

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: McGRAW-EDISON

Report Number: P237550

Luminaire Tested: **CTN-6-3-D-E1-T2-7030-HSS**

Issue Date: 3/3/2020

**Test Information**

Test Method: LM-79-08  
Report Number: P237550  
TEST IS SCALED FROM IESNA LM-79-08 TEST DATA (G2-1707-171-25)  
Test Lab: INNOVATION CENTER(G2)  
Issue Date: 3/3/2020  
Manufacturer: COOPER LIGHTING SOLUTIONS (FORMERLY EATON)  
Product Line: MCGRAW-EDISON  
Catalog Number: CTN-6-3-D-E1-T2-7030-HSS  
Description: CELESTEON HIGH MAST LUMINAIRE  
(6) 70 CRI, 3000K LEDS AND TYPE II OPTICS WITH HOUSE SIDE SHIELD  
Light Source: -  
Ballast/Driver: ELECTRONIC DRIVER

**Summary**

Lumens per Lamp: N/A  
Luminaire Lumens: 27547 lumens  
Efficiency: N/A  
Efficacy: 117.7 lumens/watt  
Luminous Opening: Circular (Dia: 2.08' x H: 0')  
IES Classification: Type II - Short - Non-Cutoff  
BUG Rating: B3 - U0 - G3

Input Watts (W): 234  
Input Voltage (V): NR  
Input Current (Ain): NR  
Voltage Rise (V): NR  
Power Factor: NR  
Total Harmonic Distortion (THDi): NR  
Frequency (hertz): 60  
Stabilization Time: NR  
Operation Time: NR  
Ambient Temperature (°C): NR  
Test Distance: 25 FT



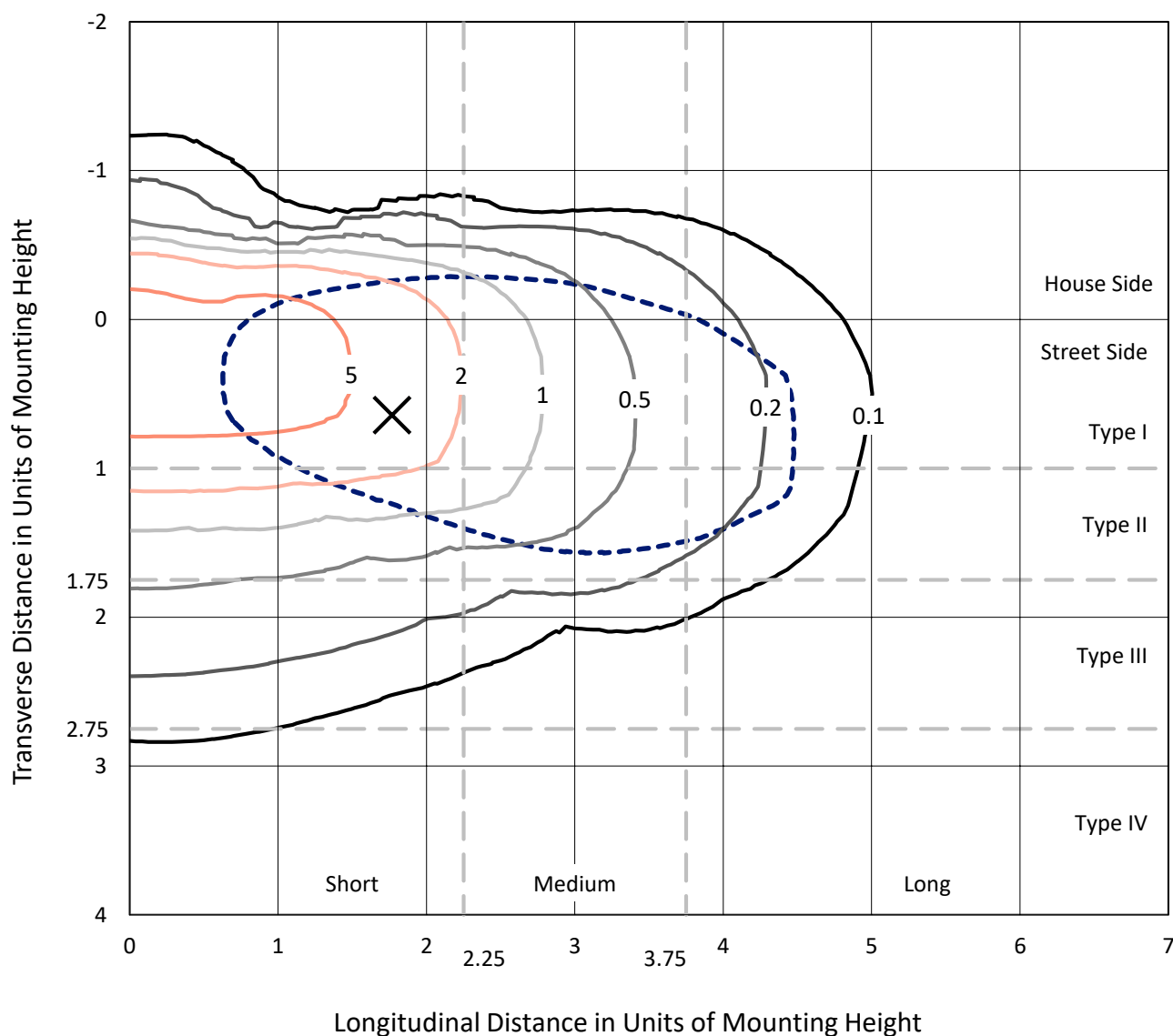
REPORT NUMBER: P237550

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## Iso-Footcandle Lines of Horizontal Illumination

