Cooper Lighting Solutions Photometric Lab
1121 Highway 74 South
Peachtree City, GA 30269

Scaled data based on original data using

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

Test Report Prepared for

Cooper Lighting Solutions

Brand: FAIL-SAFE

Report Number: P1357352

Luminaire Tested: 6ASL4-25VHE-3-50-UNV

Issue Date: 2/17/2026

Cooper Lighting Solutions Photometric Lab
1121 Highway 74 South
Peachtree City, GA 30269

Scaled Data Report

**Test Information**

| | |
|---|---|
| Test Method: | LM-79-2019 |
| Report Number: | P1357352 |
| | TEST IS SCALED FROM IESNA LM-79-08 TEST DATA (G2-2511-597-12) |
| Test Lab: | INNOVATION CENTER |
| Issue Date: | 2/17/2026 |
| Manufacturer: | COOPER LIGHTING SOLUTIONS |
| Product Line: | FAIL-SAFE |
| Catalog Number: | 6ASL4-25VHE-3-50-UNV |
| Description: | 6FT 2500 LUMEN PER FOOT 4ASL LED LUMINAIRE WITH OPL LENS AND 5000K LEDS 3 ROW |
| Light Source: | - |
| Ballast/Driver: | - |

**Summary**

| | |
|---|---|
| Lumens per Lamp: | N/A |
| Luminaire Lumens: | 15366.0 lumens |
| Efficiency: | N/A |
| Efficacy: | 119.7 lumens/watt |
| Spacing Criteria (0/90/45): | 1.21 / 1.3 / 1.39 |
| Luminous Opening: | Rectangular w/ Sides (W: 0.33' x L: 5.98' x H: 0.1') |
| CIE Type: | Direct |

| | |
|---|---|
| Input Watts (W): | 128.4 |
| 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: | 24 FT |

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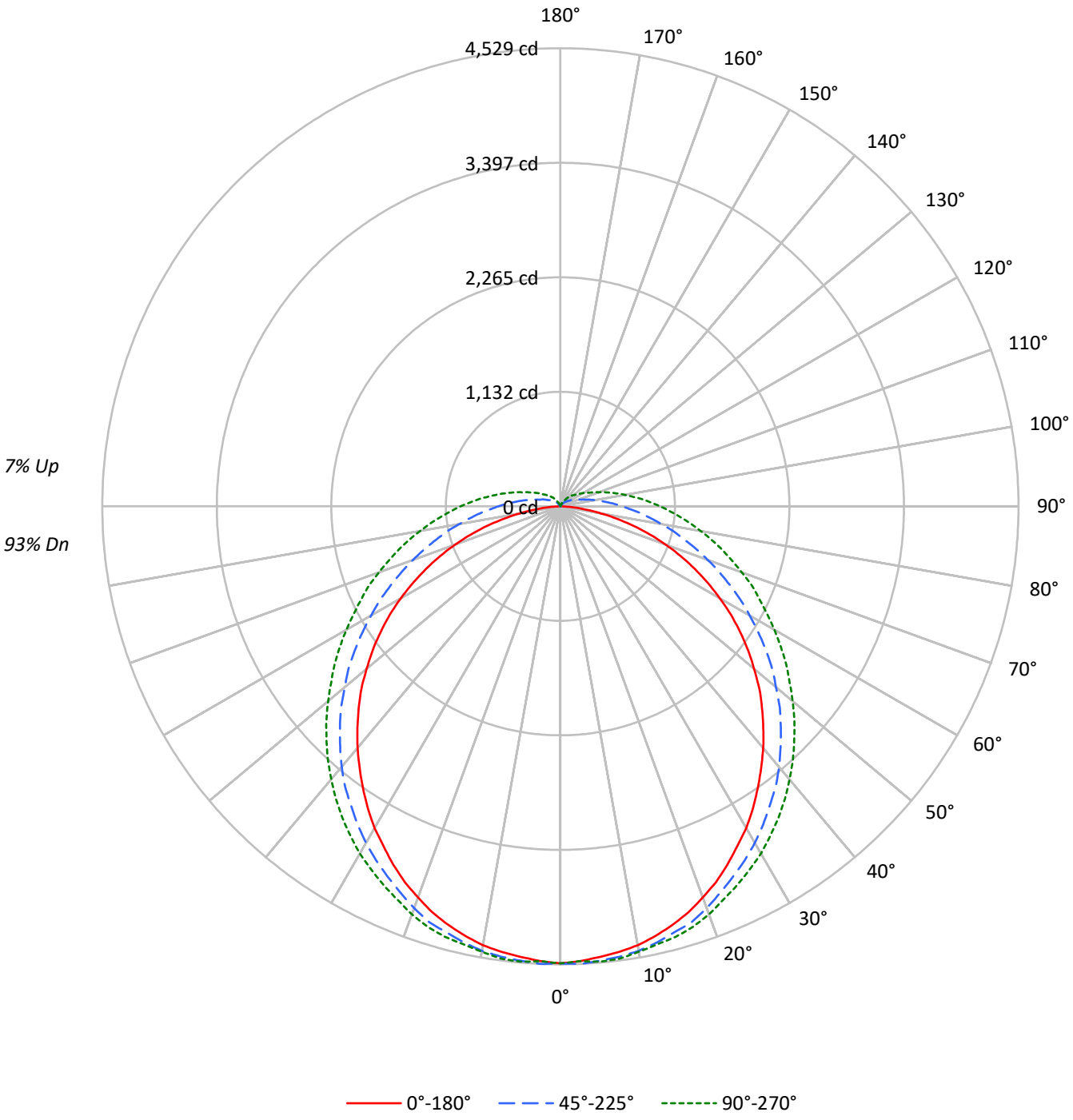
Scaled Data Report

TEST NUMBER: P1357352
CATALOG NUMBER: 6ASL4-25VHE-3-50-UNV

## Luminous Intensity Polar Plot



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Scaled Data Report

TEST NUMBER: P1357352
CATALOG NUMBER: 6ASL4-25VHE-3-50-UNV

## COEFFICIENT OF UTILIZATION - ZONAL CAVITY METHOD:

| RF | 20 | | | | 20 | | | | 20 | | | 20 | | | 20 | | | 20 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| RC | 80 | | | | 70 | | | | 50 | | | 30 | | | 10 | | | 0 |
| RW | 70 | 50 | 30 | 10 | 70 | 50 | 30 | 10 | 50 | 30 | 10 | 50 | 30 | 10 | 50 | 30 | 10 | 0 |
| RCR | | | | | | | | | | | | | | | | | | |
| 0 | 117 | 117 | 117 | 117 | 114 | 114 | 114 | 114 | 107 | 107 | 107 | 101 | 101 | 101 | 96 | 96 | 96 | 93 |
| 1 | 105 | 100 | 95 | 91 | 102 | 97 | 92 | 88 | 91 | 88 | 84 | 86 | 83 | 80 | 81 | 79 | 77 | 74 |
| 2 | 95 | 86 | 79 | 72 | 92 | 84 | 77 | 71 | 79 | 73 | 68 | 75 | 70 | 66 | 71 | 67 | 63 | 61 |
| 3 | 86 | 75 | 67 | 60 | 83 | 73 | 65 | 59 | 69 | 62 | 57 | 65 | 60 | 55 | 62 | 57 | 53 | 50 |
| 4 | 79 | 66 | 57 | 50 | 76 | 65 | 56 | 49 | 61 | 54 | 48 | 58 | 52 | 47 | 55 | 50 | 45 | 43 |
| 5 | 73 | 59 | 50 | 43 | 70 | 58 | 49 | 42 | 55 | 47 | 41 | 52 | 45 | 40 | 49 | 44 | 39 | 37 |
| 6 | 67 | 53 | 44 | 37 | 64 | 52 | 43 | 37 | 49 | 42 | 36 | 47 | 40 | 35 | 45 | 39 | 34 | 32 |
| 7 | 62 | 48 | 39 | 33 | 60 | 47 | 38 | 32 | 45 | 37 | 32 | 43 | 36 | 31 | 41 | 35 | 30 | 28 |
| 8 | 58 | 44 | 35 | 29 | 56 | 43 | 35 | 29 | 41 | 34 | 28 | 39 | 32 | 28 | 37 | 32 | 27 | 25 |
| 9 | 54 | 40 | 32 | 26 | 52 | 39 | 31 | 26 | 38 | 30 | 25 | 36 | 30 | 25 | 35 | 29 | 24 | 22 |
| 10 | 50 | 37 | 29 | 24 | 49 | 36 | 29 | 23 | 35 | 28 | 23 | 33 | 27 | 23 | 32 | 26 | 22 | 20 |

