

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: P860255

Luminaire Tested: **SPHB-60SE-W-L850-CD**

Issue Date: 7/11/2024

This test was performed under the Supervised Manufacturer's Testing Program. The results of this test have not been influenced by sources from within Cooper Lighting Solutions or from external interests.



**Test Information**

Test Method: LM-79-08  
Report Number: P860255  
TEST IS SCALED FROM IESNA LM-79-08 TEST DATA (G3-2404-343-6)  
Test Lab: INNOVATION CENTER  
Issue Date: 7/11/2024  
Manufacturer: COOPER LIGHTING SOLUTIONS (FORMERLY EATON)  
Product Line: METALUX  
Catalog Number: SPHB-60SE-W-L850-CD  
Description: 60000 Lumen Standard Efficacy Select Pro High Bay with Wide Lens  
and, 5000K 80CRI LEDs  
Light Source: -  
Ballast/Driver: -

Luminaire Equipment: Sample No.   Condition   Description

**Summary**

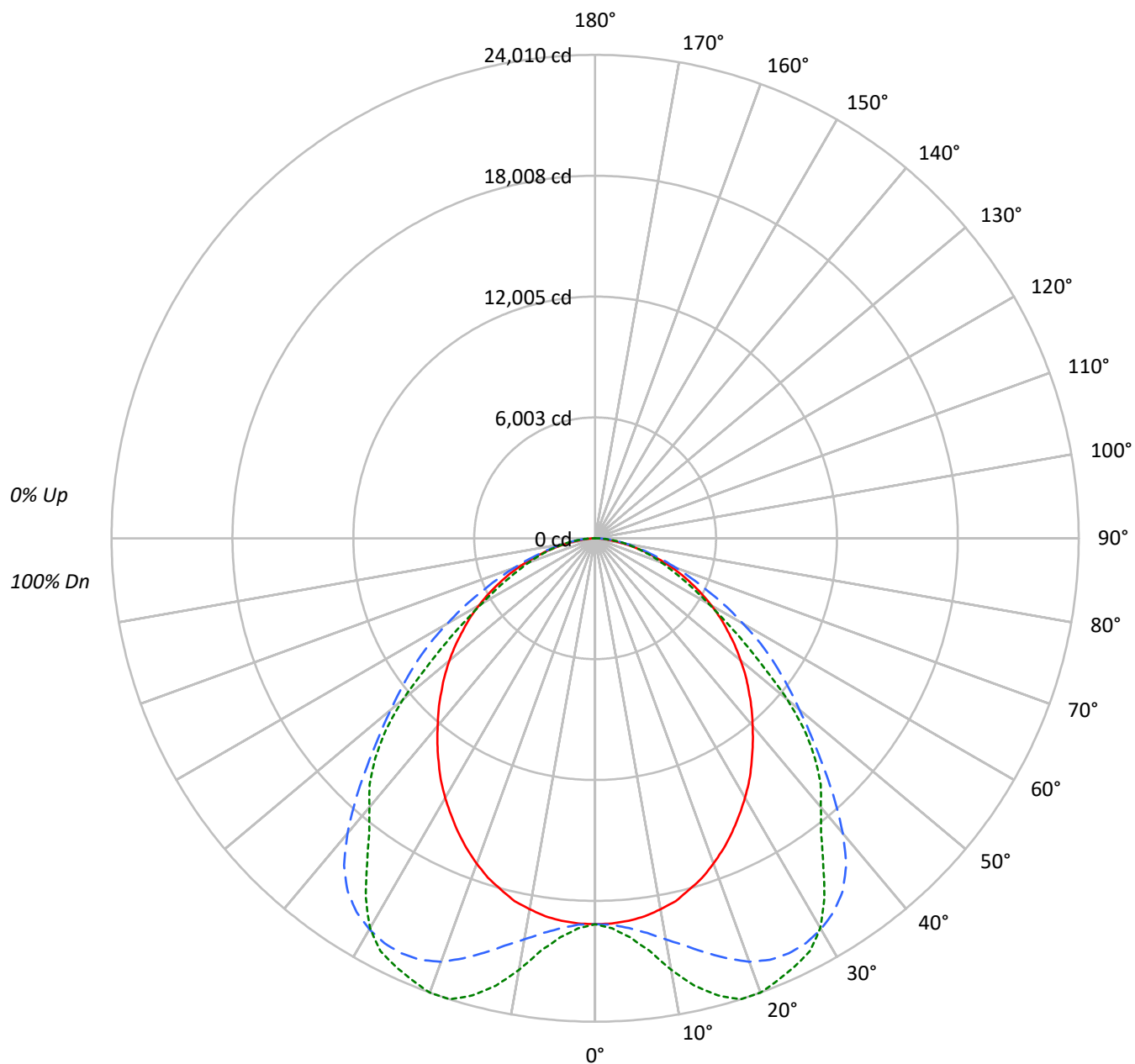
Lumens per Lamp: N/A  
Luminaire Lumens: 60306.0 lumens  
Efficiency: N/A  
Efficacy: 160.4 lumens/watt  
Spacing Criteria (0/90/45): 1.16 / 1.5 / 1.51  
Luminous Opening: Rectangular (W 1' x L: 3.38' x H: 0')  
CIE Type: Direct

Input Watts (W): 376  
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: P860255

CATALOG NUMBER: SPHB-60SE-W-L850-CD

### Luminous Intensity Polar Plot





TEST NUMBER: P860255

CATALOG NUMBER: SPHB-60SE-W-L850-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   | 119 | 119 | 119 | 119 | 116 | 116 | 116 | 116 | 111 | 111 | 111 | 106 | 106 | 106 | 102 | 102 | 102 | 100 |    |    |
| 1   | 110 | 105 | 101 | 98  | 107 | 103 | 99  | 96  | 99  | 96  | 93  | 95  | 92  | 90  | 91  | 89  | 87  | 85  |    |    |
| 2   | 100 | 92  | 86  | 81  | 98  | 91  | 85  | 80  | 87  | 82  | 78  | 84  | 80  | 76  | 81  | 77  | 74  | 72  |    |    |
| 3   | 92  | 82  | 74  | 68  | 89  | 80  | 73  | 67  | 77  | 71  | 66  | 74  | 69  | 65  | 72  | 67  | 64  | 62  |    |    |
| 4   | 84  | 73  | 64  | 58  | 82  | 71  | 63  | 57  | 69  | 62  | 57  | 66  | 61  | 56  | 64  | 59  | 55  | 53  |    |    |
| 5   | 77  | 65  | 56  | 50  | 75  | 64  | 56  | 50  | 62  | 55  | 49  | 60  | 54  | 49  | 58  | 52  | 48  | 46  |    |    |
| 6   | 72  | 59  | 50  | 44  | 70  | 58  | 49  | 43  | 56  | 49  | 43  | 54  | 48  | 43  | 53  | 47  | 42  | 40  |    |    |
| 7   | 66  | 53  | 45  | 39  | 65  | 52  | 44  | 38  | 51  | 43  | 38  | 49  | 43  | 38  | 48  | 42  | 38  | 36  |    |    |
| 8   | 62  | 48  | 40  | 34  | 60  | 48  | 40  | 34  | 46  | 39  | 34  | 45  | 39  | 34  | 44  | 38  | 34  | 32  |    |    |
| 9   | 58  | 44  | 36  | 31  | 56  | 44  | 36  | 31  | 43  | 36  | 31  | 42  | 35  | 30  | 41  | 35  | 30  | 29  |    |    |
| 10  | 54  | 41  | 33  | 28  | 53  | 40  | 33  | 28  | 39  | 33  | 28  | 39  | 32  | 28  | 38  | 32  | 28  | 26  |    |    |

