

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: P830077

Luminaire Tested: **OHBL-24HE-NL-UNV-L940-CD**

Issue Date: 5/3/2024



**Test Information**

Test Method: LM-79-08  
Report Number: P830077  
TEST IS SCALED FROM IESNA LM-79-08 TEST DATA (P472951)  
Test Lab: INNOVATION CENTER  
Issue Date: 5/3/2024  
Manufacturer: COOPER LIGHTING SOLUTIONS (FORMERLY EATON)  
Product Line: METALUX  
Catalog Number: OHBL-24HE-NL-UNV-L940-CD  
Description: 24000 LUMEN OHBL HE LED LUMINAIRE WITH 90CRI, 4000K LEDS AND NO LENS  
Light Source: -  
Ballast/Driver: -

**Summary**

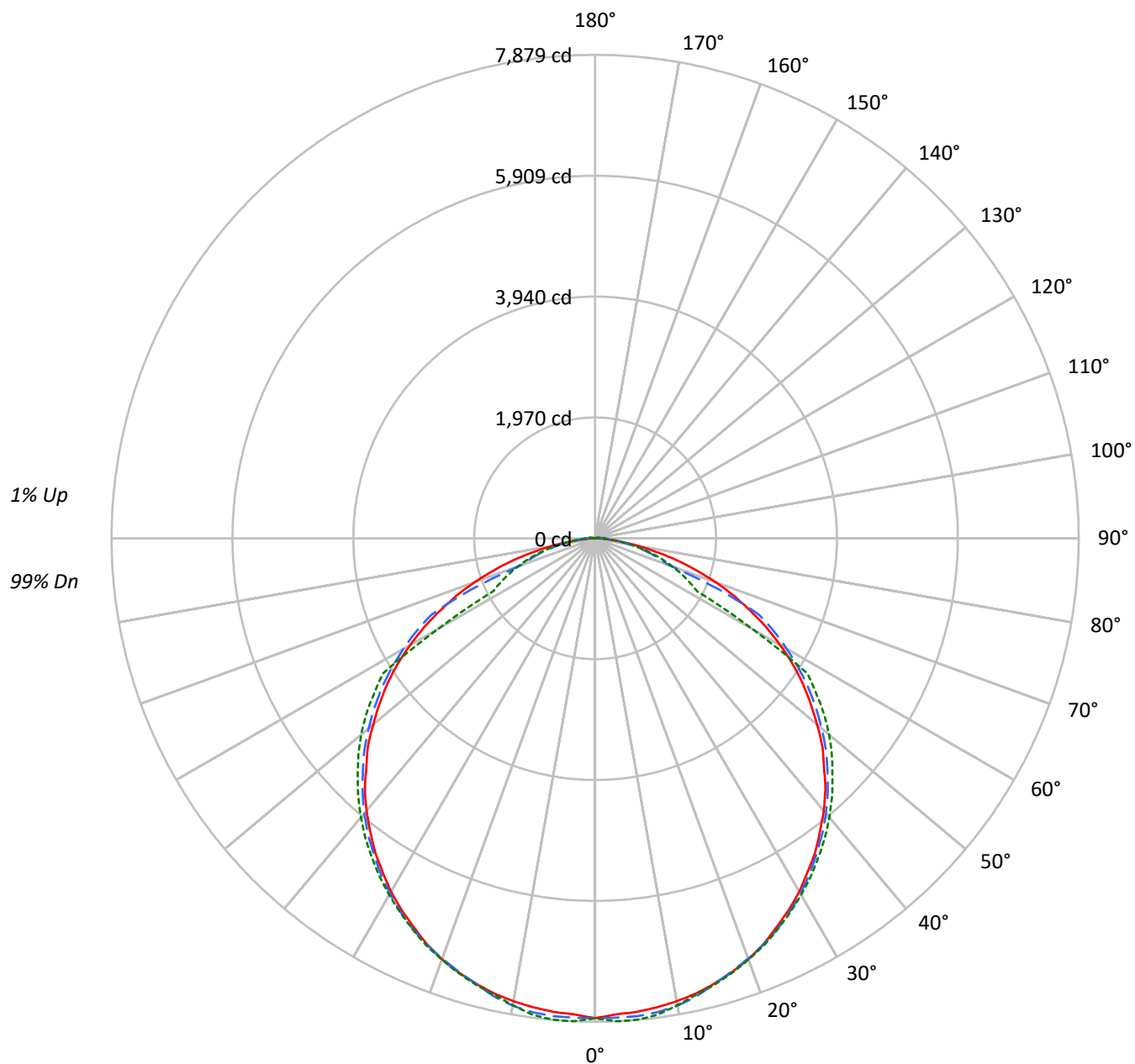
Lumens per Lamp: N/A  
Luminaire Lumens: 21959.0 lumens  
Efficiency: N/A  
Efficacy: 165.1 lumens/watt  
Spacing Criteria (0/90/45): 1.26 / 1.28 / 1.39  
Luminous Opening: Rectangular (W 1.8' x L: 3.78' x H: 0')  
CIE Type: Direct