## AVERAGE LUMINANCE (cd/sqm):

| | 0° | 45° | 90° |
|---|---|---|---|
| 0° | 24408 | 24408 | 24408 |
| 5° | 24210 | 23961 | 23849 |
| 10° | 24092 | 23508 | 23246 |
| 15° | 23845 | 22942 | 22735 |
| 20° | 23503 | 22399 | 22158 |
| 25° | 23104 | 21714 | 21502 |
| 30° | 22682 | 21121 | 20947 |
| 35° | 22155 | 20448 | 20330 |
| 40° | 21676 | 19832 | 19680 |
| 45° | 21160 | 19086 | 19027 |
| 50° | 20572 | 18284 | 18349 |
| 55° | 19940 | 17519 | 17739 |
| 60° | 19112 | 16625 | 17120 |
| 65° | 18056 | 15767 | 16607 |
| 70° | 16708 | 14918 | 16205 |
| 75° | 14728 | 14149 | 15928 |
| 80° | 11701 | 13585 | 15812 |
| 85° | 7281 | 13497 | 16046 |

## MAXIMUM LUMINANCE 45°-90°:

Horizontal Angle: 0°
Vertical Angle: 45°
Luminance: 21160 cd/sqm

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Scaled Data Report

TEST NUMBER: P1357352
CATALOG NUMBER: 6ASL4-25VHE-3-50-UNV

**ZONAL LUMENS:**

| Zone | Lumens | % Fixture |
|---|---|---|
| 0°-10° | 428.6 | 2.8 |
| 10°-20° | 1230.5 | 8.0 |
| 20°-30° | 1860.3 | 12.1 |
| 30°-40° | 2252.6 | 14.7 |
| 40°-50° | 2365.9 | 15.4 |
| 50°-60° | 2207.3 | 14.4 |
| 60°-70° | 1824.2 | 11.9 |
| 70°-80° | 1313.5 | 8.5 |
| 80°-90° | 816.2 | 5.3 |
| 90°-100° | 478.2 | 3.1 |
| 100°-110° | 273.6 | 1.8 |
| 110°-120° | 154.5 | 1.0 |
| 120°-130° | 88.9 | 0.6 |
| 130°-140° | 47.9 | 0.3 |
| 140°-150° | 20.2 | 0.1 |
| 150°-160° | 3.7 | 0.0 |
| 160°-170° | 0.0 | 0.0 |
| 170°-180° | 0.0 | 0.0 |
| 0°-30° | 3519.4 | 22.9 |
| 0°-40° | 5772.0 | 37.6 |
| 0°-60° | 10345.2 | 67.3 |
| 0°-90° | 14299.0 | 93.1 |
| 90°-120° | 906.3 | 5.9 |
| 90°-150° | 1063.3 | 6.9 |
| 90°-180° | 1067.0 | 6.9 |
| 0°-180° | 15366.0 | 100.0 |

**CANDELA DISTRIBUTION:**

| | 0° | 22.5° | 45° | 67.5° | 90° | Flux |
|---|---|---|---|---|---|---|
| 0° | 4519 | 4519 | 4519 | 4519 | 4519 | |
| 5° | 4472 | 4510 | 4510 | 4510 | 4519 | 425 |
| 15° | 4284 | 4341 | 4360 | 4388 | 4407 | 1208 |
| 25° | 3909 | 3974 | 4040 | 4096 | 4134 | 1800 |
| 35° | 3401 | 3495 | 3608 | 3711 | 3758 | 2129 |
| 45° | 2819 | 2922 | 3082 | 3213 | 3270 | 2175 |
| 55° | 2170 | 2293 | 2480 | 2659 | 2725 | 1939 |
| 65° | 1466 | 1607 | 1851 | 2086 | 2170 | 1450 |
| 75° | 752 | 940 | 1268 | 1541 | 1654 | 795 |
| 85° | 141 | 423 | 799 | 1080 | 1184 | 172 |
| 90° | 0 | 254 | 611 | 874 | 987 | 6 |
| 95° | 0 | 160 | 460 | 705 | 808 | 0 |
| 105° | 0 | 56 | 254 | 442 | 517 | 0 |
| 115° | 0 | 28 | 150 | 272 | 320 | 0 |
| 125° | 0 | 19 | 94 | 178 | 207 | 0 |
| 135° | 0 | 0 | 56 | 113 | 141 | 0 |
| 145° | 0 | 0 | 28 | 66 | 75 | 0 |
| 155° | 0 | 0 | 0 | 19 | 28 | 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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TEST NUMBER: P1357352
CATALOG NUMBER: 6ASL4-25VHE-3-50-UNV

**CANDELA DISTRIBUTION (FULL):**

| | 0° | 22.5° | 45° | 67.5° | 90° |
|---|---|---|---|---|---|
| 0° | 4519.3 | *4519.3* | 4519.3 | 4519.3 | 4519.3 |
| 2.5° | *4500.6* | *4528.7* | *4528.7* | *4500.6* | *4500.6* |
| 5° | 4472.4 | *4510.0* | 4510.0 | 4510.0 | 4519.3 |
| 7.5° | 4444.2 | *4491.2* | 4491.2 | 4491.2 | 4510.0 |
| 10° | 4406.6 | *4453.6* | 4463.0 | 4463.0 | 4472.4 |
| 12.5° | 4350.2 | *4406.6* | 4416.0 | 4425.4 | 4434.8 |
| 15° | 4284.5 | *4340.8* | 4359.6 | 4387.8 | 4406.6 |
| 17.5° | 4209.3 | *4275.1* | 4312.6 | 4340.8 | 4359.6 |
| 20° | 4115.3 | *4181.1* | 4228.1 | 4265.7 | 4293.8 |
| 22.5° | 4021.4 | *4077.7* | 4134.1 | 4181.1 | 4209.3 |
| 25° | 3908.6 | *3974.4* | 4040.2 | 4096.5 | 4134.1 |
| 27.5° | 3786.5 | *3861.6* | 3946.2 | 4012.0 | 4049.6 |
| 30° | 3673.7 | *3748.9* | 3842.9 | 3927.4 | 3965.0 |
| 32.5° | 3542.2 | *3626.8* | 3730.1 | 3814.7 | 3861.6 |
| 35° | 3401.3 | *3495.2* | 3608.0 | 3711.3 | 3758.3 |
| 37.5° | 3260.3 | *3354.3* | 3495.2 | 3598.6 | 3645.5 |
| 40° | 3119.4 | *3213.3* | 3363.7 | 3476.4 | 3523.4 |
| 42.5° | 2969.1 | *3063.0* | 3222.7 | 3344.9 | 3401.3 |
| 45° | 2818.7 | *2922.1* | 3081.8 | 3213.3 | 3269.7 |
| 47.5° | 2668.4 | *2771.7* | 2940.9 | 3081.8 | 3138.2 |
| 50° | 2499.3 | *2612.0* | 2781.1 | 2940.9 | 2997.2 |
| 52.5° | 2339.5 | *2452.3* | 2640.2 | 2799.9 | 2856.3 |
| 55° | 2170.4 | *2292.6* | 2480.5 | 2659.0 | 2724.8 |
| 57.5° | 2001.3 | *2123.4* | 2320.7 | 2508.7 | 2583.8 |
| 60° | 1822.8 | *1954.3* | 2161.0 | 2358.3 | 2442.9 |
| 62.5° | 1644.3 | *1785.2* | 2010.7 | 2217.4 | 2302.0 |
| 65° | 1465.7 | *1606.7* | 1851.0 | 2085.9 | 2170.4 |
| 67.5° | 1287.2 | *1437.5* | 1700.6 | 1944.9 | 2048.3 |
| 70° | 1108.7 | *1268.4* | 1550.3 | 1804.0 | 1907.3 |
| 72.5° | 930.2 | *1099.3* | 1409.4 | 1672.4 | 1775.8 |
| 75° | 751.7 | *939.6* | 1268.4 | 1540.9 | 1653.6 |
| 77.5° | 573.1 | *789.2* | 1146.3 | 1418.8 | 1531.5 |
| 80° | 413.4 | *657.7* | 1014.7 | 1296.6 | 1409.4 |
| 82.5° | 263.1 | *526.2* | 902.0 | 1183.9 | 1296.6 |
| 85° | 140.9 | *422.8* | 798.6 | 1080.5 | 1183.9 |
| 87.5° | 47.0 | *328.9* | 695.3 | 977.2 | 1080.5 |
| 90° | 0.0 | *253.7* | 610.7 | 873.8 | 986.6 |
| 92.5° | 0.0 | *197.3* | 535.6 | 789.2 | 892.6 |
| 95° | 0.0 | *159.7* | 460.4 | 704.7 | 808.0 |
| 97.5° | 0.0 | *131.5* | 404.0 | 629.5 | 723.5 |
| 100° | 0.0 | *103.4* | 347.6 | 563.7 | 648.3 |
| 102.5° | 0.0 | *84.6* | 300.7 | 498.0 | 582.5 |
| 105° | 0.0 | *56.4* | 253.7 | 441.6 | 516.8 |
| 107.5° | 0.0 | *47.0* | 216.1 | 394.6 | 460.4 |
| 110° | 0.0 | *37.6* | 197.3 | 338.2 | 404.0 |

