

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: P732003

Luminaire Tested: **22CZ2-29HE-S-B2750-W2D-3500K**

Issue Date: 1/5/2024



**Test Information**

Test Method: LM-79-08  
Report Number: P732003  
TEST IS SCALED FROM IESNA LM-79-08 TEST DATA (P272009)  
Test Lab: INNOVATION CENTER(G3)  
Issue Date: 1/5/2024  
Manufacturer: COOPER LIGHTING SOLUTIONS (FORMERLY EATON)  
Product Line: METALUX  
Catalog Number: 22CZ2-29HE-S-B2750-W2D-3500K  
Description: 2X2 2900 LUMEN CRUZE TROFFER WITH BIO UP LEDS AT 3500K CCT AND SMOOTH LENS

Light Source: -  
Ballast/Driver: -

**Summary**

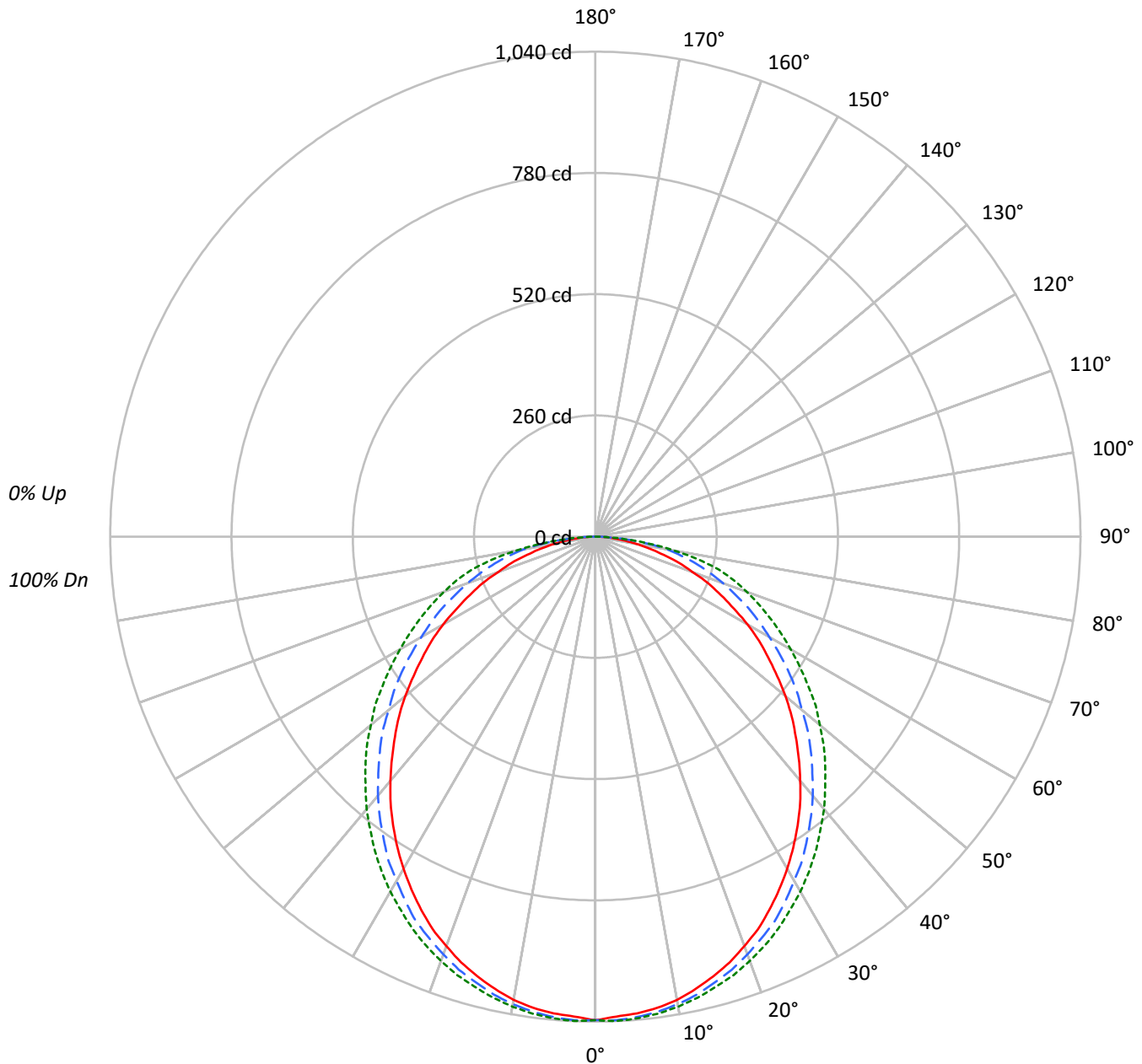
Lumens per Lamp: N/A  
Luminaire Lumens: 2894.0 lumens  
Efficiency: N/A  
Efficacy: 115.8 lumens/watt  
Spacing Criteria (0/90/45): 1.18 / 1.26 / 1.34  
Luminous Opening: Rectangular (W 1.92' x L: 1.98' x H: 0')  
CIE Type: Direct

