

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: P860027

Luminaire Tested: **SPHB-24SE-N-L750-CD**

Issue Date: 7/11/2024



**Test Information**

Test Method: LM-79-08  
Report Number: P860027  
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-24SE-N-L750-CD  
Description: 24000 Lumen Standard Efficacy Select Pro High Bay with Narrow Lens  
and, 5000K 70CRI LEDs  
Light Source: -  
Ballast/Driver: -

Luminaire Equipment: Sample No.   Condition   Description

**Summary**

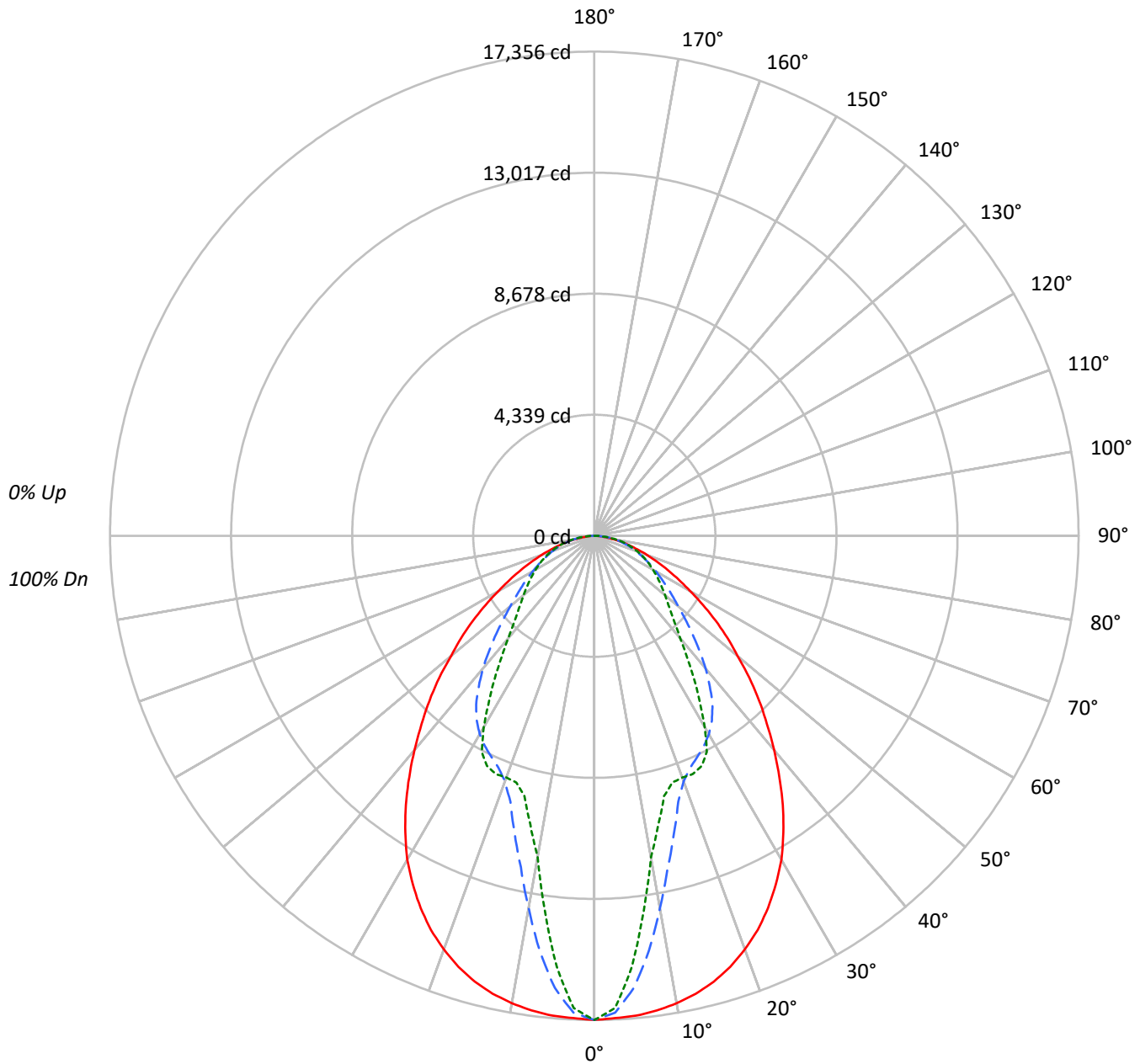
Lumens per Lamp: N/A  
Luminaire Lumens: 25437.0 lumens  
Efficiency: N/A  
Efficacy: 160.4 lumens/watt  
Spacing Criteria (0/90/45): 1.16 / 0.54 / 0.94  
Luminous Opening: Rectangular (W 1' x L: 1.38' x H: 0')  
CIE Type: Direct

Input Watts (W): 158.6  
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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### Luminous Intensity Polar Plot





TEST NUMBER: P860027

CATALOG NUMBER: SPHB-24SE-N-L750-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 | 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°  | 135377 | 135377 | 135377 |
| 5°  | 135219 | 127376 | 121349 |
| 10° | 134758 | 107367 | 92560  |
| 15° | 133636 | 89126  | 77999  |
| 20° | 130944 | 77691  | 76569  |
| 25° | 126736 | 75171  | 78364  |
| 30° | 120745 | 73965  | 71316  |
| 35° | 112111 | 70286  | 59096  |
| 40° | 102088 | 63098  | 48798  |
| 45° | 92152  | 54750  | 42839  |
| 50° | 81323  | 47607  | 40116  |
| 55° | 72163  | 42938  | 38614  |
| 60° | 61844  | 39706  | 37825  |
| 65° | 53530  | 37317  | 37636  |
| 70° | 45809  | 35898  | 37590  |
| 75° | 38454  | 34859  | 37255  |
| 80° | 29340  | 33684  | 36482  |
| 85° | 19205  | 29882  | 28101  |



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**ZONAL LUMENS:**

| Zone      | Lumens  | % Fixture |
|-----------|---------|-----------|
| 0°-10°    | 1479.8  | 5.8       |
| 10°-20°   | 3397.7  | 13.4      |
| 20°-30°   | 4591.9  | 18.1      |
| 30°-40°   | 4832.7  | 19.0      |
| 40°-50°   | 4100.7  | 16.1      |
| 50°-60°   | 3176.6  | 12.5      |
| 60°-70°   | 2212.4  | 8.7       |
| 70°-80°   | 1266.8  | 5.0       |
| 80°-90°   | 368.6   | 1.4       |
| 90°-100°  | 9.8     | 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°    | 9469.3  | 37.2      |
| 0°-40°    | 14302.0 | 56.2      |
| 0°-60°    | 21579.3 | 84.8      |
| 0°-90°    | 25427.1 | 100.0     |
| 90°-120°  | 9.8     | 0.0       |
| 90°-150°  | 9.8     | 0.0       |
| 90°-180°  | 10.0    | 0.0       |
| 0°-180°   | 25437.0 | 100.0     |

