

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



Scaled data based on original data using  
LM-79-2019 Approved Method: Electrical and Photometric Measurements of Solid-  
State Lighting Products

Test Report Prepared for

Cooper Lighting Solutions

Brand: McGRAW-EDISON

Report Number: P637478

Luminaire Tested: GWS-SA4C-830-U-RW-W

Issue Date: 1/10/2023

**Test Information**

Test Method: LM-79-2019  
Report Number: P637478  
TEST IS SCALED FROM IESNA LM-79-08 TEST DATA (G2-2209-782-49)  
Test Lab: COOPER LIGHTING SOLUTIONS  
Issue Date: 1/10/2023  
Manufacturer: COOPER LIGHTING SOLUTIONS  
Product Line: McGRAW-EDISON  
Catalog Number: GWS-SA4C-830-U-RW-W  
Description: GALLEON WALL SLIM LUMINAIRE. (4) LIGHTSQUARES WITH 16 LEDS EACH AND RECTANGULAR WIDE OPTICS  
Light Source: (64) 3000K CCT, 80 CRI LEDS  
Ballast/Driver: -

**Summary**

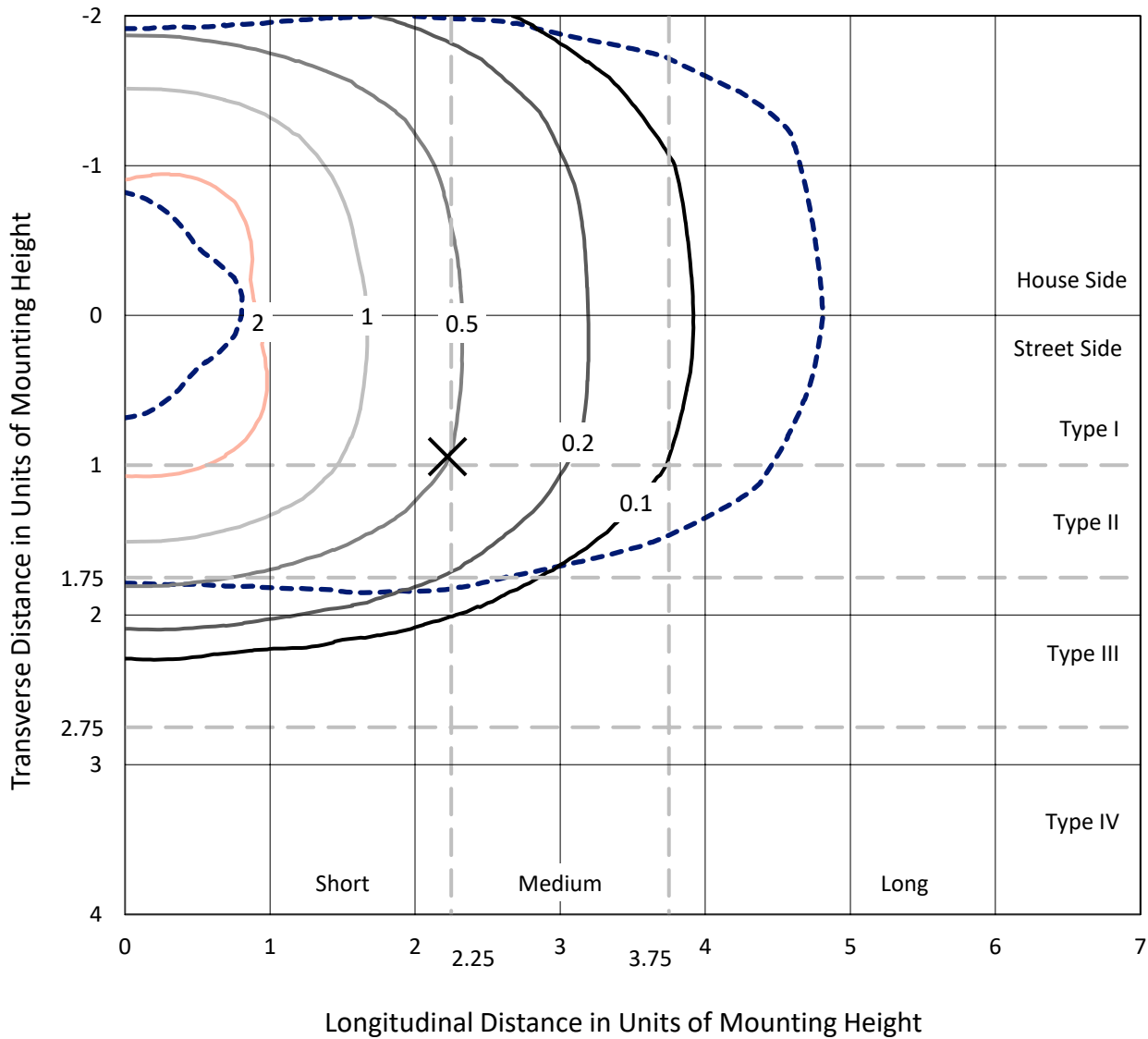
Lumens per Lamp: N/A  
Luminaire Lumens: 15874.2 lumens  
Efficiency: N/A  
Efficacy: 123.5 lumens/watt  
Luminous Opening: Rectangular (W 1' x L: 1' x H: 0')  
IES Classification: Type III - Short  
BUG Rating: B4 - U0 - G4  
  
Input Watts (W): 128.5  
Input Voltage (V): 120  
Input Current (Ain): 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



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 CATALOG NUMBER: GWS-SA4C-830-U-RW-W

