

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: P828648

Luminaire Tested: **OHBL-24SE-MCL-UNV-L950-CD-UPL12**

Issue Date: 5/3/2024



**Test Information**

Test Method: LM-79-08  
Report Number: P828648  
REPORT IS A COMBINATION OF REPORTS P826078 AND G3-2310-221-12  
Test Lab: INNOVATION CENTER  
Issue Date: 5/3/2024  
Manufacturer: COOPER LIGHTING SOLUTIONS (FORMERLY EATON)  
Product Line: METALUX  
Catalog Number: OHBL-24SE-MCL-UNV-L950-CD-UPL12  
Description:  
Light Source: -  
Ballast/Driver: -

**Summary**

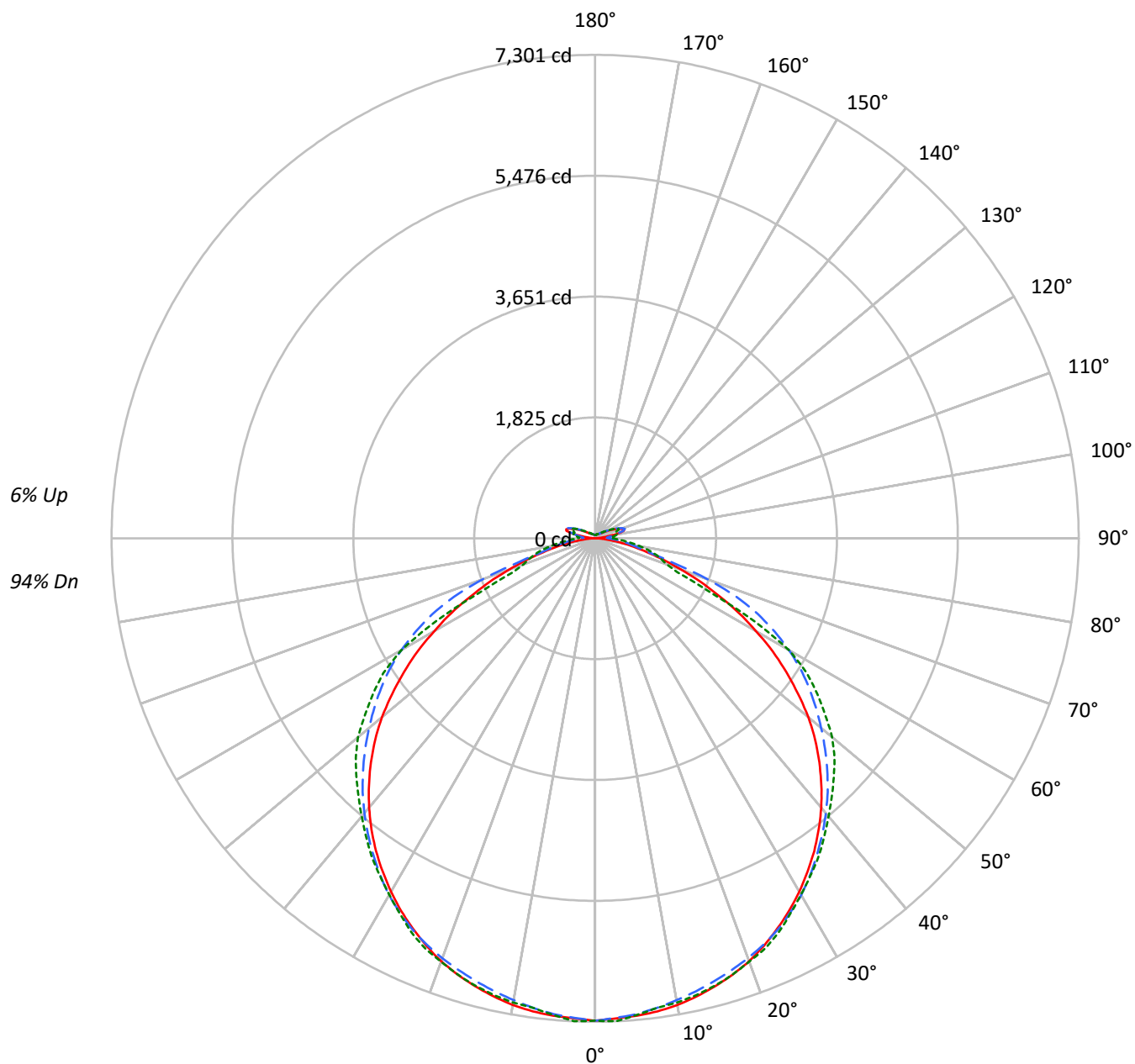
Lumens per Lamp: N/A  
Luminaire Lumens: 21676.4 lumens  
Efficiency: N/A  
Efficacy: 148.1 lumens/watt  
Spacing Criteria (0/90/45): 1.26 / 1.27 / 1.39  
Luminous Opening: Rectangular w/ Sides (W: 3.78' x L: 1.67' x H: 0.17')  
CIE Type: Direct

Input Watts (W): 146.4  
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: P828648