**CANDELA DISTRIBUTION:**

|      | 0°    | 22.5° | 45°   | 67.5° | 90°   | Flux |
|------|-------|-------|-------|-------|-------|------|
| 0°   | 17356 | 17356 | 17356 | 17356 | 17356 |      |
| 5°   | 17270 | 16953 | 16268 | 15644 | 15498 | ###  |
| 15°  | 16549 | 14046 | 11037 | 9935  | 9659  | 4657 |
| 25°  | 14726 | 10402 | 8734  | 8987  | 9105  | 6760 |
| 35°  | 11774 | 8000  | 7382  | 6667  | 6206  | 7339 |
| 45°  | 8354  | 6008  | 4963  | 4078  | 3884  | 6434 |
| 55°  | 5307  | 4046  | 3158  | 2870  | 2840  | 4744 |
| 65°  | 2900  | 2374  | 2022  | 2022  | 2039  | 2897 |
| 75°  | 1276  | 1134  | 1157  | 1230  | 1236  | 1361 |
| 85°  | 215   | 278   | 334   | 314   | 314   | 273  |
| 90°  | 1     | 25    | 49    | 62    | 65    | 12   |
| 95°  | 1     | 4     | 8     | 8     | 7     | 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     |      |



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**CANDELA DISTRIBUTION (FULL):**

|        | 0°      | 22.5°   | 45°     | 67.5°   | 90°     |
|--------|---------|---------|---------|---------|---------|
| 0°     | 17356.1 | 17356.1 | 17356.1 | 17356.1 | 17356.1 |
| 2.5°   | 17305.8 | 17248.8 | 17109.7 | 17019.6 | 16949.3 |
| 5°     | 17270.0 | 16953.3 | 16268.3 | 15644.2 | 15498.5 |
| 7.5°   | 17162.7 | 16467.0 | 15002.9 | 13848.8 | 13557.3 |
| 10°    | 17014.3 | 15768.8 | 13556.0 | 12110.5 | 11686.5 |
| 12.5°  | 16816.8 | 15022.8 | 12170.1 | 10808.0 | 10600.0 |
| 15°    | 16549.2 | 14046.3 | 11037.2 | 9934.8  | 9659.2  |
| 17.5°  | 16202.0 | 13036.6 | 9991.8  | 9354.5  | 9277.6  |
| 20°    | 15775.4 | 12110.5 | 9359.8  | 9142.5  | 9224.6  |
| 22.5°  | 15295.7 | 11210.8 | 8992.7  | 9084.2  | 9237.9  |
| 25°    | 14726.0 | 10402.5 | 8734.4  | 8987.4  | 9105.4  |
| 27.5°  | 14086.0 | 9672.5  | 8497.2  | 8729.1  | 8729.1  |
| 30°    | 13406.3 | 9064.3  | 8212.3  | 8191.1  | 7918.2  |
| 32.5°  | 12612.6 | 8547.5  | 7840.0  | 7420.0  | 7014.5  |
| 35°    | 11773.9 | 8000.3  | 7381.5  | 6667.4  | 6206.3  |
| 37.5°  | 10894.1 | 7491.5  | 6801.2  | 5859.1  | 5429.8  |
| 40°    | 10026.2 | 6989.3  | 6197.0  | 5133.0  | 4792.5  |
| 42.5°  | 9162.3  | 6477.9  | 5567.6  | 4544.7  | 4275.8  |
| 45°    | 8354.1  | 6007.5  | 4963.4  | 4078.3  | 3883.6  |
| 47.5°  | 7532.6  | 5508.0  | 4405.6  | 3703.4  | 3568.2  |
| 50°    | 6701.8  | 5001.9  | 3923.3  | 3405.2  | 3305.9  |
| 52.5°  | 6002.2  | 4530.2  | 3513.9  | 3123.0  | 3063.4  |
| 55°    | 5306.6  | 4046.5  | 3157.5  | 2869.9  | 2839.5  |
| 57.5°  | 4616.3  | 3596.0  | 2831.5  | 2638.1  | 2631.4  |
| 60°    | 3964.4  | 3174.7  | 2545.3  | 2439.3  | 2424.7  |
| 62.5°  | 3409.2  | 2756.0  | 2273.7  | 2223.3  | 2230.0  |
| 65°    | 2900.4  | 2374.4  | 2021.9  | 2021.9  | 2039.2  |
| 67.5°  | 2428.7  | 2023.3  | 1791.4  | 1821.9  | 1845.7  |
| 70°    | 2008.7  | 1705.3  | 1574.1  | 1627.1  | 1648.3  |
| 72.5°  | 1611.2  | 1409.8  | 1366.1  | 1424.4  | 1441.6  |
| 75°    | 1276.0  | 1134.2  | 1156.7  | 1229.6  | 1236.2  |
| 77.5°  | 946.0   | 893.0   | 951.3   | 1030.8  | 1045.4  |
| 80°    | 653.2   | 658.5   | 749.9   | 805.6   | 812.2   |
| 82.5°  | 421.3   | 459.8   | 561.8   | 590.9   | 580.3   |
| 85°    | 214.6   | 278.2   | 333.9   | 314.0   | 314.0   |
| 87.5°  | 82.1    | 120.6   | 141.8   | 166.9   | 176.2   |
| 90°    | 1.3     | 25.2    | 49.0    | 62.3    | 64.9    |
| 92.5°  | 1.3     | 6.6     | 10.6    | 11.9    | 10.6    |
| 95°    | 1.3     | 4.0     | 7.9     | 7.9     | 6.6     |
| 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: SP1-2404-343-3

Test Date: 05/20/2024

Luminaire Tested: SPHB-24SE-M-UNV-L750-CD

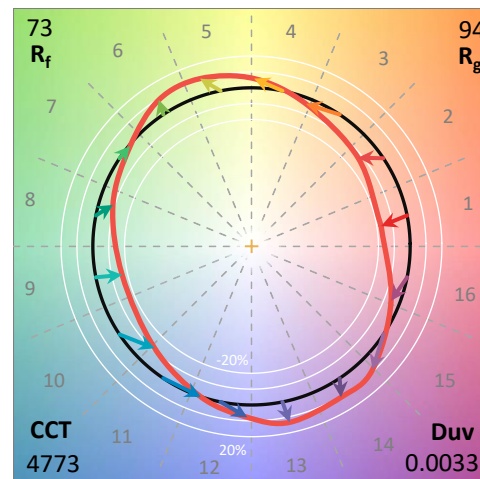
Data in this report applies to families of products SPHB-24SE-M-UNV-L750-CD.

