

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: P859971

Luminaire Tested: **SPHB-18SE-N-L735-CD**

Issue Date: 7/11/2024



**Test Information**

Test Method: LM-79-08  
Report Number: P859971  
TEST IS SCALED FROM IESNA LM-79-08 TEST DATA (G3-2404-343-7)  
Test Lab: INNOVATION CENTER  
Issue Date: 7/11/2024  
Manufacturer: COOPER LIGHTING SOLUTIONS (FORMERLY EATON)  
Product Line: METALUX  
Catalog Number: SPHB-18SE-N-L735-CD  
Description: 18000 Lumen Standard Efficacy Select Pro High Bay with Narrow Lens  
and, 3500K 70CRI LEDs  
Light Source: -  
Ballast/Driver: -

Luminaire Equipment: Sample No.   Condition   Description

**Summary**

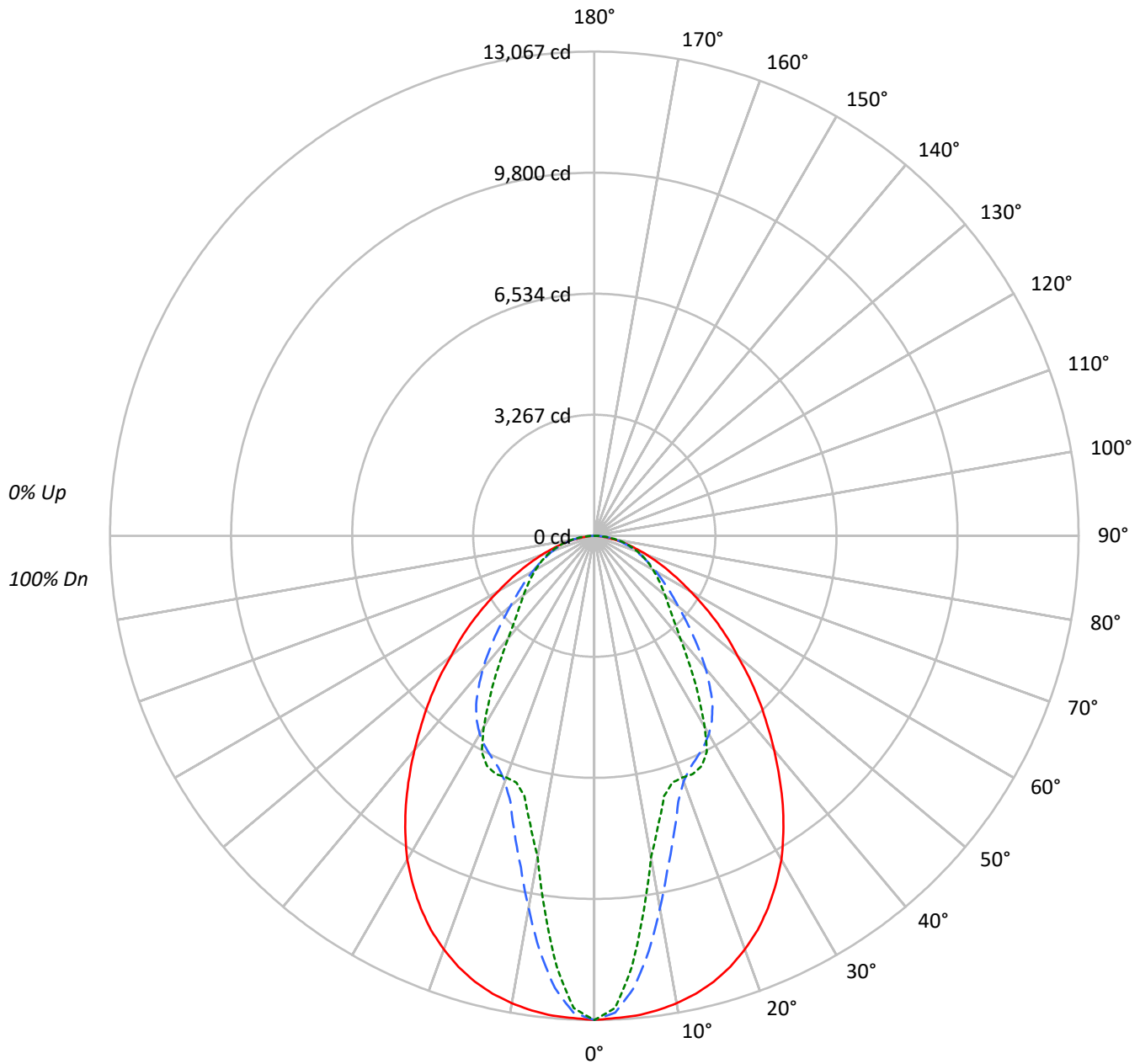
Lumens per Lamp: N/A  
Luminaire Lumens: 19151.0 lumens  
Efficiency: N/A  
Efficacy: 163.1 lumens/watt  
Spacing Criteria (0/90/45): 1.16 / 0.54 / 0.94  
Luminous Opening: Rectangular (W 1' x L: 1.38' x H: 0')  
CIE Type: Direct

Input Watts (W): 117.4  
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: P859971

