

Signify Classified - Internal  
Cooper Lighting Solutions Photometric Lab  
1121 Highway 74 South  
Peachtree City, GA 30269



Scaled data based on original data using  
LM-79-08 Approved Method: Electrical and Photometric Measurements of Solid-  
State Lighting Products

Test Report Prepared for  
Cooper Lighting Solutions  
(formerly Eaton)

Brand: INVUE

Report Number: P671133

Luminaire Tested: **CCP-SA2D-760-U-T4W**

Issue Date: 04/16/2023



**Test Information**

Test Method: LM-79-08  
Report Number: P671133  
Test Lab: INNOVATION CENTER(G1)  
Issue Date: 04/16/2023  
Manufacturer: COOPER LIGHTING SOLUTIONS (FORMERLY EATON)  
Product Line: INVUE  
Catalog Number: CCP-SA2D-760-U-T4W  
Description: INVUE CLEAR CURVE POLE MOUNT LIGHT SQUARE LUMINAIRE @800mA w/ T4W  
distribution lens  
Light Source: (32) 5700K CCT, 70 CRI LEDS  
Ballast/Driver: ELECTRONIC DRIVER

**Summary**

Lumens per Lamp: N/A  
Luminaire Lumens: 11508.8 lumens  
Efficiency: N/A  
Efficacy: 142.4 lumens/watt  
Luminous Opening: Rectangular (W 1' x L: 1' x H: 0')  
IES Classification: Type IV - Medium  
BUG Rating: B2 - U0 - G3

Input Watts (W): 80.8  
Input Voltage (V): 120  
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

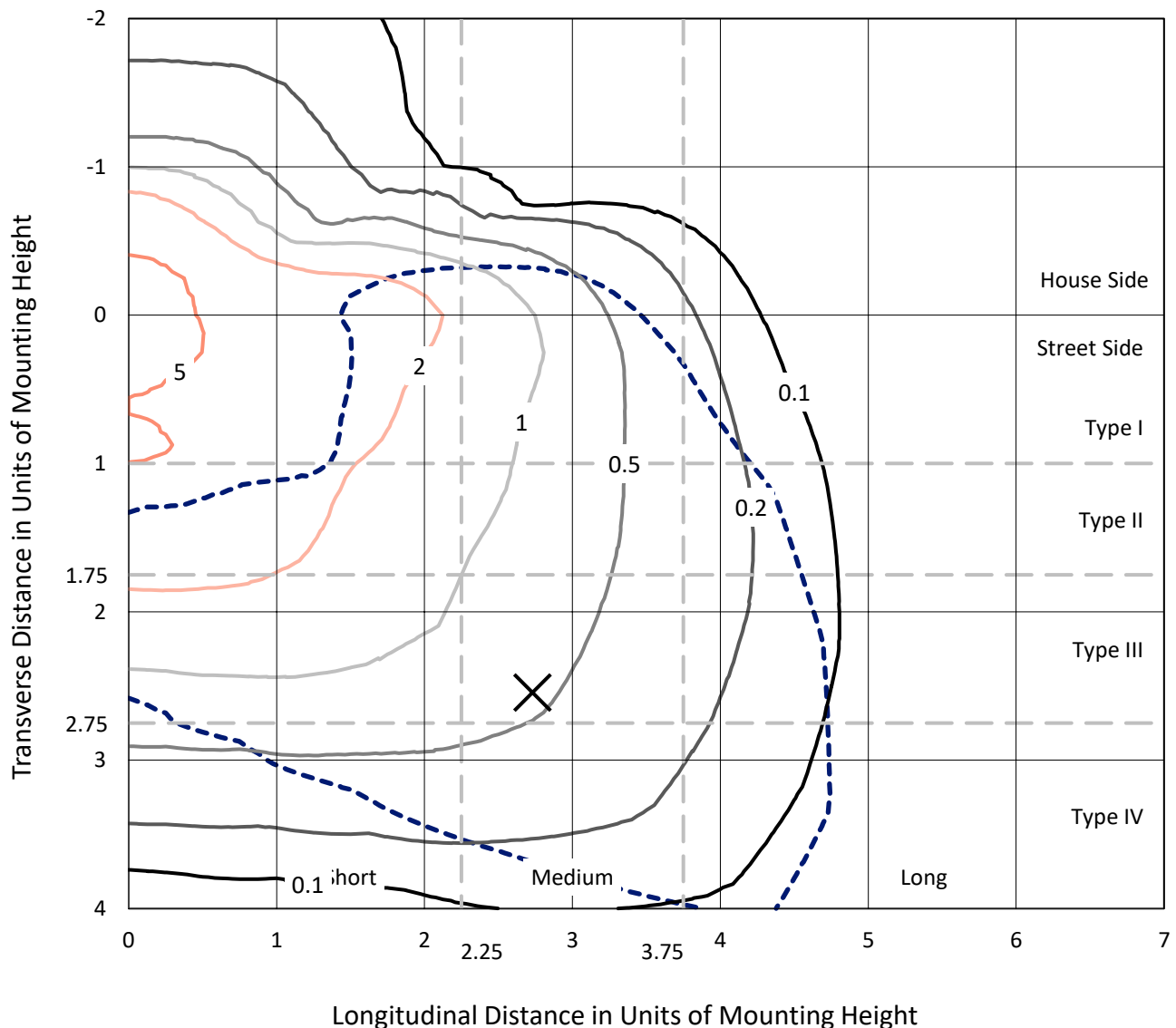
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## Iso-Footcandle Lines of Horizontal Illumination