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

|     | 0°    | 45°   | 90°   |
|-----|-------|-------|-------|
| 0°  | 61036 | 61036 | 61036 |
| 5°  | 60970 | 62121 | 63593 |
| 10° | 60488 | 65399 | 70356 |
| 15° | 59543 | 70268 | 77498 |
| 20° | 58254 | 75856 | 81369 |
| 25° | 56573 | 79949 | 82436 |
| 30° | 54731 | 82450 | 82212 |
| 35° | 52677 | 83279 | 76713 |
| 40° | 50555 | 79518 | 72456 |
| 45° | 48643 | 72078 | 69517 |
| 50° | 46747 | 65539 | 61628 |
| 55° | 44609 | 60553 | 50150 |
| 60° | 42402 | 53985 | 41302 |
| 65° | 39482 | 46388 | 35813 |
| 70° | 35920 | 39605 | 32390 |
| 75° | 30847 | 33238 | 29696 |
| 80° | 24111 | 28510 | 27542 |
| 85° | 16304 | 24193 | 22705 |



TEST NUMBER: P860255

CATALOG NUMBER: SPHB-60SE-W-L850-CD

**ZONAL LUMENS:**

| Zone      | Lumens  | % Fixture |
|-----------|---------|-----------|
| 0°-10°    | 1881.8  | 3.1       |
| 10°-20°   | 5966.9  | 9.9       |
| 20°-30°   | 9765.2  | 16.2      |
| 30°-40°   | 11912.9 | 19.8      |
| 40°-50°   | 11798.5 | 19.6      |
| 50°-60°   | 9434.9  | 15.6      |
| 60°-70°   | 5885.8  | 9.8       |
| 70°-80°   | 2883.8  | 4.8       |
| 80°-90°   | 756.4   | 1.3       |
| 90°-100°  | 19.9    | 0.0       |
| 100°-110° | 0.0     | 0.0       |
| 110°-120° | 0.0     | 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       |
| 0°-30°    | 17614.0 | 29.2      |
| 0°-40°    | 29526.8 | 49.0      |
| 0°-60°    | 50760.2 | 84.2      |
| 0°-90°    | 60286.1 | 100.0     |
| 90°-120°  | 19.9    | 0.0       |
| 90°-150°  | 19.9    | 0.0       |
| 90°-180°  | 20.0    | 0.0       |
| 0°-180°   | 60306.0 | 100.0     |

**CANDELA DISTRIBUTION:**

|      | 0°    | 22.5° | 45°   | 67.5° | 90°   | Flux |
|------|-------|-------|-------|-------|-------|------|
| 0°   | 19166 | 19166 | 19166 | 19166 | 19166 |      |
| 5°   | 19073 | 19156 | 19432 | 19771 | 19893 | ###  |
| 15°  | 18060 | 19111 | 21313 | 23010 | 23506 | 5091 |
| 25°  | 16100 | 18826 | 22753 | 23412 | 23460 | 7409 |
| 35°  | 13550 | 18106 | 21421 | 20277 | 19732 | 8476 |
| 45°  | 10801 | 16779 | 16004 | 15467 | 15436 | 8342 |
| 55°  | 8034  | 12883 | 10906 | 9853  | 9032  | 7198 |
| 65°  | 5240  | 7228  | 6156  | 5105  | 4753  | 5195 |
| 75°  | 2507  | 3071  | 2701  | 2473  | 2414  | 2661 |
| 85°  | 446   | 633   | 662   | 629   | 621   | 553  |
| 90°  | 2     | 65    | 118   | 149   | 154   | 26   |
| 95°  | 2     | 10    | 10    | 7     | 5     | 1    |
| 105° | 0     | 0     | 0     | 0     | 0     | 0    |
| 115° | 0     | 0     | 0     | 0     | 0     | 0    |
| 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     |      |



TEST NUMBER: P860255

CATALOG NUMBER: SPHB-60SE-W-L850-CD

**CANDELA DISTRIBUTION (FULL):**

|        | 0°      | 22.5°   | 45°     | 67.5°   | 90°     |
|--------|---------|---------|---------|---------|---------|
| 0°     | 19166.1 | 19166.1 | 19166.1 | 19166.1 | 19166.1 |
| 2.5°   | 19147.0 | 19139.8 | 19209.3 | 19336.5 | 19394.1 |
| 5°     | 19072.6 | 19156.5 | 19432.4 | 19770.7 | 19893.1 |
| 7.5°   | 18938.2 | 19163.7 | 19773.1 | 20394.5 | 20658.4 |
| 10°    | 18705.5 | 19168.5 | 20224.1 | 21320.5 | 21757.1 |
| 12.5°  | 18465.6 | 19151.8 | 20725.5 | 22277.7 | 22755.1 |
| 15°    | 18060.2 | 19111.0 | 21313.3 | 23009.5 | 23506.1 |
| 17.5°  | 17683.5 | 19063.0 | 21879.5 | 23630.8 | 24007.5 |
| 20°    | 17189.3 | 18993.4 | 22383.3 | 23820.3 | 24009.9 |
| 22.5°  | 16671.1 | 18938.2 | 22661.6 | 23693.2 | 23750.8 |
| 25°    | 16100.1 | 18825.5 | 22752.8 | 23412.5 | 23460.5 |
| 27.5°  | 15490.8 | 18724.7 | 22666.4 | 23064.6 | 23105.4 |
| 30°    | 14883.8 | 18542.4 | 22421.7 | 22522.4 | 22356.9 |
| 32.5°  | 14248.1 | 18360.1 | 22025.8 | 21572.4 | 21186.2 |
| 35°    | 13549.9 | 18105.8 | 21421.3 | 20276.9 | 19732.3 |
| 37.5°  | 12861.4 | 17861.1 | 20478.4 | 18827.9 | 18417.6 |
| 40°    | 12160.9 | 17558.8 | 19127.8 | 17474.8 | 17429.2 |
| 42.5°  | 11498.7 | 17232.5 | 17599.6 | 16421.6 | 16575.2 |
| 45°    | 10800.6 | 16779.1 | 16004.2 | 15466.8 | 15435.6 |
| 47.5°  | 10138.5 | 16152.9 | 14552.7 | 14411.2 | 14092.1 |
| 50°    | 9435.5  | 15289.3 | 13228.5 | 13094.1 | 12439.2 |
| 52.5°  | 8747.0  | 14188.1 | 12045.7 | 11541.9 | 10587.1 |
| 55°    | 8034.5  | 12883.0 | 10906.2 | 9853.0  | 9032.5  |
| 57.5°  | 7372.3  | 11448.3 | 9747.4  | 8382.3  | 7645.8  |
| 60°    | 6657.4  | 9994.5  | 8475.9  | 7091.6  | 6484.7  |
| 62.5°  | 5956.9  | 8562.3  | 7324.4  | 5992.9  | 5589.8  |
| 65°    | 5239.6  | 7228.4  | 6156.0  | 5105.2  | 4752.6  |
| 67.5°  | 4553.4  | 6074.4  | 5146.0  | 4303.9  | 4068.8  |
| 70°    | 3857.7  | 4927.7  | 4253.5  | 3615.4  | 3478.6  |
| 72.5°  | 3140.4  | 3936.9  | 3440.3  | 3051.6  | 2948.5  |
| 75°    | 2507.0  | 3070.8  | 2701.3  | 2473.4  | 2413.5  |
| 77.5°  | 1866.5  | 2283.9  | 2111.2  | 1976.8  | 1960.0  |
| 80°    | 1314.7  | 1648.2  | 1554.6  | 1528.2  | 1501.8  |
| 82.5°  | 839.7   | 1077.2  | 1106.0  | 1089.2  | 1070.0  |
| 85°    | 446.2   | 633.4   | 662.1   | 628.6   | 621.4   |
| 87.5°  | 179.9   | 275.9   | 297.5   | 328.7   | 338.3   |
| 90°    | 2.4     | 64.8    | 117.6   | 148.7   | 153.5   |
| 92.5°  | 2.4     | 14.4    | 16.8    | 16.8    | 14.4    |
| 95°    | 2.4     | 9.6     | 9.6     | 7.2     | 4.8     |
| 97.5°  | 0.0     | 0.0     | 0.0     | 0.0     | 0.0     |
| 100°   | 0.0     | 0.0     | 0.0     | 0.0     | 0.0     |
| 102.5° | 0.0     | 0.0     | 0.0     | 0.0     | 0.0     |
| 105°   | 0.0     | 0.0     | 0.0     | 0.0     | 0.0     |