TEST NUMBER: P1357352
CATALOG NUMBER: 6ASL4-25VHE-3-50-UNV

**CANDELA DISTRIBUTION (continued):**

| | 0° | 22.5° | 45° | 67.5° | 90° |
|---|---|---|---|---|---|
| 112.5° | 0.0 | *28.2* | 178.5 | 300.7 | 366.4 |
| 115° | 0.0 | *28.2* | 150.3 | 272.5 | 319.5 |
| 117.5° | 0.0 | *28.2* | 131.5 | 244.3 | 291.3 |
| 120° | 0.0 | *18.8* | 122.1 | 216.1 | 263.1 |
| 122.5° | 0.0 | *18.8* | 103.4 | 197.3 | 234.9 |
| 125° | 0.0 | *18.8* | 94.0 | 178.5 | 206.7 |
| 127.5° | 0.0 | *9.4* | 84.6 | 159.7 | 187.9 |
| 130° | 0.0 | *9.4* | 75.2 | 140.9 | 169.1 |
| 132.5° | 0.0 | *9.4* | 65.8 | 131.5 | 159.7 |
| 135° | 0.0 | *0.0* | 56.4 | 112.7 | 140.9 |
| 137.5° | 0.0 | *0.0* | 47.0 | 103.4 | 122.1 |
| 140° | 0.0 | *0.0* | 37.6 | 84.6 | 112.7 |
| 142.5° | 0.0 | *0.0* | 28.2 | 75.2 | 94.0 |
| 145° | 0.0 | *0.0* | 28.2 | 65.8 | 75.2 |
| 147.5° | 0.0 | *0.0* | 18.8 | 47.0 | 65.8 |
| 150° | 0.0 | *0.0* | 9.4 | 37.6 | 47.0 |
| 152.5° | 0.0 | *0.0* | 0.0 | 28.2 | 37.6 |
| 155° | 0.0 | *0.0* | 0.0 | 18.8 | 28.2 |
| 157.5° | 0.0 | *0.0* | 0.0 | 0.0 | 9.4 |
| 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 |

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Scaled Data Report

TEST NUMBER: P1357352
CATALOG NUMBER: 6ASL4-25VHE-3-50-UNV

**CIE UGR TABLE:**

| Reflectances: | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | Ceiling | 0.7 | 0.7 | 0.5 | 0.5 | 0.3 | 0.7 | 0.7 | 0.5 | 0.5 | 0.3 |
| | Wall | 0.5 | 0.3 | 0.5 | 0.3 | 0.3 | 0.5 | 0.3 | 0.5 | 0.3 | 0.3 |
| | Reference plane | 0.2 | 0.2 | 0.2 | 0.2 | 0.2 | 0.2 | 0.2 | 0.2 | 0.2 | 0.2 |
| Room dimensions | | Viewed crosswise | | | | | Viewed endwise | | | | |
| X=2H | Y=2H | 20.44 | 21.98 | 20.91 | 22.44 | 22.92 | 22.50 | 24.04 | 22.97 | 24.49 | 24.98 |
| | 3H | 21.94 | 23.34 | 22.42 | 23.81 | 24.33 | 24.97 | 26.38 | 25.46 | 26.84 | 27.37 |
| | 4H | 22.42 | 23.75 | 22.92 | 24.23 | 24.77 | 26.18 | 27.51 | 26.68 | 28.00 | 28.53 |
| | 6H | 22.70 | 23.94 | 23.21 | 24.43 | 24.98 | 27.45 | 28.69 | 27.97 | 29.19 | 29.74 |
| | 8H | 22.75 | 23.93 | 23.27 | 24.45 | 25.01 | 28.11 | 29.30 | 28.64 | 29.82 | 30.38 |
| | 12H | 22.76 | 23.90 | 23.29 | 24.41 | 25.00 | 28.85 | 29.99 | 29.38 | 30.50 | 31.09 |
| 4H | 2H | 21.33 | 22.66 | 21.83 | 23.14 | 23.68 | 22.93 | 24.26 | 23.43 | 24.74 | 25.28 |
| | 3H | 23.06 | 24.19 | 23.58 | 24.72 | 25.28 | 25.63 | 26.77 | 26.15 | 27.29 | 27.85 |
| | 4H | 23.66 | 24.70 | 24.20 | 25.24 | 25.83 | 27.01 | 28.05 | 27.55 | 28.59 | 29.18 |
| | 6H | 24.06 | 24.98 | 24.62 | 25.54 | 26.15 | 28.47 | 29.39 | 29.03 | 29.95 | 30.56 |
| | 8H | 24.16 | 25.02 | 24.72 | 25.58 | 26.20 | 29.24 | 30.10 | 29.80 | 30.67 | 31.28 |
| | 12H | 24.20 | 24.98 | 24.78 | 25.57 | 26.20 | 30.10 | 30.88 | 30.68 | 31.47 | 32.10 |
| 8H | 4H | 24.35 | 25.21 | 24.91 | 25.78 | 26.40 | 27.23 | 28.09 | 27.79 | 28.65 | 29.27 |
| | 6H | 24.93 | 25.66 | 25.52 | 26.27 | 26.89 | 28.86 | 29.59 | 29.45 | 30.19 | 30.82 |
| | 8H | 25.11 | 25.77 | 25.72 | 26.39 | 27.03 | 29.77 | 30.43 | 30.37 | 31.04 | 31.68 |
| | 12H | 25.23 | 25.82 | 25.83 | 26.42 | 27.12 | 30.81 | 31.40 | 31.42 | 32.00 | 32.71 |
| 12H | 4H | 24.55 | 25.33 | 25.13 | 25.92 | 26.55 | 27.23 | 28.02 | 27.82 | 28.61 | 29.23 |
| | 6H | 25.23 | 25.89 | 25.83 | 26.50 | 27.14 | 28.89 | 29.56 | 29.50 | 30.17 | 30.81 |
| | 8H | 25.51 | 26.10 | 26.11 | 26.70 | 27.41 | 29.87 | 30.46 | 30.48 | 31.06 | 31.77 |

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1121 Highway 74 South
Peachtree City, GA 30269

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

Report Prepared for

Cooper Lighting Solutions

Fail-Safe

Report Number: SP1-2511-597-5

Test Date: 11/18/2025

Luminaire Tested: 4ASL-2-50-UNV-OPL-1_600mA

Data in this report applies to families of products including 4ASL

Report Generated By FNC07603 / LDUCLS01DT446
Version: v7.05

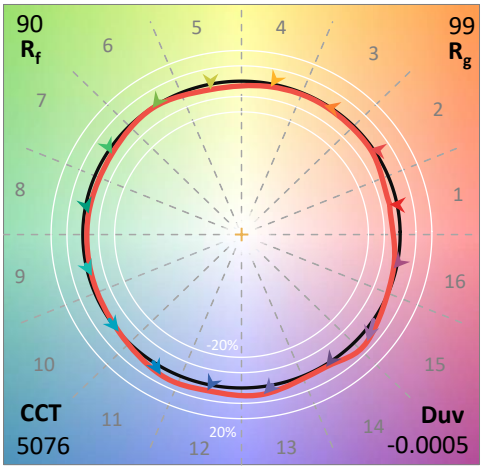
## Test Information

| | |
|---|---|
| Test Method: | LM-79-2019 |
| Report Number: | SP1-2511-597-5 |
| Test Lab: | COOPER LIGHTING SOLUTIONS |
| Photometer: | SP1 - 76IN SPHERE |
| Measurement Geometry: | 4π |
| Issue Date: | 11/18/2025 |
| Manufacturer: | COOPER LIGHTING SOLUTIONS |
| Product Line: | Fail-Safe |
| Catalog Number: | **4ASL-2-50-UNV-OPL-1_600mA** |
| Description: | 2foot 4ASL LED LUMINAIRE WITH OPL LENS AND 5000K LEDS with 1 rows at 600mA |

