

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: P828631

Luminaire Tested: **OHBL-24HE-MCL-UNV-L950-CD-UPL24**

Issue Date: 5/3/2024



**Test Information**

Test Method: LM-79-08  
Report Number: P828631  
REPORT IS A COMBINATION OF REPORTS P826240 AND G3-2310-221-6  
Test Lab: INNOVATION CENTER  
Issue Date: 5/3/2024  
Manufacturer: COOPER LIGHTING SOLUTIONS (FORMERLY EATON)  
Product Line: METALUX  
Catalog Number: OHBL-24HE-MCL-UNV-L950-CD-UPL24  
Description:  
Light Source: -  
Ballast/Driver: -

**Summary**

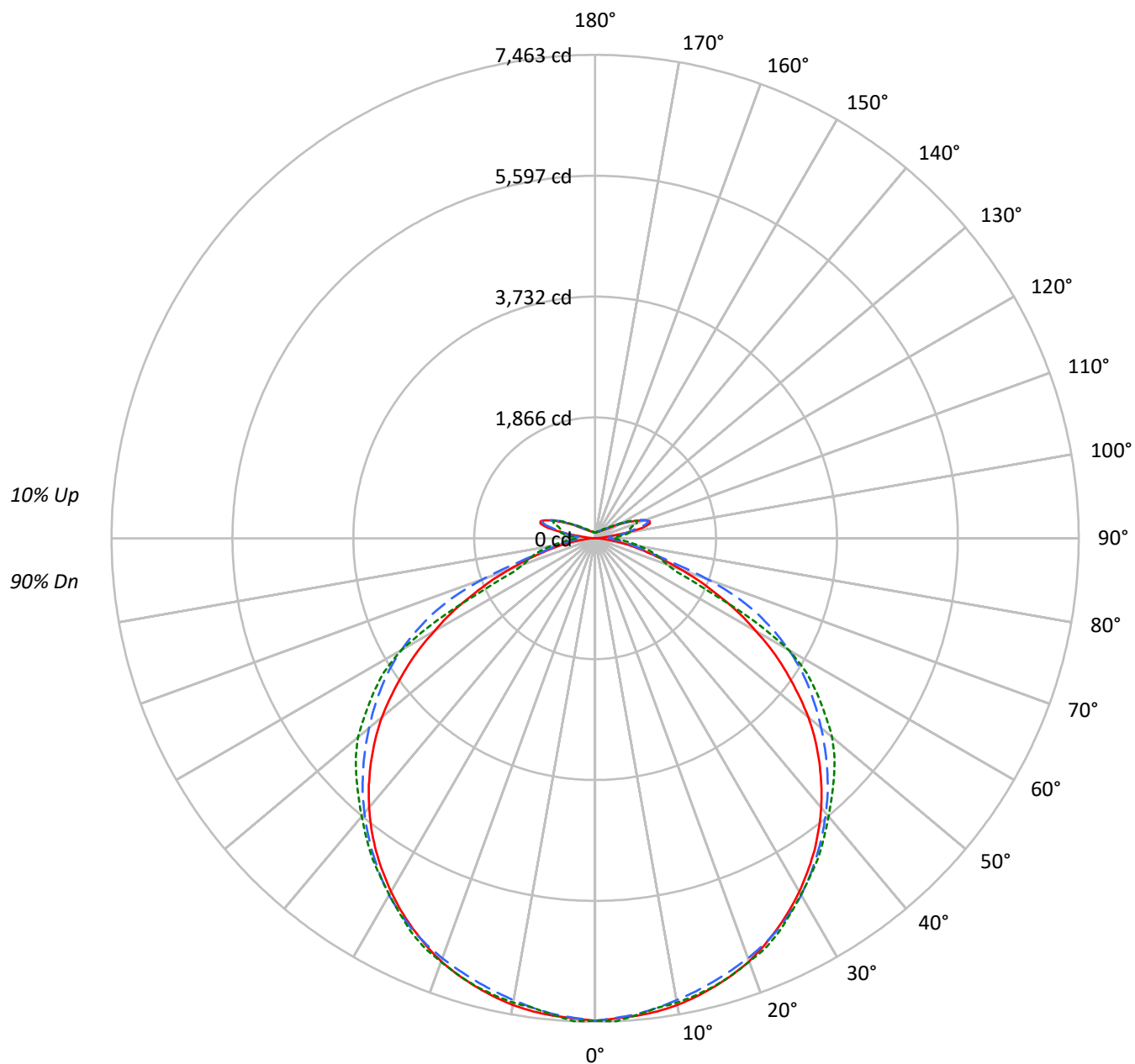
Lumens per Lamp: N/A  
Luminaire Lumens: 23156.1 lumens  
Efficiency: N/A  
Efficacy: 154.0 lumens/watt  
Spacing Criteria (0/90/45): 1.26 / 1.27 / 1.39  
Luminous Opening: Rectangular w/ Sides (W: 3.78' x L: 1.8' x H: 0.17')  
CIE Type: Semi-Direct