TEST NUMBER: P860255

CATALOG NUMBER: SPHB-60SE-W-L850-CD

**CANDELA DISTRIBUTION (continued):**

|        | 0°  | 22.5° | 45° | 67.5° | 90° |
|--------|-----|-------|-----|-------|-----|
| 112.5° | 0.0 | 0.0   | 0.0 | 0.0   | 0.0 |
| 115°   | 0.0 | 0.0   | 0.0 | 0.0   | 0.0 |
| 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° | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 110°   | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |



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

Report Prepared for

Cooper Lighting Solutions

METALUX

Report Number: SP1-2309-187-6

Test Date: 10/10/2023

Luminaire Tested: SPHB-2436SE-M-UNV-L84050-CD-U (36K LUMEN 5000K)

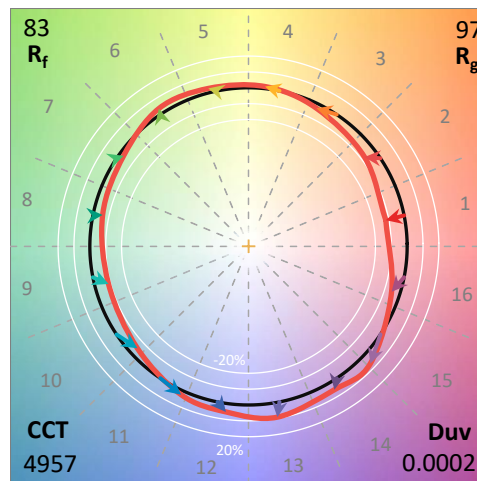
Data in this report applies to families of products including SPHB-2436SE-M-UNV-L84050-CD-U (36K LUMEN 5000K).

### Test Information

Test Method: LM-79-2019  
 Report Number: SP1-2309-187-6  
 Test Lab: COOPER LIGHTING SOLUTIONS  
 Photometer: SP1 - 76IN SPHERE  
 Measurement Geometry:  $4\pi$   
 Issue Date: 10/10/2023  
 Manufacturer: COOPER LIGHTING SOLUTIONS  
 Product Line: METALUX  
 Catalog Number: **SPHB-2436SE-M-UNV-L84050-CD-U (36K LUMEN 5000K)**  
 Description: SPHB SELECT, MEDIUM LENS, 36K LUMENS, 5000K

### Spectral Parameters

|                           |        |           |      |      |      |
|---------------------------|--------|-----------|------|------|------|
| CCT (K):                  | 4957   | CRI (Ra): | 83.0 |      |      |
| CIE u':                   | 0.2117 | R1:       | 81.6 | R9:  | 13.4 |
| CIE v':                   | 0.4855 | R2:       | 88.2 | R10: | 70.8 |
| Duv:                      | 0.0002 | R3:       | 91.8 | R11: | 80.4 |
| CIE x:                    | 0.3463 | R4:       | 82.0 | R12: | 55.2 |
| CIE y:                    | 0.3530 | R5:       | 81.2 | R13: | 83.4 |
| CIE z:                    | 0.3007 | R6:       | 82.2 | R14: | 95.6 |
| Peak Wavelength (nm):     | 452    | R7:       | 88.1 |      |      |
| Dominant Wavelength (nm): | 573    | R8:       | 69.2 |      |      |
| Purity:                   | 10     |           |      |      |      |
| Rf:                       | 83     |           |      |      |      |
| Rg:                       | 96.6   |           |      |      |      |



### Test Conditions

Stabilization Time: 10M  
 Operation Time: 12H  
 Room Temperature (°C) / RH%: 25.8/38%  
 Sphere Temperature (°C): 24.2

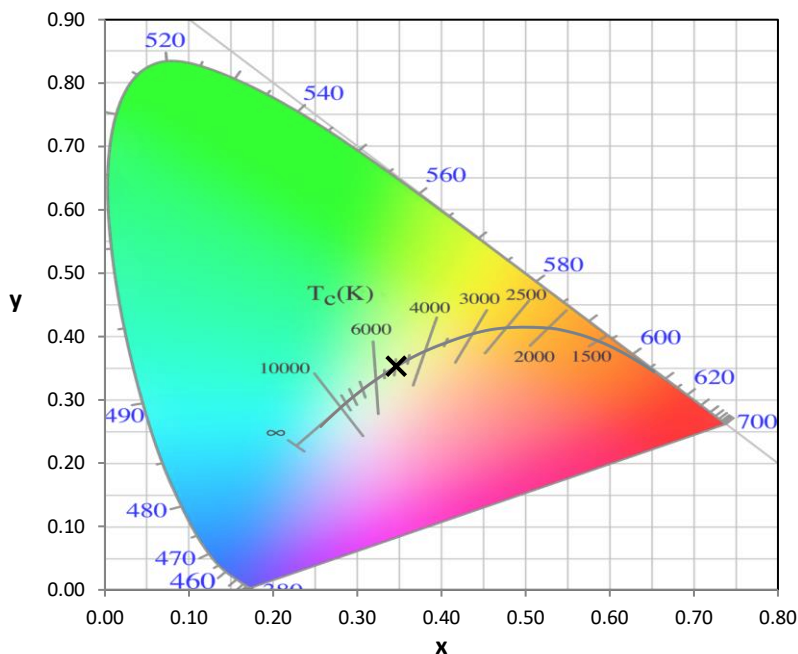


REPORT NUMBER: SP1-2309-187-6

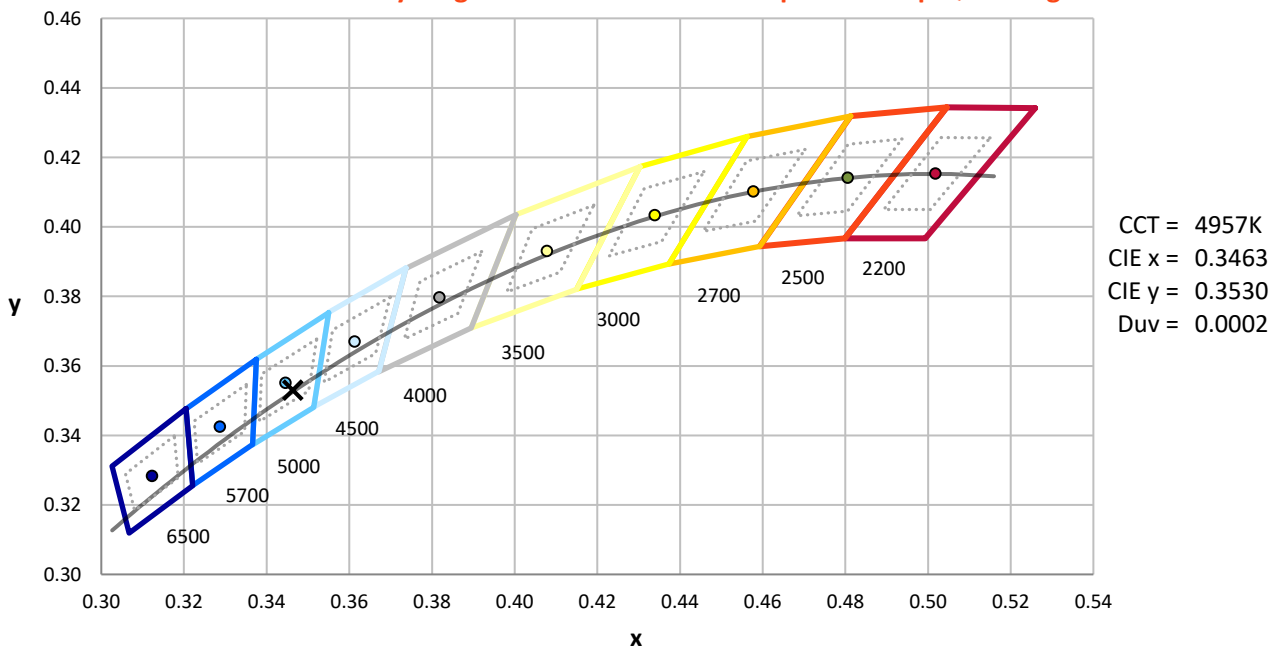
| Measurement and Test Equipment |                       |                  |                      |
|--------------------------------|-----------------------|------------------|----------------------|
| Instrument                     | Identification Number | Calibration Date | Calibration Due Date |
| Photometer                     | 76INCH SPHERE IN0058  | 8/9/2023         | 2/9/2024             |
| 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: SP1-2309-187-6