Input Watts (W): 25  
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: P732003

CATALOG NUMBER: 22CZ2-29HE-S-B2750-W2D-3500K

### Luminous Intensity Polar Plot





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**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 | 99  | 95  | 106 | 101 | 97  | 94  | 97  | 94  | 91  | 93  | 90  | 88  | 89  | 87  | 85  | 83  |    |    |
| 2   | 98  | 90  | 83  | 77  | 96  | 88  | 82  | 76  | 84  | 79  | 74  | 81  | 77  | 73  | 78  | 74  | 71  | 69  |    |    |
| 3   | 90  | 79  | 71  | 64  | 87  | 77  | 70  | 63  | 74  | 68  | 62  | 72  | 66  | 61  | 69  | 64  | 60  | 58  |    |    |
| 4   | 82  | 70  | 61  | 54  | 80  | 69  | 60  | 54  | 66  | 59  | 53  | 64  | 57  | 52  | 61  | 56  | 52  | 49  |    |    |
| 5   | 75  | 62  | 53  | 47  | 73  | 61  | 53  | 46  | 59  | 52  | 46  | 57  | 51  | 45  | 55  | 50  | 45  | 43  |    |    |
| 6   | 70  | 56  | 47  | 41  | 68  | 55  | 47  | 41  | 53  | 46  | 40  | 52  | 45  | 40  | 50  | 44  | 39  | 37  |    |    |
| 7   | 65  | 51  | 42  | 36  | 63  | 50  | 42  | 36  | 49  | 41  | 36  | 47  | 40  | 35  | 46  | 40  | 35  | 33  |    |    |
| 8   | 60  | 47  | 38  | 32  | 59  | 46  | 38  | 32  | 45  | 37  | 32  | 43  | 37  | 32  | 42  | 36  | 31  | 30  |    |    |
| 9   | 56  | 43  | 35  | 29  | 55  | 42  | 34  | 29  | 41  | 34  | 29  | 40  | 33  | 29  | 39  | 33  | 28  | 27  |    |    |
| 10  | 53  | 40  | 32  | 26  | 51  | 39  | 31  | 26  | 38  | 31  | 26  | 37  | 31  | 26  | 36  | 30  | 26  | 24  |    |    |

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

|     | 0°   | 45°  | 90°  |
|-----|------|------|------|
| 0°  | 2943 | 2943 | 2943 |
| 5°  | 2923 | 2946 | 2954 |
| 10° | 2906 | 2933 | 2949 |
| 15° | 2868 | 2907 | 2936 |
| 20° | 2821 | 2878 | 2924 |
| 25° | 2765 | 2849 | 2905 |
| 30° | 2695 | 2792 | 2880 |
| 35° | 2619 | 2741 | 2853 |
| 40° | 2531 | 2686 | 2826 |
| 45° | 2438 | 2622 | 2796 |
| 50° | 2348 | 2552 | 2772 |
| 55° | 2238 | 2505 | 2752 |
| 60° | 2138 | 2444 | 2743 |
| 65° | 1995 | 2430 | 2774 |
| 70° | 1838 | 2408 | 2856 |
| 75° | 1658 | 2443 | 3006 |
| 80° | 1433 | 2515 | 2824 |
| 85° | 1185 | 2110 | 2110 |



TEST NUMBER: P732003

CATALOG NUMBER: 22CZ2-29HE-S-B2750-W2D-3500K

**ZONAL LUMENS:**

| Zone      | Lumens | % Fixture |
|-----------|--------|-----------|
| 0°-10°    | 98.1   | 3.4       |
| 10°-20°   | 279.1  | 9.6       |
| 20°-30°   | 417.6  | 14.4      |
| 30°-40°   | 494.5  | 17.1      |
| 40°-50°   | 504.0  | 17.4      |
| 50°-60°   | 451.7  | 15.6      |
| 60°-70°   | 353.6  | 12.2      |
| 70°-80°   | 228.1  | 7.9       |
| 80°-90°   | 67.3   | 2.3       |
| 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°    | 794.7  | 27.5      |
| 0°-40°    | 1289.3 | 44.5      |
| 0°-60°    | 2245.0 | 77.6      |
| 0°-90°    | 2894.0 | 100.0     |
| 90°-120°  | 0.0    | 0.0       |
| 90°-150°  | 0.0    | 0.0       |
| 90°-180°  | 0.0    | 0.0       |
| 0°-180°   | 2894.0 | 100.0     |

