

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: P830491

Luminaire Tested: **OHBL-48HE-N-UNV-L830-CD**

Issue Date: 5/3/2024



**Test Information**

Test Method: LM-79-08  
Report Number: P830491  
TEST IS SCALED FROM IESNA LM-79-08 TEST DATA (G2-2106-285-5)  
Test Lab: INNOVATION CENTER  
Issue Date: 5/3/2024  
Manufacturer: COOPER LIGHTING SOLUTIONS (FORMERLY EATON)  
Product Line: METALUX  
Catalog Number: OHBL-48HE-N-UNV-L830-CD  
Description: 48000 LUMEN OHBL HE LED LUMINAIRE WITH 80CRI, 3000K LEDS AND NARROW LENS  
Light Source: -  
Ballast/Driver: -

**Summary**

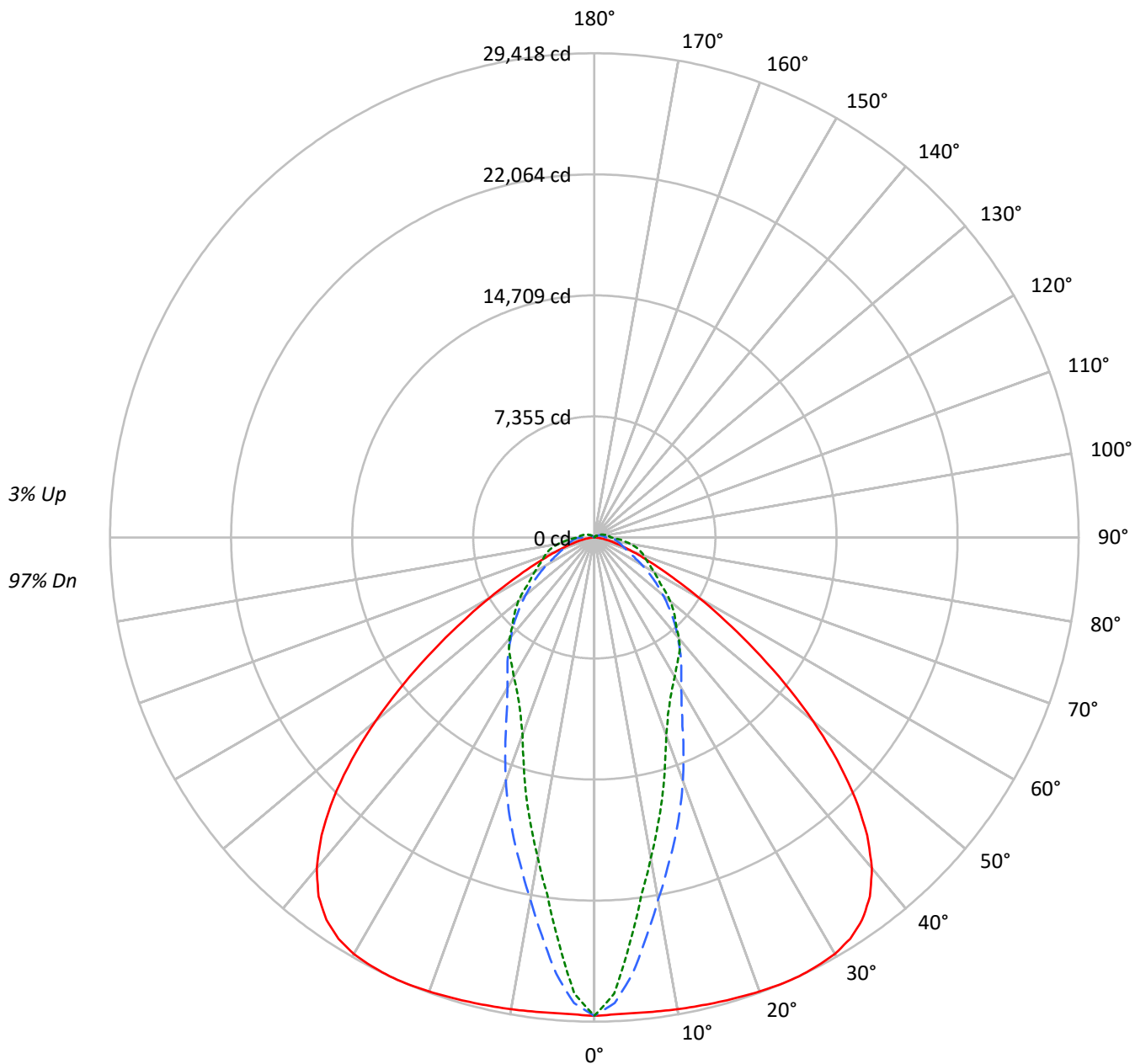
Lumens per Lamp: N/A  
Luminaire Lumens: 42892.0 lumens  
Efficiency: N/A  
Efficacy: 161.2 lumens/watt  
Spacing Criteria (0/90/45): 1.47 / 0.53 / 0.78  
Luminous Opening: Rectangular w/ Sides (W: 1.8' x L: 3.78' x H: 0.17')  
CIE Type: Direct

