

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: McGRAW-EDISON

Report Number: P638048

Luminaire Tested: GWS-SA4E-722-U-T2-W-GRSBK

Issue Date: 1/10/2023

**Test Information**

Test Method: LM-79-2019  
Report Number: P638048  
TEST IS SCALED FROM IESNA LM-79-08 TEST DATA (G2-2209-782-20)  
Test Lab: COOPER LIGHTING SOLUTIONS  
Issue Date: 1/10/2023  
Manufacturer: COOPER LIGHTING SOLUTIONS  
Product Line: McGRAW-EDISON  
Catalog Number: GWS-SA4E-722-U-T2-W-GRSBK  
Description: GALLEON WALL SLIM LUMINAIRE. (4) LIGHTSQUARES WITH 16 LEDS EACH AND  
TYPE II OPTICS W/ FACTORY INSTALLED GLARE SHIELD, BK  
Light Source: (64) 2200K CCT, 70 CRI LEDS  
Ballast/Driver: -

**Summary**

Lumens per Lamp: N/A  
Luminaire Lumens: 13389.8 lumens  
Efficiency: N/A  
Efficacy: 66.1 lumens/watt  
Luminous Opening: Rectangular (W 1' x L: 1' x H: 0')  
IES Classification: Type II - Short  
BUG Rating: B2 - U0 - G1

Input Watts (W): 202.6  
Input Voltage (V): 120  
Input Current (Ain): NR  
Voltage Rise (V): NR  
Power Factor: NR  
Total Harmonic Distortion (THDi): NR  
Frequency (hertz): 0  
Stabilization Time: NR  
Operation Time: NR  
Ambient Temperature (°C): NR  
Test Distance: 28.75 FT



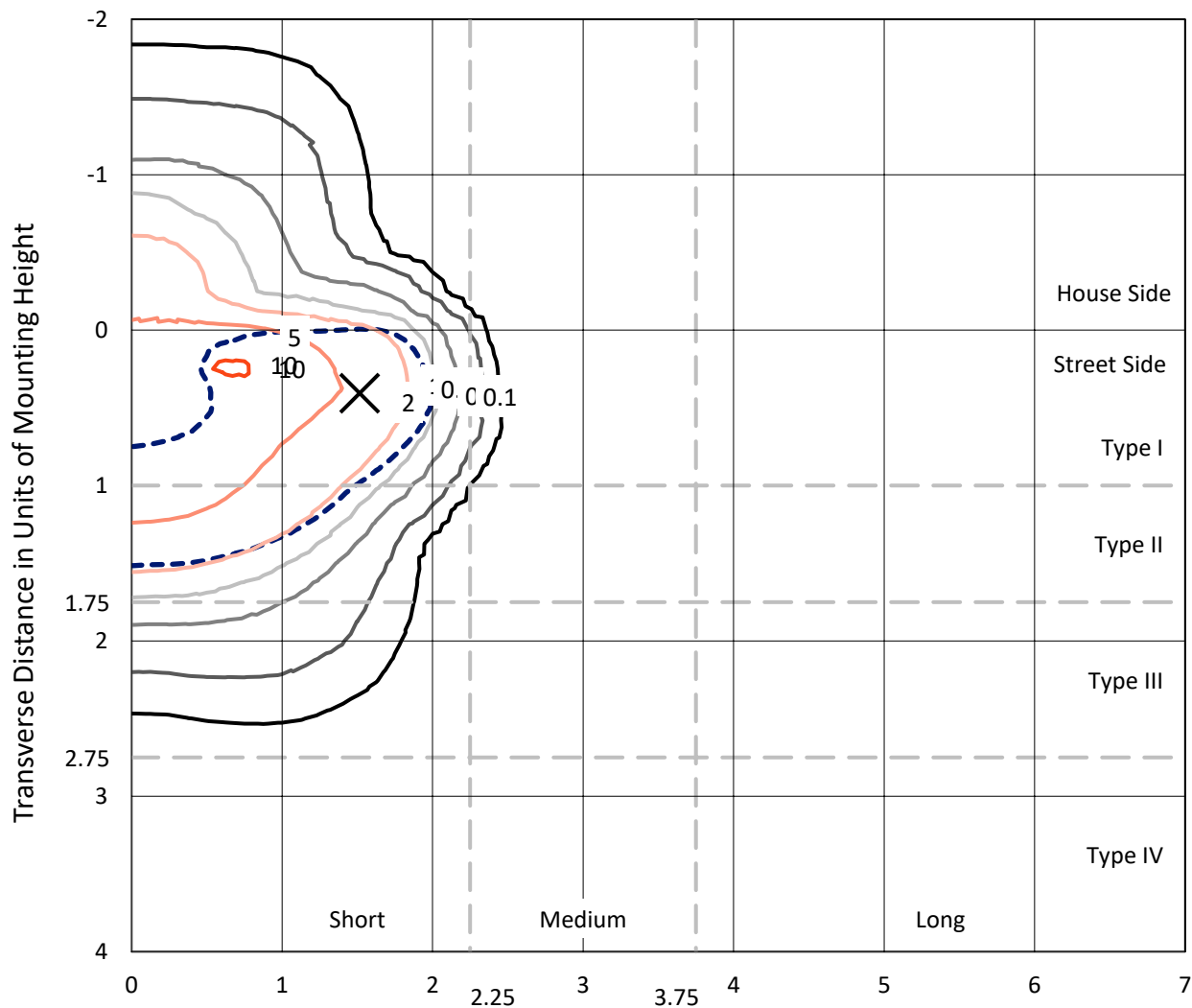
REPORT NUMBER: P638048

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## Iso-Footcandle Lines of Horizontal Illumination