## Spectral Parameters

| | |
|---|---|
| CCT (K): | 5076 |
| CIE u': | 0.2110 |
| CIE v': | 0.4830 |
| Duv: | -0.0005 |
| CIE x: | 0.3429 |
| CIE y: | 0.3489 |
| CIE z: | 0.3082 |
| Peak Wavelength (nm): | 630 |
| Dominant Wavelength (nm): | 572 |
| Purity: | 7.553016 |
| Rf: | 90.4 |
| Rg: | 99 |

| | | | | | |
|---|---|---|---|---|---|
| CRI (Ra): | 94.9 | | | | |
| R1: | 96.7 | R9: | 74.0 | | |
| R2: | 98.2 | R10: | 93.9 | | |
| R3: | 96.6 | R11: | 96.2 | | |
| R4: | 95.6 | R12: | 72.4 | | |
| R5: | 95.1 | R13: | 98.1 | | |
| R6: | 93.6 | R14: | 97.8 | | |
| R7: | 94.0 | R15: | 95.6 | | |
| R8: | 89.6 | | | | |




## Test Conditions

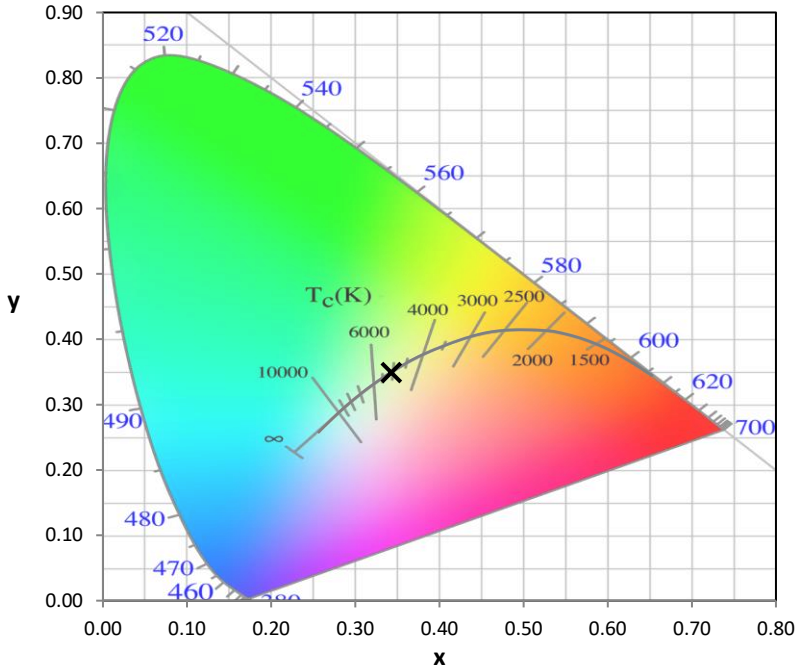
| | |
|---|---|
| Stabilization Time: | 24M |
| Operation Time: | 1H 24M |
| Sphere Temperature (°C): | 24.1 |

REPORT NUMBER: SP1-2511-597-5

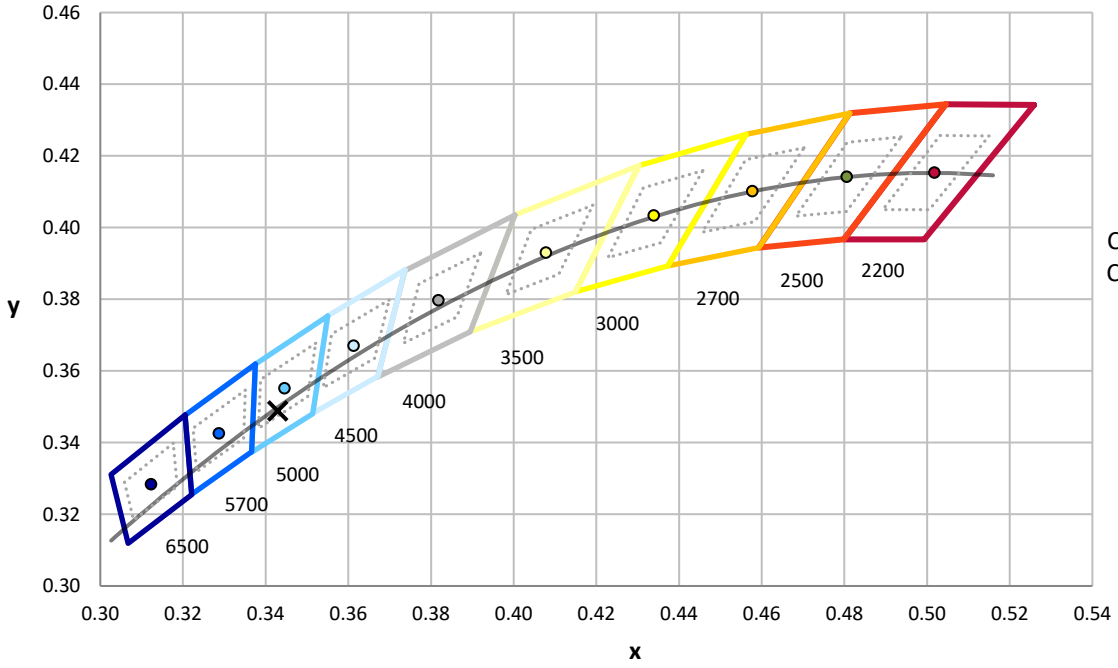
| Measurement and Test Equipment | | | |
|---|---|---|---|
| Instrument | Identification Number | Calibration Date | Calibration Due Date |
| Photometer | 76INCH SPHERE IN0058 | 6/16/2025 | 12/16/2025 |
| Power Meter | XITRON INXT2011004 | 10/21/2025 | 10/21/2026 |
| AC Power Source | CHROMA 61603 IN0063 | 10/21/2025 | 10/21/2026 |
| DC Power Source | AGILENT E3634A IN0208 | 10/21/2025 | 10/21/2026 |
| Sphere Thermometer | ONSET IN0085 | 10/21/2025 | 10/21/2026 |
| Room Thermometer | ONSET IN0046 | 10/21/2025 | 10/21/2026 |