CATALOG NUMBER: SPHB-18SE-N-L735-CD

### Luminous Intensity Polar Plot





TEST NUMBER: P859971

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

|     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |    |    |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|----|----|
| RF  | 20  |     |     |     | 20  |     |     |     |     | 20  |     |     |     |     | 20  |     |     |     |    | 20 |
| RC  | 80  |     |     |     | 70  |     |     |     |     | 50  |     |     |     |     | 30  |     |     |     |    | 10 |
| RW  | 70  | 50  | 30  | 10  | 70  | 50  | 30  | 10  | 50  | 30  | 10  | 50  | 30  | 10  | 50  | 30  | 10  | 50  | 30 | 10 |
| RCR |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |    |    |
| 0   | 119 | 119 | 119 | 119 | 116 | 116 | 116 | 116 | 111 | 111 | 111 | 106 | 106 | 106 | 102 | 102 | 102 | 100 |    |    |
| 1   | 110 | 106 | 102 | 98  | 107 | 103 | 100 | 97  | 99  | 96  | 94  | 95  | 93  | 91  | 92  | 90  | 88  | 86  |    |    |
| 2   | 101 | 94  | 88  | 83  | 99  | 92  | 86  | 82  | 88  | 84  | 80  | 85  | 81  | 78  | 82  | 79  | 76  | 74  |    |    |
| 3   | 93  | 84  | 76  | 71  | 91  | 82  | 75  | 70  | 79  | 73  | 69  | 77  | 72  | 68  | 74  | 70  | 66  | 64  |    |    |
| 4   | 86  | 75  | 67  | 61  | 84  | 74  | 67  | 61  | 72  | 65  | 60  | 69  | 64  | 59  | 67  | 62  | 58  | 56  |    |    |
| 5   | 80  | 68  | 60  | 54  | 78  | 67  | 59  | 54  | 65  | 58  | 53  | 63  | 57  | 53  | 61  | 56  | 52  | 50  |    |    |
| 6   | 74  | 62  | 54  | 48  | 73  | 61  | 54  | 48  | 60  | 53  | 47  | 58  | 52  | 47  | 56  | 51  | 47  | 45  |    |    |
| 7   | 70  | 57  | 49  | 43  | 68  | 56  | 49  | 43  | 55  | 48  | 43  | 53  | 47  | 43  | 52  | 46  | 42  | 40  |    |    |
| 8   | 65  | 53  | 45  | 39  | 64  | 52  | 44  | 39  | 51  | 44  | 39  | 49  | 43  | 39  | 48  | 43  | 38  | 37  |    |    |
| 9   | 61  | 49  | 41  | 36  | 60  | 48  | 41  | 36  | 47  | 40  | 36  | 46  | 40  | 35  | 45  | 39  | 35  | 34  |    |    |
| 10  | 58  | 45  | 38  | 33  | 56  | 45  | 38  | 33  | 44  | 37  | 33  | 43  | 37  | 33  | 42  | 37  | 33  | 31  |    |    |

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

|     | 0°     | 45°    | 90°    |
|-----|--------|--------|--------|
| 0°  | 101923 | 101923 | 101923 |
| 5°  | 101804 | 95899  | 91361  |
| 10° | 101456 | 80835  | 69686  |
| 15° | 100612 | 67102  | 58724  |
| 20° | 98585  | 58492  | 57647  |
| 25° | 95417  | 56594  | 58998  |
| 30° | 90906  | 55687  | 53692  |
| 35° | 84406  | 52917  | 44492  |
| 40° | 76860  | 47506  | 36739  |
| 45° | 69379  | 41221  | 32253  |
| 50° | 61227  | 35843  | 30202  |
| 55° | 54330  | 32327  | 29071  |
| 60° | 46561  | 29894  | 28478  |
| 65° | 40303  | 28096  | 28334  |
| 70° | 34489  | 27027  | 28302  |
| 75° | 28952  | 26246  | 28048  |
| 80° | 22091  | 25361  | 27467  |
| 85° | 14462  | 22499  | 21156  |



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**ZONAL LUMENS:**

| Zone      | Lumens  | % Fixture |
|-----------|---------|-----------|
| 0°-10°    | 1114.1  | 5.8       |
| 10°-20°   | 2558.1  | 13.4      |
| 20°-30°   | 3457.1  | 18.1      |
| 30°-40°   | 3638.4  | 19.0      |
| 40°-50°   | 3087.3  | 16.1      |
| 50°-60°   | 2391.6  | 12.5      |
| 60°-70°   | 1665.7  | 8.7       |
| 70°-80°   | 953.8   | 5.0       |
| 80°-90°   | 277.6   | 1.4       |
| 90°-100°  | 7.4     | 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°    | 7129.3  | 37.2      |
| 0°-40°    | 10767.7 | 56.2      |
| 0°-60°    | 16246.6 | 84.8      |
| 0°-90°    | 19143.6 | 100.0     |
| 90°-120°  | 7.4     | 0.0       |
| 90°-150°  | 7.4     | 0.0       |
| 90°-180°  | 7.0     | 0.0       |
| 0°-180°   | 19151.0 | 100.0     |

**CANDELA DISTRIBUTION:**

|      | 0°    | 22.5° | 45°   | 67.5° | 90°   | Flux |
|------|-------|-------|-------|-------|-------|------|
| 0°   | 13067 | 13067 | 13067 | 13067 | 13067 |      |
| 5°   | 13002 | 12764 | 12248 | 11778 | 11668 | ###  |
| 15°  | 12460 | 10575 | 8310  | 7480  | 7272  | 3506 |
| 25°  | 11087 | 7832  | 6576  | 6766  | 6855  | 5090 |
| 35°  | 8864  | 6023  | 5557  | 5020  | 4673  | 5526 |
| 45°  | 6290  | 4523  | 3737  | 3070  | 2924  | 4844 |
| 55°  | 3995  | 3047  | 2377  | 2161  | 2138  | 3572 |
| 65°  | 2184  | 1788  | 1522  | 1522  | 1535  | 2181 |
| 75°  | 961   | 854   | 871   | 926   | 931   | 1024 |
| 85°  | 162   | 210   | 251   | 236   | 236   | 205  |
| 90°  | 1     | 19    | 37    | 47    | 49    | 9    |
| 95°  | 1     | 3     | 6     | 6     | 5     | 0    |
| 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     | 0    |