CIE 1931 Chromaticity Diagram



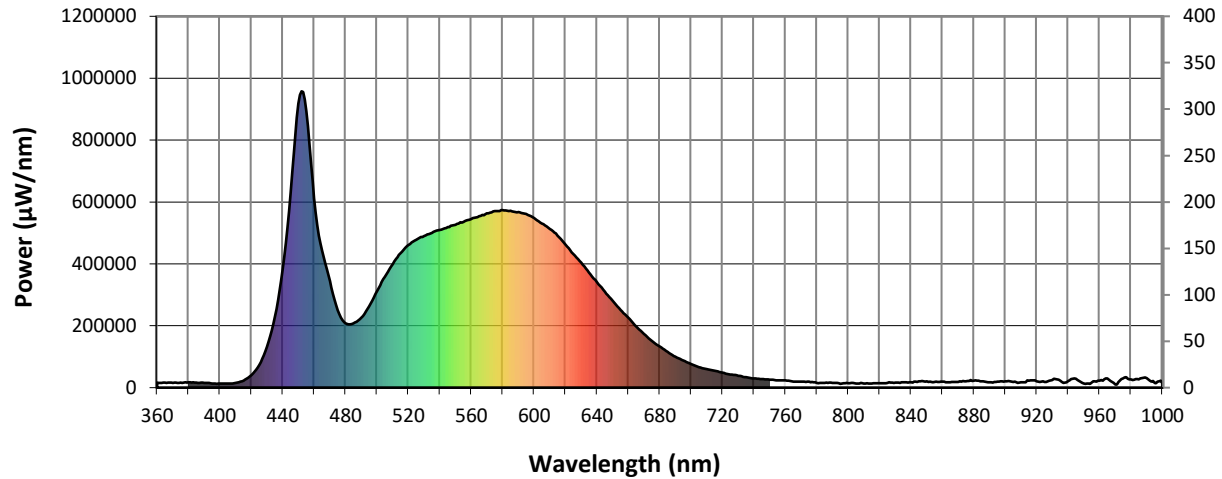
CIE 1931 Chromaticity Diagram with 2017 ANSI 7-Step and 4-Step Quadrangles



Point lies inside the ANSI 5000K 4-step quadrangle

REPORT NUMBER: SP1-2309-187-6

**Photopic Flux vs. Wavelength**

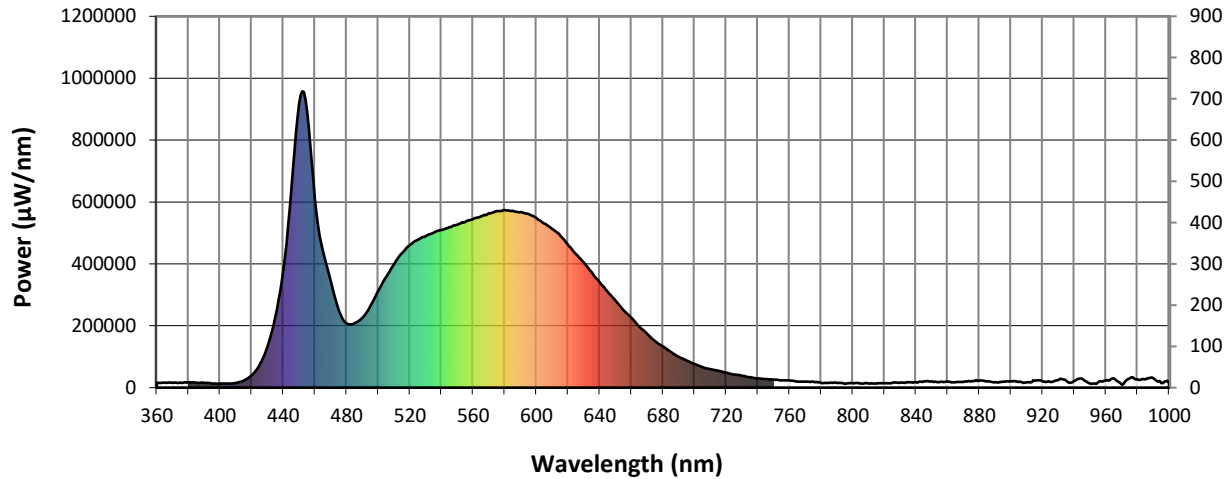


#####

| 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       | 16466            | NR               | 490       | 226060           | NR               | 620       | 461721           | NR               | 750       | 25725            | NR               | 880       | 22907            | NR               |
| 365       | 15834            | NR               | 495       | 262555           | NR               | 625       | 431803           | NR               | 755       | 23611            | NR               | 885       | 20279            | NR               |
| 370       | 15705            | NR               | 500       | 311885           | NR               | 630       | 403609           | NR               | 760       | 23080            | NR               | 890       | 16993            | NR               |
| 375       | 16161            | NR               | 505       | 357744           | NR               | 635       | 372123           | NR               | 765       | 19807            | NR               | 895       | 19274            | NR               |
| 380       | 17604            | NR               | 510       | 398986           | NR               | 640       | 341468           | NR               | 770       | 19668            | NR               | 900       | 19961            | NR               |
| 385       | 15901            | NR               | 515       | 433700           | NR               | 645       | 309940           | NR               | 775       | 19158            | NR               | 905       | 18541            | NR               |
| 390       | 15561            | NR               | 520       | 460798           | NR               | 650       | 281489           | NR               | 780       | 15443            | NR               | 910       | 17677            | NR               |
| 395       | 13649            | NR               | 525       | 477719           | NR               | 655       | 251312           | NR               | 785       | 15332            | NR               | 915       | 22715            | NR               |
| 400       | 12726            | NR               | 530       | 489588           | NR               | 660       | 226441           | NR               | 790       | 15443            | NR               | 920       | 20431            | NR               |
| 405       | 12867            | NR               | 535       | 500614           | NR               | 665       | 197313           | NR               | 795       | 12716            | NR               | 925       | 18281            | NR               |
| 410       | 14858            | NR               | 540       | 509478           | NR               | 670       | 174037           | NR               | 800       | 14486            | NR               | 930       | 24254            | NR               |
| 415       | 22758            | NR               | 545       | 518634           | NR               | 675       | 150402           | NR               | 805       | 13381            | NR               | 935       | 22361            | NR               |
| 420       | 40173            | NR               | 550       | 526082           | NR               | 680       | 133071           | NR               | 810       | 13493            | NR               | 940       | 21374            | NR               |
| 425       | 73606            | NR               | 555       | 535227           | NR               | 685       | 115398           | NR               | 815       | 13669            | NR               | 945       | 28437            | NR               |
| 430       | 132581           | NR               | 560       | 544645           | NR               | 690       | 99841            | NR               | 820       | 13949            | NR               | 950       | 12992            | NR               |
| 435       | 230438           | NR               | 565       | 553668           | NR               | 695       | 87508            | NR               | 825       | 15609            | NR               | 955       | 16488            | NR               |
| 440       | 382216           | NR               | 570       | 563202           | NR               | 700       | 76178            | NR               | 830       | 16481            | NR               | 960       | 22861            | NR               |
| 445       | 630161           | NR               | 575       | 570117           | NR               | 705       | 66441            | NR               | 835       | 17363            | NR               | 965       | 29851            | NR               |
| 450       | 918124           | NR               | 580       | 573472           | NR               | 710       | 60098            | NR               | 840       | 16960            | NR               | 970       | 10276            | NR               |
| 455       | 893762           | NR               | 585       | 571600           | NR               | 715       | 54539            | NR               | 845       | 20190            | NR               | 975       | 29525            | NR               |
| 460       | 612059           | NR               | 590       | 567612           | NR               | 720       | 48071            | NR               | 850       | 20506            | NR               | 980       | 26199            | NR               |
| 465       | 443338           | NR               | 595       | 561157           | NR               | 725       | 42545            | NR               | 855       | 18525            | NR               | 985       | 27187            | NR               |
| 470       | 344255           | NR               | 600       | 547832           | NR               | 730       | 38502            | NR               | 860       | 19090            | NR               | 990       | 30712            | NR               |
| 475       | 249784           | NR               | 605       | 530525           | NR               | 735       | 33410            | NR               | 865       | 17185            | NR               | 995       | 15047            | NR               |
| 480       | 207499           | NR               | 610       | 513131           | NR               | 740       | 29667            | NR               | 870       | 18599            | NR               | 1000      | 14588            | NR               |
| 485       | 208029           | NR               | 615       | 491003           | NR               | 745       | 27521            | NR               | 875       | 20800            | NR               |           |                  |                  |