### Iso-Footcandle Lines of Horizontal Illumination

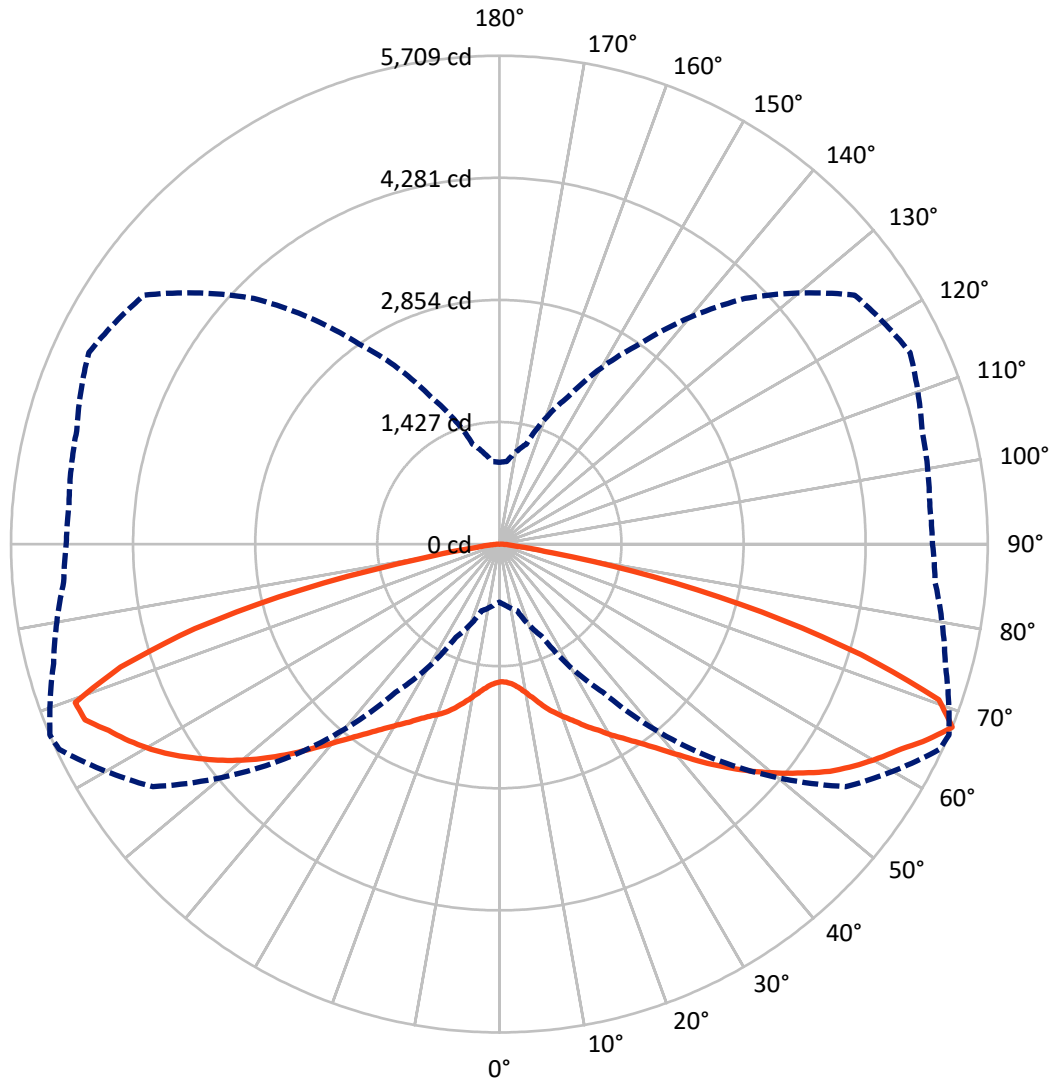
✕ Max cd  
 - - - 1/2 Max cd



Based on 25 foot mounting height. Maximum calculated value = 3 fc  
 Type III - Short - N/A

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### Luminous Intensity Polar Plot



— Vertical Plane Through 67-Deg Lateral    - - - Horizontal Cone Through 67.5-Deg Vertical

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CATALOG NUMBER: GWS-SA4C-830-U-RW-W

**FLUX DISTRIBUTION:**

|                    |           | Downward | Upward | Total   |
|--------------------|-----------|----------|--------|---------|
| <b>House Side</b>  | Lumens    | 7849.5   | 0.0    | 7849.5  |
|                    | % Fixture | 49.4     | 0.0    | 49.4    |
| <b>Street Side</b> | Lumens    | 8024.7   | 0.0    | 8024.7  |
|                    | % Fixture | 50.6     | 0.0    | 50.6    |
| <b>Total</b>       | Lumens    | 15874.2  | 0.0    | 15874.2 |
|                    | % Fixture | 100.0    | 0.0    | 100.0   |

**ZONAL LUMENS:**

| Zone      | Lumens  | % Fixture |
|-----------|---------|-----------|
| 0°-10°    | 157.7   | 1.0       |
| 10°-20°   | 532.8   | 3.4       |
| 20°-30°   | 1045.3  | 6.6       |
| 30°-40°   | 1780.8  | 11.2      |
| 40°-50°   | 2859.7  | 18.0      |
| 50°-60°   | 3885.7  | 24.5      |
| 60°-70°   | 3716.9  | 23.4      |
| 70°-80°   | 1767.2  | 11.1      |
| 80°-90°   | 128.1   | 0.8       |
| 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°    | 15874.2 | 100.0     |
| 0°-180°   | 15874.2 | 100.0     |

**Coefficient of Utilization**



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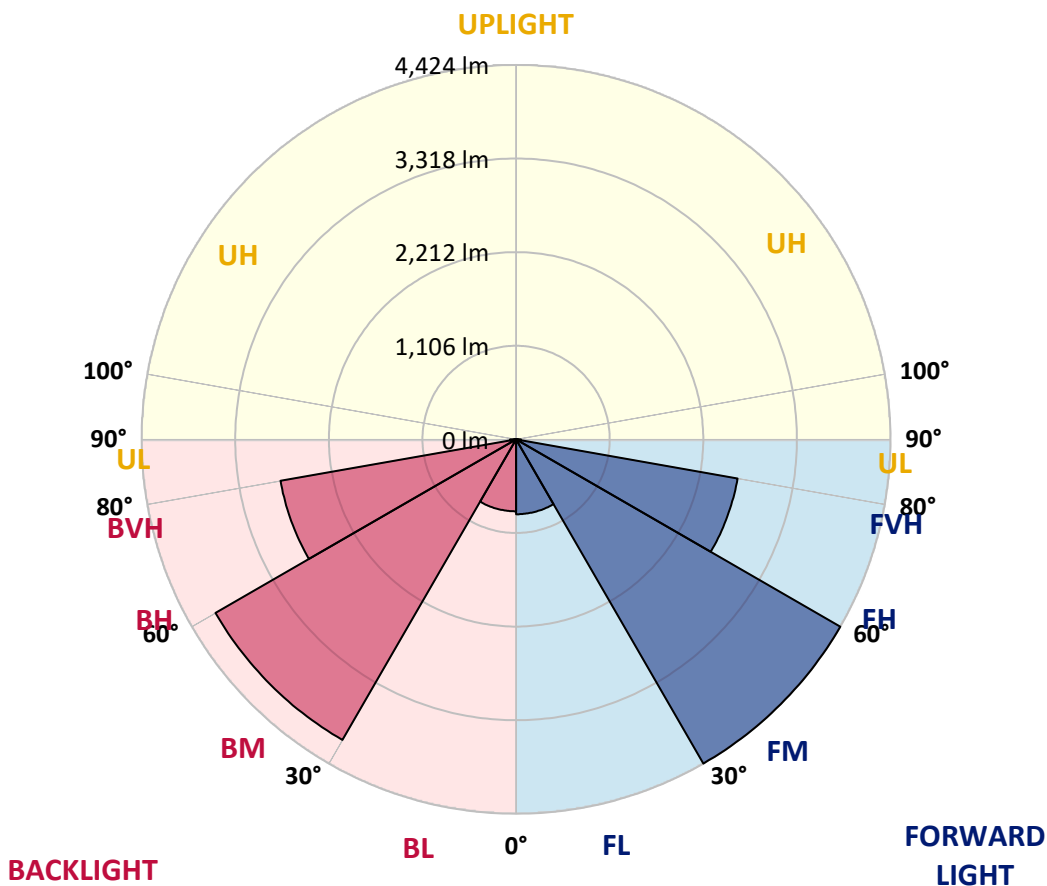
CATALOG NUMBER: GWS-SA4C-830-U-RW-W

