

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: METALUX

Report Number: P732091

Luminaire Tested: **24CZ2-30-HRP-B2750-W2D-2700K**

Issue Date: 1/5/2024



**Test Information**

Test Method: LM-79-08  
Report Number: P732091  
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: METALUX  
Catalog Number: 24CZ2-30-HRP-B2750-W2D-2700K  
Description: 2X4 3000 LUMEN CRUZE TROFFER WITH BIO UP LEDS AT 2700K CCT AND HRP LENS  
  
Light Source: -  
Ballast/Driver: -

**Summary**

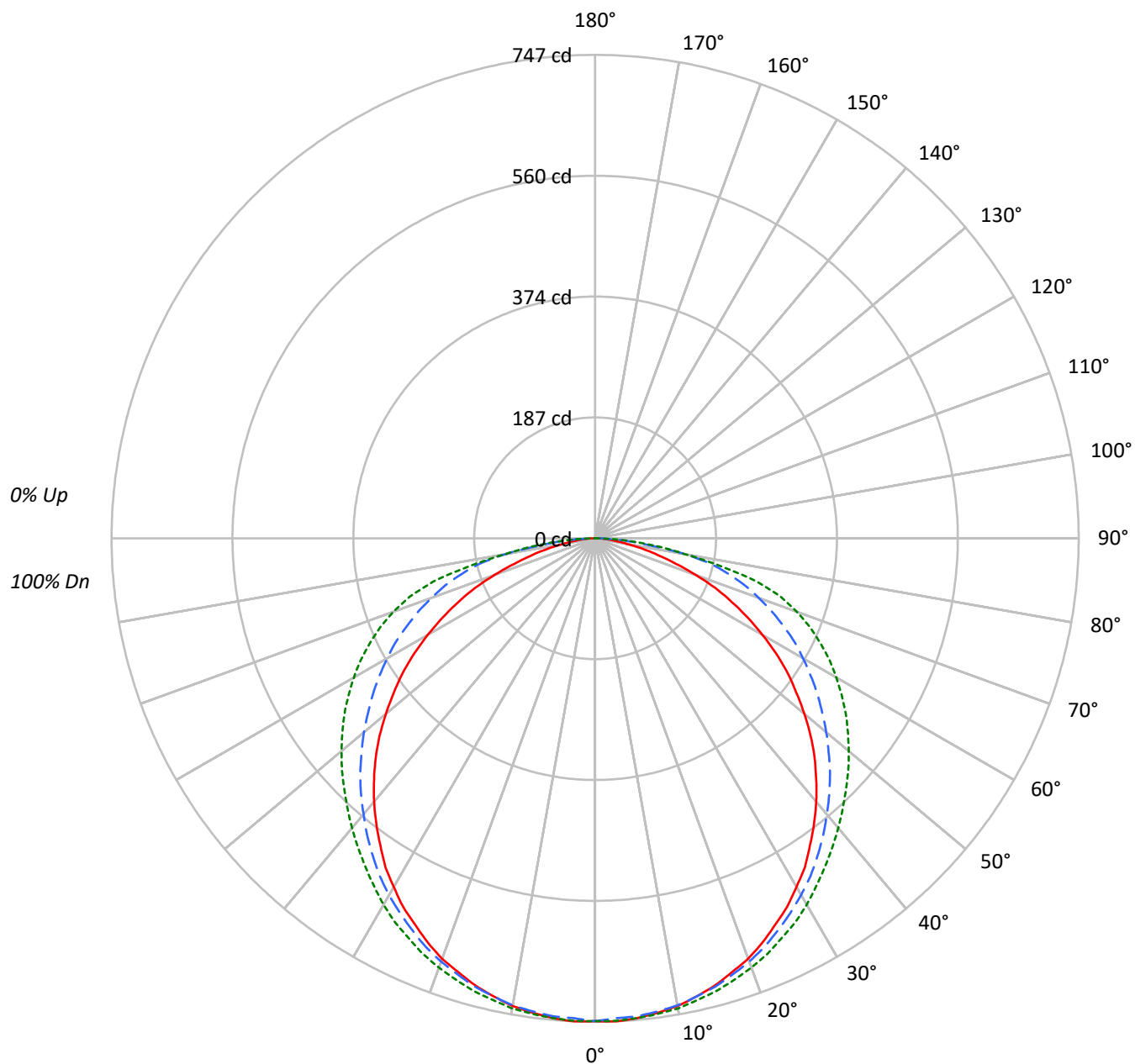
Lumens per Lamp: N/A  
Luminaire Lumens: 2300.0 lumens  
Efficiency: N/A  
Efficacy: 100.0 lumens/watt  
Spacing Criteria (0/90/45): 1.24 / 1.3 / 1.4  
Luminous Opening: Rectangular (W 1.92' x L: 3.98' x H: 0')  
CIE Type: Direct