### Test Information

Test Method: LM-79-2019  
 Report Number: SP1-2404-343-3  
 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-L750-CD**  
 Description: 18IN SPHB WITH MEDIUM LENS, 5000K/70CRI, 24K LUMENS, SE

### Spectral Parameters

|                           |        |           |      |      |       |
|---------------------------|--------|-----------|------|------|-------|
| CCT (K):                  | 4773   | CRI (Ra): | 71.4 |      |       |
| CIE u':                   | 0.2116 | R1:       | 68.3 | R9:  | -30.1 |
| CIE v':                   | 0.4918 | R2:       | 76.4 | R10: | 43.3  |
| Duv:                      | 0.0033 | R3:       | 81.8 | R11: | 66.6  |
| CIE x:                    | 0.3527 | R4:       | 71.3 | R12: | 37.4  |
| CIE y:                    | 0.3643 | R5:       | 68.3 | R13: | 69.4  |
| CIE z:                    | 0.2831 | R6:       | 66.6 | R14: | 89.7  |
| Peak Wavelength (nm):     | 449    | R7:       | 81.9 |      |       |
| Dominant Wavelength (nm): | 572    | R8:       | 56.2 |      |       |
| Purity:                   | 15.2   |           |      |      |       |
| Rf:                       | 72.8   |           |      |      |       |
| Rg:                       | 94.3   |           |      |      |       |



### Test Conditions

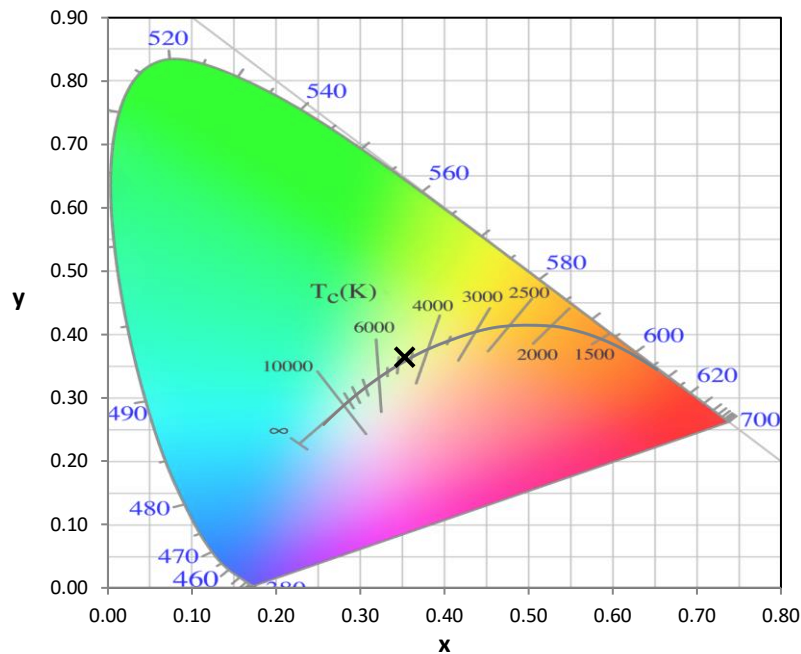
Stabilization Time: 23M  
 Operation Time: 12H  
 Room Temperature (°C) / RH%: 25.0/41%  
 Sphere Temperature (°C): 25.2

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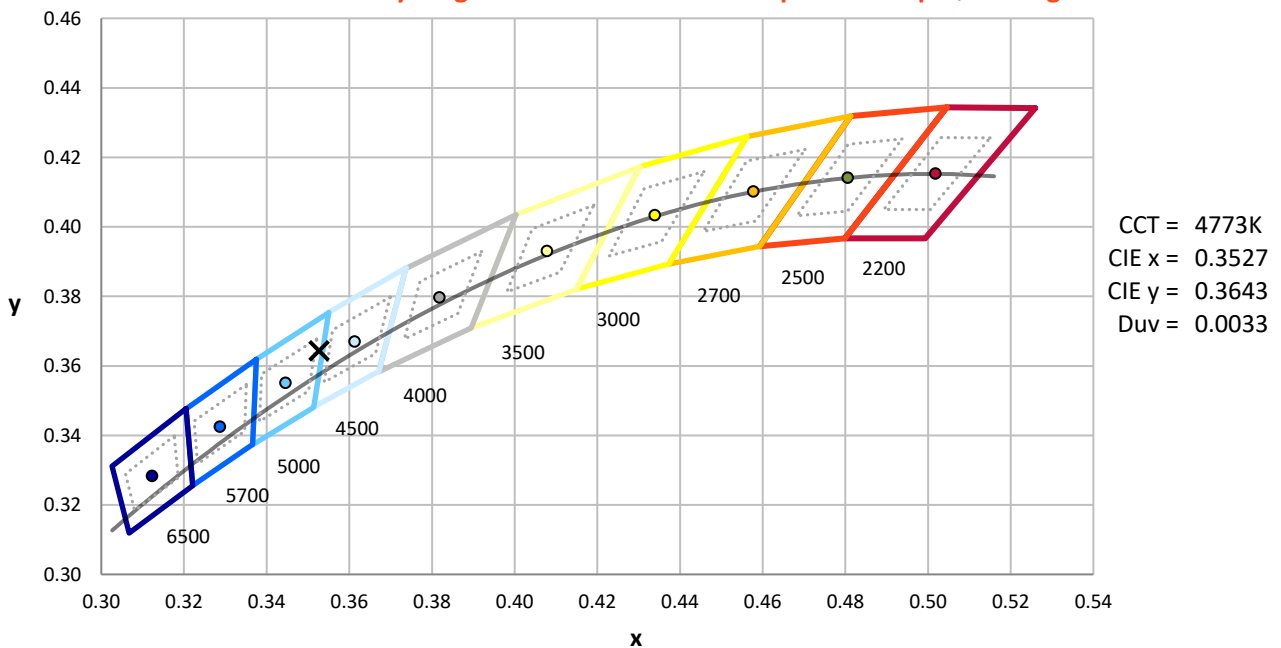
| Measurement and Test Equipment |                       |                  |                      |
|--------------------------------|-----------------------|------------------|----------------------|
| Instrument                     | Identification Number | Calibration Date | Calibration Due Date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



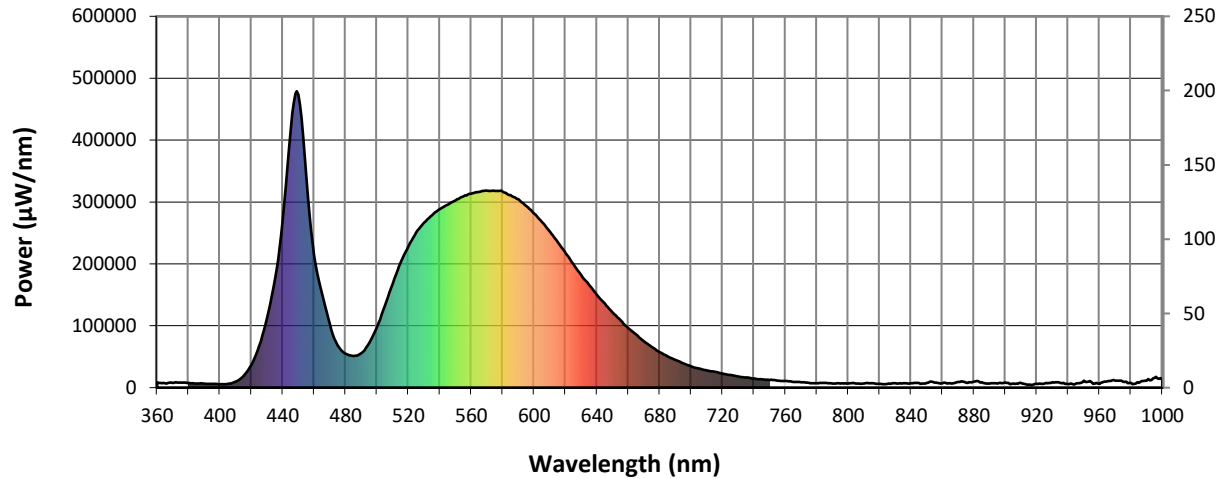
CIE 1931 Chromaticity Diagram with 2017 ANSI 7-Step and 4-Step Quadrangles