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

| Zone           | Lumens | % Fixture | Zone Rating/Lumen Limit |      |         |
|----------------|--------|-----------|-------------------------|------|---------|
|                |        |           | B                       | U    | G       |
| FL (0°-30°)    | 885.1  | 5.6       |                         |      |         |
| FM (30°-60°)   | 4424.3 | 27.9      |                         |      |         |
| FH (60°-80°)   | 2657.8 | 16.7      |                         |      | G2/5000 |
| FVH (80°-90°)  | 57.6   | 0.4       |                         |      | G1/100  |
| BL (0°-30°)    | 850.7  | 5.4       | B2/1000                 |      |         |
| BM (30°-60°)   | 4102.0 | 25.8      | B3/5000                 |      |         |
| BH (60°-80°)   | 2826.4 | 17.8      | B4/5000                 |      | G4/5000 |
| BVH (80°-90°)  | 70.5   | 0.4       |                         |      | G1/100  |
| UL (90°-100°)  | 0.0    | 0.0       |                         | U0/0 |         |
| UH (100°-180°) | 0.0    | 0.0       |                         | U0/0 |         |

**BUG Rating: B4-U0-G4**

Type III Short





REPORT NUMBER: P637478

CATALOG NUMBER: GWS-SA4C-830-U-RW-W

**CANDELA DISTRIBUTION (FULL):**

|       | 0°     | 5°     | 15°    | 25°    | 35°    | 45°    | 55°    | 65°    | 67°    | 75°    | 85°    |
|-------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|
| 0°    | 1607.4 | 1607.4 | 1607.4 | 1607.4 | 1607.4 | 1607.4 | 1607.4 | 1607.4 | 1607.4 | 1607.4 | 1607.4 |
| 2.5°  | 1574.2 | 1576.4 | 1579.7 | 1586.3 | 1593.0 | 1602.9 | 1612.9 | 1611.8 | 1616.2 | 1619.5 | 1622.8 |
| 5°    | 1565.3 | 1567.6 | 1573.1 | 1581.9 | 1591.9 | 1608.5 | 1629.5 | 1638.3 | 1644.9 | 1657.1 | 1668.2 |
| 7.5°  | 1584.1 | 1588.6 | 1596.3 | 1608.5 | 1623.9 | 1644.9 | 1673.7 | 1689.2 | 1699.1 | 1721.2 | 1740.0 |
| 10°   | 1609.6 | 1615.1 | 1630.6 | 1653.8 | 1677.0 | 1709.1 | 1745.5 | 1768.7 | 1775.4 | 1804.1 | 1839.5 |
| 12.5° | 1633.9 | 1640.5 | 1665.9 | 1707.9 | 1750.0 | 1793.1 | 1836.2 | 1864.9 | 1867.1 | 1905.8 | 1945.6 |
| 15°   | 1672.6 | 1678.1 | 1712.4 | 1766.5 | 1830.7 | 1890.4 | 1943.4 | 1963.3 | 1972.2 | 1999.8 | 2049.5 |
| 17.5° | 1757.7 | 1764.3 | 1808.5 | 1867.1 | 1934.6 | 1997.6 | 2050.6 | 2067.2 | 2067.2 | 2090.4 | 2131.3 |
| 20°   | 1849.4 | 1856.1 | 1914.7 | 1989.8 | 2071.6 | 2135.8 | 2176.7 | 2161.2 | 2155.7 | 2162.3 | 2191.0 |
| 22.5° | 1952.3 | 1964.4 | 2020.8 | 2108.1 | 2208.7 | 2287.2 | 2308.2 | 2261.8 | 2246.3 | 2230.8 | 2237.5 |
| 25°   | 2083.8 | 2098.2 | 2153.5 | 2246.3 | 2344.7 | 2427.6 | 2439.8 | 2367.9 | 2359.1 | 2304.9 | 2285.0 |
| 27.5° | 2235.3 | 2246.3 | 2314.9 | 2406.6 | 2498.4 | 2568.0 | 2581.3 | 2492.8 | 2463.0 | 2387.8 | 2341.4 |
| 30°   | 2430.9 | 2440.9 | 2500.6 | 2591.2 | 2670.8 | 2719.5 | 2736.0 | 2614.4 | 2591.2 | 2476.2 | 2404.4 |
| 32.5° | 2644.3 | 2648.7 | 2709.5 | 2796.8 | 2867.6 | 2914.0 | 2890.8 | 2749.3 | 2715.0 | 2585.7 | 2487.3 |
| 35°   | 2888.6 | 2888.6 | 2967.1 | 3037.8 | 3094.2 | 3107.5 | 3063.3 | 2901.9 | 2862.1 | 2721.7 | 2599.0 |
| 37.5° | 3128.5 | 3135.1 | 3208.1 | 3292.1 | 3341.8 | 3339.6 | 3258.9 | 3082.0 | 3036.7 | 2884.2 | 2748.2 |
| 40°   | 3388.3 | 3402.6 | 3475.6 | 3569.6 | 3617.1 | 3610.5 | 3486.6 | 3289.9 | 3243.4 | 3063.3 | 2930.6 |
| 42.5° | 3627.0 | 3650.3 | 3735.4 | 3831.6 | 3883.5 | 3879.1 | 3749.7 | 3528.7 | 3483.3 | 3279.9 | 3147.3 |
| 45°   | 3817.2 | 3841.5 | 3947.6 | 4081.4 | 4164.3 | 4156.6 | 4026.1 | 3776.3 | 3721.0 | 3507.7 | 3361.7 |
| 47.5° | 3984.1 | 4009.5 | 4127.8 | 4269.3 | 4400.9 | 4414.1 | 4294.7 | 4026.1 | 3967.5 | 3752.0 | 3587.2 |
| 50°   | 4112.3 | 4124.5 | 4257.2 | 4411.9 | 4564.5 | 4638.5 | 4534.6 | 4277.1 | 4206.3 | 3993.0 | 3807.2 |
| 52.5° | 4102.4 | 4119.0 | 4282.6 | 4492.6 | 4697.1 | 4818.7 | 4746.9 | 4513.6 | 4445.1 | 4212.9 | 4031.6 |
| 55°   | 3900.1 | 3916.7 | 4111.2 | 4417.5 | 4771.2 | 4950.3 | 4942.5 | 4739.1 | 4689.4 | 4437.4 | 4264.9 |
| 57.5° | 3604.9 | 3641.4 | 3834.9 | 4165.4 | 4673.9 | 5055.3 | 5086.3 | 4944.8 | 4892.8 | 4657.3 | 4495.9 |
| 60°   | 3076.5 | 3125.2 | 3348.5 | 3777.4 | 4362.2 | 5019.9 | 5239.9 | 5118.3 | 5086.3 | 4861.9 | 4704.9 |
| 62.5° | 2235.3 | 2270.6 | 2568.0 | 3130.7 | 3900.1 | 4767.9 | 5369.3 | 5297.4 | 5273.1 | 5045.4 | 4893.9 |
| 65°   | 1338.7 | 1419.4 | 1658.2 | 2214.3 | 3146.2 | 4292.5 | 5298.5 | 5531.8 | 5506.3 | 5234.4 | 5055.3 |
| 67.5° | 677.7  | 714.1  | 808.1  | 1200.5 | 2115.9 | 3551.9 | 4943.7 | 5677.7 | 5708.6 | 5395.8 | 5112.8 |
| 70°   | 420.1  | 430.0  | 456.6  | 592.5  | 1056.8 | 2333.6 | 4042.7 | 5297.4 | 5448.9 | 5370.4 | 4963.6 |
| 72.5° | 337.2  | 339.4  | 343.8  | 369.2  | 507.4  | 1091.1 | 2555.8 | 4148.8 | 4421.9 | 5015.5 | 4750.2 |
| 75°   | 279.7  | 280.8  | 281.9  | 289.6  | 316.2  | 445.5  | 1243.7 | 2851.0 | 3170.5 | 4262.7 | 4404.2 |
| 77.5° | 224.4  | 218.9  | 223.3  | 226.6  | 233.3  | 248.7  | 428.9  | 1521.1 | 1845.0 | 2797.9 | 3405.9 |
| 80°   | 145.9  | 143.7  | 152.6  | 155.9  | 162.5  | 172.5  | 228.8  | 516.3  | 626.8  | 1018.1 | 1083.4 |
| 82.5° | 78.5   | 74.1   | 92.9   | 89.5   | 92.9   | 100.6  | 134.9  | 189.0  | 212.2  | 307.3  | 259.8  |
| 85°   | 24.3   | 24.3   | 25.4   | 29.8   | 36.5   | 35.4   | 58.6   | 92.9   | 102.8  | 131.6  | 97.3   |
| 87.5° | 4.4    | 4.4    | 4.4    | 4.4    | 4.4    | 5.5    | 12.2   | 18.8   | 25.4   | 45.3   | 34.3   |
| 90°   | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    |



