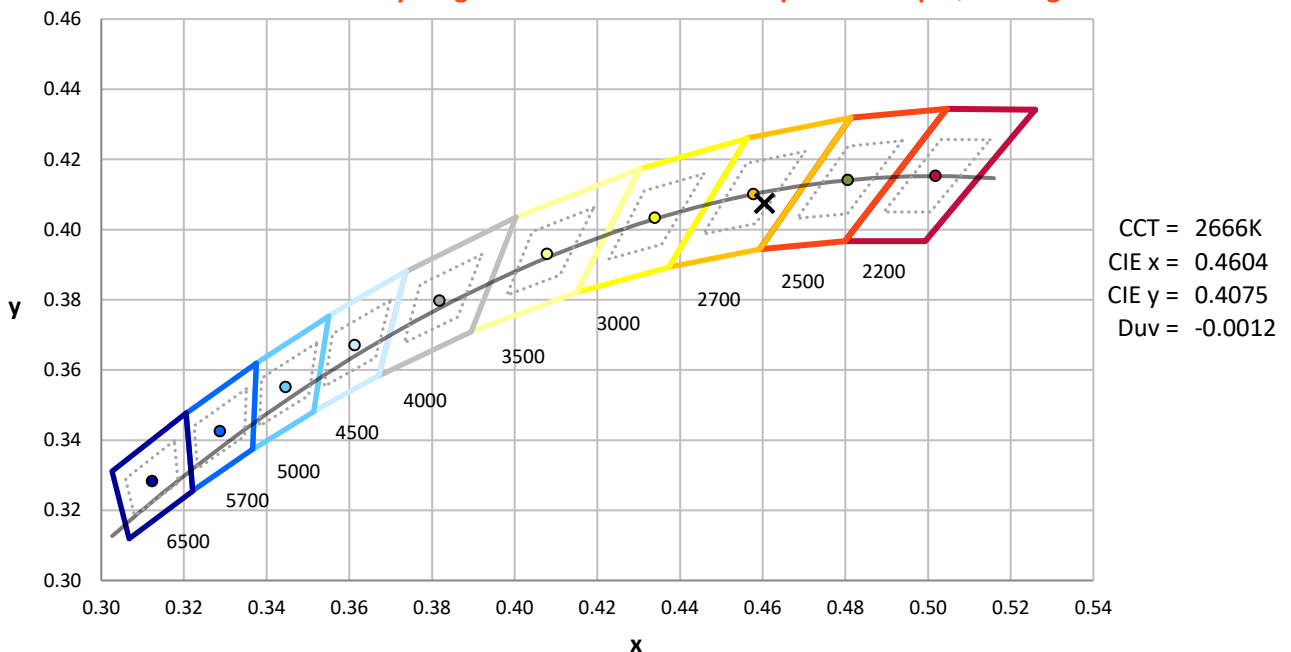
| Measurement and Test Equipment |                       |                  |                      |
|--------------------------------|-----------------------|------------------|----------------------|
| Instrument                     | Identification Number | Calibration Date | Calibration Due Date |
| Photometer                     | 76INCH SPHERE IN0058  | 8/8/2022         | 2/8/2023             |
| Power Meter                    | XITRON 2801 IN0071    | 11/29/2021       | 11/29/2022           |
| AC Power Source                | CHROMA 61603 IN0063   | 11/29/2021       | 11/29/2022           |
| DC Power Source                | AGILENT E3634A IN0208 | 11/29/2021       | 11/29/2022           |
| Sphere Thermometer             | ONSET IN0085          | 11/29/2021       | 11/29/2022           |
| Room Thermometer               | ONSET IN0046          | 11/29/2021       | 11/29/2022           |

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**CIE 1931 Chromaticity Diagram**



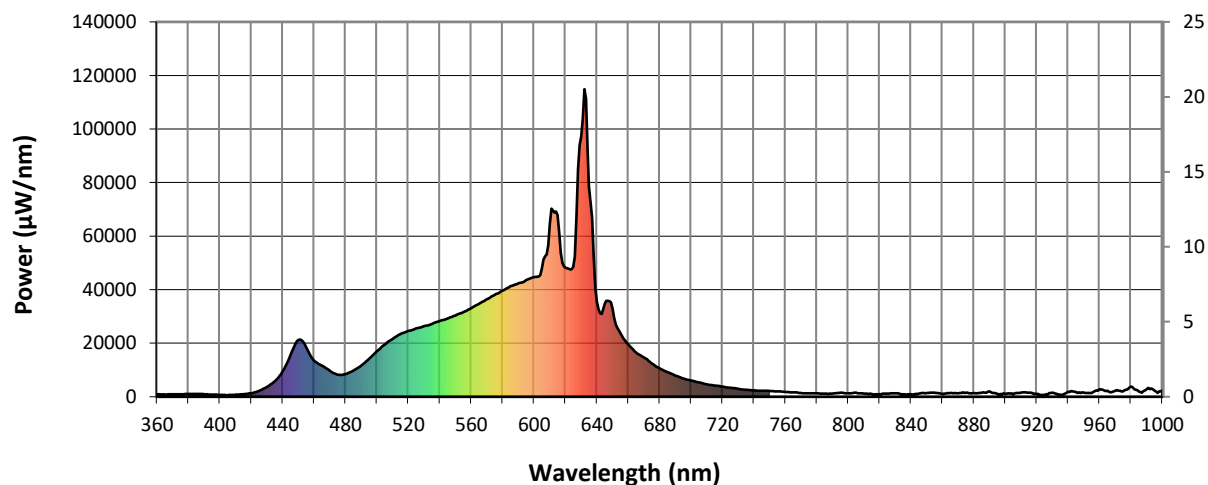
**CIE 1931 Chromaticity Diagram with 2017 ANSI 7-Step and 4-Step Quadrangles**