Input Watts (W): 266  
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: P830491

CATALOG NUMBER: OHBL-48HE-N-UNV-L830-CD

### Luminous Intensity Polar Plot





TEST NUMBER: P830491

CATALOG NUMBER: OHBL-48HE-N-UNV-L830-CD

**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   | 118 | 118 | 118 | 118 | 115 | 115 | 115 | 115 | 109 | 109 | 109 | 104 | 104 | 104 | 99 | 99 | 99 | 99 | 99 | 97 |
| 1   | 109 | 104 | 100 | 97  | 106 | 102 | 98  | 95  | 97  | 94  | 91  | 92  | 90  | 88  | 88 | 86 | 85 | 85 | 85 | 82 |
| 2   | 100 | 93  | 86  | 81  | 97  | 90  | 85  | 80  | 86  | 82  | 78  | 83  | 79  | 75  | 79 | 76 | 73 | 73 | 73 | 71 |
| 3   | 92  | 83  | 75  | 69  | 90  | 81  | 74  | 69  | 78  | 72  | 67  | 74  | 70  | 65  | 72 | 67 | 64 | 64 | 64 | 62 |
| 4   | 85  | 74  | 66  | 60  | 83  | 73  | 66  | 60  | 70  | 64  | 59  | 67  | 62  | 57  | 65 | 60 | 56 | 56 | 56 | 54 |
| 5   | 79  | 67  | 59  | 53  | 77  | 66  | 59  | 53  | 64  | 57  | 52  | 62  | 56  | 51  | 59 | 54 | 50 | 50 | 50 | 48 |
| 6   | 74  | 62  | 53  | 47  | 72  | 60  | 53  | 47  | 58  | 52  | 46  | 56  | 50  | 46  | 55 | 49 | 45 | 45 | 45 | 43 |
| 7   | 69  | 56  | 48  | 43  | 67  | 55  | 48  | 42  | 54  | 47  | 42  | 52  | 46  | 41  | 50 | 45 | 41 | 41 | 41 | 39 |
| 8   | 65  | 52  | 44  | 39  | 63  | 51  | 44  | 39  | 50  | 43  | 38  | 48  | 42  | 38  | 47 | 41 | 37 | 37 | 37 | 35 |
| 9   | 61  | 48  | 41  | 35  | 59  | 47  | 40  | 35  | 46  | 40  | 35  | 45  | 39  | 35  | 44 | 38 | 34 | 34 | 34 | 32 |
| 10  | 57  | 45  | 37  | 33  | 56  | 44  | 37  | 32  | 43  | 37  | 32  | 42  | 36  | 32  | 41 | 35 | 32 | 32 | 32 | 30 |

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

|     | 0°    | 45°   | 90°   |
|-----|-------|-------|-------|
| 0°  | 45960 | 45960 | 45960 |
| 5°  | 45867 | 41874 | 38940 |
| 10° | 46384 | 35288 | 31244 |
| 15° | 47290 | 30193 | 25661 |
| 20° | 48618 | 25542 | 20769 |
| 25° | 50300 | 21152 | 18210 |
| 30° | 52039 | 18232 | 16930 |
| 35° | 53122 | 16625 | 16143 |
| 40° | 52212 | 15027 | 15328 |
| 45° | 48033 | 13589 | 14205 |
| 50° | 40525 | 12015 | 13348 |
| 55° | 30793 | 10534 | 11895 |
| 60° | 21579 | 9045  | 11407 |
| 65° | 14515 | 7802  | 11191 |
| 70° | 9913  | 7337  | 11775 |
| 75° | 6879  | 7589  | 12635 |
| 80° | 4736  | 8444  | 13097 |
| 85° | 2770  | 10659 | 13921 |