× Max cd

--- 1/2 Max cd

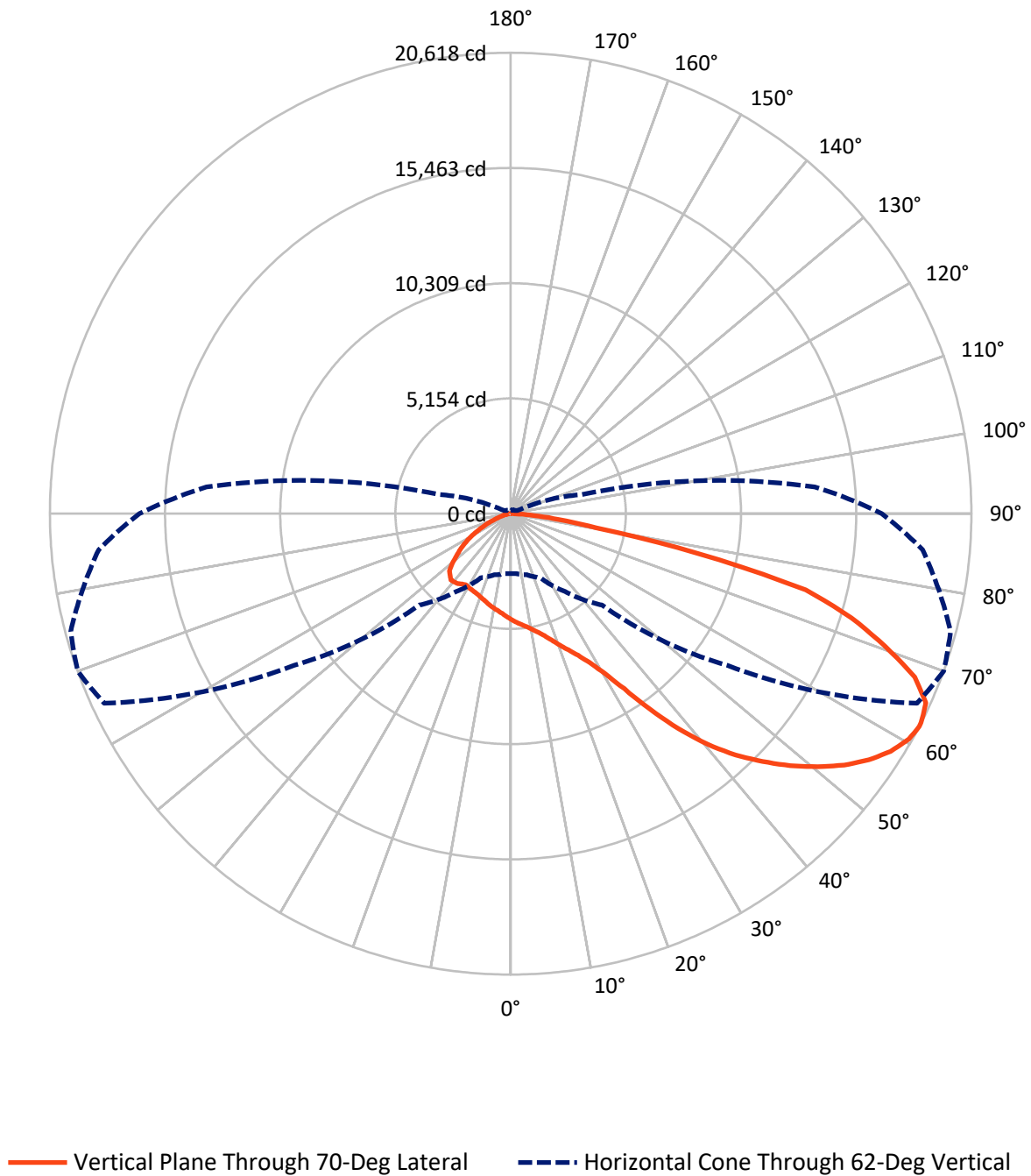


Based on 25 foot mounting height. Maximum calculated value = 9.8 fc  
 Type II - Short - Non-Cutoff

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## Luminous Intensity Polar Plot



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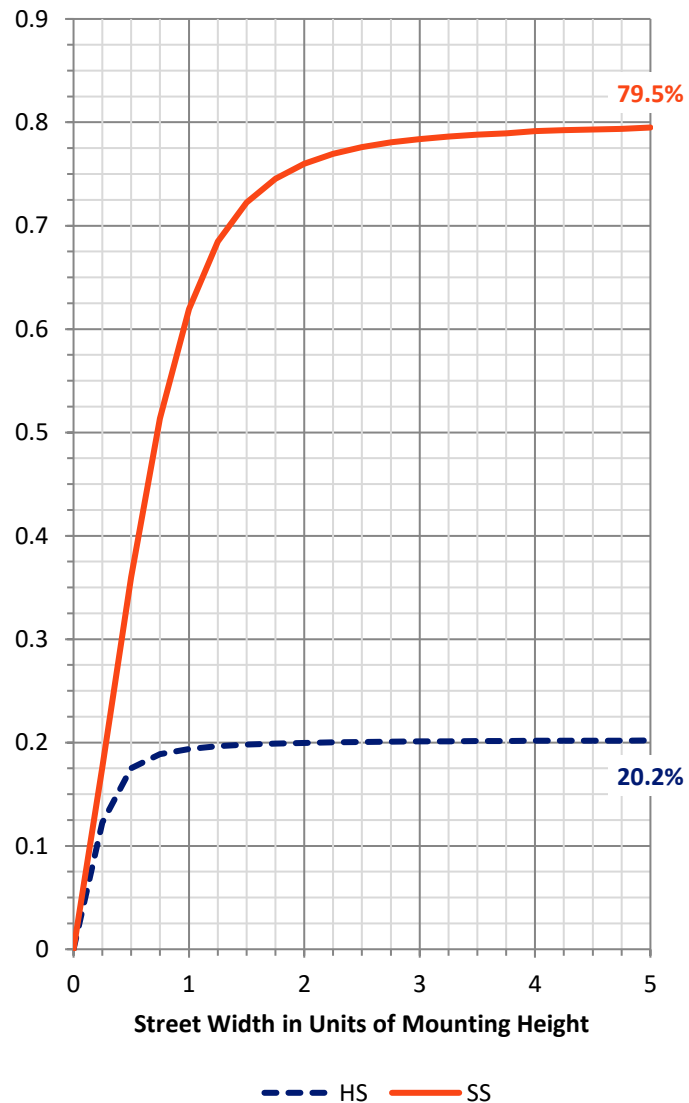
**FLUX DISTRIBUTION:**

|                    |           | Downward | Upward | Total   |
|--------------------|-----------|----------|--------|---------|
| <b>House Side</b>  | Lumens    | 5635.0   | 0.0    | 5635.0  |
|                    | % Fixture | 20.5     | 0.0    | 20.5    |
| <b>Street Side</b> | Lumens    | 21912.0  | 0.0    | 21912.0 |
|                    | % Fixture | 79.5     | 0.0    | 79.5    |
| <b>Total</b>       | Lumens    | 27547.0  | 0.0    | 27547.0 |
|                    | % Fixture | 100.0    | 0.0    | 100.0   |