Point lies inside the ANSI 2700K 4-step quadrangle

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**Photopic Flux vs. Wavelength**

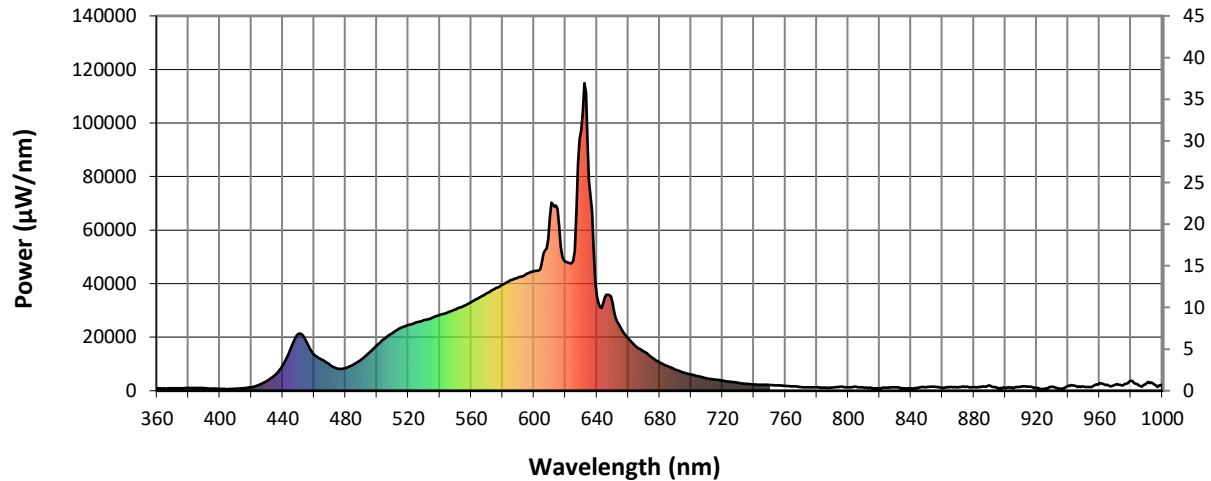


#####

| λ<br>(nm) | Power<br>(μW/nm) | Lumens<br>(φ/nm) | λ<br>(nm) | Power<br>(μW/nm) | Lumens<br>(φ/nm) | λ<br>(nm) | Power<br>(μW/nm) | Lumens<br>(φ/nm) | λ<br>(nm) | Power<br>(μW/nm) | Lumens<br>(φ/nm) | λ<br>(nm) | Power<br>(μW/nm) | Lumens<br>(φ/nm) |
|-----------|------------------|------------------|-----------|------------------|------------------|-----------|------------------|------------------|-----------|------------------|------------------|-----------|------------------|------------------|
| 360       | 960              | NR               | 490       | 11655            | NR               | 620       | 48137            | NR               | 750       | 2159             | NR               | 880       | 1428             | NR               |
| 365       | 835              | NR               | 495       | 14187            | NR               | 625       | 48484            | NR               | 755       | 2025             | NR               | 885       | 1524             | NR               |
| 370       | 889              | NR               | 500       | 17034            | NR               | 630       | 97268            | NR               | 760       | 1802             | NR               | 890       | 1952             | NR               |
| 375       | 919              | NR               | 505       | 19485            | NR               | 635       | 78475            | NR               | 765       | 1584             | NR               | 895       | 1011             | NR               |
| 380       | 1009             | NR               | 510       | 21619            | NR               | 640       | 35314            | NR               | 770       | 1353             | NR               | 900       | 1014             | NR               |
| 385       | 1040             | NR               | 515       | 23444            | NR               | 645       | 34925            | NR               | 775       | 1274             | NR               | 905       | 955              | NR               |
| 390       | 939              | NR               | 520       | 24555            | NR               | 650       | 32851            | NR               | 780       | 1257             | NR               | 910       | 1509             | NR               |
| 395       | 813              | NR               | 525       | 25491            | NR               | 655       | 23599            | NR               | 785       | 1107             | NR               | 915       | 1506             | NR               |
| 400       | 710              | NR               | 530       | 26360            | NR               | 660       | 19532            | NR               | 790       | 1143             | NR               | 920       | 1068             | NR               |
| 405       | 620              | NR               | 535       | 27190            | NR               | 665       | 16486            | NR               | 795       | 1531             | NR               | 925       | 638              | NR               |
| 410       | 774              | NR               | 540       | 28277            | NR               | 670       | 14655            | NR               | 800       | 1331             | NR               | 930       | 1536             | NR               |
| 415       | 979              | NR               | 545       | 29229            | NR               | 675       | 12412            | NR               | 805       | 1467             | NR               | 935       | 842              | NR               |
| 420       | 1333             | NR               | 550       | 30350            | NR               | 680       | 10584            | NR               | 810       | 1194             | NR               | 940       | 1826             | NR               |
| 425       | 2180             | NR               | 555       | 31650            | NR               | 685       | 9145             | NR               | 815       | 1068             | NR               | 945       | 1708             | NR               |
| 430       | 3664             | NR               | 560       | 33070            | NR               | 690       | 7913             | NR               | 820       | 903              | NR               | 950       | 1541             | NR               |
| 435       | 5835             | NR               | 565       | 34723            | NR               | 695       | 6836             | NR               | 825       | 1155             | NR               | 955       | 1365             | NR               |
| 440       | 9472             | NR               | 570       | 36375            | NR               | 700       | 6062             | NR               | 830       | 1254             | NR               | 960       | 2795             | NR               |
| 445       | 15693            | NR               | 575       | 38067            | NR               | 705       | 5352             | NR               | 835       | 969              | NR               | 965       | 2273             | NR               |
| 450       | 21182            | NR               | 580       | 39619            | NR               | 710       | 4621             | NR               | 840       | 885              | NR               | 970       | 2269             | NR               |
| 455       | 18329            | NR               | 585       | 41308            | NR               | 715       | 4197             | NR               | 845       | 1169             | NR               | 975       | 2026             | NR               |
| 460       | 13472            | NR               | 590       | 42407            | NR               | 720       | 3736             | NR               | 850       | 1432             | NR               | 980       | 3840             | NR               |
| 465       | 11611            | NR               | 595       | 43552            | NR               | 725       | 3370             | NR               | 855       | 1474             | NR               | 985       | 2004             | NR               |
| 470       | 9668             | NR               | 600       | 44708            | NR               | 730       | 2929             | NR               | 860       | 1037             | NR               | 990       | 2889             | NR               |
| 475       | 8254             | NR               | 605       | 47912            | NR               | 735       | 2599             | NR               | 865       | 1441             | NR               | 995       | 2268             | NR               |
| 480       | 8432             | NR               | 610       | 64799            | NR               | 740       | 2366             | NR               | 870       | 1316             | NR               | 1000      | 2322             | NR               |
| 485       | 9747             | NR               | 615       | 67855            | NR               | 745       | 2257             | NR               | 875       | 1515             | NR               |           |                  |                  |

