

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: P732198

Luminaire Tested: **24CZ2-40-RDP-B2750-W2D-3500K**

Issue Date: 1/5/2024



**Test Information**

Test Method: LM-79-08  
Report Number: P732198  
TEST IS SCALED FROM IESNA LM-79-08 TEST DATA (P274775)  
Test Lab: INNOVATION CENTER(G3)  
Issue Date: 1/5/2024  
Manufacturer: COOPER LIGHTING SOLUTIONS (FORMERLY EATON)  
Product Line: METALUX  
Catalog Number: 24CZ2-40-RDP-B2750-W2D-3500K  
Description: 2X4 4000 LUMEN CRUZE TROFFER WITH BIO UP LEDS AT 3500K CCT AND RDP LENS  
  
Light Source: -  
Ballast/Driver: -

**Summary**

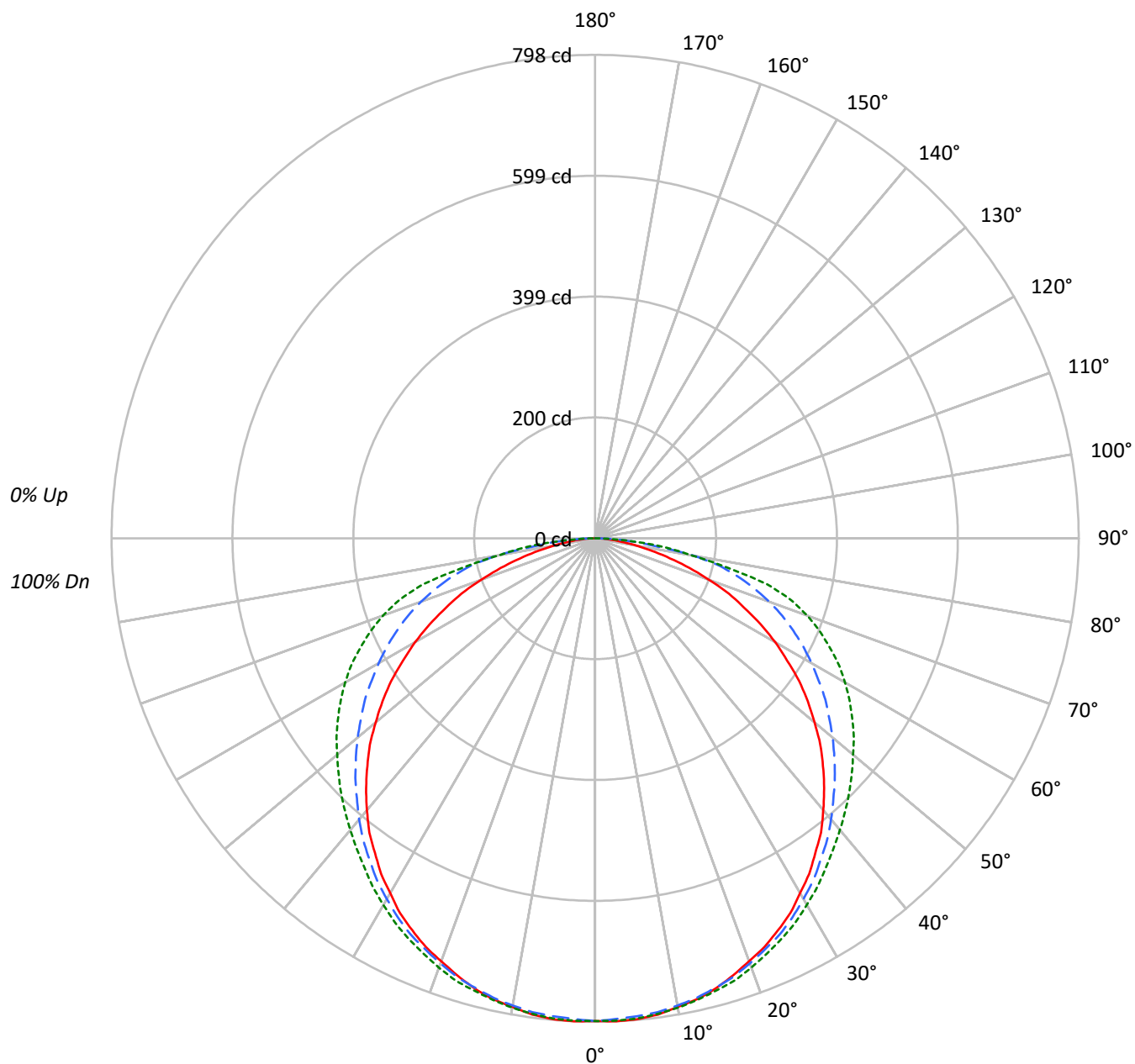
Lumens per Lamp: N/A  
Luminaire Lumens: 2534.0 lumens  
Efficiency: N/A  
Efficacy: 81.7 lumens/watt  
Spacing Criteria (0/90/45): 1.26 / 1.3 / 1.41  
Luminous Opening: Rectangular (W 1.92' x L: 3.98' x H: 0')  
CIE Type: Direct