**ZONAL LUMENS:**

| Zone      | Lumens  | % Fixture |
|-----------|---------|-----------|
| 0°-10°    | 451.4   | 1.6       |
| 10°-20°   | 1373.4  | 5.0       |
| 20°-30°   | 2312.3  | 8.4       |
| 30°-40°   | 3491.5  | 12.7      |
| 40°-50°   | 4896.2  | 17.8      |
| 50°-60°   | 5722.5  | 20.8      |
| 60°-70°   | 5551.9  | 20.2      |
| 70°-80°   | 3245.6  | 11.8      |
| 80°-90°   | 502.0   | 1.8       |
| 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°    | 27547.0 | 100.0     |
| 0°-180°   | 27547.0 | 100.0     |

**Coefficient of Utilization**



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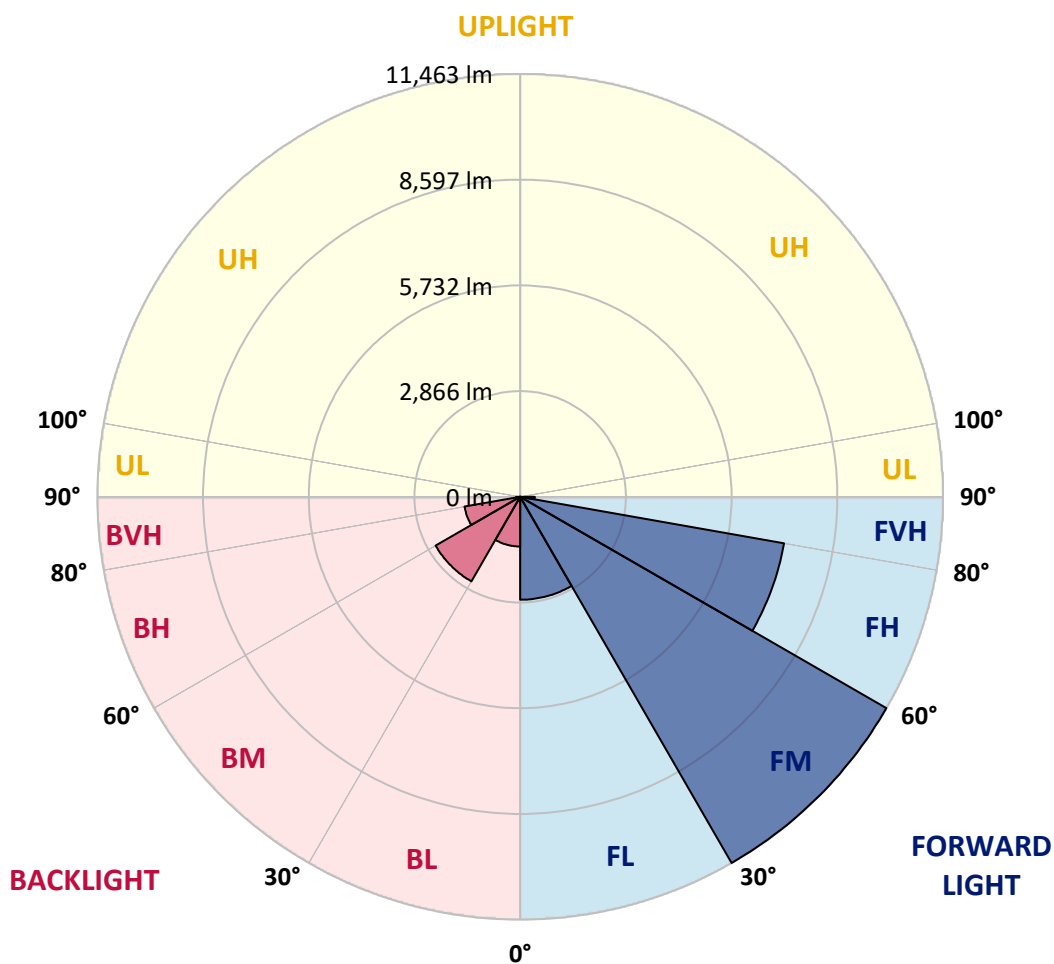
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**LUMINAIRE CLASSIFICATION SYSTEM LUMEN TABLE AND BUG RATING:**

| Zone |             | Lumens  | % Fixture | Zone Rating/Lumen Limit |      |         |
|------|-------------|---------|-----------|-------------------------|------|---------|
|      |             |         |           | B                       | U    | G       |
| FL   | (0°-30°)    | 2789.9  | 10.1      |                         |      |         |
| FM   | (30°-60°)   | 11463.3 | 41.6      |                         |      |         |
| FH   | (60°-80°)   | 7265.3  | 26.4      |                         |      | G3/7500 |
| FVH  | (80°-90°)   | 393.4   | 1.4       |                         |      | G3/500  |
| BL   | (0°-30°)    | 1347.3  | 4.9       | B3/2500                 |      |         |
| BM   | (30°-60°)   | 2646.9  | 9.6       | B3/5000                 |      |         |
| BH   | (60°-80°)   | 1532.2  | 5.6       | B3/2500                 |      | G3/2500 |
| BVH  | (80°-90°)   | 108.6   | 0.4       |                         |      | G2/225  |
| UL   | (90°-100°)  | 0.0     | 0.0       |                         | U0/0 |         |
| UH   | (100°-180°) | 0.0     | 0.0       |                         | U0/0 |         |

**BUG Rating: B3-U0-G3**

Type II Short



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**CANDELA DISTRIBUTION (FULL):**