Input Watts (W): 23  
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

TEST NUMBER: P732091

CATALOG NUMBER: 24CZ2-30-HRP-B2750-W2D-2700K

### Luminous Intensity Polar Plot





TEST NUMBER: P732091

CATALOG NUMBER: 24CZ2-30-HRP-B2750-W2D-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  | 50  | 30 | 10 |
| RCR |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |    |    |
| 0   | 119 | 119 | 119 | 119 | 116 | 116 | 116 | 116 | 111 | 111 | 111 | 106 | 106 | 106 | 102 | 102 | 102 | 100 |    |    |
| 1   | 108 | 103 | 98  | 94  | 105 | 101 | 96  | 93  | 96  | 93  | 90  | 92  | 90  | 87  | 89  | 86  | 84  | 82  |    |    |
| 2   | 98  | 89  | 82  | 76  | 95  | 87  | 80  | 75  | 83  | 78  | 73  | 80  | 75  | 71  | 77  | 73  | 70  | 67  |    |    |
| 3   | 89  | 78  | 69  | 62  | 86  | 76  | 68  | 62  | 73  | 66  | 61  | 70  | 64  | 59  | 68  | 63  | 58  | 56  |    |    |
| 4   | 81  | 68  | 59  | 52  | 79  | 67  | 59  | 52  | 65  | 57  | 51  | 62  | 56  | 50  | 60  | 54  | 50  | 48  |    |    |
| 5   | 74  | 61  | 52  | 45  | 72  | 60  | 51  | 45  | 58  | 50  | 44  | 56  | 49  | 44  | 54  | 48  | 43  | 41  |    |    |
| 6   | 69  | 55  | 46  | 39  | 67  | 54  | 45  | 39  | 52  | 44  | 38  | 50  | 43  | 38  | 49  | 42  | 38  | 36  |    |    |
| 7   | 63  | 50  | 41  | 34  | 62  | 49  | 40  | 34  | 47  | 39  | 34  | 46  | 39  | 34  | 44  | 38  | 33  | 31  |    |    |
| 8   | 59  | 45  | 36  | 30  | 57  | 44  | 36  | 30  | 43  | 36  | 30  | 42  | 35  | 30  | 41  | 34  | 30  | 28  |    |    |
| 9   | 55  | 41  | 33  | 27  | 54  | 41  | 33  | 27  | 40  | 32  | 27  | 39  | 32  | 27  | 38  | 31  | 27  | 25  |    |    |
| 10  | 52  | 38  | 30  | 25  | 50  | 38  | 30  | 25  | 37  | 30  | 25  | 36  | 29  | 24  | 35  | 29  | 24  | 23  |    |    |

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

|     | 0°   | 45°  | 90°  |
|-----|------|------|------|
| 0°  | 1053 | 1053 | 1053 |
| 5°  | 1055 | 1050 | 1055 |
| 10° | 1052 | 1050 | 1057 |
| 15° | 1045 | 1048 | 1058 |
| 20° | 1038 | 1045 | 1060 |
| 25° | 1026 | 1041 | 1062 |
| 30° | 1014 | 1037 | 1065 |
| 35° | 997  | 1032 | 1067 |
| 40° | 979  | 1025 | 1077 |
| 45° | 957  | 1024 | 1094 |
| 50° | 926  | 1023 | 1123 |
| 55° | 893  | 1030 | 1163 |
| 60° | 843  | 1046 | 1215 |
| 65° | 778  | 1071 | 1283 |
| 70° | 680  | 1108 | 1367 |
| 75° | 551  | 1165 | 1412 |
| 80° | 406  | 1143 | 1143 |
| 85° | 313  | 842  | 951  |