✗ Max cd

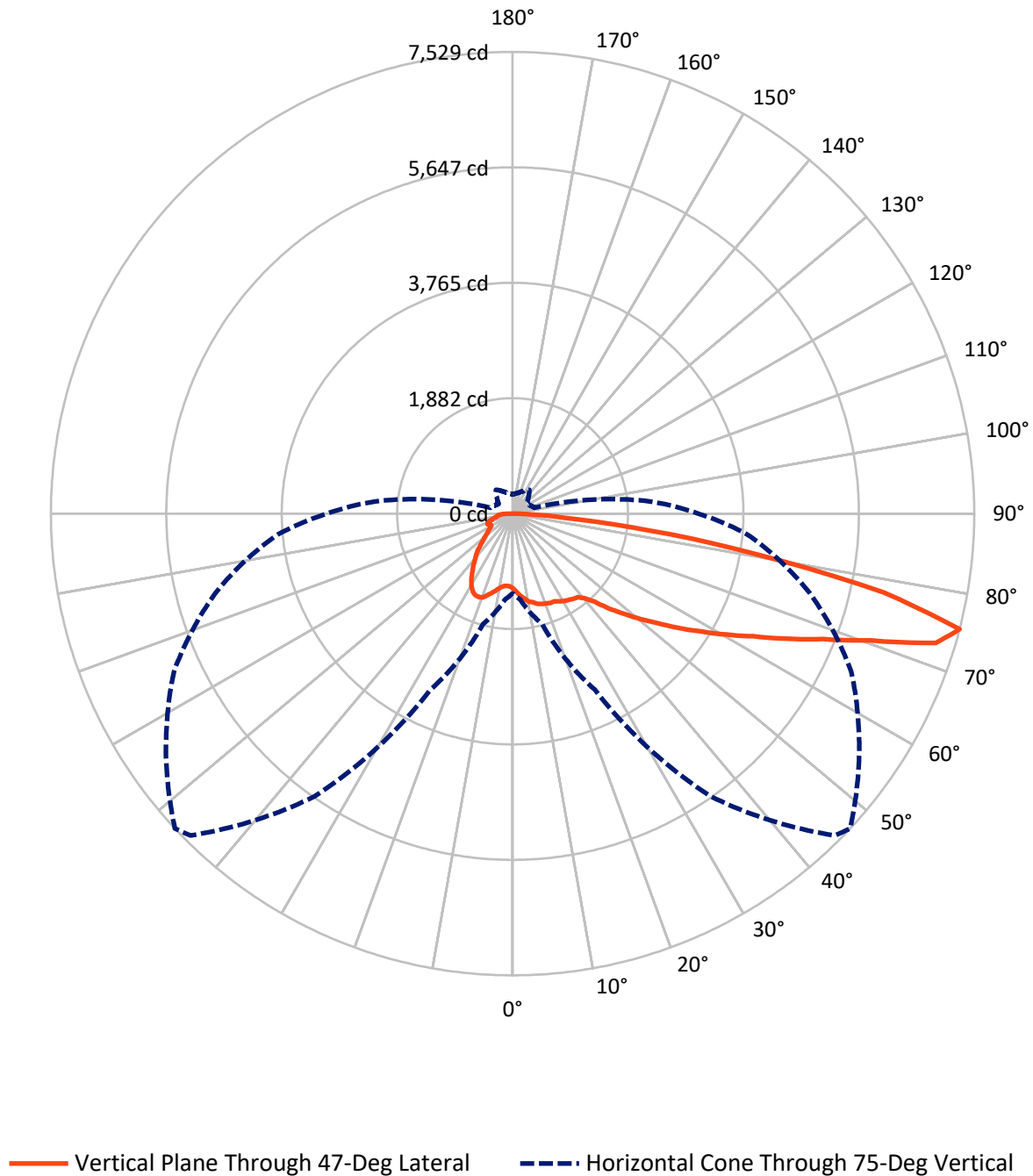
--- 1/2 Max cd



Based on 15 foot mounting height. Maximum calculated value = 6.9 fc  
Type IV - Medium - N/A

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## Luminous Intensity Polar Plot



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CATALOG NUMBER: CCP-SA2D-760-U-T4W

**FLUX DISTRIBUTION:**

|                    |           | Downward | Upward | Total   |
|--------------------|-----------|----------|--------|---------|
| <b>House Side</b>  | Lumens    | 2752.3   | 0.0    | 2752.3  |
|                    | % Fixture | 23.9     | 0.0    | 23.9    |
| <b>Street Side</b> | Lumens    | 8756.5   | 0.0    | 8756.5  |
|                    | % Fixture | 76.1     | 0.0    | 76.1    |
| <b>Total</b>       | Lumens    | 11508.8  | 0.0    | 11508.8 |
|                    | % Fixture | 100.0    | 0.0    | 100.0   |

**Coefficient of Utilization**

**ZONAL LUMENS:**

| Zone      | Lumens  | % Fixture |
|-----------|---------|-----------|
| 0°-10°    | 123.5   | 1.1       |
| 10°-20°   | 410.2   | 3.6       |
| 20°-30°   | 702.7   | 6.1       |
| 30°-40°   | 983.2   | 8.5       |
| 40°-50°   | 1370.8  | 11.9      |
| 50°-60°   | 2049.0  | 17.8      |
| 60°-70°   | 2954.2  | 25.7      |
| 70°-80°   | 2514.6  | 21.8      |
| 80°-90°   | 400.6   | 3.5       |
| 90°-100°  | 0.0     | 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°-90°    | 11508.8 | 100.0     |
| 0°-180°   | 11508.8 | 100.0     |



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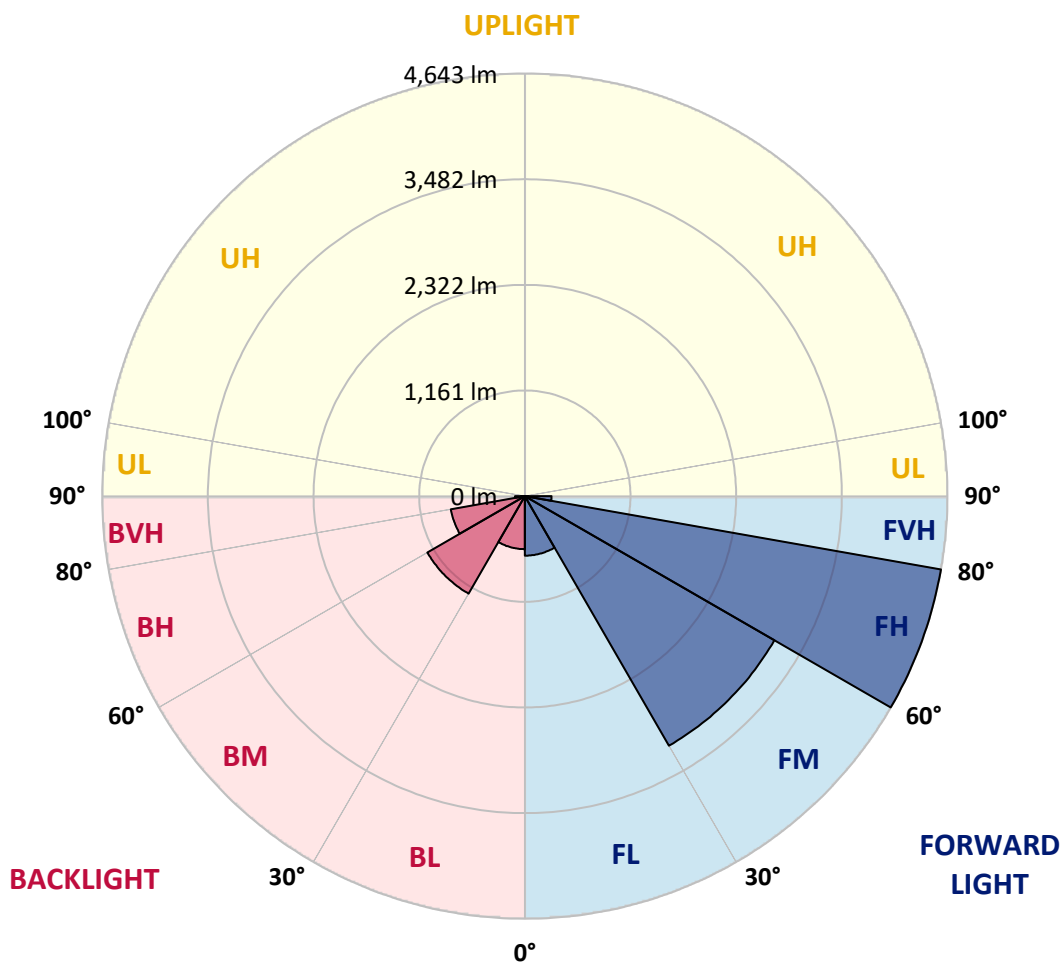
CATALOG NUMBER: CCP-SA2D-760-U-T4W