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**CANDELA DISTRIBUTION (FULL):**

|        | 0°      | 22.5°   | 45°     | 67.5°   | 90°     |
|--------|---------|---------|---------|---------|---------|
| 0°     | 13067.1 | 13067.1 | 13067.1 | 13067.1 | 13067.1 |
| 2.5°   | 13029.2 | 12986.3 | 12881.5 | 12813.7 | 12760.8 |
| 5°     | 13002.2 | 12763.8 | 12248.1 | 11778.2 | 11668.5 |
| 7.5°   | 12921.4 | 12397.7 | 11295.4 | 10426.5 | 10207.0 |
| 10°    | 12809.7 | 11872.0 | 10206.1 | 9117.7  | 8798.5  |
| 12.5°  | 12661.1 | 11310.4 | 9162.6  | 8137.1  | 7980.5  |
| 15°    | 12459.5 | 10575.1 | 8309.7  | 7479.7  | 7272.2  |
| 17.5°  | 12198.2 | 9815.0  | 7522.6  | 7042.8  | 6984.9  |
| 20°    | 11877.0 | 9117.7  | 7046.8  | 6883.2  | 6945.0  |
| 22.5°  | 11515.9 | 8440.4  | 6770.5  | 6839.3  | 6955.0  |
| 25°    | 11086.9 | 7831.9  | 6575.9  | 6766.5  | 6855.2  |
| 27.5°  | 10605.1 | 7282.2  | 6397.4  | 6571.9  | 6571.9  |
| 30°    | 10093.3 | 6824.3  | 6182.9  | 6166.9  | 5961.4  |
| 32.5°  | 9495.8  | 6435.3  | 5902.6  | 5586.3  | 5281.1  |
| 35°    | 8864.3  | 6023.3  | 5557.4  | 5019.7  | 4672.6  |
| 37.5°  | 8202.0  | 5640.2  | 5120.5  | 4411.2  | 4088.0  |
| 40°    | 7548.5  | 5262.1  | 4665.6  | 3864.6  | 3608.2  |
| 42.5°  | 6898.1  | 4877.1  | 4191.8  | 3421.6  | 3219.1  |
| 45°    | 6289.6  | 4522.9  | 3736.9  | 3070.5  | 2923.9  |
| 47.5°  | 5671.1  | 4146.9  | 3316.9  | 2788.2  | 2686.4  |
| 50°    | 5045.7  | 3765.8  | 2953.8  | 2563.7  | 2488.9  |
| 52.5°  | 4519.0  | 3410.7  | 2645.5  | 2351.3  | 2306.4  |
| 55°    | 3995.2  | 3046.6  | 2377.2  | 2160.7  | 2137.8  |
| 57.5°  | 3475.5  | 2707.4  | 2131.8  | 1986.1  | 1981.2  |
| 60°    | 2984.7  | 2390.2  | 1916.3  | 1836.5  | 1825.5  |
| 62.5°  | 2566.7  | 2074.9  | 1711.8  | 1673.9  | 1678.9  |
| 65°    | 2183.7  | 1787.6  | 1522.3  | 1522.3  | 1535.2  |
| 67.5°  | 1828.5  | 1523.3  | 1348.7  | 1371.6  | 1389.6  |
| 70°    | 1512.3  | 1283.9  | 1185.1  | 1225.0  | 1241.0  |
| 72.5°  | 1213.0  | 1061.4  | 1028.5  | 1072.4  | 1085.3  |
| 75°    | 960.7   | 853.9   | 870.9   | 925.7   | 930.7   |
| 77.5°  | 712.3   | 672.4   | 716.2   | 776.1   | 787.1   |
| 80°    | 491.8   | 495.8   | 564.6   | 606.5   | 611.5   |
| 82.5°  | 317.2   | 346.2   | 423.0   | 444.9   | 436.9   |
| 85°    | 161.6   | 209.5   | 251.4   | 236.4   | 236.4   |
| 87.5°  | 61.8    | 90.8    | 106.7   | 125.7   | 132.7   |
| 90°    | 1.0     | 19.0    | 36.9    | 46.9    | 48.9    |
| 92.5°  | 1.0     | 5.0     | 8.0     | 9.0     | 8.0     |
| 95°    | 1.0     | 3.0     | 6.0     | 6.0     | 5.0     |
| 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

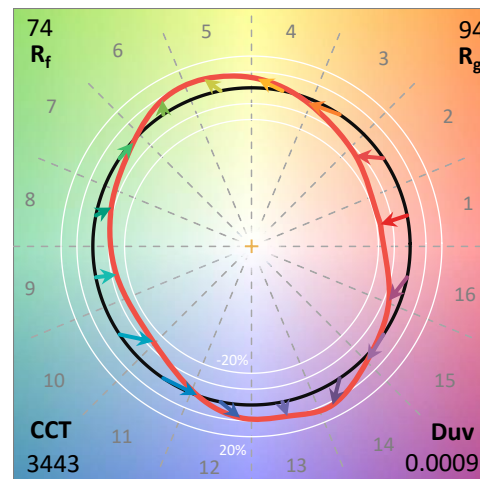
Data in this report applies to families of products SPHB-24SE-M-UNV-L735-CD.