TEST NUMBER: P732091

CATALOG NUMBER: 24CZ2-30-HRP-B2750-W2D-2700K

**ZONAL LUMENS:**

| Zone      | Lumens | % Fixture |
|-----------|--------|-----------|
| 0°-10°    | 70.7   | 3.1       |
| 10°-20°   | 203.0  | 8.8       |
| 20°-30°   | 309.0  | 13.4      |
| 30°-40°   | 375.2  | 16.3      |
| 40°-50°   | 396.4  | 17.2      |
| 50°-60°   | 374.1  | 16.3      |
| 60°-70°   | 311.0  | 13.5      |
| 70°-80°   | 204.6  | 8.9       |
| 80°-90°   | 55.8   | 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°    | 582.7  | 25.3      |
| 0°-40°    | 958.0  | 41.7      |
| 0°-60°    | 1728.5 | 75.2      |
| 0°-90°    | 2300.0 | 100.0     |
| 90°-120°  | 0.0    | 0.0       |
| 90°-150°  | 0.0    | 0.0       |
| 90°-180°  | 0.0    | 0.0       |
| 0°-180°   | 2300.0 | 100.0     |

**CANDELA DISTRIBUTION:**

|     | 0°  | 22.5° | 45° | 67.5° | 90° | Flux |
|-----|-----|-------|-----|-------|-----|------|
| 0°  | 746 | 746   | 746 | 746   | 746 |      |
| 5°  | 744 | 744   | 741 | 744   | 744 | 71   |
| 15° | 715 | 716   | 717 | 724   | 724 | 202  |
| 25° | 659 | 662   | 668 | 680   | 682 | 304  |
| 35° | 579 | 585   | 599 | 614   | 619 | 362  |
| 45° | 480 | 489   | 513 | 538   | 548 | 369  |
| 55° | 363 | 378   | 419 | 458   | 473 | 323  |
| 65° | 233 | 260   | 321 | 368   | 384 | 230  |
| 75° | 101 | 147   | 214 | 253   | 259 | 109  |
| 85° | 19  | 42    | 52  | 58    | 59  | 24   |
| 90° | 0   | 0     | 0   | 0     | 0   |      |



TEST NUMBER: P732091

CATALOG NUMBER: 24CZ2-30-HRP-B2750-W2D-2700K

**CANDELA DISTRIBUTION (FULL):**

|       | 0°    | 22.5° | 45°   | 67.5° | 90°   |
|-------|-------|-------|-------|-------|-------|
| 0°    | 746.3 | 746.3 | 746.3 | 746.3 | 746.3 |
| 2.5°  | 747.2 | 746.3 | 742.3 | 746.3 | 746.3 |
| 5°    | 744.4 | 744.4 | 741.4 | 744.4 | 744.4 |
| 7.5°  | 739.5 | 739.5 | 737.6 | 741.4 | 741.4 |
| 10°   | 733.8 | 733.8 | 732.7 | 737.6 | 737.6 |
| 12.5° | 725.1 | 726.0 | 725.1 | 730.8 | 730.8 |
| 15°   | 715.4 | 716.4 | 717.3 | 724.1 | 724.1 |
| 17.5° | 702.9 | 704.8 | 706.7 | 714.5 | 715.4 |
| 20°   | 691.4 | 692.3 | 696.1 | 704.8 | 705.8 |
| 22.5° | 675.9 | 678.9 | 683.6 | 692.3 | 695.2 |
| 25°   | 658.6 | 662.4 | 668.3 | 679.8 | 681.7 |
| 27.5° | 642.2 | 645.2 | 652.8 | 665.3 | 669.2 |
| 30°   | 622.1 | 626.8 | 636.5 | 649.0 | 653.7 |
| 32.5° | 602.8 | 607.5 | 619.1 | 632.7 | 636.5 |
| 35°   | 578.7 | 585.4 | 599.0 | 614.3 | 619.1 |
| 37.5° | 555.6 | 562.3 | 578.7 | 596.0 | 601.8 |
| 40°   | 531.4 | 539.2 | 556.6 | 576.8 | 584.4 |
| 42.5° | 505.5 | 516.1 | 535.4 | 557.5 | 566.2 |
| 45°   | 479.5 | 489.2 | 513.2 | 538.2 | 547.9 |
| 47.5° | 451.5 | 463.1 | 489.2 | 518.9 | 530.5 |
| 50°   | 421.8 | 436.2 | 466.1 | 498.8 | 511.3 |
| 52.5° | 391.9 | 408.2 | 441.9 | 478.6 | 492.0 |
| 55°   | 363.0 | 378.4 | 418.8 | 458.3 | 472.7 |
| 57.5° | 331.3 | 350.4 | 394.7 | 437.1 | 451.5 |
| 60°   | 298.5 | 319.7 | 370.7 | 415.0 | 430.4 |
| 62.5° | 265.8 | 289.8 | 347.6 | 391.9 | 408.2 |
| 65°   | 233.0 | 259.9 | 320.7 | 367.8 | 384.1 |
| 67.5° | 201.2 | 231.1 | 295.6 | 342.8 | 359.1 |
| 70°   | 164.7 | 202.2 | 268.6 | 314.8 | 331.3 |
| 72.5° | 131.0 | 174.3 | 242.7 | 286.0 | 300.4 |
| 75°   | 101.1 | 147.3 | 213.7 | 253.3 | 259.0 |
| 77.5° | 74.2  | 120.4 | 183.9 | 197.4 | 198.4 |
| 80°   | 50.0  | 96.3  | 140.6 | 138.6 | 140.6 |
| 82.5° | 32.7  | 72.2  | 88.6  | 99.2  | 100.1 |
| 85°   | 19.3  | 42.4  | 52.0  | 57.8  | 58.7  |
| 87.5° | 9.6   | 14.4  | 18.3  | 19.3  | 21.2  |
| 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.