✕ Max cd

--- 1/2 Max cd



Longitudinal Distance in Units of Mounting Height

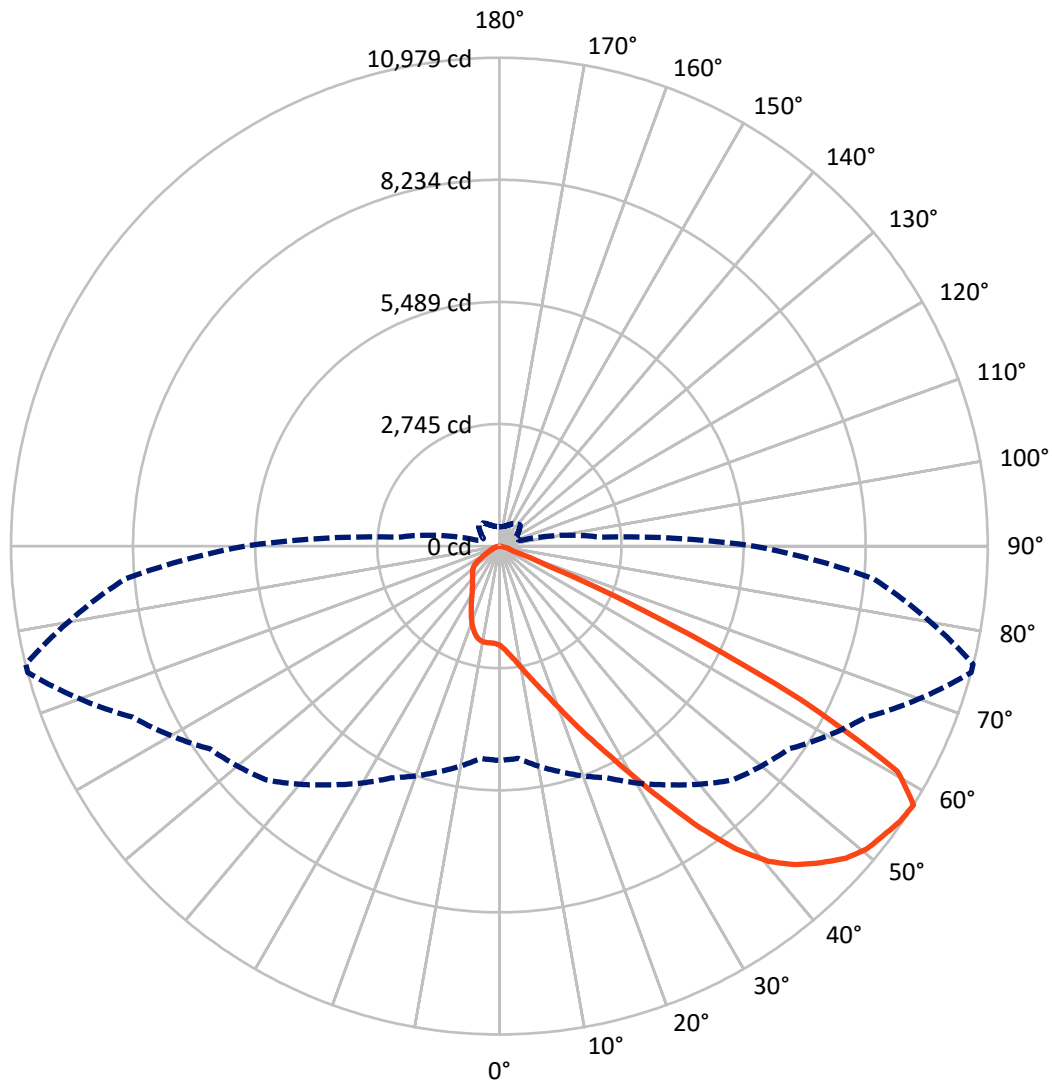
Based on 20 foot mounting height. Maximum calculated value = 10.4 fc

Type II - Short - N/A

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## Luminous Intensity Polar Plot



— Vertical Plane Through 75-Deg Lateral    - - - Horizontal Cone Through 57.5-Deg Vertical

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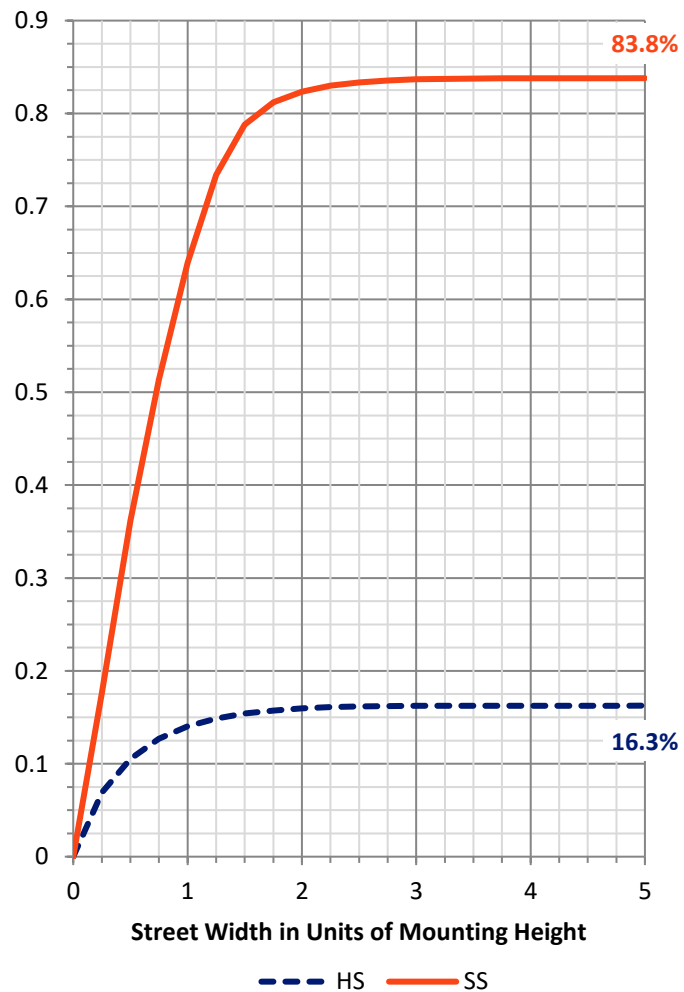
**FLUX DISTRIBUTION:**

|                    |           | Downward | Upward | Total   |
|--------------------|-----------|----------|--------|---------|
| <b>House Side</b>  | Lumens    | 2187.2   | 0.0    | 2187.2  |
|                    | % Fixture | 16.3     | 0.0    | 16.3    |
| <b>Street Side</b> | Lumens    | 11202.6  | 0.0    | 11202.6 |
|                    | % Fixture | 83.7     | 0.0    | 83.7    |
| <b>Total</b>       | Lumens    | 13389.8  | 0.0    | 13389.8 |
|                    | % Fixture | 100.0    | 0.0    | 100.0   |

**ZONAL LUMENS:**

| Zone      | Lumens  | % Fixture |
|-----------|---------|-----------|
| 0°-10°    | 227.2   | 1.7       |
| 10°-20°   | 738.2   | 5.5       |
| 20°-30°   | 1351.8  | 10.1      |
| 30°-40°   | 2242.8  | 16.8      |
| 40°-50°   | 3425.3  | 25.6      |
| 50°-60°   | 3848.9  | 28.7      |
| 60°-70°   | 1419.7  | 10.6      |
| 70°-80°   | 135.7   | 1.0       |
| 80°-90°   | 0.1     | 0.0       |
| 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°    | 13389.8 | 100.0     |
| 0°-180°   | 13389.8 | 100.0     |