Input Watts (W): 133  
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: P830077

CATALOG NUMBER: OHBL-24HE-NL-UNV-L940-CD

### Luminous Intensity Polar Plot





TEST NUMBER: P830077

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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 |    |    | 99 |
| 1   | 109 | 105 | 100 | 97  | 106 | 102 | 99  | 95  | 98  | 95  | 92  | 94  | 91  | 89  | 90  | 88  | 86  |    |    | 84 |
| 2   | 99  | 92  | 85  | 79  | 97  | 90  | 84  | 78  | 86  | 81  | 76  | 83  | 78  | 75  | 80  | 76  | 73  |    |    | 71 |
| 3   | 91  | 81  | 73  | 66  | 88  | 79  | 72  | 66  | 76  | 70  | 64  | 73  | 68  | 63  | 70  | 66  | 62  |    |    | 60 |
| 4   | 83  | 71  | 63  | 56  | 81  | 70  | 62  | 56  | 67  | 60  | 55  | 65  | 59  | 54  | 63  | 58  | 53  |    |    | 51 |
| 5   | 76  | 64  | 55  | 48  | 74  | 63  | 54  | 48  | 60  | 53  | 47  | 58  | 52  | 47  | 57  | 51  | 46  |    |    | 44 |
| 6   | 71  | 57  | 49  | 42  | 69  | 56  | 48  | 42  | 55  | 47  | 42  | 53  | 46  | 41  | 51  | 45  | 41  |    |    | 39 |
| 7   | 65  | 52  | 43  | 37  | 64  | 51  | 43  | 37  | 50  | 42  | 37  | 48  | 41  | 36  | 47  | 41  | 36  |    |    | 34 |
| 8   | 61  | 47  | 39  | 33  | 59  | 47  | 39  | 33  | 45  | 38  | 33  | 44  | 37  | 33  | 43  | 37  | 32  |    |    | 30 |
| 9   | 57  | 43  | 35  | 30  | 55  | 43  | 35  | 30  | 42  | 35  | 30  | 41  | 34  | 29  | 40  | 34  | 29  |    |    | 27 |
| 10  | 53  | 40  | 32  | 27  | 52  | 40  | 32  | 27  | 39  | 32  | 27  | 38  | 31  | 27  | 37  | 31  | 26  |    |    | 25 |

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

|     | 0°    | 45°   | 90°   |
|-----|-------|-------|-------|
| 0°  | 12369 | 12369 | 12369 |
| 5°  | 12301 | 12412 | 12506 |
| 10° | 12304 | 12421 | 12406 |
| 15° | 12302 | 12300 | 12327 |
| 20° | 12285 | 12267 | 12297 |
| 25° | 12201 | 12263 | 12273 |
| 30° | 12145 | 12207 | 12255 |
| 35° | 12066 | 12132 | 12246 |
| 40° | 11962 | 12075 | 12254 |
| 45° | 11789 | 11968 | 12229 |
| 50° | 11612 | 11848 | 12240 |
| 55° | 11390 | 11685 | 12105 |
| 60° | 11008 | 11399 | 9424  |
| 65° | 10415 | 11020 | 6342  |
| 70° | 9633  | 5851  | 6155  |
| 75° | 8402  | 5560  | 5878  |
| 80° | 6462  | 5100  | 5387  |
| 85° | 3261  | 5155  | 5278  |



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**ZONAL LUMENS:**

| Zone      | Lumens  | % Fixture |
|-----------|---------|-----------|
| 0°-10°    | 743.0   | 3.4       |
| 10°-20°   | 2127.5  | 9.7       |
| 20°-30°   | 3237.2  | 14.7      |
| 30°-40°   | 3936.0  | 17.9      |
| 40°-50°   | 4138.5  | 18.8      |
| 50°-60°   | 3779.0  | 17.2      |
| 60°-70°   | 2422.5  | 11.0      |
| 70°-80°   | 1144.4  | 5.2       |
| 80°-90°   | 317.3   | 1.4       |
| 90°-100°  | 84.0    | 0.4       |
| 100°-110° | 23.0    | 0.1       |
| 110°-120° | 6.4     | 0.0       |
| 120°-130° | 0.0     | 0.0       |
| 130°-140° | 0.0     | 0.0       |
| 140°-150° | 0.0     | 0.0       |
| 150°-160° | 0.0     | 0.0       |
| 160°-170° | 0.0     | 0.0       |
| 170°-180° | 0.0     | 0.0       |
| <hr/>     |         |           |
| 0°-30°    | 6107.8  | 27.8      |
| 0°-40°    | 10043.8 | 45.7      |
| 0°-60°    | 17961.4 | 81.8      |
| 0°-90°    | 21845.6 | 99.5      |
| 90°-120°  | 113.4   | 0.5       |
| 90°-150°  | 113.4   | 0.5       |
| 90°-180°  | 113.0   | 0.5       |
| 0°-180°   | 21959.0 | 100.0     |