REPORT NUMBER: SP1-2309-187-6

Scotopic Flux vs. Wavelength



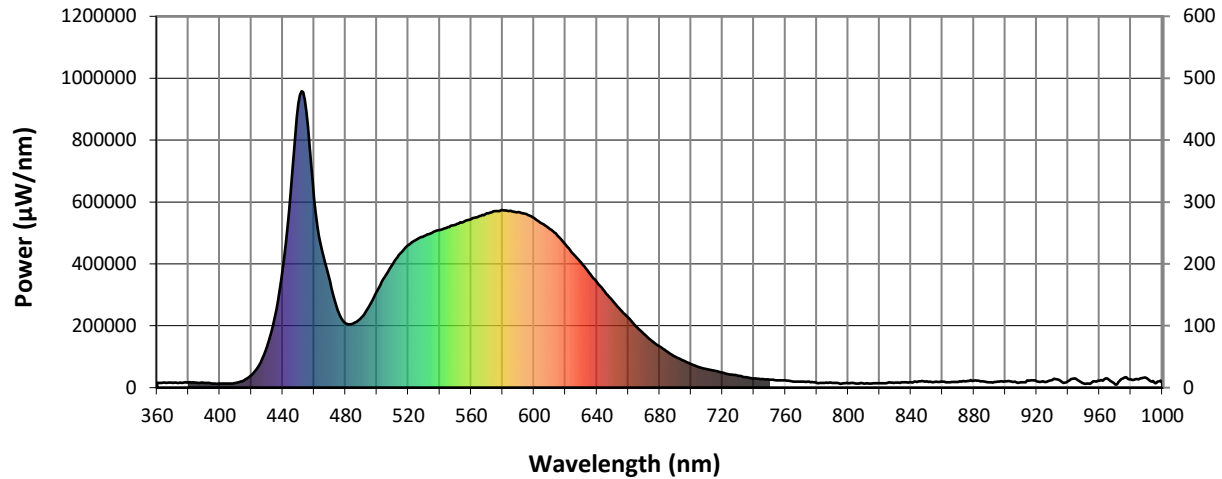
Scotopic Lumens: 69332.4

S/P: 1.93

| 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       | 16466            | NR               | 490       | 226060           | NR               | 620       | 461721           | NR               | 750       | 25725            | NR               | 880       | 22907            | NR               |
| 365       | 15834            | NR               | 495       | 262555           | NR               | 625       | 431803           | NR               | 755       | 23611            | NR               | 885       | 20279            | NR               |
| 370       | 15705            | NR               | 500       | 311885           | NR               | 630       | 403609           | NR               | 760       | 23080            | NR               | 890       | 16993            | NR               |
| 375       | 16161            | NR               | 505       | 357744           | NR               | 635       | 372123           | NR               | 765       | 19807            | NR               | 895       | 19274            | NR               |
| 380       | 17604            | NR               | 510       | 398986           | NR               | 640       | 341468           | NR               | 770       | 19668            | NR               | 900       | 19961            | NR               |
| 385       | 15901            | NR               | 515       | 433700           | NR               | 645       | 309940           | NR               | 775       | 19158            | NR               | 905       | 18541            | NR               |
| 390       | 15561            | NR               | 520       | 460798           | NR               | 650       | 281489           | NR               | 780       | 15443            | NR               | 910       | 17677            | NR               |
| 395       | 13649            | NR               | 525       | 477719           | NR               | 655       | 251312           | NR               | 785       | 15332            | NR               | 915       | 22715            | NR               |
| 400       | 12726            | NR               | 530       | 489588           | NR               | 660       | 226441           | NR               | 790       | 15443            | NR               | 920       | 20431            | NR               |
| 405       | 12867            | NR               | 535       | 500614           | NR               | 665       | 197313           | NR               | 795       | 12716            | NR               | 925       | 18281            | NR               |
| 410       | 14858            | NR               | 540       | 509478           | NR               | 670       | 174037           | NR               | 800       | 14486            | NR               | 930       | 24254            | NR               |
| 415       | 22758            | NR               | 545       | 518634           | NR               | 675       | 150402           | NR               | 805       | 13381            | NR               | 935       | 22361            | NR               |
| 420       | 40173            | NR               | 550       | 526082           | NR               | 680       | 133071           | NR               | 810       | 13493            | NR               | 940       | 21374            | NR               |
| 425       | 73606            | NR               | 555       | 535227           | NR               | 685       | 115398           | NR               | 815       | 13669            | NR               | 945       | 28437            | NR               |
| 430       | 132581           | NR               | 560       | 544645           | NR               | 690       | 99841            | NR               | 820       | 13949            | NR               | 950       | 12992            | NR               |
| 435       | 230438           | NR               | 565       | 553668           | NR               | 695       | 87508            | NR               | 825       | 15609            | NR               | 955       | 16488            | NR               |
| 440       | 382216           | NR               | 570       | 563202           | NR               | 700       | 76178            | NR               | 830       | 16481            | NR               | 960       | 22861            | NR               |
| 445       | 630161           | NR               | 575       | 570117           | NR               | 705       | 66441            | NR               | 835       | 17363            | NR               | 965       | 29851            | NR               |
| 450       | 918124           | NR               | 580       | 573472           | NR               | 710       | 60098            | NR               | 840       | 16960            | NR               | 970       | 10276            | NR               |
| 455       | 893762           | NR               | 585       | 571600           | NR               | 715       | 54539            | NR               | 845       | 20190            | NR               | 975       | 29525            | NR               |
| 460       | 612059           | NR               | 590       | 567612           | NR               | 720       | 48071            | NR               | 850       | 20506            | NR               | 980       | 26199            | NR               |
| 465       | 443338           | NR               | 595       | 561157           | NR               | 725       | 42545            | NR               | 855       | 18525            | NR               | 985       | 27187            | NR               |
| 470       | 344255           | NR               | 600       | 547832           | NR               | 730       | 38502            | NR               | 860       | 19090            | NR               | 990       | 30712            | NR               |
| 475       | 249784           | NR               | 605       | 530525           | NR               | 735       | 33410            | NR               | 865       | 17185            | NR               | 995       | 15047            | NR               |
| 480       | 207499           | NR               | 610       | 513131           | NR               | 740       | 29667            | NR               | 870       | 18599            | NR               | 1000      | 14588            | NR               |
| 485       | 208029           | NR               | 615       | 491003           | NR               | 745       | 27521            | NR               | 875       | 20800            | NR               |           |                  |                  |

