

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: P830688

Luminaire Tested: **OHBL-60SE-MCL-UNV-L935-CD**

Issue Date: 5/3/2024



**Test Information**

Test Method: LM-79-08  
Report Number: P830688  
TEST IS SCALED FROM IESNA LM-79-08 TEST DATA (G2-2103-200-1)  
Test Lab: INNOVATION CENTER  
Issue Date: 5/3/2024  
Manufacturer: COOPER LIGHTING SOLUTIONS (FORMERLY EATON)  
Product Line: METALUX  
Catalog Number: OHBL-60SE-MCL-UNV-L935-CD  
Description: 60000 LUMEN OHBL SE LED LUMINAIRE WITH 90CRI, 3500K LEDS AND MEDIUM CLEAR LENS  
Light Source: -  
Ballast/Driver: -

**Summary**

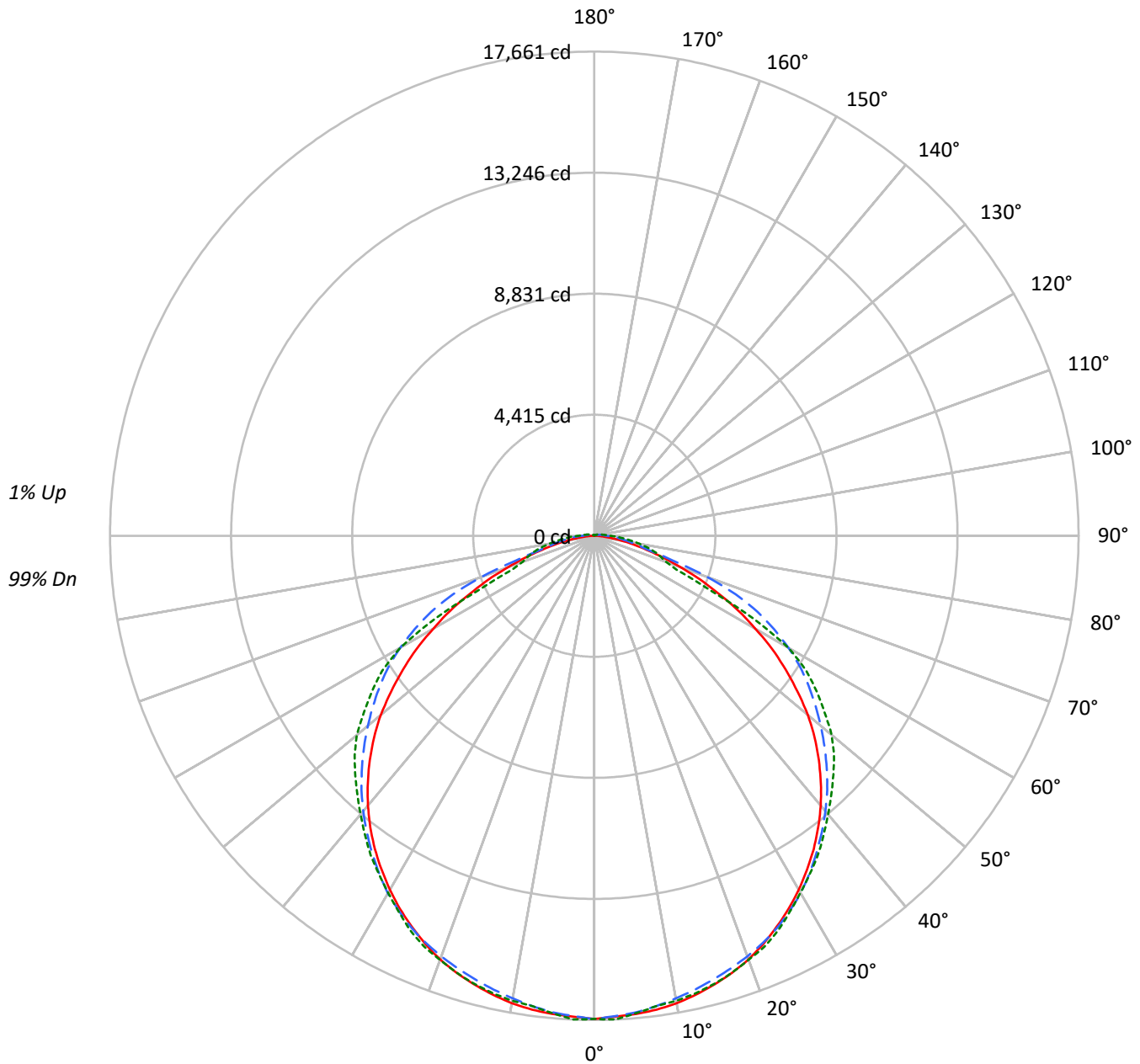
Lumens per Lamp: N/A  
Luminaire Lumens: 49816.0 lumens  
Efficiency: N/A  
Efficacy: 137.6 lumens/watt  
Spacing Criteria (0/90/45): 1.26 / 1.27 / 1.39  
Luminous Opening: Rectangular w/ Sides (W: 1.67' x L: 3.78' x H: 0.17')  
CIE Type: Direct

Input Watts (W): 362  
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: P830688

CATALOG NUMBER: OHBL-60SE-MCL-UNV-L935-CD

### Luminous Intensity Polar Plot





TEST NUMBER: P830688

CATALOG NUMBER: OHBL-60SE-MCL-UNV-L935-CD

**COEFFICIENT OF UTILIZATION - ZONAL CAVITY METHOD:**

|     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |    |    |    |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|----|----|----|
| RF  | 20  |     |     |     | 20  |     |     |     |     | 20  |     |     |     |     | 20  |     |     |    |    | 20 |
| RC  | 80  |     |     |     | 70  |     |     |     |     | 50  |     |     |     |     | 30  |     |     |    |    | 0  |
| 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 | 110 | 110 | 110 | 106 | 106 | 106 | 101 | 101 | 101 |    |    | 99 |
| 1   | 109 | 104 | 100 | 96  | 106 | 102 | 98  | 95  | 97  | 94  | 91  | 93  | 91  | 88  | 90  | 87  | 86  |    |    | 83 |
| 2   | 99  | 91  | 84  | 79  | 96  | 89  | 83  | 78  | 85  | 80  | 76  | 82  | 78  | 74  | 79  | 75  | 72  |    |    | 70 |
| 3   | 91  | 80  | 72  | 66  | 88  | 79  | 71  | 65  | 75  | 69  | 64  | 72  | 67  | 63  | 70  | 65  | 61  |    |    | 59 |
| 4   | 83  | 71  | 62  | 56  | 81  | 70  | 62  | 55  | 67  | 60  | 54  | 65  | 59  | 54  | 62  | 57  | 53  |    |    | 51 |
| 5   | 76  | 64  | 55  | 48  | 74  | 62  | 54  | 48  | 60  | 53  | 47  | 58  | 52  | 46  | 56  | 50  | 46  |    |    | 44 |
| 6   | 70  | 57  | 48  | 42  | 68  | 56  | 48  | 42  | 54  | 47  | 41  | 52  | 46  | 41  | 51  | 45  | 40  |    |    | 38 |
| 7   | 65  | 52  | 43  | 37  | 63  | 51  | 43  | 37  | 49  | 42  | 36  | 48  | 41  | 36  | 46  | 40  | 36  |    |    | 34 |
| 8   | 61  | 47  | 39  | 33  | 59  | 46  | 38  | 33  | 45  | 38  | 33  | 44  | 37  | 32  | 42  | 36  | 32  |    |    | 30 |
| 9   | 57  | 43  | 35  | 30  | 55  | 43  | 35  | 29  | 41  | 34  | 29  | 40  | 34  | 29  | 39  | 33  | 29  |    |    | 27 |
| 10  | 53  | 40  | 32  | 27  | 52  | 39  | 32  | 27  | 38  | 31  | 27  | 37  | 31  | 26  | 36  | 30  | 26  |    |    | 24 |