**Coefficient of Utilization**



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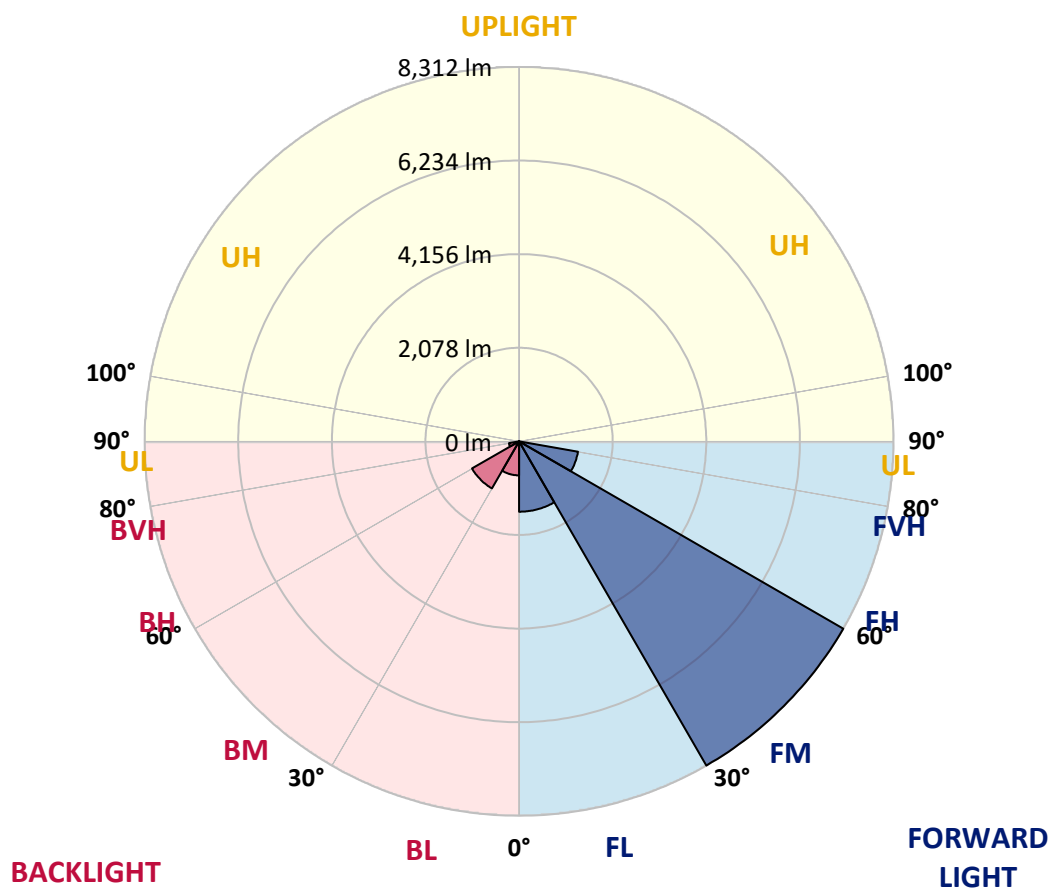
CATALOG NUMBER: GWS-SA4E-722-U-T2-W-GRSBK

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

| Zone |             | Lumens | % Fixture | Zone Rating/Lumen Limit |      |         |
|------|-------------|--------|-----------|-------------------------|------|---------|
|      |             |        |           | B                       | U    | G       |
| FL   | (0°-30°)    | 1562.6 | 11.7      |                         |      |         |
| FM   | (30°-60°)   | 8311.8 | 62.1      |                         |      |         |
| FH   | (60°-80°)   | 1328.2 | 9.9       |                         |      | G1/1800 |
| FVH  | (80°-90°)   | 0.1    | 0.0       |                         |      | G0/10   |
| BL   | (0°-30°)    | 754.7  | 5.6       | B2/1000                 |      |         |
| BM   | (30°-60°)   | 1205.3 | 9.0       | B2/2500                 |      |         |
| BH   | (60°-80°)   | 227.1  | 1.7       | B1/500                  |      | G1/500  |
| BVH  | (80°-90°)   | 0.0    | 0.0       |                         |      | G0/10   |
| UL   | (90°-100°)  | 0.0    | 0.0       |                         | U0/0 |         |
| UH   | (100°-180°) | 0.0    | 0.0       |                         | U0/0 |         |

**BUG Rating: B2-U0-G1**

Type II Short



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**CANDELA DISTRIBUTION (FULL):**