CATALOG NUMBER: OHBL-24SE-MCL-UNV-L950-CD-UPL12

### Luminous Intensity Polar Plot





TEST NUMBER: P828648

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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 |
| RCR |     |     |     |     |     |     |     |     |  |     |     |     |  |     |     |     |  |    |    |    |
| 0   | 118 | 118 | 118 | 118 | 114 | 114 | 114 | 114 |  | 108 | 108 | 108 |  | 102 | 102 | 102 |  | 96 | 96 | 96 |
| 1   | 108 | 103 | 99  | 95  | 104 | 100 | 97  | 93  |  | 95  | 92  | 89  |  | 90  | 88  | 85  |  | 85 | 84 | 82 |
| 2   | 98  | 90  | 84  | 78  | 95  | 88  | 82  | 77  |  | 83  | 78  | 74  |  | 79  | 75  | 71  |  | 75 | 72 | 69 |
| 3   | 90  | 79  | 71  | 65  | 87  | 77  | 70  | 64  |  | 73  | 67  | 62  |  | 70  | 65  | 60  |  | 67 | 62 | 59 |
| 4   | 82  | 70  | 62  | 55  | 79  | 69  | 61  | 54  |  | 65  | 58  | 53  |  | 62  | 56  | 52  |  | 59 | 55 | 50 |
| 5   | 75  | 63  | 54  | 47  | 73  | 61  | 53  | 47  |  | 59  | 51  | 46  |  | 56  | 50  | 45  |  | 53 | 48 | 44 |
| 6   | 70  | 56  | 48  | 41  | 67  | 55  | 47  | 41  |  | 53  | 46  | 40  |  | 51  | 44  | 39  |  | 48 | 43 | 38 |
| 7   | 64  | 51  | 43  | 36  | 62  | 50  | 42  | 36  |  | 48  | 41  | 35  |  | 46  | 40  | 35  |  | 44 | 38 | 34 |
| 8   | 60  | 47  | 38  | 32  | 58  | 46  | 38  | 32  |  | 44  | 37  | 32  |  | 42  | 36  | 31  |  | 41 | 35 | 31 |
| 9   | 56  | 43  | 35  | 29  | 54  | 42  | 34  | 29  |  | 40  | 33  | 28  |  | 39  | 32  | 28  |  | 37 | 32 | 28 |
| 10  | 52  | 39  | 32  | 26  | 51  | 39  | 31  | 26  |  | 37  | 30  | 26  |  | 36  | 30  | 25  |  | 35 | 29 | 25 |

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

|     | 0°    | 45°   | 90°   |
|-----|-------|-------|-------|
| 0°  | 12444 | 12444 | 12444 |
| 5°  | 12303 | 12258 | 12341 |
| 10° | 12198 | 12067 | 12256 |
| 15° | 12061 | 11923 | 12227 |
| 20° | 11923 | 11830 | 12173 |
| 25° | 11715 | 11736 | 12122 |
| 30° | 11493 | 11591 | 11952 |
| 35° | 11237 | 11365 | 11890 |
| 40° | 10922 | 11131 | 11788 |
| 45° | 10509 | 10861 | 11792 |
| 50° | 9975  | 10554 | 11793 |
| 55° | 9177  | 10251 | 11463 |
| 60° | 8162  | 9810  | 10726 |
| 65° | 6878  | 9001  | 6905  |
| 70° | 5406  | 7012  | 5115  |
| 75° | 3908  | 4150  | 5361  |
| 80° | 2559  | 3435  | 5405  |
| 85° | 1282  | 3119  | 5683  |



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**ZONAL LUMENS:**

| Zone      | Lumens  | % Fixture |
|-----------|---------|-----------|
| 0°-10°    | 687.0   | 3.2       |
| 10°-20°   | 1970.0  | 9.1       |
| 20°-30°   | 3008.8  | 13.9      |
| 30°-40°   | 3650.7  | 16.8      |
| 40°-50°   | 3826.3  | 17.7      |
| 50°-60°   | 3467.2  | 16.0      |
| 60°-70°   | 2324.6  | 10.7      |
| 70°-80°   | 1043.9  | 4.8       |
| 80°-90°   | 381.5   | 1.8       |
| 90°-100°  | 217.5   | 1.0       |
| 100°-110° | 413.7   | 1.9       |
| 110°-120° | 336.1   | 1.6       |
| 120°-130° | 163.0   | 0.8       |
| 130°-140° | 84.3    | 0.4       |
| 140°-150° | 50.0    | 0.2       |
| 150°-160° | 30.3    | 0.1       |
| 160°-170° | 16.3    | 0.1       |
| 170°-180° | 5.0     | 0.0       |
| 0°-30°    | 5665.9  | 26.1      |
| 0°-40°    | 9316.6  | 43.0      |
| 0°-60°    | 16610.2 | 76.6      |
| 0°-90°    | 20360.2 | 93.9      |
| 90°-120°  | 967.2   | 4.5       |
| 90°-150°  | 1264.5  | 5.8       |
| 90°-180°  | 1316.0  | 6.1       |
| 0°-180°   | 21676.4 | 100.0     |