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

|     | 0°    | 45°   | 90°   |
|-----|-------|-------|-------|
| 0°  | 30103 | 30103 | 30103 |
| 5°  | 29906 | 29652 | 29709 |
| 10° | 29797 | 29190 | 29360 |
| 15° | 29608 | 28841 | 29145 |
| 20° | 29418 | 28616 | 28867 |
| 25° | 29064 | 28389 | 28592 |
| 30° | 28678 | 28039 | 28030 |
| 35° | 28216 | 27492 | 27709 |
| 40° | 27616 | 26926 | 27280 |
| 45° | 26784 | 26273 | 27073 |
| 50° | 25657 | 25530 | 26827 |
| 55° | 23866 | 24796 | 25790 |
| 60° | 21522 | 23730 | 23803 |
| 65° | 18462 | 21773 | 15053 |
| 70° | 14870 | 16962 | 10882 |
| 75° | 11149 | 10040 | 10997 |
| 80° | 7760  | 8308  | 10428 |
| 85° | 4416  | 7544  | 9647  |



TEST NUMBER: P830688

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**ZONAL LUMENS:**

| Zone      | Lumens  | % Fixture |
|-----------|---------|-----------|
| 0°-10°    | 1661.9  | 3.3       |
| 10°-20°   | 4765.5  | 9.6       |
| 20°-30°   | 7278.4  | 14.6      |
| 30°-40°   | 8831.1  | 17.7      |
| 40°-50°   | 9255.9  | 18.6      |
| 50°-60°   | 8387.2  | 16.8      |
| 60°-70°   | 5623.3  | 11.3      |
| 70°-80°   | 2525.1  | 5.1       |
| 80°-90°   | 916.3   | 1.8       |
| 90°-100°  | 275.8   | 0.6       |
| 100°-110° | 130.1   | 0.3       |
| 110°-120° | 65.2    | 0.1       |
| 120°-130° | 36.0    | 0.1       |
| 130°-140° | 24.7    | 0.0       |
| 140°-150° | 16.6    | 0.0       |
| 150°-160° | 12.4    | 0.0       |
| 160°-170° | 7.9     | 0.0       |
| 170°-180° | 2.5     | 0.0       |
| <hr/>     |         |           |
| 0°-30°    | 13705.7 | 27.5      |
| 0°-40°    | 22536.8 | 45.2      |
| 0°-60°    | 40179.9 | 80.7      |
| 0°-90°    | 49244.6 | 98.9      |
| 90°-120°  | 471.2   | 0.9       |
| 90°-150°  | 548.5   | 1.1       |
| 90°-180°  | 571.0   | 1.1       |
| 0°-180°   | 49816.0 | 100.0     |

**CANDELA DISTRIBUTION:**

|      | 0°    | 22.5° | 45°   | 67.5° | 90°   | Flux |
|------|-------|-------|-------|-------|-------|------|
| 0°   | 17625 | 17625 | 17625 | 17625 | 17625 |      |
| 5°   | 17510 | 17571 | 17449 | 17503 | 17480 | ###  |
| 15°  | 16942 | 16876 | 16756 | 16904 | 16924 | 4783 |
| 25°  | 15739 | 15670 | 15780 | 15925 | 15879 | 7255 |
| 35°  | 13950 | 13983 | 14126 | 14276 | 14220 | 8719 |
| 45°  | 11578 | 11766 | 11985 | 12291 | 12329 | 8919 |
| 55°  | 8519  | 8930  | 9539  | 9921  | 9898  | 7605 |
| 65°  | 5000  | 5782  | 6565  | 5540  | 4524  | 4982 |
| 75°  | 1967  | 2854  | 2100  | 2148  | 2288  | 2150 |
| 85°  | 339   | 650   | 833   | 1007  | 1055  | 414  |
| 90°  | 2     | 217   | 431   | 540   | 566   | 20   |
| 95°  | 2     | 135   | 296   | 359   | 370   | 3    |
| 105° | 10    | 59    | 145   | 176   | 184   | 12   |
| 115° | 20    | 31    | 74    | 94    | 99    | 19   |
| 125° | 18    | 20    | 46    | 54    | 56    | 18   |
| 135° | 23    | 26    | 28    | 41    | 43    | 18   |
| 145° | 23    | 26    | 26    | 28    | 31    | 15   |
| 155° | 26    | 28    | 28    | 28    | 26    | 12   |
| 165° | 28    | 28    | 28    | 28    | 28    | 8    |
| 175° | 28    | 28    | 26    | 23    | 23    | 3    |
| 180° | 26    | 26    | 26    | 26    | 26    |      |