|       | 0°     | 5°     | 15°    | 25°    | 35°    | 45°    | 55°    | 65°    | 75°     | 76°     | 85°    |
|-------|--------|--------|--------|--------|--------|--------|--------|--------|---------|---------|--------|
| 0°    | 2233.2 | 2233.2 | 2233.2 | 2233.2 | 2233.2 | 2233.2 | 2233.2 | 2233.2 | 2233.2  | 2233.2  | 2233.2 |
| 2.5°  | 2495.0 | 2520.9 | 2512.8 | 2496.6 | 2486.9 | 2453.0 | 2432.0 | 2370.6 | 2327.0  | 2322.1  | 2281.7 |
| 5°    | 2810.1 | 2805.3 | 2798.8 | 2779.4 | 2763.3 | 2709.9 | 2646.9 | 2543.5 | 2451.4  | 2440.1  | 2354.4 |
| 7.5°  | 2983.0 | 2986.3 | 2989.5 | 2986.3 | 2974.9 | 2934.6 | 2865.1 | 2743.9 | 2603.3  | 2593.6  | 2457.8 |
| 10°   | 3054.1 | 3060.6 | 3076.8 | 3107.5 | 3134.9 | 3131.7 | 3091.3 | 2966.9 | 2794.0  | 2777.8  | 2595.2 |
| 12.5° | 3088.1 | 3096.1 | 3122.0 | 3180.2 | 3254.5 | 3312.7 | 3319.1 | 3207.6 | 3017.0  | 2991.1  | 2758.4 |
| 15°   | 3134.9 | 3143.0 | 3175.3 | 3251.3 | 3359.5 | 3474.3 | 3548.6 | 3477.5 | 3264.2  | 3236.7  | 2937.8 |
| 17.5° | 3155.9 | 3167.2 | 3214.1 | 3314.3 | 3454.9 | 3631.0 | 3799.1 | 3792.6 | 3556.7  | 3535.7  | 3146.2 |
| 20°   | 3196.3 | 3204.4 | 3246.4 | 3354.7 | 3524.4 | 3778.1 | 4060.9 | 4162.7 | 3913.8  | 3883.1  | 3398.3 |
| 22.5° | 3324.0 | 3327.2 | 3346.6 | 3414.5 | 3572.8 | 3884.7 | 4327.5 | 4594.1 | 4335.6  | 4295.2  | 3681.1 |
| 25°   | 3532.4 | 3530.8 | 3538.9 | 3550.2 | 3666.6 | 3993.0 | 4584.4 | 5080.5 | 4818.7  | 4775.1  | 4001.1 |
| 27.5° | 3797.5 | 3797.5 | 3816.9 | 3784.5 | 3831.4 | 4127.1 | 4838.1 | 5639.6 | 5381.1  | 5319.7  | 4351.7 |
| 30°   | 4109.3 | 4107.7 | 4153.0 | 4101.3 | 4115.8 | 4338.8 | 5111.2 | 6248.8 | 6059.8  | 5983.8  | 4755.7 |
| 32.5° | 4532.7 | 4523.0 | 4574.7 | 4503.6 | 4455.2 | 4658.8 | 5444.1 | 6885.5 | 6872.6  | 6756.3  | 5263.1 |
| 35°   | 5067.6 | 5051.4 | 5067.6 | 4998.1 | 4910.8 | 5106.4 | 5880.4 | 7520.6 | 7774.3  | 7651.5  | 5867.5 |
| 37.5° | 5599.2 | 5651.0 | 5668.7 | 5549.1 | 5478.0 | 5673.6 | 6405.6 | 8089.4 | 8635.6  | 8507.9  | 6496.1 |
| 40°   | 6226.2 | 6210.1 | 6271.5 | 6137.3 | 6092.1 | 6308.6 | 6919.5 | 8512.8 | 9317.5  | 9196.3  | 7055.2 |
| 42.5° | 6688.4 | 6717.5 | 6793.4 | 6719.1 | 6683.5 | 6887.1 | 7350.9 | 8760.0 | 9791.0  | 9671.4  | 7454.3 |
| 45°   | 7242.7 | 7263.7 | 7292.7 | 7231.3 | 7194.2 | 7394.6 | 7662.8 | 8868.3 | 10151.3 | 10022.1 | 7722.6 |
| 47.5° | 7842.2 | 7858.3 | 7858.3 | 7732.3 | 7612.7 | 7695.1 | 7871.3 | 8929.7 | 10482.6 | 10358.2 | 7921.3 |
| 50°   | 8272.0 | 8280.1 | 8351.2 | 8262.3 | 8002.1 | 7874.5 | 7966.6 | 8989.5 | 10702.4 | 10586.0 | 7986.0 |
| 52.5° | 7890.6 | 7881.0 | 8115.3 | 8299.5 | 8369.0 | 8115.3 | 8131.4 | 9076.7 | 10809.0 | 10708.8 | 8037.7 |
| 55°   | 6644.8 | 6628.6 | 6958.2 | 7405.9 | 8018.3 | 8343.1 | 8330.2 | 9128.5 | 10927.0 | 10865.6 | 8225.1 |
| 57.5° | 4817.1 | 4789.7 | 5248.6 | 5746.3 | 6549.4 | 7430.1 | 7947.2 | 9099.4 | 10978.7 | 10973.9 | 8443.3 |
| 60°   | 2895.8 | 2873.1 | 3306.2 | 3829.8 | 4450.3 | 5335.8 | 6193.9 | 8150.8 | 10287.1 | 10296.8 | 7876.1 |
| 62.5° | 1782.4 | 1803.4 | 2194.4 | 2461.1 | 2692.2 | 2958.8 | 3454.9 | 5482.9 | 7620.8  | 7683.8  | 5534.6 |
| 65°   | 1199.0 | 1215.2 | 1577.2 | 1913.3 | 1913.3 | 1564.2 | 1342.8 | 2621.1 | 4065.7  | 3959.1  | 2617.8 |
| 67.5° | 804.7  | 822.5  | 1108.5 | 1501.2 | 1557.8 | 1090.8 | 544.6  | 782.1  | 1132.8  | 1098.8  | 648.0  |
| 70°   | 473.5  | 492.9  | 738.5  | 1029.4 | 1134.4 | 759.5  | 363.6  | 331.3  | 321.6   | 311.9   | 252.1  |
| 72.5° | 211.7  | 219.8  | 376.5  | 523.6  | 478.3  | 320.0  | 256.9  | 265.0  | 250.5   | 245.6   | 205.2  |
| 75°   | 64.6   | 67.9   | 97.0   | 113.1  | 114.7  | 114.7  | 155.1  | 208.5  | 197.1   | 198.8   | 158.4  |
| 77.5° | 16.2   | 16.2   | 25.9   | 24.2   | 12.9   | 11.3   | 29.1   | 46.9   | 48.5    | 43.6    | 32.3   |
| 80°   | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    | 1.6    | 1.6    | 1.6    | 1.6     | 1.6     | 1.6    |
| 82.5° | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    | 0.0     | 0.0     | 0.0    |
| 85°   | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    | 0.0     | 0.0     | 0.0    |
| 87.5° | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    | 0.0     | 0.0     | 0.0    |
| 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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**CANDELA DISTRIBUTION (continued):**