**CANDELA DISTRIBUTION:**

|     | 0°   | 22.5° | 45°  | 67.5° | 90°  | Flux |
|-----|------|-------|------|-------|------|------|
| 0°  | 1037 | 1037  | 1037 | 1037  | 1037 |      |
| 5°  | 1026 | 1029  | 1034 | 1036  | 1037 | 97   |
| 15° | 976  | 982   | 990  | 998   | 999  | 275  |
| 25° | 883  | 891   | 910  | 922   | 928  | 406  |
| 35° | 756  | 766   | 791  | 816   | 824  | 473  |
| 45° | 608  | 621   | 654  | 687   | 697  | 469  |
| 55° | 452  | 467   | 506  | 542   | 556  | 406  |
| 65° | 297  | 314   | 362  | 397   | 413  | 295  |
| 75° | 151  | 174   | 223  | 261   | 274  | 162  |
| 85° | 36   | 50    | 65   | 65    | 65   | 43   |
| 90° | 0    | 0     | 0    | 0     | 0    |      |



TEST NUMBER: P732003

CATALOG NUMBER: 22CZ2-29HE-S-B2750-W2D-3500K

**CANDELA DISTRIBUTION (FULL):**

|       | 0°     | 22.5°  | 45°    | 67.5°  | 90°    |
|-------|--------|--------|--------|--------|--------|
| 0°    | 1037.0 | 1037.0 | 1037.0 | 1037.0 | 1037.0 |
| 2.5°  | 1030.2 | 1033.0 | 1038.3 | 1039.8 | 1039.8 |
| 5°    | 1026.3 | 1028.9 | 1034.3 | 1035.7 | 1037.0 |
| 7.5°  | 1019.4 | 1020.8 | 1027.6 | 1030.2 | 1031.7 |
| 10°   | 1008.7 | 1011.3 | 1018.1 | 1022.2 | 1023.5 |
| 12.5° | 993.7  | 997.8  | 1005.9 | 1011.3 | 1012.8 |
| 15°   | 976.3  | 981.7  | 989.7  | 997.8  | 999.3  |
| 17.5° | 957.3  | 962.8  | 973.6  | 983.0  | 985.8  |
| 20°   | 934.3  | 941.2  | 953.2  | 964.1  | 968.2  |
| 22.5° | 911.4  | 916.8  | 931.7  | 945.2  | 949.3  |
| 25°   | 883.1  | 891.2  | 910.1  | 922.3  | 927.7  |
| 27.5° | 853.3  | 862.7  | 881.8  | 897.9  | 903.3  |
| 30°   | 822.4  | 831.8  | 852.0  | 872.3  | 879.0  |
| 32.5° | 789.8  | 800.8  | 825.0  | 845.3  | 852.0  |
| 35°   | 756.2  | 765.6  | 791.3  | 815.6  | 823.7  |
| 37.5° | 721.0  | 729.2  | 758.9  | 784.5  | 792.6  |
| 40°   | 683.3  | 694.0  | 725.1  | 754.9  | 762.8  |
| 42.5° | 645.4  | 657.6  | 688.6  | 721.0  | 729.2  |
| 45°   | 607.6  | 621.1  | 653.5  | 687.3  | 696.8  |
| 47.5° | 571.2  | 581.9  | 618.5  | 650.9  | 664.4  |
| 50°   | 531.9  | 542.8  | 578.0  | 614.4  | 627.9  |
| 52.5° | 491.4  | 506.4  | 544.1  | 579.3  | 595.4  |
| 55°   | 452.4  | 467.2  | 506.4  | 541.5  | 556.3  |
| 57.5° | 415.9  | 428.0  | 468.5  | 504.9  | 519.9  |
| 60°   | 376.7  | 387.6  | 430.7  | 469.9  | 483.4  |
| 62.5° | 334.9  | 351.0  | 395.6  | 432.0  | 448.3  |
| 65°   | 297.1  | 314.5  | 361.9  | 397.0  | 413.1  |
| 67.5° | 262.0  | 278.1  | 324.1  | 361.9  | 379.5  |
| 70°   | 221.5  | 243.1  | 290.3  | 328.0  | 344.3  |
| 72.5° | 189.1  | 208.0  | 256.6  | 294.4  | 311.9  |
| 75°   | 151.2  | 174.1  | 222.8  | 260.7  | 274.2  |
| 77.5° | 120.3  | 143.2  | 189.1  | 218.7  | 225.5  |
| 80°   | 87.7   | 110.7  | 153.9  | 168.7  | 172.8  |
| 82.5° | 59.4   | 81.0   | 110.7  | 114.7  | 116.2  |
| 85°   | 36.4   | 50.0   | 64.8   | 64.8   | 64.8   |
| 87.5° | 17.6   | 20.2   | 22.9   | 21.6   | 21.6   |
| 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)