**LUMINAIRE CLASSIFICATION SYSTEM LUMEN TABLE AND BUG RATING:**

| Zone |             | Lumens | % Fixture | Zone Rating/Lumen Limit |      |         |
|------|-------------|--------|-----------|-------------------------|------|---------|
|      |             |        |           | B                       | U    | G       |
| FL   | (0°-30°)    | 653.9  | 5.7       |                         |      |         |
| FM   | (30°-60°)   | 3166.0 | 27.5      |                         |      |         |
| FH   | (60°-80°)   | 4643.1 | 40.3      |                         |      | G2/5000 |
| FVH  | (80°-90°)   | 293.5  | 2.6       |                         |      | G3/500  |
| BL   | (0°-30°)    | 582.6  | 5.1       | B2/1000                 |      |         |
| BM   | (30°-60°)   | 1237.0 | 10.7      | B2/2500                 |      |         |
| BH   | (60°-80°)   | 825.7  | 7.2       | B2/1000                 |      | G2/1000 |
| BVH  | (80°-90°)   | 107.1  | 0.9       |                         |      | G2/225  |
| UL   | (90°-100°)  | 0.0    | 0.0       |                         | U0/0 |         |
| UH   | (100°-180°) | 0.0    | 0.0       |                         | U0/0 |         |

**BUG Rating: B2-U0-G3**

Type IV Medium





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**CANDELA DISTRIBUTION (FULL):**

|       | 0°     | 5°     | 15°    | 25°    | 35°    | 45°    | 47°    | 55°    | 65°    | 75°    | 85°    |
|-------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|
| 0°    | 1222.0 | 1222.0 | 1222.0 | 1222.0 | 1222.0 | 1222.0 | 1222.0 | 1222.0 | 1222.0 | 1222.0 | 1222.0 |
| 2.5°  | 1310.2 | 1314.4 | 1314.4 | 1306.0 | 1297.6 | 1280.8 | 1280.8 | 1264.0 | 1255.6 | 1234.6 | 1226.2 |
| 5°    | 1432.0 | 1419.4 | 1406.8 | 1402.6 | 1381.6 | 1352.2 | 1348.0 | 1331.2 | 1285.0 | 1264.0 | 1234.6 |
| 7.5°  | 1520.1 | 1515.9 | 1511.7 | 1495.0 | 1457.2 | 1411.0 | 1398.4 | 1373.2 | 1327.0 | 1285.0 | 1251.4 |
| 10°   | 1591.5 | 1608.3 | 1591.5 | 1553.7 | 1515.9 | 1465.6 | 1461.4 | 1415.2 | 1373.2 | 1322.8 | 1280.8 |
| 12.5° | 1671.3 | 1675.5 | 1646.1 | 1599.9 | 1541.1 | 1499.1 | 1482.4 | 1465.6 | 1419.4 | 1377.4 | 1314.4 |
| 15°   | 1725.9 | 1717.5 | 1696.5 | 1633.5 | 1566.3 | 1524.3 | 1528.5 | 1507.5 | 1457.2 | 1427.8 | 1360.6 |
| 17.5° | 1725.9 | 1725.9 | 1692.3 | 1646.1 | 1587.3 | 1549.5 | 1549.5 | 1536.9 | 1503.3 | 1461.4 | 1415.2 |
| 20°   | 1692.3 | 1692.3 | 1671.3 | 1646.1 | 1578.9 | 1570.5 | 1562.1 | 1553.7 | 1553.7 | 1515.9 | 1448.8 |
| 22.5° | 1650.3 | 1641.9 | 1650.3 | 1608.3 | 1562.1 | 1570.5 | 1583.1 | 1578.9 | 1566.3 | 1532.7 | 1486.6 |
| 25°   | 1608.3 | 1612.5 | 1620.9 | 1591.5 | 1549.5 | 1587.3 | 1583.1 | 1604.1 | 1595.7 | 1570.5 | 1532.7 |
| 27.5° | 1604.1 | 1612.5 | 1616.7 | 1587.3 | 1570.5 | 1604.1 | 1620.9 | 1641.9 | 1646.1 | 1620.9 | 1574.7 |
| 30°   | 1667.1 | 1662.9 | 1658.7 | 1620.9 | 1608.3 | 1637.7 | 1654.5 | 1683.9 | 1709.1 | 1654.5 | 1616.7 |
| 32.5° | 1830.9 | 1805.7 | 1780.5 | 1679.7 | 1641.9 | 1662.9 | 1679.7 | 1721.7 | 1725.9 | 1696.5 | 1641.9 |
| 35°   | 2091.3 | 2074.5 | 1990.5 | 1814.1 | 1709.1 | 1688.1 | 1704.9 | 1734.3 | 1742.7 | 1721.7 | 1679.7 |
| 37.5° | 2389.4 | 2381.0 | 2263.4 | 2049.3 | 1847.7 | 1746.9 | 1730.1 | 1772.1 | 1805.7 | 1759.5 | 1700.7 |
| 40°   | 2683.4 | 2649.8 | 2565.8 | 2355.8 | 2024.1 | 1835.1 | 1814.1 | 1835.1 | 1847.7 | 1814.1 | 1776.3 |
| 42.5° | 2947.9 | 2910.1 | 2889.1 | 2679.2 | 2255.0 | 1982.1 | 1965.3 | 1914.9 | 1952.7 | 1910.7 | 1860.3 |
| 45°   | 3170.5 | 3162.1 | 3153.7 | 2973.1 | 2519.6 | 2221.4 | 2208.8 | 2078.7 | 2120.6 | 2087.1 | 2015.7 |
| 47.5° | 3330.0 | 3367.8 | 3355.2 | 3254.5 | 2821.9 | 2477.6 | 2439.8 | 2271.8 | 2334.8 | 2301.2 | 2229.8 |
| 50°   | 3519.0 | 3540.0 | 3527.4 | 3460.2 | 3103.3 | 2771.5 | 2700.1 | 2528.0 | 2599.4 | 2595.2 | 2557.4 |
| 52.5° | 3687.0 | 3750.0 | 3678.6 | 3674.4 | 3506.4 | 3090.7 | 2968.9 | 2805.1 | 2922.7 | 2968.9 | 2964.7 |
| 55°   | 3884.4 | 3934.7 | 3913.7 | 3905.3 | 3867.6 | 3401.4 | 3292.3 | 3094.9 | 3292.3 | 3359.4 | 3418.2 |
| 57.5° | 4052.3 | 4048.1 | 4127.9 | 4224.5 | 4270.7 | 3758.4 | 3628.2 | 3397.2 | 3695.4 | 3771.0 | 3934.7 |
| 60°   | 4127.9 | 4199.3 | 4333.7 | 4577.2 | 4707.4 | 4140.5 | 4006.1 | 3821.4 | 4102.7 | 4161.5 | 4463.9 |
| 62.5° | 4178.3 | 4241.3 | 4501.6 | 4913.2 | 4988.8 | 4531.0 | 4405.1 | 4220.3 | 4547.8 | 4589.8 | 5039.2 |
| 65°   | 4039.7 | 4098.5 | 4615.0 | 5039.2 | 5307.9 | 4951.0 | 4921.6 | 4728.4 | 4993.0 | 5018.2 | 5643.9 |
| 67.5° | 3880.2 | 3943.1 | 4518.4 | 5198.7 | 5732.0 | 5509.5 | 5463.3 | 5232.3 | 5433.9 | 5404.5 | 6105.8 |
| 70°   | 3598.8 | 3682.8 | 4270.7 | 5337.3 | 6202.4 | 6290.5 | 6198.2 | 5870.6 | 5891.6 | 5614.5 | 6126.8 |
| 72.5° | 2742.1 | 2796.7 | 3342.6 | 4787.2 | 6420.7 | 7374.0 | 7214.4 | 6559.3 | 6319.9 | 5656.5 | 5408.7 |
| 75°   | 1301.8 | 1402.6 | 1864.5 | 3166.3 | 5627.1 | 7424.4 | 7529.3 | 6899.4 | 6093.2 | 5018.2 | 3834.0 |
| 77.5° | 377.9  | 377.9  | 566.9  | 1343.8 | 3527.4 | 5984.0 | 6181.4 | 5858.0 | 5026.6 | 3716.4 | 2015.7 |
| 80°   | 205.8  | 218.4  | 298.2  | 474.5  | 1549.5 | 3775.2 | 4060.7 | 3884.4 | 2960.5 | 1469.8 | 520.7  |
| 82.5° | 117.6  | 121.8  | 197.4  | 285.6  | 705.5  | 2053.5 | 2221.4 | 2015.7 | 1125.4 | 445.1  | 243.6  |
| 85°   | 67.2   | 71.4   | 113.4  | 189.0  | 419.9  | 755.9  | 823.1  | 713.9  | 453.5  | 298.2  | 121.8  |
| 87.5° | 33.6   | 33.6   | 54.6   | 88.2   | 214.2  | 214.2  | 210.0  | 256.2  | 273.0  | 180.6  | 54.6   |
| 90°   | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    |