|       | 90°    | 95°    | 105°   | 115°   | 125°   | 135°   | 145°   | 155°   | 165°   | 175°   | 180°   |
|-------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|
| 0°    | 2233.2 | 2233.2 | 2233.2 | 2233.2 | 2233.2 | 2233.2 | 2233.2 | 2233.2 | 2233.2 | 2233.2 | 2233.2 |
| 2.5°  | 2263.9 | 2221.9 | 2194.4 | 2155.7 | 2128.2 | 2099.1 | 2073.3 | 2052.2 | 2040.9 | 2037.7 | 2039.3 |
| 5°    | 2315.6 | 2249.4 | 2184.8 | 2110.4 | 2058.7 | 2010.2 | 1971.4 | 1940.7 | 1926.2 | 1921.4 | 1921.4 |
| 7.5°  | 2394.8 | 2302.7 | 2188.0 | 2071.6 | 1984.4 | 1908.4 | 1863.2 | 1829.2 | 1816.3 | 1813.1 | 1803.4 |
| 10°   | 2498.2 | 2372.2 | 2183.1 | 2002.2 | 1879.3 | 1800.2 | 1767.8 | 1758.1 | 1763.0 | 1764.6 | 1763.0 |
| 12.5° | 2622.7 | 2444.9 | 2152.4 | 1900.3 | 1767.8 | 1719.4 | 1722.6 | 1748.4 | 1777.5 | 1792.1 | 1795.3 |
| 15°   | 2755.2 | 2511.2 | 2082.9 | 1779.2 | 1672.5 | 1670.9 | 1717.7 | 1777.5 | 1834.1 | 1858.3 | 1864.8 |
| 17.5° | 2903.8 | 2564.5 | 1976.3 | 1649.9 | 1590.1 | 1636.9 | 1721.0 | 1813.1 | 1889.0 | 1929.4 | 1937.5 |
| 20°   | 3067.1 | 2608.1 | 1840.6 | 1528.7 | 1517.4 | 1601.4 | 1717.7 | 1830.9 | 1924.6 | 1969.8 | 1977.9 |
| 22.5° | 3236.7 | 2638.8 | 1683.8 | 1417.2 | 1451.1 | 1561.0 | 1687.0 | 1796.9 | 1885.8 | 1937.5 | 1944.0 |
| 25°   | 3430.6 | 2642.1 | 1523.8 | 1323.5 | 1389.7 | 1506.1 | 1612.7 | 1703.2 | 1777.5 | 1822.8 | 1827.6 |
| 27.5° | 3600.3 | 2603.3 | 1381.6 | 1247.5 | 1333.2 | 1438.2 | 1509.3 | 1559.4 | 1611.1 | 1636.9 | 1638.6 |
| 30°   | 3795.8 | 2535.4 | 1247.5 | 1186.1 | 1275.0 | 1354.2 | 1389.7 | 1401.0 | 1405.9 | 1410.7 | 1404.3 |
| 32.5° | 4028.5 | 2453.0 | 1147.3 | 1126.3 | 1208.7 | 1262.1 | 1271.7 | 1249.1 | 1221.7 | 1182.9 | 1173.2 |
| 35°   | 4314.6 | 2378.7 | 1064.9 | 1068.1 | 1136.0 | 1168.3 | 1160.2 | 1111.8 | 1058.4 | 1011.6 | 1003.5 |
| 37.5° | 4624.8 | 2315.6 | 1001.9 | 1011.6 | 1056.8 | 1079.4 | 1055.2 | 1001.9 | 977.6  | 937.2  | 938.9  |
| 40°   | 4899.5 | 2263.9 | 945.3  | 955.0  | 976.0  | 997.0  | 958.3  | 922.7  | 967.9  | 964.7  | 967.9  |
| 42.5° | 5095.1 | 2220.3 | 896.8  | 892.0  | 906.5  | 921.1  | 892.0  | 874.2  | 950.2  | 929.2  | 940.5  |
| 45°   | 5209.8 | 2179.9 | 856.4  | 827.4  | 850.0  | 875.8  | 856.4  | 833.8  | 859.7  | 762.7  | 754.6  |
| 47.5° | 5287.4 | 2157.3 | 820.9  | 764.3  | 804.7  | 850.0  | 809.6  | 754.6  | 717.5  | 633.4  | 627.0  |
| 50°   | 5295.4 | 2146.0 | 778.9  | 699.7  | 751.4  | 799.9  | 753.0  | 677.1  | 623.8  | 586.6  | 581.7  |
| 52.5° | 5337.5 | 2168.6 | 720.7  | 617.3  | 673.8  | 751.4  | 719.1  | 643.1  | 570.4  | 538.1  | 531.6  |
| 55°   | 5524.9 | 2263.9 | 623.8  | 504.2  | 586.6  | 714.2  | 691.6  | 573.7  | 504.2  | 484.8  | 479.9  |
| 57.5° | 5718.8 | 2283.3 | 491.2  | 399.1  | 510.6  | 660.9  | 631.8  | 528.4  | 460.5  | 437.9  | 433.1  |
| 60°   | 5229.2 | 1881.0 | 368.4  | 329.7  | 450.8  | 610.8  | 585.0  | 500.9  | 421.8  | 394.3  | 389.4  |
| 62.5° | 3435.5 | 1016.4 | 292.5  | 279.6  | 379.7  | 517.1  | 533.3  | 452.5  | 376.5  | 347.4  | 345.8  |
| 65°   | 1583.6 | 471.9  | 224.6  | 221.4  | 297.3  | 412.1  | 458.9  | 395.9  | 318.3  | 292.5  | 292.5  |
| 67.5° | 431.5  | 234.3  | 176.1  | 163.2  | 202.0  | 276.3  | 334.5  | 295.7  | 226.2  | 195.5  | 193.9  |
| 70°   | 214.9  | 189.1  | 158.4  | 140.6  | 145.4  | 171.3  | 197.1  | 164.8  | 114.7  | 93.7   | 92.1   |
| 72.5° | 176.1  | 155.1  | 134.1  | 119.6  | 109.9  | 105.0  | 101.8  | 82.4   | 53.3   | 40.4   | 38.8   |
| 75°   | 130.9  | 111.5  | 95.3   | 77.6   | 66.3   | 61.4   | 54.9   | 40.4   | 22.6   | 12.9   | 11.3   |
| 77.5° | 29.1   | 27.5   | 25.9   | 19.4   | 17.8   | 14.5   | 11.3   | 8.1    | 3.2    | 0.0    | 0.0    |
| 80°   | 1.6    | 1.6    | 1.6    | 1.6    | 1.6    | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    |
| 82.5° | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    |
| 85°   | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    |
| 87.5° | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    |
| 90°   | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    |

LM-79-2008: Approved Method: Electrical and Photometric Measurements of Solid-  
State Lighting Products

Report Prepared for

Cooper Lighting Solutions

McGRAW-EDISON

Report Number: SP1-1908-441-10-R4

Test Date: 10/25/2019

Luminaire Tested: SA1C-722-U-5WQ

Data in this report applies to families of products SA1C-722-U-5WQ.