TEST NUMBER: P830688

CATALOG NUMBER: OHBL-60SE-MCL-UNV-L935-CD

**CANDELA DISTRIBUTION (FULL):**

|        | 0°      | 22.5°   | 45°     | 67.5°   | 90°     |
|--------|---------|---------|---------|---------|---------|
| 0°     | 17624.9 | 17624.9 | 17624.9 | 17624.9 | 17624.9 |
| 2.5°   | 17553.6 | 17627.5 | 17535.7 | 17635.1 | 17660.6 |
| 5°     | 17510.3 | 17571.4 | 17449.1 | 17502.6 | 17479.7 |
| 7.5°   | 17431.3 | 17451.6 | 17306.4 | 17349.7 | 17303.8 |
| 10°    | 17314.0 | 17303.8 | 17133.1 | 17217.2 | 17227.4 |
| 12.5°  | 17140.7 | 17110.2 | 16957.3 | 17084.7 | 17087.2 |
| 15°    | 16942.0 | 16875.7 | 16755.9 | 16903.7 | 16924.1 |
| 17.5°  | 16712.6 | 16626.0 | 16547.0 | 16738.1 | 16707.5 |
| 20°    | 16445.0 | 16343.1 | 16327.8 | 16536.8 | 16460.3 |
| 22.5°  | 16113.7 | 16034.7 | 16070.4 | 16269.2 | 16220.8 |
| 25°    | 15739.1 | 15670.3 | 15779.9 | 15925.1 | 15879.3 |
| 27.5°  | 15344.1 | 15303.3 | 15428.2 | 15540.3 | 15451.1 |
| 30°    | 14910.9 | 14887.9 | 15053.6 | 15145.3 | 15033.2 |
| 32.5°  | 14439.4 | 14447.1 | 14605.1 | 14729.9 | 14625.4 |
| 35°    | 13950.1 | 13983.2 | 14125.9 | 14276.3 | 14220.2 |
| 37.5°  | 13412.4 | 13486.3 | 13629.0 | 13799.7 | 13741.1 |
| 40°    | 12844.1 | 12951.1 | 13109.1 | 13315.5 | 13262.0 |
| 42.5°  | 12229.9 | 12365.0 | 12568.9 | 12798.2 | 12793.1 |
| 45°    | 11577.5 | 11766.1 | 11985.3 | 12291.1 | 12329.3 |
| 47.5°  | 10899.6 | 11111.2 | 11388.9 | 11796.7 | 11855.3 |
| 50°    | 10163.1 | 10428.2 | 10774.8 | 11264.1 | 11299.7 |
| 52.5°  | 9342.5  | 9704.4  | 10163.1 | 10632.1 | 10588.7 |
| 55°    | 8519.4  | 8929.7  | 9538.8  | 9921.0  | 9898.1  |
| 57.5°  | 7698.8  | 8160.1  | 8899.1  | 9171.8  | 9169.3  |
| 60°    | 6781.4  | 7365.0  | 8172.8  | 8379.2  | 8175.4  |
| 62.5°  | 5932.7  | 6559.7  | 7398.1  | 7247.7  | 6549.5  |
| 65°    | 5000.0  | 5782.4  | 6564.8  | 5540.3  | 4523.5  |
| 67.5°  | 4171.8  | 4987.3  | 5576.0  | 3794.6  | 3249.2  |
| 70°    | 3338.4  | 4238.0  | 4347.6  | 2816.0  | 2777.8  |
| 72.5°  | 2599.4  | 3557.6  | 2999.5  | 2410.8  | 2533.1  |
| 75°    | 1967.4  | 2854.2  | 2099.9  | 2148.3  | 2288.5  |
| 77.5°  | 1434.8  | 2191.6  | 1633.5  | 1883.3  | 1998.0  |
| 80°    | 986.2   | 1552.0  | 1332.8  | 1582.6  | 1661.6  |
| 82.5°  | 619.3   | 1024.5  | 1067.8  | 1274.2  | 1355.8  |
| 85°    | 338.9   | 649.8   | 833.3   | 1006.6  | 1055.1  |
| 87.5°  | 140.2   | 392.5   | 637.1   | 777.3   | 818.0   |
| 90°    | 2.5     | 216.6   | 430.7   | 540.3   | 565.8   |
| 92.5°  | 2.5     | 165.6   | 351.7   | 435.8   | 453.6   |
| 95°    | 2.5     | 135.1   | 295.6   | 359.3   | 369.5   |
| 97.5°  | 5.1     | 107.0   | 247.2   | 298.2   | 308.4   |
| 100°   | 7.6     | 89.2    | 206.4   | 249.7   | 257.4   |
| 102.5° | 10.2    | 71.4    | 173.3   | 209.0   | 216.6   |
| 105°   | 10.2    | 58.6    | 145.3   | 175.8   | 183.5   |



TEST NUMBER: P830688

CATALOG NUMBER: OHBL-60SE-MCL-UNV-L935-CD

**CANDELA DISTRIBUTION (continued):**

|        | 0°   | 22.5° | 45°  | 67.5° | 90°   |
|--------|------|-------|------|-------|-------|
| 112.5° | 17.8 | 35.7  | 86.6 | 109.6 | 114.7 |
| 115°   | 20.4 | 30.6  | 73.9 | 94.3  | 99.4  |
| 117.5° | 20.4 | 25.5  | 63.7 | 79.0  | 84.1  |
| 120°   | 20.4 | 22.9  | 56.1 | 68.8  | 71.4  |
| 122.5° | 20.4 | 20.4  | 48.4 | 61.2  | 63.7  |
| 125°   | 17.8 | 20.4  | 45.9 | 53.5  | 56.1  |
| 127.5° | 20.4 | 20.4  | 40.8 | 48.4  | 51.0  |
| 130°   | 20.4 | 22.9  | 35.7 | 45.9  | 45.9  |
| 132.5° | 22.9 | 25.5  | 33.1 | 43.3  | 43.3  |
| 135°   | 22.9 | 25.5  | 28.0 | 40.8  | 43.3  |
| 137.5° | 25.5 | 25.5  | 25.5 | 38.2  | 40.8  |
| 140°   | 25.5 | 25.5  | 22.9 | 33.1  | 35.7  |
| 142.5° | 22.9 | 25.5  | 22.9 | 30.6  | 33.1  |
| 145°   | 22.9 | 25.5  | 25.5 | 28.0  | 30.6  |
| 147.5° | 25.5 | 25.5  | 25.5 | 25.5  | 28.0  |
| 150°   | 25.5 | 25.5  | 25.5 | 25.5  | 25.5  |
| 152.5° | 25.5 | 25.5  | 25.5 | 25.5  | 25.5  |
| 155°   | 25.5 | 28.0  | 28.0 | 28.0  | 25.5  |
| 157.5° | 25.5 | 28.0  | 28.0 | 28.0  | 28.0  |
| 160°   | 25.5 | 28.0  | 28.0 | 28.0  | 28.0  |
| 162.5° | 28.0 | 28.0  | 28.0 | 28.0  | 28.0  |
| 165°   | 28.0 | 28.0  | 28.0 | 28.0  | 28.0  |
| 167.5° | 28.0 | 30.6  | 28.0 | 28.0  | 28.0  |
| 170°   | 28.0 | 28.0  | 28.0 | 25.5  | 25.5  |
| 172.5° | 28.0 | 28.0  | 28.0 | 25.5  | 25.5  |
| 175°   | 28.0 | 28.0  | 25.5 | 22.9  | 22.9  |
| 177.5° | 30.6 | 28.0  | 25.5 | 22.9  | 20.4  |
| 180°   | 25.5 | 25.5  | 25.5 | 25.5  | 25.5  |



Report Generated By 670246072 / DESKTOP-50001EG





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







|        |      |      |       |       |       |
|--------|------|------|-------|-------|-------|
| 107.5° | 12.7 | 48.4 | 124.9 | 150.4 | 155.5 |
| 110°   | 15.3 | 40.8 | 104.5 | 127.4 | 132.5 |



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

Report Prepared for

Cooper Lighting Solutions

METALUX

Report Number: SP1-2307-100-7

Test Date: 07/28/2023

Luminaire Tested: OHB-15SE-N-UNV-L935-CD

Data in this report applies to families of products including OHB-15SE-N-UNV-L935-CD.