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CATALOG NUMBER: CCP-SA2D-760-U-T4W

**CANDELA DISTRIBUTION (continued):**

|       | 90°    | 95°    | 105°   | 115°   | 125°   | 135°   | 145°   | 155°   | 165°   | 175°   | 180°   |
|-------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|
| 0°    | 1222.0 | 1222.0 | 1222.0 | 1222.0 | 1222.0 | 1222.0 | 1222.0 | 1222.0 | 1222.0 | 1222.0 | 1222.0 |
| 2.5°  | 1222.0 | 1217.8 | 1217.8 | 1201.0 | 1196.8 | 1184.2 | 1184.2 | 1175.8 | 1171.6 | 1184.2 | 1184.2 |
| 5°    | 1226.2 | 1205.2 | 1201.0 | 1184.2 | 1188.4 | 1180.0 | 1196.8 | 1188.4 | 1184.2 | 1184.2 | 1180.0 |
| 7.5°  | 1234.6 | 1213.6 | 1196.8 | 1184.2 | 1180.0 | 1192.6 | 1213.6 | 1213.6 | 1238.8 | 1226.2 | 1226.2 |
| 10°   | 1255.6 | 1243.0 | 1222.0 | 1213.6 | 1213.6 | 1226.2 | 1251.4 | 1268.2 | 1289.2 | 1289.2 | 1276.6 |
| 12.5° | 1306.0 | 1285.0 | 1259.8 | 1247.2 | 1264.0 | 1276.6 | 1301.8 | 1318.6 | 1343.8 | 1352.2 | 1343.8 |
| 15°   | 1343.8 | 1322.8 | 1314.4 | 1306.0 | 1318.6 | 1335.4 | 1356.4 | 1373.2 | 1402.6 | 1411.0 | 1406.8 |
| 17.5° | 1394.2 | 1369.0 | 1364.8 | 1369.0 | 1377.4 | 1390.0 | 1402.6 | 1415.2 | 1436.2 | 1436.2 | 1436.2 |
| 20°   | 1419.4 | 1411.0 | 1406.8 | 1419.4 | 1436.2 | 1453.0 | 1444.6 | 1436.2 | 1432.0 | 1440.4 | 1436.2 |
| 22.5° | 1465.6 | 1457.2 | 1461.4 | 1474.0 | 1474.0 | 1465.6 | 1453.0 | 1423.6 | 1415.2 | 1423.6 | 1415.2 |
| 25°   | 1507.5 | 1499.1 | 1499.1 | 1490.8 | 1486.6 | 1457.2 | 1432.0 | 1406.8 | 1377.4 | 1390.0 | 1385.8 |
| 27.5° | 1549.5 | 1545.3 | 1545.3 | 1511.7 | 1469.8 | 1419.4 | 1385.8 | 1356.4 | 1339.6 | 1360.6 | 1348.0 |
| 30°   | 1599.9 | 1604.1 | 1583.1 | 1503.3 | 1402.6 | 1348.0 | 1310.2 | 1306.0 | 1301.8 | 1314.4 | 1310.2 |
| 32.5° | 1646.1 | 1650.3 | 1616.7 | 1490.8 | 1352.2 | 1247.2 | 1209.4 | 1213.6 | 1234.6 | 1255.6 | 1276.6 |
| 35°   | 1671.3 | 1692.3 | 1650.3 | 1448.8 | 1251.4 | 1133.8 | 1091.8 | 1129.6 | 1167.4 | 1196.8 | 1217.8 |
| 37.5° | 1717.5 | 1772.1 | 1700.7 | 1402.6 | 1163.2 | 1033.0 | 1003.6 | 1016.2 | 1062.4 | 1108.6 | 1129.6 |
| 40°   | 1784.7 | 1847.7 | 1713.3 | 1314.4 | 1045.6 | 932.2  | 915.4  | 919.6  | 936.4  | 965.8  | 986.8  |
| 42.5° | 1902.3 | 1969.5 | 1725.9 | 1201.0 | 928.0  | 869.3  | 823.1  | 810.5  | 797.9  | 797.9  | 793.7  |
| 45°   | 2074.5 | 2137.4 | 1709.1 | 1058.2 | 810.5  | 768.5  | 734.9  | 705.5  | 671.9  | 617.3  | 625.7  |
| 47.5° | 2326.4 | 2376.8 | 1721.7 | 932.2  | 701.3  | 667.7  | 642.5  | 608.9  | 558.5  | 499.7  | 495.5  |
| 50°   | 2708.5 | 2633.0 | 1704.9 | 802.1  | 621.5  | 592.1  | 571.1  | 524.9  | 466.1  | 424.1  | 419.9  |
| 52.5° | 3153.7 | 3002.5 | 1688.1 | 692.9  | 554.3  | 529.1  | 512.3  | 461.9  | 407.3  | 386.3  | 382.1  |
| 55°   | 3691.2 | 3472.8 | 1713.3 | 596.3  | 503.9  | 482.9  | 466.1  | 419.9  | 377.9  | 361.1  | 356.9  |
| 57.5° | 4325.3 | 3980.9 | 1851.9 | 520.7  | 449.3  | 440.9  | 436.7  | 398.9  | 361.1  | 348.5  | 344.3  |
| 60°   | 4921.6 | 4468.1 | 1944.3 | 466.1  | 398.9  | 407.3  | 415.7  | 398.9  | 356.9  | 348.5  | 348.5  |
| 62.5° | 5421.3 | 4871.2 | 1797.3 | 419.9  | 373.7  | 398.9  | 436.7  | 424.1  | 407.3  | 415.7  | 407.3  |
| 65°   | 5862.2 | 5009.8 | 1343.8 | 394.7  | 361.1  | 419.9  | 482.9  | 478.7  | 440.9  | 449.3  | 445.1  |
| 67.5° | 5937.8 | 4841.8 | 877.7  | 373.7  | 352.7  | 461.9  | 541.7  | 491.3  | 415.7  | 415.7  | 403.1  |
| 70°   | 5622.9 | 4392.5 | 587.9  | 352.7  | 348.5  | 461.9  | 554.3  | 461.9  | 390.5  | 390.5  | 373.7  |
| 72.5° | 4615.0 | 3510.6 | 453.5  | 331.7  | 319.1  | 411.5  | 524.9  | 436.7  | 365.3  | 356.9  | 327.5  |
| 75°   | 3031.9 | 2263.4 | 369.5  | 314.9  | 277.2  | 361.1  | 474.5  | 403.1  | 348.5  | 323.3  | 310.7  |
| 77.5° | 1486.6 | 1016.2 | 310.7  | 277.2  | 239.4  | 314.9  | 432.5  | 382.1  | 327.5  | 302.3  | 294.0  |
| 80°   | 407.3  | 365.3  | 260.4  | 243.6  | 201.6  | 273.0  | 407.3  | 365.3  | 306.5  | 281.4  | 268.8  |
| 82.5° | 231.0  | 226.8  | 210.0  | 197.4  | 168.0  | 273.0  | 411.5  | 365.3  | 289.8  | 285.6  | 243.6  |
| 85°   | 126.0  | 134.4  | 151.2  | 147.0  | 130.2  | 243.6  | 390.5  | 319.1  | 235.2  | 197.4  | 197.4  |
| 87.5° | 50.4   | 63.0   | 75.6   | 84.0   | 88.2   | 180.6  | 294.0  | 243.6  | 180.6  | 151.2  | 151.2  |
| 90°   | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    |