|       | 0°     | 5°     | 15°    | 25°    | 35°    | 45°     | 55°     | 65°     | 70°     | 75°     | 85°     |
|-------|--------|--------|--------|--------|--------|---------|---------|---------|---------|---------|---------|
| 0°    | 4739.1 | 4739.1 | 4739.1 | 4739.1 | 4739.1 | 4739.1  | 4739.1  | 4739.1  | 4739.1  | 4739.1  | 4739.1  |
| 2.5°  | 5143.0 | 5108.9 | 5094.3 | 5115.7 | 4972.7 | 4975.6  | 4906.5  | 4895.8  | 4862.7  | 4816.0  | 4764.4  |
| 5°    | 5436.9 | 5397.0 | 5376.5 | 5389.2 | 5238.4 | 5212.1  | 5099.2  | 5043.7  | 4978.5  | 4920.1  | 4808.2  |
| 7.5°  | 5719.1 | 5678.2 | 5662.6 | 5655.8 | 5473.9 | 5434.0  | 5289.9  | 5191.6  | 5103.1  | 5028.2  | 4876.4  |
| 10°   | 6003.2 | 5961.4 | 5929.3 | 5938.0 | 5747.3 | 5676.3  | 5509.9  | 5374.6  | 5260.7  | 5163.4  | 4954.2  |
| 12.5° | 6285.4 | 6234.8 | 6199.8 | 6199.8 | 6012.0 | 5942.9  | 5756.1  | 5582.8  | 5437.8  | 5315.2  | 5052.5  |
| 15°   | 6574.5 | 6508.3 | 6500.5 | 6500.5 | 6301.0 | 6217.3  | 6033.4  | 5841.7  | 5663.6  | 5506.0  | 5171.2  |
| 17.5° | 6873.2 | 6789.5 | 6787.6 | 6800.2 | 6617.3 | 6522.9  | 6349.7  | 6170.6  | 5943.9  | 5744.4  | 5316.2  |
| 20°   | 7069.8 | 6994.9 | 6977.3 | 7015.3 | 6871.3 | 6810.0  | 6624.1  | 6498.6  | 6280.6  | 6043.1  | 5503.0  |
| 22.5° | 7219.6 | 7173.9 | 7190.5 | 7252.7 | 7182.7 | 7130.1  | 6934.5  | 6821.6  | 6625.1  | 6381.8  | 5755.1  |
| 25°   | 7370.5 | 7340.3 | 7378.3 | 7488.2 | 7494.1 | 7508.7  | 7345.2  | 7201.2  | 7018.2  | 6801.2  | 6083.0  |
| 27.5° | 7323.8 | 7315.0 | 7429.8 | 7656.6 | 7781.1 | 7847.3  | 7755.8  | 7705.2  | 7537.9  | 7309.2  | 6495.6  |
| 30°   | 7357.8 | 7336.4 | 7474.6 | 7761.7 | 8039.0 | 8230.7  | 8230.7  | 8345.6  | 8272.6  | 8042.9  | 7125.3  |
| 32.5° | 7256.6 | 7216.7 | 7375.3 | 7787.0 | 8263.8 | 8636.5  | 8802.0  | 9208.7  | 9336.2  | 9253.5  | 8373.8  |
| 35°   | 6790.5 | 6820.7 | 7131.1 | 7685.8 | 8418.5 | 9033.6  | 9471.5  | 10343.4 | 10735.6 | 10829.0 | 9811.1  |
| 37.5° | 6499.5 | 6512.2 | 6828.4 | 7520.3 | 8473.0 | 9423.8  | 10204.2 | 11653.2 | 12208.9 | 12266.3 | 11072.3 |
| 40°   | 6098.6 | 6146.3 | 6500.5 | 7298.5 | 8441.9 | 9753.7  | 10993.4 | 12944.6 | 13562.5 | 13514.8 | 12175.8 |
| 42.5° | 5782.3 | 5796.0 | 6105.4 | 6946.2 | 8305.7 | 10016.4 | 11789.5 | 14117.2 | 14764.3 | 14631.0 | 13266.7 |
| 45°   | 5388.2 | 5413.5 | 5706.4 | 6508.3 | 8063.3 | 10149.7 | 12476.5 | 15216.8 | 15809.5 | 15643.1 | 14211.6 |
| 47.5° | 4911.4 | 5022.3 | 5328.9 | 6036.3 | 7652.7 | 10136.1 | 13058.4 | 16168.5 | 16844.9 | 16588.9 | 15095.2 |
| 50°   | 3955.8 | 4091.0 | 4704.1 | 5611.1 | 7114.5 | 9945.4  | 13521.6 | 17216.6 | 17795.6 | 17537.7 | 15901.9 |
| 52.5° | 3455.6 | 3481.9 | 3794.2 | 5133.3 | 6484.0 | 9519.2  | 13836.9 | 18082.7 | 18686.0 | 18414.5 | 16677.5 |
| 55°   | 3229.8 | 3257.1 | 3414.7 | 4359.6 | 5904.9 | 8764.0  | 13952.7 | 18908.9 | 19444.1 | 19132.7 | 17316.8 |
| 57.5° | 3032.3 | 3041.0 | 3226.9 | 3687.2 | 5353.2 | 7769.5  | 13708.5 | 19597.9 | 20056.2 | 19632.9 | 17760.6 |
| 60°   | 2806.5 | 2841.5 | 3024.5 | 3366.1 | 4731.4 | 6614.4  | 12871.6 | 20038.7 | 20471.7 | 20095.1 | 18220.9 |
| 62°   | 2680.0 | 2688.8 | 2831.8 | 3166.6 | 4249.7 | 5779.4  | 11829.4 | 20064.0 | 20617.7 | 20379.3 | 18504.1 |
| 62.5° | 2643.0 | 2648.9 | 2784.1 | 3116.0 | 4150.4 | 5614.0  | 11545.2 | 20043.5 | 20608.9 | 20428.9 | 18566.3 |
| 65°   | 2430.9 | 2444.5 | 2566.1 | 2876.6 | 3715.4 | 4968.8  | 10214.0 | 19709.8 | 20421.1 | 20345.2 | 18560.5 |
| 67.5° | 2173.0 | 2176.9 | 2306.3 | 2585.6 | 3266.8 | 4362.5  | 8579.1  | 19071.4 | 19501.5 | 19403.2 | 17747.9 |
| 70°   | 1776.9 | 1848.0 | 1989.1 | 2235.3 | 2702.4 | 3619.1  | 6525.8  | 17083.3 | 17788.8 | 17886.1 | 16292.1 |
| 72.5° | 1350.7 | 1345.8 | 1395.5 | 1566.7 | 1968.6 | 2780.2  | 4405.4  | 14313.8 | 15948.6 | 16475.1 | 14685.5 |
| 75°   | 834.0  | 866.1  | 1074.3 | 1211.5 | 1411.0 | 1960.9  | 2761.7  | 9963.9  | 13637.4 | 14547.3 | 12980.6 |
| 77.5° | 648.1  | 653.9  | 762.0  | 999.4  | 1156.1 | 1389.6  | 1722.4  | 5429.1  | 8548.9  | 10811.5 | 10109.8 |
| 80°   | 493.4  | 504.1  | 575.1  | 626.7  | 813.5  | 846.6   | 1149.3  | 2808.5  | 3893.5  | 5453.4  | 6791.5  |
| 82.5° | 297.8  | 314.3  | 380.5  | 410.7  | 448.6  | 424.3   | 617.9   | 1515.2  | 2158.4  | 2790.9  | 3458.5  |
| 85°   | 149.9  | 180.0  | 253.0  | 239.4  | 203.4  | 187.8   | 264.7   | 732.8   | 1031.5  | 1365.3  | 1587.2  |