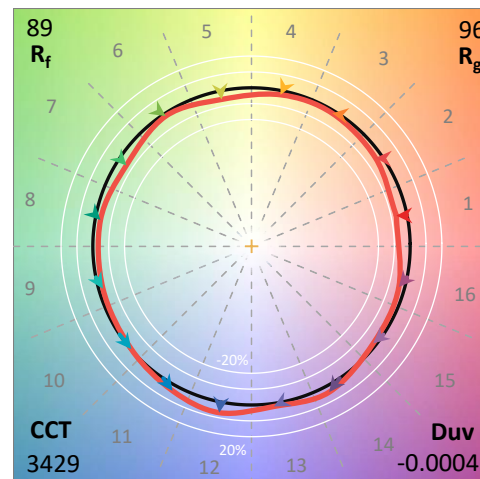
### Test Information

Test Method: LM-79-2019  
 Report Number: SP1-2307-100-7  
 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-L935-CD**  
 Description: 15000 LUMEN OHB SE LED LUMINAIRE WITH 90CRI, 3500K LEDS AND NARROW LENS

LENS

### Spectral Parameters

|                           |         |           |      |      |      |
|---------------------------|---------|-----------|------|------|------|
| CCT (K):                  | 3429    | CRI (Ra): | 90.9 |      |      |
| CIE u':                   | 0.2376  | R1:       | 91.1 | R9:  | 50.7 |
| CIE v':                   | 0.5121  | R2:       | 96.7 | R10: | 90.8 |
| Duv:                      | -0.0004 | R3:       | 97.7 | R11: | 88.9 |
| CIE x:                    | 0.4088  | R4:       | 88.8 | R12: | 74.6 |
| CIE y:                    | 0.3916  | R5:       | 90.3 | R13: | 92.9 |
| CIE z:                    | 0.1997  | R6:       | 94.5 | R14: | 99.5 |
| Peak Wavelength (nm):     | 609     | R7:       | 89.8 |      |      |
| Dominant Wavelength (nm): | 581     | R8:       | 78.2 |      |      |
| Purity:                   | 40.4    |           |      |      |      |
| Rf:                       | 88.9    |           |      |      |      |
| Rg:                       | 96.3    |           |      |      |      |



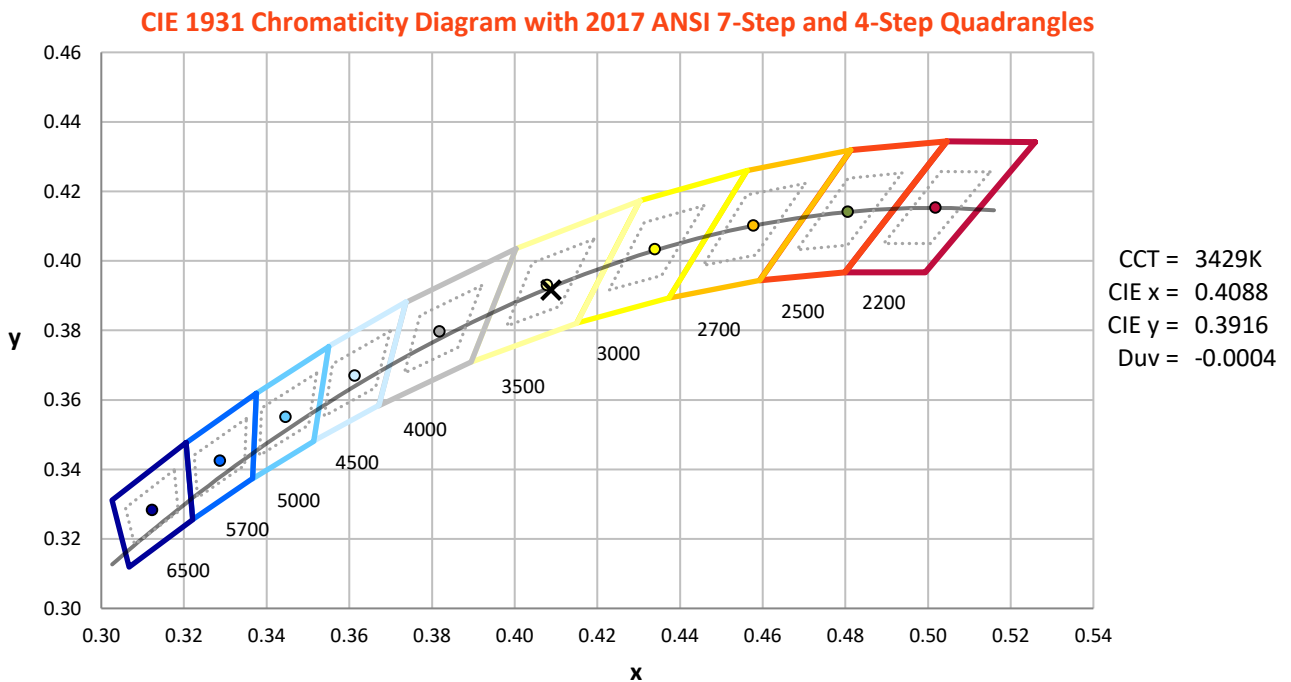
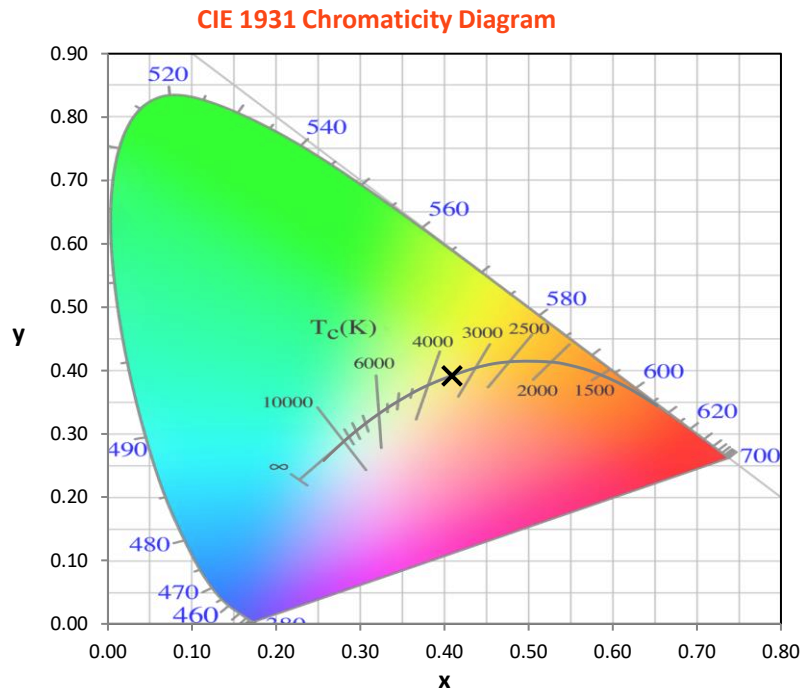
### Test Conditions

Stabilization Time: 23M  
 Operation Time: 12H  
 Room Temperature (°C) / RH%: 25.7/55%  
 Sphere Temperature (°C): 25.2