Report Prepared for

Cooper Lighting Solutions

(formerly Eaton)

INVUE

Report Number: SP1-2012-088-5-R3

Luminaire Tested: CCW-SA1A-760-U-SL2-HSS

Test Date: 01/19/2021

### Test Information

Test Method: LM-79-08  
 Report Number: SP1-2012-088-5-R3  
 Test Lab: COOPER LIGHTING SOLUTIONS  
 Photometer: SP1  
 Measurement Geometry:  $4\pi$   
 Issue Date: 01/19/2021  
 Manufacturer: COOPER LIGHTING SOLUTIONS (FORMERLY EATON)  
 Product Line: INVUE  
 Catalog Number: **CCW-SA1A-760-U-SL2-HSS**  
 Description: INVUE WALL PACK

\*\*\*THIS IS A REVISION OF SP1-2012-088-5-R2. TO UPDATE THE CATALOG  
 INFORMATION.\*\*\*TESTED IN SITU. INVUE WALL PACK LIGHT SQUARE T2 OPTICS 1-SQUARE WITH  
 HOUSE SIDE SHIELD

### Spectral Parameters

|                           |        |           |      |      |       |
|---------------------------|--------|-----------|------|------|-------|
| CCT (K):                  | 5447   | CRI (Ra): | 71.9 |      |       |
| CIE u':                   | 0.2053 | R1:       | 70.7 | R9:  | -27.5 |
| CIE v':                   | 0.4809 | R2:       | 74.8 | R10: | 41.5  |
| Duv:                      | 0.0027 | R3:       | 78.7 | R11: | 74.9  |
| CIE x:                    | 0.3337 | R4:       | 74.0 | R12: | 49.9  |
| CIE y:                    | 0.3473 | R5:       | 72.5 | R13: | 70.2  |
| CIE z:                    | 0.3190 | R6:       | 67.7 | R14: | 88.1  |
| Peak Wavelength (nm):     | 443    | R7:       | 77.7 |      |       |
| Dominant Wavelength (nm): | 556    | R8:       | 58.8 |      |       |
| Purity:                   | 4.5    |           |      |      |       |
| Rf:                       | 72.3   |           |      |      |       |
| Rg:                       | 97.2   |           |      |      |       |



### Test Conditions

Stabilization Time: 75M  
 Operation Time: 12H  
 Room Temperature (°C) / RH%: 25.4/18%  
 Sphere Temperature (°C): 25.3

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| Measurement and Test Equipment |                       |                  |                      |
|--------------------------------|-----------------------|------------------|----------------------|
| Instrument                     | Identification Number | Calibration Date | Calibration Due Date |
| Photometer                     | IN0058                | 7/29/2020        | 1/29/2021            |
| Power Meter                    | IN0071                | 12/1/2020        | 12/1/2021            |
| AC Power Source                | IN0063                | 12/1/2020        | 12/1/2021            |
| DC Power Source                | IN0208                | 12/1/2020        | 12/1/2021            |
| Sphere Thermometer             | IN0085                | 12/1/2020        | 12/1/2021            |
| Room Thermometer               | IN0046                | 12/1/2020        | 12/1/2021            |