Input Watts (W): 31  
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: P732198

CATALOG NUMBER: 24CZ2-40-RDP-B2750-W2D-3500K

### Luminous Intensity Polar Plot





TEST NUMBER: P732198

CATALOG NUMBER: 24CZ2-40-RDP-B2750-W2D-3500K

**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  |
| RCR |     |     |     |     |     |     |     |     |  |     |     |     |  |  |     |     |     |  |  |     |
| 0   | 119 | 119 | 119 | 119 | 116 | 116 | 116 | 116 |  | 111 | 111 | 111 |  |  | 106 | 106 | 106 |  |  | 102 |
| 1   | 108 | 103 | 98  | 94  | 105 | 100 | 96  | 92  |  | 96  | 93  | 89  |  |  | 92  | 89  | 87  |  |  | 88  |
| 2   | 97  | 89  | 81  | 75  | 95  | 87  | 80  | 74  |  | 83  | 77  | 72  |  |  | 80  | 75  | 71  |  |  | 77  |
| 3   | 88  | 77  | 68  | 62  | 86  | 76  | 67  | 61  |  | 72  | 66  | 60  |  |  | 70  | 64  | 59  |  |  | 67  |
| 4   | 81  | 68  | 59  | 52  | 78  | 67  | 58  | 51  |  | 64  | 57  | 51  |  |  | 62  | 55  | 50  |  |  | 59  |
| 5   | 74  | 60  | 51  | 44  | 72  | 59  | 51  | 44  |  | 57  | 49  | 43  |  |  | 55  | 48  | 43  |  |  | 53  |
| 6   | 68  | 54  | 45  | 38  | 66  | 53  | 45  | 38  |  | 51  | 44  | 38  |  |  | 50  | 43  | 37  |  |  | 48  |
| 7   | 63  | 49  | 40  | 34  | 61  | 48  | 40  | 34  |  | 47  | 39  | 33  |  |  | 45  | 38  | 33  |  |  | 44  |
| 8   | 59  | 45  | 36  | 30  | 57  | 44  | 36  | 30  |  | 43  | 35  | 30  |  |  | 41  | 34  | 29  |  |  | 40  |
| 9   | 55  | 41  | 33  | 27  | 53  | 40  | 32  | 27  |  | 39  | 32  | 27  |  |  | 38  | 31  | 26  |  |  | 37  |
| 10  | 51  | 38  | 30  | 24  | 50  | 37  | 29  | 24  |  | 36  | 29  | 24  |  |  | 35  | 29  | 24  |  |  | 34  |