**CANDELA DISTRIBUTION:**

|      | 0°   | 22.5° | 45°  | 67.5° | 90°  | Flux |
|------|------|-------|------|-------|------|------|
| 0°   | 7821 | 7821  | 7821 | 7821  | 7821 |      |
| 5°   | 7748 | 7779  | 7818 | 7861  | 7878 | 737  |
| 15°  | 7514 | 7570  | 7512 | 7523  | 7529 | 2121 |
| 25°  | 6992 | 7003  | 7028 | 7039  | 7033 | 3226 |
| 35°  | 6250 | 6213  | 6284 | 6361  | 6343 | 3906 |
| 45°  | 5271 | 5262  | 5351 | 5477  | 5468 | 4074 |
| 55°  | 4131 | 4099  | 4238 | 4379  | 4390 | 3684 |
| 65°  | 2783 | 2783  | 2945 | 1689  | 1695 | 2759 |
| 75°  | 1375 | 1401  | 910  | 958   | 962  | 1450 |
| 85°  | 180  | 228   | 284  | 307   | 291  | 266  |
| 90°  | 0    | 77    | 126  | 150   | 147  | 8    |
| 95°  | 4    | 40    | 91   | 122   | 122  | 2    |
| 105° | 7    | 15    | 22   | 22    | 21   | 7    |
| 115° | 7    | 10    | 14   | 10    | 1    | 5    |
| 125° | 0    | 0     | 0    | 0     | 0    | 0    |
| 135° | 0    | 0     | 0    | 0     | 0    | 0    |
| 145° | 0    | 0     | 0    | 0     | 0    | 0    |
| 155° | 0    | 0     | 0    | 0     | 0    | 0    |
| 165° | 0    | 0     | 0    | 0     | 0    | 0    |
| 175° | 0    | 0     | 0    | 0     | 0    | 0    |
| 180° | 0    | 0     | 0    | 0     | 0    |      |



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**CANDELA DISTRIBUTION (FULL):**

|        | 0°     | 22.5°  | 45°    | 67.5°  | 90°    |
|--------|--------|--------|--------|--------|--------|
| 0°     | 7821.2 | 7821.2 | 7821.2 | 7821.2 | 7821.2 |
| 2.5°   | 7766.3 | 7792.5 | 7821.2 | 7858.3 | 7878.8 |
| 5°     | 7748.4 | 7778.7 | 7818.5 | 7861.0 | 7877.5 |
| 7.5°   | 7710.1 | 7752.5 | 7791.0 | 7821.2 | 7830.8 |
| 10°    | 7662.0 | 7712.8 | 7734.8 | 7732.0 | 7725.2 |
| 12.5°  | 7597.5 | 7651.1 | 7644.3 | 7612.6 | 7618.1 |
| 15°    | 7513.8 | 7570.0 | 7512.5 | 7523.4 | 7528.9 |
| 17.5°  | 7415.0 | 7469.9 | 7402.6 | 7424.6 | 7426.0 |
| 20°    | 7299.8 | 7340.9 | 7288.7 | 7306.6 | 7306.6 |
| 22.5°  | 7161.1 | 7189.9 | 7168.0 | 7180.3 | 7183.1 |
| 25°    | 6992.3 | 7003.2 | 7027.9 | 7038.9 | 7033.4 |
| 27.5°  | 6830.4 | 6816.6 | 6864.7 | 6890.7 | 6876.9 |
| 30°    | 6650.6 | 6628.6 | 6684.9 | 6727.4 | 6711.0 |
| 32.5°  | 6444.7 | 6431.0 | 6495.5 | 6546.2 | 6536.7 |
| 35°    | 6249.8 | 6212.8 | 6284.1 | 6361.0 | 6343.1 |
| 37.5°  | 6019.2 | 5997.3 | 6078.2 | 6159.3 | 6149.7 |
| 40°    | 5794.2 | 5757.1 | 5849.1 | 5945.1 | 5935.6 |
| 42.5°  | 5552.7 | 5508.7 | 5608.9 | 5724.3 | 5713.3 |
| 45°    | 5271.3 | 5261.7 | 5350.9 | 5477.1 | 5467.6 |
| 47.5°  | 5021.6 | 4973.5 | 5098.4 | 5220.5 | 5231.6 |
| 50°    | 4719.6 | 4701.8 | 4815.7 | 4964.0 | 4974.8 |
| 52.5°  | 4424.6 | 4412.3 | 4531.5 | 4681.2 | 4700.4 |
| 55°    | 4130.8 | 4099.3 | 4237.9 | 4379.3 | 4390.3 |
| 57.5°  | 3816.7 | 3783.7 | 3925.1 | 4078.8 | 4102.0 |
| 60°    | 3480.3 | 3448.8 | 3603.8 | 3746.6 | 2979.5 |
| 62.5°  | 3144.1 | 3122.2 | 3284.2 | 2326.2 | 1874.8 |
| 65°    | 2783.2 | 2783.2 | 2945.0 | 1689.4 | 1694.9 |
| 67.5°  | 2445.7 | 2423.7 | 2195.9 | 1517.8 | 1517.8 |
| 70°    | 2083.3 | 2091.6 | 1265.3 | 1329.9 | 1331.2 |
| 72.5°  | 1719.6 | 1749.8 | 1092.5 | 1144.5 | 1147.3 |
| 75°    | 1375.1 | 1401.3 | 909.9  | 957.9  | 962.0  |
| 77.5°  | 1010.1 | 776.8  | 731.4  | 768.6  | 769.9  |
| 80°    | 709.5  | 489.9  | 560.0  | 595.6  | 591.5  |
| 82.5°  | 414.4  | 343.0  | 410.3  | 436.5  | 435.0  |
| 85°    | 179.7  | 227.8  | 284.1  | 307.4  | 290.9  |
| 87.5°  | 57.5   | 141.4  | 177.0  | 190.8  | 189.3  |
| 90°    | 0.0    | 76.9   | 126.3  | 149.5  | 146.9  |
| 92.5°  | 0.0    | 60.3   | 109.8  | 137.3  | 138.6  |
| 95°    | 4.1    | 39.8   | 90.7   | 122.2  | 122.2  |
| 97.5°  | 2.8    | 28.8   | 64.5   | 96.0   | 98.8   |
| 100°   | 2.8    | 23.2   | 42.6   | 68.6   | 70.0   |
| 102.5° | 6.8    | 19.2   | 26.0   | 43.9   | 45.3   |
| 105°   | 6.8    | 15.1   | 21.9   | 21.9   | 20.6   |