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**ZONAL LUMENS:**

| Zone      | Lumens  | % Fixture |
|-----------|---------|-----------|
| 0°-10°    | 2446.4  | 5.7       |
| 10°-20°   | 5755.0  | 13.4      |
| 20°-30°   | 7213.8  | 16.8      |
| 30°-40°   | 7654.6  | 17.8      |
| 40°-50°   | 6921.0  | 16.1      |
| 50°-60°   | 5018.2  | 11.7      |
| 60°-70°   | 3149.2  | 7.3       |
| 70°-80°   | 2084.0  | 4.9       |
| 80°-90°   | 1200.6  | 2.8       |
| 90°-100°  | 581.7   | 1.4       |
| 100°-110° | 401.5   | 0.9       |
| 110°-120° | 247.7   | 0.6       |
| 120°-130° | 120.0   | 0.3       |
| 130°-140° | 55.2    | 0.1       |
| 140°-150° | 30.1    | 0.1       |
| 150°-160° | 13.1    | 0.0       |
| 160°-170° | 0.0     | 0.0       |
| 170°-180° | 0.0     | 0.0       |
| <hr/>     |         |           |
| 0°-30°    | 15415.1 | 35.9      |
| 0°-40°    | 23069.8 | 53.8      |
| 0°-60°    | 35008.9 | 81.6      |
| 0°-90°    | 41442.7 | 96.6      |
| 90°-120°  | 1230.9  | 2.9       |
| 90°-150°  | 1436.2  | 3.3       |
| 90°-180°  | 1449.0  | 3.4       |
| 0°-180°   | 42892.0 | 100.0     |

**CANDELA DISTRIBUTION:**

|      | 0°    | 22.5° | 45°   | 67.5° | 90°   | Flux  |
|------|-------|-------|-------|-------|-------|-------|
| 0°   | 29062 | 29062 | 29062 | 29062 | 29062 |       |
| 5°   | 29004 | 28260 | 26600 | 25366 | 24727 | ###   |
| 15°  | 29225 | 23820 | 18919 | 16825 | 16062 | 8288  |
| 25°  | 29418 | 18418 | 12668 | 11244 | 10887 | 13591 |
| 35°  | 28365 | 12245 | 9194  | 8906  | 8904  | 17633 |
| 45°  | 22423 | 7756  | 6663  | 6824  | 6940  | 17082 |
| 55°  | 11871 | 4807  | 4348  | 4716  | 4885  | 10726 |
| 65°  | 4246  | 2788  | 2517  | 3225  | 3585  | 4418  |
| 75°  | 1311  | 1502  | 1690  | 2625  | 2782  | 1461  |
| 85°  | 230   | 622   | 1236  | 1720  | 1579  | 275   |
| 90°  | 0     | 260   | 716   | 1010  | 1018  | 15    |
| 95°  | 11    | 183   | 631   | 857   | 896   | 10    |
| 105° | 22    | 122   | 459   | 608   | 625   | 22    |
| 115° | 30    | 86    | 310   | 387   | 396   | 30    |
| 125° | 33    | 44    | 158   | 199   | 196   | 29    |
| 135° | 28    | 33    | 69    | 108   | 108   | 22    |
| 145° | 33    | 36    | 42    | 64    | 61    | 20    |
| 155° | 33    | 42    | 44    | 47    | 42    | 10    |
| 165° | 0     | 0     | 0     | 0     | 0     | 0     |
| 175° | 0     | 0     | 0     | 0     | 0     | 0     |
| 180° | 0     | 0     | 0     | 0     | 0     |       |



