

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: P860070

Luminaire Tested: **SPHB-30SE-M-L735-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: P860070  
TEST IS SCALED FROM IESNA LM-79-08 TEST DATA (G3-2404-343-1)  
Test Lab: INNOVATION CENTER  
Issue Date: 7/11/2024  
Manufacturer: COOPER LIGHTING SOLUTIONS (FORMERLY EATON)  
Product Line: METALUX  
Catalog Number: SPHB-30SE-M-L735-CD  
Description: 30000 Lumen Standard Efficacy Select Pro High Bay with Medium Lens  
and, 3500K 70CRI LEDs  
Light Source: -  
Ballast/Driver: -

Luminaire Equipment: Sample No.   Condition   Description

**Summary**

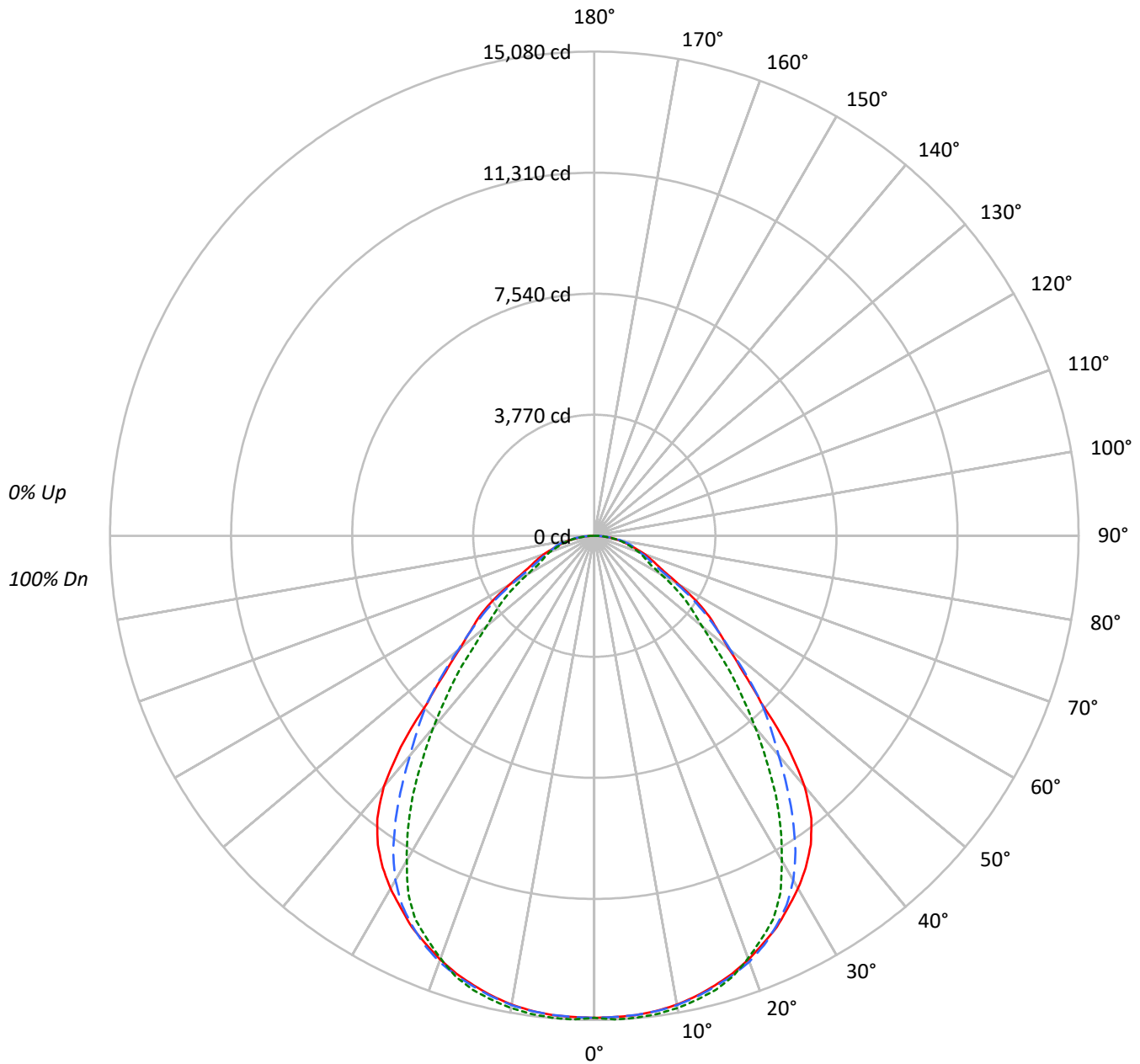
Lumens per Lamp: N/A  
Luminaire Lumens: 31161.0 lumens  
Efficiency: N/A  
Efficacy: 159.8 lumens/watt  
Spacing Criteria (0/90/45): 1.25 / 1.16 / 1.22  
Luminous Opening: Rectangular (W 1' x L: 2.04' x H: 0')  
CIE Type: Direct

Input Watts (W): 195  
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

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CATALOG NUMBER: SPHB-30SE-M-L735-CD

### Luminous Intensity Polar Plot





TEST NUMBER: P860070

CATALOG NUMBER: SPHB-30SE-M-L735-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 | 111 | 111 | 111 | 106 | 106 | 106 | 102 | 102 | 102 | 100 |    |    |
| 1   | 110 | 106 | 103 | 99  | 108 | 104 | 101 | 98  | 100 | 97  | 95  | 96  | 94  | 92  | 92  | 91  | 89  | 87  |    |    |
| 2   | 102 | 95  | 89  | 84  | 99  | 93  | 87  | 83  | 89  | 85  | 81  | 86  | 82  | 79  | 83  | 80  | 77  | 75  |    |    |
| 3   | 94  | 85  | 78  | 72  | 92  | 83  | 77  | 71  | 80  | 75  | 70  | 78  | 73  | 69  | 75  | 71  | 68  | 66  |    |    |
| 4   | 87  | 76  | 69  | 63  | 85  | 75  | 68  | 62  | 73  | 66  | 61  | 70  | 65  | 61  | 68  | 64  | 60  | 58  |    |    |
| 5   | 81  | 69  | 61  | 55  | 79  | 68  | 61  | 55  | 66  | 59  | 54  | 64  | 58  | 54  | 62  | 57  | 53  | 51  |    |    |
| 6   | 75  | 63  | 55  | 49  | 73  | 62  | 54  | 49  | 60  | 54  | 48  | 59  | 53  | 48  | 57  | 52  | 48  | 46  |    |    |
| 7   | 70  | 58  | 50  | 44  | 68  | 57  | 49  | 44  | 55  | 49  | 44  | 54  | 48  | 43  | 53  | 47  | 43  | 41  |    |    |
| 8   | 66  | 53  | 45  | 40  | 64  | 52  | 45  | 40  | 51  | 44  | 39  | 50  | 44  | 39  | 49  | 43  | 39  | 37  |    |    |
| 9   | 61  | 49  | 41  | 36  | 60  | 48  | 41  | 36  | 47  | 41  | 36  | 46  | 40  | 36  | 45  | 40  | 36  | 34  |    |    |
| 10  | 58  | 45  | 38  | 33  | 57  | 45  | 38  | 33  | 44  | 37  | 33  | 43  | 37  | 33  | 42  | 37  | 33  | 31  |    |    |