REPORT NUMBER: P637478  
 CATALOG NUMBER: GWS-SA4C-830-U-RW-W

**CANDELA DISTRIBUTION (continued):**

|       | 90°    | 95°    | 105°   | 115°   | 125°   | 135°   | 145°   | 155°   | 165°   | 175°   | 180°   |
|-------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|
| 0°    | 1607.4 | 1607.4 | 1607.4 | 1607.4 | 1607.4 | 1607.4 | 1607.4 | 1607.4 | 1607.4 | 1607.4 | 1607.4 |
| 2.5°  | 1629.5 | 1619.5 | 1625.0 | 1628.4 | 1627.2 | 1625.0 | 1614.0 | 1611.8 | 1606.2 | 1597.4 | 1595.2 |
| 5°    | 1678.1 | 1667.0 | 1668.2 | 1664.8 | 1653.8 | 1639.4 | 1615.1 | 1602.9 | 1593.0 | 1581.9 | 1580.8 |
| 7.5°  | 1754.4 | 1742.2 | 1738.9 | 1723.4 | 1692.5 | 1659.3 | 1620.6 | 1598.5 | 1581.9 | 1567.6 | 1565.3 |
| 10°   | 1851.7 | 1839.5 | 1828.4 | 1792.0 | 1741.1 | 1696.9 | 1646.0 | 1614.0 | 1589.7 | 1572.0 | 1568.7 |
| 12.5° | 1960.0 | 1950.0 | 1922.4 | 1869.3 | 1808.5 | 1756.6 | 1704.6 | 1664.8 | 1629.5 | 1602.9 | 1599.6 |
| 15°   | 2080.5 | 2058.4 | 2016.4 | 1947.8 | 1890.4 | 1848.3 | 1785.3 | 1731.2 | 1674.8 | 1639.4 | 1631.7 |
| 17.5° | 2164.5 | 2145.7 | 2096.0 | 2029.6 | 1984.3 | 1947.8 | 1873.8 | 1796.4 | 1720.1 | 1668.2 | 1657.1 |
| 20°   | 2224.2 | 2204.3 | 2147.9 | 2099.3 | 2084.9 | 2054.0 | 1967.7 | 1878.2 | 1789.8 | 1725.6 | 1711.3 |
| 22.5° | 2267.3 | 2246.3 | 2188.8 | 2164.5 | 2184.4 | 2178.9 | 2094.9 | 1993.2 | 1888.1 | 1811.9 | 1794.2 |
| 25°   | 2308.2 | 2288.3 | 2237.5 | 2246.3 | 2299.4 | 2316.0 | 2225.3 | 2107.0 | 1987.6 | 1898.1 | 1877.1 |
| 27.5° | 2346.9 | 2321.5 | 2298.3 | 2346.9 | 2422.1 | 2453.0 | 2356.9 | 2223.1 | 2093.8 | 2002.0 | 1985.4 |
| 30°   | 2406.6 | 2376.8 | 2373.4 | 2444.2 | 2563.6 | 2590.1 | 2484.0 | 2350.2 | 2222.0 | 2129.1 | 2108.1 |
| 32.5° | 2481.8 | 2454.1 | 2456.4 | 2562.5 | 2700.7 | 2722.8 | 2632.1 | 2507.2 | 2379.0 | 2286.1 | 2257.4 |
| 35°   | 2583.5 | 2549.2 | 2568.0 | 2698.4 | 2837.7 | 2878.6 | 2805.7 | 2701.8 | 2576.8 | 2481.8 | 2449.7 |
| 37.5° | 2723.9 | 2674.1 | 2712.8 | 2849.9 | 2990.3 | 3051.1 | 2994.7 | 2917.3 | 2793.5 | 2697.3 | 2667.5 |
| 40°   | 2903.0 | 2862.1 | 2877.5 | 3029.0 | 3173.8 | 3246.8 | 3211.4 | 3135.1 | 3012.4 | 2911.8 | 2877.5 |
| 42.5° | 3115.2 | 3074.3 | 3068.8 | 3230.2 | 3375.0 | 3485.5 | 3451.3 | 3381.6 | 3254.5 | 3139.5 | 3106.4 |
| 45°   | 3323.0 | 3285.5 | 3293.2 | 3457.9 | 3620.4 | 3740.9 | 3706.6 | 3624.8 | 3486.6 | 3354.0 | 3327.5 |
| 47.5° | 3539.7 | 3508.8 | 3515.4 | 3690.1 | 3869.1 | 3989.6 | 3946.5 | 3847.0 | 3685.6 | 3544.1 | 3512.1 |
| 50°   | 3761.9 | 3726.5 | 3736.5 | 3920.0 | 4113.4 | 4227.3 | 4161.0 | 4014.0 | 3836.0 | 3697.8 | 3670.2 |
| 52.5° | 3983.0 | 3941.0 | 3966.4 | 4140.0 | 4340.1 | 4430.7 | 4308.0 | 4130.0 | 3957.6 | 3820.5 | 3789.5 |
| 55°   | 4237.3 | 4193.0 | 4165.4 | 4351.1 | 4549.0 | 4586.6 | 4418.6 | 4210.7 | 4006.2 | 3850.3 | 3831.6 |
| 57.5° | 4469.4 | 4431.8 | 4379.9 | 4565.6 | 4711.5 | 4683.9 | 4503.7 | 4188.6 | 3887.9 | 3687.8 | 3661.3 |
| 60°   | 4677.2 | 4645.2 | 4599.9 | 4757.9 | 4824.3 | 4762.4 | 4435.1 | 3926.6 | 3596.1 | 3387.2 | 3375.0 |
| 62.5° | 4868.5 | 4834.2 | 4792.2 | 4927.1 | 4918.2 | 4774.5 | 4123.4 | 3524.2 | 3082.0 | 2857.6 | 2837.7 |
| 65°   | 5019.9 | 4989.0 | 4976.8 | 5082.9 | 5068.6 | 4536.8 | 3638.1 | 2865.4 | 2251.8 | 1998.7 | 1990.9 |
| 67.5° | 5063.0 | 5050.9 | 5116.1 | 5296.3 | 5071.9 | 4059.3 | 2853.2 | 1900.3 | 1209.4 | 969.5  | 955.1  |
| 70°   | 4901.6 | 4900.5 | 5087.4 | 5344.9 | 4612.0 | 3100.8 | 1683.6 | 856.7  | 608.0  | 539.5  | 530.6  |
| 72.5° | 4691.6 | 4688.3 | 4836.4 | 4610.9 | 3420.3 | 1696.9 | 708.6  | 458.8  | 380.3  | 361.5  | 361.5  |
| 75°   | 4346.7 | 4337.9 | 4449.5 | 3507.7 | 1923.5 | 639.0  | 375.9  | 315.1  | 298.5  | 295.2  | 295.2  |
| 77.5° | 3543.0 | 3469.0 | 3293.2 | 2167.8 | 671.0  | 314.0  | 248.7  | 247.6  | 237.7  | 236.6  | 236.6  |
| 80°   | 1165.2 | 1165.2 | 1354.2 | 826.9  | 296.3  | 193.5  | 175.8  | 184.6  | 174.7  | 168.0  | 166.9  |
| 82.5° | 190.1  | 262.0  | 372.5  | 236.6  | 160.3  | 120.5  | 108.3  | 115.0  | 120.5  | 96.2   | 96.2   |
| 85°   | 75.2   | 98.4   | 143.7  | 110.5  | 74.1   | 48.6   | 52.0   | 57.5   | 50.9   | 44.2   | 43.1   |
| 87.5° | 28.7   | 35.4   | 50.9   | 26.5   | 15.5   | 8.8    | 5.5    | 5.5    | 4.4    | 4.4    | 4.4    |
| 90°   | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    |