REPORT NUMBER: SP1-2210-795-1

**Scotopic Flux vs. Wavelength**



**Scotopic Lumens: 3229.5**

**S/P: 1.28**

| λ<br>(nm) | Power<br>(μW/nm) | Lumens<br>(φ/nm) | λ<br>(nm) | Power<br>(μW/nm) | Lumens<br>(φ/nm) | λ<br>(nm) | Power<br>(μW/nm) | Lumens<br>(φ/nm) | λ<br>(nm) | Power<br>(μW/nm) | Lumens<br>(φ/nm) | λ<br>(nm) | Power<br>(μW/nm) | Lumens<br>(φ/nm) |
|-----------|------------------|------------------|-----------|------------------|------------------|-----------|------------------|------------------|-----------|------------------|------------------|-----------|------------------|------------------|
| 360       | 960              | NR               | 490       | 11655            | NR               | 620       | 48137            | NR               | 750       | 2159             | NR               | 880       | 1428             | NR               |
| 365       | 835              | NR               | 495       | 14187            | NR               | 625       | 48484            | NR               | 755       | 2025             | NR               | 885       | 1524             | NR               |
| 370       | 889              | NR               | 500       | 17034            | NR               | 630       | 97268            | NR               | 760       | 1802             | NR               | 890       | 1952             | NR               |
| 375       | 919              | NR               | 505       | 19485            | NR               | 635       | 78475            | NR               | 765       | 1584             | NR               | 895       | 1011             | NR               |
| 380       | 1009             | NR               | 510       | 21619            | NR               | 640       | 35314            | NR               | 770       | 1353             | NR               | 900       | 1014             | NR               |
| 385       | 1040             | NR               | 515       | 23444            | NR               | 645       | 34925            | NR               | 775       | 1274             | NR               | 905       | 955              | NR               |
| 390       | 939              | NR               | 520       | 24555            | NR               | 650       | 32851            | NR               | 780       | 1257             | NR               | 910       | 1509             | NR               |
| 395       | 813              | NR               | 525       | 25491            | NR               | 655       | 23599            | NR               | 785       | 1107             | NR               | 915       | 1506             | NR               |
| 400       | 710              | NR               | 530       | 26360            | NR               | 660       | 19532            | NR               | 790       | 1143             | NR               | 920       | 1068             | NR               |
| 405       | 620              | NR               | 535       | 27190            | NR               | 665       | 16486            | NR               | 795       | 1531             | NR               | 925       | 638              | NR               |
| 410       | 774              | NR               | 540       | 28277            | NR               | 670       | 14655            | NR               | 800       | 1331             | NR               | 930       | 1536             | NR               |
| 415       | 979              | NR               | 545       | 29229            | NR               | 675       | 12412            | NR               | 805       | 1467             | NR               | 935       | 842              | NR               |
| 420       | 1333             | NR               | 550       | 30350            | NR               | 680       | 10584            | NR               | 810       | 1194             | NR               | 940       | 1826             | NR               |
| 425       | 2180             | NR               | 555       | 31650            | NR               | 685       | 9145             | NR               | 815       | 1068             | NR               | 945       | 1708             | NR               |
| 430       | 3664             | NR               | 560       | 33070            | NR               | 690       | 7913             | NR               | 820       | 903              | NR               | 950       | 1541             | NR               |
| 435       | 5835             | NR               | 565       | 34723            | NR               | 695       | 6836             | NR               | 825       | 1155             | NR               | 955       | 1365             | NR               |
| 440       | 9472             | NR               | 570       | 36375            | NR               | 700       | 6062             | NR               | 830       | 1254             | NR               | 960       | 2795             | NR               |
| 445       | 15693            | NR               | 575       | 38067            | NR               | 705       | 5352             | NR               | 835       | 969              | NR               | 965       | 2273             | NR               |
| 450       | 21182            | NR               | 580       | 39619            | NR               | 710       | 4621             | NR               | 840       | 885              | NR               | 970       | 2269             | NR               |
| 455       | 18329            | NR               | 585       | 41308            | NR               | 715       | 4197             | NR               | 845       | 1169             | NR               | 975       | 2026             | NR               |
| 460       | 13472            | NR               | 590       | 42407            | NR               | 720       | 3736             | NR               | 850       | 1432             | NR               | 980       | 3840             | NR               |
| 465       | 11611            | NR               | 595       | 43552            | NR               | 725       | 3370             | NR               | 855       | 1474             | NR               | 985       | 2004             | NR               |
| 470       | 9668             | NR               | 600       | 44708            | NR               | 730       | 2929             | NR               | 860       | 1037             | NR               | 990       | 2889             | NR               |
| 475       | 8254             | NR               | 605       | 47912            | NR               | 735       | 2599             | NR               | 865       | 1441             | NR               | 995       | 2268             | NR               |
| 480       | 8432             | NR               | 610       | 64799            | NR               | 740       | 2366             | NR               | 870       | 1316             | NR               | 1000      | 2322             | NR               |
| 485       | 9747             | NR               | 615       | 67855            | NR               | 745       | 2257             | NR               | 875       | 1515             | NR               |           |                  |                  |

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**Melanopic Flux vs. Wavelength**