Point lies inside the ANSI 5000K 7-step quadrangle

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**Photopic Flux vs. Wavelength**

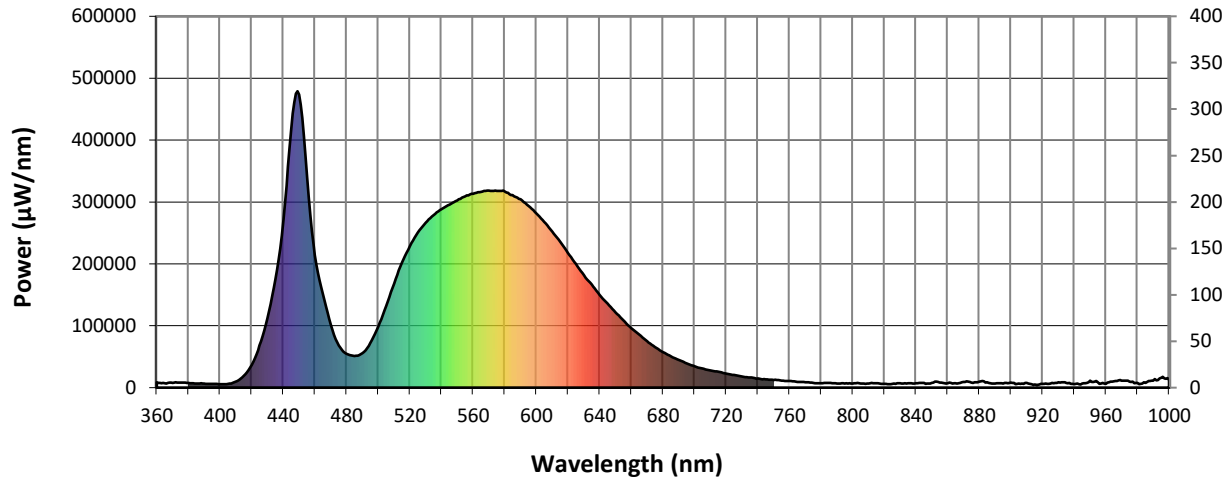


#####

| 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       | 8480             | NR               | 490       | 55894            | NR               | 620       | 217674           | NR               | 750       | 12551            | NR               | 880       | 9941             | NR               |
| 365       | 7167             | NR               | 495       | 71653            | NR               | 625       | 199777           | NR               | 755       | 11483            | NR               | 885       | 8519             | NR               |
| 370       | 7865             | NR               | 500       | 98307            | NR               | 630       | 181877           | NR               | 760       | 10694            | NR               | 890       | 6494             | NR               |
| 375       | 8331             | NR               | 505       | 131790           | NR               | 635       | 166247           | NR               | 765       | 9403             | NR               | 895       | 6597             | NR               |
| 380       | 7548             | NR               | 510       | 168072           | NR               | 640       | 149837           | NR               | 770       | 8855             | NR               | 900       | 8336             | NR               |
| 385       | 6461             | NR               | 515       | 201420           | NR               | 645       | 135768           | NR               | 775       | 7636             | NR               | 905       | 6602             | NR               |
| 390       | 6487             | NR               | 520       | 228557           | NR               | 650       | 121585           | NR               | 780       | 7116             | NR               | 910       | 7642             | NR               |
| 395       | 6127             | NR               | 525       | 250625           | NR               | 655       | 109011           | NR               | 785       | 7510             | NR               | 915       | 5085             | NR               |
| 400       | 5597             | NR               | 530       | 266917           | NR               | 660       | 96100            | NR               | 790       | 6788             | NR               | 920       | 5983             | NR               |
| 405       | 6031             | NR               | 535       | 278640           | NR               | 665       | 85658            | NR               | 795       | 6699             | NR               | 925       | 6623             | NR               |
| 410       | 9570             | NR               | 540       | 288470           | NR               | 670       | 74952            | NR               | 800       | 6841             | NR               | 930       | 8676             | NR               |
| 415       | 18905            | NR               | 545       | 295902           | NR               | 675       | 65604            | NR               | 805       | 6702             | NR               | 935       | 7559             | NR               |
| 420       | 36670            | NR               | 550       | 302610           | NR               | 680       | 57532            | NR               | 810       | 6415             | NR               | 940       | 5582             | NR               |
| 425       | 67971            | NR               | 555       | 309255           | NR               | 685       | 50737            | NR               | 815       | 6951             | NR               | 945       | 6681             | NR               |
| 430       | 112169           | NR               | 560       | 313346           | NR               | 690       | 45019            | NR               | 820       | 6164             | NR               | 950       | 11467            | NR               |
| 435       | 175042           | NR               | 565       | 316467           | NR               | 695       | 39302            | NR               | 825       | 6223             | NR               | 955       | 8479             | NR               |
| 440       | 270331           | NR               | 570       | 318291           | NR               | 700       | 34342            | NR               | 830       | 6882             | NR               | 960       | 6322             | NR               |
| 445       | 415458           | NR               | 575       | 317762           | NR               | 705       | 30709            | NR               | 835       | 7035             | NR               | 965       | 10418            | NR               |
| 450       | 473704           | NR               | 580       | 316909           | NR               | 710       | 27863            | NR               | 840       | 7196             | NR               | 970       | 11212            | NR               |
| 455       | 340246           | NR               | 585       | 310908           | NR               | 715       | 25645            | NR               | 845       | 7661             | NR               | 975       | 9921             | NR               |
| 460       | 214204           | NR               | 590       | 304222           | NR               | 720       | 22546            | NR               | 850       | 7691             | NR               | 980       | 7645             | NR               |
| 465       | 151767           | NR               | 595       | 293404           | NR               | 725       | 20358            | NR               | 855       | 8165             | NR               | 985       | 7411             | NR               |
| 470       | 101801           | NR               | 600       | 281357           | NR               | 730       | 18023            | NR               | 860       | 6918             | NR               | 990       | 11268            | NR               |
| 475       | 68160            | NR               | 605       | 267848           | NR               | 735       | 16491            | NR               | 865       | 6985             | NR               | 995       | 16172            | NR               |
| 480       | 54940            | NR               | 610       | 252294           | NR               | 740       | 14653            | NR               | 870       | 9265             | NR               | 1000      | 12246            | NR               |
| 485       | 51233            | NR               | 615       | 235449           | NR               | 745       | 13435            | NR               | 875       | 8266             | NR               |           |                  |                  |

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**Scotopic Flux vs. Wavelength**