| 87.5° | 38.0   | 45.7   | 59.4   | 71.0   | 60.3   | 49.6    | 72.0    | 198.5   | 204.4   | 195.6   | 547.9   |
| 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°    | 4739.1  | 4739.1  | 4739.1 | 4739.1 | 4739.1 | 4739.1 | 4739.1 | 4739.1 | 4739.1 | 4739.1 | 4739.1 |
| 2.5°  | 4746.9  | 4707.0  | 4634.0 | 4592.2 | 4488.1 | 4448.2 | 4373.2 | 4400.5 | 4383.9 | 4367.4 | 4368.4 |
| 5°    | 4754.7  | 4682.7  | 4543.5 | 4443.3 | 4292.5 | 4215.6 | 4117.3 | 4101.7 | 4058.9 | 4032.6 | 4035.6 |
| 7.5°  | 4771.3  | 4668.1  | 4471.5 | 4311.9 | 4099.8 | 3979.1 | 3847.8 | 3825.4 | 3761.1 | 3732.0 | 3735.8 |
| 10°   | 4813.1  | 4691.5  | 4424.8 | 4190.3 | 3950.9 | 3783.5 | 3629.8 | 3580.1 | 3518.8 | 3485.7 | 3483.8 |
| 12.5° | 4877.3  | 4726.5  | 4358.6 | 4097.8 | 3806.9 | 3589.9 | 3412.8 | 3333.0 | 3245.4 | 3216.2 | 3219.1 |
| 15°   | 4979.5  | 4771.3  | 4303.2 | 3970.4 | 3632.7 | 3406.9 | 3188.0 | 3091.6 | 2999.2 | 2965.1 | 2962.2 |
| 17.5° | 5104.1  | 4812.1  | 4264.3 | 3820.5 | 3481.9 | 3211.3 | 3018.6 | 2887.3 | 2731.6 | 2709.2 | 2684.9 |
| 20°   | 5227.7  | 4893.9  | 4229.2 | 3711.5 | 3302.8 | 3014.8 | 2762.7 | 2628.4 | 2405.6 | 2321.9 | 2291.7 |
| 22.5° | 5407.7  | 5023.3  | 4224.4 | 3582.1 | 3122.8 | 2799.7 | 2460.1 | 2243.1 | 1997.8 | 1855.8 | 1824.6 |
| 25°   | 5648.0  | 5165.4  | 4237.0 | 3483.8 | 2921.3 | 2526.2 | 2067.9 | 1754.6 | 1521.0 | 1360.4 | 1327.3 |
| 27.5° | 5960.4  | 5359.0  | 4275.0 | 3375.8 | 2738.4 | 2198.3 | 1628.0 | 1305.9 | 1108.4 | 974.1  | 943.0  |
| 30°   | 6420.7  | 5684.0  | 4334.3 | 3275.6 | 2471.7 | 1771.1 | 1196.9 | 941.0  | 787.3  | 704.5  | 703.6  |
| 32.5° | 7495.0  | 6410.0  | 4368.4 | 3151.0 | 2223.6 | 1339.0 | 861.2  | 681.2  | 558.6  | 527.4  | 553.7  |
| 35°   | 8727.0  | 7438.6  | 4631.1 | 3016.7 | 1835.3 | 984.8  | 615.0  | 484.6  | 434.0  | 441.8  | 456.4  |
| 37.5° | 9863.6  | 8427.3  | 5032.1 | 2798.7 | 1469.4 | 693.8  | 441.8  | 385.4  | 374.7  | 402.9  | 429.2  |
| 40°   | 10869.9 | 9281.7  | 5375.6 | 2559.3 | 1039.3 | 484.6  | 354.2  | 356.2  | 345.5  | 358.1  | 366.9  |
| 42.5° | 11856.6 | 10073.8 | 5738.5 | 2237.2 | 692.9  | 358.1  | 320.2  | 337.7  | 325.0  | 327.0  | 314.3  |
| 45°   | 12837.5 | 10909.8 | 5895.2 | 1839.2 | 464.2  | 310.4  | 299.7  | 320.2  | 319.2  | 311.4  | 292.9  |
| 47.5° | 13684.1 | 11485.8 | 6093.7 | 1387.7 | 345.5  | 282.2  | 285.1  | 299.7  | 309.5  | 295.8  | 287.1  |
| 50°   | 14412.0 | 12097.0 | 5941.0 | 918.6  | 308.5  | 263.7  | 274.4  | 274.4  | 290.0  | 266.6  | 255.9  |
| 52.5° | 15107.8 | 12705.2 | 5548.8 | 605.3  | 283.2  | 251.1  | 261.8  | 255.0  | 261.8  | 238.4  | 235.5  |
| 55°   | 15525.3 | 13019.5 | 5074.9 | 472.0  | 267.6  | 240.4  | 245.2  | 243.3  | 237.4  | 213.1  | 218.0  |
| 57.5° | 15984.6 | 13381.5 | 4485.2 | 396.1  | 260.8  | 227.7  | 228.7  | 225.8  | 208.2  | 191.7  | 192.7  |
| 60°   | 16351.5 | 13652.0 | 3854.6 | 349.4  | 253.0  | 220.9  | 207.3  | 202.4  | 178.1  | 168.4  | 169.3  |
| 62°   | 16608.4 | 13664.7 | 3304.7 | 325.0  | 243.3  | 216.0  | 194.6  | 183.9  | 156.7  | 148.9  | 147.9  |
| 62.5° | 16636.6 | 13617.0 | 3170.5 | 319.2  | 239.4  | 214.1  | 193.7  | 178.1  | 150.8  | 145.0  | 143.1  |
| 65°   | 16531.5 | 13086.6 | 2529.2 | 287.1  | 222.8  | 202.4  | 180.0  | 154.7  | 129.4  | 121.6  | 118.7  |
| 67.5° | 15749.1 | 12136.9 | 1931.7 | 260.8  | 202.4  | 194.6  | 166.4  | 136.2  | 114.8  | 105.1  | 103.2  |
| 70°   | 14223.3 | 10851.4 | 1378.9 | 227.7  | 182.0  | 177.1  | 167.4  | 124.6  | 106.1  | 92.4   | 90.5   |
| 72.5° | 12528.1 | 9483.1  | 938.1  | 202.4  | 161.5  | 146.0  | 123.6  | 117.7  | 99.3   | 81.7   | 79.8   |
| 75°   | 10661.6 | 7552.5  | 667.6  | 174.2  | 139.2  | 123.6  | 104.1  | 109.0  | 93.4   | 73.0   | 71.0   |
| 77.5° | 8180.1  | 5554.6  | 495.3  | 143.1  | 108.0  | 100.2  | 87.6   | 96.3   | 84.7   | 66.2   | 65.2   |
| 80°   | 5585.8  | 3836.1  | 352.3  | 108.0  | 71.0   | 71.0   | 74.0   | 82.7   | 74.9   | 59.4   | 58.4   |
| 82.5° | 3140.3  | 2019.2  | 208.2  | 77.9   | 48.7   | 48.7   | 57.4   | 67.1   | 62.3   | 51.6   | 50.6   |
| 85°   | 1301.1  | 730.8   | 110.0  | 48.7   | 32.1   | 33.1   | 40.9   | 49.6   | 48.7   | 40.9   | 39.9   |
| 87.5° | 452.5   | 183.9   | 32.1   | 16.5   | 13.6   | 14.6   | 16.5   | 23.4   | 23.4   | 20.4   | 21.4   |
| 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)