TEST NUMBER: P830491

CATALOG NUMBER: OHBL-48HE-N-UNV-L830-CD

**CANDELA DISTRIBUTION (FULL):**

|        | 0°      | 22.5°   | 45°     | 67.5°   | 90°     |
|--------|---------|---------|---------|---------|---------|
| 0°     | 29061.6 | 29061.6 | 29061.6 | 29061.6 | 29061.6 |
| 2.5°   | 29000.8 | 28834.8 | 28317.6 | 28002.3 | 27736.7 |
| 5°     | 29003.5 | 28259.5 | 26599.9 | 25366.3 | 24727.4 |
| 7.5°   | 29045.0 | 27391.0 | 24401.0 | 22600.4 | 21897.9 |
| 10°    | 29108.6 | 26315.0 | 22348.7 | 20429.2 | 19773.6 |
| 12.5°  | 29155.7 | 25103.6 | 20542.6 | 18570.4 | 17851.3 |
| 15°    | 29224.8 | 23820.2 | 18919.0 | 16825.1 | 16061.8 |
| 17.5°  | 29288.4 | 22611.5 | 17314.7 | 15126.9 | 14277.7 |
| 20°    | 29352.0 | 21308.7 | 15710.5 | 13456.2 | 12756.5 |
| 22.5°  | 29412.9 | 19934.1 | 14145.0 | 12159.0 | 11680.5 |
| 25°    | 29418.4 | 18418.3 | 12668.0 | 11243.5 | 10886.7 |
| 27.5°  | 29346.5 | 16847.3 | 11470.3 | 10477.3 | 10256.1 |
| 30°    | 29222.0 | 15323.2 | 10541.0 | 9924.2  | 9766.5  |
| 32.5°  | 28912.3 | 13768.8 | 9821.8  | 9390.3  | 9299.1  |
| 35°    | 28364.6 | 12244.8 | 9193.9  | 8906.3  | 8903.5  |
| 37.5°  | 27501.6 | 10892.2 | 8513.5  | 8463.7  | 8524.6  |
| 40°    | 26226.5 | 9708.4  | 7869.1  | 8001.8  | 8001.8  |
| 42.5°  | 24525.5 | 8679.5  | 7285.5  | 7421.0  | 7385.0  |
| 45°    | 22423.4 | 7755.7  | 6663.1  | 6823.5  | 6939.7  |
| 47.5°  | 19986.6 | 6942.5  | 6027.0  | 6336.7  | 6497.2  |
| 50°    | 17336.8 | 6168.0  | 5446.1  | 5841.6  | 6024.2  |
| 52.5°  | 14559.9 | 5451.6  | 4879.1  | 5332.7  | 5479.3  |
| 55°    | 11871.4 | 4807.2  | 4348.0  | 4715.9  | 4884.6  |
| 57.5°  | 9437.4  | 4193.1  | 3828.0  | 4176.6  | 4525.1  |
| 60°    | 7343.5  | 3664.9  | 3338.5  | 3836.3  | 4184.9  |
| 62.5°  | 5609.3  | 3194.6  | 2879.3  | 3518.3  | 3866.8  |
| 65°    | 4245.7  | 2788.1  | 2517.0  | 3225.1  | 3584.6  |
| 67.5°  | 3200.2  | 2436.8  | 2234.9  | 3012.1  | 3363.4  |
| 70°    | 2403.6  | 2096.6  | 2008.1  | 2879.3  | 3194.6  |
| 72.5°  | 1775.7  | 1784.0  | 1828.3  | 2763.2  | 3003.8  |
| 75°    | 1311.1  | 1501.9  | 1690.0  | 2624.9  | 2782.5  |
| 77.5°  | 937.6   | 1244.7  | 1565.5  | 2458.9  | 2514.2  |
| 80°    | 650.0   | 1015.1  | 1435.5  | 2240.4  | 2193.4  |
| 82.5°  | 406.6   | 813.2   | 1319.3  | 1999.8  | 1869.8  |
| 85°    | 229.6   | 622.3   | 1236.4  | 1720.4  | 1579.3  |
| 87.5°  | 102.3   | 464.7   | 1081.5  | 1341.5  | 1253.0  |
| 90°    | 0.0     | 260.0   | 716.4   | 1009.6  | 1017.9  |
| 92.5°  | 5.5     | 215.7   | 661.1   | 923.8   | 951.5   |
| 95°    | 11.1    | 182.6   | 630.6   | 857.4   | 896.2   |
| 97.5°  | 13.8    | 160.4   | 591.9   | 796.6   | 829.8   |
| 100°   | 16.6    | 143.8   | 544.9   | 733.0   | 760.6   |
| 102.5° | 19.4    | 132.8   | 500.6   | 666.6   | 688.7   |
| 105°   | 22.1    | 121.7   | 459.1   | 608.5   | 625.1   |



TEST NUMBER: P830491

CATALOG NUMBER: OHBL-48HE-N-UNV-L830-CD

**CANDELA DISTRIBUTION (continued):**

|        | 0°   | 22.5° | 45°   | 67.5° | 90°   |
|--------|------|-------|-------|-------|-------|
| 112.5° | 27.7 | 94.0  | 345.7 | 437.0 | 450.8 |
| 115°   | 30.4 | 85.7  | 309.8 | 387.2 | 395.5 |
| 117.5° | 33.2 | 74.7  | 271.1 | 340.2 | 343.0 |
| 120°   | 33.2 | 66.4  | 232.3 | 290.4 | 290.4 |
| 122.5° | 33.2 | 55.3  | 193.6 | 240.6 | 237.9 |
| 125°   | 33.2 | 44.3  | 157.7 | 199.1 | 196.4 |
| 127.5° | 30.4 | 36.0  | 127.2 | 166.0 | 163.2 |
| 130°   | 30.4 | 36.0  | 102.3 | 141.1 | 141.1 |
| 132.5° | 27.7 | 33.2  | 83.0  | 121.7 | 121.7 |
| 135°   | 27.7 | 33.2  | 69.1  | 107.9 | 107.9 |
| 137.5° | 27.7 | 36.0  | 58.1  | 94.0  | 94.0  |
| 140°   | 27.7 | 33.2  | 49.8  | 83.0  | 83.0  |
| 142.5° | 30.4 | 33.2  | 44.3  | 71.9  | 71.9  |
| 145°   | 33.2 | 36.0  | 41.5  | 63.6  | 60.9  |
| 147.5° | 33.2 | 38.7  | 41.5  | 55.3  | 52.6  |
| 150°   | 33.2 | 41.5  | 41.5  | 49.8  | 47.0  |
| 152.5° | 33.2 | 41.5  | 41.5  | 47.0  | 44.3  |
| 155°   | 33.2 | 41.5  | 44.3  | 47.0  | 41.5  |
| 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° | 22.1 | 113.4 | 420.4 | 544.9 | 564.2 |
| 110°   | 24.9 | 102.3 | 384.5 | 486.8 | 506.2 |