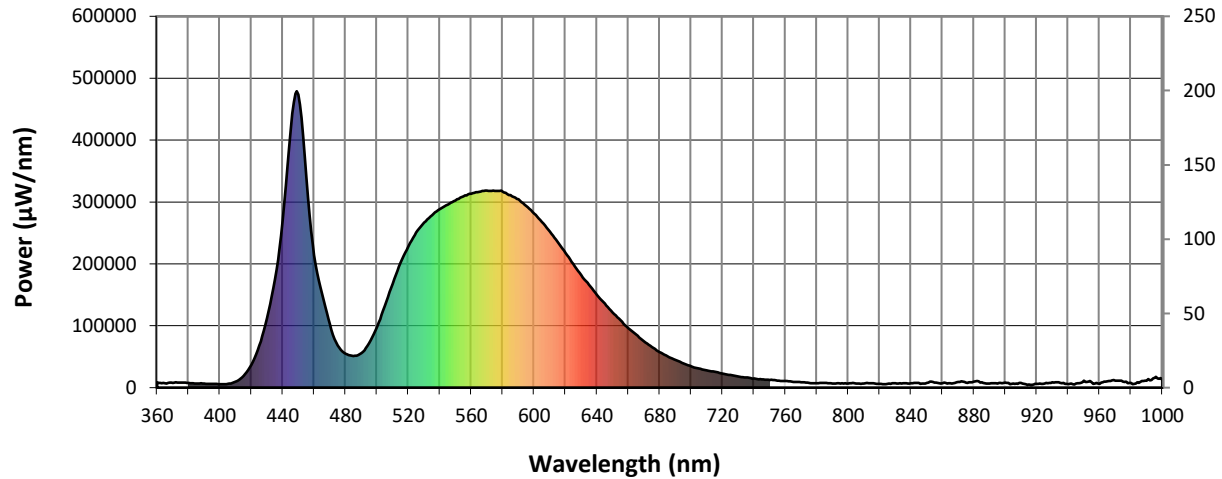
**Scotopic Lumens: 32037.1**

**S/P: 1.7**

| 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       | 8480             | NR               | 490       | 55894            | NR               | 620       | 217674           | NR               | 750       | 12551            | NR               | 880       | 9941             | NR               |
| 365       | 7167             | NR               | 495       | 71653            | NR               | 625       | 199777           | NR               | 755       | 11483            | NR               | 885       | 8519             | NR               |
| 370       | 7865             | NR               | 500       | 98307            | NR               | 630       | 181877           | NR               | 760       | 10694            | NR               | 890       | 6494             | NR               |
| 375       | 8331             | NR               | 505       | 131790           | NR               | 635       | 166247           | NR               | 765       | 9403             | NR               | 895       | 6597             | NR               |
| 380       | 7548             | NR               | 510       | 168072           | NR               | 640       | 149837           | NR               | 770       | 8855             | NR               | 900       | 8336             | NR               |
| 385       | 6461             | NR               | 515       | 201420           | NR               | 645       | 135768           | NR               | 775       | 7636             | NR               | 905       | 6602             | NR               |
| 390       | 6487             | NR               | 520       | 228557           | NR               | 650       | 121585           | NR               | 780       | 7116             | NR               | 910       | 7642             | NR               |
| 395       | 6127             | NR               | 525       | 250625           | NR               | 655       | 109011           | NR               | 785       | 7510             | NR               | 915       | 5085             | NR               |
| 400       | 5597             | NR               | 530       | 266917           | NR               | 660       | 96100            | NR               | 790       | 6788             | NR               | 920       | 5983             | NR               |
| 405       | 6031             | NR               | 535       | 278640           | NR               | 665       | 85658            | NR               | 795       | 6699             | NR               | 925       | 6623             | NR               |
| 410       | 9570             | NR               | 540       | 288470           | NR               | 670       | 74952            | NR               | 800       | 6841             | NR               | 930       | 8676             | NR               |
| 415       | 18905            | NR               | 545       | 295902           | NR               | 675       | 65604            | NR               | 805       | 6702             | NR               | 935       | 7559             | NR               |
| 420       | 36670            | NR               | 550       | 302610           | NR               | 680       | 57532            | NR               | 810       | 6415             | NR               | 940       | 5582             | NR               |
| 425       | 67971            | NR               | 555       | 309255           | NR               | 685       | 50737            | NR               | 815       | 6951             | NR               | 945       | 6681             | NR               |
| 430       | 112169           | NR               | 560       | 313346           | NR               | 690       | 45019            | NR               | 820       | 6164             | NR               | 950       | 11467            | NR               |
| 435       | 175042           | NR               | 565       | 316467           | NR               | 695       | 39302            | NR               | 825       | 6223             | NR               | 955       | 8479             | NR               |
| 440       | 270331           | NR               | 570       | 318291           | NR               | 700       | 34342            | NR               | 830       | 6882             | NR               | 960       | 6322             | NR               |
| 445       | 415458           | NR               | 575       | 317762           | NR               | 705       | 30709            | NR               | 835       | 7035             | NR               | 965       | 10418            | NR               |
| 450       | 473704           | NR               | 580       | 316909           | NR               | 710       | 27863            | NR               | 840       | 7196             | NR               | 970       | 11212            | NR               |
| 455       | 340246           | NR               | 585       | 310908           | NR               | 715       | 25645            | NR               | 845       | 7661             | NR               | 975       | 9921             | NR               |
| 460       | 214204           | NR               | 590       | 304222           | NR               | 720       | 22546            | NR               | 850       | 7691             | NR               | 980       | 7645             | NR               |
| 465       | 151767           | NR               | 595       | 293404           | NR               | 725       | 20358            | NR               | 855       | 8165             | NR               | 985       | 7411             | NR               |
| 470       | 101801           | NR               | 600       | 281357           | NR               | 730       | 18023            | NR               | 860       | 6918             | NR               | 990       | 11268            | NR               |
| 475       | 68160            | NR               | 605       | 267848           | NR               | 735       | 16491            | NR               | 865       | 6985             | NR               | 995       | 16172            | NR               |
| 480       | 54940            | NR               | 610       | 252294           | NR               | 740       | 14653            | NR               | 870       | 9265             | NR               | 1000      | 12246            | NR               |
| 485       | 51233            | NR               | 615       | 235449           | NR               | 745       | 13435            | NR               | 875       | 8266             | NR               |           |                  |                  |

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**Melanopic Flux vs. Wavelength**