### 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

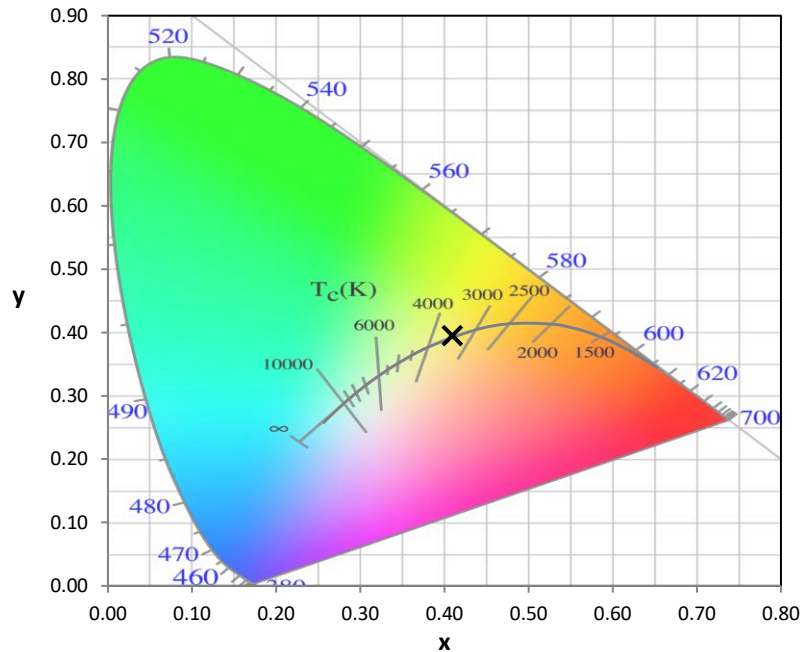
Stabilization Time: 23M  
 Operation Time: 12H  
 Room Temperature (°C) / RH%: 25.0/42%  
 Sphere Temperature (°C): 25.2

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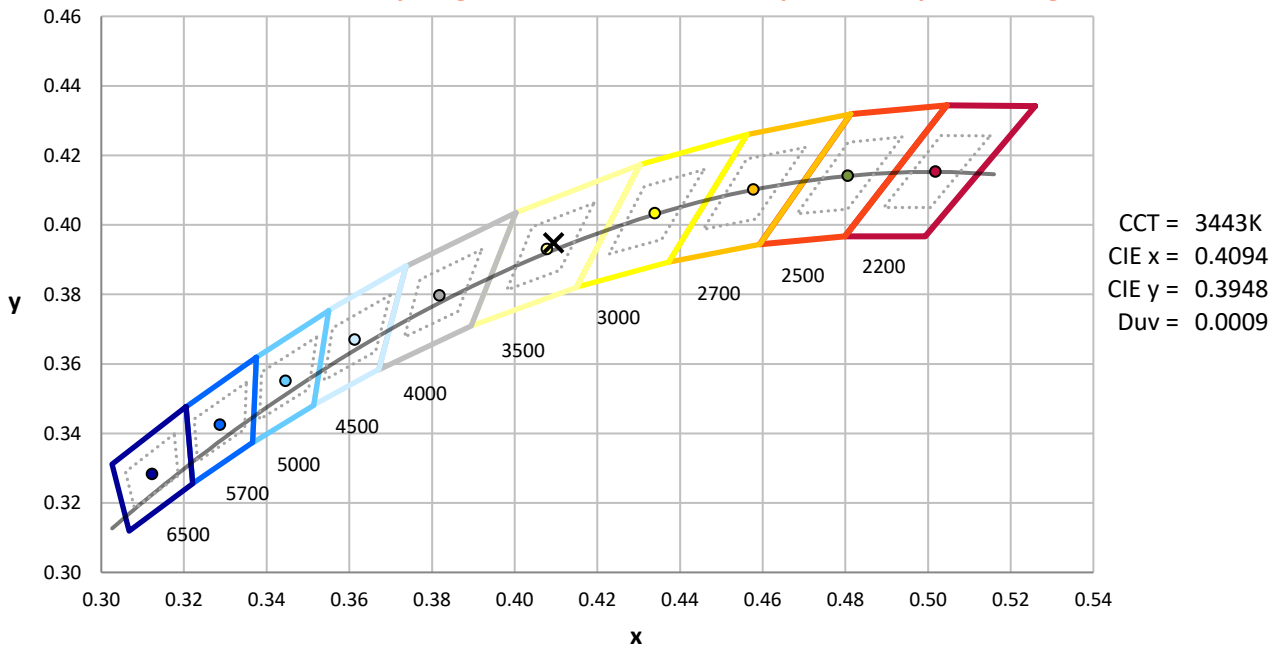
| Measurement and Test Equipment |                       |                  |                      |
|--------------------------------|-----------------------|------------------|----------------------|
| Instrument                     | Identification Number | Calibration Date | Calibration Due Date |
| 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           |

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CIE 1931 Chromaticity Diagram