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**CANDELA DISTRIBUTION (continued):**

|        | 0°  | 22.5° | 45°  | 67.5° | 90° |
|--------|-----|-------|------|-------|-----|
| 112.5° | 8.3 | 11.0  | 15.1 | 11.0  | 1.3 |
| 115°   | 6.8 | 9.6   | 13.7 | 9.6   | 1.3 |
| 117.5° | 0.0 | 0.0   | 0.0  | 0.0   | 0.0 |
| 120°   | 0.0 | 0.0   | 0.0  | 0.0   | 0.0 |
| 122.5° | 0.0 | 0.0   | 0.0  | 0.0   | 0.0 |
| 125°   | 0.0 | 0.0   | 0.0  | 0.0   | 0.0 |
| 127.5° | 0.0 | 0.0   | 0.0  | 0.0   | 0.0 |
| 130°   | 0.0 | 0.0   | 0.0  | 0.0   | 0.0 |
| 132.5° | 0.0 | 0.0   | 0.0  | 0.0   | 0.0 |
| 135°   | 0.0 | 0.0   | 0.0  | 0.0   | 0.0 |
| 137.5° | 0.0 | 0.0   | 0.0  | 0.0   | 0.0 |
| 140°   | 0.0 | 0.0   | 0.0  | 0.0   | 0.0 |
| 142.5° | 0.0 | 0.0   | 0.0  | 0.0   | 0.0 |
| 145°   | 0.0 | 0.0   | 0.0  | 0.0   | 0.0 |
| 147.5° | 0.0 | 0.0   | 0.0  | 0.0   | 0.0 |
| 150°   | 0.0 | 0.0   | 0.0  | 0.0   | 0.0 |
| 152.5° | 0.0 | 0.0   | 0.0  | 0.0   | 0.0 |
| 155°   | 0.0 | 0.0   | 0.0  | 0.0   | 0.0 |
| 157.5° | 0.0 | 0.0   | 0.0  | 0.0   | 0.0 |
| 160°   | 0.0 | 0.0   | 0.0  | 0.0   | 0.0 |
| 162.5° | 0.0 | 0.0   | 0.0  | 0.0   | 0.0 |
| 165°   | 0.0 | 0.0   | 0.0  | 0.0   | 0.0 |
| 167.5° | 0.0 | 0.0   | 0.0  | 0.0   | 0.0 |
| 170°   | 0.0 | 0.0   | 0.0  | 0.0   | 0.0 |
| 172.5° | 0.0 | 0.0   | 0.0  | 0.0   | 0.0 |
| 175°   | 0.0 | 0.0   | 0.0  | 0.0   | 0.0 |
| 177.5° | 0.0 | 0.0   | 0.0  | 0.0   | 0.0 |
| 180°   | 0.0 | 0.0   | 0.0  | 0.0   | 0.0 |



Report Generated By 670246072 / DESKTOP-50001EG





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







|        |     |      |      |      |     |
|--------|-----|------|------|------|-----|
| 107.5° | 6.8 | 13.7 | 19.2 | 12.4 | 4.1 |
| 110°   | 8.3 | 12.4 | 16.4 | 11.0 | 1.3 |



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

Report Prepared for

Cooper Lighting Solutions

METALUX

Report Number: SP1-2307-100-8

Test Date: 08/01/2023

Luminaire Tested: OHB-15SE-N-UNV-L940-CD

Data in this report applies to families of products including OHB-15SE-N-UNV-L940-CD.