STREETWORKS

Report Number: SP1-2104-215-6

Luminaire Tested: CST-CA6-230-730-U-T4

Test Date: 04/22/2021

### Test Information

Test Method: LM-79-08  
 Report Number: SP1-2104-215-6  
 Test Lab: COOPER LIGHTING SOLUTIONS  
 Photometer: SP1  
 Measurement Geometry:  $4\pi$   
 Issue Date: 04/22/2021  
 Manufacturer: COOPER LIGHTING SOLUTIONS (FORMERLY EATON)  
 Product Line: STREETWORKS  
 Catalog Number: **CST-CA6-230-730-U-T4**  
 Description: STREETWORKS HIGH MAST LUMINAIRE

### Spectral Parameters

|                           |         |           |      |      |       |
|---------------------------|---------|-----------|------|------|-------|
| CCT (K):                  | 2914    | CRI (Ra): | 73.2 |      |       |
| CIE u':                   | 0.2541  | R1:       | 70.1 | R9:  | -27.2 |
| CIE v':                   | 0.5212  | R2:       | 83.3 | R10: | 61.9  |
| Duv:                      | -0.0013 | R3:       | 94.2 | R11: | 65.4  |
| CIE x:                    | 0.4410  | R4:       | 69.4 | R12: | 53.3  |
| CIE y:                    | 0.4020  | R5:       | 69.3 | R13: | 72.6  |
| CIE z:                    | 0.1571  | R6:       | 77.3 | R14: | 96.9  |
| Peak Wavelength (nm):     | 599     | R7:       | 77.5 |      |       |
| Dominant Wavelength (nm): | 583     | R8:       | 44.9 |      |       |
| Purity:                   | 53.4    |           |      |      |       |
| Rf:                       | 75.3    |           |      |      |       |
| Rg:                       | 95.7    |           |      |      |       |



### Test Conditions

Stabilization Time: 72M  
 Operation Time: 12H  
 Room Temperature (°C) / RH%: 25.6/15%  
 Sphere Temperature (°C): 24.0

REPORT NUMBER: SP1-2104-215-6

| Measurement and Test Equipment |                       |                  |                      |
|--------------------------------|-----------------------|------------------|----------------------|
| Instrument                     | Identification Number | Calibration Date | Calibration Due Date |
| Photometer                     | IN0058                | 1/31/2021        | 7/31/2021            |
| 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            |



REPORT NUMBER: SP1-2104-215-6

**CIE 1931 Chromaticity Diagram**



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



Point lies inside the ANSI 3000K 7-step quadrangle

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### Photopic Flux vs. Wavelength