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

|     | 0°   | 45°  | 90°  |
|-----|------|------|------|
| 0°  | 1125 | 1125 | 1125 |
| 5°  | 1129 | 1122 | 1127 |
| 10° | 1126 | 1122 | 1128 |
| 15° | 1124 | 1122 | 1129 |
| 20° | 1116 | 1121 | 1133 |
| 25° | 1112 | 1123 | 1135 |
| 30° | 1102 | 1120 | 1139 |
| 35° | 1091 | 1117 | 1144 |
| 40° | 1079 | 1116 | 1158 |
| 45° | 1061 | 1117 | 1184 |
| 50° | 1037 | 1123 | 1220 |
| 55° | 1011 | 1141 | 1274 |
| 60° | 968  | 1164 | 1344 |
| 65° | 906  | 1205 | 1427 |
| 70° | 825  | 1260 | 1535 |
| 75° | 699  | 1330 | 1604 |
| 80° | 552  | 1338 | 1297 |
| 85° | 408  | 1019 | 1138 |



TEST NUMBER: P732198

CATALOG NUMBER: 24CZ2-40-RDP-B2750-W2D-3500K

**ZONAL LUMENS:**

| Zone      | Lumens | % Fixture |
|-----------|--------|-----------|
| 0°-10°    | 75.6   | 3.0       |
| 10°-20°   | 217.5  | 8.6       |
| 20°-30°   | 332.7  | 13.1      |
| 30°-40°   | 406.7  | 16.0      |
| 40°-50°   | 433.4  | 17.1      |
| 50°-60°   | 414.4  | 16.4      |
| 60°-70°   | 351.1  | 13.9      |
| 70°-80°   | 236.0  | 9.3       |
| 80°-90°   | 66.6   | 2.6       |
| 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       |
| <hr/>     |        |           |
| 0°-30°    | 625.8  | 24.7      |
| 0°-40°    | 1032.5 | 40.7      |
| 0°-60°    | 1880.4 | 74.2      |
| 0°-90°    | 2534.0 | 100.0     |
| 90°-120°  | 0.0    | 0.0       |
| 90°-150°  | 0.0    | 0.0       |
| 90°-180°  | 0.0    | 0.0       |
| 0°-180°   | 2534.0 | 100.0     |

**CANDELA DISTRIBUTION:**

|     | 0°  | 22.5° | 45° | 67.5° | 90° | Flux |
|-----|-----|-------|-----|-------|-----|------|
| 0°  | 797 | 797   | 797 | 797   | 797 |      |
| 5°  | 797 | 796   | 792 | 796   | 796 | 76   |
| 15° | 769 | 769   | 768 | 774   | 773 | 217  |
| 25° | 714 | 716   | 721 | 728   | 729 | 329  |
| 35° | 634 | 638   | 648 | 661   | 664 | 397  |
| 45° | 532 | 540   | 559 | 583   | 593 | 410  |
| 55° | 411 | 426   | 464 | 500   | 518 | 366  |
| 65° | 271 | 299   | 361 | 408   | 427 | 270  |
| 75° | 128 | 175   | 244 | 285   | 294 | 137  |
| 85° | 25  | 52    | 63  | 68    | 70  | 31   |
| 90° | 0   | 0     | 0   | 0     | 0   |      |