**Melanopic Lumens: 1204.8**

**S/P: 0.48**

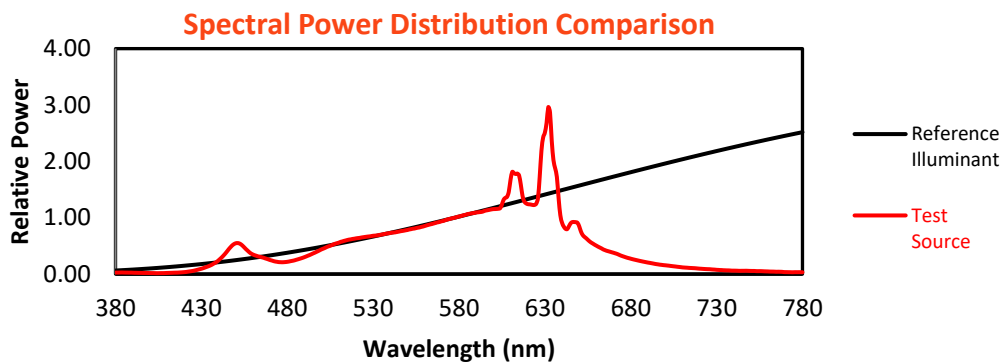
| λ<br>(nm) | Power<br>(μW/nm) | Lumens<br>(φ/nm) | λ<br>(nm) | Power<br>(μW/nm) | Lumens<br>(φ/nm) | λ<br>(nm) | Power<br>(μW/nm) | Lumens<br>(φ/nm) | λ<br>(nm) | Power<br>(μW/nm) | Lumens<br>(φ/nm) | λ<br>(nm) | Power<br>(μW/nm) | Lumens<br>(φ/nm) |
|-----------|------------------|------------------|-----------|------------------|------------------|-----------|------------------|------------------|-----------|------------------|------------------|-----------|------------------|------------------|
| 360       | 960              | NR               | 490       | 11655            | NR               | 620       | 48137            | NR               | 750       | 2159             | NR               | 880       | 1428             | NR               |
| 365       | 835              | NR               | 495       | 14187            | NR               | 625       | 48484            | NR               | 755       | 2025             | NR               | 885       | 1524             | NR               |
| 370       | 889              | NR               | 500       | 17034            | NR               | 630       | 97268            | NR               | 760       | 1802             | NR               | 890       | 1952             | NR               |
| 375       | 919              | NR               | 505       | 19485            | NR               | 635       | 78475            | NR               | 765       | 1584             | NR               | 895       | 1011             | NR               |
| 380       | 1009             | NR               | 510       | 21619            | NR               | 640       | 35314            | NR               | 770       | 1353             | NR               | 900       | 1014             | NR               |
| 385       | 1040             | NR               | 515       | 23444            | NR               | 645       | 34925            | NR               | 775       | 1274             | NR               | 905       | 955              | NR               |
| 390       | 939              | NR               | 520       | 24555            | NR               | 650       | 32851            | NR               | 780       | 1257             | NR               | 910       | 1509             | NR               |
| 395       | 813              | NR               | 525       | 25491            | NR               | 655       | 23599            | NR               | 785       | 1107             | NR               | 915       | 1506             | NR               |
| 400       | 710              | NR               | 530       | 26360            | NR               | 660       | 19532            | NR               | 790       | 1143             | NR               | 920       | 1068             | NR               |
| 405       | 620              | NR               | 535       | 27190            | NR               | 665       | 16486            | NR               | 795       | 1531             | NR               | 925       | 638              | NR               |
| 410       | 774              | NR               | 540       | 28277            | NR               | 670       | 14655            | NR               | 800       | 1331             | NR               | 930       | 1536             | NR               |
| 415       | 979              | NR               | 545       | 29229            | NR               | 675       | 12412            | NR               | 805       | 1467             | NR               | 935       | 842              | NR               |
| 420       | 1333             | NR               | 550       | 30350            | NR               | 680       | 10584            | NR               | 810       | 1194             | NR               | 940       | 1826             | NR               |
| 425       | 2180             | NR               | 555       | 31650            | NR               | 685       | 9145             | NR               | 815       | 1068             | NR               | 945       | 1708             | NR               |
| 430       | 3664             | NR               | 560       | 33070            | NR               | 690       | 7913             | NR               | 820       | 903              | NR               | 950       | 1541             | NR               |
| 435       | 5835             | NR               | 565       | 34723            | NR               | 695       | 6836             | NR               | 825       | 1155             | NR               | 955       | 1365             | NR               |
| 440       | 9472             | NR               | 570       | 36375            | NR               | 700       | 6062             | NR               | 830       | 1254             | NR               | 960       | 2795             | NR               |
| 445       | 15693            | NR               | 575       | 38067            | NR               | 705       | 5352             | NR               | 835       | 969              | NR               | 965       | 2273             | NR               |
| 450       | 21182            | NR               | 580       | 39619            | NR               | 710       | 4621             | NR               | 840       | 885              | NR               | 970       | 2269             | NR               |
| 455       | 18329            | NR               | 585       | 41308            | NR               | 715       | 4197             | NR               | 845       | 1169             | NR               | 975       | 2026             | NR               |
| 460       | 13472            | NR               | 590       | 42407            | NR               | 720       | 3736             | NR               | 850       | 1432             | NR               | 980       | 3840             | NR               |
| 465       | 11611            | NR               | 595       | 43552            | NR               | 725       | 3370             | NR               | 855       | 1474             | NR               | 985       | 2004             | NR               |
| 470       | 9668             | NR               | 600       | 44708            | NR               | 730       | 2929             | NR               | 860       | 1037             | NR               | 990       | 2889             | NR               |
| 475       | 8254             | NR               | 605       | 47912            | NR               | 735       | 2599             | NR               | 865       | 1441             | NR               | 995       | 2268             | NR               |
| 480       | 8432             | NR               | 610       | 64799            | NR               | 740       | 2366             | NR               | 870       | 1316             | NR               | 1000      | 2322             | NR               |
| 485       | 9747             | NR               | 615       | 67855            | NR               | 745       | 2257             | NR               | 875       | 1515             | NR               |           |                  |                  |