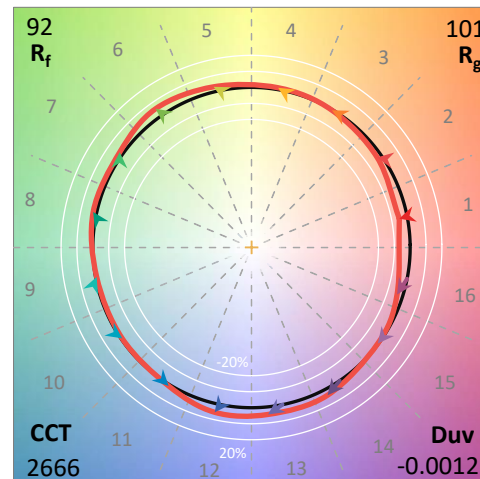
### Test Information

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

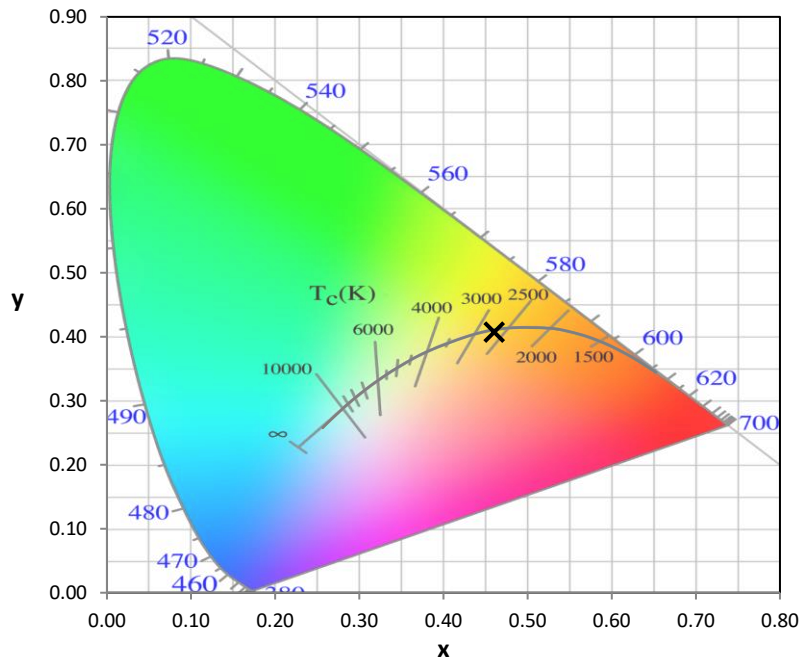
Stabilization Time: 146M  
 Operation Time: 12H  
 Room Temperature (°C) / RH%: 24.0/38%  
 Sphere Temperature (°C): 24.4