### Test Information

Test Method: LM-79-2019  
 Report Number: SP1-2307-100-8  
 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-L940-CD**  
 Description: 15000 LUMEN OHB SE LED LUMINAIRE WITH 90CRI, 4000K LEDS AND NARROW LENS

LENS

### Spectral Parameters

|                           |        |           |      |      |      |
|---------------------------|--------|-----------|------|------|------|
| CCT (K):                  | 3979   | CRI (Ra): | 91.5 |      |      |
| CIE u':                   | 0.2254 | R1:       | 91.7 | R9:  | 57.0 |
| CIE v':                   | 0.5020 | R2:       | 96.4 | R10: | 89.6 |
| Duv:                      | 0.0001 | R3:       | 97.6 | R11: | 89.1 |
| CIE x:                    | 0.3813 | R4:       | 89.2 | R12: | 69.6 |
| CIE y:                    | 0.3773 | R5:       | 90.3 | R13: | 93.4 |
| CIE z:                    | 0.2414 | R6:       | 93.0 | R14: | 98.9 |
| Peak Wavelength (nm):     | 455    | R7:       | 91.6 |      |      |
| Dominant Wavelength (nm): | 579    | R8:       | 81.9 |      |      |
| Purity:                   | 27.8   |           |      |      |      |
| Rf:                       | 88.6   |           |      |      |      |
| Rg:                       | 96.2   |           |      |      |      |



### Test Conditions

Stabilization Time: 23M  
 Operation Time: 12H  
 Room Temperature (°C) / RH%: 25.7/57%  
 Sphere Temperature (°C): 25.2

REPORT NUMBER: SP1-2307-100-8

| 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 4000K 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       | 6299             | NR               | 490       | 95290            | NR               | 620       | 202945           | NR               | 750       | 17048            | NR               | 880       | 6802             | NR               |
| 365       | 5178             | NR               | 495       | 104168           | NR               | 625       | 198934           | NR               | 755       | 15396            | NR               | 885       | 7389             | NR               |
| 370       | 5490             | NR               | 500       | 113725           | NR               | 630       | 192455           | NR               | 760       | 13359            | NR               | 890       | 5235             | NR               |
| 375       | 6104             | NR               | 505       | 126034           | NR               | 635       | 185651           | NR               | 765       | 12573            | NR               | 895       | 4778             | NR               |
| 380       | 6149             | NR               | 510       | 134848           | NR               | 640       | 177659           | NR               | 770       | 10940            | NR               | 900       | 5847             | NR               |
| 385       | 5688             | NR               | 515       | 142720           | NR               | 645       | 169230           | NR               | 775       | 9589             | NR               | 905       | 5969             | NR               |
| 390       | 5262             | NR               | 520       | 149276           | NR               | 650       | 157607           | NR               | 780       | 8802             | NR               | 910       | 6399             | NR               |
| 395       | 4581             | NR               | 525       | 154675           | NR               | 655       | 148474           | NR               | 785       | 8257             | NR               | 915       | 5912             | NR               |
| 400       | 4118             | NR               | 530       | 159852           | NR               | 660       | 137175           | NR               | 790       | 7397             | NR               | 920       | 6048             | NR               |
| 405       | 4084             | NR               | 535       | 164319           | NR               | 665       | 125124           | NR               | 795       | 7591             | NR               | 925       | 5552             | NR               |
| 410       | 4438             | NR               | 540       | 169099           | NR               | 670       | 113759           | NR               | 800       | 7116             | NR               | 930       | 7244             | NR               |
| 415       | 5782             | NR               | 545       | 173030           | NR               | 675       | 102656           | NR               | 805       | 6905             | NR               | 935       | 6076             | NR               |
| 420       | 8737             | NR               | 550       | 175415           | NR               | 680       | 92651            | NR               | 810       | 6711             | NR               | 940       | 6581             | NR               |
| 425       | 14203            | NR               | 555       | 179385           | NR               | 685       | 82728            | NR               | 815       | 6202             | NR               | 945       | 7094             | NR               |
| 430       | 23287            | NR               | 560       | 183651           | NR               | 690       | 72755            | NR               | 820       | 6421             | NR               | 950       | 6374             | NR               |
| 435       | 39198            | NR               | 565       | 186704           | NR               | 695       | 64864            | NR               | 825       | 6067             | NR               | 955       | 5408             | NR               |
| 440       | 65090            | NR               | 570       | 189735           | NR               | 700       | 57132            | NR               | 830       | 6507             | NR               | 960       | 5406             | NR               |
| 445       | 111800           | NR               | 575       | 192391           | NR               | 705       | 50899            | NR               | 835       | 6304             | NR               | 965       | 5676             | NR               |
| 450       | 185327           | NR               | 580       | 195587           | NR               | 710       | 44715            | NR               | 840       | 5605             | NR               | 970       | 6132             | NR               |
| 455       | 231910           | NR               | 585       | 198690           | NR               | 715       | 39661            | NR               | 845       | 5975             | NR               | 975       | 7732             | NR               |
| 460       | 199850           | NR               | 590       | 200528           | NR               | 720       | 35220            | NR               | 850       | 5252             | NR               | 980       | 4497             | NR               |
| 465       | 159032           | NR               | 595       | 204245           | NR               | 725       | 31033            | NR               | 855       | 6570             | NR               | 985       | 1796             | NR               |
| 470       | 134681           | NR               | 600       | 206961           | NR               | 730       | 27573            | NR               | 860       | 6167             | NR               | 990       | 6719             | NR               |
| 475       | 109873           | NR               | 605       | 207509           | NR               | 735       | 24077            | NR               | 865       | 5558             | NR               | 995       | 10730            | NR               |
| 480       | 92595            | NR               | 610       | 206751           | NR               | 740       | 21375            | NR               | 870       | 5280             | NR               | 1000      | 10317            | NR               |
| 485       | 90323            | NR               | 615       | 205233           | NR               | 745       | 19152            | NR               | 875       | 5889             | NR               |           |                  |                  |