**Melanopic Lumens: 12680.1 M/P: 0.67**

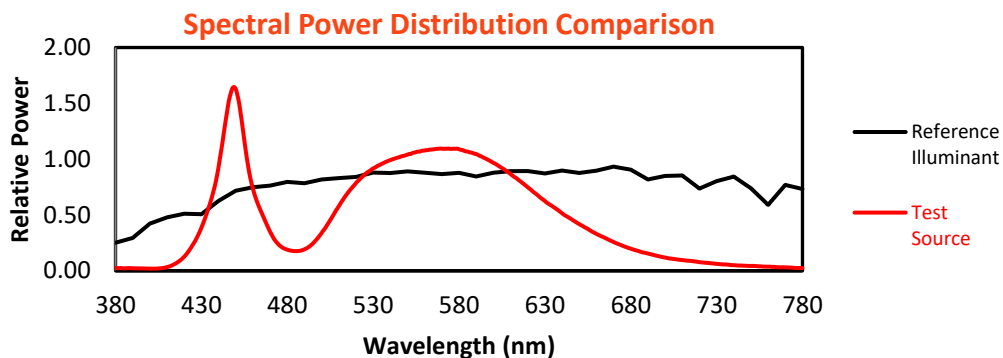
| λ<br>(nm) | Power<br>(μW/nm) | Lumens<br>(φ/nm) | λ<br>(nm) | Power<br>(μW/nm) | Lumens<br>(φ/nm) | λ<br>(nm) | Power<br>(μW/nm) | Lumens<br>(φ/nm) | λ<br>(nm) | Power<br>(μW/nm) | Lumens<br>(φ/nm) | λ<br>(nm) | Power<br>(μW/nm) | Lumens<br>(φ/nm) |
|-----------|------------------|------------------|-----------|------------------|------------------|-----------|------------------|------------------|-----------|------------------|------------------|-----------|------------------|------------------|
| 360       | 8480             | NR               | 490       | 55894            | NR               | 620       | 217674           | NR               | 750       | 12551            | NR               | 880       | 9941             | NR               |
| 365       | 7167             | NR               | 495       | 71653            | NR               | 625       | 199777           | NR               | 755       | 11483            | NR               | 885       | 8519             | NR               |
| 370       | 7865             | NR               | 500       | 98307            | NR               | 630       | 181877           | NR               | 760       | 10694            | NR               | 890       | 6494             | NR               |
| 375       | 8331             | NR               | 505       | 131790           | NR               | 635       | 166247           | NR               | 765       | 9403             | NR               | 895       | 6597             | NR               |
| 380       | 7548             | NR               | 510       | 168072           | NR               | 640       | 149837           | NR               | 770       | 8855             | NR               | 900       | 8336             | NR               |
| 385       | 6461             | NR               | 515       | 201420           | NR               | 645       | 135768           | NR               | 775       | 7636             | NR               | 905       | 6602             | NR               |
| 390       | 6487             | NR               | 520       | 228557           | NR               | 650       | 121585           | NR               | 780       | 7116             | NR               | 910       | 7642             | NR               |
| 395       | 6127             | NR               | 525       | 250625           | NR               | 655       | 109011           | NR               | 785       | 7510             | NR               | 915       | 5085             | NR               |
| 400       | 5597             | NR               | 530       | 266917           | NR               | 660       | 96100            | NR               | 790       | 6788             | NR               | 920       | 5983             | NR               |
| 405       | 6031             | NR               | 535       | 278640           | NR               | 665       | 85658            | NR               | 795       | 6699             | NR               | 925       | 6623             | NR               |
| 410       | 9570             | NR               | 540       | 288470           | NR               | 670       | 74952            | NR               | 800       | 6841             | NR               | 930       | 8676             | NR               |
| 415       | 18905            | NR               | 545       | 295902           | NR               | 675       | 65604            | NR               | 805       | 6702             | NR               | 935       | 7559             | NR               |
| 420       | 36670            | NR               | 550       | 302610           | NR               | 680       | 57532            | NR               | 810       | 6415             | NR               | 940       | 5582             | NR               |
| 425       | 67971            | NR               | 555       | 309255           | NR               | 685       | 50737            | NR               | 815       | 6951             | NR               | 945       | 6681             | NR               |
| 430       | 112169           | NR               | 560       | 313346           | NR               | 690       | 45019            | NR               | 820       | 6164             | NR               | 950       | 11467            | NR               |
| 435       | 175042           | NR               | 565       | 316467           | NR               | 695       | 39302            | NR               | 825       | 6223             | NR               | 955       | 8479             | NR               |
| 440       | 270331           | NR               | 570       | 318291           | NR               | 700       | 34342            | NR               | 830       | 6882             | NR               | 960       | 6322             | NR               |
| 445       | 415458           | NR               | 575       | 317762           | NR               | 705       | 30709            | NR               | 835       | 7035             | NR               | 965       | 10418            | NR               |
| 450       | 473704           | NR               | 580       | 316909           | NR               | 710       | 27863            | NR               | 840       | 7196             | NR               | 970       | 11212            | NR               |
| 455       | 340246           | NR               | 585       | 310908           | NR               | 715       | 25645            | NR               | 845       | 7661             | NR               | 975       | 9921             | NR               |
| 460       | 214204           | NR               | 590       | 304222           | NR               | 720       | 22546            | NR               | 850       | 7691             | NR               | 980       | 7645             | NR               |
| 465       | 151767           | NR               | 595       | 293404           | NR               | 725       | 20358            | NR               | 855       | 8165             | NR               | 985       | 7411             | NR               |
| 470       | 101801           | NR               | 600       | 281357           | NR               | 730       | 18023            | NR               | 860       | 6918             | NR               | 990       | 11268            | NR               |
| 475       | 68160            | NR               | 605       | 267848           | NR               | 735       | 16491            | NR               | 865       | 6985             | NR               | 995       | 16172            | NR               |
| 480       | 54940            | NR               | 610       | 252294           | NR               | 740       | 14653            | NR               | 870       | 9265             | NR               | 1000      | 12246            | NR               |
| 485       | 51233            | NR               | 615       | 235449           | NR               | 745       | 13435            | NR               | 875       | 8266             | NR               |           |                  |                  |

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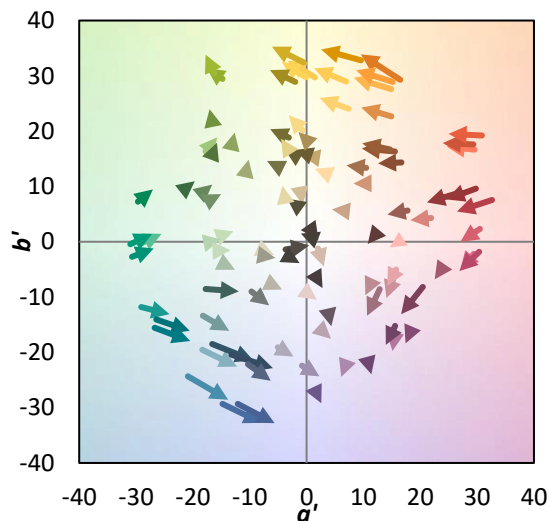
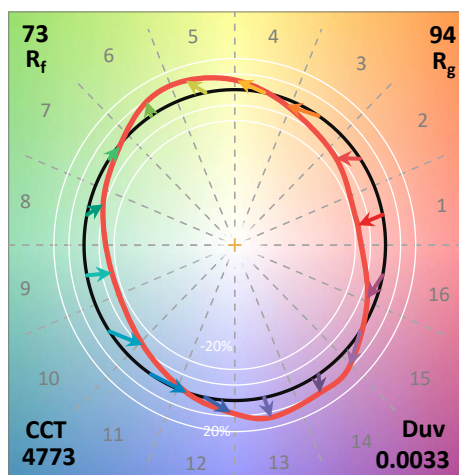
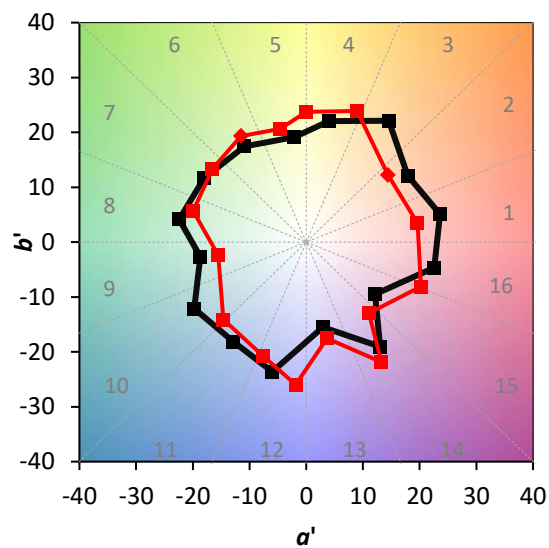
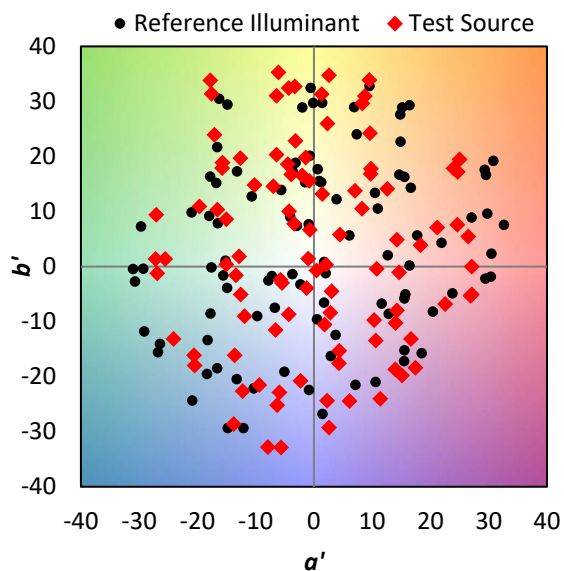
**TM-30-18**