Input Watts (W): 150.4  
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: P828631

CATALOG NUMBER: OHBL-24HE-MCL-UNV-L950-CD-UPL24

### Luminous Intensity Polar Plot





TEST NUMBER: P828631

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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   | 117 | 117 | 117 | 117 | 113 | 113 | 113 | 113 | 105 | 105 | 105 | 99 | 99 | 99 | 93 | 93 | 93 |
| 1   | 107 | 102 | 98  | 94  | 103 | 99  | 95  | 92  | 93  | 90  | 87  | 87 | 85 | 83 | 82 | 80 | 79 |
| 2   | 97  | 89  | 83  | 77  | 94  | 87  | 81  | 76  | 82  | 77  | 72  | 77 | 73 | 69 | 72 | 69 | 66 |
| 3   | 89  | 79  | 71  | 64  | 86  | 76  | 69  | 63  | 72  | 66  | 61  | 68 | 63 | 59 | 64 | 60 | 56 |
| 4   | 81  | 70  | 61  | 55  | 78  | 68  | 60  | 54  | 64  | 57  | 52  | 60 | 55 | 50 | 57 | 52 | 48 |
| 5   | 75  | 62  | 53  | 47  | 72  | 60  | 52  | 46  | 57  | 50  | 45  | 54 | 48 | 43 | 51 | 46 | 42 |
| 6   | 69  | 56  | 47  | 41  | 66  | 54  | 46  | 40  | 52  | 45  | 39  | 49 | 43 | 38 | 47 | 41 | 37 |
| 7   | 64  | 51  | 42  | 36  | 62  | 49  | 41  | 36  | 47  | 40  | 35  | 45 | 38 | 34 | 42 | 37 | 33 |
| 8   | 59  | 46  | 38  | 32  | 57  | 45  | 37  | 32  | 43  | 36  | 31  | 41 | 35 | 30 | 39 | 33 | 29 |
| 9   | 55  | 42  | 34  | 29  | 53  | 41  | 34  | 28  | 39  | 33  | 28  | 38 | 31 | 27 | 36 | 30 | 26 |
| 10  | 52  | 39  | 31  | 26  | 50  | 38  | 31  | 26  | 36  | 30  | 25  | 35 | 29 | 25 | 33 | 28 | 24 |

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

|     | 0°    | 45°   | 90°   |
|-----|-------|-------|-------|
| 0°  | 11779 | 11779 | 11779 |
| 5°  | 11653 | 11608 | 11682 |
| 10° | 11561 | 11432 | 11601 |
| 15° | 11438 | 11301 | 11573 |
| 20° | 11315 | 11218 | 11522 |
| 25° | 11126 | 11134 | 11474 |
| 30° | 10923 | 11003 | 11313 |
| 35° | 10688 | 10794 | 11254 |
| 40° | 10398 | 10579 | 11157 |
| 45° | 10015 | 10329 | 11161 |
| 50° | 9517  | 10046 | 11162 |
| 55° | 8767  | 9766  | 10850 |
| 60° | 7811  | 9358  | 10152 |
| 65° | 6597  | 8599  | 6535  |
| 70° | 5200  | 6713  | 4841  |
| 75° | 3775  | 3985  | 5074  |
| 80° | 2489  | 3313  | 5116  |
| 85° | 1262  | 3035  | 5380  |