TEST NUMBER: P732198

CATALOG NUMBER: 24CZ2-40-RDP-B2750-W2D-3500K

**CANDELA DISTRIBUTION (FULL):**

|       | 0°    | 22.5° | 45°   | 67.5° | 90°   |
|-------|-------|-------|-------|-------|-------|
| 0°    | 796.9 | 796.9 | 796.9 | 796.9 | 796.9 |
| 2.5°  | 798.1 | 798.1 | 794.3 | 796.9 | 796.9 |
| 5°    | 796.9 | 795.7 | 791.9 | 795.7 | 795.7 |
| 7.5°  | 793.1 | 791.9 | 789.3 | 793.1 | 791.9 |
| 10°   | 785.5 | 785.5 | 783.1 | 786.9 | 786.9 |
| 12.5° | 779.3 | 778.1 | 776.7 | 781.7 | 780.5 |
| 15°   | 769.3 | 769.3 | 767.9 | 774.3 | 772.9 |
| 17.5° | 756.7 | 757.9 | 759.1 | 764.1 | 765.5 |
| 20°   | 742.8 | 745.3 | 746.6 | 754.1 | 754.1 |
| 22.5° | 730.2 | 731.6 | 734.0 | 741.6 | 741.6 |
| 25°   | 714.0 | 716.4 | 721.4 | 727.8 | 729.0 |
| 27.5° | 697.6 | 698.8 | 705.2 | 714.0 | 715.2 |
| 30°   | 676.2 | 680.0 | 687.5 | 697.6 | 698.8 |
| 32.5° | 657.3 | 661.1 | 669.9 | 680.0 | 682.5 |
| 35°   | 633.5 | 638.5 | 648.5 | 661.1 | 663.7 |
| 37.5° | 612.1 | 615.9 | 628.5 | 642.3 | 646.1 |
| 40°   | 585.8 | 593.2 | 605.8 | 622.1 | 628.5 |
| 42.5° | 559.4 | 566.8 | 582.0 | 603.3 | 610.9 |
| 45°   | 531.7 | 540.4 | 559.4 | 583.2 | 593.2 |
| 47.5° | 504.1 | 514.1 | 535.4 | 563.0 | 574.4 |
| 50°   | 472.5 | 485.1 | 511.5 | 543.0 | 555.6 |
| 52.5° | 442.4 | 457.5 | 486.5 | 521.7 | 538.0 |
| 55°   | 411.0 | 426.0 | 463.8 | 500.3 | 517.9 |
| 57.5° | 375.9 | 395.9 | 437.4 | 478.9 | 497.7 |
| 60°   | 343.1 | 361.9 | 412.2 | 457.5 | 476.3 |
| 62.5° | 308.0 | 333.1 | 387.1 | 434.8 | 453.8 |
| 65°   | 271.4 | 299.2 | 360.7 | 408.4 | 427.4 |
| 67.5° | 238.9 | 269.0 | 334.3 | 382.1 | 401.0 |
| 70°   | 199.9 | 237.5 | 305.4 | 353.1 | 372.1 |
| 72.5° | 163.4 | 204.9 | 275.2 | 321.8 | 339.3 |
| 75°   | 128.2 | 174.7 | 243.9 | 285.4 | 294.2 |
| 77.5° | 95.5  | 144.6 | 211.1 | 228.7 | 222.5 |
| 80°   | 67.9  | 115.6 | 164.6 | 155.8 | 159.6 |
| 82.5° | 44.0  | 88.1  | 101.8 | 115.6 | 119.4 |
| 85°   | 25.2  | 51.5  | 62.9  | 67.9  | 70.3  |
| 87.5° | 11.4  | 18.8  | 25.2  | 25.2  | 23.9  |
| 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: SP1-2210-795-3

Test Date: 10/06/2022

Luminaire Tested: 9WP217084MDER4AM-3500K-315MA

Data in this report applies to families of products including 9WP217084MDER4AM-3500K.

### Test Information

Test Method: LM-79-2019  
 Report Number: SP1-2210-795-3  
 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-3500K-315MA**  
 Description: METALUX

TUNABLE BOARD, 3500K-315MA, PROGRAMMED @ 4.0Vdc.

### Spectral Parameters

CCT (K): 3506  
 CIE  $u'$ : 0.2401  
 CIE  $v'$ : 0.4983  
 Duv: -0.0097  
 CIE x: 0.3952  
 CIE y: 0.3646  
 CIE z: 0.2402  
 Peak Wavelength (nm): 632  
 Dominant Wavelength (nm): 586  
 Purity: 28.3

CRI (Ra): 90.1  
 R1: 96.2  
 R2: 91.5  
 R3: 88.2  
 R4: 94.5  
 R5: 94.6  
 R6: 84.9  
 R7: 86.1  
 R8: 84.7  
 R9: 75.4  
 R10: 83.5  
 R11: 96.0  
 R12: 76.6  
 R13: 94.5  
 R14: 94.8

Rf: 90.4  
 Rg: 97.8

### Test Conditions

Stabilization Time: 42M  
 Operation Time: 12H  
 Room Temperature (°C) / RH%: 24.0/38%  
 Sphere Temperature (°C): 24.4