**Summary**

$R_f = 72.8$   
 $R_g = 94.3$   
 $CIE R_a = 71.4$   
 $R_g = -30.1$



**Color Vector Graphics**

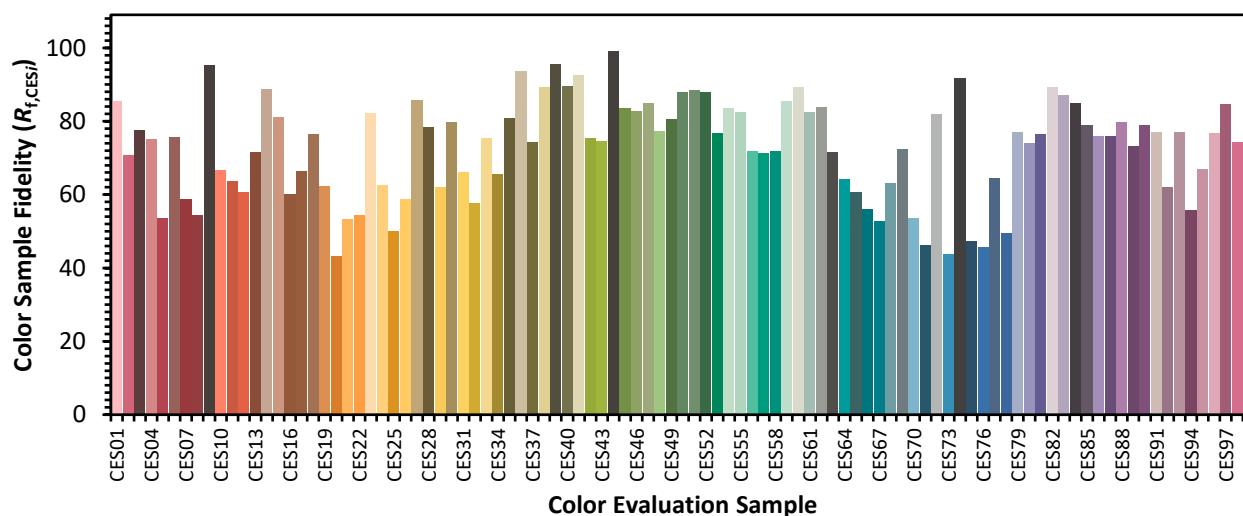


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**Individual Sample Fidelity Index ( $R_{f,i}$ )**