REPORT NUMBER: SP1-2210-795-1

| 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



REPORT NUMBER: SP1-2210-795-1

**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**



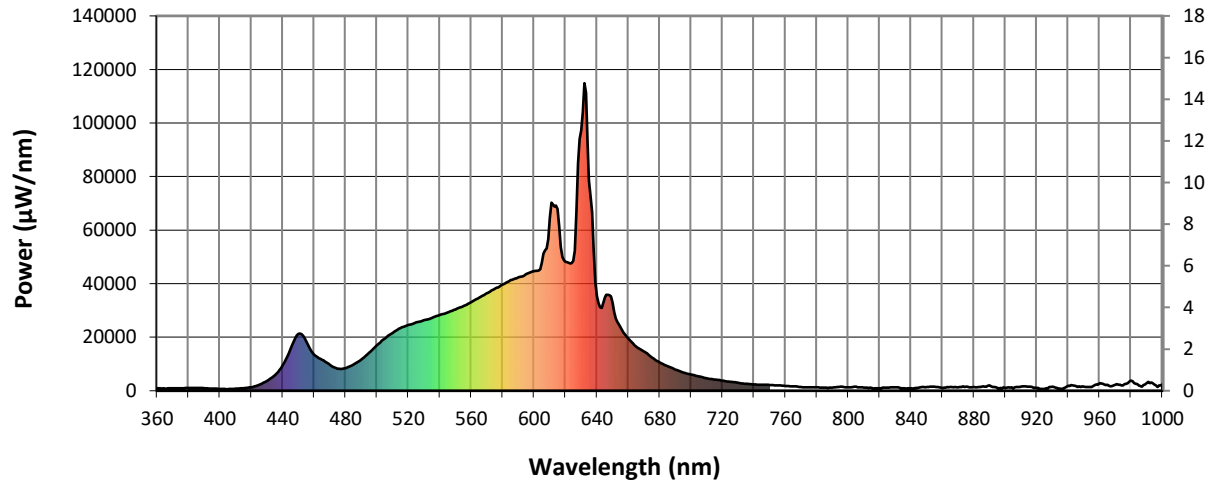
**Scotopic Lumens: 3229.5**

**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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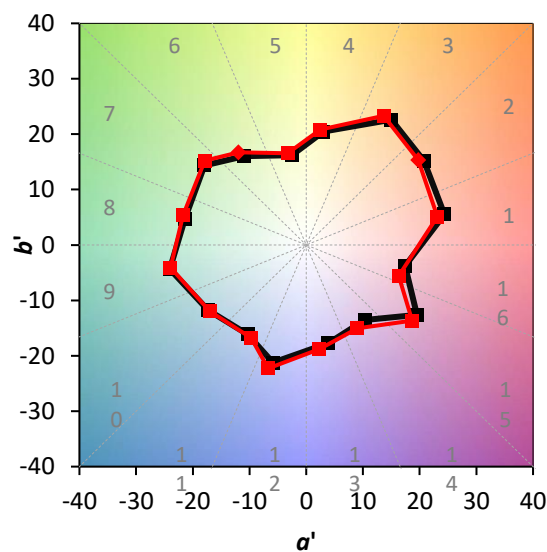
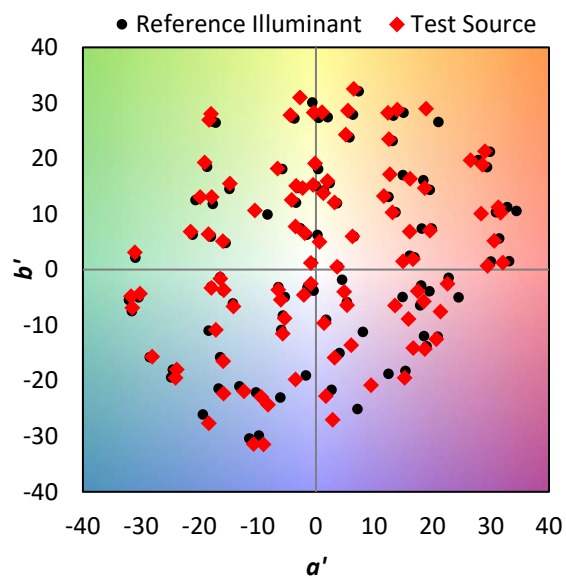
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**Summary**