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**ZONAL LUMENS:**

| Zone      | Lumens  | % Fixture |
|-----------|---------|-----------|
| 0°-10°    | 702.3   | 3.0       |
| 10°-20°   | 2013.8  | 8.7       |
| 20°-30°   | 3075.8  | 13.3      |
| 30°-40°   | 3732.0  | 16.1      |
| 40°-50°   | 3911.5  | 16.9      |
| 50°-60°   | 3544.4  | 15.3      |
| 60°-70°   | 2376.4  | 10.3      |
| 70°-80°   | 1067.1  | 4.6       |
| 80°-90°   | 392.6   | 1.7       |
| 90°-100°  | 318.1   | 1.4       |
| 100°-110° | 754.8   | 3.3       |
| 110°-120° | 627.9   | 2.7       |
| 120°-130° | 303.2   | 1.3       |
| 130°-140° | 154.6   | 0.7       |
| 140°-150° | 90.5    | 0.4       |
| 150°-160° | 53.9    | 0.2       |
| 160°-170° | 28.6    | 0.1       |
| 170°-180° | 8.7     | 0.0       |
| 0°-30°    | 5791.9  | 25.0      |
| 0°-40°    | 9523.9  | 41.1      |
| 0°-60°    | 16979.7 | 73.3      |
| 0°-90°    | 20815.8 | 89.9      |
| 90°-120°  | 1700.8  | 7.3       |
| 90°-150°  | 2249.1  | 9.7       |
| 90°-180°  | 2340.0  | 10.1      |
| 0°-180°   | 23156.1 | 100.0     |

**CANDELA DISTRIBUTION:**

|      | 0°   | 22.5° | 45°  | 67.5° | 90°  | Flux |
|------|------|-------|------|-------|------|------|
| 0°   | 7448 | 7448  | 7448 | 7448  | 7448 |      |
| 5°   | 7400 | 7426  | 7374 | 7396  | 7387 | 704  |
| 15°  | 7160 | 7132  | 7081 | 7143  | 7152 | 2021 |
| 25°  | 6651 | 6622  | 6668 | 6730  | 6710 | 3066 |
| 35°  | 5895 | 5909  | 5970 | 6033  | 6009 | 3685 |
| 45°  | 4892 | 4972  | 5065 | 5194  | 5210 | 3769 |
| 55°  | 3600 | 3774  | 4031 | 4192  | 4183 | 3214 |
| 65°  | 2113 | 2444  | 2774 | 2341  | 1912 | 2105 |
| 75°  | 831  | 1206  | 887  | 908   | 967  | 909  |
| 85°  | 143  | 275   | 352  | 425   | 446  | 175  |
| 90°  | 5    | 121   | 223  | 282   | 299  | 12   |
| 95°  | 47   | 154   | 274  | 350   | 380  | 145  |
| 105° | 876  | 887   | 795  | 597   | 558  | 832  |
| 115° | 610  | 621   | 639  | 646   | 643  | 615  |
| 125° | 301  | 318   | 335  | 337   | 336  | 283  |
| 135° | 184  | 188   | 195  | 202   | 205  | 145  |
| 145° | 136  | 140   | 143  | 145   | 147  | 87   |
| 155° | 112  | 114   | 116  | 117   | 116  | 52   |
| 165° | 99   | 100   | 100  | 100   | 100  | 28   |
| 175° | 90   | 91    | 90   | 90    | 90   | 9    |
| 180° | 89   | 89    | 89   | 89    | 89   |      |



TEST NUMBER: P828631

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**CANDELA DISTRIBUTION (FULL):**