**CANDELA DISTRIBUTION:**

|      | 0°   | 22.5° | 45°  | 67.5° | 90°  | Flux |
|------|------|-------|------|-------|------|------|
| 0°   | 7286 | 7286  | 7286 | 7286  | 7286 |      |
| 5°   | 7239 | 7264  | 7213 | 7236  | 7226 | 688  |
| 15°  | 7004 | 6976  | 6927 | 6988  | 6996 | 1977 |
| 25°  | 6506 | 6478  | 6523 | 6583  | 6564 | 2999 |
| 35°  | 5767 | 5781  | 5840 | 5902  | 5879 | 3604 |
| 45°  | 4786 | 4864  | 4955 | 5081  | 5097 | 3687 |
| 55°  | 3522 | 3692  | 3943 | 4101  | 4092 | 3144 |
| 65°  | 2067 | 2390  | 2714 | 2290  | 1870 | 2059 |
| 75°  | 813  | 1180  | 868  | 888   | 946  | 889  |
| 85°  | 140  | 269   | 344  | 416   | 436  | 171  |
| 90°  | 4    | 105   | 199  | 250   | 264  | 10   |
| 95°  | 23   | 106   | 197  | 249   | 269  | 73   |
| 105° | 454  | 468   | 439  | 341   | 323  | 430  |
| 115° | 321  | 326   | 344  | 350   | 347  | 321  |
| 125° | 160  | 168   | 182  | 183   | 185  | 150  |
| 135° | 98   | 102   | 106  | 112   | 114  | 78   |
| 145° | 75   | 78    | 78   | 80    | 82   | 48   |
| 155° | 63   | 65    | 66   | 66    | 65   | 29   |
| 165° | 57   | 57    | 58   | 58    | 58   | 16   |
| 175° | 52   | 52    | 51   | 50    | 50   | 5    |
| 180° | 50   | 50    | 50   | 50    | 50   |      |



TEST NUMBER: P828648

CATALOG NUMBER: OHBL-24SE-MCL-UNV-L950-CD-UPL12

**CANDELA DISTRIBUTION (FULL):**

|        | 0°     | 22.5°  | 45°    | 67.5°  | 90°    |
|--------|--------|--------|--------|--------|--------|
| 0°     | 7286.0 | 7286.0 | 7286.0 | 7286.0 | 7286.0 |
| 2.5°   | 7256.6 | 7287.1 | 7249.2 | 7290.3 | 7300.8 |
| 5°     | 7238.6 | 7263.9 | 7213.3 | 7235.5 | 7226.0 |
| 7.5°   | 7206.0 | 7214.4 | 7154.4 | 7172.3 | 7153.4 |
| 10°    | 7157.5 | 7153.4 | 7082.8 | 7117.5 | 7121.7 |
| 12.5°  | 7085.9 | 7073.3 | 7010.1 | 7062.7 | 7063.8 |
| 15°    | 7003.7 | 6976.3 | 6926.8 | 6987.9 | 6996.3 |
| 17.5°  | 6908.9 | 6873.0 | 6840.4 | 6919.5 | 6906.8 |
| 20°    | 6798.3 | 6756.1 | 6749.8 | 6836.2 | 6804.6 |
| 22.5°  | 6661.3 | 6628.6 | 6643.4 | 6725.6 | 6705.6 |
| 25°    | 6506.5 | 6478.1 | 6523.4 | 6583.3 | 6564.4 |
| 27.5°  | 6343.2 | 6326.3 | 6377.9 | 6424.3 | 6387.4 |
| 30°    | 6164.1 | 6154.6 | 6223.0 | 6261.0 | 6214.6 |
| 32.5°  | 5969.2 | 5972.3 | 6037.7 | 6089.2 | 6046.1 |
| 35°    | 5766.9 | 5780.6 | 5839.6 | 5901.8 | 5878.6 |
| 37.5°  | 5544.6 | 5575.1 | 5634.2 | 5704.8 | 5680.5 |
| 40°    | 5309.7 | 5354.0 | 5419.2 | 5504.5 | 5482.5 |
| 42.5°  | 5055.8 | 5111.6 | 5195.9 | 5290.7 | 5288.6 |
| 45°    | 4786.1 | 4864.0 | 4954.6 | 5081.0 | 5096.9 |
| 47.5°  | 4505.8 | 4593.3 | 4708.1 | 4876.7 | 4900.9 |
| 50°    | 4201.4 | 4311.0 | 4454.3 | 4656.5 | 4671.3 |
| 52.5°  | 3862.2 | 4011.8 | 4201.4 | 4395.2 | 4377.3 |
| 55°    | 3521.9 | 3691.5 | 3943.3 | 4101.3 | 4091.8 |
| 57.5°  | 3182.6 | 3373.4 | 3678.9 | 3791.6 | 3790.5 |
| 60°    | 2803.3 | 3044.6 | 3378.6 | 3464.0 | 3379.6 |
| 62.5°  | 2452.5 | 2711.7 | 3058.4 | 2996.2 | 2707.5 |
| 65°    | 2067.0 | 2390.5 | 2713.8 | 2290.3 | 1870.0 |
| 67.5°  | 1724.6 | 2061.7 | 2305.1 | 1568.7 | 1343.2 |
| 70°    | 1380.1 | 1752.0 | 1797.3 | 1164.1 | 1148.4 |
| 72.5°  | 1074.5 | 1470.7 | 1240.0 | 996.6  | 1047.2 |
| 75°    | 813.3  | 1179.9 | 868.1  | 888.1  | 946.0  |
| 77.5°  | 593.1  | 906.0  | 675.3  | 778.5  | 826.0  |
| 80°    | 407.7  | 641.6  | 551.0  | 654.3  | 686.9  |
| 82.5°  | 256.0  | 423.5  | 441.4  | 526.8  | 560.4  |
| 85°    | 140.2  | 268.7  | 344.5  | 416.1  | 436.1  |
| 87.5°  | 57.9   | 162.2  | 263.4  | 321.3  | 338.2  |
| 90°    | 3.7    | 105.2  | 198.9  | 250.3  | 264.3  |
| 92.5°  | 8.9    | 88.5   | 178.4  | 227.1  | 238.8  |
| 95°    | 22.8   | 106.2  | 197.0  | 249.4  | 269.3  |
| 97.5°  | 119.5  | 172.1  | 246.5  | 293.7  | 306.6  |
| 100°   | 243.1  | 295.1  | 300.0  | 327.5  | 335.1  |
| 102.5° | 385.9  | 405.9  | 346.4  | 335.1  | 333.9  |
| 105°   | 453.7  | 468.5  | 439.2  | 341.3  | 322.7  |