REPORT NUMBER: SP1-2307-100-7

| 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: SP1-2307-100-7



Point lies inside the ANSI 3500K 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       | 5498             | NR               | 490       | 81900            | NR               | 620       | 217907           | NR               | 750       | 17550            | NR               | 880       | 6189             | NR               |
| 365       | 4903             | NR               | 495       | 90120            | NR               | 625       | 213734           | NR               | 755       | 15662            | NR               | 885       | 6187             | NR               |
| 370       | 4767             | NR               | 500       | 98453            | NR               | 630       | 206250           | NR               | 760       | 13792            | NR               | 890       | 3830             | NR               |
| 375       | 5225             | NR               | 505       | 109244           | NR               | 635       | 198796           | NR               | 765       | 12765            | NR               | 895       | 4688             | NR               |
| 380       | 5499             | NR               | 510       | 117784           | NR               | 640       | 189406           | NR               | 770       | 11372            | NR               | 900       | 4680             | NR               |
| 385       | 5081             | NR               | 515       | 125000           | NR               | 645       | 180677           | NR               | 775       | 9965             | NR               | 905       | 4599             | NR               |
| 390       | 4739             | NR               | 520       | 131786           | NR               | 650       | 168402           | NR               | 780       | 9154             | NR               | 910       | 4495             | NR               |
| 395       | 4255             | NR               | 525       | 136796           | NR               | 655       | 157693           | NR               | 785       | 8847             | NR               | 915       | 3983             | NR               |
| 400       | 3864             | NR               | 530       | 142357           | NR               | 660       | 145357           | NR               | 790       | 7937             | NR               | 920       | 4675             | NR               |
| 405       | 3583             | NR               | 535       | 147243           | NR               | 665       | 132743           | NR               | 795       | 6956             | NR               | 925       | 4952             | NR               |
| 410       | 3994             | NR               | 540       | 152273           | NR               | 670       | 120757           | NR               | 800       | 6970             | NR               | 930       | 6097             | NR               |
| 415       | 5055             | NR               | 545       | 157222           | NR               | 675       | 108421           | NR               | 805       | 6299             | NR               | 935       | 5657             | NR               |
| 420       | 7131             | NR               | 550       | 161271           | NR               | 680       | 97325            | NR               | 810       | 6023             | NR               | 940       | 4574             | NR               |
| 425       | 11311            | NR               | 555       | 167038           | NR               | 685       | 86839            | NR               | 815       | 6343             | NR               | 945       | 5252             | NR               |
| 430       | 17754            | NR               | 560       | 173115           | NR               | 690       | 76248            | NR               | 820       | 6462             | NR               | 950       | 5635             | NR               |
| 435       | 28634            | NR               | 565       | 178502           | NR               | 695       | 67406            | NR               | 825       | 5476             | NR               | 955       | 4501             | NR               |
| 440       | 46392            | NR               | 570       | 184331           | NR               | 700       | 60039            | NR               | 830       | 5786             | NR               | 960       | 2938             | NR               |
| 445       | 78344            | NR               | 575       | 189666           | NR               | 705       | 53650            | NR               | 835       | 5884             | NR               | 965       | 5544             | NR               |
| 450       | 131219           | NR               | 580       | 196488           | NR               | 710       | 47273            | NR               | 840       | 4862             | NR               | 970       | 5050             | NR               |
| 455       | 170311           | NR               | 585       | 202769           | NR               | 715       | 41664            | NR               | 845       | 5651             | NR               | 975       | 5575             | NR               |
| 460       | 154269           | NR               | 590       | 207213           | NR               | 720       | 37083            | NR               | 850       | 5178             | NR               | 980       | 2973             | NR               |
| 465       | 126622           | NR               | 595       | 213472           | NR               | 725       | 32494            | NR               | 855       | 5510             | NR               | 985       | 4912             | NR               |
| 470       | 109065           | NR               | 600       | 218473           | NR               | 730       | 28665            | NR               | 860       | 5438             | NR               | 990       | 5454             | NR               |
| 475       | 91762            | NR               | 605       | 220737           | NR               | 735       | 25540            | NR               | 865       | 5848             | NR               | 995       | 6068             | NR               |
| 480       | 78213            | NR               | 610       | 221090           | NR               | 740       | 22878            | NR               | 870       | 4969             | NR               | 1000      | 9406             | NR               |
| 485       | 77035            | NR               | 615       | 220059           | NR               | 745       | 20304            | NR               | 875       | 5438             | NR               |           |                  |                  |

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Scotopic Flux vs. Wavelength



Scotopic Lumens: 19629.6

S/P: 1.6

| 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       | 5498             | NR               | 490       | 81900            | NR               | 620       | 217907           | NR               | 750       | 17550            | NR               | 880       | 6189             | NR               |
| 365       | 4903             | NR               | 495       | 90120            | NR               | 625       | 213734           | NR               | 755       | 15662            | NR               | 885       | 6187             | NR               |
| 370       | 4767             | NR               | 500       | 98453            | NR               | 630       | 206250           | NR               | 760       | 13792            | NR               | 890       | 3830             | NR               |
| 375       | 5225             | NR               | 505       | 109244           | NR               | 635       | 198796           | NR               | 765       | 12765            | NR               | 895       | 4688             | NR               |
| 380       | 5499             | NR               | 510       | 117784           | NR               | 640       | 189406           | NR               | 770       | 11372            | NR               | 900       | 4680             | NR               |
| 385       | 5081             | NR               | 515       | 125000           | NR               | 645       | 180677           | NR               | 775       | 9965             | NR               | 905       | 4599             | NR               |
| 390       | 4739             | NR               | 520       | 131786           | NR               | 650       | 168402           | NR               | 780       | 9154             | NR               | 910       | 4495             | NR               |
| 395       | 4255             | NR               | 525       | 136796           | NR               | 655       | 157693           | NR               | 785       | 8847             | NR               | 915       | 3983             | NR               |
| 400       | 3864             | NR               | 530       | 142357           | NR               | 660       | 145357           | NR               | 790       | 7937             | NR               | 920       | 4675             | NR               |
| 405       | 3583             | NR               | 535       | 147243           | NR               | 665       | 132743           | NR               | 795       | 6956             | NR               | 925       | 4952             | NR               |
| 410       | 3994             | NR               | 540       | 152273           | NR               | 670       | 120757           | NR               | 800       | 6970             | NR               | 930       | 6097             | NR               |
| 415       | 5055             | NR               | 545       | 157222           | NR               | 675       | 108421           | NR               | 805       | 6299             | NR               | 935       | 5657             | NR               |
| 420       | 7131             | NR               | 550       | 161271           | NR               | 680       | 97325            | NR               | 810       | 6023             | NR               | 940       | 4574             | NR               |
| 425       | 11311            | NR               | 555       | 167038           | NR               | 685       | 86839            | NR               | 815       | 6343             | NR               | 945       | 5252             | NR               |
| 430       | 17754            | NR               | 560       | 173115           | NR               | 690       | 76248            | NR               | 820       | 6462             | NR               | 950       | 5635             | NR               |
| 435       | 28634            | NR               | 565       | 178502           | NR               | 695       | 67406            | NR               | 825       | 5476             | NR               | 955       | 4501             | NR               |
| 440       | 46392            | NR               | 570       | 184331           | NR               | 700       | 60039            | NR               | 830       | 5786             | NR               | 960       | 2938             | NR               |
| 445       | 78344            | NR               | 575       | 189666           | NR               | 705       | 53650            | NR               | 835       | 5884             | NR               | 965       | 5544             | NR               |
| 450       | 131219           | NR               | 580       | 196488           | NR               | 710       | 47273            | NR               | 840       | 4862             | NR               | 970       | 5050             | NR               |
| 455       | 170311           | NR               | 585       | 202769           | NR               | 715       | 41664            | NR               | 845       | 5651             | NR               | 975       | 5575             | NR               |
| 460       | 154269           | NR               | 590       | 207213           | NR               | 720       | 37083            | NR               | 850       | 5178             | NR               | 980       | 2973             | NR               |
| 465       | 126622           | NR               | 595       | 213472           | NR               | 725       | 32494            | NR               | 855       | 5510             | NR               | 985       | 4912             | NR               |
| 470       | 109065           | NR               | 600       | 218473           | NR               | 730       | 28665            | NR               | 860       | 5438             | NR               | 990       | 5454             | NR               |
| 475       | 91762            | NR               | 605       | 220737           | NR               | 735       | 25540            | NR               | 865       | 5848             | NR               | 995       | 6068             | NR               |
| 480       | 78213            | NR               | 610       | 221090           | NR               | 740       | 22878            | NR               | 870       | 4969             | NR               | 1000      | 9406             | NR               |
| 485       | 77035            | NR               | 615       | 220059           | NR               | 745       | 20304            | NR               | 875       | 5438             | NR               |           |                  |                  |