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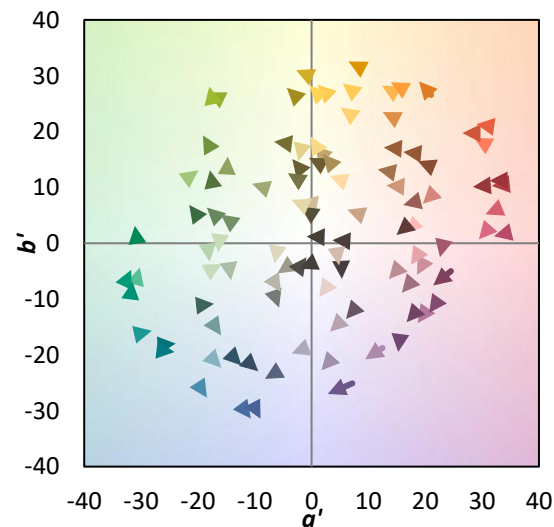
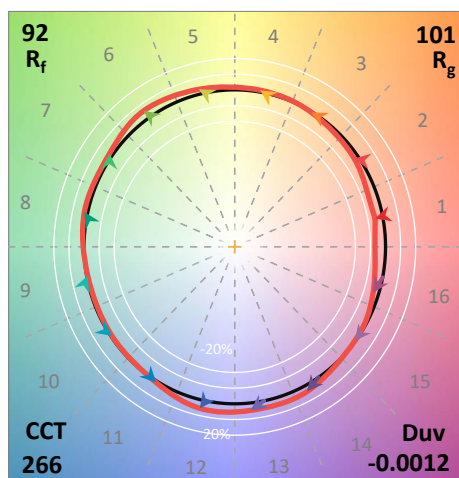
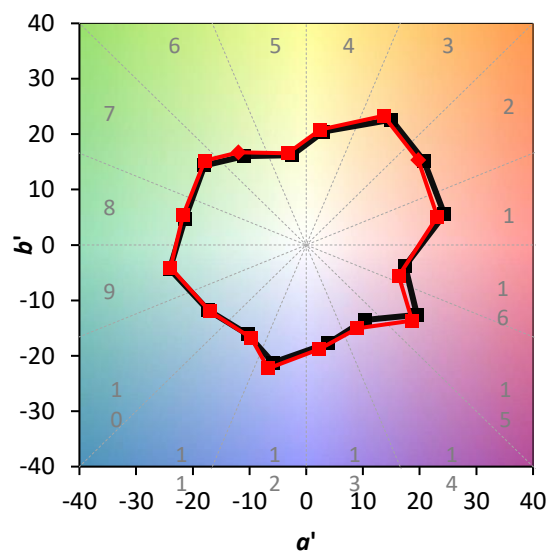
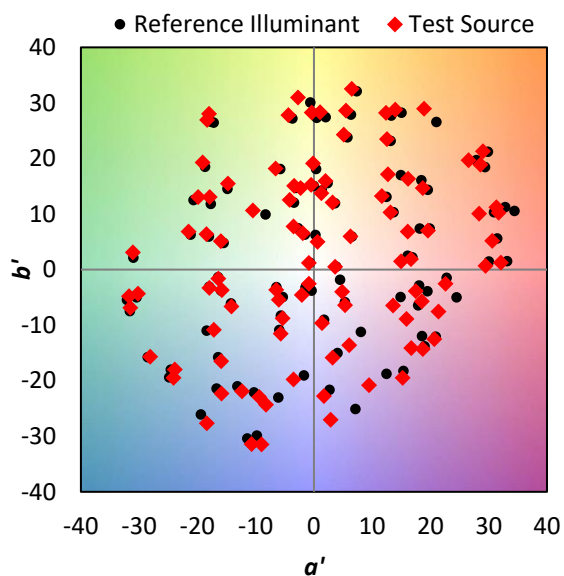
**TM-30-18**