### Test Information

Test Method: LM-79-2008 Report  
 Number: SP1-1908-441-10-R4  
 Test Lab: COOPER LIGHTING SOLUTIONS  
 Photometer: SP1 - 76IN SPHERE  
 Measurement Geometry:  $4\pi$   
 Issue Date: 10/28/2024  
 Manufacturer: COOPER LIGHTING SOLUTIONS  
 Product Line: MCGRAW-EDISON  
 Catalog Number: **SA1C-722-U-5WQ**  
 Description: MCGRAW EDISON ROADWAY AND AREA LUMINAIRE

\*\*\*THIS IS A REVISION OF SP1-1908-441-4-R3. TO UPDATE THE CATALOG INFORMATION.\*\*\*TESTED IN SITU. ROADWAY AND AREA LUMINAIRE. (1) 70 CRI, 5000K, 1050MA LIGHTSQUARE WITH 16 LEDS AND TYPE V WIDE OPTICS.

### Spectral Parameters

|                           |         |           |      |      |       |
|---------------------------|---------|-----------|------|------|-------|
| CCT (K):                  | 2237    | CRI (Ra): | 72.0 |      |       |
| CIE u':                   | 0.2876  | R1:       | 68.9 | R9:  | -17.4 |
| CIE v':                   | 0.5346  | R2:       | 83.0 | R10: | 61.3  |
| Duv:                      | -0.0006 | R3:       | 95.2 | R11: | 59.8  |
| CIE x:                    | 0.5005  | R4:       | 66.2 | R12: | 50.5  |
| CIE y:                    | 0.4134  | R5:       | 65.9 | R13: | 71.1  |
| CIE z:                    | 0.0860  | R6:       | 76.3 | R14: | 96.9  |
| Peak Wavelength (nm):     | 603     | R7:       | 76.7 |      |       |
| Dominant Wavelength (nm): | 587     | R8:       | 43.8 |      |       |
| Purity:                   | 74.5    |           |      |      |       |
| Rf:                       | 69.8    |           |      |      |       |
| Rg:                       | 99.2    |           |      |      |       |



### Test Conditions

Stabilization Time: 71M  
 Operation Time: 12H  
 Room Temperature (°C) / RH%: 24.7/41%  
 Sphere Temperature (°C): 25.6

REPORT NUMBER: SP1-1908-441-10-R4

| Measurement and Test Equipment |                       |                  |                      |
|--------------------------------|-----------------------|------------------|----------------------|
| Instrument                     | Identification Number | Calibration Date | Calibration Due Date |
| Photometer                     | IN0058                | 6/28/2019        | 12/28/2019           |
| Power Meter                    | IN0071                | 12/5/2018        | 12/5/2019            |
| AC Power Source                | IN0063                | 12/5/2018        | 12/5/2019            |
| DC Power Source                | IN0208                | 12/5/2018        | 12/5/2019            |
| Sphere Thermometer             | IN0085                | 12/5/2018        | 12/5/2019            |
| Room Thermometer               | IN0046                | 12/5/2018        | 12/5/2019            |

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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 2200K 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       | 1768             | NR               | 490       | 5206             | NR               | 620       | 130919           | NR               | 750       | 8553             | NR               | 880       | 2713             | NR               |
| 365       | 1569             | NR               | 495       | 7286             | NR               | 625       | 125335           | NR               | 755       | 7696             | NR               | 885       | 2316             | NR               |
| 370       | 1594             | NR               | 500       | 10654            | NR               | 630       | 118388           | NR               | 760       | 6978             | NR               | 890       | 2539             | NR               |
| 375       | 1744             | NR               | 505       | 15189            | NR               | 635       | 111855           | NR               | 765       | 6377             | NR               | 895       | 1933             | NR               |
| 380       | 1659             | NR               | 510       | 20541            | NR               | 640       | 104062           | NR               | 770       | 5600             | NR               | 900       | 2216             | NR               |
| 385       | 1504             | NR               | 515       | 26492            | NR               | 645       | 96365            | NR               | 775       | 5000             | NR               | 905       | 2067             | NR               |
| 390       | 1541             | NR               | 520       | 32294            | NR               | 650       | 88651            | NR               | 780       | 4709             | NR               | 910       | 1959             | NR               |
| 395       | 1355             | NR               | 525       | 38123            | NR               | 655       | 81152            | NR               | 785       | 4305             | NR               | 915       | 1874             | NR               |
| 400       | 1243             | NR               | 530       | 43232            | NR               | 660       | 73523            | NR               | 790       | 4040             | NR               | 920       | 1484             | NR               |
| 405       | 1417             | NR               | 535       | 48012            | NR               | 665       | 66123            | NR               | 795       | 3642             | NR               | 925       | 1914             | NR               |
| 410       | 2147             | NR               | 540       | 52623            | NR               | 670       | 58677            | NR               | 800       | 3594             | NR               | 930       | 1948             | NR               |
| 415       | 3837             | NR               | 545       | 57516            | NR               | 675       | 52349            | NR               | 805       | 3190             | NR               | 935       | 2079             | NR               |
| 420       | 7159             | NR               | 550       | 62613            | NR               | 680       | 46159            | NR               | 810       | 3241             | NR               | 940       | 2263             | NR               |
| 425       | 12599            | NR               | 555       | 68554            | NR               | 685       | 40525            | NR               | 815       | 2732             | NR               | 945       | 1688             | NR               |
| 430       | 19019            | NR               | 560       | 75325            | NR               | 690       | 35615            | NR               | 820       | 2612             | NR               | 950       | 1560             | NR               |
| 435       | 24875            | NR               | 565       | 82533            | NR               | 695       | 31158            | NR               | 825       | 2966             | NR               | 955       | 2826             | NR               |
| 440       | 29103            | NR               | 570       | 90909            | NR               | 700       | 27409            | NR               | 830       | 2574             | NR               | 960       | 1477             | NR               |
| 445       | 29901            | NR               | 575       | 99621            | NR               | 705       | 24204            | NR               | 835       | 2633             | NR               | 965       | 1568             | NR               |
| 450       | 24862            | NR               | 580       | 108484           | NR               | 710       | 21558            | NR               | 840       | 2526             | NR               | 970       | 2030             | NR               |
| 455       | 15942            | NR               | 585       | 116679           | NR               | 715       | 19222            | NR               | 845       | 2631             | NR               | 975       | 1986             | NR               |
| 460       | 9916             | NR               | 590       | 123752           | NR               | 720       | 17310            | NR               | 850       | 2079             | NR               | 980       | 2540             | NR               |
| 465       | 7051             | NR               | 595       | 129324           | NR               | 725       | 15280            | NR               | 855       | 2309             | NR               | 985       | 1139             | NR               |
| 470       | 5227             | NR               | 600       | 134082           | NR               | 730       | 13282            | NR               | 860       | 2528             | NR               | 990       | 2018             | NR               |
| 475       | 4257             | NR               | 605       | 135698           | NR               | 735       | 11753            | NR               | 865       | 2121             | NR               | 995       | 3445             | NR               |
| 480       | 4052             | NR               | 610       | 135144           | NR               | 740       | 10654            | NR               | 870       | 2751             | NR               | 1000      | 3704             | NR               |
| 485       | 4298             | NR               | 615       | 134180           | NR               | 745       | 9451             | NR               | 875       | 2317             | NR               |           |                  |                  |