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

|     | 0°    | 45°   | 90°   |
|-----|-------|-------|-------|
| 0°  | 79214 | 79214 | 79214 |
| 5°  | 79370 | 79349 | 79799 |
| 10° | 79439 | 79524 | 80012 |
| 15° | 79207 | 79413 | 79964 |
| 20° | 78861 | 79261 | 78628 |
| 25° | 78285 | 78065 | 76740 |
| 30° | 77293 | 75471 | 71165 |
| 35° | 75671 | 69434 | 63426 |
| 40° | 70224 | 61454 | 53721 |
| 45° | 54786 | 54934 | 44459 |
| 50° | 44746 | 45380 | 35904 |
| 55° | 40091 | 38579 | 31549 |
| 60° | 32095 | 30382 | 25241 |
| 65° | 26897 | 24622 | 22323 |
| 70° | 25537 | 23460 | 22727 |
| 75° | 23171 | 24906 | 21920 |
| 80° | 23285 | 25451 | 23102 |
| 85° | 20257 | 23738 | 19300 |



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**ZONAL LUMENS:**

| Zone      | Lumens  | % Fixture |
|-----------|---------|-----------|
| 0°-10°    | 1427.5  | 4.6       |
| 10°-20°   | 4105.3  | 13.2      |
| 20°-30°   | 6128.6  | 19.7      |
| 30°-40°   | 6687.3  | 21.5      |
| 40°-50°   | 5470.5  | 17.6      |
| 50°-60°   | 3596.9  | 11.5      |
| 60°-70°   | 2063.6  | 6.6       |
| 70°-80°   | 1250.5  | 4.0       |
| 80°-90°   | 419.9   | 1.3       |
| 90°-100°  | 10.9    | 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°    | 11661.4 | 37.4      |
| 0°-40°    | 18348.7 | 58.9      |
| 0°-60°    | 27416.1 | 88.0      |
| 0°-90°    | 31150.1 | 100.0     |
| 90°-120°  | 10.9    | 0.0       |
| 90°-150°  | 10.9    | 0.0       |
| 90°-180°  | 11.0    | 0.0       |
| 0°-180°   | 31161.0 | 100.0     |

**CANDELA DISTRIBUTION:**

|      | 0°    | 22.5° | 45°   | 67.5° | 90°   | Flux |
|------|-------|-------|-------|-------|-------|------|
| 0°   | 15013 | 15013 | 15013 | 15013 | 15013 |      |
| 5°   | 14985 | 14961 | 14981 | 15042 | 15066 | ###  |
| 15°  | 14500 | 14498 | 14538 | 14631 | 14638 | 4093 |
| 25°  | 13447 | 13478 | 13409 | 13247 | 13181 | 6186 |
| 35°  | 11748 | 11482 | 10779 | 10045 | 9847  | 7281 |
| 45°  | 7342  | 7890  | 7362  | 6498  | 5958  | 5828 |
| 55°  | 4358  | 4239  | 4194  | 3604  | 3430  | 3838 |
| 65°  | 2154  | 2123  | 1972  | 1919  | 1788  | 2202 |
| 75°  | 1137  | 1230  | 1222  | 1172  | 1075  | 1230 |
| 85°  | 335   | 380   | 392   | 342   | 319   | 363  |
| 90°  | 2     | 28    | 55    | 65    | 69    | 16   |
| 95°  | 2     | 4     | 6     | 6     | 4     | 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: P860070

CATALOG NUMBER: SPHB-30SE-M-L735-CD

**CANDELA DISTRIBUTION (FULL):**

|        | 0°      | 22.5°   | 45°     | 67.5°   | 90°     |
|--------|---------|---------|---------|---------|---------|
| 0°     | 15012.8 | 15012.8 | 15012.8 | 15012.8 | 15012.8 |
| 2.5°   | 15002.9 | 14981.1 | 15000.9 | 15062.3 | 15080.1 |
| 5°     | 14985.1 | 14961.3 | 14981.1 | 15042.5 | 15066.2 |
| 7.5°   | 14923.7 | 14909.8 | 14929.6 | 14991.0 | 15020.7 |
| 10°    | 14826.7 | 14810.8 | 14842.5 | 14896.0 | 14933.6 |
| 12.5°  | 14682.1 | 14676.2 | 14705.9 | 14783.1 | 14798.9 |
| 15°    | 14499.9 | 14498.0 | 14537.6 | 14630.6 | 14638.5 |
| 17.5°  | 14294.0 | 14292.0 | 14341.5 | 14402.9 | 14381.1 |
| 20°    | 14044.5 | 14058.4 | 14115.8 | 14058.4 | 14003.0 |
| 22.5°  | 13745.5 | 13789.1 | 13803.0 | 13622.8 | 13595.1 |
| 25°    | 13446.6 | 13478.2 | 13408.9 | 13246.6 | 13181.2 |
| 27.5°  | 13060.4 | 13098.1 | 12969.4 | 12737.7 | 12551.6 |
| 30°    | 12686.2 | 12650.6 | 12387.2 | 11939.7 | 11680.3 |
| 32.5°  | 12256.5 | 12129.8 | 11656.6 | 11038.8 | 10803.2 |
| 35°    | 11747.7 | 11482.3 | 10779.4 | 10044.8 | 9846.8  |
| 37.5°  | 11104.2 | 10619.0 | 9850.8  | 9084.5  | 8785.5  |
| 40°    | 10195.3 | 9634.9  | 8922.1  | 8130.1  | 7799.4  |
| 42.5°  | 8922.1  | 8714.2  | 8124.2  | 7233.1  | 6839.1  |
| 45°    | 7342.0  | 7890.5  | 7361.8  | 6498.5  | 5958.0  |
| 47.5°  | 6284.7  | 7047.0  | 6411.4  | 5787.7  | 5043.2  |
| 50°    | 5451.1  | 5975.8  | 5528.3  | 4966.0  | 4373.9  |
| 52.5°  | 4849.2  | 5007.6  | 4827.4  | 4209.6  | 3873.0  |
| 55°    | 4358.1  | 4239.3  | 4193.8  | 3603.7  | 3429.5  |
| 57.5°  | 3748.2  | 3682.9  | 3566.1  | 3142.3  | 2912.7  |
| 60°    | 3041.4  | 3180.0  | 2879.0  | 2758.2  | 2391.9  |
| 62.5°  | 2498.8  | 2635.5  | 2312.7  | 2304.8  | 1999.9  |
| 65°    | 2154.3  | 2122.6  | 1972.1  | 1918.7  | 1788.0  |
| 67.5°  | 1906.8  | 1807.8  | 1756.3  | 1687.0  | 1641.5  |
| 70°    | 1655.3  | 1613.7  | 1520.7  | 1534.5  | 1473.2  |
| 72.5°  | 1380.1  | 1433.6  | 1340.5  | 1366.2  | 1255.4  |
| 75°    | 1136.6  | 1229.6  | 1221.7  | 1172.2  | 1075.2  |
| 77.5°  | 936.6   | 1035.6  | 1053.4  | 1007.8  | 928.6   |
| 80°    | 766.3   | 833.6   | 837.6   | 809.8   | 760.3   |
| 82.5°  | 562.3   | 601.9   | 631.6   | 584.1   | 552.4   |
| 85°    | 334.6   | 380.2   | 392.1   | 342.5   | 318.8   |
| 87.5°  | 108.9   | 152.5   | 170.3   | 176.2   | 178.2   |
| 90°    | 2.0     | 27.7    | 55.4    | 65.3    | 69.3    |
| 92.5°  | 2.0     | 7.9     | 11.9    | 17.8    | 19.8    |
| 95°    | 2.0     | 4.0     | 5.9     | 5.9     | 4.0     |
| 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     |



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**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: SP1-2404-343-1

Test Date: 05/18/2024

Luminaire Tested: SPHB-24SE-M-UNV-L735-CD

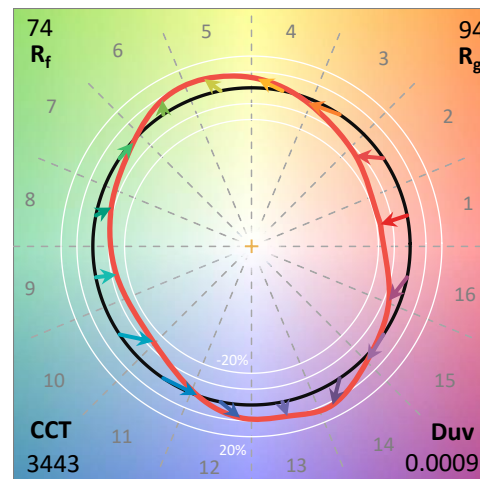
Data in this report applies to families of products SPHB-24SE-M-UNV-L735-CD.