TEST NUMBER: P828648

CATALOG NUMBER: OHBL-24SE-MCL-UNV-L950-CD-UPL12

**CANDELA DISTRIBUTION (continued):**

|        | 0°    | 22.5° | 45°   | 67.5° | 90°   |
|--------|-------|-------|-------|-------|-------|
| 112.5° | 370.8 | 380.8 | 399.2 | 394.8 | 382.1 |
| 115°   | 321.4 | 325.6 | 344.4 | 350.2 | 347.2 |
| 117.5° | 271.0 | 276.6 | 295.0 | 298.7 | 299.1 |
| 120°   | 228.4 | 234.7 | 250.1 | 251.9 | 252.9 |
| 122.5° | 193.6 | 198.0 | 212.1 | 214.8 | 216.8 |
| 125°   | 160.4 | 167.5 | 181.5 | 182.9 | 184.9 |
| 127.5° | 136.2 | 141.5 | 156.0 | 158.2 | 159.3 |
| 130°   | 119.7 | 124.2 | 133.9 | 138.9 | 138.9 |
| 132.5° | 108.6 | 112.2 | 118.9 | 124.0 | 124.9 |
| 135°   | 98.2  | 101.8 | 106.3 | 112.5 | 113.5 |
| 137.5° | 92.2  | 94.0  | 96.6  | 102.8 | 104.7 |
| 140°   | 85.3  | 87.9  | 88.6  | 93.7  | 94.8  |
| 142.5° | 79.0  | 81.8  | 82.5  | 86.5  | 88.5  |
| 145°   | 74.7  | 77.5  | 78.3  | 80.2  | 82.2  |
| 147.5° | 71.4  | 73.1  | 74.9  | 74.9  | 76.8  |
| 150°   | 68.8  | 69.6  | 70.5  | 71.4  | 71.4  |
| 152.5° | 65.3  | 66.2  | 67.0  | 67.9  | 67.9  |
| 155°   | 62.7  | 64.6  | 65.5  | 66.3  | 65.3  |
| 157.5° | 60.1  | 62.9  | 62.9  | 63.7  | 63.7  |
| 160°   | 58.3  | 60.3  | 61.1  | 61.1  | 61.1  |
| 162.5° | 57.6  | 58.5  | 58.5  | 59.4  | 59.4  |
| 165°   | 56.8  | 56.8  | 57.6  | 57.6  | 57.6  |
| 167.5° | 55.0  | 56.1  | 55.9  | 55.9  | 55.9  |
| 170°   | 54.2  | 54.2  | 54.2  | 54.0  | 54.0  |
| 172.5° | 53.3  | 53.3  | 53.3  | 52.3  | 52.3  |
| 175°   | 52.4  | 52.4  | 51.4  | 50.3  | 50.3  |
| 177.5° | 52.6  | 52.4  | 51.4  | 50.3  | 49.3  |
| 180°   | 50.5  | 50.5  | 50.5  | 50.5  | 50.5  |



Report Generated By 670246072 / DESKTOP-50001EG





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







|        |       |       |       |       |       |
|--------|-------|-------|-------|-------|-------|
| 107.5° | 457.4 | 473.8 | 469.8 | 386.5 | 332.9 |
| 110°   | 420.2 | 436.8 | 444.0 | 417.9 | 375.6 |



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

Report Prepared for

Cooper Lighting Solutions

METALUX

Report Number: SP1-2307-100-9

Test Date: 08/01/2023

Luminaire Tested: OHB-15SE-N-UNV-L950-CD

Data in this report applies to families of products including OHB-15SE-N-UNV-L950-CD.