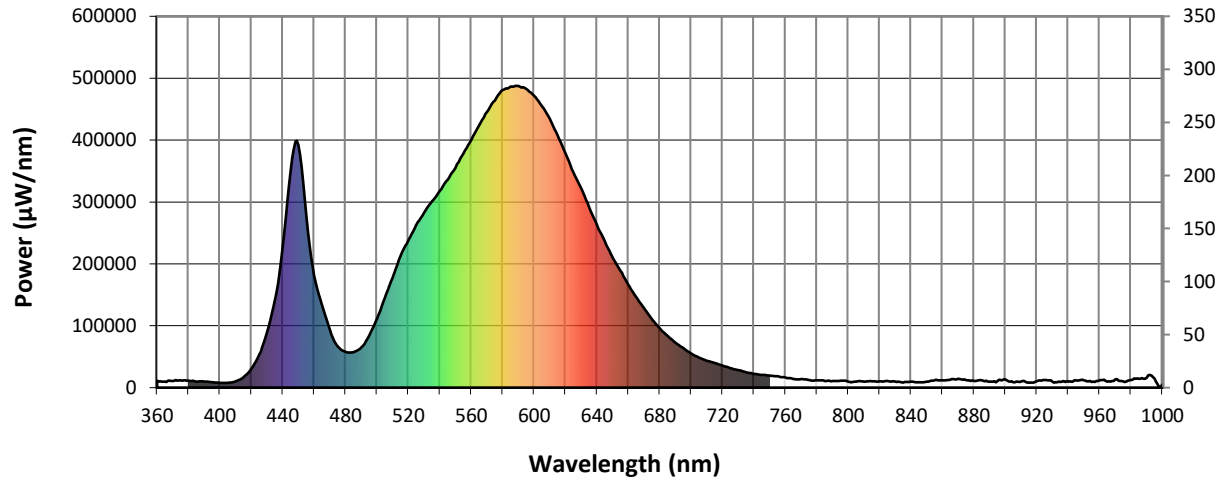
CIE 1931 Chromaticity Diagram with 2017 ANSI 7-Step and 4-Step Quadrangles



Point lies inside the ANSI 3500K 4-step quadrangle

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**Photopic Flux vs. Wavelength**

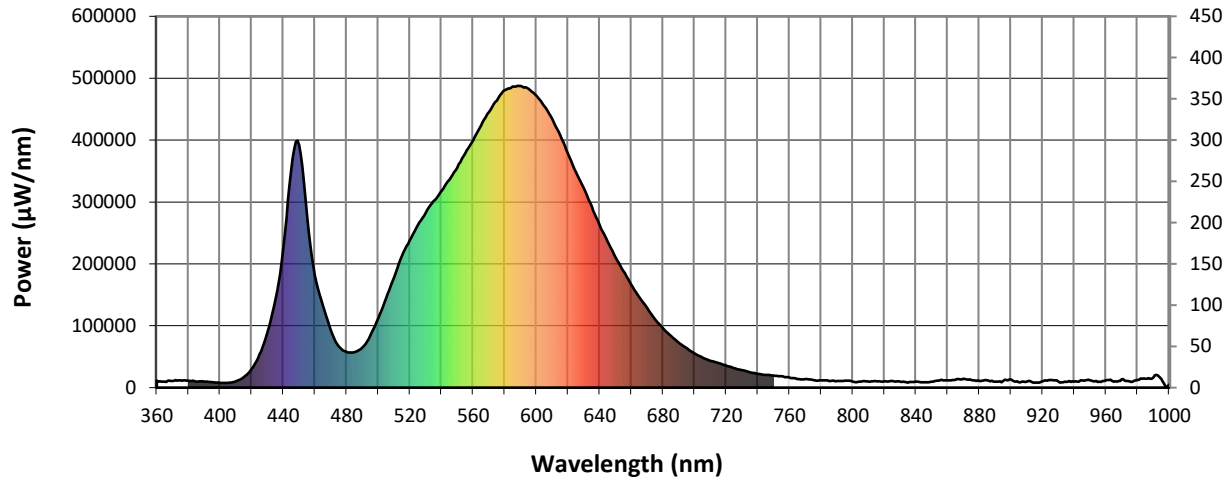


#####

| 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       | 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**