|        | 0°     | 22.5°  | 45°    | 67.5°  | 90°    |
|--------|--------|--------|--------|--------|--------|
| 0°     | 7448.2 | 7448.2 | 7448.2 | 7448.2 | 7448.2 |
| 2.5°   | 7418.0 | 7449.2 | 7410.4 | 7452.4 | 7463.2 |
| 5°     | 7399.7 | 7425.6 | 7373.8 | 7396.5 | 7386.8 |
| 7.5°   | 7366.3 | 7375.0 | 7313.5 | 7331.9 | 7312.5 |
| 10°    | 7316.8 | 7312.5 | 7240.3 | 7275.9 | 7280.1 |
| 12.5°  | 7243.5 | 7230.6 | 7166.0 | 7219.9 | 7220.9 |
| 15°    | 7159.5 | 7131.5 | 7080.9 | 7143.4 | 7152.0 |
| 17.5°  | 7062.6 | 7026.0 | 6992.6 | 7073.4 | 7060.5 |
| 20°    | 6949.6 | 6906.4 | 6900.0 | 6988.3 | 6956.0 |
| 22.5°  | 6809.6 | 6776.2 | 6791.2 | 6875.2 | 6854.8 |
| 25°    | 6651.2 | 6622.1 | 6668.5 | 6729.8 | 6710.5 |
| 27.5°  | 6484.3 | 6467.1 | 6519.9 | 6567.3 | 6529.5 |
| 30°    | 6301.2 | 6291.6 | 6361.6 | 6400.3 | 6352.9 |
| 32.5°  | 6102.0 | 6105.2 | 6172.0 | 6224.8 | 6180.6 |
| 35°    | 5895.2 | 5909.2 | 5969.5 | 6033.1 | 6009.3 |
| 37.5°  | 5668.0 | 5699.2 | 5759.5 | 5831.6 | 5806.9 |
| 40°    | 5427.9 | 5473.1 | 5539.8 | 5627.0 | 5604.4 |
| 42.5°  | 5168.2 | 5225.4 | 5311.5 | 5408.5 | 5406.3 |
| 45°    | 4892.5 | 4972.3 | 5064.9 | 5194.1 | 5210.2 |
| 47.5°  | 4606.1 | 4695.5 | 4812.9 | 4985.2 | 5010.0 |
| 50°    | 4294.9 | 4406.9 | 4553.4 | 4760.1 | 4775.2 |
| 52.5°  | 3948.1 | 4101.0 | 4294.9 | 4493.0 | 4474.7 |
| 55°    | 3600.2 | 3773.6 | 4031.0 | 4192.5 | 4182.9 |
| 57.5°  | 3253.5 | 3448.4 | 3760.7 | 3875.9 | 3874.9 |
| 60°    | 2865.8 | 3112.4 | 3453.8 | 3541.0 | 3454.8 |
| 62.5°  | 2507.1 | 2772.0 | 3126.3 | 3062.9 | 2767.8 |
| 65°    | 2113.0 | 2443.6 | 2774.2 | 2341.2 | 1911.6 |
| 67.5°  | 1763.0 | 2107.6 | 2356.4 | 1603.6 | 1373.1 |
| 70°    | 1410.8 | 1791.0 | 1837.3 | 1190.0 | 1173.8 |
| 72.5°  | 1098.5 | 1503.4 | 1267.6 | 1018.8 | 1070.5 |
| 75°    | 831.4  | 1206.2 | 887.4  | 907.9  | 967.1  |
| 77.5°  | 606.4  | 926.1  | 690.3  | 795.9  | 844.3  |
| 80°    | 416.8  | 655.8  | 563.2  | 668.8  | 702.2  |
| 82.5°  | 261.7  | 432.9  | 451.2  | 538.4  | 573.0  |
| 85°    | 143.2  | 274.7  | 352.1  | 425.4  | 445.9  |
| 87.5°  | 59.2   | 165.9  | 269.3  | 328.5  | 345.7  |
| 90°    | 5.4    | 121.1  | 222.8  | 282.2  | 299.1  |
| 92.5°  | 15.8   | 109.1  | 211.2  | 272.8  | 291.7  |
| 95°    | 47.1   | 153.5  | 274.5  | 350.1  | 380.5  |
| 97.5°  | 236.1  | 298.2  | 376.6  | 455.5  | 488.5  |
| 100°   | 483.2  | 547.2  | 498.5  | 540.3  | 551.3  |
| 102.5° | 746.0  | 767.5  | 610.5  | 570.0  | 566.3  |
| 105°   | 876.4  | 887.3  | 795.2  | 596.9  | 557.5  |



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CATALOG NUMBER: OHBL-24HE-MCL-UNV-L950-CD-UPL24