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

Report Prepared for

Cooper Lighting Solutions

METALUX

Report Number: SP1-2307-100-4

Test Date: 07/27/2023

Luminaire Tested: OHB-15SE-N-UNV-L830-CD

Data in this report applies to families of products including OHB-15SE-N-UNV-L830-CD.

### Test Information

Test Method: LM-79-2019  
 Report Number: SP1-2307-100-4  
 Test Lab: COOPER LIGHTING SOLUTIONS  
 Photometer: SP1 - 76IN SPHERE  
 Measurement Geometry:  $4\pi$   
 Issue Date: 08/04/2023  
 Manufacturer: COOPER LIGHTING SOLUTIONS  
 Product Line: METALUX  
 Catalog Number: **OHB-15SE-N-UNV-L830-CD**  
 Description: 15000 LUMEN OHB SE LED LUMINAIRE WITH 80CRI, 3000K LEDS AND NARROW LENS

LENS

### Spectral Parameters

CCT (K): 3094  
 CIE u': 0.2471  
 CIE v': 0.5200  
 Duv: 0.0004  
 CIE x: 0.4308  
 CIE y: 0.4028  
 CIE z: 0.1664  
 Peak Wavelength (nm): 601  
 Dominant Wavelength (nm): 582  
 Purity: 50.4  
 Rf: 85.5  
 Rg: 95.7

CRI (Ra): 83.1  
 R1: 81.4  
 R2: 91.2  
 R3: 96.3  
 R4: 81.2  
 R5: 81.8  
 R6: 89.5  
 R7: 83.2  
 R8: 59.8  
 R9: 8.0  
 R10: 80.2  
 R11: 80.9  
 R12: 72.3  
 R13: 83.8  
 R14: 98.6