**Summary**

$R_f = 91.5$   
 $R_g = 101.3$   
 CIE  $R_a = 94.1$   
 $R_g = 58.8$



**Color Vector Graphics**

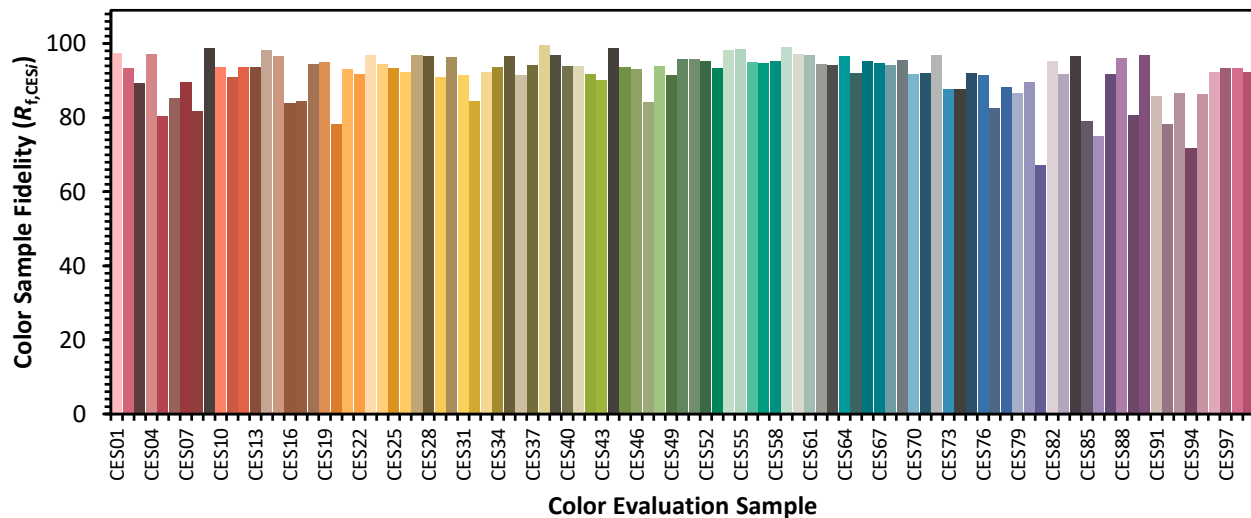


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**Individual Sample Fidelity Index ( $R_{f,i}$ )**