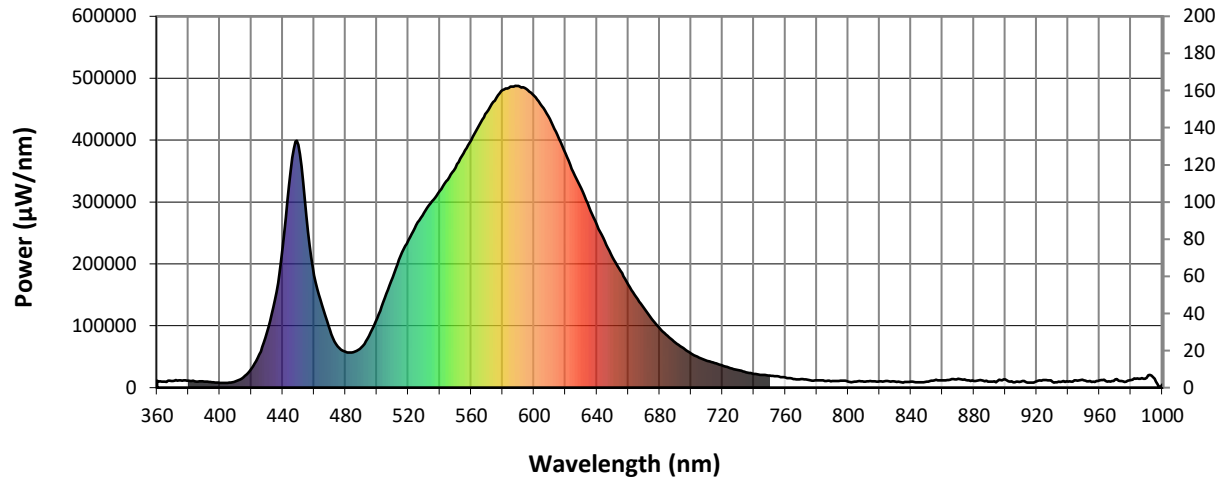
**Scotopic Lumens: 34063.8**

**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**

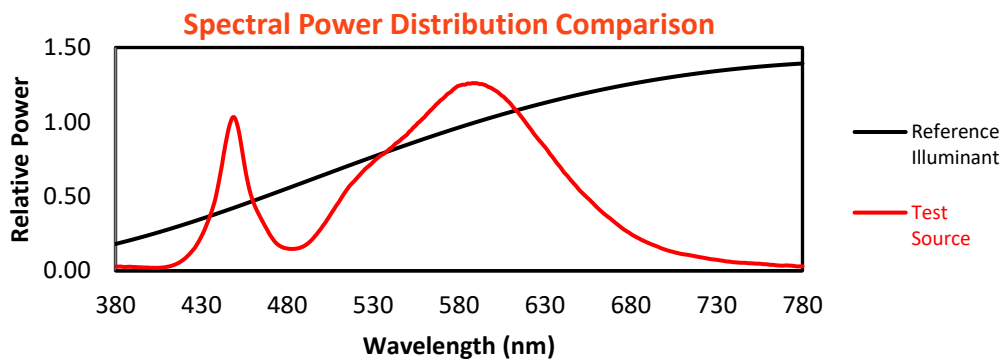
| λ<br>(nm) | Power<br>(μW/nm) | Lumens<br>(φ/nm) | λ<br>(nm) | Power<br>(μW/nm) | Lumens<br>(φ/nm) | λ<br>(nm) | Power<br>(μW/nm) | Lumens<br>(φ/nm) | λ<br>(nm) | Power<br>(μW/nm) | Lumens<br>(φ/nm) | λ<br>(nm) | Power<br>(μW/nm) | Lumens<br>(φ/nm) |
|-----------|------------------|------------------|-----------|------------------|------------------|-----------|------------------|------------------|-----------|------------------|------------------|-----------|------------------|------------------|
| 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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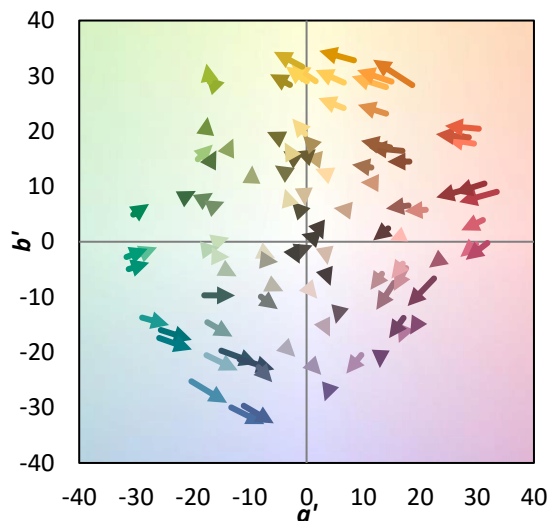
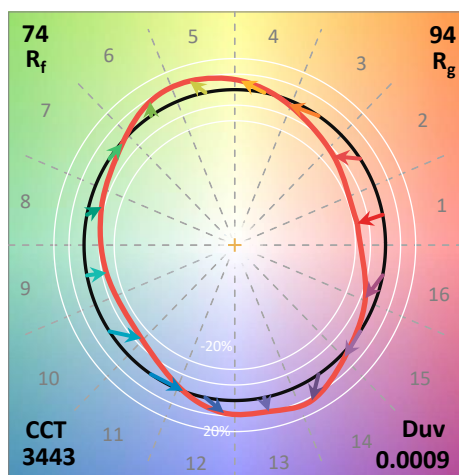
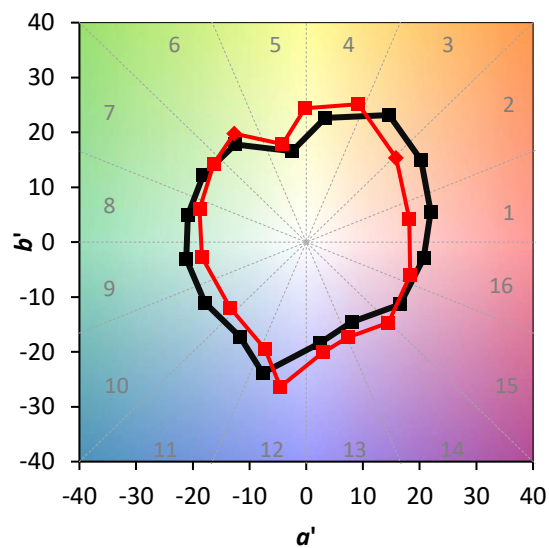
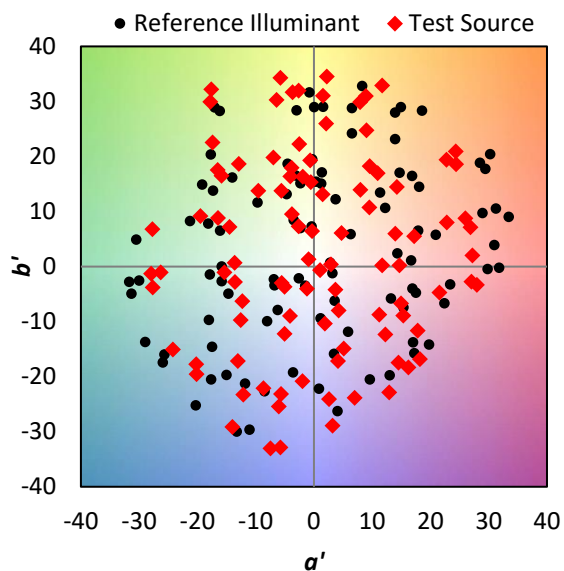
**TM-30-18**