REPORT NUMBER: SP1-2511-597-5

## CIE 1931 Chromaticity Diagram




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

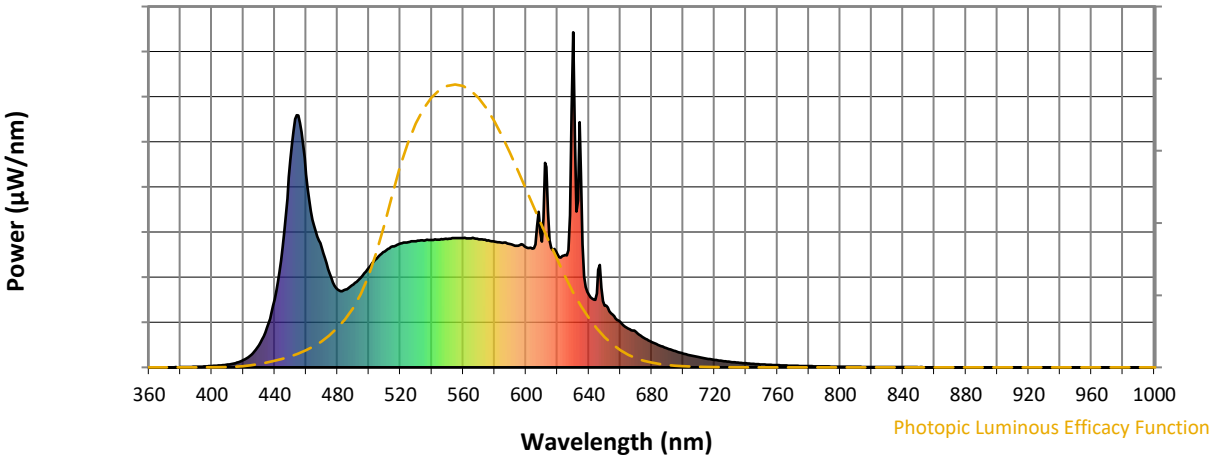



CCT = 5076K
CIE x = 0.3429
CIE y = 0.3489
Duv = -0.0005

Point lies inside the ANSI 5000K 4-step quadrangle

REPORT NUMBER: SP1-2511-597-5

## Photopic Flux vs. Wavelength




## Photopic Lumens: NR

| λ (nm) | Power W^/nm | Lumens (ϕ/nm) | λ (nm) | Power W^/nm | Lumens (ϕ/nm) | λ (nm) | Power W^/nm | Lumens (ϕ/nm) | λ (nm) | Power W^/nm | Lumens (ϕ/nm) | λ (nm) | Power W^/nm | Lumens (ϕ/nm) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 360 | 0 | NR | 490 | 248 | NR | 620 | 337 | NR | 750 | 9 | NR | 880 | 0 | NR |
| 365 | 0 | NR | 495 | 269 | NR | 625 | 335 | NR | 755 | 8 | NR | 885 | 0 | NR |
| 370 | 0 | NR | 500 | 298 | NR | 630 | 1000 | NR | 760 | 6 | NR | 890 | 0 | NR |
| 375 | 0 | NR | 505 | 325 | NR | 635 | 580 | NR | 765 | 6 | NR | 895 | 0 | NR |
| 380 | 1 | NR | 510 | 346 | NR | 640 | 216 | NR | 770 | 5 | NR | 900 | 0 | NR |
| 385 | 1 | NR | 515 | 361 | NR | 645 | 221 | NR | 775 | 4 | NR | 905 | 0 | NR |
| 390 | 2 | NR | 520 | 369 | NR | 650 | 185 | NR | 780 | 4 | NR | 910 | 0 | NR |
| 395 | 3 | NR | 525 | 374 | NR | 655 | 158 | NR | 785 | 3 | NR | 915 | 0 | NR |
| 400 | 4 | NR | 530 | 376 | NR | 660 | 136 | NR | 790 | 3 | NR | 920 | 0 | NR |
| 405 | 6 | NR | 535 | 379 | NR | 665 | 116 | NR | 795 | 2 | NR | 925 | 0 | NR |
| 410 | 8 | NR | 540 | 381 | NR | 670 | 106 | NR | 800 | 2 | NR | 930 | 0 | NR |
| 415 | 13 | NR | 545 | 381 | NR | 675 | 88 | NR | 805 | 2 | NR | 935 | 0 | NR |
| 420 | 22 | NR | 550 | 383 | NR | 680 | 76 | NR | 810 | 2 | NR | 940 | 0 | NR |
| 425 | 37 | NR | 555 | 386 | NR | 685 | 65 | NR | 815 | 1 | NR | 945 | 0 | NR |
| 430 | 66 | NR | 560 | 386 | NR | 690 | 56 | NR | 820 | 1 | NR | 950 | 0 | NR |
| 435 | 119 | NR | 565 | 385 | NR | 695 | 48 | NR | 825 | 1 | NR | 955 | 0 | NR |
| 440 | 203 | NR | 570 | 382 | NR | 700 | 41 | NR | 830 | 1 | NR | 960 | 0 | NR |
| 445 | 359 | NR | 575 | 379 | NR | 705 | 35 | NR | 835 | 1 | NR | 965 | 0 | NR |
| 450 | 620 | NR | 580 | 376 | NR | 710 | 30 | NR | 840 | 1 | NR | 970 | 0 | NR |
| 455 | 752 | NR | 585 | 372 | NR | 715 | 26 | NR | 845 | 1 | NR | 975 | 0 | NR |
| 460 | 576 | NR | 590 | 368 | NR | 720 | 22 | NR | 850 | 1 | NR | 980 | 0 | NR |
| 465 | 423 | NR | 595 | 363 | NR | 725 | 19 | NR | 855 | 0 | NR | 985 | 0 | NR |
| 470 | 354 | NR | 600 | 358 | NR | 730 | 16 | NR | 860 | 0 | NR | 990 | 0 | NR |
| 475 | 280 | NR | 605 | 355 | NR | 735 | 14 | NR | 865 | 0 | NR | 995 | 0 | NR |
| 480 | 232 | NR | 610 | 375 | NR | 740 | 12 | NR | 870 | 0 | NR | 1000 | 0 | NR |
| 485 | 232 | NR | 615 | 379 | NR | 745 | 10 | NR | 875 | 0 | NR | | | |

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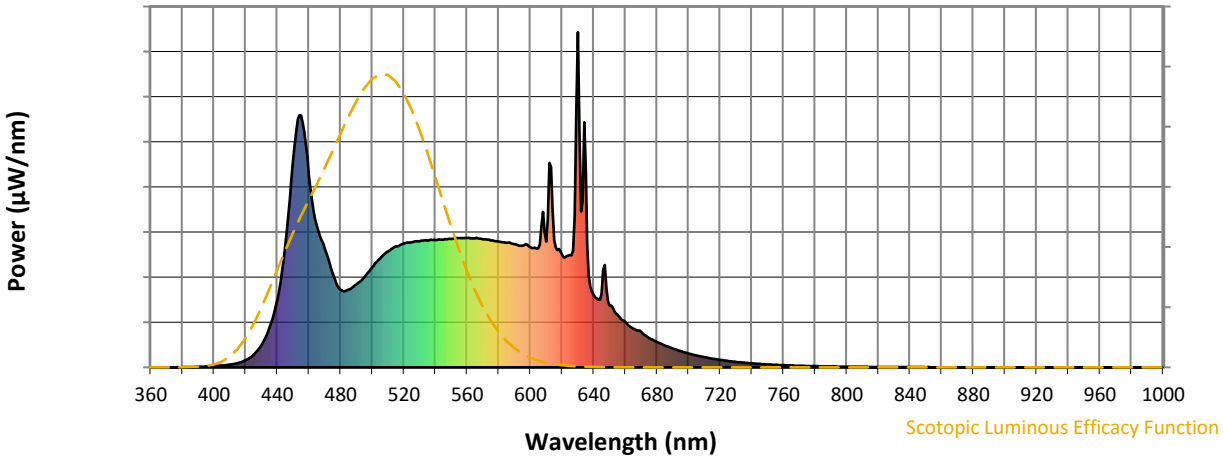
## Scotopic Flux vs. Wavelength




**Scotopic Lumens: NR** **S/P: 2.12**

| λ (nm) | Power W^/nm | Lumens (ϕ/nm) | λ (nm) | Power W^/nm | Lumens (ϕ/nm) | λ (nm) | Power W^/nm | Lumens (ϕ/nm) | λ (nm) | Power W^/nm | Lumens (ϕ/nm) | λ (nm) | Power W^/nm | Lumens (ϕ/nm) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 360 | 0 | NR | 490 | 248 | NR | 620 | 337 | NR | 750 | 9 | NR | 880 | 0 | NR |
| 365 | 0 | NR | 495 | 269 | NR | 625 | 335 | NR | 755 | 8 | NR | 885 | 0 | NR |
| 370 | 0 | NR | 500 | 298 | NR | 630 | 1000 | NR | 760 | 6 | NR | 890 | 0 | NR |
| 375 | 0 | NR | 505 | 325 | NR | 635 | 580 | NR | 765 | 6 | NR | 895 | 0 | NR |
| 380 | 1 | NR | 510 | 346 | NR | 640 | 216 | NR | 770 | 5 | NR | 900 | 0 | NR |
| 385 | 1 | NR | 515 | 361 | NR | 645 | 221 | NR | 775 | 4 | NR | 905 | 0 | NR |
| 390 | 2 | NR | 520 | 369 | NR | 650 | 185 | NR | 780 | 4 | NR | 910 | 0 | NR |
| 395 | 3 | NR | 525 | 374 | NR | 655 | 158 | NR | 785 | 3 | NR | 915 | 0 | NR |
| 400 | 4 | NR | 530 | 376 | NR | 660 | 136 | NR | 790 | 3 | NR | 920 | 0 | NR |
| 405 | 6 | NR | 535 | 379 | NR | 665 | 116 | NR | 795 | 2 | NR | 925 | 0 | NR |
| 410 | 8 | NR | 540 | 381 | NR | 670 | 106 | NR | 800 | 2 | NR | 930 | 0 | NR |
| 415 | 13 | NR | 545 | 381 | NR | 675 | 88 | NR | 805 | 2 | NR | 935 | 0 | NR |
| 420 | 22 | NR | 550 | 383 | NR | 680 | 76 | NR | 810 | 2 | NR | 940 | 0 | NR |
| 425 | 37 | NR | 555 | 386 | NR | 685 | 65 | NR | 815 | 1 | NR | 945 | 0 | NR |
| 430 | 66 | NR | 560 | 386 | NR | 690 | 56 | NR | 820 | 1 | NR | 950 | 0 | NR |
| 435 | 119 | NR | 565 | 385 | NR | 695 | 48 | NR | 825 | 1 | NR | 955 | 0 | NR |
| 440 | 203 | NR | 570 | 382 | NR | 700 | 41 | NR | 830 | 1 | NR | 960 | 0 | NR |
| 445 | 359 | NR | 575 | 379 | NR | 705 | 35 | NR | 835 | 1 | NR | 965 | 0 | NR |
| 450 | 620 | NR | 580 | 376 | NR | 710 | 30 | NR | 840 | 1 | NR | 970 | 0 | NR |
| 455 | 752 | NR | 585 | 372 | NR | 715 | 26 | NR | 845 | 1 | NR | 975 | 0 | NR |
| 460 | 576 | NR | 590 | 368 | NR | 720 | 22 | NR | 850 | 1 | NR | 980 | 0 | NR |
| 465 | 423 | NR | 595 | 363 | NR | 725 | 19 | NR | 855 | 0 | NR | 985 | 0 | NR |
| 470 | 354 | NR | 600 | 358 | NR | 730 | 16 | NR | 860 | 0 | NR | 990 | 0 | NR |
| 475 | 280 | NR | 605 | 355 | NR | 735 | 14 | NR | 865 | 0 | NR | 995 | 0 | NR |
| 480 | 232 | NR | 610 | 375 | NR | 740 | 12 | NR | 870 | 0 | NR | 1000 | 0 | NR |
| 485 | 232 | NR | 615 | 379 | NR | 745 | 10 | NR | 875 | 0 | NR | | | |