Cooper Lighting Solutions Photometric Lab  
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

MCGRAW EDISON

Report Number: SP1-2408-195-9

Test Date: 08/07/2024

Luminaire Tested: GALN-SB1A-830-U-5WQ

Data in this report applies to families of products including GALN-SB1A-830-U-5WQ.

**Test Information**

Test Method: LM-79-2019  
 Report Number: SP1-2408-195-9  
 Test Lab: COOPER LIGHTING SOLUTIONS  
 Photometer: SP1 - 76IN SPHERE  
 Measurement Geometry: 4π  
 Issue Date: 08/07/2024  
 Manufacturer: COOPER LIGHTING SOLUTIONS  
 Product Line: MCGRAW EDISON  
 Catalog Number: **GALN-SB1A-830-U-5WQ**  
 Description: GALLEON AREA AND ROADWAY LUMINAIRE. (1) 80 CRI, 3000K, 350MA HIGH DENSITY LIGHTSQUARE WITH 26 LEDS AND TYPE V WIDE OPTICS

**Spectral Parameters**

CCT (K): 3050  
 CIE u': 0.2476  
 CIE v': 0.5251  
 Duv: 0.0034  
 CIE x: 0.4383  
 CIE y: 0.4131  
 CIE z: 0.1487  
 Peak Wavelength (nm): 603  
 Dominant Wavelength (nm): 581  
 Purity: 55.55201  
 Rf: 81.5  
 Rg: 99.2

|           |      |      |      |
|-----------|------|------|------|
| CRI (Ra): | 81.0 |      |      |
| R1:       | 79.6 | R9:  | 7.1  |
| R2:       | 85.6 | R10: | 67.0 |
| R3:       | 92.0 | R11: | 82.7 |
| R4:       | 82.6 | R12: | 63.2 |
| R5:       | 78.9 | R13: | 80.3 |
| R6:       | 81.7 | R14: | 95.0 |
| R7:       | 85.2 | R15: | 71.7 |
| R8:       | 62.0 |      |      |



**Test Conditions**

Stabilization Time: 20M  
 Operation Time: 1H 20M  
 Sphere Temperature (°C): 24.2

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| Measurement and Test Equipment |                       |                  |                      |
|--------------------------------|-----------------------|------------------|----------------------|
| Instrument                     | Identification Number | Calibration Date | Calibration Due Date |
| Photometer                     | IN0058                | 6/18/2024        | 12/18/2024           |
| Power Meter                    | INXT2011004           | 2/8/2024         | 2/8/2025             |
| AC Power Source                | IN0063                | 10/24/2023       | 10/24/2024           |
| DC Power Source                | IN0208                | 10/24/2023       | 10/24/2024           |
| Sphere Thermometer             | IN0085                | 10/24/2023       | 10/24/2024           |
| Room Thermometer               | IN0046                | 10/24/2023       | 10/24/2024           |

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CIE 1931 Chromaticity Diagram



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



Point lies inside the ANSI 3000K 4-step quadrangle

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**Photopic Flux vs. Wavelength**