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**Melanopic Flux vs. Wavelength**



**Melanopic Lumens: 7912.5**

**M/P: 0.65**

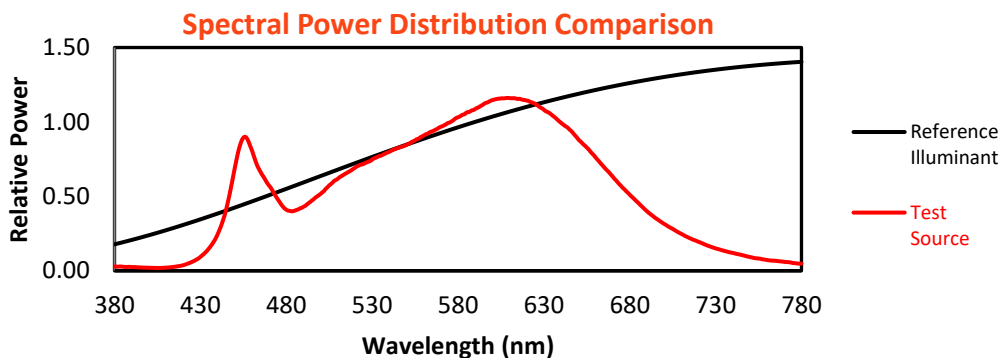
| λ<br>(nm) | Power<br>(μW/nm) | Lumens<br>(φ/nm) | λ<br>(nm) | Power<br>(μW/nm) | Lumens<br>(φ/nm) | λ<br>(nm) | Power<br>(μW/nm) | Lumens<br>(φ/nm) | λ<br>(nm) | Power<br>(μW/nm) | Lumens<br>(φ/nm) | λ<br>(nm) | Power<br>(μW/nm) | Lumens<br>(φ/nm) |
|-----------|------------------|------------------|-----------|------------------|------------------|-----------|------------------|------------------|-----------|------------------|------------------|-----------|------------------|------------------|
| 360       | 5498             | NR               | 490       | 81900            | NR               | 620       | 217907           | NR               | 750       | 17550            | NR               | 880       | 6189             | NR               |
| 365       | 4903             | NR               | 495       | 90120            | NR               | 625       | 213734           | NR               | 755       | 15662            | NR               | 885       | 6187             | NR               |
| 370       | 4767             | NR               | 500       | 98453            | NR               | 630       | 206250           | NR               | 760       | 13792            | NR               | 890       | 3830             | NR               |
| 375       | 5225             | NR               | 505       | 109244           | NR               | 635       | 198796           | NR               | 765       | 12765            | NR               | 895       | 4688             | NR               |
| 380       | 5499             | NR               | 510       | 117784           | NR               | 640       | 189406           | NR               | 770       | 11372            | NR               | 900       | 4680             | NR               |
| 385       | 5081             | NR               | 515       | 125000           | NR               | 645       | 180677           | NR               | 775       | 9965             | NR               | 905       | 4599             | NR               |
| 390       | 4739             | NR               | 520       | 131786           | NR               | 650       | 168402           | NR               | 780       | 9154             | NR               | 910       | 4495             | NR               |
| 395       | 4255             | NR               | 525       | 136796           | NR               | 655       | 157693           | NR               | 785       | 8847             | NR               | 915       | 3983             | NR               |
| 400       | 3864             | NR               | 530       | 142357           | NR               | 660       | 145357           | NR               | 790       | 7937             | NR               | 920       | 4675             | NR               |
| 405       | 3583             | NR               | 535       | 147243           | NR               | 665       | 132743           | NR               | 795       | 6956             | NR               | 925       | 4952             | NR               |
| 410       | 3994             | NR               | 540       | 152273           | NR               | 670       | 120757           | NR               | 800       | 6970             | NR               | 930       | 6097             | NR               |
| 415       | 5055             | NR               | 545       | 157222           | NR               | 675       | 108421           | NR               | 805       | 6299             | NR               | 935       | 5657             | NR               |
| 420       | 7131             | NR               | 550       | 161271           | NR               | 680       | 97325            | NR               | 810       | 6023             | NR               | 940       | 4574             | NR               |
| 425       | 11311            | NR               | 555       | 167038           | NR               | 685       | 86839            | NR               | 815       | 6343             | NR               | 945       | 5252             | NR               |
| 430       | 17754            | NR               | 560       | 173115           | NR               | 690       | 76248            | NR               | 820       | 6462             | NR               | 950       | 5635             | NR               |
| 435       | 28634            | NR               | 565       | 178502           | NR               | 695       | 67406            | NR               | 825       | 5476             | NR               | 955       | 4501             | NR               |
| 440       | 46392            | NR               | 570       | 184331           | NR               | 700       | 60039            | NR               | 830       | 5786             | NR               | 960       | 2938             | NR               |
| 445       | 78344            | NR               | 575       | 189666           | NR               | 705       | 53650            | NR               | 835       | 5884             | NR               | 965       | 5544             | NR               |
| 450       | 131219           | NR               | 580       | 196488           | NR               | 710       | 47273            | NR               | 840       | 4862             | NR               | 970       | 5050             | NR               |
| 455       | 170311           | NR               | 585       | 202769           | NR               | 715       | 41664            | NR               | 845       | 5651             | NR               | 975       | 5575             | NR               |
| 460       | 154269           | NR               | 590       | 207213           | NR               | 720       | 37083            | NR               | 850       | 5178             | NR               | 980       | 2973             | NR               |
| 465       | 126622           | NR               | 595       | 213472           | NR               | 725       | 32494            | NR               | 855       | 5510             | NR               | 985       | 4912             | NR               |
| 470       | 109065           | NR               | 600       | 218473           | NR               | 730       | 28665            | NR               | 860       | 5438             | NR               | 990       | 5454             | NR               |
| 475       | 91762            | NR               | 605       | 220737           | NR               | 735       | 25540            | NR               | 865       | 5848             | NR               | 995       | 6068             | NR               |
| 480       | 78213            | NR               | 610       | 221090           | NR               | 740       | 22878            | NR               | 870       | 4969             | NR               | 1000      | 9406             | NR               |
| 485       | 77035            | NR               | 615       | 220059           | NR               | 745       | 20304            | NR               | 875       | 5438             | NR               |           |                  |                  |