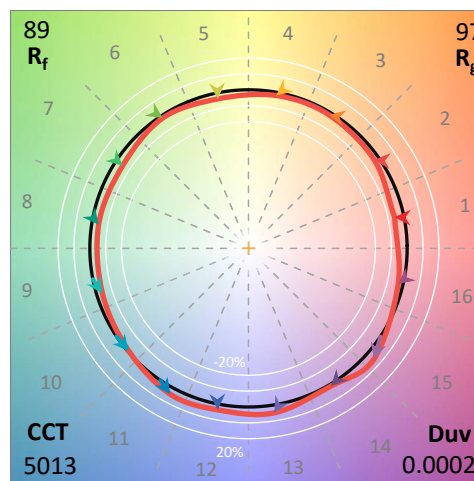
### Test Information

Test Method: LM-79-2019  
 Report Number: SP1-2307-100-9  
 Test Lab: COOPER LIGHTING SOLUTIONS  
 Photometer: SP1 - 76IN SPHERE  
 Measurement Geometry: 4π  
 Issue Date: 08/04/2023  
 Manufacturer: COOPER LIGHTING SOLUTIONS  
 Product Line: METALUX  
 Catalog Number: **OHB-15SE-N-UNV-L950-CD**  
 Description: 15000 LUMEN OHB SE LED LUMINAIRE WITH 90CRI, 5000K LEDS AND NARROW LENS

LENS

### Spectral Parameters

|                           |        |           |      |      |      |
|---------------------------|--------|-----------|------|------|------|
| CCT (K):                  | 5013   | CRI (Ra): | 92.0 |      |      |
| CIE u':                   | 0.2111 | R1:       | 92.6 | R9:  | 62.7 |
| CIE v':                   | 0.4847 | R2:       | 96.7 | R10: | 90.0 |
| Duv:                      | 0.0002 | R3:       | 96.5 | R11: | 89.8 |
| CIE x:                    | 0.3447 | R4:       | 90.1 | R12: | 69.9 |
| CIE y:                    | 0.3517 | R5:       | 91.1 | R13: | 94.5 |
| CIE z:                    | 0.3036 | R6:       | 92.0 | R14: | 98.3 |
| Peak Wavelength (nm):     | 455    | R7:       | 92.4 |      |      |
| Dominant Wavelength (nm): | 572    | R8:       | 84.9 |      |      |
| Purity:                   | 9.1    |           |      |      |      |
| Rf:                       | 88.9   |           |      |      |      |
| Rg:                       | 97.2   |           |      |      |      |



### Test Conditions

Stabilization Time: 26M  
 Operation Time: 12H  
 Room Temperature (°C) / RH%: 25.7/57%  
 Sphere Temperature (°C): 25.2

REPORT NUMBER: SP1-2307-100-9

| Measurement and Test Equipment |                       |                  |                      |
|--------------------------------|-----------------------|------------------|----------------------|
| Instrument                     | Identification Number | Calibration Date | Calibration Due Date |
| Photometer                     | 76INCH SPHERE IN0058  | 2/9/2023         | 8/9/2023             |
| Power Meter                    | XITRON 2801 IN0071    | 11/29/2022       | 11/29/2023           |
| AC Power Source                | CHROMA 61603 IN0063   | 11/28/2022       | 11/28/2023           |
| DC Power Source                | AGILENT E3634A IN0208 | 11/28/2022       | 11/28/2023           |
| Sphere Thermometer             | ONSET IN0085          | 11/28/2022       | 11/28/2023           |
| Room Thermometer               | ONSET IN0046          | 11/28/2022       | 11/28/2023           |