#####

| λ<br>(nm) | Power<br>(μW/nm) | Lumens<br>(Φ/nm) | λ<br>(nm) | Power<br>(μW/nm) | Lumens<br>(Φ/nm) | λ<br>(nm) | Power<br>(μW/nm) | Lumens<br>(Φ/nm) | λ<br>(nm) | Power<br>(μW/nm) | Lumens<br>(Φ/nm) | λ<br>(nm) | Power<br>(μW/nm) | Lumens<br>(Φ/nm) |
|-----------|------------------|------------------|-----------|------------------|------------------|-----------|------------------|------------------|-----------|------------------|------------------|-----------|------------------|------------------|
| 360       | 12827            | 0.0              | 490       | 80096            | 11.4             | 620       | 649050           | 168.9            | 750       | 30187            | 0.0              | 880       | 19756            | 0.0              |
| 365       | 11336            | 0.0              | 495       | 104447           | 18.9             | 625       | 608162           | 134.2            | 755       | 27442            | 0.0              | 885       | 21245            | 0.0              |
| 370       | 11776            | 0.0              | 500       | 142477           | 31.4             | 630       | 557990           | 101.0            | 760       | 25382            | 0.0              | 890       | 17771            | 0.0              |
| 375       | 13009            | 0.0              | 505       | 187724           | 52.5             | 635       | 506861           | 76.2             | 765       | 23778            | 0.0              | 895       | 14356            | 0.0              |
| 380       | 13906            | 0.0              | 510       | 232209           | 79.8             | 640       | 460827           | 55.1             | 770       | 21474            | 0.0              | 900       | 16683            | 0.0              |
| 385       | 12960            | 0.0              | 515       | 273388           | 113.2            | 645       | 418064           | 40.3             | 775       | 21394            | 0.0              | 905       | 16548            | 0.0              |
| 390       | 11750            | 0.0              | 520       | 308378           | 149.5            | 650       | 376246           | 27.5             | 780       | 18945            | 0.0              | 910       | 15630            | 0.0              |
| 395       | 10399            | 0.0              | 525       | 336804           | 180.8            | 655       | 332016           | 19.0             | 785       | 16318            | 0.0              | 915       | 20907            | 0.0              |
| 400       | 9192             | 0.0              | 530       | 361609           | 212.9            | 660       | 294638           | 12.3             | 790       | 17841            | 0.0              | 920       | 16083            | 0.0              |
| 405       | 8943             | 0.0              | 535       | 382440           | 237.2            | 665       | 259105           | 8.2              | 795       | 16506            | 0.0              | 925       | 20203            | 0.0              |
| 410       | 11120            | 0.0              | 540       | 401976           | 261.9            | 670       | 223041           | 4.9              | 800       | 15058            | 0.0              | 930       | 22625            | 0.0              |
| 415       | 18193            | 0.0              | 545       | 426232           | 283.7            | 675       | 193569           | 3.2              | 805       | 16851            | 0.0              | 935       | 24828            | 0.0              |
| 420       | 32317            | 0.1              | 550       | 455969           | 309.9            | 680       | 167520           | 1.9              | 810       | 16679            | 0.0              | 940       | 21275            | 0.0              |
| 425       | 59220            | 0.3              | 555       | 490448           | 335.0            | 685       | 144697           | 1.2              | 815       | 15851            | 0.0              | 945       | 23270            | 0.0              |
| 430       | 100522           | 0.8              | 560       | 530799           | 360.7            | 690       | 125032           | 0.7              | 820       | 15536            | 0.0              | 950       | 21756            | 0.0              |
| 435       | 155311           | 1.8              | 565       | 572799           | 380.9            | 695       | 107458           | 0.5              | 825       | 16381            | 0.0              | 955       | 24823            | 0.0              |
| 440       | 239817           | 3.8              | 570       | 615361           | 400.1            | 700       | 93549            | 0.3              | 830       | 16149            | 0.0              | 960       | 19499            | 0.0              |
| 445       | 368265           | 7.7              | 575       | 659689           | 410.5            | 705       | 81608            | 0.2              | 835       | 16687            | 0.0              | 965       | 27077            | 0.0              |
| 450       | 439895           | 11.4             | 580       | 700037           | 416.0            | 710       | 71559            | 0.1              | 840       | 16206            | 0.0              | 970       | 28727            | 0.0              |
| 455       | 329010           | 11.0             | 585       | 734518           | 408.1            | 715       | 65193            | 0.1              | 845       | 16062            | 0.0              | 975       | 21725            | 0.0              |
| 460       | 207545           | 8.5              | 590       | 760906           | 393.4            | 720       | 58466            | 0.0              | 850       | 18530            | 0.0              | 980       | 33536            | 0.0              |
| 465       | 154577           | 8.0              | 595       | 763605           | 362.0            | 725       | 52265            | 0.0              | 855       | 17709            | 0.0              | 985       | 30537            | 0.0              |
| 470       | 110708           | 6.9              | 600       | 766048           | 330.1            | 730       | 46287            | 0.0              | 860       | 18086            | 0.0              | 990       | 25187            | 0.0              |
| 475       | 78445            | 6.2              | 605       | 756483           | 293.0            | 735       | 40164            | 0.0              | 865       | 19763            | 0.0              | 995       | 35676            | 0.0              |
| 480       | 68887            | 6.5              | 610       | 730981           | 251.1            | 740       | 35097            | 0.0              | 870       | 19416            | 0.0              | 1000      | 32909            | 0.0              |
| 485       | 69832            | 8.3              | 615       | 694682           | 209.7            | 745       | 32334            | 0.0              | 875       | 19352            | 0.0              |           |                  |                  |

REPORT NUMBER: SP1-2104-215-6

### Scotopic Flux vs. Wavelength



Scotopic Lumens: 43125.2

S/P: 1.19

| 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       | 12827            | 0.0              | 490       | 80096            | 123.3            | 620       | 649050           | 8.1              | 750       | 30187            | 0.0              | 880       | 19756            | 0.0              |
| 365       | 11336            | 0.0              | 495       | 104447           | 168.8            | 625       | 608162           | 5.1              | 755       | 27442            | 0.0              | 885       | 21245            | 0.0              |
| 370       | 11776            | 0.0              | 500       | 142477           | 238.3            | 630       | 557990           | 3.2              | 760       | 25382            | 0.0              | 890       | 17771            | 0.0              |
| 375       | 13009            | 0.0              | 505       | 187724           | 319.1            | 635       | 506861           | 1.9              | 765       | 23778            | 0.0              | 895       | 14356            | 0.0              |
| 380       | 13906            | 0.0              | 510       | 232209           | 393.6            | 640       | 460827           | 1.2              | 770       | 21474            | 0.0              | 900       | 16683            | 0.0              |
| 385       | 12960            | 0.0              | 515       | 273388           | 453.1            | 645       | 418064           | 0.7              | 775       | 21394            | 0.0              | 905       | 16548            | 0.0              |
| 390       | 11750            | 0.0              | 520       | 308378           | 490.2            | 650       | 376246           | 0.4              | 780       | 18945            | 0.0              | 910       | 15630            | 0.0              |
| 395       | 10399            | 0.1              | 525       | 336804           | 503.9            | 655       | 332016           | 0.3              | 785       | 16318            | 0.0              | 915       | 20907            | 0.0              |
| 400       | 9192             | 0.1              | 530       | 361609           | 498.6            | 660       | 294638           | 0.2              | 790       | 17841            | 0.0              | 920       | 16083            | 0.0              |
| 405       | 8943             | 0.3              | 535       | 382440           | 476.6            | 665       | 259105           | 0.1              | 795       | 16506            | 0.0              | 925       | 20203            | 0.0              |
| 410       | 11120            | 0.7              | 540       | 401976           | 444.2            | 670       | 223041           | 0.1              | 800       | 15058            | 0.0              | 930       | 22625            | 0.0              |
| 415       | 18193            | 1.9              | 545       | 426232           | 408.7            | 675       | 193569           | 0.0              | 805       | 16851            | 0.0              | 935       | 24828            | 0.0              |
| 420       | 32317            | 5.3              | 550       | 455969           | 372.8            | 680       | 167520           | 0.0              | 810       | 16679            | 0.0              | 940       | 21275            | 0.0              |
| 425       | 59220            | 14.5             | 555       | 490448           | 335.2            | 685       | 144697           | 0.0              | 815       | 15851            | 0.0              | 945       | 23270            | 0.0              |
| 430       | 100522           | 34.2             | 560       | 530799           | 296.7            | 690       | 125032           | 0.0              | 820       | 15536            | 0.0              | 950       | 21756            | 0.0              |
| 435       | 155311           | 69.4             | 565       | 572799           | 257.0            | 695       | 107458           | 0.0              | 825       | 16381            | 0.0              | 955       | 24823            | 0.0              |
| 440       | 239817           | 134.0            | 570       | 615361           | 217.2            | 700       | 93549            | 0.0              | 830       | 16149            | 0.0              | 960       | 19499            | 0.0              |
| 445       | 368265           | 246.6            | 575       | 659689           | 179.7            | 705       | 81608            | 0.0              | 835       | 16687            | 0.0              | 965       | 27077            | 0.0              |
| 450       | 439895           | 340.9            | 580       | 700037           | 144.2            | 710       | 71559            | 0.0              | 840       | 16206            | 0.0              | 970       | 28727            | 0.0              |
| 455       | 329010           | 287.5            | 585       | 734518           | 112.3            | 715       | 65193            | 0.0              | 845       | 16062            | 0.0              | 975       | 21725            | 0.0              |
| 460       | 207545           | 200.5            | 590       | 760906           | 84.7             | 720       | 58466            | 0.0              | 850       | 18530            | 0.0              | 980       | 33536            | 0.0              |
| 465       | 154577           | 163.3            | 595       | 763605           | 60.9             | 725       | 52265            | 0.0              | 855       | 17709            | 0.0              | 985       | 30537            | 0.0              |
| 470       | 110708           | 127.5            | 600       | 766048           | 43.2             | 730       | 46287            | 0.0              | 860       | 18086            | 0.0              | 990       | 25187            | 0.0              |
| 475       | 78445            | 98.1             | 605       | 756483           | 29.7             | 735       | 40164            | 0.0              | 865       | 19763            | 0.0              | 995       | 35676            | 0.0              |
| 480       | 68887            | 93.1             | 610       | 730981           | 19.8             | 740       | 35097            | 0.0              | 870       | 19416            | 0.0              | 1000      | 32909            | 0.0              |
| 485       | 69832            | 101.2            | 615       | 694682           | 12.8             | 745       | 32334            | 0.0              | 875       | 19352            | 0.0              |           |                  |                  |