### Test Information

Test Method: LM-79-2019  
 Report Number: SP1-2404-343-1  
 Test Lab: COOPER LIGHTING SOLUTIONS  
 Photometer: SP1 - 76IN SPHERE  
 Measurement Geometry:  $4\pi$   
 Issue Date: 05/21/2024  
 Manufacturer: COOPER LIGHTING SOLUTIONS  
 Product Line: METALUX  
 Catalog Number: **SPHB-24SE-M-UNV-L735-CD**  
 Description: 18IN SPHB WITH MEDIUM LENS, 3500K/70CRI, 24K LUMENS, SE

### Spectral Parameters

|                           |        |           |      |      |       |
|---------------------------|--------|-----------|------|------|-------|
| CCT (K):                  | 3443   | CRI (Ra): | 71.3 |      |       |
| CIE u':                   | 0.2367 | R1:       | 67.5 | R9:  | -34.0 |
| CIE v':                   | 0.5135 | R2:       | 79.7 | R10: | 52.8  |
| Duv:                      | 0.0009 | R3:       | 90.1 | R11: | 63.2  |
| CIE x:                    | 0.4094 | R4:       | 68.5 | R12: | 44.0  |
| CIE y:                    | 0.3948 | R5:       | 66.9 | R13: | 69.5  |
| CIE z:                    | 0.1959 | R6:       | 71.2 | R14: | 94.3  |
| Peak Wavelength (nm):     | 588    | R7:       | 79.3 |      |       |
| Dominant Wavelength (nm): | 580    | R8:       | 47.0 |      |       |
| Purity:                   | 41.6   |           |      |      |       |
| Rf:                       | 74.2   |           |      |      |       |
| Rg:                       | 93.7   |           |      |      |       |



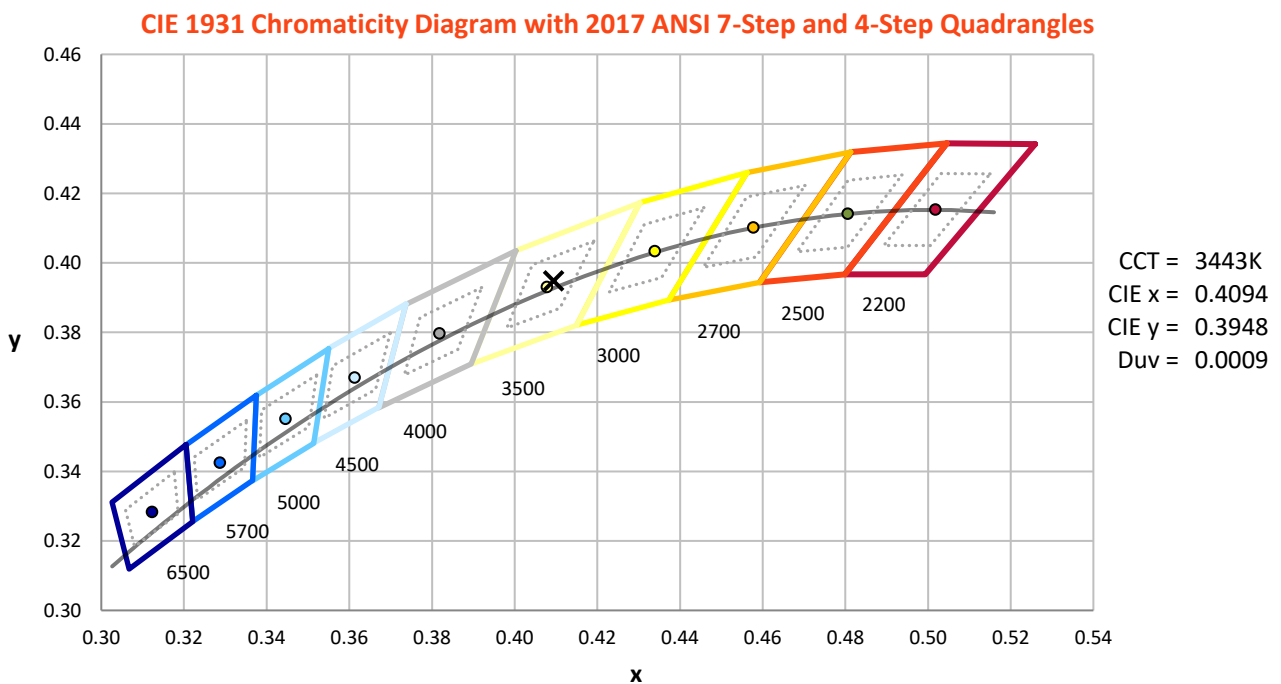
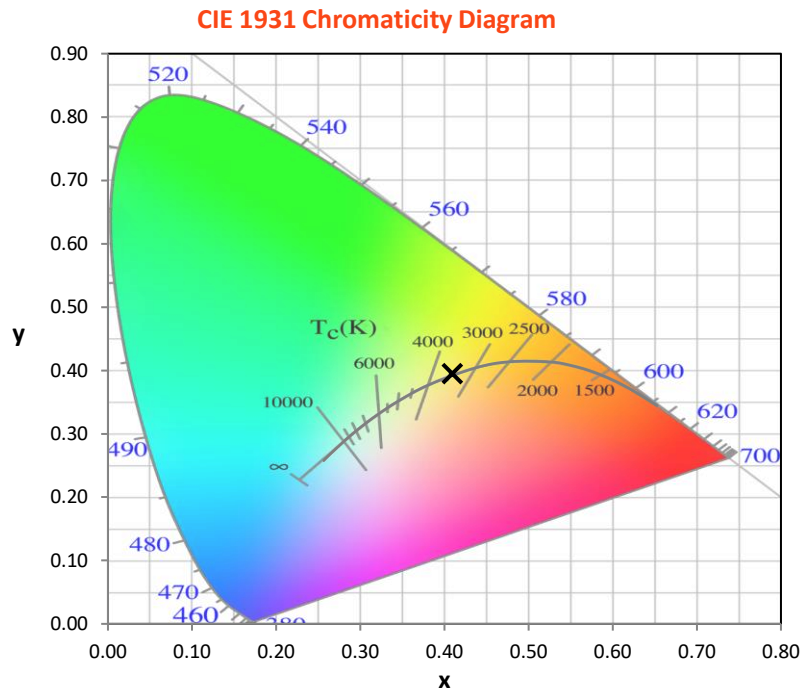
### Test Conditions

Stabilization Time: 23M  
 Operation Time: 12H  
 Room Temperature (°C) / RH%: 25.0/42%  
 Sphere Temperature (°C): 25.2

REPORT NUMBER: SP1-2404-343-1

| Measurement and Test Equipment |                       |                  |                      |
|--------------------------------|-----------------------|------------------|----------------------|
| Instrument                     | Identification Number | Calibration Date | Calibration Due Date |
| Photometer                     | 76INCH SPHERE IN0058  | 2/12/2024        | 8/12/2024            |
| Power Meter                    | XITRON 2801 IN0071    | 10/23/2023       | 10/23/2024           |
| AC Power Source                | CHROMA 61603 IN0063   | 10/24/2023       | 10/24/2024           |
| DC Power Source                | AGILENT E3634A IN0208 | 10/24/2023       | 10/24/2024           |
| Sphere Thermometer             | ONSET IN0085          | 10/24/2023       | 10/24/2024           |
| Room Thermometer               | ONSET IN0046          | 10/24/2023       | 10/24/2024           |