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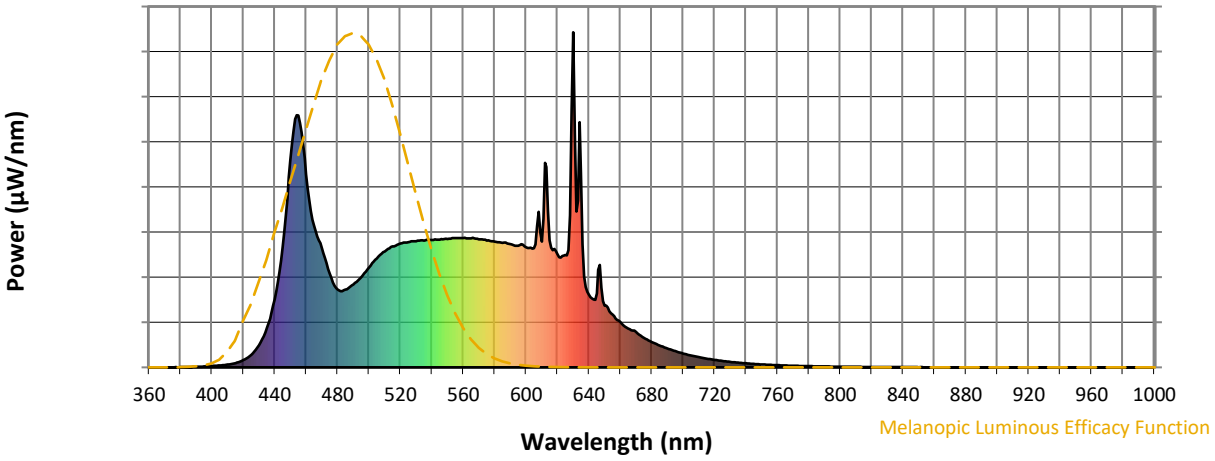
## Melanopic Flux vs. Wavelength




**Melanopic Lumens: NR** **M/P: 4.65**

| λ (nm) | Power W^/nm | Lumens (ϕ/nm) | λ (nm) | Power W^/nm | Lumens (ϕ/nm) | λ (nm) | Power W^/nm | Lumens (ϕ/nm) | λ (nm) | Power W^/nm | Lumens (ϕ/nm) | λ (nm) | Power W^/nm | Lumens (ϕ/nm) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 360 | 0 | NR | 490 | 248 | NR | 620 | 337 | NR | 750 | 9 | NR | 880 | 0 | NR |
| 365 | 0 | NR | 495 | 269 | NR | 625 | 335 | NR | 755 | 8 | NR | 885 | 0 | NR |
| 370 | 0 | NR | 500 | 298 | NR | 630 | 1000 | NR | 760 | 6 | NR | 890 | 0 | NR |
| 375 | 0 | NR | 505 | 325 | NR | 635 | 580 | NR | 765 | 6 | NR | 895 | 0 | NR |
| 380 | 1 | NR | 510 | 346 | NR | 640 | 216 | NR | 770 | 5 | NR | 900 | 0 | NR |
| 385 | 1 | NR | 515 | 361 | NR | 645 | 221 | NR | 775 | 4 | NR | 905 | 0 | NR |
| 390 | 2 | NR | 520 | 369 | NR | 650 | 185 | NR | 780 | 4 | NR | 910 | 0 | NR |
| 395 | 3 | NR | 525 | 374 | NR | 655 | 158 | NR | 785 | 3 | NR | 915 | 0 | NR |
| 400 | 4 | NR | 530 | 376 | NR | 660 | 136 | NR | 790 | 3 | NR | 920 | 0 | NR |
| 405 | 6 | NR | 535 | 379 | NR | 665 | 116 | NR | 795 | 2 | NR | 925 | 0 | NR |
| 410 | 8 | NR | 540 | 381 | NR | 670 | 106 | NR | 800 | 2 | NR | 930 | 0 | NR |
| 415 | 13 | NR | 545 | 381 | NR | 675 | 88 | NR | 805 | 2 | NR | 935 | 0 | NR |
| 420 | 22 | NR | 550 | 383 | NR | 680 | 76 | NR | 810 | 2 | NR | 940 | 0 | NR |
| 425 | 37 | NR | 555 | 386 | NR | 685 | 65 | NR | 815 | 1 | NR | 945 | 0 | NR |
| 430 | 66 | NR | 560 | 386 | NR | 690 | 56 | NR | 820 | 1 | NR | 950 | 0 | NR |
| 435 | 119 | NR | 565 | 385 | NR | 695 | 48 | NR | 825 | 1 | NR | 955 | 0 | NR |
| 440 | 203 | NR | 570 | 382 | NR | 700 | 41 | NR | 830 | 1 | NR | 960 | 0 | NR |
| 445 | 359 | NR | 575 | 379 | NR | 705 | 35 | NR | 835 | 1 | NR | 965 | 0 | NR |
| 450 | 620 | NR | 580 | 376 | NR | 710 | 30 | NR | 840 | 1 | NR | 970 | 0 | NR |
| 455 | 752 | NR | 585 | 372 | NR | 715 | 26 | NR | 845 | 1 | NR | 975 | 0 | NR |
| 460 | 576 | NR | 590 | 368 | NR | 720 | 22 | NR | 850 | 1 | NR | 980 | 0 | NR |
| 465 | 423 | NR | 595 | 363 | NR | 725 | 19 | NR | 855 | 0 | NR | 985 | 0 | NR |
| 470 | 354 | NR | 600 | 358 | NR | 730 | 16 | NR | 860 | 0 | NR | 990 | 0 | NR |
| 475 | 280 | NR | 605 | 355 | NR | 735 | 14 | NR | 865 | 0 | NR | 995 | 0 | NR |
| 480 | 232 | NR | 610 | 375 | NR | 740 | 12 | NR | 870 | 0 | NR | 1000 | 0 | NR |
| 485 | 232 | NR | 615 | 379 | NR | 745 | 10 | NR | 875 | 0 | NR | | | |

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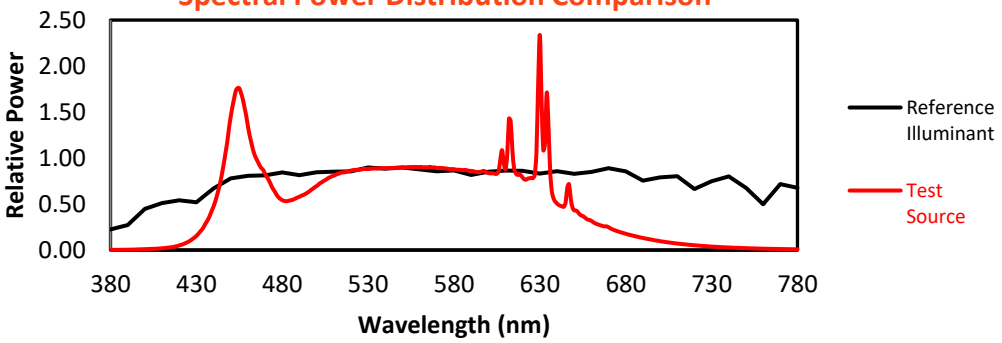
# TM-30-18