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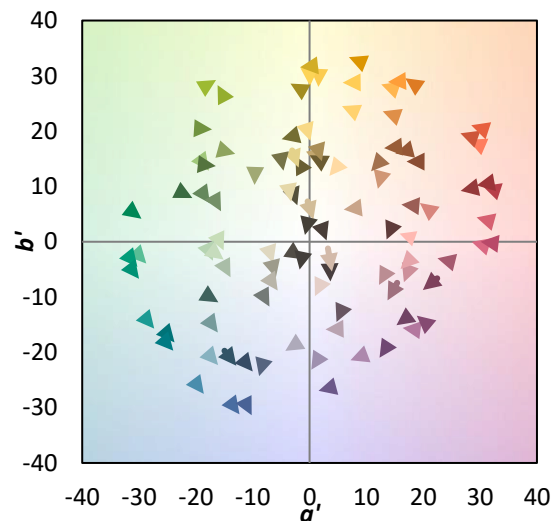
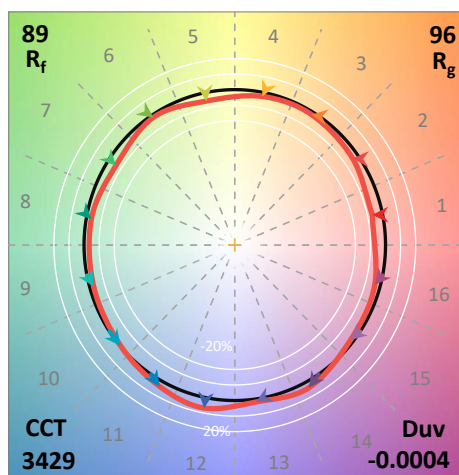
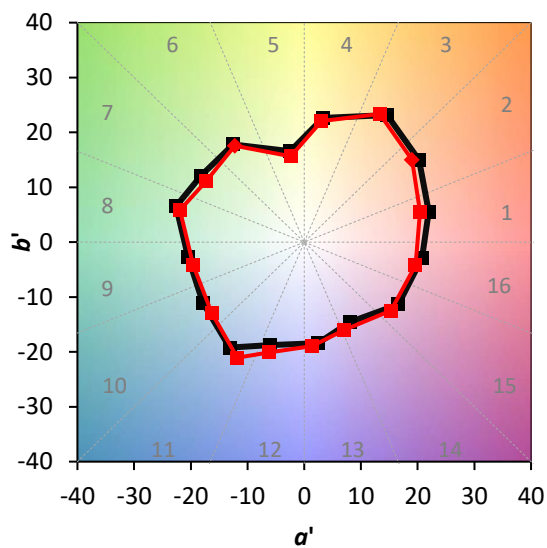
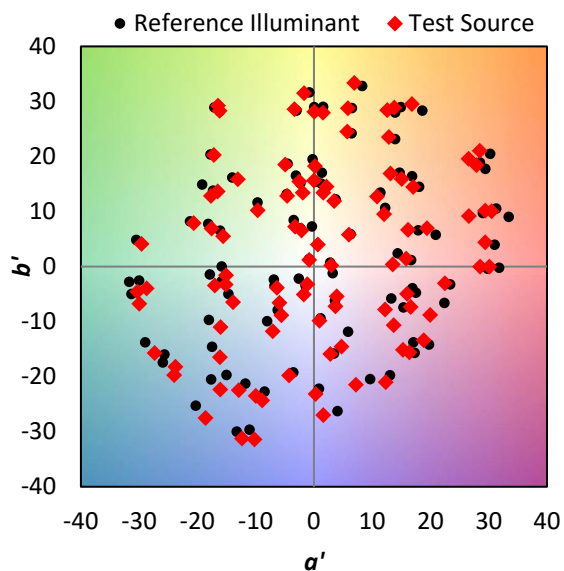
**TM-30-18**

**Summary**

$R_f = 88.9$   
 $R_g = 96.3$   
 CIE  $R_a = 90.9$   
 $R_9 = 50.7$



**Color Vector Graphics**

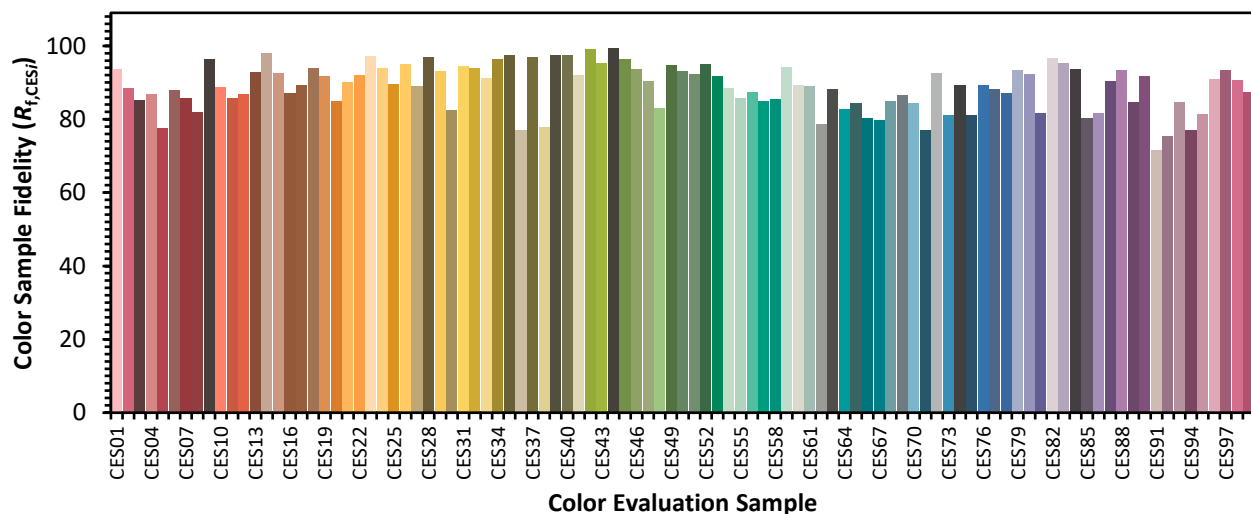


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**Individual Sample Fidelity Index ( $R_{f,i}$ )**