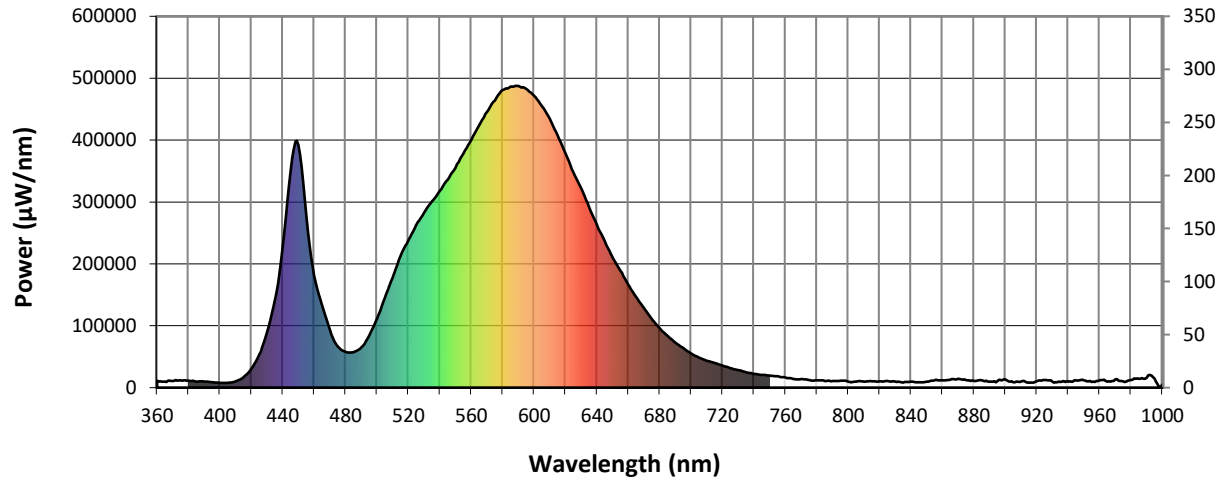
REPORT NUMBER: SP1-2404-343-1



Point lies inside the ANSI 3500K 4-step quadrangle

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**Photopic Flux vs. Wavelength**

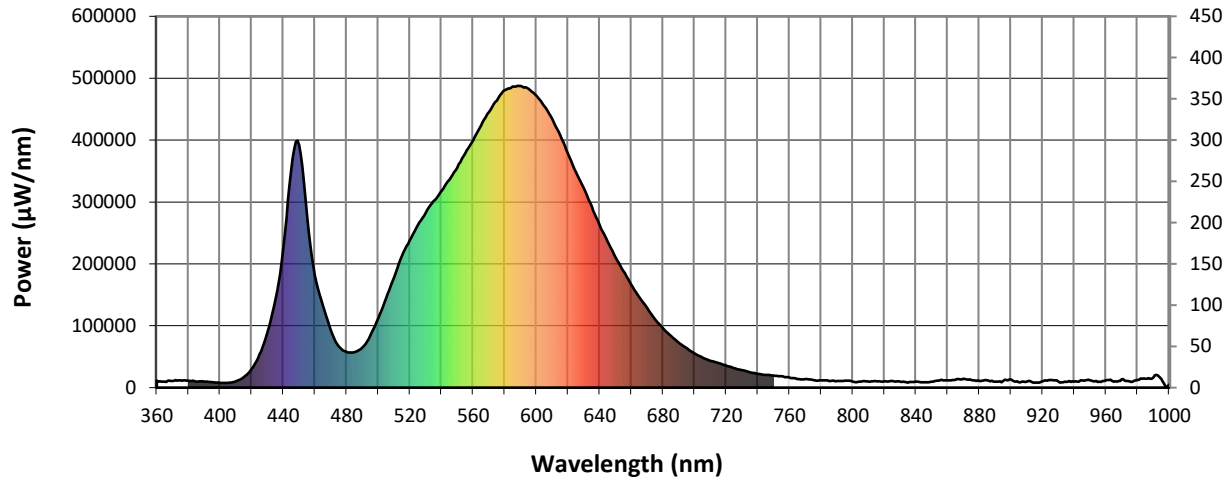


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| λ<br>(nm) | Power<br>(μW/nm) | Lumens<br>(φ/nm) | λ<br>(nm) | Power<br>(μW/nm) | Lumens<br>(φ/nm) | λ<br>(nm) | Power<br>(μW/nm) | Lumens<br>(φ/nm) | λ<br>(nm) | Power<br>(μW/nm) | Lumens<br>(φ/nm) | λ<br>(nm) | Power<br>(μW/nm) | Lumens<br>(φ/nm) |
|-----------|------------------|------------------|-----------|------------------|------------------|-----------|------------------|------------------|-----------|------------------|------------------|-----------|------------------|------------------|
| 360       | 11069            | NR               | 490       | 64826            | NR               | 620       | 378287           | NR               | 750       | 19405            | NR               | 880       | 10598            | NR               |
| 365       | 9532             | NR               | 495       | 83788            | NR               | 625       | 348295           | NR               | 755       | 18362            | NR               | 885       | 11768            | NR               |
| 370       | 10973            | NR               | 500       | 111516           | NR               | 630       | 321786           | NR               | 760       | 16477            | NR               | 890       | 9466             | NR               |
| 375       | 11762            | NR               | 505       | 144674           | NR               | 635       | 292338           | NR               | 765       | 14099            | NR               | 895       | 10985            | NR               |
| 380       | 11270            | NR               | 510       | 178210           | NR               | 640       | 263074           | NR               | 770       | 13754            | NR               | 900       | 13336            | NR               |
| 385       | 9763             | NR               | 515       | 212444           | NR               | 645       | 236032           | NR               | 775       | 12358            | NR               | 905       | 8557             | NR               |
| 390       | 9964             | NR               | 520       | 238043           | NR               | 650       | 210183           | NR               | 780       | 11829            | NR               | 910       | 9683             | NR               |
| 395       | 8870             | NR               | 525       | 262630           | NR               | 655       | 188533           | NR               | 785       | 10905            | NR               | 915       | 8102             | NR               |
| 400       | 7833             | NR               | 530       | 282711           | NR               | 660       | 166359           | NR               | 790       | 10518            | NR               | 920       | 10188            | NR               |
| 405       | 7894             | NR               | 535       | 301137           | NR               | 665       | 146164           | NR               | 795       | 11147            | NR               | 925       | 12355            | NR               |
| 410       | 10280            | NR               | 540       | 317875           | NR               | 670       | 128599           | NR               | 800       | 9675             | NR               | 930       | 9904             | NR               |
| 415       | 16727            | NR               | 545       | 336094           | NR               | 675       | 110738           | NR               | 805       | 9859             | NR               | 935       | 9277             | NR               |
| 420       | 30410            | NR               | 550       | 355114           | NR               | 680       | 95972            | NR               | 810       | 9869             | NR               | 940       | 9862             | NR               |
| 425       | 53420            | NR               | 555       | 378403           | NR               | 685       | 83465            | NR               | 815       | 10276            | NR               | 945       | 11594            | NR               |
| 430       | 89156            | NR               | 560       | 399679           | NR               | 690       | 72721            | NR               | 820       | 10232            | NR               | 950       | 11887            | NR               |
| 435       | 142197           | NR               | 565       | 423645           | NR               | 695       | 63911            | NR               | 825       | 10857            | NR               | 955       | 8965             | NR               |
| 440       | 226845           | NR               | 570       | 445147           | NR               | 700       | 55055            | NR               | 830       | 9619             | NR               | 960       | 11572            | NR               |
| 445       | 350540           | NR               | 575       | 463862           | NR               | 705       | 48705            | NR               | 835       | 8389             | NR               | 965       | 9869             | NR               |
| 450       | 392129           | NR               | 580       | 480777           | NR               | 710       | 43400            | NR               | 840       | 9682             | NR               | 970       | 13235            | NR               |
| 455       | 277676           | NR               | 585       | 486479           | NR               | 715       | 39918            | NR               | 845       | 8871             | NR               | 975       | 10310            | NR               |
| 460       | 181452           | NR               | 590       | 487337           | NR               | 720       | 35595            | NR               | 850       | 9686             | NR               | 980       | 12444            | NR               |
| 465       | 133159           | NR               | 595       | 482847           | NR               | 725       | 31639            | NR               | 855       | 11822            | NR               | 985       | 14597            | NR               |
| 470       | 92882            | NR               | 600       | 471286           | NR               | 730       | 28555            | NR               | 860       | 11731            | NR               | 990       | 16092            | NR               |
| 475       | 66501            | NR               | 605       | 455024           | NR               | 735       | 24821            | NR               | 865       | 12816            | NR               | 995       | 14551            | NR               |
| 480       | 57816            | NR               | 610       | 434209           | NR               | 740       | 22145            | NR               | 870       | 14159            | NR               | 1000      | 5319             | NR               |
| 485       | 57380            | NR               | 615       | 407697           | NR               | 745       | 20684            | NR               | 875       | 12561            | NR               |           |                  |                  |