REPORT NUMBER: SP1-2210-795-3

| 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           |

REPORT NUMBER: SP1-2210-795-3

**CIE 1931 Chromaticity Diagram**



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



Point lies outside the range

REPORT NUMBER: SP1-2210-795-3

**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       | 1172             | NR               | 490       | 25948            | NR               | 620       | 41537            | NR               | 750       | 1967             | NR               | 880       | 2125             | NR               |
| 365       | 1124             | NR               | 495       | 24688            | NR               | 625       | 40984            | NR               | 755       | 1800             | NR               | 885       | 2057             | NR               |
| 370       | 1161             | NR               | 500       | 24010            | NR               | 630       | 70640            | NR               | 760       | 1684             | NR               | 890       | 2080             | NR               |
| 375       | 1195             | NR               | 505       | 24099            | NR               | 635       | 57718            | NR               | 765       | 1458             | NR               | 895       | 1496             | NR               |
| 380       | 1247             | NR               | 510       | 24608            | NR               | 640       | 30257            | NR               | 770       | 1312             | NR               | 900       | 1417             | NR               |
| 385       | 1197             | NR               | 515       | 25386            | NR               | 645       | 29336            | NR               | 775       | 1355             | NR               | 905       | 1054             | NR               |
| 390       | 930              | NR               | 520       | 25689            | NR               | 650       | 27279            | NR               | 780       | 1313             | NR               | 910       | 1583             | NR               |
| 395       | 934              | NR               | 525       | 25906            | NR               | 655       | 20755            | NR               | 785       | 1001             | NR               | 915       | 1866             | NR               |
| 400       | 841              | NR               | 530       | 26477            | NR               | 660       | 17587            | NR               | 790       | 1065             | NR               | 920       | 1529             | NR               |
| 405       | 808              | NR               | 535       | 27006            | NR               | 665       | 15073            | NR               | 795       | 1315             | NR               | 925       | 1671             | NR               |
| 410       | 914              | NR               | 540       | 27913            | NR               | 670       | 13454            | NR               | 800       | 1029             | NR               | 930       | 1617             | NR               |
| 415       | 1302             | NR               | 545       | 28798            | NR               | 675       | 11513            | NR               | 805       | 1267             | NR               | 935       | 1522             | NR               |
| 420       | 2088             | NR               | 550       | 29982            | NR               | 680       | 9839             | NR               | 810       | 1312             | NR               | 940       | 1792             | NR               |
| 425       | 3768             | NR               | 555       | 31264            | NR               | 685       | 8568             | NR               | 815       | 1239             | NR               | 945       | 1727             | NR               |
| 430       | 6771             | NR               | 560       | 32729            | NR               | 690       | 7487             | NR               | 820       | 1107             | NR               | 950       | 1375             | NR               |
| 435       | 12240            | NR               | 565       | 34271            | NR               | 695       | 6502             | NR               | 825       | 1209             | NR               | 955       | 2031             | NR               |
| 440       | 21697            | NR               | 570       | 35931            | NR               | 700       | 5703             | NR               | 830       | 1175             | NR               | 960       | 2155             | NR               |
| 445       | 30873            | NR               | 575       | 37457            | NR               | 705       | 4977             | NR               | 835       | 916              | NR               | 965       | 2519             | NR               |
| 450       | 30626            | NR               | 580       | 38827            | NR               | 710       | 4394             | NR               | 840       | 1171             | NR               | 970       | 2234             | NR               |
| 455       | 24859            | NR               | 585       | 40347            | NR               | 715       | 3979             | NR               | 845       | 1406             | NR               | 975       | 2064             | NR               |
| 460       | 23253            | NR               | 590       | 41126            | NR               | 720       | 3528             | NR               | 850       | 1407             | NR               | 980       | 2541             | NR               |
| 465       | 26717            | NR               | 595       | 41803            | NR               | 725       | 3206             | NR               | 855       | 1173             | NR               | 985       | 1959             | NR               |
| 470       | 33149            | NR               | 600       | 42231            | NR               | 730       | 2798             | NR               | 860       | 928              | NR               | 990       | 2532             | NR               |
| 475       | 36075            | NR               | 605       | 43629            | NR               | 735       | 2417             | NR               | 865       | 1256             | NR               | 995       | 2564             | NR               |
| 480       | 33381            | NR               | 610       | 53581            | NR               | 740       | 2135             | NR               | 870       | 1460             | NR               | 1000      | 2056             | NR               |
| 485       | 28773            | NR               | 615       | 54375            | NR               | 745       | 2151             | NR               | 875       | 1741             | NR               |           |                  |                  |