REPORT NUMBER: SP1-2309-187-6

**Melanopic Flux vs. Wavelength**



**Melanopic Lumens: 29078.2 M/P: 0.81**

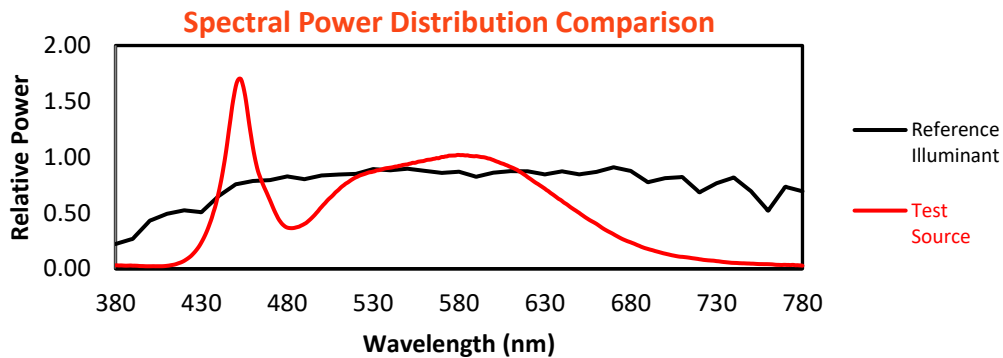
| λ<br>(nm) | Power<br>(μW/nm) | Lumens<br>(φ/nm) | λ<br>(nm) | Power<br>(μW/nm) | Lumens<br>(φ/nm) | λ<br>(nm) | Power<br>(μW/nm) | Lumens<br>(φ/nm) | λ<br>(nm) | Power<br>(μW/nm) | Lumens<br>(φ/nm) | λ<br>(nm) | Power<br>(μW/nm) | Lumens<br>(φ/nm) |
|-----------|------------------|------------------|-----------|------------------|------------------|-----------|------------------|------------------|-----------|------------------|------------------|-----------|------------------|------------------|
| 360       | 16466            | NR               | 490       | 226060           | NR               | 620       | 461721           | NR               | 750       | 25725            | NR               | 880       | 22907            | NR               |
| 365       | 15834            | NR               | 495       | 262555           | NR               | 625       | 431803           | NR               | 755       | 23611            | NR               | 885       | 20279            | NR               |
| 370       | 15705            | NR               | 500       | 311885           | NR               | 630       | 403609           | NR               | 760       | 23080            | NR               | 890       | 16993            | NR               |
| 375       | 16161            | NR               | 505       | 357744           | NR               | 635       | 372123           | NR               | 765       | 19807            | NR               | 895       | 19274            | NR               |
| 380       | 17604            | NR               | 510       | 398986           | NR               | 640       | 341468           | NR               | 770       | 19668            | NR               | 900       | 19961            | NR               |
| 385       | 15901            | NR               | 515       | 433700           | NR               | 645       | 309940           | NR               | 775       | 19158            | NR               | 905       | 18541            | NR               |
| 390       | 15561            | NR               | 520       | 460798           | NR               | 650       | 281489           | NR               | 780       | 15443            | NR               | 910       | 17677            | NR               |
| 395       | 13649            | NR               | 525       | 477719           | NR               | 655       | 251312           | NR               | 785       | 15332            | NR               | 915       | 22715            | NR               |
| 400       | 12726            | NR               | 530       | 489588           | NR               | 660       | 226441           | NR               | 790       | 15443            | NR               | 920       | 20431            | NR               |
| 405       | 12867            | NR               | 535       | 500614           | NR               | 665       | 197313           | NR               | 795       | 12716            | NR               | 925       | 18281            | NR               |
| 410       | 14858            | NR               | 540       | 509478           | NR               | 670       | 174037           | NR               | 800       | 14486            | NR               | 930       | 24254            | NR               |
| 415       | 22758            | NR               | 545       | 518634           | NR               | 675       | 150402           | NR               | 805       | 13381            | NR               | 935       | 22361            | NR               |
| 420       | 40173            | NR               | 550       | 526082           | NR               | 680       | 133071           | NR               | 810       | 13493            | NR               | 940       | 21374            | NR               |
| 425       | 73606            | NR               | 555       | 535227           | NR               | 685       | 115398           | NR               | 815       | 13669            | NR               | 945       | 28437            | NR               |
| 430       | 132581           | NR               | 560       | 544645           | NR               | 690       | 99841            | NR               | 820       | 13949            | NR               | 950       | 12992            | NR               |
| 435       | 230438           | NR               | 565       | 553668           | NR               | 695       | 87508            | NR               | 825       | 15609            | NR               | 955       | 16488            | NR               |
| 440       | 382216           | NR               | 570       | 563202           | NR               | 700       | 76178            | NR               | 830       | 16481            | NR               | 960       | 22861            | NR               |
| 445       | 630161           | NR               | 575       | 570117           | NR               | 705       | 66441            | NR               | 835       | 17363            | NR               | 965       | 29851            | NR               |
| 450       | 918124           | NR               | 580       | 573472           | NR               | 710       | 60098            | NR               | 840       | 16960            | NR               | 970       | 10276            | NR               |
| 455       | 893762           | NR               | 585       | 571600           | NR               | 715       | 54539            | NR               | 845       | 20190            | NR               | 975       | 29525            | NR               |
| 460       | 612059           | NR               | 590       | 567612           | NR               | 720       | 48071            | NR               | 850       | 20506            | NR               | 980       | 26199            | NR               |
| 465       | 443338           | NR               | 595       | 561157           | NR               | 725       | 42545            | NR               | 855       | 18525            | NR               | 985       | 27187            | NR               |
| 470       | 344255           | NR               | 600       | 547832           | NR               | 730       | 38502            | NR               | 860       | 19090            | NR               | 990       | 30712            | NR               |
| 475       | 249784           | NR               | 605       | 530525           | NR               | 735       | 33410            | NR               | 865       | 17185            | NR               | 995       | 15047            | NR               |
| 480       | 207499           | NR               | 610       | 513131           | NR               | 740       | 29667            | NR               | 870       | 18599            | NR               | 1000      | 14588            | NR               |
| 485       | 208029           | NR               | 615       | 491003           | NR               | 745       | 27521            | NR               | 875       | 20800            | NR               |           |                  |                  |