**Photopic Lumens: NR**

| $\lambda$<br>(nm) | Power<br>W <sup>^</sup> /nm | Lumens<br>( $\phi$ /nm) | $\lambda$<br>(nm) | Power<br>W <sup>^</sup> /nm | Lumens<br>( $\phi$ /nm) | $\lambda$<br>(nm) | Power<br>W <sup>^</sup> /nm | Lumens<br>( $\phi$ /nm) | $\lambda$<br>(nm) | Power<br>W <sup>^</sup> /nm | Lumens<br>( $\phi$ /nm) | $\lambda$<br>(nm) | Power<br>W <sup>^</sup> /nm | Lumens<br>( $\phi$ /nm) |
|-------------------|-----------------------------|-------------------------|-------------------|-----------------------------|-------------------------|-------------------|-----------------------------|-------------------------|-------------------|-----------------------------|-------------------------|-------------------|-----------------------------|-------------------------|
| 360               | 0                           | NR                      | 490               | 168                         | NR                      | 620               | 940                         | NR                      | 750               | 35                          | NR                      | 880               | 1                           | NR                      |
| 365               | 0                           | NR                      | 495               | 233                         | NR                      | 625               | 897                         | NR                      | 755               | 30                          | NR                      | 885               | 1                           | NR                      |
| 370               | 0                           | NR                      | 500               | 300                         | NR                      | 630               | 847                         | NR                      | 760               | 26                          | NR                      | 890               | 1                           | NR                      |
| 375               | 0                           | NR                      | 505               | 372                         | NR                      | 635               | 790                         | NR                      | 765               | 22                          | NR                      | 895               | 1                           | NR                      |
| 380               | 0                           | NR                      | 510               | 430                         | NR                      | 640               | 730                         | NR                      | 770               | 19                          | NR                      | 900               | 1                           | NR                      |
| 385               | 0                           | NR                      | 515               | 483                         | NR                      | 645               | 668                         | NR                      | 775               | 16                          | NR                      | 905               | 1                           | NR                      |
| 390               | 0                           | NR                      | 520               | 524                         | NR                      | 650               | 605                         | NR                      | 780               | 14                          | NR                      | 910               | 0                           | NR                      |
| 395               | 2                           | NR                      | 525               | 555                         | NR                      | 655               | 545                         | NR                      | 785               | 12                          | NR                      | 915               | 0                           | NR                      |
| 400               | 4                           | NR                      | 530               | 581                         | NR                      | 660               | 485                         | NR                      | 790               | 10                          | NR                      | 920               | 0                           | NR                      |
| 405               | 7                           | NR                      | 535               | 604                         | NR                      | 665               | 430                         | NR                      | 795               | 9                           | NR                      | 925               | 0                           | NR                      |
| 410               | 17                          | NR                      | 540               | 623                         | NR                      | 670               | 378                         | NR                      | 800               | 8                           | NR                      | 930               | 0                           | NR                      |
| 415               | 34                          | NR                      | 545               | 645                         | NR                      | 675               | 331                         | NR                      | 805               | 7                           | NR                      | 935               | 0                           | NR                      |
| 420               | 68                          | NR                      | 550               | 667                         | NR                      | 680               | 290                         | NR                      | 810               | 6                           | NR                      | 940               | 0                           | NR                      |
| 425               | 128                         | NR                      | 555               | 693                         | NR                      | 685               | 251                         | NR                      | 815               | 5                           | NR                      | 945               | 0                           | NR                      |
| 430               | 214                         | NR                      | 560               | 719                         | NR                      | 690               | 218                         | NR                      | 820               | 4                           | NR                      | 950               | 0                           | NR                      |
| 435               | 339                         | NR                      | 565               | 754                         | NR                      | 695               | 188                         | NR                      | 825               | 4                           | NR                      | 955               | 0                           | NR                      |
| 440               | 507                         | NR                      | 570               | 791                         | NR                      | 700               | 162                         | NR                      | 830               | 3                           | NR                      | 960               | 0                           | NR                      |
| 445               | 573                         | NR                      | 575               | 830                         | NR                      | 705               | 139                         | NR                      | 835               | 3                           | NR                      | 965               | 0                           | NR                      |
| 450               | 356                         | NR                      | 580               | 873                         | NR                      | 710               | 119                         | NR                      | 840               | 3                           | NR                      | 970               | 0                           | NR                      |
| 455               | 217                         | NR                      | 585               | 913                         | NR                      | 715               | 102                         | NR                      | 845               | 2                           | NR                      | 975               | 0                           | NR                      |
| 460               | 168                         | NR                      | 590               | 948                         | NR                      | 720               | 88                          | NR                      | 850               | 2                           | NR                      | 980               | 0                           | NR                      |
| 465               | 113                         | NR                      | 595               | 974                         | NR                      | 725               | 76                          | NR                      | 855               | 2                           | NR                      | 985               | 0                           | NR                      |
| 470               | 85                          | NR                      | 600               | 994                         | NR                      | 730               | 65                          | NR                      | 860               | 1                           | NR                      | 990               | 0                           | NR                      |
| 475               | 85                          | NR                      | 605               | 998                         | NR                      | 735               | 55                          | NR                      | 865               | 1                           | NR                      | 995               | 0                           | NR                      |
| 480               | 94                          | NR                      | 610               | 994                         | NR                      | 740               | 47                          | NR                      | 870               | 1                           | NR                      | 1000              | 0                           | NR                      |
| 485               | 120                         | NR                      | 615               | 973                         | NR                      | 745               | 41                          | NR                      | 875               | 1                           | NR                      |                   |                             |                         |

REPORT NUMBER: SP1-2408-195-9

**Scotopic Flux vs. Wavelength**



**Scotopic Lumens: NR**

**S/P: 1.27**

| $\lambda$ (nm) | Power W <sup>^</sup> /nm | Lumens ( $\phi$ /nm) | $\lambda$ (nm) | Power W <sup>^</sup> /nm | Lumens ( $\phi$ /nm) | $\lambda$ (nm) | Power W <sup>^</sup> /nm | Lumens ( $\phi$ /nm) | $\lambda$ (nm) | Power W <sup>^</sup> /nm | Lumens ( $\phi$ /nm) | $\lambda$ (nm) | Power W <sup>^</sup> /nm | Lumens ( $\phi$ /nm) |
|----------------|--------------------------|----------------------|----------------|--------------------------|----------------------|----------------|--------------------------|----------------------|----------------|--------------------------|----------------------|----------------|--------------------------|----------------------|
| 360            | 0                        | NR                   | 490            | 168                      | NR                   | 620            | 940                      | NR                   | 750            | 35                       | NR                   | 880            | 1                        | NR                   |
| 365            | 0                        | NR                   | 495            | 233                      | NR                   | 625            | 897                      | NR                   | 755            | 30                       | NR                   | 885            | 1                        | NR                   |
| 370            | 0                        | NR                   | 500            | 300                      | NR                   | 630            | 847                      | NR                   | 760            | 26                       | NR                   | 890            | 1                        | NR                   |
| 375            | 0                        | NR                   | 505            | 372                      | NR                   | 635            | 790                      | NR                   | 765            | 22                       | NR                   | 895            | 1                        | NR                   |
| 380            | 0                        | NR                   | 510            | 430                      | NR                   | 640            | 730                      | NR                   | 770            | 19                       | NR                   | 900            | 1                        | NR                   |
| 385            | 0                        | NR                   | 515            | 483                      | NR                   | 645            | 668                      | NR                   | 775            | 16                       | NR                   | 905            | 1                        | NR                   |
| 390            | 0                        | NR                   | 520            | 524                      | NR                   | 650            | 605                      | NR                   | 780            | 14                       | NR                   | 910            | 0                        | NR                   |
| 395            | 2                        | NR                   | 525            | 555                      | NR                   | 655            | 545                      | NR                   | 785            | 12                       | NR                   | 915            | 0                        | NR                   |
| 400            | 4                        | NR                   | 530            | 581                      | NR                   | 660            | 485                      | NR                   | 790            | 10                       | NR                   | 920            | 0                        | NR                   |
| 405            | 7                        | NR                   | 535            | 604                      | NR                   | 665            | 430                      | NR                   | 795            | 9                        | NR                   | 925            | 0                        | NR                   |
| 410            | 17                       | NR                   | 540            | 623                      | NR                   | 670            | 378                      | NR                   | 800            | 8                        | NR                   | 930            | 0                        | NR                   |
| 415            | 34                       | NR                   | 545            | 645                      | NR                   | 675            | 331                      | NR                   | 805            | 7                        | NR                   | 935            | 0                        | NR                   |
| 420            | 68                       | NR                   | 550            | 667                      | NR                   | 680            | 290                      | NR                   | 810            | 6                        | NR                   | 940            | 0                        | NR                   |
| 425            | 128                      | NR                   | 555            | 693                      | NR                   | 685            | 251                      | NR                   | 815            | 5                        | NR                   | 945            | 0                        | NR                   |
| 430            | 214                      | NR                   | 560            | 719                      | NR                   | 690            | 218                      | NR                   | 820            | 4                        | NR                   | 950            | 0                        | NR                   |
| 435            | 339                      | NR                   | 565            | 754                      | NR                   | 695            | 188                      | NR                   | 825            | 4                        | NR                   | 955            | 0                        | NR                   |
| 440            | 507                      | NR                   | 570            | 791                      | NR                   | 700            | 162                      | NR                   | 830            | 3                        | NR                   | 960            | 0                        | NR                   |
| 445            | 573                      | NR                   | 575            | 830                      | NR                   | 705            | 139                      | NR                   | 835            | 3                        | NR                   | 965            | 0                        | NR                   |
| 450            | 356                      | NR                   | 580            | 873                      | NR                   | 710            | 119                      | NR                   | 840            | 3                        | NR                   | 970            | 0                        | NR                   |
| 455            | 217                      | NR                   | 585            | 913                      | NR                   | 715            | 102                      | NR                   | 845            | 2                        | NR                   | 975            | 0                        | NR                   |
| 460            | 168                      | NR                   | 590            | 948                      | NR                   | 720            | 88                       | NR                   | 850            | 2                        | NR                   | 980            | 0                        | NR                   |
| 465            | 113                      | NR                   | 595            | 974                      | NR                   | 725            | 76                       | NR                   | 855            | 2                        | NR                   | 985            | 0                        | NR                   |
| 470            | 85                       | NR                   | 600            | 994                      | NR                   | 730            | 65                       | NR                   | 860            | 1                        | NR                   | 990            | 0                        | NR                   |
| 475            | 85                       | NR                   | 605            | 998                      | NR                   | 735            | 55                       | NR                   | 865            | 1                        | NR                   | 995            | 0                        | NR                   |
| 480            | 94                       | NR                   | 610            | 994                      | NR                   | 740            | 47                       | NR                   | 870            | 1                        | NR                   | 1000           | 0                        | NR                   |
| 485            | 120                      | NR                   | 615            | 973                      | NR                   | 745            | 41                       | NR                   | 875            | 1                        | NR                   |                |                          |                      |