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**Scotopic Flux vs. Wavelength**



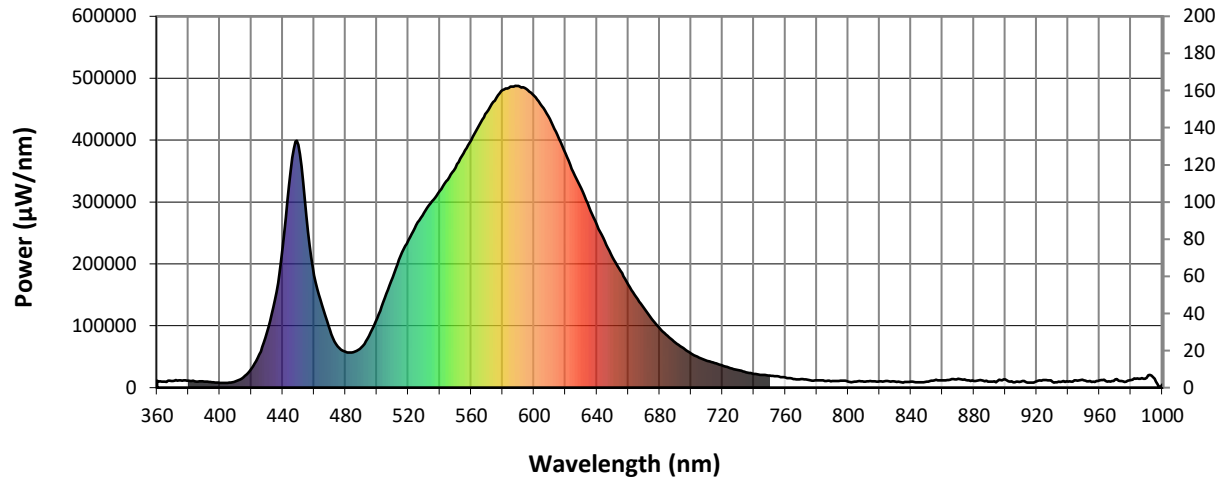
**Scotopic Lumens: 34063.8**

**S/P: 1.35**

| 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       | 11069            | NR               | 490       | 64826            | NR               | 620       | 378287           | NR               | 750       | 19405            | NR               | 880       | 10598            | NR               |
| 365       | 9532             | NR               | 495       | 83788            | NR               | 625       | 348295           | NR               | 755       | 18362            | NR               | 885       | 11768            | NR               |
| 370       | 10973            | NR               | 500       | 111516           | NR               | 630       | 321786           | NR               | 760       | 16477            | NR               | 890       | 9466             | NR               |
| 375       | 11762            | NR               | 505       | 144674           | NR               | 635       | 292338           | NR               | 765       | 14099            | NR               | 895       | 10985            | NR               |
| 380       | 11270            | NR               | 510       | 178210           | NR               | 640       | 263074           | NR               | 770       | 13754            | NR               | 900       | 13336            | NR               |
| 385       | 9763             | NR               | 515       | 212444           | NR               | 645       | 236032           | NR               | 775       | 12358            | NR               | 905       | 8557             | NR               |
| 390       | 9964             | NR               | 520       | 238043           | NR               | 650       | 210183           | NR               | 780       | 11829            | NR               | 910       | 9683             | NR               |
| 395       | 8870             | NR               | 525       | 262630           | NR               | 655       | 188533           | NR               | 785       | 10905            | NR               | 915       | 8102             | NR               |
| 400       | 7833             | NR               | 530       | 282711           | NR               | 660       | 166359           | NR               | 790       | 10518            | NR               | 920       | 10188            | NR               |
| 405       | 7894             | NR               | 535       | 301137           | NR               | 665       | 146164           | NR               | 795       | 11147            | NR               | 925       | 12355            | NR               |
| 410       | 10280            | NR               | 540       | 317875           | NR               | 670       | 128599           | NR               | 800       | 9675             | NR               | 930       | 9904             | NR               |
| 415       | 16727            | NR               | 545       | 336094           | NR               | 675       | 110738           | NR               | 805       | 9859             | NR               | 935       | 9277             | NR               |
| 420       | 30410            | NR               | 550       | 355114           | NR               | 680       | 95972            | NR               | 810       | 9869             | NR               | 940       | 9862             | NR               |
| 425       | 53420            | NR               | 555       | 378403           | NR               | 685       | 83465            | NR               | 815       | 10276            | NR               | 945       | 11594            | NR               |
| 430       | 89156            | NR               | 560       | 399679           | NR               | 690       | 72721            | NR               | 820       | 10232            | NR               | 950       | 11887            | NR               |
| 435       | 142197           | NR               | 565       | 423645           | NR               | 695       | 63911            | NR               | 825       | 10857            | NR               | 955       | 8965             | NR               |
| 440       | 226845           | NR               | 570       | 445147           | NR               | 700       | 55055            | NR               | 830       | 9619             | NR               | 960       | 11572            | NR               |
| 445       | 350540           | NR               | 575       | 463862           | NR               | 705       | 48705            | NR               | 835       | 8389             | NR               | 965       | 9869             | NR               |
| 450       | 392129           | NR               | 580       | 480777           | NR               | 710       | 43400            | NR               | 840       | 9682             | NR               | 970       | 13235            | NR               |
| 455       | 277676           | NR               | 585       | 486479           | NR               | 715       | 39918            | NR               | 845       | 8871             | NR               | 975       | 10310            | NR               |
| 460       | 181452           | NR               | 590       | 487337           | NR               | 720       | 35595            | NR               | 850       | 9686             | NR               | 980       | 12444            | NR               |
| 465       | 133159           | NR               | 595       | 482847           | NR               | 725       | 31639            | NR               | 855       | 11822            | NR               | 985       | 14597            | NR               |
| 470       | 92882            | NR               | 600       | 471286           | NR               | 730       | 28555            | NR               | 860       | 11731            | NR               | 990       | 16092            | NR               |
| 475       | 66501            | NR               | 605       | 455024           | NR               | 735       | 24821            | NR               | 865       | 12816            | NR               | 995       | 14551            | NR               |
| 480       | 57816            | NR               | 610       | 434209           | NR               | 740       | 22145            | NR               | 870       | 14159            | NR               | 1000      | 5319             | NR               |
| 485       | 57380            | NR               | 615       | 407697           | NR               | 745       | 20684            | NR               | 875       | 12561            | NR               |           |                  |                  |