REPORT NUMBER: SP1-2309-187-6

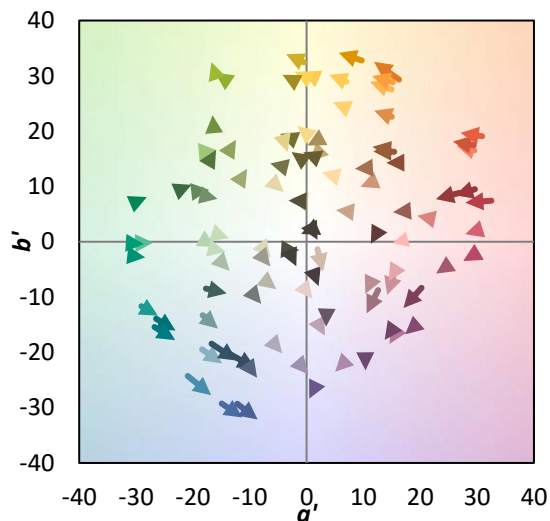
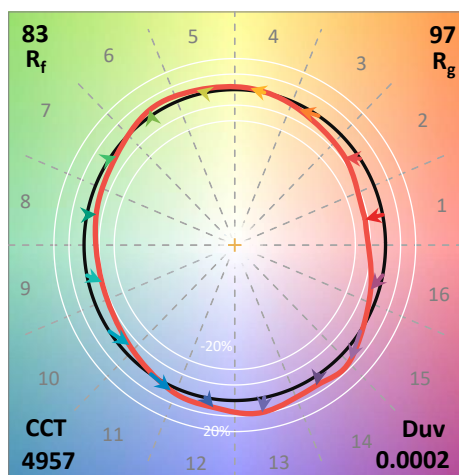
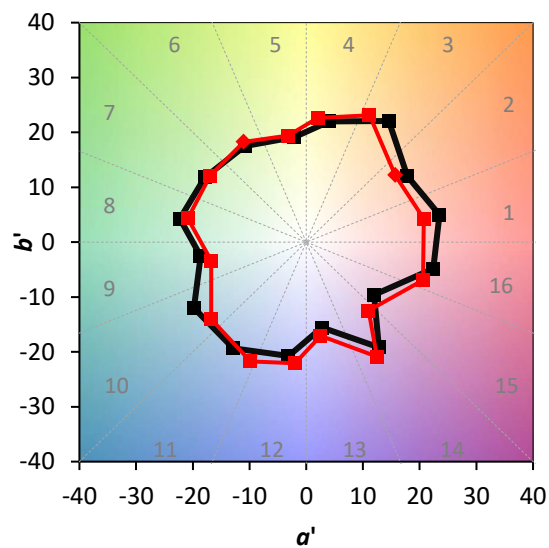
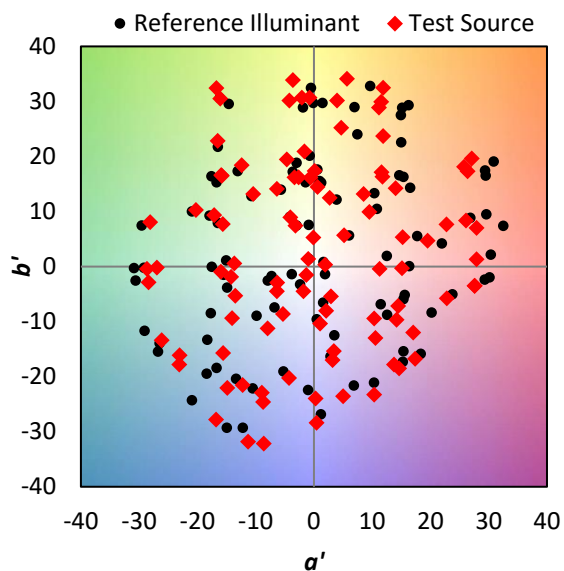
**TM-30-18**