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**Scotopic Flux vs. Wavelength**



**Scotopic Lumens: 4696.9**

**S/P: 0.85**

| 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       | 1768             | NR               | 490       | 5206             | NR               | 620       | 130919           | NR               | 750       | 8553             | NR               | 880       | 2713             | NR               |
| 365       | 1569             | NR               | 495       | 7286             | NR               | 625       | 125335           | NR               | 755       | 7696             | NR               | 885       | 2316             | NR               |
| 370       | 1594             | NR               | 500       | 10654            | NR               | 630       | 118388           | NR               | 760       | 6978             | NR               | 890       | 2539             | NR               |
| 375       | 1744             | NR               | 505       | 15189            | NR               | 635       | 111855           | NR               | 765       | 6377             | NR               | 895       | 1933             | NR               |
| 380       | 1659             | NR               | 510       | 20541            | NR               | 640       | 104062           | NR               | 770       | 5600             | NR               | 900       | 2216             | NR               |
| 385       | 1504             | NR               | 515       | 26492            | NR               | 645       | 96365            | NR               | 775       | 5000             | NR               | 905       | 2067             | NR               |
| 390       | 1541             | NR               | 520       | 32294            | NR               | 650       | 88651            | NR               | 780       | 4709             | NR               | 910       | 1959             | NR               |
| 395       | 1355             | NR               | 525       | 38123            | NR               | 655       | 81152            | NR               | 785       | 4305             | NR               | 915       | 1874             | NR               |
| 400       | 1243             | NR               | 530       | 43232            | NR               | 660       | 73523            | NR               | 790       | 4040             | NR               | 920       | 1484             | NR               |
| 405       | 1417             | NR               | 535       | 48012            | NR               | 665       | 66123            | NR               | 795       | 3642             | NR               | 925       | 1914             | NR               |
| 410       | 2147             | NR               | 540       | 52623            | NR               | 670       | 58677            | NR               | 800       | 3594             | NR               | 930       | 1948             | NR               |
| 415       | 3837             | NR               | 545       | 57516            | NR               | 675       | 52349            | NR               | 805       | 3190             | NR               | 935       | 2079             | NR               |
| 420       | 7159             | NR               | 550       | 62613            | NR               | 680       | 46159            | NR               | 810       | 3241             | NR               | 940       | 2263             | NR               |
| 425       | 12599            | NR               | 555       | 68554            | NR               | 685       | 40525            | NR               | 815       | 2732             | NR               | 945       | 1688             | NR               |
| 430       | 19019            | NR               | 560       | 75325            | NR               | 690       | 35615            | NR               | 820       | 2612             | NR               | 950       | 1560             | NR               |
| 435       | 24875            | NR               | 565       | 82533            | NR               | 695       | 31158            | NR               | 825       | 2966             | NR               | 955       | 2826             | NR               |
| 440       | 29103            | NR               | 570       | 90909            | NR               | 700       | 27409            | NR               | 830       | 2574             | NR               | 960       | 1477             | NR               |
| 445       | 29901            | NR               | 575       | 99621            | NR               | 705       | 24204            | NR               | 835       | 2633             | NR               | 965       | 1568             | NR               |
| 450       | 24862            | NR               | 580       | 108484           | NR               | 710       | 21558            | NR               | 840       | 2526             | NR               | 970       | 2030             | NR               |
| 455       | 15942            | NR               | 585       | 116679           | NR               | 715       | 19222            | NR               | 845       | 2631             | NR               | 975       | 1986             | NR               |
| 460       | 9916             | NR               | 590       | 123752           | NR               | 720       | 17310            | NR               | 850       | 2079             | NR               | 980       | 2540             | NR               |
| 465       | 7051             | NR               | 595       | 129324           | NR               | 725       | 15280            | NR               | 855       | 2309             | NR               | 985       | 1139             | NR               |
| 470       | 5227             | NR               | 600       | 134082           | NR               | 730       | 13282            | NR               | 860       | 2528             | NR               | 990       | 2018             | NR               |
| 475       | 4257             | NR               | 605       | 135698           | NR               | 735       | 11753            | NR               | 865       | 2121             | NR               | 995       | 3445             | NR               |
| 480       | 4052             | NR               | 610       | 135144           | NR               | 740       | 10654            | NR               | 870       | 2751             | NR               | 1000      | 3704             | NR               |
| 485       | 4298             | NR               | 615       | 134180           | NR               | 745       | 9451             | NR               | 875       | 2317             | NR               |           |                  |                  |

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**Melanopic Flux vs. Wavelength**