**CANDELA DISTRIBUTION (continued):**

|        | 0°    | 22.5° | 45°   | 67.5° | 90°   |
|--------|-------|-------|-------|-------|-------|
| 112.5° | 710.1 | 728.0 | 735.6 | 725.4 | 699.6 |
| 115°   | 610.3 | 620.7 | 639.0 | 645.8 | 642.8 |
| 117.5° | 523.3 | 526.4 | 546.0 | 551.6 | 554.6 |
| 120°   | 434.6 | 445.2 | 467.2 | 468.1 | 464.0 |
| 122.5° | 365.9 | 376.4 | 393.4 | 397.1 | 393.0 |
| 125°   | 301.4 | 318.1 | 335.0 | 337.3 | 335.9 |
| 127.5° | 257.3 | 268.6 | 285.9 | 290.0 | 290.2 |
| 130°   | 225.1 | 233.1 | 247.2 | 252.4 | 253.3 |
| 132.5° | 201.8 | 209.0 | 218.3 | 226.1 | 225.3 |
| 135°   | 183.5 | 188.1 | 195.3 | 202.4 | 205.3 |
| 137.5° | 169.9 | 172.5 | 177.7 | 185.7 | 186.8 |
| 140°   | 156.8 | 160.3 | 163.5 | 169.6 | 171.5 |
| 142.5° | 144.4 | 149.0 | 151.4 | 156.4 | 157.5 |
| 145°   | 135.7 | 140.3 | 142.9 | 144.8 | 146.8 |
| 147.5° | 129.0 | 132.5 | 134.2 | 136.0 | 137.0 |
| 150°   | 122.9 | 124.7 | 127.3 | 128.2 | 129.0 |
| 152.5° | 116.9 | 118.6 | 121.2 | 122.1 | 122.1 |
| 155°   | 111.6 | 114.4 | 116.2 | 117.0 | 116.0 |
| 157.5° | 107.3 | 110.1 | 111.8 | 112.7 | 112.7 |
| 160°   | 103.8 | 105.7 | 107.5 | 108.3 | 108.3 |
| 162.5° | 101.4 | 102.2 | 103.1 | 104.0 | 104.0 |
| 165°   | 98.8  | 99.6  | 100.5 | 100.5 | 100.5 |
| 167.5° | 96.2  | 97.3  | 97.0  | 97.9  | 97.9  |
| 170°   | 93.6  | 94.4  | 94.4  | 94.2  | 94.2  |
| 172.5° | 91.8  | 92.7  | 92.7  | 91.6  | 92.5  |
| 175°   | 90.1  | 90.9  | 89.9  | 89.6  | 89.6  |
| 177.5° | 91.2  | 90.1  | 89.0  | 87.9  | 86.9  |
| 180°   | 89.0  | 89.0  | 89.0  | 89.0  | 89.0  |



Report Generated By 670246072 / DESKTOP-50001EG





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







|        |       |       |       |       |       |
|--------|-------|-------|-------|-------|-------|
| 107.5° | 880.9 | 899.4 | 864.0 | 697.4 | 593.5 |
| 110°   | 814.1 | 832.8 | 820.6 | 763.3 | 680.3 |



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.

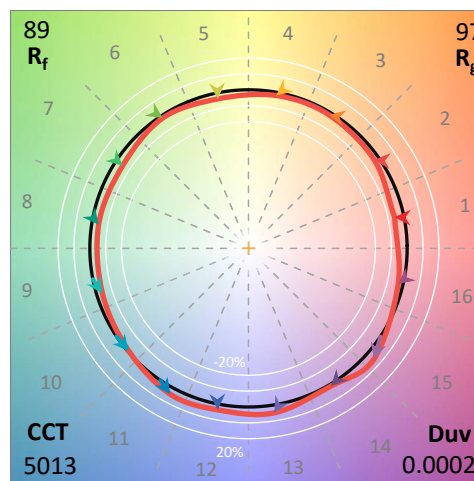
### Test Information

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           |

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**CIE 1931 Chromaticity Diagram**



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



Point lies inside the ANSI 5000K 4-step quadrangle

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**Photopic Flux vs. Wavelength**



#####

| λ<br>(nm) | Power<br>(μW/nm) | Lumens<br>(φ/nm) | λ<br>(nm) | Power<br>(μW/nm) | Lumens<br>(φ/nm) | λ<br>(nm) | Power<br>(μW/nm) | Lumens<br>(φ/nm) | λ<br>(nm) | Power<br>(μW/nm) | Lumens<br>(φ/nm) | λ<br>(nm) | Power<br>(μW/nm) | Lumens<br>(φ/nm) |
|-----------|------------------|------------------|-----------|------------------|------------------|-----------|------------------|------------------|-----------|------------------|------------------|-----------|------------------|------------------|
| 360       | 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               |           |                  |                  |

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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               |           |                  |                  |

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**TM-30-18**

**Summary**

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



**Color Vector Graphics**



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**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 |            |



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**TM-30-18**

**Color Rendition by Hue-Angle Bin**



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**Measure Comparisons**



(END OF REPORT)