REPORT NUMBER: SP1-2307-100-9

CIE 1931 Chromaticity Diagram



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



Point lies inside the ANSI 5000K 4-step quadrangle

REPORT NUMBER: SP1-2307-100-9

**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       | 6694             | NR               | 490       | 112019           | NR               | 620       | 173132           | NR               | 750       | 14981            | NR               | 880       | 5536             | NR               |
| 365       | 5354             | NR               | 495       | 119136           | NR               | 625       | 169860           | NR               | 755       | 13480            | NR               | 885       | 6938             | NR               |
| 370       | 5722             | NR               | 500       | 127627           | NR               | 630       | 163982           | NR               | 760       | 11900            | NR               | 890       | 5411             | NR               |
| 375       | 6251             | NR               | 505       | 139687           | NR               | 635       | 158304           | NR               | 765       | 10671            | NR               | 895       | 4784             | NR               |
| 380       | 6177             | NR               | 510       | 148127           | NR               | 640       | 151433           | NR               | 770       | 9643             | NR               | 900       | 5872             | NR               |
| 385       | 5889             | NR               | 515       | 155327           | NR               | 645       | 144044           | NR               | 775       | 8310             | NR               | 905       | 5214             | NR               |
| 390       | 5252             | NR               | 520       | 161724           | NR               | 650       | 134971           | NR               | 780       | 7378             | NR               | 910       | 5425             | NR               |
| 395       | 5012             | NR               | 525       | 166350           | NR               | 655       | 126523           | NR               | 785       | 7348             | NR               | 915       | 5372             | NR               |
| 400       | 4505             | NR               | 530       | 170827           | NR               | 660       | 117624           | NR               | 790       | 6731             | NR               | 920       | 5263             | NR               |
| 405       | 4163             | NR               | 535       | 174287           | NR               | 665       | 107737           | NR               | 795       | 6603             | NR               | 925       | 5581             | NR               |
| 410       | 4931             | NR               | 540       | 177402           | NR               | 670       | 97796            | NR               | 800       | 6333             | NR               | 930       | 7934             | NR               |
| 415       | 6887             | NR               | 545       | 179468           | NR               | 675       | 88146            | NR               | 805       | 5919             | NR               | 935       | 6835             | NR               |
| 420       | 10750            | NR               | 550       | 180621           | NR               | 680       | 80008            | NR               | 810       | 5757             | NR               | 940       | 4871             | NR               |
| 425       | 18574            | NR               | 555       | 182239           | NR               | 685       | 71588            | NR               | 815       | 6226             | NR               | 945       | 6554             | NR               |
| 430       | 31943            | NR               | 560       | 184077           | NR               | 690       | 63388            | NR               | 820       | 5694             | NR               | 950       | 6239             | NR               |
| 435       | 54504            | NR               | 565       | 184113           | NR               | 695       | 56106            | NR               | 825       | 5621             | NR               | 955       | 4562             | NR               |
| 440       | 91570            | NR               | 570       | 183843           | NR               | 700       | 49976            | NR               | 830       | 5832             | NR               | 960       | 3863             | NR               |
| 445       | 155007           | NR               | 575       | 183242           | NR               | 705       | 44326            | NR               | 835       | 5478             | NR               | 965       | 4898             | NR               |
| 450       | 253466           | NR               | 580       | 182759           | NR               | 710       | 39116            | NR               | 840       | 5675             | NR               | 970       | 7576             | NR               |
| 455       | 316705           | NR               | 585       | 182781           | NR               | 715       | 34755            | NR               | 845       | 4960             | NR               | 975       | 6056             | NR               |
| 460       | 273954           | NR               | 590       | 181075           | NR               | 720       | 30900            | NR               | 850       | 5274             | NR               | 980       | 3439             | NR               |
| 465       | 214019           | NR               | 595       | 181315           | NR               | 725       | 27349            | NR               | 855       | 5470             | NR               | 985       | 3623             | NR               |
| 470       | 175153           | NR               | 600       | 181289           | NR               | 730       | 23954            | NR               | 860       | 6539             | NR               | 990       | 4301             | NR               |
| 475       | 140894           | NR               | 605       | 180053           | NR               | 735       | 21526            | NR               | 865       | 6378             | NR               | 995       | 7368             | NR               |
| 480       | 115223           | NR               | 610       | 177907           | NR               | 740       | 18965            | NR               | 870       | 5702             | NR               | 1000      | 10668            | NR               |
| 485       | 108577           | NR               | 615       | 175575           | NR               | 745       | 17153            | NR               | 875       | 4933             | NR               |           |                  |                  |