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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 5700K 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       | 828              | 0.0              | 490       | 9471             | 1.3              | 620       | 23317            | 6.1              | 750       | 1157             | 0.0              | 880       | 1136             | 0.0              |
| 365       | 696              | 0.0              | 495       | 12752            | 2.3              | 625       | 21413            | 4.7              | 755       | 1067             | 0.0              | 885       | 773              | 0.0              |
| 370       | 807              | 0.0              | 500       | 16685            | 3.7              | 630       | 19344            | 3.5              | 760       | 1059             | 0.0              | 890       | 872              | 0.0              |
| 375       | 837              | 0.0              | 505       | 20565            | 5.8              | 635       | 17464            | 2.6              | 765       | 1009             | 0.0              | 895       | 891              | 0.0              |
| 380       | 757              | 0.0              | 510       | 24119            | 8.3              | 640       | 15745            | 1.9              | 770       | 774              | 0.0              | 900       | 807              | 0.0              |
| 385       | 706              | 0.0              | 515       | 27181            | 11.3             | 645       | 14060            | 1.4              | 775       | 761              | 0.0              | 905       | 899              | 0.0              |
| 390       | 746              | 0.0              | 520       | 29555            | 14.3             | 650       | 12579            | 0.9              | 780       | 653              | 0.0              | 910       | 506              | 0.0              |
| 395       | 660              | 0.0              | 525       | 31307            | 16.8             | 655       | 11181            | 0.6              | 785       | 704              | 0.0              | 915       | 598              | 0.0              |
| 400       | 671              | 0.0              | 530       | 32558            | 19.2             | 660       | 9847             | 0.4              | 790       | 663              | 0.0              | 920       | 510              | 0.0              |
| 405       | 848              | 0.0              | 535       | 33301            | 20.7             | 665       | 8641             | 0.3              | 795       | 493              | 0.0              | 925       | 874              | 0.0              |
| 410       | 1490             | 0.0              | 540       | 33727            | 22.0             | 670       | 7535             | 0.2              | 800       | 584              | 0.0              | 930       | 549              | 0.0              |
| 415       | 3203             | 0.0              | 545       | 34356            | 22.9             | 675       | 6542             | 0.1              | 805       | 739              | 0.0              | 935       | 720              | 0.0              |
| 420       | 7298             | 0.0              | 550       | 34589            | 23.5             | 680       | 5664             | 0.1              | 810       | 601              | 0.0              | 940       | 754              | 0.0              |
| 425       | 15315            | 0.1              | 555       | 34855            | 23.8             | 685       | 4962             | 0.0              | 815       | 677              | 0.0              | 945       | 931              | 0.0              |
| 430       | 27886            | 0.2              | 560       | 35083            | 23.8             | 690       | 4369             | 0.0              | 820       | 726              | 0.0              | 950       | 811              | 0.0              |
| 435       | 45485            | 0.5              | 565       | 35553            | 23.6             | 695       | 3785             | 0.0              | 825       | 693              | 0.0              | 955       | 955              | 0.0              |
| 440       | 61965            | 1.0              | 570       | 35511            | 23.1             | 700       | 3318             | 0.0              | 830       | 619              | 0.0              | 960       | 1025             | 0.0              |
| 445       | 62721            | 1.3              | 575       | 35515            | 22.1             | 705       | 2962             | 0.0              | 835       | 738              | 0.0              | 965       | 916              | 0.0              |
| 450       | 44754            | 1.2              | 580       | 35114            | 20.9             | 710       | 2689             | 0.0              | 840       | 681              | 0.0              | 970       | 695              | 0.0              |
| 455       | 26152            | 0.9              | 585       | 34546            | 19.2             | 715       | 2476             | 0.0              | 845       | 691              | 0.0              | 975       | 568              | 0.0              |
| 460       | 17101            | 0.7              | 590       | 33522            | 17.3             | 720       | 2192             | 0.0              | 850       | 710              | 0.0              | 980       | 643              | 0.0              |
| 465       | 11400            | 0.6              | 595       | 32326            | 15.3             | 725       | 1939             | 0.0              | 855       | 1025             | 0.0              | 985       | 804              | 0.0              |
| 470       | 7763             | 0.5              | 600       | 30973            | 13.3             | 730       | 1698             | 0.0              | 860       | 889              | 0.0              | 990       | 812              | 0.0              |
| 475       | 6419             | 0.5              | 605       | 29160            | 11.3             | 735       | 1533             | 0.0              | 865       | 885              | 0.0              | 995       | 496              | 0.0              |
| 480       | 6330             | 0.6              | 610       | 27373            | 9.4              | 740       | 1375             | 0.0              | 870       | 905              | 0.0              | 1000      | 659              | 0.0              |
| 485       | 7299             | 0.9              | 615       | 25423            | 7.7              | 745       | 1254             | 0.0              | 875       | 739              | 0.0              |           |                  |                  |