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**Melanopic Flux vs. Wavelength**



**Melanopic Lumens: 12664.2 M/P: 0.5**

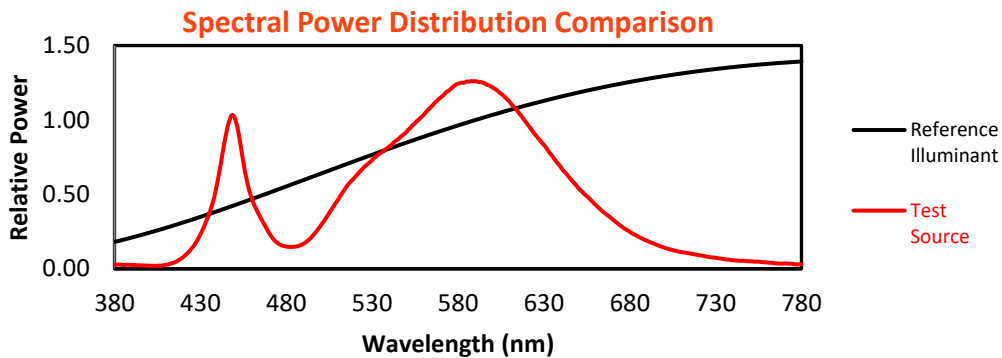
| λ<br>(nm) | Power<br>(μW/nm) | Lumens<br>(φ/nm) | λ<br>(nm) | Power<br>(μW/nm) | Lumens<br>(φ/nm) | λ<br>(nm) | Power<br>(μW/nm) | Lumens<br>(φ/nm) | λ<br>(nm) | Power<br>(μW/nm) | Lumens<br>(φ/nm) | λ<br>(nm) | Power<br>(μW/nm) | Lumens<br>(φ/nm) |
|-----------|------------------|------------------|-----------|------------------|------------------|-----------|------------------|------------------|-----------|------------------|------------------|-----------|------------------|------------------|
| 360       | 11069            | NR               | 490       | 64826            | NR               | 620       | 378287           | NR               | 750       | 19405            | NR               | 880       | 10598            | NR               |
| 365       | 9532             | NR               | 495       | 83788            | NR               | 625       | 348295           | NR               | 755       | 18362            | NR               | 885       | 11768            | NR               |
| 370       | 10973            | NR               | 500       | 111516           | NR               | 630       | 321786           | NR               | 760       | 16477            | NR               | 890       | 9466             | NR               |
| 375       | 11762            | NR               | 505       | 144674           | NR               | 635       | 292338           | NR               | 765       | 14099            | NR               | 895       | 10985            | NR               |
| 380       | 11270            | NR               | 510       | 178210           | NR               | 640       | 263074           | NR               | 770       | 13754            | NR               | 900       | 13336            | NR               |
| 385       | 9763             | NR               | 515       | 212444           | NR               | 645       | 236032           | NR               | 775       | 12358            | NR               | 905       | 8557             | NR               |
| 390       | 9964             | NR               | 520       | 238043           | NR               | 650       | 210183           | NR               | 780       | 11829            | NR               | 910       | 9683             | NR               |
| 395       | 8870             | NR               | 525       | 262630           | NR               | 655       | 188533           | NR               | 785       | 10905            | NR               | 915       | 8102             | NR               |
| 400       | 7833             | NR               | 530       | 282711           | NR               | 660       | 166359           | NR               | 790       | 10518            | NR               | 920       | 10188            | NR               |
| 405       | 7894             | NR               | 535       | 301137           | NR               | 665       | 146164           | NR               | 795       | 11147            | NR               | 925       | 12355            | NR               |
| 410       | 10280            | NR               | 540       | 317875           | NR               | 670       | 128599           | NR               | 800       | 9675             | NR               | 930       | 9904             | NR               |
| 415       | 16727            | NR               | 545       | 336094           | NR               | 675       | 110738           | NR               | 805       | 9859             | NR               | 935       | 9277             | NR               |
| 420       | 30410            | NR               | 550       | 355114           | NR               | 680       | 95972            | NR               | 810       | 9869             | NR               | 940       | 9862             | NR               |
| 425       | 53420            | NR               | 555       | 378403           | NR               | 685       | 83465            | NR               | 815       | 10276            | NR               | 945       | 11594            | NR               |
| 430       | 89156            | NR               | 560       | 399679           | NR               | 690       | 72721            | NR               | 820       | 10232            | NR               | 950       | 11887            | NR               |
| 435       | 142197           | NR               | 565       | 423645           | NR               | 695       | 63911            | NR               | 825       | 10857            | NR               | 955       | 8965             | NR               |
| 440       | 226845           | NR               | 570       | 445147           | NR               | 700       | 55055            | NR               | 830       | 9619             | NR               | 960       | 11572            | NR               |
| 445       | 350540           | NR               | 575       | 463862           | NR               | 705       | 48705            | NR               | 835       | 8389             | NR               | 965       | 9869             | NR               |
| 450       | 392129           | NR               | 580       | 480777           | NR               | 710       | 43400            | NR               | 840       | 9682             | NR               | 970       | 13235            | NR               |
| 455       | 277676           | NR               | 585       | 486479           | NR               | 715       | 39918            | NR               | 845       | 8871             | NR               | 975       | 10310            | NR               |
| 460       | 181452           | NR               | 590       | 487337           | NR               | 720       | 35595            | NR               | 850       | 9686             | NR               | 980       | 12444            | NR               |
| 465       | 133159           | NR               | 595       | 482847           | NR               | 725       | 31639            | NR               | 855       | 11822            | NR               | 985       | 14597            | NR               |
| 470       | 92882            | NR               | 600       | 471286           | NR               | 730       | 28555            | NR               | 860       | 11731            | NR               | 990       | 16092            | NR               |
| 475       | 66501            | NR               | 605       | 455024           | NR               | 735       | 24821            | NR               | 865       | 12816            | NR               | 995       | 14551            | NR               |
| 480       | 57816            | NR               | 610       | 434209           | NR               | 740       | 22145            | NR               | 870       | 14159            | NR               | 1000      | 5319             | NR               |
| 485       | 57380            | NR               | 615       | 407697           | NR               | 745       | 20684            | NR               | 875       | 12561            | NR               |           |                  |                  |