REPORT NUMBER: SP1-2210-795-3

**Scotopic Flux vs. Wavelength**



**Scotopic Lumens: 4472.9**

**S/P: 1.81**

| 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       | 1172             | NR               | 490       | 25948            | NR               | 620       | 41537            | NR               | 750       | 1967             | NR               | 880       | 2125             | NR               |
| 365       | 1124             | NR               | 495       | 24688            | NR               | 625       | 40984            | NR               | 755       | 1800             | NR               | 885       | 2057             | NR               |
| 370       | 1161             | NR               | 500       | 24010            | NR               | 630       | 70640            | NR               | 760       | 1684             | NR               | 890       | 2080             | NR               |
| 375       | 1195             | NR               | 505       | 24099            | NR               | 635       | 57718            | NR               | 765       | 1458             | NR               | 895       | 1496             | NR               |
| 380       | 1247             | NR               | 510       | 24608            | NR               | 640       | 30257            | NR               | 770       | 1312             | NR               | 900       | 1417             | NR               |
| 385       | 1197             | NR               | 515       | 25386            | NR               | 645       | 29336            | NR               | 775       | 1355             | NR               | 905       | 1054             | NR               |
| 390       | 930              | NR               | 520       | 25689            | NR               | 650       | 27279            | NR               | 780       | 1313             | NR               | 910       | 1583             | NR               |
| 395       | 934              | NR               | 525       | 25906            | NR               | 655       | 20755            | NR               | 785       | 1001             | NR               | 915       | 1866             | NR               |
| 400       | 841              | NR               | 530       | 26477            | NR               | 660       | 17587            | NR               | 790       | 1065             | NR               | 920       | 1529             | NR               |
| 405       | 808              | NR               | 535       | 27006            | NR               | 665       | 15073            | NR               | 795       | 1315             | NR               | 925       | 1671             | NR               |
| 410       | 914              | NR               | 540       | 27913            | NR               | 670       | 13454            | NR               | 800       | 1029             | NR               | 930       | 1617             | NR               |
| 415       | 1302             | NR               | 545       | 28798            | NR               | 675       | 11513            | NR               | 805       | 1267             | NR               | 935       | 1522             | NR               |
| 420       | 2088             | NR               | 550       | 29982            | NR               | 680       | 9839             | NR               | 810       | 1312             | NR               | 940       | 1792             | NR               |
| 425       | 3768             | NR               | 555       | 31264            | NR               | 685       | 8568             | NR               | 815       | 1239             | NR               | 945       | 1727             | NR               |
| 430       | 6771             | NR               | 560       | 32729            | NR               | 690       | 7487             | NR               | 820       | 1107             | NR               | 950       | 1375             | NR               |
| 435       | 12240            | NR               | 565       | 34271            | NR               | 695       | 6502             | NR               | 825       | 1209             | NR               | 955       | 2031             | NR               |
| 440       | 21697            | NR               | 570       | 35931            | NR               | 700       | 5703             | NR               | 830       | 1175             | NR               | 960       | 2155             | NR               |
| 445       | 30873            | NR               | 575       | 37457            | NR               | 705       | 4977             | NR               | 835       | 916              | NR               | 965       | 2519             | NR               |
| 450       | 30626            | NR               | 580       | 38827            | NR               | 710       | 4394             | NR               | 840       | 1171             | NR               | 970       | 2234             | NR               |
| 455       | 24859            | NR               | 585       | 40347            | NR               | 715       | 3979             | NR               | 845       | 1406             | NR               | 975       | 2064             | NR               |
| 460       | 23253            | NR               | 590       | 41126            | NR               | 720       | 3528             | NR               | 850       | 1407             | NR               | 980       | 2541             | NR               |
| 465       | 26717            | NR               | 595       | 41803            | NR               | 725       | 3206             | NR               | 855       | 1173             | NR               | 985       | 1959             | NR               |
| 470       | 33149            | NR               | 600       | 42231            | NR               | 730       | 2798             | NR               | 860       | 928              | NR               | 990       | 2532             | NR               |
| 475       | 36075            | NR               | 605       | 43629            | NR               | 735       | 2417             | NR               | 865       | 1256             | NR               | 995       | 2564             | NR               |
| 480       | 33381            | NR               | 610       | 53581            | NR               | 740       | 2135             | NR               | 870       | 1460             | NR               | 1000      | 2056             | NR               |
| 485       | 28773            | NR               | 615       | 54375            | NR               | 745       | 2151             | NR               | 875       | 1741             | NR               |           |                  |                  |