REPORT NUMBER: SP1-2307-100-9

Scotopic Flux vs. Wavelength



Scotopic Lumens: 26039.5

S/P: 2.08

| 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       | 6694             | NR               | 490       | 112019           | NR               | 620       | 173132           | NR               | 750       | 14981            | NR               | 880       | 5536             | NR               |
| 365       | 5354             | NR               | 495       | 119136           | NR               | 625       | 169860           | NR               | 755       | 13480            | NR               | 885       | 6938             | NR               |
| 370       | 5722             | NR               | 500       | 127627           | NR               | 630       | 163982           | NR               | 760       | 11900            | NR               | 890       | 5411             | NR               |
| 375       | 6251             | NR               | 505       | 139687           | NR               | 635       | 158304           | NR               | 765       | 10671            | NR               | 895       | 4784             | NR               |
| 380       | 6177             | NR               | 510       | 148127           | NR               | 640       | 151433           | NR               | 770       | 9643             | NR               | 900       | 5872             | NR               |
| 385       | 5889             | NR               | 515       | 155327           | NR               | 645       | 144044           | NR               | 775       | 8310             | NR               | 905       | 5214             | NR               |
| 390       | 5252             | NR               | 520       | 161724           | NR               | 650       | 134971           | NR               | 780       | 7378             | NR               | 910       | 5425             | NR               |
| 395       | 5012             | NR               | 525       | 166350           | NR               | 655       | 126523           | NR               | 785       | 7348             | NR               | 915       | 5372             | NR               |
| 400       | 4505             | NR               | 530       | 170827           | NR               | 660       | 117624           | NR               | 790       | 6731             | NR               | 920       | 5263             | NR               |
| 405       | 4163             | NR               | 535       | 174287           | NR               | 665       | 107737           | NR               | 795       | 6603             | NR               | 925       | 5581             | NR               |
| 410       | 4931             | NR               | 540       | 177402           | NR               | 670       | 97796            | NR               | 800       | 6333             | NR               | 930       | 7934             | NR               |
| 415       | 6887             | NR               | 545       | 179468           | NR               | 675       | 88146            | NR               | 805       | 5919             | NR               | 935       | 6835             | NR               |
| 420       | 10750            | NR               | 550       | 180621           | NR               | 680       | 80008            | NR               | 810       | 5757             | NR               | 940       | 4871             | NR               |
| 425       | 18574            | NR               | 555       | 182239           | NR               | 685       | 71588            | NR               | 815       | 6226             | NR               | 945       | 6554             | NR               |
| 430       | 31943            | NR               | 560       | 184077           | NR               | 690       | 63388            | NR               | 820       | 5694             | NR               | 950       | 6239             | NR               |
| 435       | 54504            | NR               | 565       | 184113           | NR               | 695       | 56106            | NR               | 825       | 5621             | NR               | 955       | 4562             | NR               |
| 440       | 91570            | NR               | 570       | 183843           | NR               | 700       | 49976            | NR               | 830       | 5832             | NR               | 960       | 3863             | NR               |
| 445       | 155007           | NR               | 575       | 183242           | NR               | 705       | 44326            | NR               | 835       | 5478             | NR               | 965       | 4898             | NR               |
| 450       | 253466           | NR               | 580       | 182759           | NR               | 710       | 39116            | NR               | 840       | 5675             | NR               | 970       | 7576             | NR               |
| 455       | 316705           | NR               | 585       | 182781           | NR               | 715       | 34755            | NR               | 845       | 4960             | NR               | 975       | 6056             | NR               |
| 460       | 273954           | NR               | 590       | 181075           | NR               | 720       | 30900            | NR               | 850       | 5274             | NR               | 980       | 3439             | NR               |
| 465       | 214019           | NR               | 595       | 181315           | NR               | 725       | 27349            | NR               | 855       | 5470             | NR               | 985       | 3623             | NR               |
| 470       | 175153           | NR               | 600       | 181289           | NR               | 730       | 23954            | NR               | 860       | 6539             | NR               | 990       | 4301             | NR               |
| 475       | 140894           | NR               | 605       | 180053           | NR               | 735       | 21526            | NR               | 865       | 6378             | NR               | 995       | 7368             | NR               |
| 480       | 115223           | NR               | 610       | 177907           | NR               | 740       | 18965            | NR               | 870       | 5702             | NR               | 1000      | 10668            | NR               |
| 485       | 108577           | NR               | 615       | 175575           | NR               | 745       | 17153            | NR               | 875       | 4933             | NR               |           |                  |                  |

REPORT NUMBER: SP1-2307-100-9

**Melanopic Flux vs. Wavelength**



**Melanopic Lumens: 11248.3 M/P: 0.9**

| 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       | 6694             | NR               | 490       | 112019           | NR               | 620       | 173132           | NR               | 750       | 14981            | NR               | 880       | 5536             | NR               |
| 365       | 5354             | NR               | 495       | 119136           | NR               | 625       | 169860           | NR               | 755       | 13480            | NR               | 885       | 6938             | NR               |
| 370       | 5722             | NR               | 500       | 127627           | NR               | 630       | 163982           | NR               | 760       | 11900            | NR               | 890       | 5411             | NR               |
| 375       | 6251             | NR               | 505       | 139687           | NR               | 635       | 158304           | NR               | 765       | 10671            | NR               | 895       | 4784             | NR               |
| 380       | 6177             | NR               | 510       | 148127           | NR               | 640       | 151433           | NR               | 770       | 9643             | NR               | 900       | 5872             | NR               |
| 385       | 5889             | NR               | 515       | 155327           | NR               | 645       | 144044           | NR               | 775       | 8310             | NR               | 905       | 5214             | NR               |
| 390       | 5252             | NR               | 520       | 161724           | NR               | 650       | 134971           | NR               | 780       | 7378             | NR               | 910       | 5425             | NR               |
| 395       | 5012             | NR               | 525       | 166350           | NR               | 655       | 126523           | NR               | 785       | 7348             | NR               | 915       | 5372             | NR               |
| 400       | 4505             | NR               | 530       | 170827           | NR               | 660       | 117624           | NR               | 790       | 6731             | NR               | 920       | 5263             | NR               |
| 405       | 4163             | NR               | 535       | 174287           | NR               | 665       | 107737           | NR               | 795       | 6603             | NR               | 925       | 5581             | NR               |
| 410       | 4931             | NR               | 540       | 177402           | NR               | 670       | 97796            | NR               | 800       | 6333             | NR               | 930       | 7934             | NR               |
| 415       | 6887             | NR               | 545       | 179468           | NR               | 675       | 88146            | NR               | 805       | 5919             | NR               | 935       | 6835             | NR               |
| 420       | 10750            | NR               | 550       | 180621           | NR               | 680       | 80008            | NR               | 810       | 5757             | NR               | 940       | 4871             | NR               |
| 425       | 18574            | NR               | 555       | 182239           | NR               | 685       | 71588            | NR               | 815       | 6226             | NR               | 945       | 6554             | NR               |
| 430       | 31943            | NR               | 560       | 184077           | NR               | 690       | 63388            | NR               | 820       | 5694             | NR               | 950       | 6239             | NR               |
| 435       | 54504            | NR               | 565       | 184113           | NR               | 695       | 56106            | NR               | 825       | 5621             | NR               | 955       | 4562             | NR               |
| 440       | 91570            | NR               | 570       | 183843           | NR               | 700       | 49976            | NR               | 830       | 5832             | NR               | 960       | 3863             | NR               |
| 445       | 155007           | NR               | 575       | 183242           | NR               | 705       | 44326            | NR               | 835       | 5478             | NR               | 965       | 4898             | NR               |
| 450       | 253466           | NR               | 580       | 182759           | NR               | 710       | 39116            | NR               | 840       | 5675             | NR               | 970       | 7576             | NR               |
| 455       | 316705           | NR               | 585       | 182781           | NR               | 715       | 34755            | NR               | 845       | 4960             | NR               | 975       | 6056             | NR               |
| 460       | 273954           | NR               | 590       | 181075           | NR               | 720       | 30900            | NR               | 850       | 5274             | NR               | 980       | 3439             | NR               |
| 465       | 214019           | NR               | 595       | 181315           | NR               | 725       | 27349            | NR               | 855       | 5470             | NR               | 985       | 3623             | NR               |
| 470       | 175153           | NR               | 600       | 181289           | NR               | 730       | 23954            | NR               | 860       | 6539             | NR               | 990       | 4301             | NR               |
| 475       | 140894           | NR               | 605       | 180053           | NR               | 735       | 21526            | NR               | 865       | 6378             | NR               | 995       | 7368             | NR               |
| 480       | 115223           | NR               | 610       | 177907           | NR               | 740       | 18965            | NR               | 870       | 5702             | NR               | 1000      | 10668            | NR               |
| 485       | 108577           | NR               | 615       | 175575           | NR               | 745       | 17153            | NR               | 875       | 4933             | NR               |           |                  |                  |