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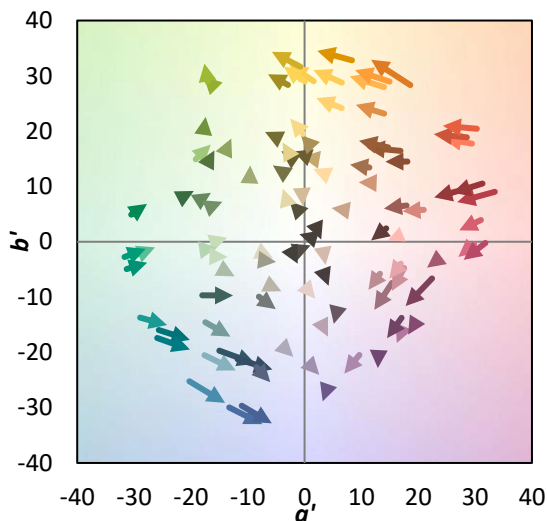
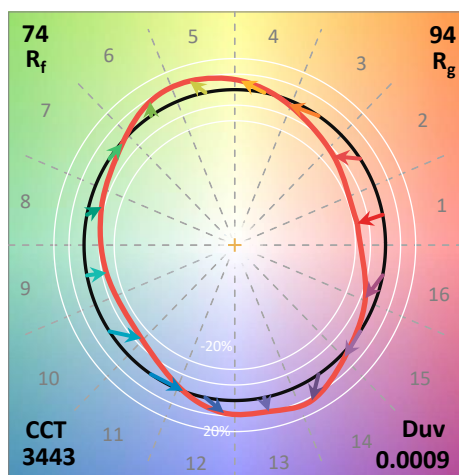
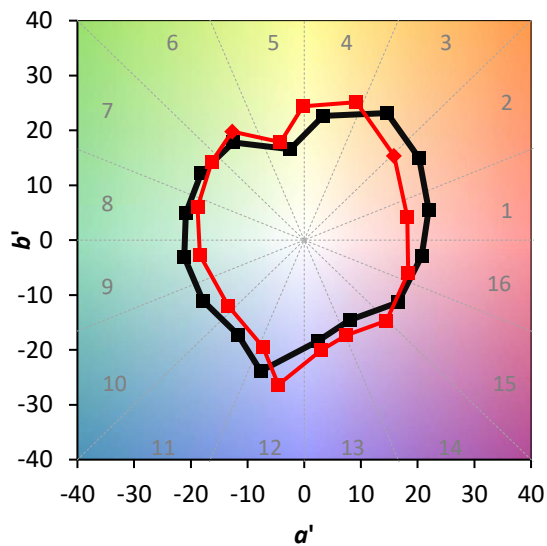
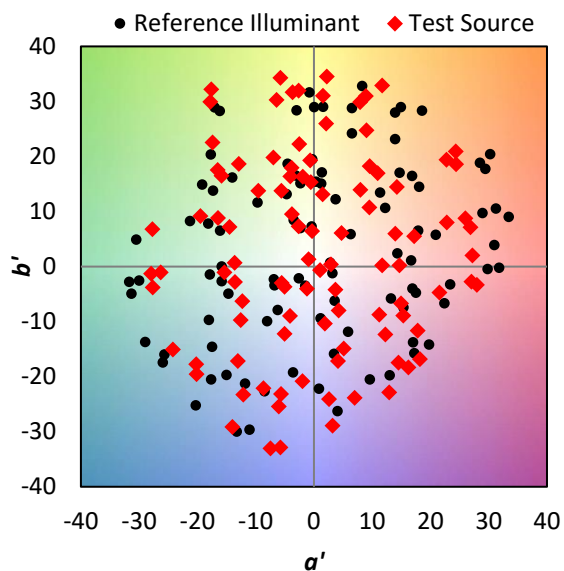
**TM-30-18**

**Summary**

$R_f = 74.2$   
 $R_g = 93.7$   
 CIE  $R_a = 71.3$   
 $R_g = -34.0$



**Color Vector Graphics**

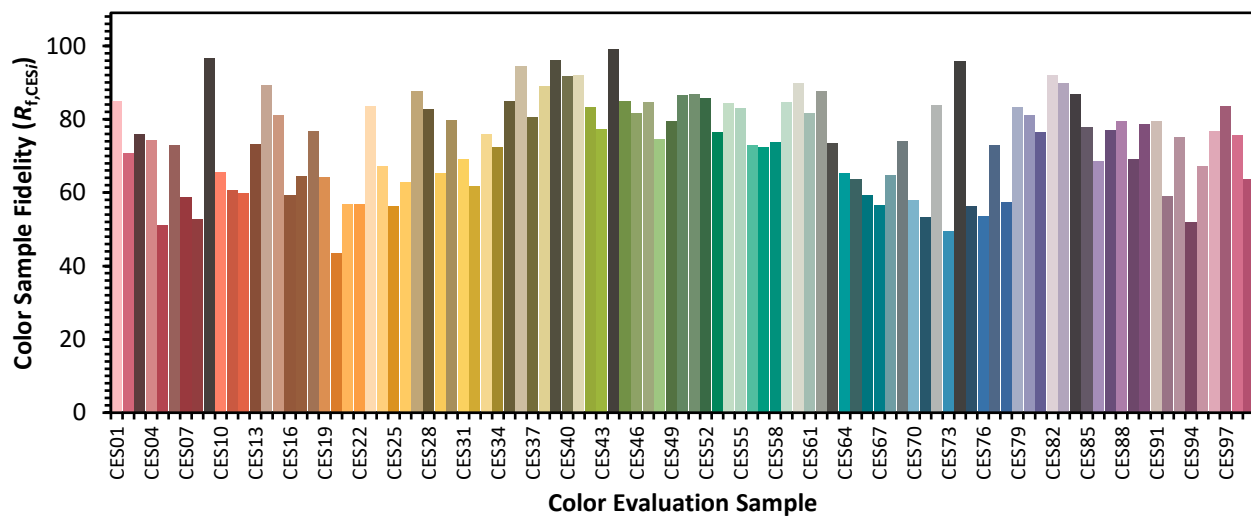


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**Individual Sample Fidelity Index ( $R_{f,i}$ )**