### Test Conditions

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

REPORT NUMBER: SP1-2307-100-4

| 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: SP1-2307-100-4

**CIE 1931 Chromaticity Diagram**



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



Point lies inside the ANSI 3000K 4-step quadrangle

REPORT NUMBER: SP1-2307-100-4

**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       | 5588             | NR               | 490       | 67760            | NR               | 620       | 245592           | NR               | 750       | 12500            | NR               | 880       | 5775             | NR               |
| 365       | 4653             | NR               | 495       | 80150            | NR               | 625       | 233690           | NR               | 755       | 11226            | NR               | 885       | 6968             | NR               |
| 370       | 4816             | NR               | 500       | 92862            | NR               | 630       | 218514           | NR               | 760       | 10108            | NR               | 890       | 4448             | NR               |
| 375       | 5382             | NR               | 505       | 106466           | NR               | 635       | 203332           | NR               | 765       | 9635             | NR               | 895       | 3971             | NR               |
| 380       | 5471             | NR               | 510       | 115999           | NR               | 640       | 188047           | NR               | 770       | 8591             | NR               | 900       | 4881             | NR               |
| 385       | 5274             | NR               | 515       | 124150           | NR               | 645       | 172926           | NR               | 775       | 7303             | NR               | 905       | 5743             | NR               |
| 390       | 4889             | NR               | 520       | 130163           | NR               | 650       | 155620           | NR               | 780       | 6289             | NR               | 910       | 5113             | NR               |
| 395       | 4299             | NR               | 525       | 135224           | NR               | 655       | 141125           | NR               | 785       | 5911             | NR               | 915       | 4407             | NR               |
| 400       | 4023             | NR               | 530       | 140755           | NR               | 660       | 126216           | NR               | 790       | 5635             | NR               | 920       | 4245             | NR               |
| 405       | 3768             | NR               | 535       | 146504           | NR               | 665       | 111397           | NR               | 795       | 5646             | NR               | 925       | 3908             | NR               |
| 410       | 4601             | NR               | 540       | 152733           | NR               | 670       | 97878            | NR               | 800       | 5673             | NR               | 930       | 5417             | NR               |
| 415       | 6365             | NR               | 545       | 159328           | NR               | 675       | 85741            | NR               | 805       | 5281             | NR               | 935       | 4964             | NR               |
| 420       | 9813             | NR               | 550       | 166801           | NR               | 680       | 74760            | NR               | 810       | 5525             | NR               | 940       | 3949             | NR               |
| 425       | 16211            | NR               | 555       | 175954           | NR               | 685       | 65227            | NR               | 815       | 4927             | NR               | 945       | 4140             | NR               |
| 430       | 25392            | NR               | 560       | 187354           | NR               | 690       | 56436            | NR               | 820       | 5126             | NR               | 950       | 3965             | NR               |
| 435       | 39464            | NR               | 565       | 198482           | NR               | 695       | 48938            | NR               | 825       | 4905             | NR               | 955       | 4799             | NR               |
| 440       | 61997            | NR               | 570       | 210996           | NR               | 700       | 42760            | NR               | 830       | 5269             | NR               | 960       | 3231             | NR               |
| 445       | 101388           | NR               | 575       | 223758           | NR               | 705       | 37659            | NR               | 835       | 4331             | NR               | 965       | 3690             | NR               |
| 450       | 140880           | NR               | 580       | 236632           | NR               | 710       | 33026            | NR               | 840       | 4092             | NR               | 970       | 6116             | NR               |
| 455       | 134821           | NR               | 585       | 248639           | NR               | 715       | 29202            | NR               | 845       | 4761             | NR               | 975       | 5312             | NR               |
| 460       | 103575           | NR               | 590       | 256555           | NR               | 720       | 25763            | NR               | 850       | 4730             | NR               | 980       | 4400             | NR               |
| 465       | 86441            | NR               | 595       | 264551           | NR               | 725       | 22755            | NR               | 855       | 4934             | NR               | 985       | 4764             | NR               |
| 470       | 70678            | NR               | 600       | 268886           | NR               | 730       | 20059            | NR               | 860       | 5495             | NR               | 990       | 4803             | NR               |
| 475       | 58575            | NR               | 605       | 267857           | NR               | 735       | 17717            | NR               | 865       | 5241             | NR               | 995       | 3507             | NR               |
| 480       | 55102            | NR               | 610       | 262898           | NR               | 740       | 15495            | NR               | 870       | 5223             | NR               | 1000      | 6247             | NR               |
| 485       | 58801            | NR               | 615       | 255346           | NR               | 745       | 14094            | NR               | 875       | 5501             | NR               |           |                  |                  |

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Scotopic Flux vs. Wavelength



Scotopic Lumens: 18580

S/P: 1.39

| 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       | 5588             | NR               | 490       | 67760            | NR               | 620       | 245592           | NR               | 750       | 12500            | NR               | 880       | 5775             | NR               |
| 365       | 4653             | NR               | 495       | 80150            | NR               | 625       | 233690           | NR               | 755       | 11226            | NR               | 885       | 6968             | NR               |
| 370       | 4816             | NR               | 500       | 92862            | NR               | 630       | 218514           | NR               | 760       | 10108            | NR               | 890       | 4448             | NR               |
| 375       | 5382             | NR               | 505       | 106466           | NR               | 635       | 203332           | NR               | 765       | 9635             | NR               | 895       | 3971             | NR               |
| 380       | 5471             | NR               | 510       | 115999           | NR               | 640       | 188047           | NR               | 770       | 8591             | NR               | 900       | 4881             | NR               |
| 385       | 5274             | NR               | 515       | 124150           | NR               | 645       | 172926           | NR               | 775       | 7303             | NR               | 905       | 5743             | NR               |
| 390       | 4889             | NR               | 520       | 130163           | NR               | 650       | 155620           | NR               | 780       | 6289             | NR               | 910       | 5113             | NR               |
| 395       | 4299             | NR               | 525       | 135224           | NR               | 655       | 141125           | NR               | 785       | 5911             | NR               | 915       | 4407             | NR               |
| 400       | 4023             | NR               | 530       | 140755           | NR               | 660       | 126216           | NR               | 790       | 5635             | NR               | 920       | 4245             | NR               |
| 405       | 3768             | NR               | 535       | 146504           | NR               | 665       | 111397           | NR               | 795       | 5646             | NR               | 925       | 3908             | NR               |
| 410       | 4601             | NR               | 540       | 152733           | NR               | 670       | 97878            | NR               | 800       | 5673             | NR               | 930       | 5417             | NR               |
| 415       | 6365             | NR               | 545       | 159328           | NR               | 675       | 85741            | NR               | 805       | 5281             | NR               | 935       | 4964             | NR               |
| 420       | 9813             | NR               | 550       | 166801           | NR               | 680       | 74760            | NR               | 810       | 5525             | NR               | 940       | 3949             | NR               |
| 425       | 16211            | NR               | 555       | 175954           | NR               | 685       | 65227            | NR               | 815       | 4927             | NR               | 945       | 4140             | NR               |
| 430       | 25392            | NR               | 560       | 187354           | NR               | 690       | 56436            | NR               | 820       | 5126             | NR               | 950       | 3965             | NR               |
| 435       | 39464            | NR               | 565       | 198482           | NR               | 695       | 48938            | NR               | 825       | 4905             | NR               | 955       | 4799             | NR               |
| 440       | 61997            | NR               | 570       | 210996           | NR               | 700       | 42760            | NR               | 830       | 5269             | NR               | 960       | 3231             | NR               |
| 445       | 101388           | NR               | 575       | 223758           | NR               | 705       | 37659            | NR               | 835       | 4331             | NR               | 965       | 3690             | NR               |
| 450       | 140880           | NR               | 580       | 236632           | NR               | 710       | 33026            | NR               | 840       | 4092             | NR               | 970       | 6116             | NR               |
| 455       | 134821           | NR               | 585       | 248639           | NR               | 715       | 29202            | NR               | 845       | 4761             | NR               | 975       | 5312             | NR               |
| 460       | 103575           | NR               | 590       | 256555           | NR               | 720       | 25763            | NR               | 850       | 4730             | NR               | 980       | 4400             | NR               |
| 465       | 86441            | NR               | 595       | 264551           | NR               | 725       | 22755            | NR               | 855       | 4934             | NR               | 985       | 4764             | NR               |
| 470       | 70678            | NR               | 600       | 268886           | NR               | 730       | 20059            | NR               | 860       | 5495             | NR               | 990       | 4803             | NR               |
| 475       | 58575            | NR               | 605       | 267857           | NR               | 735       | 17717            | NR               | 865       | 5241             | NR               | 995       | 3507             | NR               |
| 480       | 55102            | NR               | 610       | 262898           | NR               | 740       | 15495            | NR               | 870       | 5223             | NR               | 1000      | 6247             | NR               |
| 485       | 58801            | NR               | 615       | 255346           | NR               | 745       | 14094            | NR               | 875       | 5501             | NR               |           |                  |                  |