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Scotopic Flux vs. Wavelength



Scotopic Lumens: 22729.8

S/P: 1.79

| 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       | 6299             | NR               | 490       | 95290            | NR               | 620       | 202945           | NR               | 750       | 17048            | NR               | 880       | 6802             | NR               |
| 365       | 5178             | NR               | 495       | 104168           | NR               | 625       | 198934           | NR               | 755       | 15396            | NR               | 885       | 7389             | NR               |
| 370       | 5490             | NR               | 500       | 113725           | NR               | 630       | 192455           | NR               | 760       | 13359            | NR               | 890       | 5235             | NR               |
| 375       | 6104             | NR               | 505       | 126034           | NR               | 635       | 185651           | NR               | 765       | 12573            | NR               | 895       | 4778             | NR               |
| 380       | 6149             | NR               | 510       | 134848           | NR               | 640       | 177659           | NR               | 770       | 10940            | NR               | 900       | 5847             | NR               |
| 385       | 5688             | NR               | 515       | 142720           | NR               | 645       | 169230           | NR               | 775       | 9589             | NR               | 905       | 5969             | NR               |
| 390       | 5262             | NR               | 520       | 149276           | NR               | 650       | 157607           | NR               | 780       | 8802             | NR               | 910       | 6399             | NR               |
| 395       | 4581             | NR               | 525       | 154675           | NR               | 655       | 148474           | NR               | 785       | 8257             | NR               | 915       | 5912             | NR               |
| 400       | 4118             | NR               | 530       | 159852           | NR               | 660       | 137175           | NR               | 790       | 7397             | NR               | 920       | 6048             | NR               |
| 405       | 4084             | NR               | 535       | 164319           | NR               | 665       | 125124           | NR               | 795       | 7591             | NR               | 925       | 5552             | NR               |
| 410       | 4438             | NR               | 540       | 169099           | NR               | 670       | 113759           | NR               | 800       | 7116             | NR               | 930       | 7244             | NR               |
| 415       | 5782             | NR               | 545       | 173030           | NR               | 675       | 102656           | NR               | 805       | 6905             | NR               | 935       | 6076             | NR               |
| 420       | 8737             | NR               | 550       | 175415           | NR               | 680       | 92651            | NR               | 810       | 6711             | NR               | 940       | 6581             | NR               |
| 425       | 14203            | NR               | 555       | 179385           | NR               | 685       | 82728            | NR               | 815       | 6202             | NR               | 945       | 7094             | NR               |
| 430       | 23287            | NR               | 560       | 183651           | NR               | 690       | 72755            | NR               | 820       | 6421             | NR               | 950       | 6374             | NR               |
| 435       | 39198            | NR               | 565       | 186704           | NR               | 695       | 64864            | NR               | 825       | 6067             | NR               | 955       | 5408             | NR               |
| 440       | 65090            | NR               | 570       | 189735           | NR               | 700       | 57132            | NR               | 830       | 6507             | NR               | 960       | 5406             | NR               |
| 445       | 111800           | NR               | 575       | 192391           | NR               | 705       | 50899            | NR               | 835       | 6304             | NR               | 965       | 5676             | NR               |
| 450       | 185327           | NR               | 580       | 195587           | NR               | 710       | 44715            | NR               | 840       | 5605             | NR               | 970       | 6132             | NR               |
| 455       | 231910           | NR               | 585       | 198690           | NR               | 715       | 39661            | NR               | 845       | 5975             | NR               | 975       | 7732             | NR               |
| 460       | 199850           | NR               | 590       | 200528           | NR               | 720       | 35220            | NR               | 850       | 5252             | NR               | 980       | 4497             | NR               |
| 465       | 159032           | NR               | 595       | 204245           | NR               | 725       | 31033            | NR               | 855       | 6570             | NR               | 985       | 1796             | NR               |
| 470       | 134681           | NR               | 600       | 206961           | NR               | 730       | 27573            | NR               | 860       | 6167             | NR               | 990       | 6719             | NR               |
| 475       | 109873           | NR               | 605       | 207509           | NR               | 735       | 24077            | NR               | 865       | 5558             | NR               | 995       | 10730            | NR               |
| 480       | 92595            | NR               | 610       | 206751           | NR               | 740       | 21375            | NR               | 870       | 5280             | NR               | 1000      | 10317            | NR               |
| 485       | 90323            | NR               | 615       | 205233           | NR               | 745       | 19152            | NR               | 875       | 5889             | NR               |           |                  |                  |