**Summary**

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



**Color Vector Graphics**

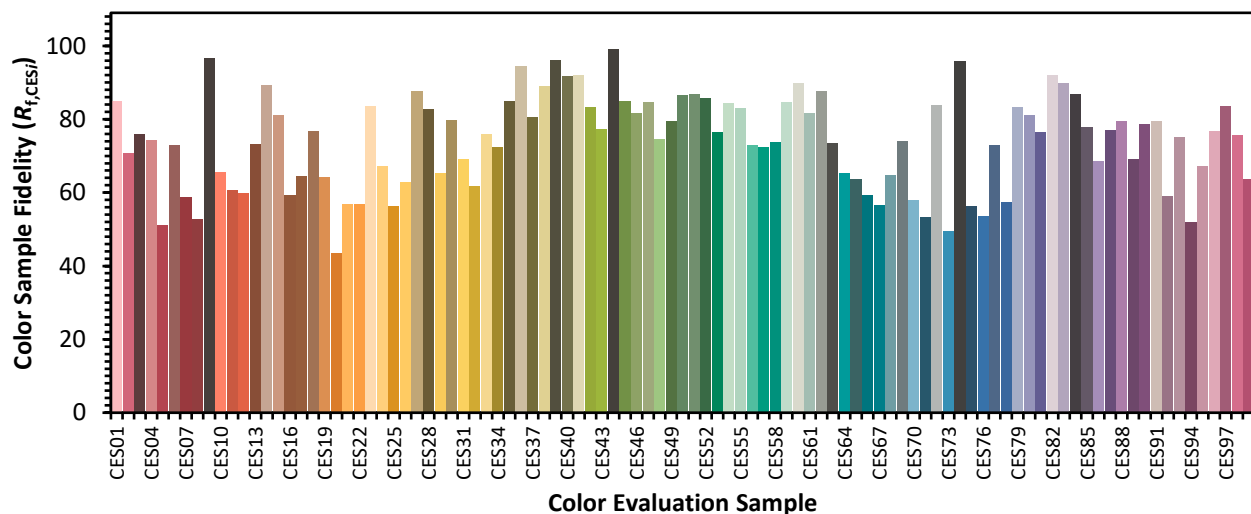


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**Individual Sample Fidelity Index ( $R_{f,i}$ )**