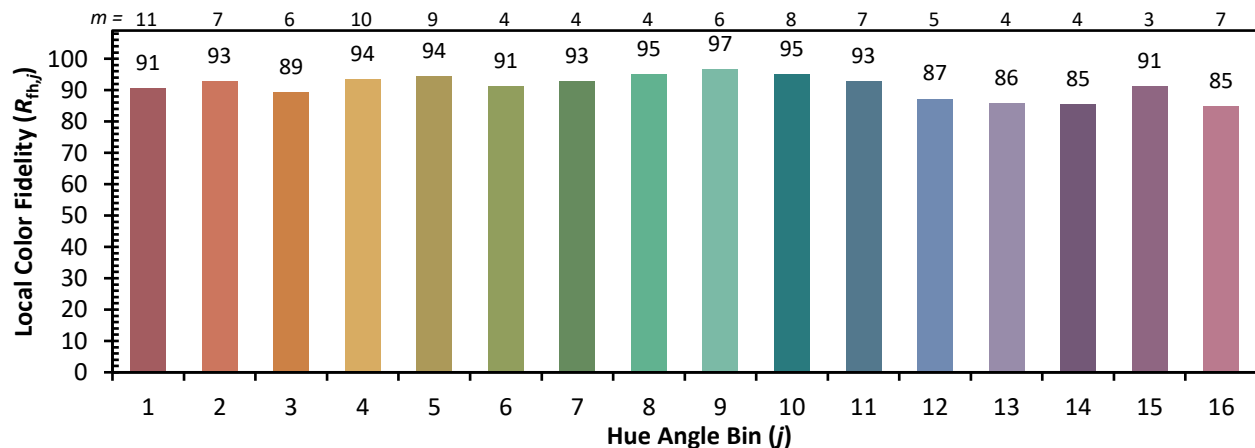
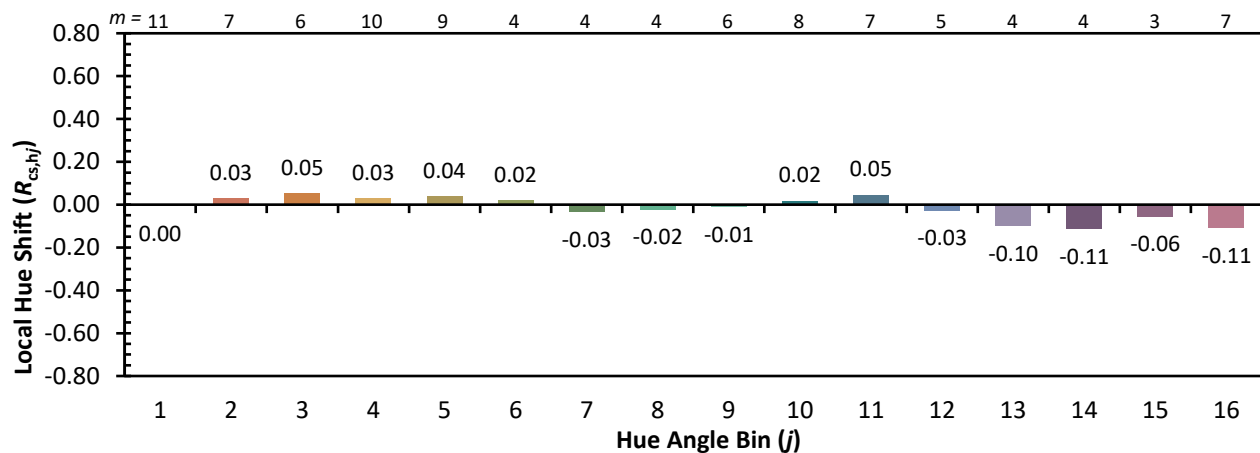
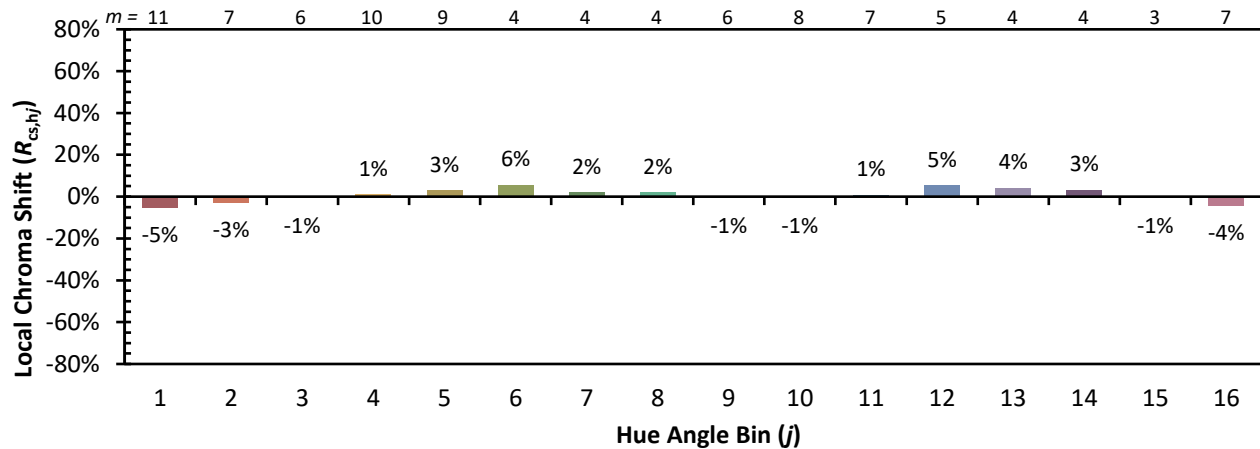
|            |            |            |            |
|------------|------------|------------|------------|
| CES01 = 86 | CES26 = 92 | CES51 = 96 | CES76 = 91 |
| CES02 = 64 | CES27 = 97 | CES52 = 95 | CES77 = 83 |
| CES03 = 32 | CES28 = 97 | CES53 = 93 | CES78 = 88 |
| CES04 = 71 | CES29 = 91 | CES54 = 98 | CES79 = 87 |
| CES05 = 51 | CES30 = 96 | CES55 = 99 | CES80 = 90 |
| CES06 = 51 | CES31 = 91 | CES56 = 95 | CES81 = 67 |
| CES07 = 44 | CES32 = 84 | CES57 = 95 | CES82 = 95 |
| CES08 = 43 | CES33 = 92 | CES58 = 95 | CES83 = 92 |
| CES09 = 29 | CES34 = 94 | CES59 = 99 | CES84 = 96 |
| CES10 = 77 | CES35 = 97 | CES60 = 97 | CES85 = 79 |
| CES11 = 59 | CES36 = 91 | CES61 = 97 | CES86 = 75 |
| CES12 = 66 | CES37 = 94 | CES62 = 94 | CES87 = 92 |