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**Melanopic Flux vs. Wavelength**



**Melanopic Lumens: 1922.8**

**S/P: 0.78**

| 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       | 1172             | NR               | 490       | 25948            | NR               | 620       | 41537            | NR               | 750       | 1967             | NR               | 880       | 2125             | NR               |
| 365       | 1124             | NR               | 495       | 24688            | NR               | 625       | 40984            | NR               | 755       | 1800             | NR               | 885       | 2057             | NR               |
| 370       | 1161             | NR               | 500       | 24010            | NR               | 630       | 70640            | NR               | 760       | 1684             | NR               | 890       | 2080             | NR               |
| 375       | 1195             | NR               | 505       | 24099            | NR               | 635       | 57718            | NR               | 765       | 1458             | NR               | 895       | 1496             | NR               |
| 380       | 1247             | NR               | 510       | 24608            | NR               | 640       | 30257            | NR               | 770       | 1312             | NR               | 900       | 1417             | NR               |
| 385       | 1197             | NR               | 515       | 25386            | NR               | 645       | 29336            | NR               | 775       | 1355             | NR               | 905       | 1054             | NR               |
| 390       | 930              | NR               | 520       | 25689            | NR               | 650       | 27279            | NR               | 780       | 1313             | NR               | 910       | 1583             | NR               |
| 395       | 934              | NR               | 525       | 25906            | NR               | 655       | 20755            | NR               | 785       | 1001             | NR               | 915       | 1866             | NR               |
| 400       | 841              | NR               | 530       | 26477            | NR               | 660       | 17587            | NR               | 790       | 1065             | NR               | 920       | 1529             | NR               |
| 405       | 808              | NR               | 535       | 27006            | NR               | 665       | 15073            | NR               | 795       | 1315             | NR               | 925       | 1671             | NR               |
| 410       | 914              | NR               | 540       | 27913            | NR               | 670       | 13454            | NR               | 800       | 1029             | NR               | 930       | 1617             | NR               |
| 415       | 1302             | NR               | 545       | 28798            | NR               | 675       | 11513            | NR               | 805       | 1267             | NR               | 935       | 1522             | NR               |
| 420       | 2088             | NR               | 550       | 29982            | NR               | 680       | 9839             | NR               | 810       | 1312             | NR               | 940       | 1792             | NR               |
| 425       | 3768             | NR               | 555       | 31264            | NR               | 685       | 8568             | NR               | 815       | 1239             | NR               | 945       | 1727             | NR               |
| 430       | 6771             | NR               | 560       | 32729            | NR               | 690       | 7487             | NR               | 820       | 1107             | NR               | 950       | 1375             | NR               |
| 435       | 12240            | NR               | 565       | 34271            | NR               | 695       | 6502             | NR               | 825       | 1209             | NR               | 955       | 2031             | NR               |
| 440       | 21697            | NR               | 570       | 35931            | NR               | 700       | 5703             | NR               | 830       | 1175             | NR               | 960       | 2155             | NR               |
| 445       | 30873            | NR               | 575       | 37457            | NR               | 705       | 4977             | NR               | 835       | 916              | NR               | 965       | 2519             | NR               |
| 450       | 30626            | NR               | 580       | 38827            | NR               | 710       | 4394             | NR               | 840       | 1171             | NR               | 970       | 2234             | NR               |
| 455       | 24859            | NR               | 585       | 40347            | NR               | 715       | 3979             | NR               | 845       | 1406             | NR               | 975       | 2064             | NR               |
| 460       | 23253            | NR               | 590       | 41126            | NR               | 720       | 3528             | NR               | 850       | 1407             | NR               | 980       | 2541             | NR               |
| 465       | 26717            | NR               | 595       | 41803            | NR               | 725       | 3206             | NR               | 855       | 1173             | NR               | 985       | 1959             | NR               |
| 470       | 33149            | NR               | 600       | 42231            | NR               | 730       | 2798             | NR               | 860       | 928              | NR               | 990       | 2532             | NR               |
| 475       | 36075            | NR               | 605       | 43629            | NR               | 735       | 2417             | NR               | 865       | 1256             | NR               | 995       | 2564             | NR               |
| 480       | 33381            | NR               | 610       | 53581            | NR               | 740       | 2135             | NR               | 870       | 1460             | NR               | 1000      | 2056             | NR               |
| 485       | 28773            | NR               | 615       | 54375            | NR               | 745       | 2151             | NR               | 875       | 1741             | NR               |           |                  |                  |