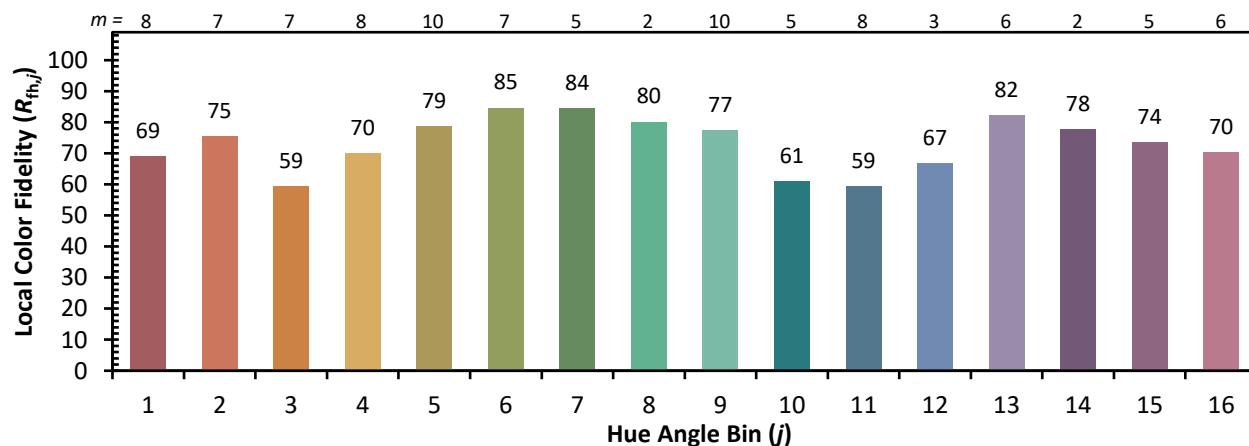
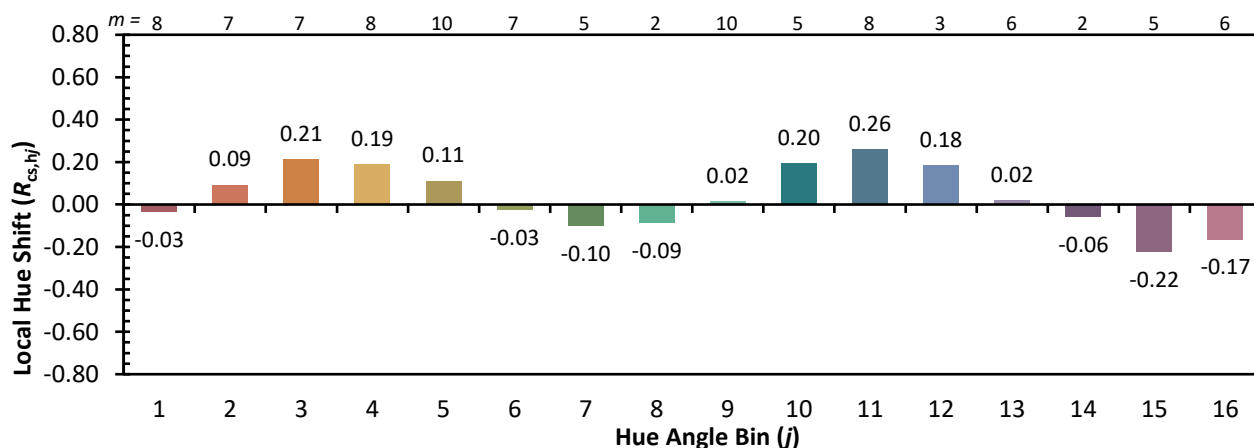
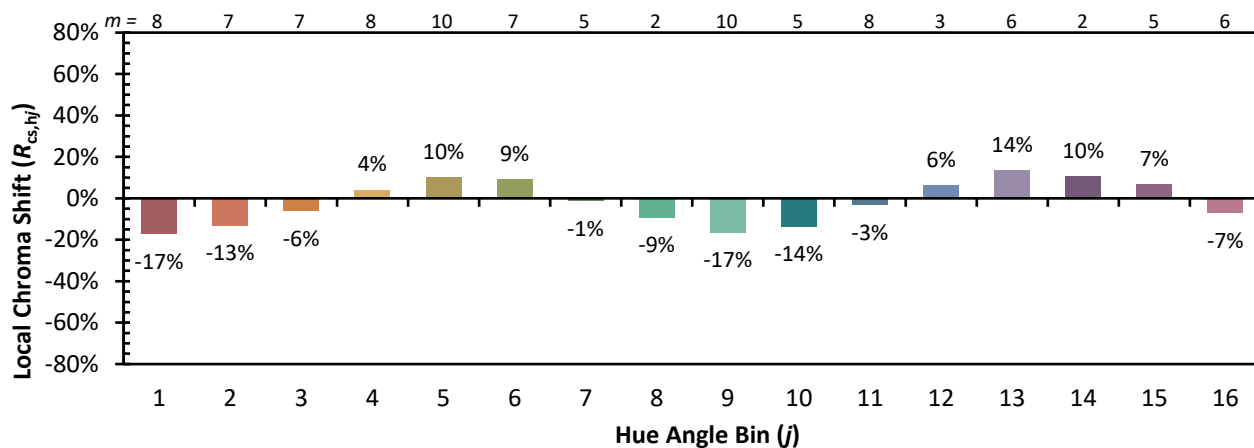
|            |            |            |            |
|------------|------------|------------|------------|
| CES01 = 85 | CES26 = 59 | CES51 = 88 | CES76 = 46 |
| CES02 = 60 | CES27 = 86 | CES52 = 88 | CES77 = 65 |
| CES03 = 30 | CES28 = 78 | CES53 = 77 | CES78 = 49 |
| CES04 = 69 | CES29 = 62 | CES54 = 84 | CES79 = 77 |
| CES05 = 46 | CES30 = 80 | CES55 = 82 | CES80 = 74 |
| CES06 = 50 | CES31 = 66 | CES56 = 72 | CES81 = 77 |
| CES07 = 39 | CES32 = 58 | CES57 = 71 | CES82 = 89 |
| CES08 = 38 | CES33 = 75 | CES58 = 72 | CES83 = 87 |
| CES09 = 29 | CES34 = 66 | CES59 = 85 | CES84 = 85 |
| CES10 = 73 | CES35 = 81 | CES60 = 89 | CES85 = 79 |
| CES11 = 56 | CES36 = 94 | CES61 = 83 | CES86 = 76 |
| CES12 = 62 | CES37 = 74 | CES62 = 84 | CES87 = 76 |
| CES13 = 41 | CES38 = 89 | CES63 = 72 | CES88 = 80 |
| CES14 = 74 | CES39 = 95 | CES64 = 64 | CES89 = 73 |
| CES15 = 70 | CES40 = 89 | CES65 = 61 | CES90 = 79 |
| CES16 = 46 | CES41 = 92 | CES66 = 56 | CES91 = 77 |
| CES17 = 49 | CES42 = 75 | CES67 = 53 | CES92 = 62 |
| CES18 = 55 | CES43 = 75 | CES68 = 63 | CES93 = 77 |
| CES19 = 71 | CES44 = 99 | CES69 = 72 | CES94 = 56 |
| CES20 = 64 | CES45 = 84 | CES70 = 53 | CES95 = 67 |
| CES21 = 85 | CES46 = 83 | CES71 = 46 | CES96 = 77 |
| CES22 = 77 | CES47 = 85 | CES72 = 82 | CES97 = 85 |
| CES23 = 91 | CES48 = 77 | CES73 = 44 | CES98 = 74 |
| CES24 = 90 | CES49 = 81 | CES74 = 92 | CES99 = 63 |
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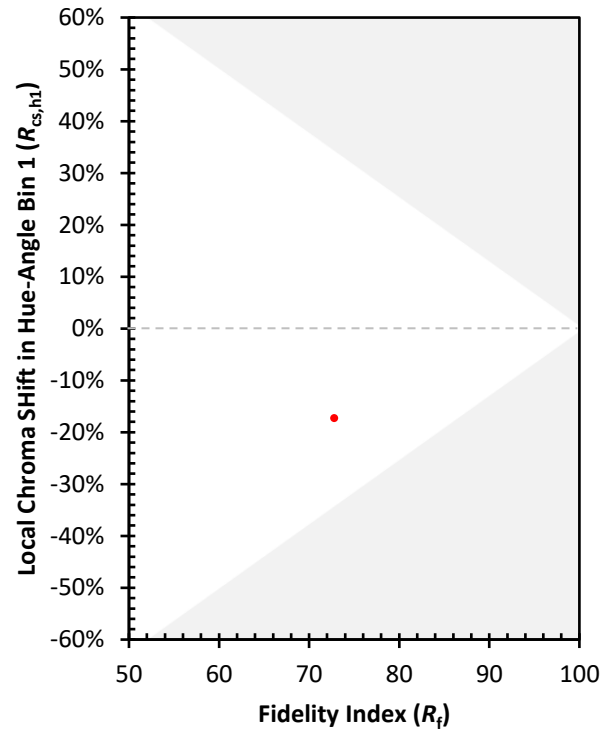
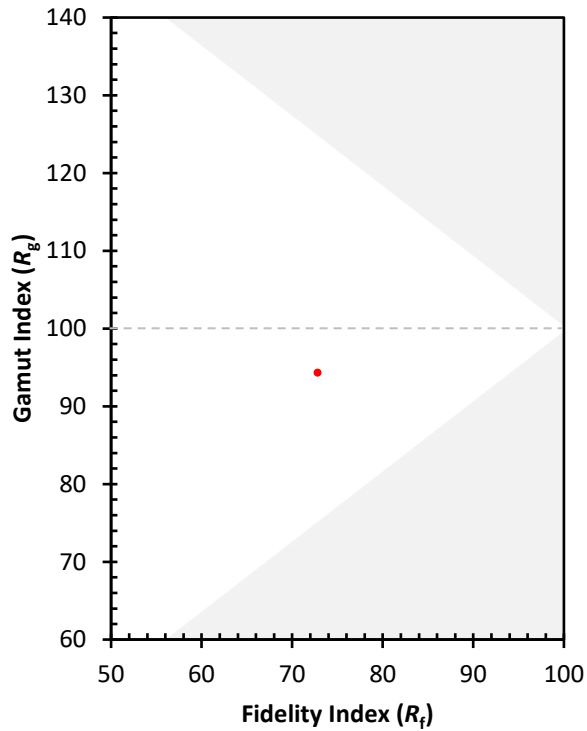
Color Rendition by Hue-Angle Bin



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**Measure Comparisons**



(END OF REPORT)