| CES13 = 45 | CES38 = 99 | CES63 = 94 | CES88 = 96 |
| CES14 = 74 | CES39 = 97 | CES64 = 97 | CES89 = 81 |
| CES15 = 72 | CES40 = 94 | CES65 = 92 | CES90 = 97 |
| CES16 = 48 | CES41 = 94 | CES66 = 95 | CES91 = 86 |
| CES17 = 50 | CES42 = 92 | CES67 = 95 | CES92 = 78 |
| CES18 = 57 | CES43 = 90 | CES68 = 94 | CES93 = 87 |
| CES19 = 72 | CES44 = 99 | CES69 = 95 | CES94 = 72 |
| CES20 = 68 | CES45 = 94 | CES70 = 92 | CES95 = 86 |
| CES21 = 87 | CES46 = 93 | CES71 = 92 | CES96 = 92 |
| CES22 = 79 | CES47 = 84 | CES72 = 97 | CES97 = 93 |
| CES23 = 92 | CES48 = 94 | CES73 = 88 | CES98 = 93 |
| CES24 = 91 | CES49 = 91 | CES74 = 88 | CES99 = 92 |
| CES25 = 72 | CES50 = 96 | CES75 = 92 |            |



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Color Rendition by Hue-Angle Bin



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**Measure Comparisons**



(END OF REPORT)