REPORT NUMBER: SP1-2012-088-5-R3

### Scotopic Flux vs. Wavelength



Scotopic Lumens: 1610.2

S/P: 0.74

| 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       | 828              | 0.0              | 490       | 9471             | 14.6             | 620       | 23317            | 0.3              | 750       | 1157             | 0.0              | 880       | 1136             | 0.0              |
| 365       | 696              | 0.0              | 495       | 12752            | 20.6             | 625       | 21413            | 0.2              | 755       | 1067             | 0.0              | 885       | 773              | 0.0              |
| 370       | 807              | 0.0              | 500       | 16685            | 27.9             | 630       | 19344            | 0.1              | 760       | 1059             | 0.0              | 890       | 872              | 0.0              |
| 375       | 837              | 0.0              | 505       | 20565            | 35.0             | 635       | 17464            | 0.1              | 765       | 1009             | 0.0              | 895       | 891              | 0.0              |
| 380       | 757              | 0.0              | 510       | 24119            | 40.9             | 640       | 15745            | 0.0              | 770       | 774              | 0.0              | 900       | 807              | 0.0              |
| 385       | 706              | 0.0              | 515       | 27181            | 45.1             | 645       | 14060            | 0.0              | 775       | 761              | 0.0              | 905       | 899              | 0.0              |
| 390       | 746              | 0.0              | 520       | 29555            | 47.0             | 650       | 12579            | 0.0              | 780       | 653              | 0.0              | 910       | 506              | 0.0              |
| 395       | 660              | 0.0              | 525       | 31307            | 46.8             | 655       | 11181            | 0.0              | 785       | 704              | 0.0              | 915       | 598              | 0.0              |
| 400       | 671              | 0.0              | 530       | 32558            | 44.9             | 660       | 9847             | 0.0              | 790       | 663              | 0.0              | 920       | 510              | 0.0              |
| 405       | 848              | 0.0              | 535       | 33301            | 41.5             | 665       | 8641             | 0.0              | 795       | 493              | 0.0              | 925       | 874              | 0.0              |
| 410       | 1490             | 0.1              | 540       | 33727            | 37.3             | 670       | 7535             | 0.0              | 800       | 584              | 0.0              | 930       | 549              | 0.0              |
| 415       | 3203             | 0.3              | 545       | 34356            | 32.9             | 675       | 6542             | 0.0              | 805       | 739              | 0.0              | 935       | 720              | 0.0              |
| 420       | 7298             | 1.2              | 550       | 34589            | 28.3             | 680       | 5664             | 0.0              | 810       | 601              | 0.0              | 940       | 754              | 0.0              |
| 425       | 15315            | 3.7              | 555       | 34855            | 23.8             | 685       | 4962             | 0.0              | 815       | 677              | 0.0              | 945       | 931              | 0.0              |
| 430       | 27886            | 9.5              | 560       | 35083            | 19.6             | 690       | 4369             | 0.0              | 820       | 726              | 0.0              | 950       | 811              | 0.0              |
| 435       | 45485            | 20.3             | 565       | 35553            | 16.0             | 695       | 3785             | 0.0              | 825       | 693              | 0.0              | 955       | 955              | 0.0              |
| 440       | 61965            | 34.6             | 570       | 35511            | 12.5             | 700       | 3318             | 0.0              | 830       | 619              | 0.0              | 960       | 1025             | 0.0              |
| 445       | 62721            | 42.0             | 575       | 35515            | 9.7              | 705       | 2962             | 0.0              | 835       | 738              | 0.0              | 965       | 916              | 0.0              |
| 450       | 44754            | 34.7             | 580       | 35114            | 7.2              | 710       | 2689             | 0.0              | 840       | 681              | 0.0              | 970       | 695              | 0.0              |
| 455       | 26152            | 22.9             | 585       | 34546            | 5.3              | 715       | 2476             | 0.0              | 845       | 691              | 0.0              | 975       | 568              | 0.0              |
| 460       | 17101            | 16.5             | 590       | 33522            | 3.7              | 720       | 2192             | 0.0              | 850       | 710              | 0.0              | 980       | 643              | 0.0              |
| 465       | 11400            | 12.0             | 595       | 32326            | 2.6              | 725       | 1939             | 0.0              | 855       | 1025             | 0.0              | 985       | 804              | 0.0              |
| 470       | 7763             | 8.9              | 600       | 30973            | 1.7              | 730       | 1698             | 0.0              | 860       | 889              | 0.0              | 990       | 812              | 0.0              |
| 475       | 6419             | 8.0              | 605       | 29160            | 1.1              | 735       | 1533             | 0.0              | 865       | 885              | 0.0              | 995       | 496              | 0.0              |
| 480       | 6330             | 8.5              | 610       | 27373            | 0.7              | 740       | 1375             | 0.0              | 870       | 905              | 0.0              | 1000      | 659              | 0.0              |
| 485       | 7299             | 10.6             | 615       | 25423            | 0.5              | 745       | 1254             | 0.0              | 875       | 739              | 0.0              |           |                  |                  |

REPORT NUMBER: SP1-2012-088-5-R3

### Melanopic Flux vs. Wavelength



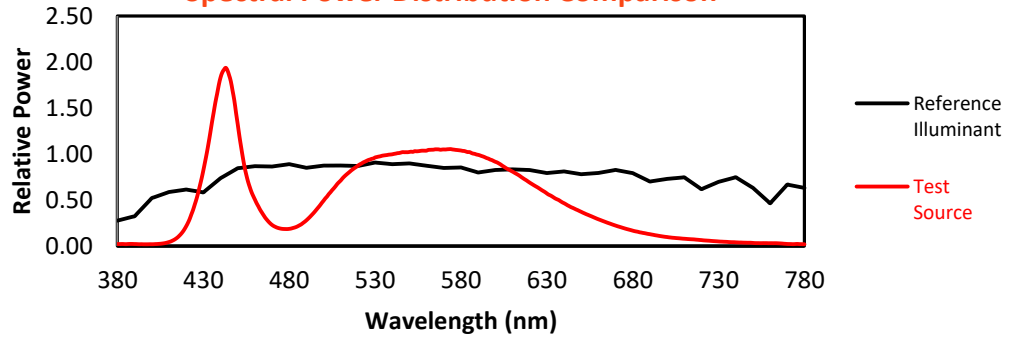
**Melanopic Lumens: 4010.3**      **S/P: 1.85**

| 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       | 828              | 0.0              | 490       | 9471             | 7.9              | 620       | 23317            | 0.0              | 750       | 1157             | 0.0              | 880       | 1136             | 0.0              |
| 365       | 696              | 0.0              | 495       | 12752            | 10.5             | 625       | 21413            | 0.0              | 755       | 1067             | 0.0              | 885       | 773              | 0.0              |
| 370       | 807              | 0.0              | 500       | 16685            | 13.4             | 630       | 19344            | 0.0              | 760       | 1059             | 0.0              | 890       | 872              | 0.0              |
| 375       | 837              | 0.0              | 505       | 20565            | 15.8             | 635       | 17464            | 0.0              | 765       | 1009             | 0.0              | 895       | 891              | 0.0              |
| 380       | 757              | 0.0              | 510       | 24119            | 17.3             | 640       | 15745            | 0.0              | 770       | 774              | 0.0              | 900       | 807              | 0.0              |
| 385       | 706              | 0.0              | 515       | 27181            | 17.8             | 645       | 14060            | 0.0              | 775       | 761              | 0.0              | 905       | 899              | 0.0              |
| 390       | 746              | 0.0              | 520       | 29555            | 17.2             | 650       | 12579            | 0.0              | 780       | 653              | 0.0              | 910       | 506              | 0.0              |
| 395       | 660              | 0.0              | 525       | 31307            | 15.9             | 655       | 11181            | 0.0              | 785       | 704              | 0.0              | 915       | 598              | 0.0              |
| 400       | 671              | 0.0              | 530       | 32558            | 14.1             | 660       | 9847             | 0.0              | 790       | 663              | 0.0              | 920       | 510              | 0.0              |
| 405       | 848              | 0.0              | 535       | 33301            | 12.0             | 665       | 8641             | 0.0              | 795       | 493              | 0.0              | 925       | 874              | 0.0              |
| 410       | 1490             | 0.1              | 540       | 33727            | 9.9              | 670       | 7535             | 0.0              | 800       | 584              | 0.0              | 930       | 549              | 0.0              |
| 415       | 3203             | 0.2              | 545       | 34356            | 8.0              | 675       | 6542             | 0.0              | 805       | 739              | 0.0              | 935       | 720              | 0.0              |
| 420       | 7298             | 0.8              | 550       | 34589            | 6.2              | 680       | 5664             | 0.0              | 810       | 601              | 0.0              | 940       | 754              | 0.0              |
| 425       | 15315            | 2.4              | 555       | 34855            | 4.7              | 685       | 4962             | 0.0              | 815       | 677              | 0.0              | 945       | 931              | 0.0              |
| 430       | 27886            | 5.9              | 560       | 35083            | 3.5              | 690       | 4369             | 0.0              | 820       | 726              | 0.0              | 950       | 811              | 0.0              |
| 435       | 45485            | 12.1             | 565       | 35553            | 2.5              | 695       | 3785             | 0.0              | 825       | 693              | 0.0              | 955       | 955              | 0.0              |
| 440       | 61965            | 20.7             | 570       | 35511            | 1.7              | 700       | 3318             | 0.0              | 830       | 619              | 0.0              | 960       | 1025             | 0.0              |
| 445       | 62721            | 24.7             | 575       | 35515            | 1.2              | 705       | 2962             | 0.0              | 835       | 738              | 0.0              | 965       | 916              | 0.0              |
| 450       | 44754            | 20.6             | 580       | 35114            | 0.8              | 710       | 2689             | 0.0              | 840       | 681              | 0.0              | 970       | 695              | 0.0              |
| 455       | 26152            | 13.7             | 585       | 34546            | 0.5              | 715       | 2476             | 0.0              | 845       | 691              | 0.0              | 975       | 568              | 0.0              |
| 460       | 17101            | 10.1             | 590       | 33522            | 0.3              | 720       | 2192             | 0.0              | 850       | 710              | 0.0              | 980       | 643              | 0.0              |
| 465       | 11400            | 7.4              | 595       | 32326            | 0.2              | 725       | 1939             | 0.0              | 855       | 1025             | 0.0              | 985       | 804              | 0.0              |
| 470       | 7763             | 5.6              | 600       | 30973            | 0.1              | 730       | 1698             | 0.0              | 860       | 889              | 0.0              | 990       | 812              | 0.0              |
| 475       | 6419             | 4.9              | 605       | 29160            | 0.1              | 735       | 1533             | 0.0              | 865       | 885              | 0.0              | 995       | 496              | 0.0              |
| 480       | 6330             | 5.1              | 610       | 27373            | 0.0              | 740       | 1375             | 0.0              | 870       | 905              | 0.0              | 1000      | 659              | 0.0              |
| 485       | 7299             | 6.0              | 615       | 25423            | 0.0              | 745       | 1254             | 0.0              | 875       | 739              | 0.0              |           |                  |                  |