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**Melanopic Flux vs. Wavelength**



**Melanopic Lumens: 7125.5 M/P: 0.53**

| 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       | 5588             | NR               | 490       | 67760            | NR               | 620       | 245592           | NR               | 750       | 12500            | NR               | 880       | 5775             | NR               |
| 365       | 4653             | NR               | 495       | 80150            | NR               | 625       | 233690           | NR               | 755       | 11226            | NR               | 885       | 6968             | NR               |
| 370       | 4816             | NR               | 500       | 92862            | NR               | 630       | 218514           | NR               | 760       | 10108            | NR               | 890       | 4448             | NR               |
| 375       | 5382             | NR               | 505       | 106466           | NR               | 635       | 203332           | NR               | 765       | 9635             | NR               | 895       | 3971             | NR               |
| 380       | 5471             | NR               | 510       | 115999           | NR               | 640       | 188047           | NR               | 770       | 8591             | NR               | 900       | 4881             | NR               |
| 385       | 5274             | NR               | 515       | 124150           | NR               | 645       | 172926           | NR               | 775       | 7303             | NR               | 905       | 5743             | NR               |
| 390       | 4889             | NR               | 520       | 130163           | NR               | 650       | 155620           | NR               | 780       | 6289             | NR               | 910       | 5113             | NR               |
| 395       | 4299             | NR               | 525       | 135224           | NR               | 655       | 141125           | NR               | 785       | 5911             | NR               | 915       | 4407             | NR               |
| 400       | 4023             | NR               | 530       | 140755           | NR               | 660       | 126216           | NR               | 790       | 5635             | NR               | 920       | 4245             | NR               |
| 405       | 3768             | NR               | 535       | 146504           | NR               | 665       | 111397           | NR               | 795       | 5646             | NR               | 925       | 3908             | NR               |
| 410       | 4601             | NR               | 540       | 152733           | NR               | 670       | 97878            | NR               | 800       | 5673             | NR               | 930       | 5417             | NR               |
| 415       | 6365             | NR               | 545       | 159328           | NR               | 675       | 85741            | NR               | 805       | 5281             | NR               | 935       | 4964             | NR               |
| 420       | 9813             | NR               | 550       | 166801           | NR               | 680       | 74760            | NR               | 810       | 5525             | NR               | 940       | 3949             | NR               |
| 425       | 16211            | NR               | 555       | 175954           | NR               | 685       | 65227            | NR               | 815       | 4927             | NR               | 945       | 4140             | NR               |
| 430       | 25392            | NR               | 560       | 187354           | NR               | 690       | 56436            | NR               | 820       | 5126             | NR               | 950       | 3965             | NR               |
| 435       | 39464            | NR               | 565       | 198482           | NR               | 695       | 48938            | NR               | 825       | 4905             | NR               | 955       | 4799             | NR               |
| 440       | 61997            | NR               | 570       | 210996           | NR               | 700       | 42760            | NR               | 830       | 5269             | NR               | 960       | 3231             | NR               |
| 445       | 101388           | NR               | 575       | 223758           | NR               | 705       | 37659            | NR               | 835       | 4331             | NR               | 965       | 3690             | NR               |
| 450       | 140880           | NR               | 580       | 236632           | NR               | 710       | 33026            | NR               | 840       | 4092             | NR               | 970       | 6116             | NR               |
| 455       | 134821           | NR               | 585       | 248639           | NR               | 715       | 29202            | NR               | 845       | 4761             | NR               | 975       | 5312             | NR               |
| 460       | 103575           | NR               | 590       | 256555           | NR               | 720       | 25763            | NR               | 850       | 4730             | NR               | 980       | 4400             | NR               |
| 465       | 86441            | NR               | 595       | 264551           | NR               | 725       | 22755            | NR               | 855       | 4934             | NR               | 985       | 4764             | NR               |
| 470       | 70678            | NR               | 600       | 268886           | NR               | 730       | 20059            | NR               | 860       | 5495             | NR               | 990       | 4803             | NR               |
| 475       | 58575            | NR               | 605       | 267857           | NR               | 735       | 17717            | NR               | 865       | 5241             | NR               | 995       | 3507             | NR               |
| 480       | 55102            | NR               | 610       | 262898           | NR               | 740       | 15495            | NR               | 870       | 5223             | NR               | 1000      | 6247             | NR               |
| 485       | 58801            | NR               | 615       | 255346           | NR               | 745       | 14094            | NR               | 875       | 5501             | NR               |           |                  |                  |