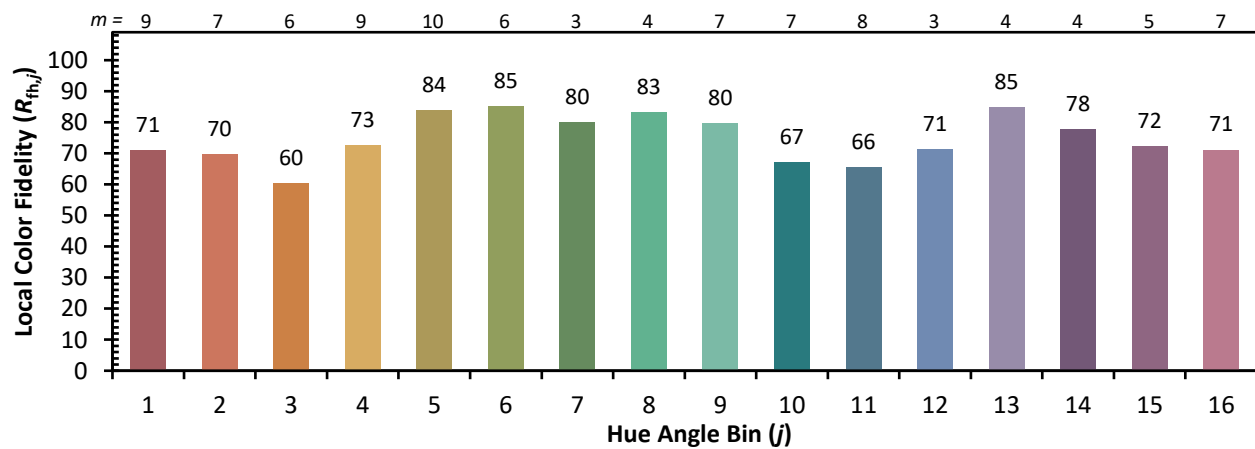
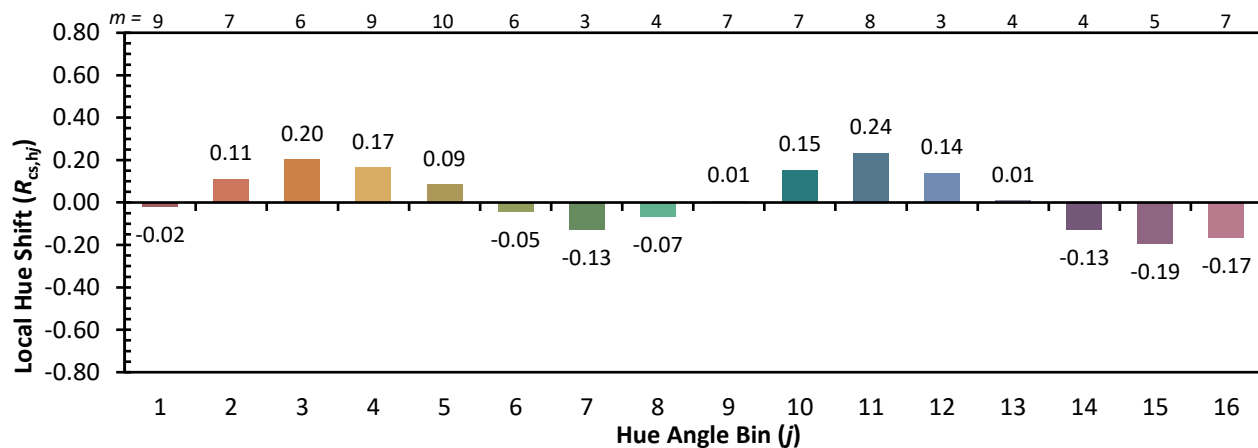
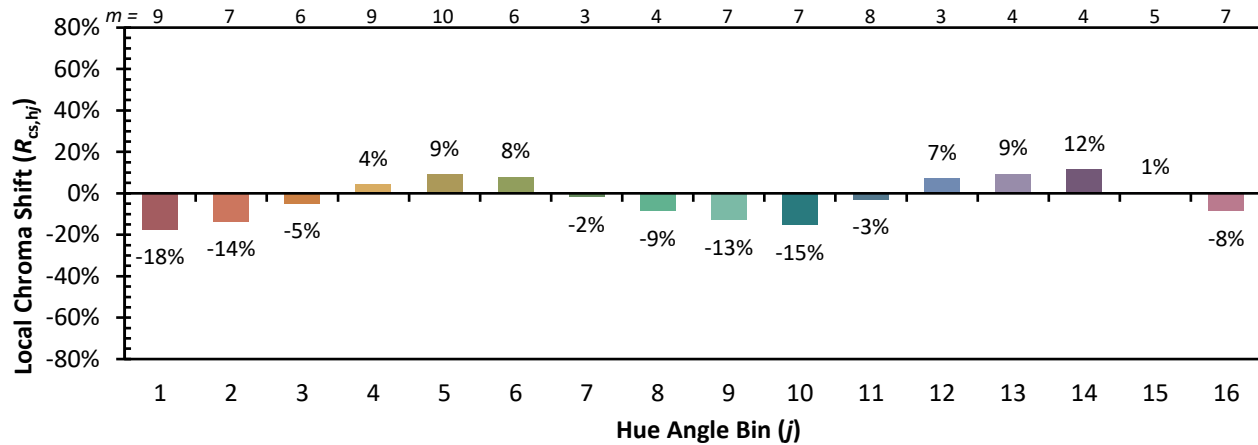
|            |            |            |            |
|------------|------------|------------|------------|
| CES01 = 86 | CES26 = 63 | CES51 = 87 | CES76 = 54 |
| CES02 = 62 | CES27 = 88 | CES52 = 86 | CES77 = 73 |
| CES03 = 31 | CES28 = 83 | CES53 = 76 | CES78 = 57 |
| CES04 = 70 | CES29 = 65 | CES54 = 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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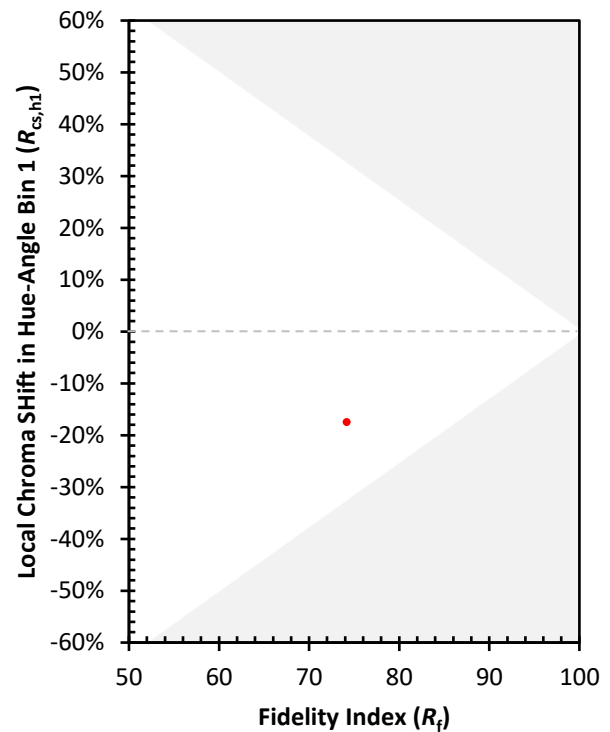
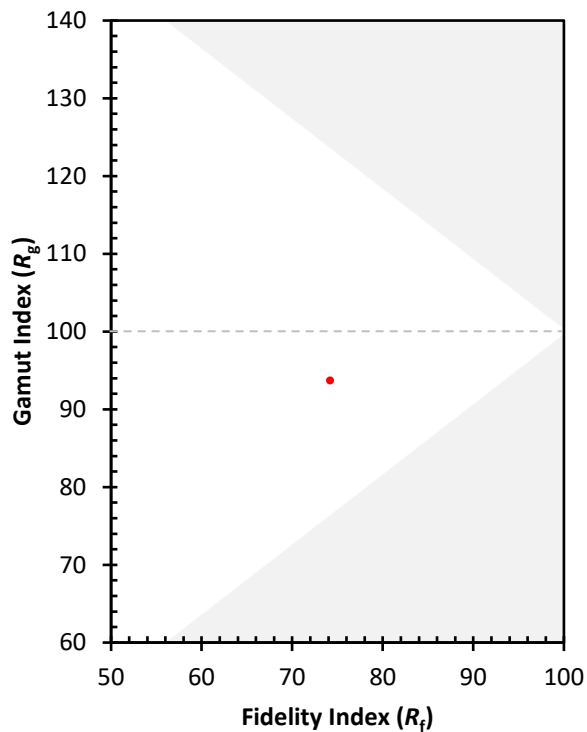
**Color Rendition by Hue-Angle Bin**



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**Measure Comparisons**



(END OF REPORT)