### Summary

$R_f = 72.3$   
 $R_g = 97.2$   
 CIE  $R_a = 71.9$   
 $R_g = -27.5$

### Spectral Power Distribution Comparison

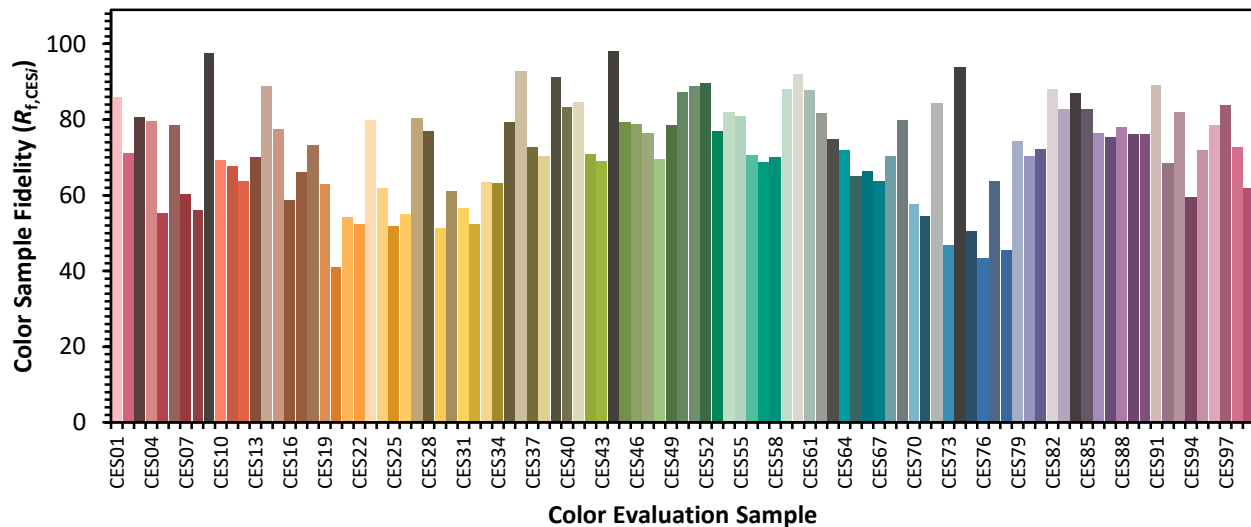


### Color Vector Graphics



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

|            |            |            |            |
|------------|------------|------------|------------|
| CES01 = 85 | CES26 = 55 | CES51 = 89 | CES76 = 43 |
| CES02 = 59 | CES27 = 80 | CES52 = 90 | CES77 = 64 |
| CES03 = 30 | CES28 = 77 | CES53 = 77 | CES78 = 46 |
| CES04 = 69 | CES29 = 51 | CES54 = 82 | CES79 = 74 |
| CES05 = 46 | CES30 = 61 | CES55 = 81 | CES80 = 70 |
| CES06 = 50 | CES31 = 56 | CES56 = 71 | CES81 = 72 |
| CES07 = 38 | CES32 = 52 | CES57 = 69 | CES82 = 88 |
| CES08 = 38 | CES33 = 63 | CES58 = 70 | CES83 = 83 |
| CES09 = 29 | CES34 = 63 | CES59 = 88 | CES84 = 87 |
| CES10 = 72 | CES35 = 79 | CES60 = 92 | CES85 = 83 |
| CES11 = 55 | CES36 = 93 | CES61 = 88 | CES86 = 76 |
| CES12 = 61 | CES37 = 73 | CES62 = 82 | CES87 = 75 |
| CES13 = 41 | CES38 = 70 | CES63 = 75 | CES88 = 78 |
| CES14 = 74 | CES39 = 91 | CES64 = 72 | CES89 = 76 |
| CES15 = 70 | CES40 = 83 | CES65 = 65 | CES90 = 76 |
| CES16 = 46 | CES41 = 85 | CES66 = 66 | CES91 = 89 |
| CES17 = 48 | CES42 = 71 | CES67 = 64 | CES92 = 69 |
| CES18 = 55 | CES43 = 69 | CES68 = 70 | CES93 = 82 |
| CES19 = 71 | CES44 = 98 | CES69 = 80 | CES94 = 60 |
| CES20 = 64 | CES45 = 79 | CES70 = 58 | CES95 = 72 |
| CES21 = 85 | CES46 = 79 | CES71 = 54 | CES96 = 79 |
| CES22 = 77 | CES47 = 76 | CES72 = 84 | CES97 = 84 |
| CES23 = 91 | CES48 = 69 | CES73 = 47 | CES98 = 73 |
| CES24 = 90 | CES49 = 79 | CES74 = 94 | CES99 = 62 |
| CES25 = 71 | CES50 = 87 | CES75 = 50 |            |



**Color Rendition by Hue-Angle Bin**


**Measure Comparisons**


(END OF REPORT)