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**Summary**

$R_f = 85.5$   
 $R_g = 95.7$   
 $CIE R_a = 83.1$   
 $R_9 = 8.0$



**Color Vector Graphics**



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

|            |            |            |            |
|------------|------------|------------|------------|
| CES01 = 86 | CES26 = 85 | CES51 = 94 | CES76 = 81 |
| CES02 = 63 | CES27 = 94 | CES52 = 94 | CES77 = 85 |
| CES03 = 31 | CES28 = 94 | CES53 = 90 | CES78 = 81 |
| CES04 = 70 | CES29 = 89 | CES54 = 91 | CES79 = 91 |
| CES05 = 49 | CES30 = 96 | CES55 = 90 | CES80 = 90 |
| CES06 = 51 | CES31 = 90 | CES56 = 87 | CES81 = 74 |
| CES07 = 42 | CES32 = 83 | CES57 = 86 | CES82 = 96 |
| CES08 = 41 | CES33 = 94 | CES58 = 87 | CES83 = 95 |
| CES09 = 29 | CES34 = 91 | CES59 = 92 | CES84 = 92 |
| CES10 = 76 | CES35 = 95 | CES60 = 92 | CES85 = 77 |
| CES11 = 59 | CES36 = 87 | CES61 = 89 | CES86 = 70 |
| CES12 = 65 | CES37 = 95 | CES62 = 90 | CES87 = 85 |
| CES13 = 43 | CES38 = 94 | CES63 = 88 | CES88 = 88 |
| CES14 = 74 | CES39 = 98 | CES64 = 82 | CES89 = 76 |
| CES15 = 71 | CES40 = 96 | CES65 = 80 | CES90 = 89 |
| CES16 = 47 | CES41 = 98 | CES66 = 80 | CES91 = 79 |
| CES17 = 50 | CES42 = 96 | CES67 = 79 | CES92 = 66 |
| CES18 = 56 | CES43 = 91 | CES68 = 82 | CES93 = 79 |
| CES19 = 72 | CES44 = 99 | CES69 = 87 | CES94 = 63 |
| CES20 = 66 | CES45 = 94 | CES70 = 79 | CES95 = 75 |
| CES21 = 87 | CES46 = 91 | CES71 = 77 | CES96 = 84 |
| CES22 = 79 | CES47 = 94 | CES72 = 92 | CES97 = 90 |
| CES23 = 92 | CES48 = 85 | CES73 = 75 | CES98 = 86 |
| CES24 = 91 | CES49 = 91 | CES74 = 92 | CES99 = 77 |
| CES25 = 72 | CES50 = 95 | CES75 = 79 |            |



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**Color Rendition by Hue-Angle Bin**



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**Measure Comparisons**



(END OF REPORT)