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**Melanopic Flux vs. Wavelength**



**Melanopic Lumens: NR**

**M/P: 2.32**

| λ (nm) | Power W <sup>^</sup> /nm | Lumens (φ/nm) | λ (nm) | Power W <sup>^</sup> /nm | Lumens (φ/nm) | λ (nm) | Power W <sup>^</sup> /nm | Lumens (φ/nm) | λ (nm) | Power W <sup>^</sup> /nm | Lumens (φ/nm) | λ (nm) | Power W <sup>^</sup> /nm | Lumens (φ/nm) |
|--------|--------------------------|---------------|--------|--------------------------|---------------|--------|--------------------------|---------------|--------|--------------------------|---------------|--------|--------------------------|---------------|
| 360    | 0                        | NR            | 490    | 168                      | NR            | 620    | 940                      | NR            | 750    | 35                       | NR            | 880    | 1                        | NR            |
| 365    | 0                        | NR            | 495    | 233                      | NR            | 625    | 897                      | NR            | 755    | 30                       | NR            | 885    | 1                        | NR            |
| 370    | 0                        | NR            | 500    | 300                      | NR            | 630    | 847                      | NR            | 760    | 26                       | NR            | 890    | 1                        | NR            |
| 375    | 0                        | NR            | 505    | 372                      | NR            | 635    | 790                      | NR            | 765    | 22                       | NR            | 895    | 1                        | NR            |
| 380    | 0                        | NR            | 510    | 430                      | NR            | 640    | 730                      | NR            | 770    | 19                       | NR            | 900    | 1                        | NR            |
| 385    | 0                        | NR            | 515    | 483                      | NR            | 645    | 668                      | NR            | 775    | 16                       | NR            | 905    | 1                        | NR            |
| 390    | 0                        | NR            | 520    | 524                      | NR            | 650    | 605                      | NR            | 780    | 14                       | NR            | 910    | 0                        | NR            |
| 395    | 2                        | NR            | 525    | 555                      | NR            | 655    | 545                      | NR            | 785    | 12                       | NR            | 915    | 0                        | NR            |
| 400    | 4                        | NR            | 530    | 581                      | NR            | 660    | 485                      | NR            | 790    | 10                       | NR            | 920    | 0                        | NR            |
| 405    | 7                        | NR            | 535    | 604                      | NR            | 665    | 430                      | NR            | 795    | 9                        | NR            | 925    | 0                        | NR            |
| 410    | 17                       | NR            | 540    | 623                      | NR            | 670    | 378                      | NR            | 800    | 8                        | NR            | 930    | 0                        | NR            |
| 415    | 34                       | NR            | 545    | 645                      | NR            | 675    | 331                      | NR            | 805    | 7                        | NR            | 935    | 0                        | NR            |
| 420    | 68                       | NR            | 550    | 667                      | NR            | 680    | 290                      | NR            | 810    | 6                        | NR            | 940    | 0                        | NR            |
| 425    | 128                      | NR            | 555    | 693                      | NR            | 685    | 251                      | NR            | 815    | 5                        | NR            | 945    | 0                        | NR            |
| 430    | 214                      | NR            | 560    | 719                      | NR            | 690    | 218                      | NR            | 820    | 4                        | NR            | 950    | 0                        | NR            |
| 435    | 339                      | NR            | 565    | 754                      | NR            | 695    | 188                      | NR            | 825    | 4                        | NR            | 955    | 0                        | NR            |
| 440    | 507                      | NR            | 570    | 791                      | NR            | 700    | 162                      | NR            | 830    | 3                        | NR            | 960    | 0                        | NR            |
| 445    | 573                      | NR            | 575    | 830                      | NR            | 705    | 139                      | NR            | 835    | 3                        | NR            | 965    | 0                        | NR            |
| 450    | 356                      | NR            | 580    | 873                      | NR            | 710    | 119                      | NR            | 840    | 3                        | NR            | 970    | 0                        | NR            |
| 455    | 217                      | NR            | 585    | 913                      | NR            | 715    | 102                      | NR            | 845    | 2                        | NR            | 975    | 0                        | NR            |
| 460    | 168                      | NR            | 590    | 948                      | NR            | 720    | 88                       | NR            | 850    | 2                        | NR            | 980    | 0                        | NR            |
| 465    | 113                      | NR            | 595    | 974                      | NR            | 725    | 76                       | NR            | 855    | 2                        | NR            | 985    | 0                        | NR            |
| 470    | 85                       | NR            | 600    | 994                      | NR            | 730    | 65                       | NR            | 860    | 1                        | NR            | 990    | 0                        | NR            |
| 475    | 85                       | NR            | 605    | 998                      | NR            | 735    | 55                       | NR            | 865    | 1                        | NR            | 995    | 0                        | NR            |
| 480    | 94                       | NR            | 610    | 994                      | NR            | 740    | 47                       | NR            | 870    | 1                        | NR            | 1000   | 0                        | NR            |
| 485    | 120                      | NR            | 615    | 973                      | NR            | 745    | 41                       | NR            | 875    | 1                        | NR            |        |                          |               |