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**Summary**

$R_f = 90.4$   
 $R_g = 97.8$   
 CIE  $R_a = 90.1$   
 $R_g = 75.4$



**Color Vector Graphics**



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

|            |            |            |            |
|------------|------------|------------|------------|
| CES01 = 86 | CES26 = 96 | CES51 = 92 | CES76 = 90 |
| CES02 = 63 | CES27 = 88 | CES52 = 95 | CES77 = 80 |
| CES03 = 32 | CES28 = 96 | CES53 = 91 | CES78 = 90 |
| CES04 = 70 | CES29 = 91 | CES54 = 89 | CES79 = 83 |
| CES05 = 50 | CES30 = 87 | CES55 = 87 | CES80 = 84 |
| CES06 = 51 | CES31 = 92 | CES56 = 88 | CES81 = 66 |
| CES07 = 43 | CES32 = 97 | CES57 = 87 | CES82 = 94 |
| CES08 = 42 | CES33 = 92 | CES58 = 87 | CES83 = 89 |
| CES09 = 29 | CES34 = 94 | CES59 = 95 | CES84 = 96 |
| CES10 = 76 | CES35 = 96 | CES60 = 91 | CES85 = 77 |
| CES11 = 58 | CES36 = 82 | CES61 = 91 | CES86 = 75 |
| CES12 = 64 | CES37 = 96 | CES62 = 84 | CES87 = 91 |
| CES13 = 44 | CES38 = 83 | CES63 = 95 | CES88 = 92 |
| CES14 = 74 | CES39 = 97 | CES64 = 90 | CES89 = 84 |
| CES15 = 72 | CES40 = 95 | CES65 = 93 | CES90 = 91 |
| CES16 = 48 | CES41 = 93 | CES66 = 91 | CES91 = 77 |
| CES17 = 49 | CES42 = 93 | CES67 = 91 | CES92 = 78 |
| CES18 = 56 | CES43 = 91 | CES68 = 92 | CES93 = 86 |
| CES19 = 71 | CES44 = 99 | CES69 = 92 | CES94 = 77 |
| CES20 = 67 | CES45 = 94 | CES70 = 92 | CES95 = 86 |
| CES21 = 86 | CES46 = 94 | CES71 = 89 | CES96 = 94 |
| CES22 = 78 | CES47 = 86 | CES72 = 95 | CES97 = 92 |
| CES23 = 91 | CES48 = 86 | CES73 = 90 | CES98 = 91 |
| CES24 = 90 | CES49 = 95 | CES74 = 88 | CES99 = 90 |
| CES25 = 71 | CES50 = 92 | CES75 = 89 |            |



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Color Rendition by Hue-Angle Bin



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**Measure Comparisons**



(END OF REPORT)