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



**Color Vector Graphics**

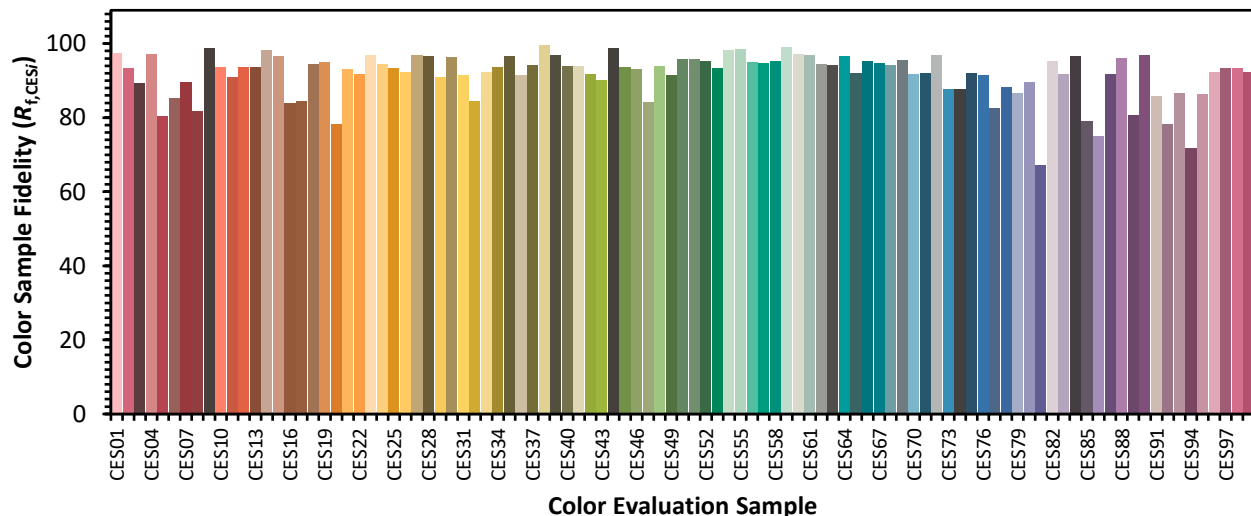


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Individual Sample Fidelity Index ( $R_{f,i}$ )