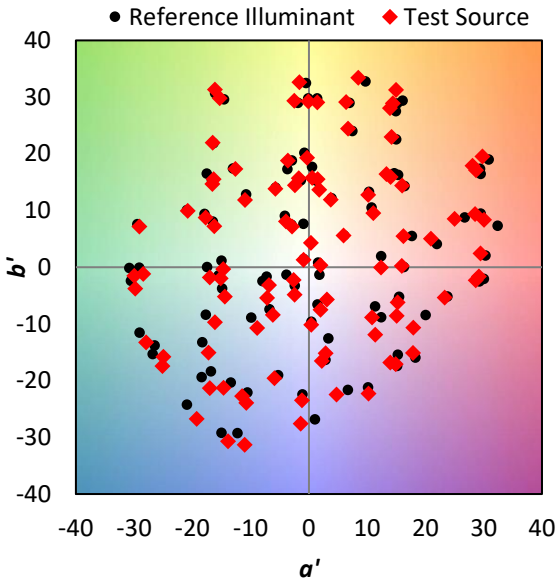
## Summary

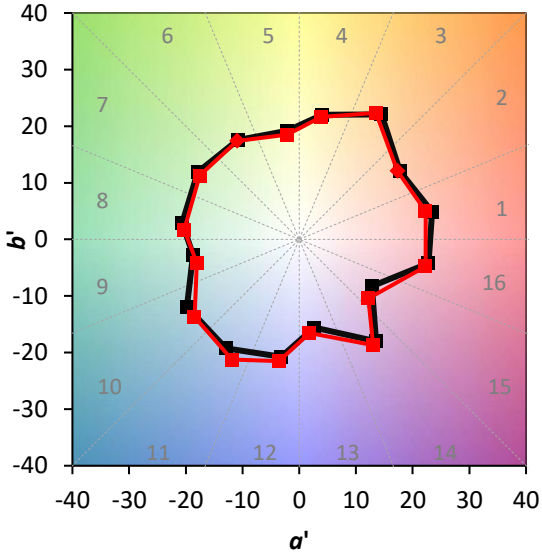
$R_f$ = 90.4
$R_g$ = 99
CIE $R_a$ = 94.9
$R_9$ = 74.0

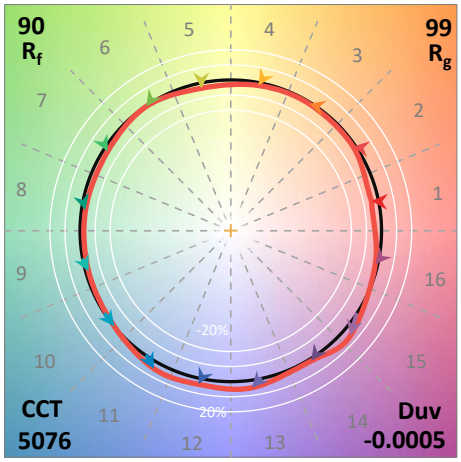
## Spectral Power Distribution Comparison

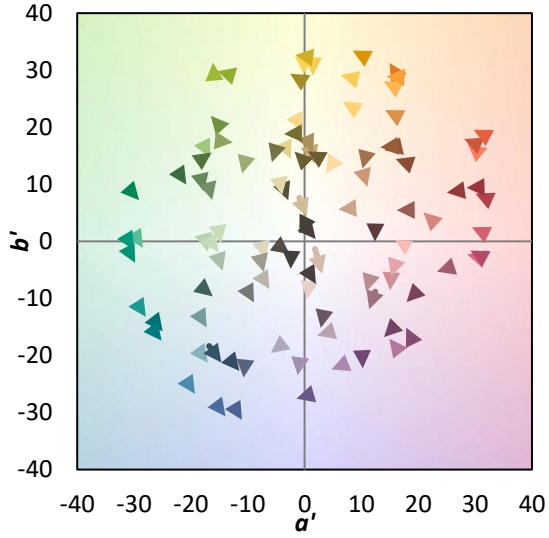



## Color Vector Graphics



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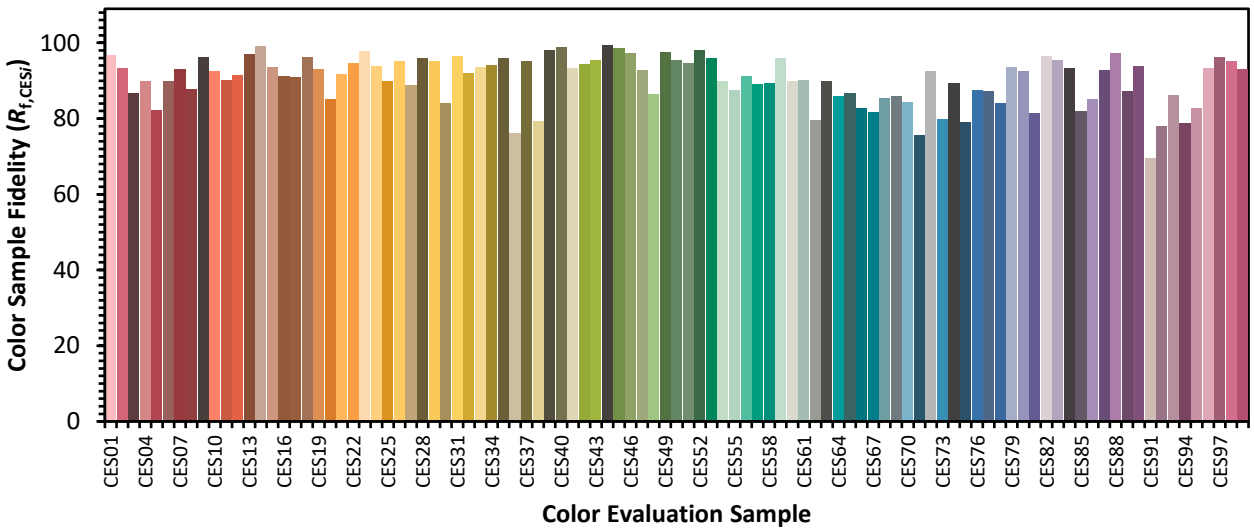
# TM-30-18

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

| | | | |
|---|---|---|---|
| CES01 = 85 | CES26 = 95 | CES51 = 95 | CES76 = 87 |
| CES02 = 61 | CES27 = 89 | CES52 = 98 | CES77 = 87 |
| CES03 = 31 | CES28 = 96 | CES53 = 96 | CES78 = 84 |
| CES04 = 69 | CES29 = 95 | CES54 = 90 | CES79 = 94 |
| CES05 = 48 | CES30 = 84 | CES55 = 88 | CES80 = 93 |
| CES06 = 50 | CES31 = 96 | CES56 = 91 | CES81 = 81 |
| CES07 = 41 | CES32 = 92 | CES57 = 89 | CES82 = 97 |
| CES08 = 40 | CES33 = 94 | CES58 = 89 | CES83 = 95 |
| CES09 = 29 | CES34 = 94 | CES59 = 96 | CES84 = 93 |
| CES10 = 73 | CES35 = 96 | CES60 = 90 | CES85 = 82 |
| CES11 = 56 | CES36 = 76 | CES61 = 90 | CES86 = 85 |
| CES12 = 62 | CES37 = 95 | CES62 = 80 | CES87 = 93 |
| CES13 = 42 | CES38 = 79 | CES63 = 90 | CES88 = 97 |
| CES14 = 74 | CES39 = 98 | CES64 = 86 | CES89 = 87 |
| CES15 = 71 | CES40 = 99 | CES65 = 87 | CES90 = 94 |
| CES16 = 47 | CES41 = 93 | CES66 = 83 | CES91 = 70 |
| CES17 = 48 | CES42 = 94 | CES67 = 82 | CES92 = 78 |
| CES18 = 56 | CES43 = 95 | CES68 = 85 | CES93 = 86 |
| CES19 = 70 | CES44 = 99 | CES69 = 86 | CES94 = 79 |
| CES20 = 65 | CES45 = 99 | CES70 = 84 | CES95 = 83 |
| CES21 = 85 | CES46 = 97 | CES71 = 76 | CES96 = 93 |
| CES22 = 77 | CES47 = 93 | CES72 = 92 | CES97 = 96 |
| CES23 = 91 | CES48 = 86 | CES73 = 80 | CES98 = 95 |
| CES24 = 90 | CES49 = 98 | CES74 = 89 | CES99 = 93 |
| CES25 = 70 | CES50 = 96 | CES75 = 79 | |