**Summary**

$R_f = 83$   
 $R_g = 96.6$   
 CIE  $R_a = 83.0$   
 $R_9 = 13.4$



**Color Vector Graphics**

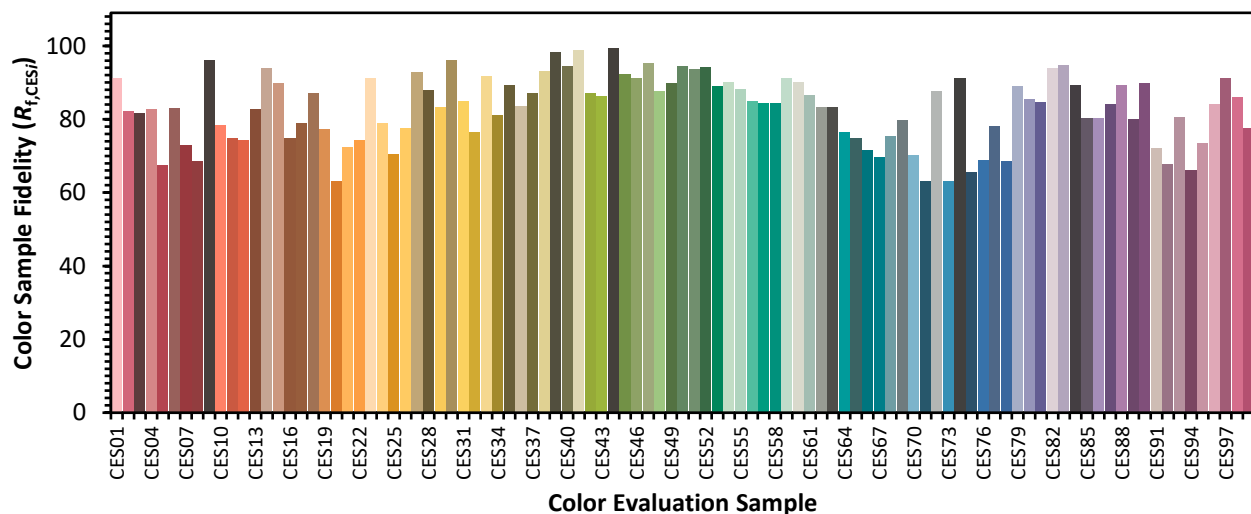


REPORT NUMBER: SP1-2309-187-6

TM-30-18

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

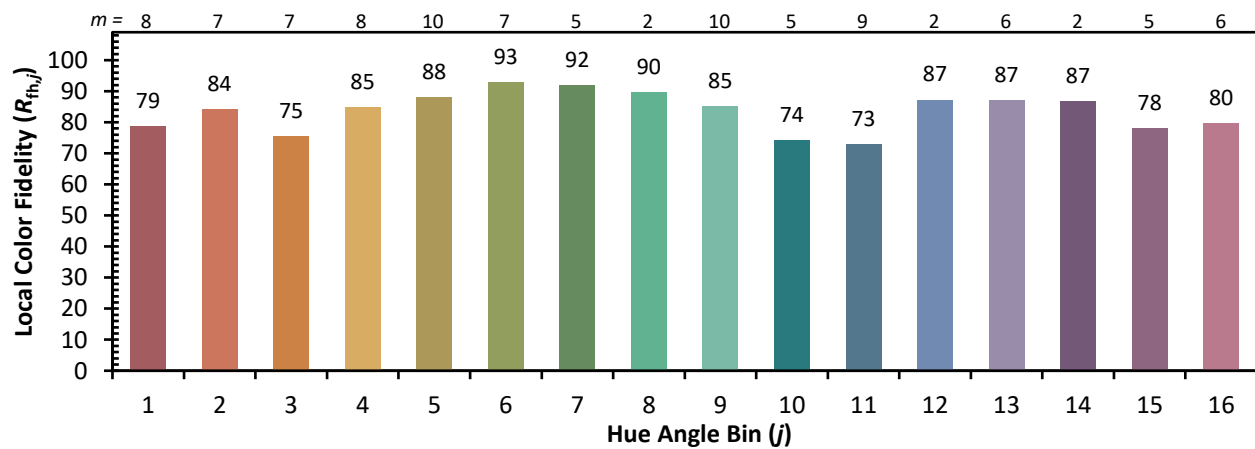
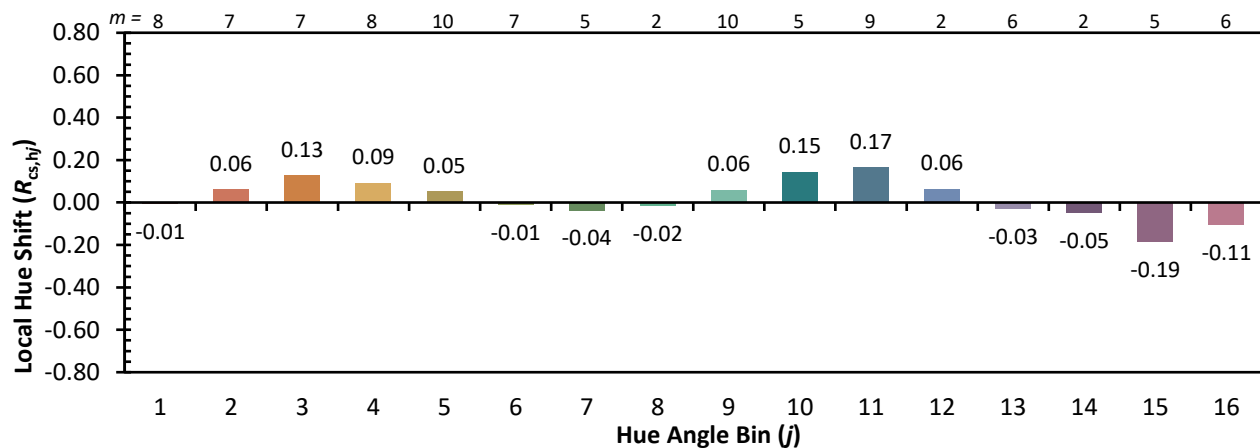
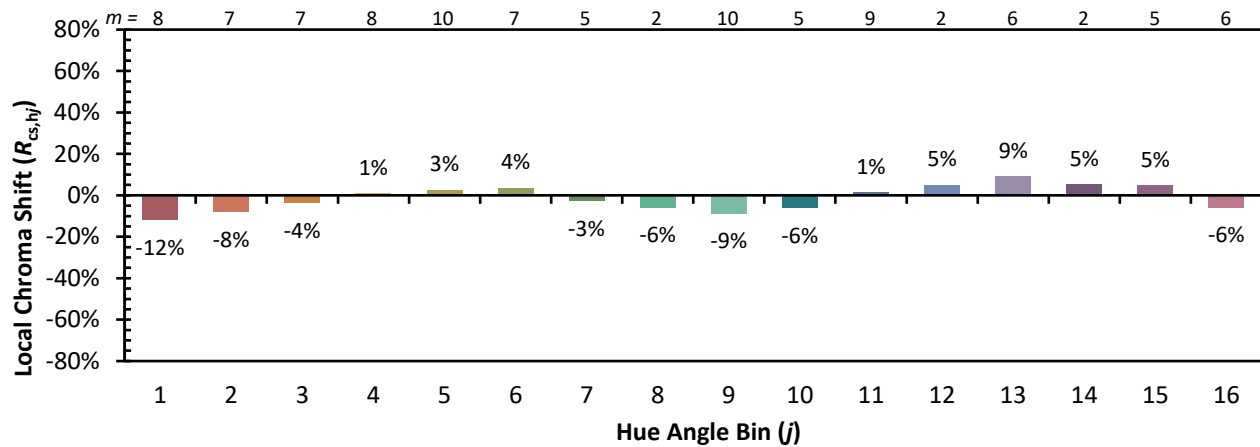
|            |            |            |            |
|------------|------------|------------|------------|
| CES01 = 85 | CES26 = 78 | CES51 = 94 | CES76 = 69 |
| CES02 = 60 | CES27 = 93 | CES52 = 94 | CES77 = 78 |
| CES03 = 30 | CES28 = 88 | CES53 = 89 | CES78 = 69 |
| CES04 = 69 | CES29 = 83 | CES54 = 90 | CES79 = 89 |
| CES05 = 47 | CES30 = 96 | CES55 = 88 | CES80 = 86 |
| CES06 = 50 | CES31 = 85 | CES56 = 85 | CES81 = 85 |
| CES07 = 40 | CES32 = 77 | CES57 = 84 | CES82 = 94 |
| CES08 = 39 | CES33 = 92 | CES58 = 84 | CES83 = 95 |
| CES09 = 29 | CES34 = 81 | CES59 = 91 | CES84 = 89 |
| CES10 = 73 | CES35 = 89 | CES60 = 90 | CES85 = 80 |
| CES11 = 56 | CES36 = 84 | CES61 = 87 | CES86 = 80 |
| CES12 = 62 | CES37 = 87 | CES62 = 83 | CES87 = 84 |
| CES13 = 42 | CES38 = 93 | CES63 = 83 | CES88 = 89 |
| CES14 = 74 | CES39 = 98 | CES64 = 76 | CES89 = 80 |
| CES15 = 71 | CES40 = 95 | CES65 = 75 | CES90 = 90 |
| CES16 = 46 | CES41 = 99 | CES66 = 72 | CES91 = 72 |
| CES17 = 49 | CES42 = 87 | CES67 = 70 | CES92 = 68 |
| CES18 = 56 | CES43 = 86 | CES68 = 75 | CES93 = 80 |
| CES19 = 71 | CES44 = 99 | CES69 = 80 | CES94 = 66 |
| CES20 = 64 | CES45 = 92 | CES70 = 70 | CES95 = 73 |
| CES21 = 85 | CES46 = 91 | CES71 = 63 | CES96 = 84 |
| CES22 = 77 | CES47 = 95 | CES72 = 88 | CES97 = 91 |
| CES23 = 91 | CES48 = 88 | CES73 = 63 | CES98 = 86 |
| CES24 = 90 | CES49 = 90 | CES74 = 91 | CES99 = 77 |
| CES25 = 71 | CES50 = 94 | CES75 = 65 |            |



REPORT NUMBER: SP1-2309-187-6

**TM-30-18**

Color Rendition by Hue-Angle Bin

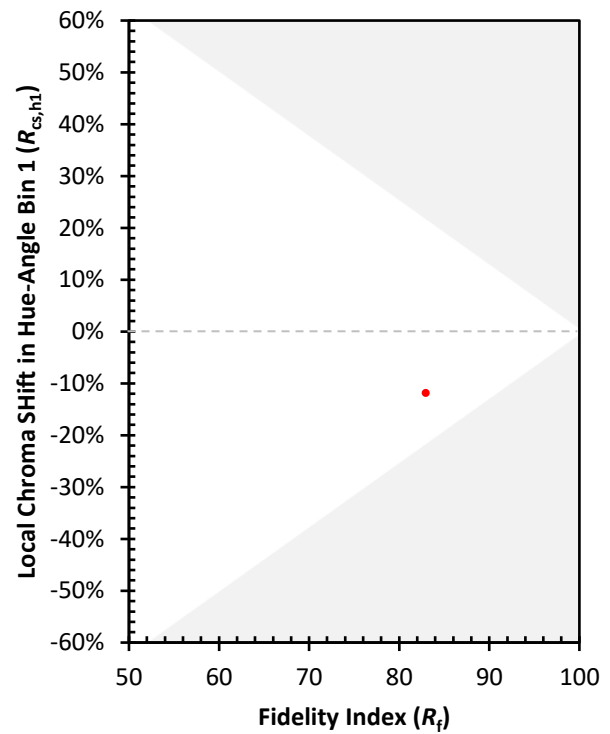
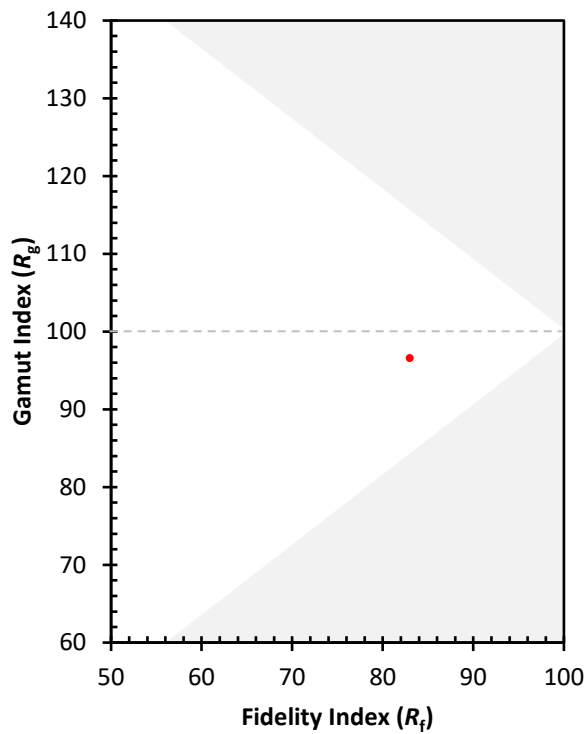




REPORT NUMBER: SP1-2309-187-6

**TM-30-18**

**Measure Comparisons**



(END OF REPORT)