REPORT NUMBER: SP1-2307-100-9

**TM-30-18**

**Summary**

$R_f = 88.9$   
 $R_g = 97.2$   
 $CIE R_a = 92.0$   
 $R_9 = 62.7$



**Color Vector Graphics**



REPORT NUMBER: SP1-2307-100-9

TM-30-18

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

|            |            |            |            |
|------------|------------|------------|------------|
| CES01 = 85 | CES26 = 93 | CES51 = 92 | CES76 = 85 |
| CES02 = 61 | CES27 = 89 | CES52 = 95 | CES77 = 86 |
| CES03 = 31 | CES28 = 95 | CES53 = 92 | CES78 = 84 |
| CES04 = 69 | CES29 = 94 | CES54 = 89 | CES79 = 95 |
| CES05 = 48 | CES30 = 83 | CES55 = 86 | CES80 = 93 |
| CES06 = 50 | CES31 = 96 | CES56 = 88 | CES81 = 89 |
| CES07 = 41 | CES32 = 93 | CES57 = 85 | CES82 = 97 |
| CES08 = 40 | CES33 = 92 | CES58 = 85 | CES83 = 97 |
| CES09 = 29 | CES34 = 93 | CES59 = 94 | CES84 = 92 |
| CES10 = 73 | CES35 = 96 | CES60 = 89 | CES85 = 83 |
| CES11 = 56 | CES36 = 76 | CES61 = 88 | CES86 = 88 |
| CES12 = 62 | CES37 = 95 | CES62 = 78 | CES87 = 91 |
| CES13 = 42 | CES38 = 78 | CES63 = 87 | CES88 = 95 |
| CES14 = 74 | CES39 = 97 | CES64 = 81 | CES89 = 88 |
| CES15 = 71 | CES40 = 97 | CES65 = 84 | CES90 = 93 |
| CES16 = 46 | CES41 = 92 | CES66 = 78 | CES91 = 70 |
| CES17 = 49 | CES42 = 96 | CES67 = 77 | CES92 = 78 |
| CES18 = 56 | CES43 = 95 | CES68 = 82 | CES93 = 86 |
| CES19 = 70 | CES44 = 99 | CES69 = 84 | CES94 = 81 |
| CES20 = 65 | CES45 = 97 | CES70 = 81 | CES95 = 81 |
| CES21 = 85 | CES46 = 95 | CES71 = 73 | CES96 = 92 |
| CES22 = 77 | CES47 = 91 | CES72 = 91 | CES97 = 94 |
| CES23 = 91 | CES48 = 85 | CES73 = 77 | CES98 = 92 |
| CES24 = 90 | CES49 = 95 | CES74 = 89 | CES99 = 90 |
| CES25 = 70 | CES50 = 93 | CES75 = 77 |            |



REPORT NUMBER: SP1-2307-100-9

**TM-30-18**

Color Rendition by Hue-Angle Bin



REPORT NUMBER: SP1-2307-100-9

**TM-30-18**

**Measure Comparisons**



(END OF REPORT)