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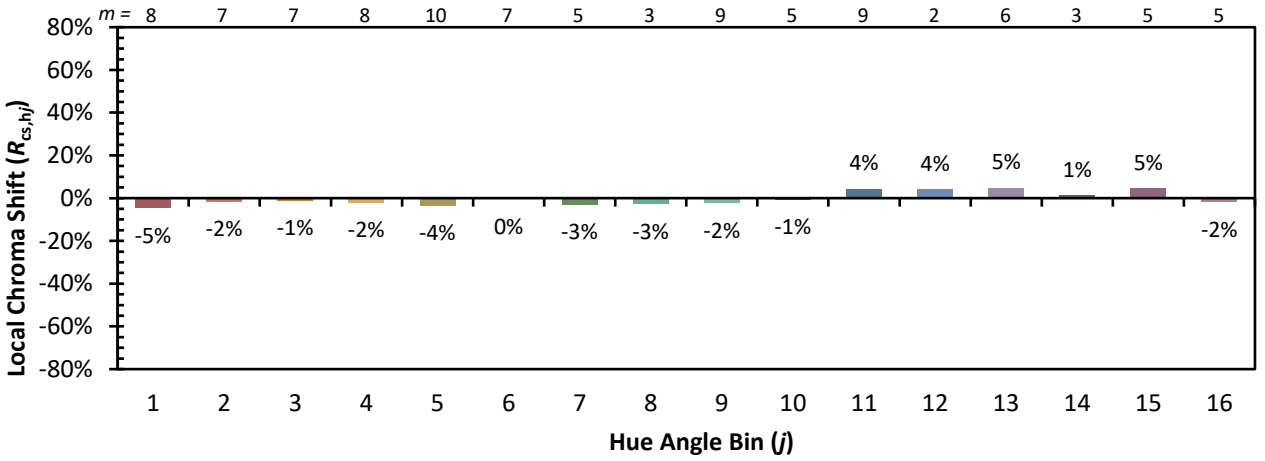
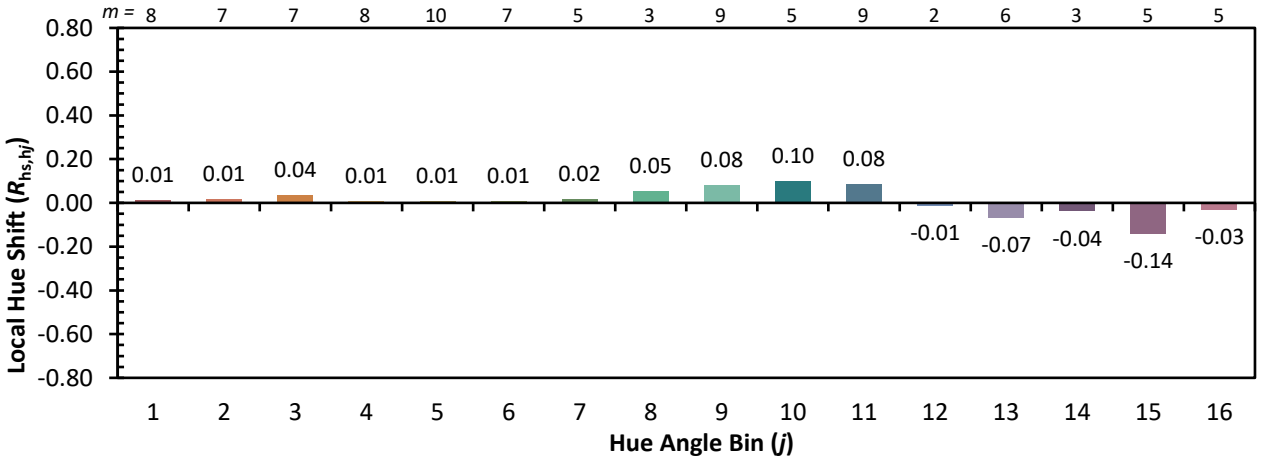
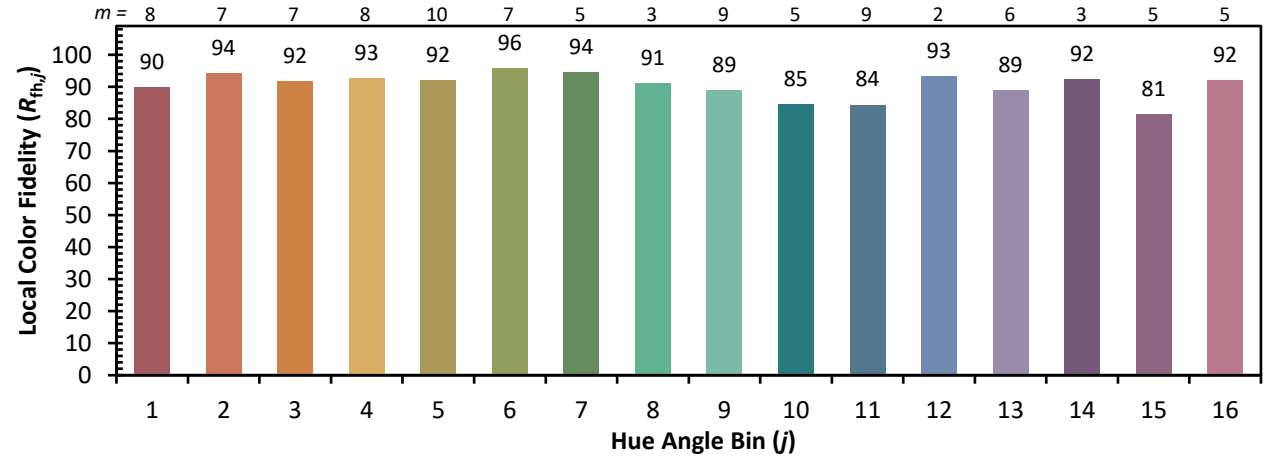
# TM-30-18

## Color Rendition by Hue-Angle Bin



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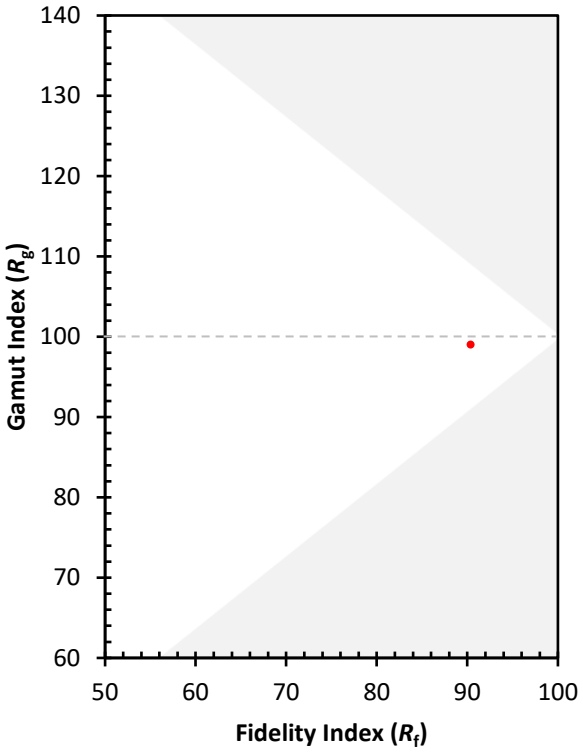
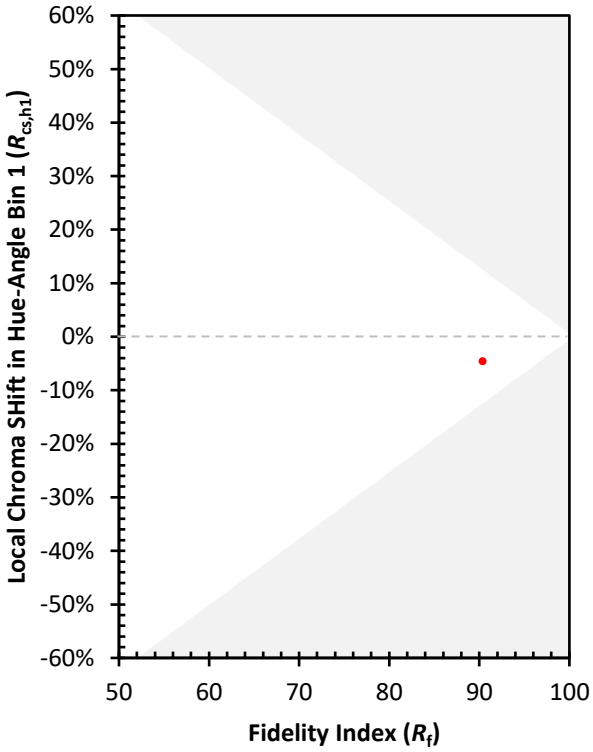
## TM-30-18

### Measure Comparisons




(END OF REPORT)