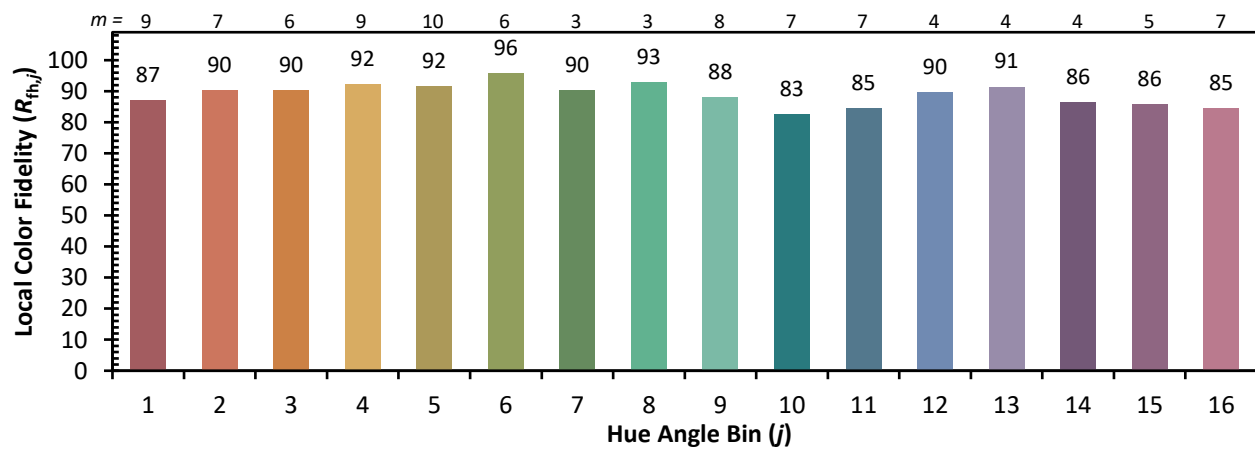
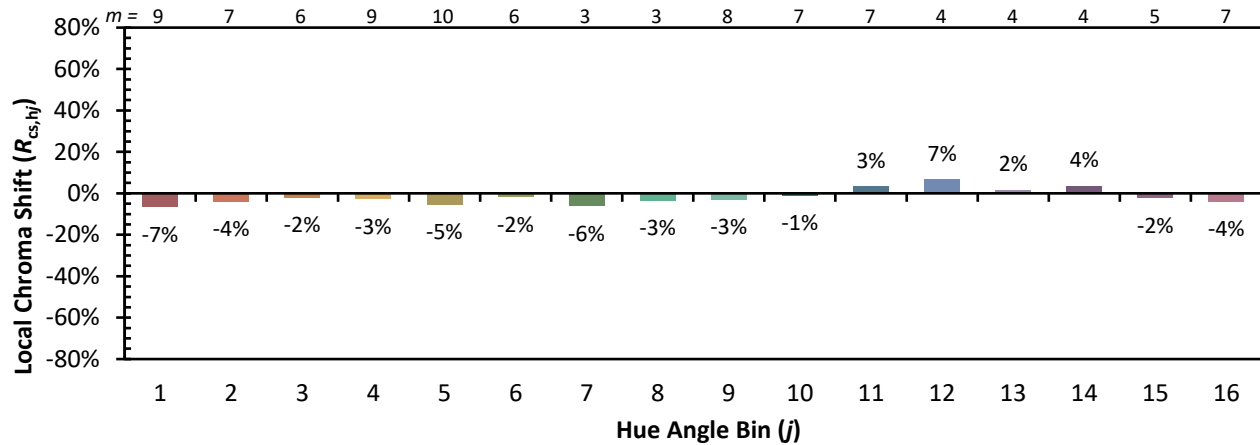
|            |            |            |            |
|------------|------------|------------|------------|
| CES01 = 86 | CES26 = 95 | CES51 = 92 | CES76 = 89 |
| CES02 = 62 | CES27 = 89 | CES52 = 95 | CES77 = 88 |
| CES03 = 31 | CES28 = 97 | CES53 = 92 | CES78 = 87 |
| CES04 = 70 | CES29 = 93 | CES54 = 89 | CES79 = 93 |
| CES05 = 49 | CES30 = 82 | CES55 = 86 | CES80 = 92 |
| CES06 = 51 | CES31 = 95 | CES56 = 87 | CES81 = 82 |
| CES07 = 42 | CES32 = 94 | CES57 = 85 | CES82 = 97 |
| CES08 = 41 | CES33 = 91 | CES58 = 85 | CES83 = 95 |
| CES09 = 29 | CES34 = 96 | CES59 = 94 | CES84 = 94 |
| CES10 = 75 | CES35 = 97 | CES60 = 89 | CES85 = 80 |
| CES11 = 58 | CES36 = 77 | CES61 = 89 | CES86 = 82 |
| CES12 = 64 | CES37 = 97 | CES62 = 79 | CES87 = 90 |
| CES13 = 43 | CES38 = 78 | CES63 = 88 | CES88 = 93 |
| CES14 = 74 | CES39 = 97 | CES64 = 83 | CES89 = 85 |
| CES15 = 71 | CES40 = 98 | CES65 = 84 | CES90 = 92 |
| CES16 = 47 | CES41 = 92 | CES66 = 80 | CES91 = 72 |
| CES17 = 50 | CES42 = 99 | CES67 = 80 | CES92 = 75 |
| CES18 = 56 | CES43 = 95 | CES68 = 85 | CES93 = 85 |
| CES19 = 71 | CES44 = 99 | CES69 = 86 | CES94 = 77 |
| CES20 = 66 | CES45 = 96 | CES70 = 84 | CES95 = 81 |
| CES21 = 86 | CES46 = 94 | CES71 = 77 | CES96 = 91 |
| CES22 = 78 | CES47 = 91 | CES72 = 93 | CES97 = 93 |
| CES23 = 91 | CES48 = 83 | CES73 = 81 | CES98 = 91 |
| CES24 = 90 | CES49 = 95 | CES74 = 89 | CES99 = 87 |
| CES25 = 71 | CES50 = 93 | CES75 = 81 |            |



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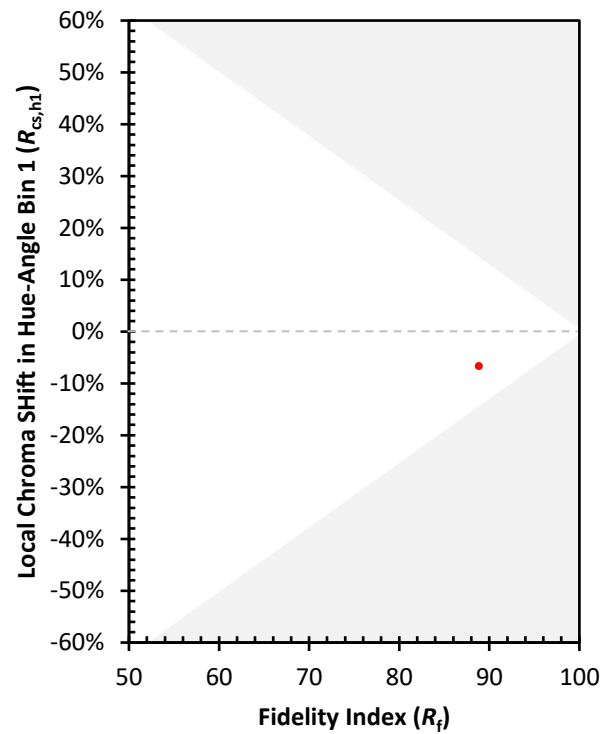
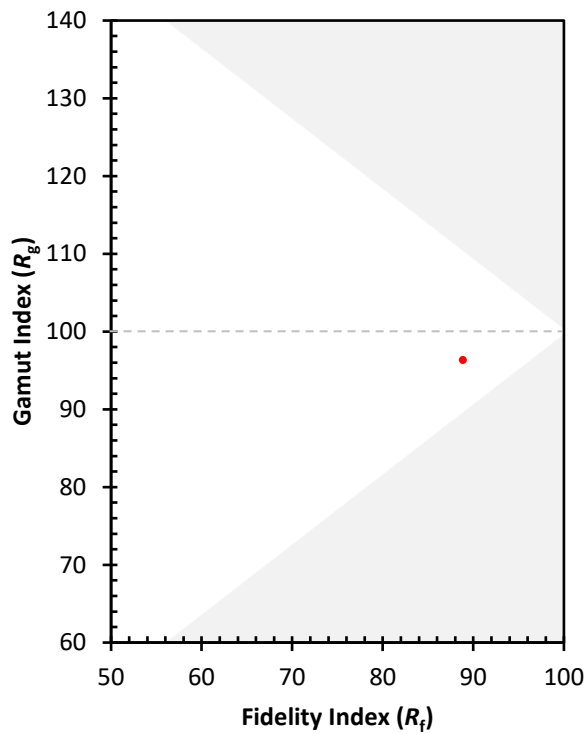
**Color Rendition by Hue-Angle Bin**



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**Measure Comparisons**



(END OF REPORT)