**Melanopic Lumens: 1470.8 M/P: 0.27**

| 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       | 1768             | NR               | 490       | 5206             | NR               | 620       | 130919           | NR               | 750       | 8553             | NR               | 880       | 2713             | NR               |
| 365       | 1569             | NR               | 495       | 7286             | NR               | 625       | 125335           | NR               | 755       | 7696             | NR               | 885       | 2316             | NR               |
| 370       | 1594             | NR               | 500       | 10654            | NR               | 630       | 118388           | NR               | 760       | 6978             | NR               | 890       | 2539             | NR               |
| 375       | 1744             | NR               | 505       | 15189            | NR               | 635       | 111855           | NR               | 765       | 6377             | NR               | 895       | 1933             | NR               |
| 380       | 1659             | NR               | 510       | 20541            | NR               | 640       | 104062           | NR               | 770       | 5600             | NR               | 900       | 2216             | NR               |
| 385       | 1504             | NR               | 515       | 26492            | NR               | 645       | 96365            | NR               | 775       | 5000             | NR               | 905       | 2067             | NR               |
| 390       | 1541             | NR               | 520       | 32294            | NR               | 650       | 88651            | NR               | 780       | 4709             | NR               | 910       | 1959             | NR               |
| 395       | 1355             | NR               | 525       | 38123            | NR               | 655       | 81152            | NR               | 785       | 4305             | NR               | 915       | 1874             | NR               |
| 400       | 1243             | NR               | 530       | 43232            | NR               | 660       | 73523            | NR               | 790       | 4040             | NR               | 920       | 1484             | NR               |
| 405       | 1417             | NR               | 535       | 48012            | NR               | 665       | 66123            | NR               | 795       | 3642             | NR               | 925       | 1914             | NR               |
| 410       | 2147             | NR               | 540       | 52623            | NR               | 670       | 58677            | NR               | 800       | 3594             | NR               | 930       | 1948             | NR               |
| 415       | 3837             | NR               | 545       | 57516            | NR               | 675       | 52349            | NR               | 805       | 3190             | NR               | 935       | 2079             | NR               |
| 420       | 7159             | NR               | 550       | 62613            | NR               | 680       | 46159            | NR               | 810       | 3241             | NR               | 940       | 2263             | NR               |
| 425       | 12599            | NR               | 555       | 68554            | NR               | 685       | 40525            | NR               | 815       | 2732             | NR               | 945       | 1688             | NR               |
| 430       | 19019            | NR               | 560       | 75325            | NR               | 690       | 35615            | NR               | 820       | 2612             | NR               | 950       | 1560             | NR               |
| 435       | 24875            | NR               | 565       | 82533            | NR               | 695       | 31158            | NR               | 825       | 2966             | NR               | 955       | 2826             | NR               |
| 440       | 29103            | NR               | 570       | 90909            | NR               | 700       | 27409            | NR               | 830       | 2574             | NR               | 960       | 1477             | NR               |
| 445       | 29901            | NR               | 575       | 99621            | NR               | 705       | 24204            | NR               | 835       | 2633             | NR               | 965       | 1568             | NR               |
| 450       | 24862            | NR               | 580       | 108484           | NR               | 710       | 21558            | NR               | 840       | 2526             | NR               | 970       | 2030             | NR               |
| 455       | 15942            | NR               | 585       | 116679           | NR               | 715       | 19222            | NR               | 845       | 2631             | NR               | 975       | 1986             | NR               |
| 460       | 9916             | NR               | 590       | 123752           | NR               | 720       | 17310            | NR               | 850       | 2079             | NR               | 980       | 2540             | NR               |
| 465       | 7051             | NR               | 595       | 129324           | NR               | 725       | 15280            | NR               | 855       | 2309             | NR               | 985       | 1139             | NR               |
| 470       | 5227             | NR               | 600       | 134082           | NR               | 730       | 13282            | NR               | 860       | 2528             | NR               | 990       | 2018             | NR               |
| 475       | 4257             | NR               | 605       | 135698           | NR               | 735       | 11753            | NR               | 865       | 2121             | NR               | 995       | 3445             | NR               |
| 480       | 4052             | NR               | 610       | 135144           | NR               | 740       | 10654            | NR               | 870       | 2751             | NR               | 1000      | 3704             | NR               |
| 485       | 4298             | NR               | 615       | 134180           | NR               | 745       | 9451             | NR               | 875       | 2317             | NR               |           |                  |                  |

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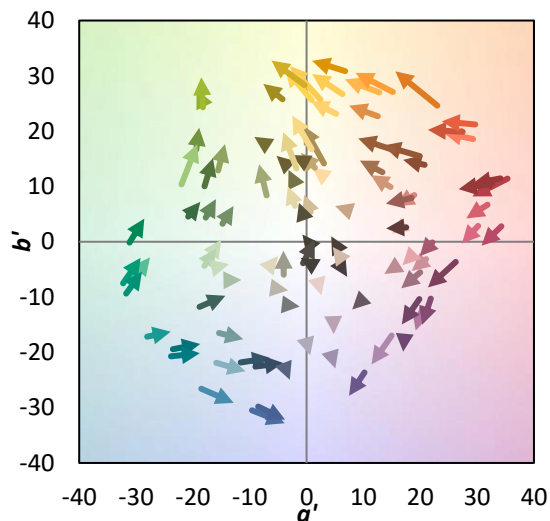
**TM-30-18**

### Summary

$R_f = 69.8$   
 $R_g = 99.2$   
 CIE  $R_a = 72.0$   
 $R_g = -17.4$



### Color Vector Graphics



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

|            |            |            |            |
|------------|------------|------------|------------|
| CES01 = 87 | CES26 = 56 | CES51 = 74 | CES76 = 56 |
| CES02 = 65 | CES27 = 76 | CES52 = 76 | CES77 = 81 |
| CES03 = 32 | CES28 = 83 | CES53 = 65 | CES78 = 63 |
| CES04 = 72 | CES29 = 46 | CES54 = 78 | CES79 = 84 |
| CES05 = 52 | CES30 = 48 | CES55 = 75 | CES80 = 84 |
| CES06 = 52 | CES31 = 51 | CES56 = 65 | CES81 = 63 |
| CES07 = 44 | CES32 = 51 | CES57 = 62 | CES82 = 92 |
| CES08 = 42 | CES33 = 53 | CES58 = 66 | CES83 = 83 |
| CES09 = 29 | CES34 = 70 | CES59 = 84 | CES84 = 92 |
| CES10 = 78 | CES35 = 85 | CES60 = 90 | CES85 = 81 |
| CES11 = 61 | CES36 = 78 | CES61 = 84 | CES86 = 56 |
| CES12 = 68 | CES37 = 80 | CES62 = 70 | CES87 = 78 |
| CES13 = 45 | CES38 = 53 | CES63 = 68 | CES88 = 72 |
| CES14 = 75 | CES39 = 90 | CES64 = 69 | CES89 = 62 |
| CES15 = 72 | CES40 = 84 | CES65 = 67 | CES90 = 67 |
| CES16 = 49 | CES41 = 75 | CES66 = 64 | CES91 = 90 |
| CES17 = 51 | CES42 = 79 | CES67 = 63 | CES92 = 67 |
| CES18 = 57 | CES43 = 64 | CES68 = 69 | CES93 = 79 |
| CES19 = 74 | CES44 = 98 | CES69 = 80 | CES94 = 52 |
| CES20 = 68 | CES45 = 73 | CES70 = 63 | CES95 = 76 |
| CES21 = 89 | CES46 = 67 | CES71 = 63 | CES96 = 78 |
| CES22 = 81 | CES47 = 60 | CES72 = 87 | CES97 = 77 |
| CES23 = 92 | CES48 = 48 | CES73 = 56 | CES98 = 71 |
| CES24 = 92 | CES49 = 64 | CES74 = 87 | CES99 = 65 |
| CES25 = 74 | CES50 = 74 | CES75 = 66 |            |



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Color Rendition by Hue-Angle Bin



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**Measure Comparisons**



(END OF REPORT)