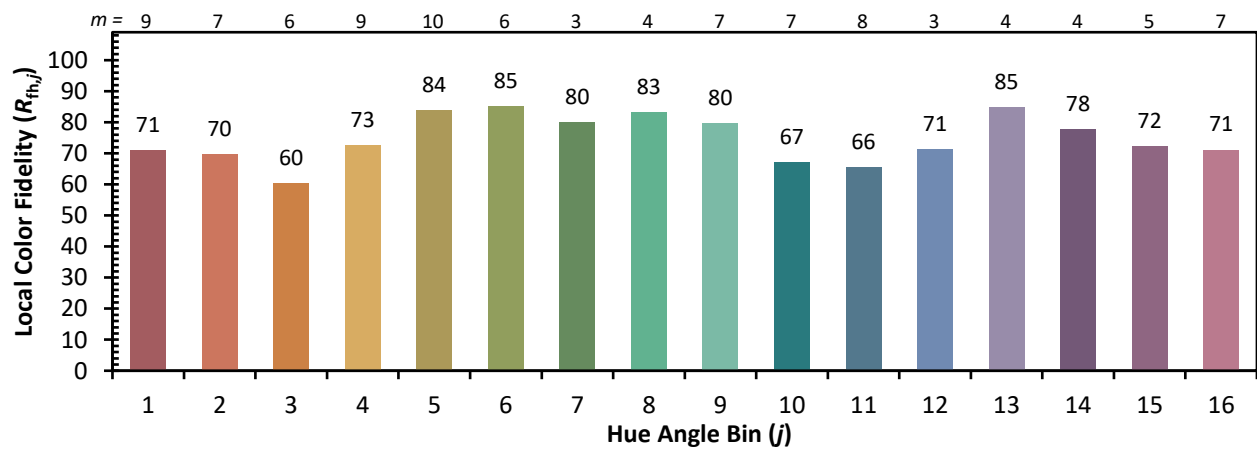
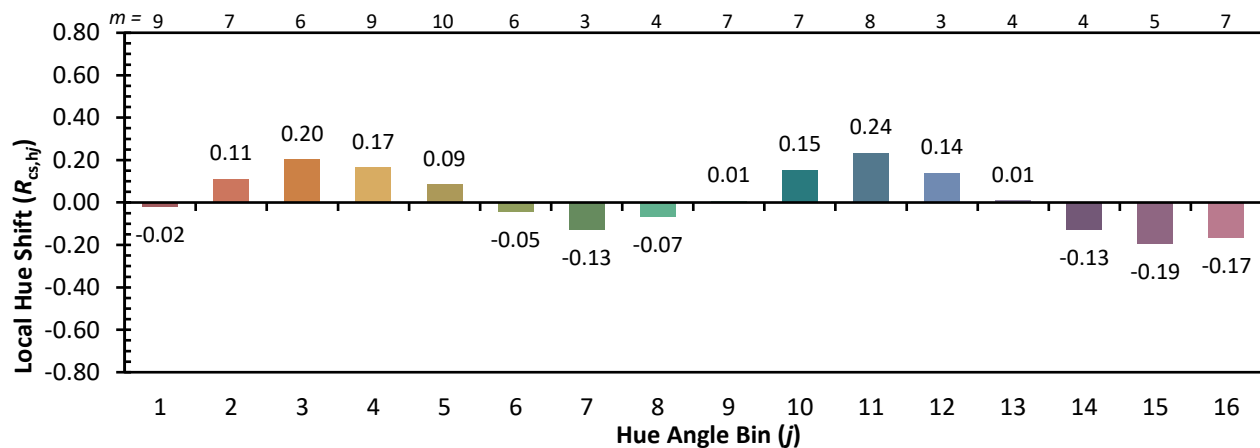
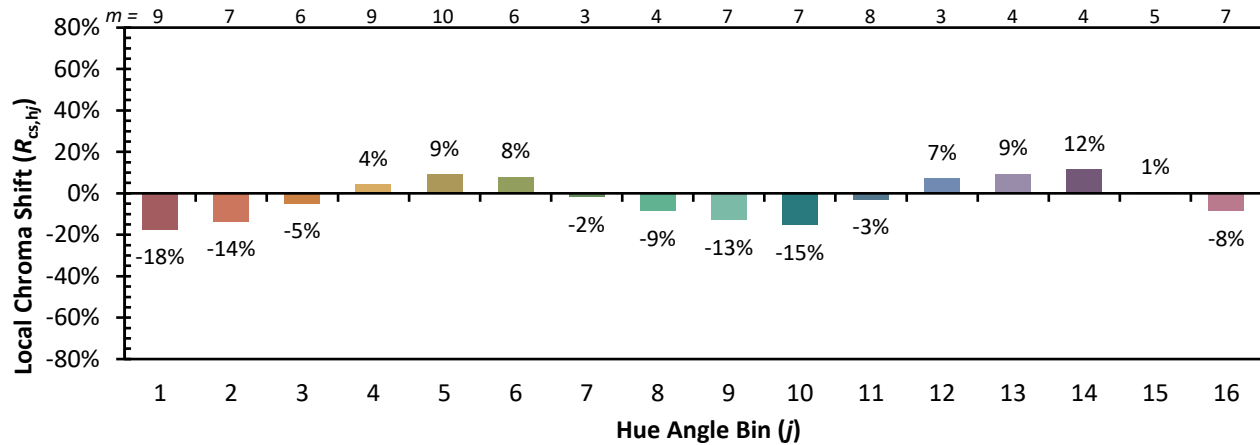
|            |            |            |            |
|------------|------------|------------|------------|
| CES01 = 86 | CES26 = 63 | CES51 = 87 | CES76 = 54 |
| CES02 = 62 | CES27 = 88 | CES52 = 86 | CES77 = 73 |
| CES03 = 31 | CES28 = 83 | CES53 = 76 | CES78 = 57 |
| CES04 = 70 | CES29 = 65 | CES54 = 84 | CES79 = 83 |
| CES05 = 48 | CES30 = 80 | CES55 = 83 | CES80 = 81 |
| CES06 = 51 | CES31 = 69 | CES56 = 73 | CES81 = 76 |
| CES07 = 40 | CES32 = 62 | CES57 = 72 | CES82 = 92 |
| CES08 = 39 | CES33 = 76 | CES58 = 74 | CES83 = 90 |
| CES09 = 29 | CES34 = 72 | CES59 = 85 | CES84 = 87 |
| CES10 = 75 | CES35 = 85 | CES60 = 90 | CES85 = 78 |
| CES11 = 58 | CES36 = 94 | CES61 = 82 | CES86 = 69 |
| CES12 = 64 | CES37 = 81 | CES62 = 88 | CES87 = 77 |
| CES13 = 42 | CES38 = 89 | CES63 = 73 | CES88 = 79 |
| CES14 = 74 | CES39 = 96 | CES64 = 65 | CES89 = 69 |
| CES15 = 71 | CES40 = 92 | CES65 = 64 | CES90 = 79 |
| CES16 = 47 | CES41 = 92 | CES66 = 59 | CES91 = 80 |
| CES17 = 50 | CES42 = 83 | CES67 = 57 | CES92 = 59 |
| CES18 = 56 | CES43 = 77 | CES68 = 65 | CES93 = 75 |
| CES19 = 72 | CES44 = 99 | CES69 = 74 | CES94 = 52 |
| CES20 = 65 | CES45 = 85 | CES70 = 58 | CES95 = 67 |
| CES21 = 87 | CES46 = 82 | CES71 = 53 | CES96 = 77 |
| CES22 = 79 | CES47 = 85 | CES72 = 84 | CES97 = 84 |
| CES23 = 92 | CES48 = 75 | CES73 = 49 | CES98 = 76 |
| CES24 = 91 | CES49 = 79 | CES74 = 96 | CES99 = 64 |
| CES25 = 72 | CES50 = 86 | CES75 = 56 |            |



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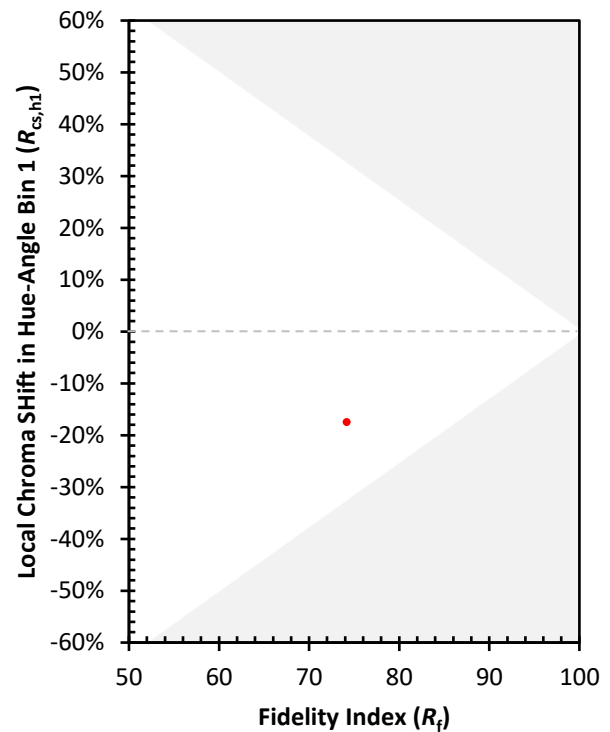
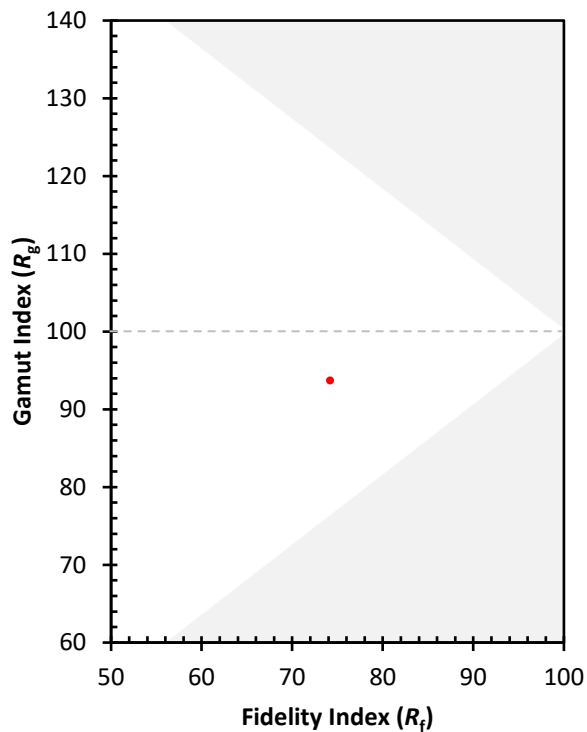
**Color Rendition by Hue-Angle Bin**



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**Measure Comparisons**



(END OF REPORT)