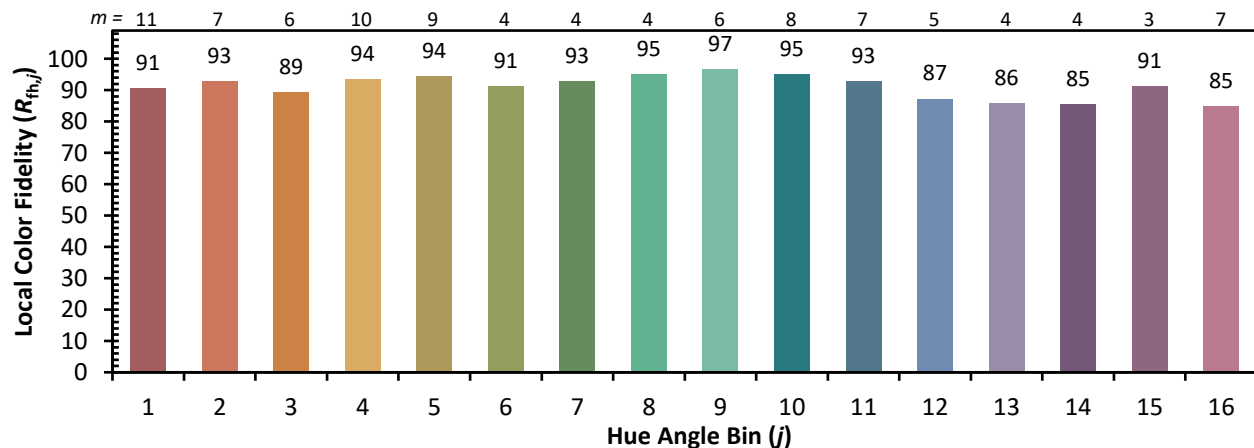
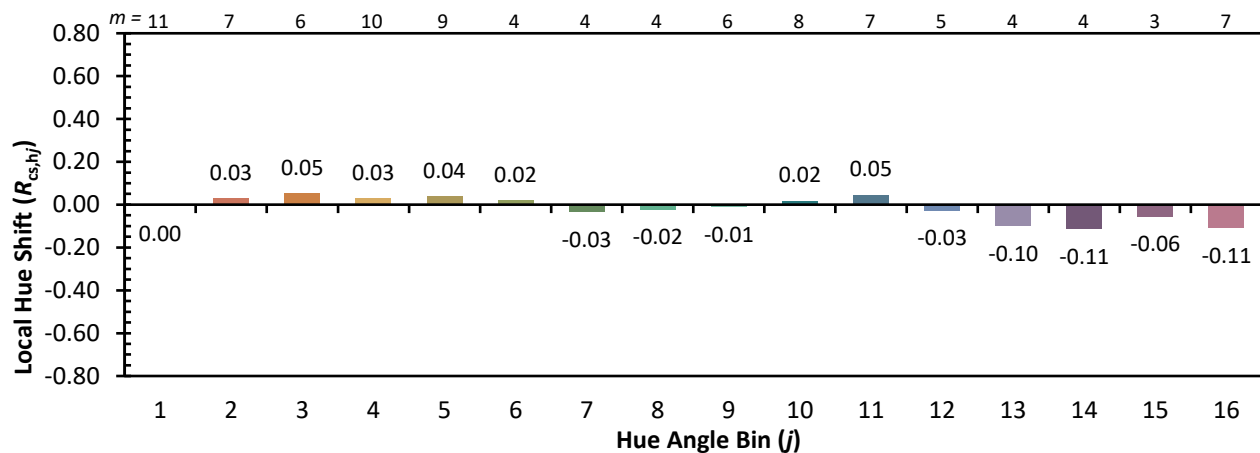
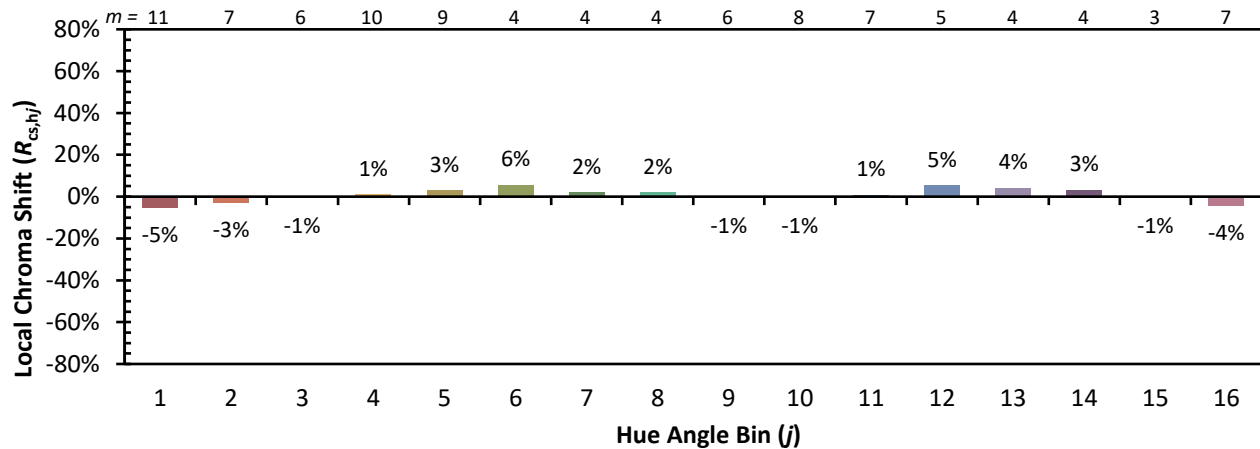
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|------------|------------|------------|------------|
| CES01 = 86 | CES26 = 92 | CES51 = 96 | CES76 = 91 |
| CES02 = 64 | CES27 = 97 | CES52 = 95 | CES77 = 83 |
| CES03 = 32 | CES28 = 97 | CES53 = 93 | CES78 = 88 |
| CES04 = 71 | CES29 = 91 | CES54 = 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)