**Summary**

$R_f = 81.5$   
 $R_g = 99.2$   
 $CIE R_a = 81.0$   
 $R_9 = 7.1$



**Color Vector Graphics**



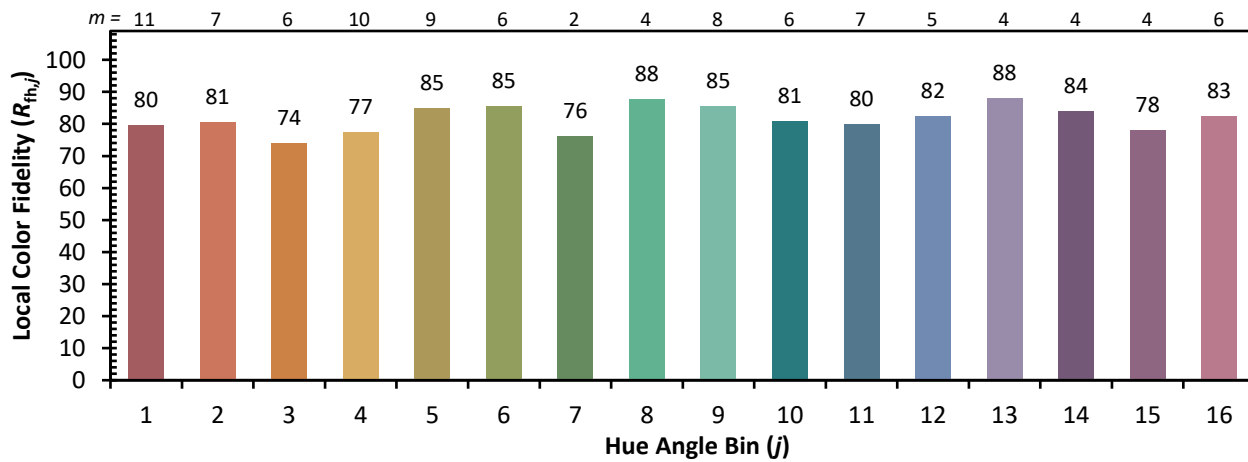
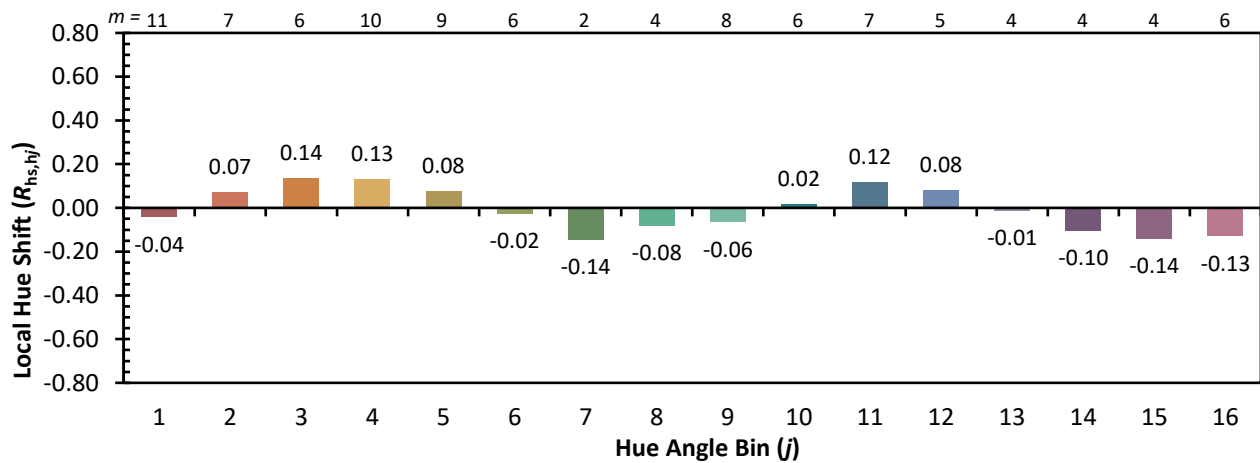
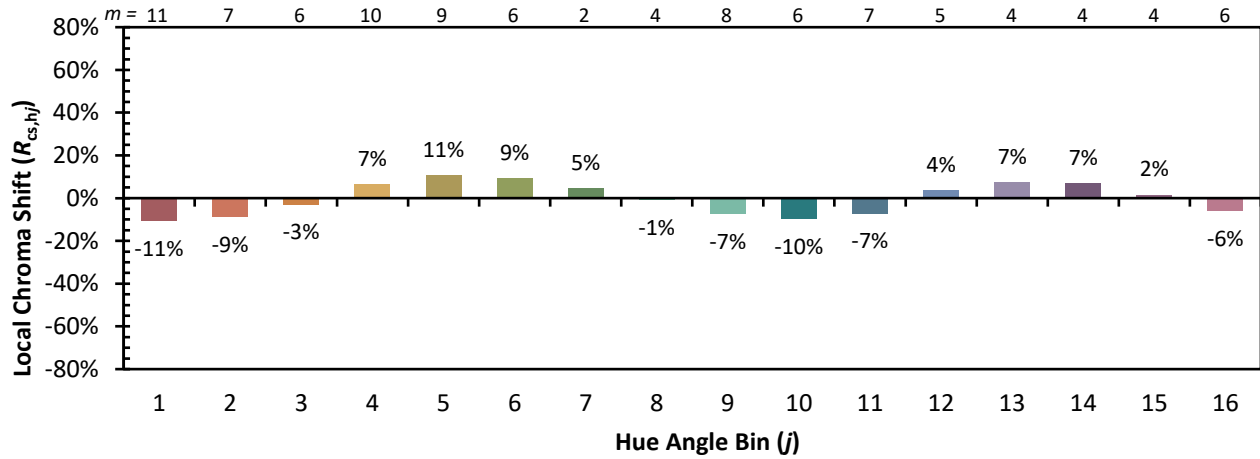


**Individual Sample Fidelity Index ( $R_{f,i}$ )**

|            |            |            |            |
|------------|------------|------------|------------|
| CES01 = 86 | CES26 = 74 | CES51 = 89 | CES76 = 70 |
| CES02 = 63 | CES27 = 88 | CES52 = 92 | CES77 = 86 |
| CES03 = 31 | CES28 = 89 | CES53 = 81 | CES78 = 72 |
| CES04 = 70 | CES29 = 67 | CES54 = 87 | CES79 = 90 |
| CES05 = 50 | CES30 = 68 | CES55 = 85 | CES80 = 88 |
| CES06 = 51 | CES31 = 71 | CES56 = 78 | CES81 = 78 |
| CES07 = 42 | CES32 = 70 | CES57 = 76 | CES82 = 95 |
| CES08 = 41 | CES33 = 71 | CES58 = 78 | CES83 = 90 |
| CES09 = 29 | CES34 = 82 | CES59 = 92 | CES84 = 94 |
| CES10 = 76 | CES35 = 90 | CES60 = 95 | CES85 = 86 |
| CES11 = 59 | CES36 = 93 | CES61 = 93 | CES86 = 72 |
| CES12 = 65 | CES37 = 87 | CES62 = 83 | CES87 = 85 |
| CES13 = 43 | CES38 = 75 | CES63 = 77 | CES88 = 83 |
| CES14 = 74 | CES39 = 94 | CES64 = 83 | CES89 = 75 |
| CES15 = 71 | CES40 = 89 | CES65 = 77 | CES90 = 81 |
| CES16 = 47 | CES41 = 85 | CES66 = 80 | CES91 = 96 |
| CES17 = 50 | CES42 = 86 | CES67 = 79 | CES92 = 73 |
| CES18 = 56 | CES43 = 81 | CES68 = 84 | CES93 = 84 |
| CES19 = 72 | CES44 = 99 | CES69 = 91 | CES94 = 64 |
| CES20 = 66 | CES45 = 87 | CES70 = 78 | CES95 = 80 |
| CES21 = 87 | CES46 = 82 | CES71 = 76 | CES96 = 84 |
| CES22 = 79 | CES47 = 77 | CES72 = 92 | CES97 = 87 |
| CES23 = 92 | CES48 = 71 | CES73 = 71 | CES98 = 81 |
| CES24 = 91 | CES49 = 81 | CES74 = 93 | CES99 = 74 |
| CES25 = 72 | CES50 = 89 | CES75 = 74 |            |



Color Rendition by Hue-Angle Bin



Measure Comparisons



(END OF REPORT)