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**Melanopic Flux vs. Wavelength**



**Melanopic Lumens: 9423.4 M/P: 0.74**

| 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       | 6299             | NR               | 490       | 95290            | NR               | 620       | 202945           | NR               | 750       | 17048            | NR               | 880       | 6802             | NR               |
| 365       | 5178             | NR               | 495       | 104168           | NR               | 625       | 198934           | NR               | 755       | 15396            | NR               | 885       | 7389             | NR               |
| 370       | 5490             | NR               | 500       | 113725           | NR               | 630       | 192455           | NR               | 760       | 13359            | NR               | 890       | 5235             | NR               |
| 375       | 6104             | NR               | 505       | 126034           | NR               | 635       | 185651           | NR               | 765       | 12573            | NR               | 895       | 4778             | NR               |
| 380       | 6149             | NR               | 510       | 134848           | NR               | 640       | 177659           | NR               | 770       | 10940            | NR               | 900       | 5847             | NR               |
| 385       | 5688             | NR               | 515       | 142720           | NR               | 645       | 169230           | NR               | 775       | 9589             | NR               | 905       | 5969             | NR               |
| 390       | 5262             | NR               | 520       | 149276           | NR               | 650       | 157607           | NR               | 780       | 8802             | NR               | 910       | 6399             | NR               |
| 395       | 4581             | NR               | 525       | 154675           | NR               | 655       | 148474           | NR               | 785       | 8257             | NR               | 915       | 5912             | NR               |
| 400       | 4118             | NR               | 530       | 159852           | NR               | 660       | 137175           | NR               | 790       | 7397             | NR               | 920       | 6048             | NR               |
| 405       | 4084             | NR               | 535       | 164319           | NR               | 665       | 125124           | NR               | 795       | 7591             | NR               | 925       | 5552             | NR               |
| 410       | 4438             | NR               | 540       | 169099           | NR               | 670       | 113759           | NR               | 800       | 7116             | NR               | 930       | 7244             | NR               |
| 415       | 5782             | NR               | 545       | 173030           | NR               | 675       | 102656           | NR               | 805       | 6905             | NR               | 935       | 6076             | NR               |
| 420       | 8737             | NR               | 550       | 175415           | NR               | 680       | 92651            | NR               | 810       | 6711             | NR               | 940       | 6581             | NR               |
| 425       | 14203            | NR               | 555       | 179385           | NR               | 685       | 82728            | NR               | 815       | 6202             | NR               | 945       | 7094             | NR               |
| 430       | 23287            | NR               | 560       | 183651           | NR               | 690       | 72755            | NR               | 820       | 6421             | NR               | 950       | 6374             | NR               |
| 435       | 39198            | NR               | 565       | 186704           | NR               | 695       | 64864            | NR               | 825       | 6067             | NR               | 955       | 5408             | NR               |
| 440       | 65090            | NR               | 570       | 189735           | NR               | 700       | 57132            | NR               | 830       | 6507             | NR               | 960       | 5406             | NR               |
| 445       | 111800           | NR               | 575       | 192391           | NR               | 705       | 50899            | NR               | 835       | 6304             | NR               | 965       | 5676             | NR               |
| 450       | 185327           | NR               | 580       | 195587           | NR               | 710       | 44715            | NR               | 840       | 5605             | NR               | 970       | 6132             | NR               |
| 455       | 231910           | NR               | 585       | 198690           | NR               | 715       | 39661            | NR               | 845       | 5975             | NR               | 975       | 7732             | NR               |
| 460       | 199850           | NR               | 590       | 200528           | NR               | 720       | 35220            | NR               | 850       | 5252             | NR               | 980       | 4497             | NR               |
| 465       | 159032           | NR               | 595       | 204245           | NR               | 725       | 31033            | NR               | 855       | 6570             | NR               | 985       | 1796             | NR               |
| 470       | 134681           | NR               | 600       | 206961           | NR               | 730       | 27573            | NR               | 860       | 6167             | NR               | 990       | 6719             | NR               |
| 475       | 109873           | NR               | 605       | 207509           | NR               | 735       | 24077            | NR               | 865       | 5558             | NR               | 995       | 10730            | NR               |
| 480       | 92595            | NR               | 610       | 206751           | NR               | 740       | 21375            | NR               | 870       | 5280             | NR               | 1000      | 10317            | NR               |
| 485       | 90323            | NR               | 615       | 205233           | NR               | 745       | 19152            | NR               | 875       | 5889             | NR               |           |                  |                  |

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**TM-30-18**

**Summary**

$R_f = 88.6$   
 $R_g = 96.2$   
 CIE  $R_a = 91.5$   
 $R_9 = 57.0$



**Color Vector Graphics**

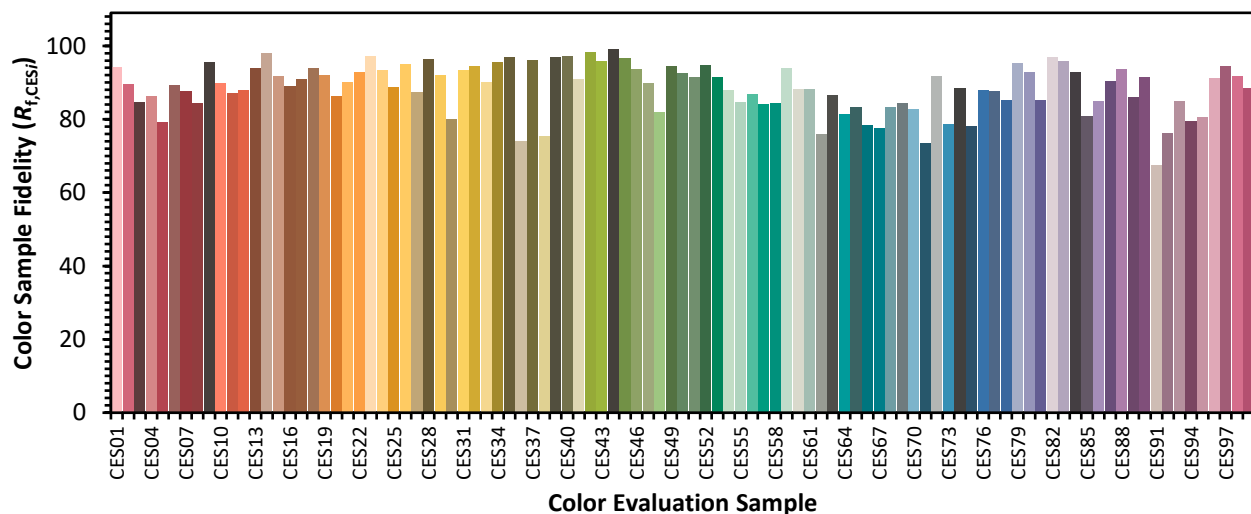


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**TM-30-18**

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

|            |            |            |            |
|------------|------------|------------|------------|
| CES01 = 86 | CES26 = 95 | CES51 = 92 | CES76 = 88 |
| CES02 = 62 | CES27 = 87 | CES52 = 95 | CES77 = 88 |
| CES03 = 31 | CES28 = 96 | CES53 = 92 | CES78 = 85 |
| CES04 = 69 | CES29 = 92 | CES54 = 88 | CES79 = 95 |
| CES05 = 49 | CES30 = 80 | CES55 = 85 | CES80 = 93 |
| CES06 = 50 | CES31 = 93 | CES56 = 87 | CES81 = 85 |
| CES07 = 42 | CES32 = 94 | CES57 = 84 | CES82 = 97 |
| CES08 = 41 | CES33 = 90 | CES58 = 84 | CES83 = 96 |
| CES09 = 29 | CES34 = 96 | CES59 = 94 | CES84 = 93 |
| CES10 = 74 | CES35 = 97 | CES60 = 88 | CES85 = 81 |
| CES11 = 57 | CES36 = 74 | CES61 = 88 | CES86 = 85 |
| CES12 = 63 | CES37 = 96 | CES62 = 76 | CES87 = 90 |
| CES13 = 43 | CES38 = 75 | CES63 = 86 | CES88 = 94 |
| CES14 = 74 | CES39 = 97 | CES64 = 81 | CES89 = 86 |
| CES15 = 71 | CES40 = 97 | CES65 = 83 | CES90 = 91 |
| CES16 = 47 | CES41 = 91 | CES66 = 78 | CES91 = 67 |
| CES17 = 49 | CES42 = 98 | CES67 = 78 | CES92 = 76 |
| CES18 = 56 | CES43 = 96 | CES68 = 83 | CES93 = 85 |
| CES19 = 71 | CES44 = 99 | CES69 = 84 | CES94 = 79 |
| CES20 = 66 | CES45 = 97 | CES70 = 83 | CES95 = 81 |
| CES21 = 85 | CES46 = 94 | CES71 = 74 | CES96 = 91 |
| CES22 = 78 | CES47 = 90 | CES72 = 92 | CES97 = 94 |
| CES23 = 91 | CES48 = 82 | CES73 = 79 | CES98 = 92 |
| CES24 = 90 | CES49 = 94 | CES74 = 89 | CES99 = 89 |
| CES25 = 71 | CES50 = 93 | CES75 = 78 |            |



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**TM-30-18**

Color Rendition by Hue-Angle Bin



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**Measure Comparisons**



(END OF REPORT)