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### Melanopic Flux vs. Wavelength



**Melanopic Lumens: 15555.2**      **M/P: 0.43**

| 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       | 12827            | 0.0              | 490       | 80096            | 66.7             | 620       | 649050           | 0.5              | 750       | 30187            | 0.0              | 880       | 19756            | 0.0              |
| 365       | 11336            | 0.0              | 495       | 104447           | 86.2             | 625       | 608162           | 0.3              | 755       | 27442            | 0.0              | 885       | 21245            | 0.0              |
| 370       | 11776            | 0.0              | 500       | 142477           | 114.5            | 630       | 557990           | 0.2              | 760       | 25382            | 0.0              | 890       | 17771            | 0.0              |
| 375       | 13009            | 0.0              | 505       | 187724           | 144.1            | 635       | 506861           | 0.1              | 765       | 23778            | 0.0              | 895       | 14356            | 0.0              |
| 380       | 13906            | 0.0              | 510       | 232209           | 166.7            | 640       | 460827           | 0.1              | 770       | 21474            | 0.0              | 900       | 16683            | 0.0              |
| 385       | 12960            | 0.0              | 515       | 273388           | 178.6            | 645       | 418064           | 0.0              | 775       | 21394            | 0.0              | 905       | 16548            | 0.0              |
| 390       | 11750            | 0.0              | 520       | 308378           | 179.5            | 650       | 376246           | 0.0              | 780       | 18945            | 0.0              | 910       | 15630            | 0.0              |
| 395       | 10399            | 0.1              | 525       | 336804           | 170.8            | 655       | 332016           | 0.0              | 785       | 16318            | 0.0              | 915       | 20907            | 0.0              |
| 400       | 9192             | 0.1              | 530       | 361609           | 156.3            | 660       | 294638           | 0.0              | 790       | 17841            | 0.0              | 920       | 16083            | 0.0              |
| 405       | 8943             | 0.2              | 535       | 382440           | 137.6            | 665       | 259105           | 0.0              | 795       | 16506            | 0.0              | 925       | 20203            | 0.0              |
| 410       | 11120            | 0.4              | 540       | 401976           | 117.6            | 670       | 223041           | 0.0              | 800       | 15058            | 0.0              | 930       | 22625            | 0.0              |
| 415       | 18193            | 1.2              | 545       | 426232           | 99.0             | 675       | 193569           | 0.0              | 805       | 16851            | 0.0              | 935       | 24828            | 0.0              |
| 420       | 32317            | 3.7              | 550       | 455969           | 81.9             | 680       | 167520           | 0.0              | 810       | 16679            | 0.0              | 940       | 21275            | 0.0              |
| 425       | 59220            | 9.2              | 555       | 490448           | 66.1             | 685       | 144697           | 0.0              | 815       | 15851            | 0.0              | 945       | 23270            | 0.0              |
| 430       | 100522           | 21.2             | 560       | 530799           | 52.4             | 690       | 125032           | 0.0              | 820       | 15536            | 0.0              | 950       | 21756            | 0.0              |
| 435       | 155311           | 41.4             | 565       | 572799           | 40.2             | 695       | 107458           | 0.0              | 825       | 16381            | 0.0              | 955       | 24823            | 0.0              |
| 440       | 239817           | 80.1             | 570       | 615361           | 30.1             | 700       | 93549            | 0.0              | 830       | 16149            | 0.0              | 960       | 19499            | 0.0              |
| 445       | 368265           | 145.3            | 575       | 659689           | 22.0             | 705       | 81608            | 0.0              | 835       | 16687            | 0.0              | 965       | 27077            | 0.0              |
| 450       | 439895           | 202.7            | 580       | 700037           | 15.7             | 710       | 71559            | 0.0              | 840       | 16206            | 0.0              | 970       | 28727            | 0.0              |
| 455       | 329010           | 172.4            | 585       | 734518           | 10.9             | 715       | 65193            | 0.0              | 845       | 16062            | 0.0              | 975       | 21725            | 0.0              |
| 460       | 207545           | 122.3            | 590       | 760906           | 7.5              | 720       | 58466            | 0.0              | 850       | 18530            | 0.0              | 980       | 33536            | 0.0              |
| 465       | 154577           | 101.0            | 595       | 763605           | 4.9              | 725       | 52265            | 0.0              | 855       | 17709            | 0.0              | 985       | 30537            | 0.0              |
| 470       | 110708           | 79.3             | 600       | 766048           | 3.2              | 730       | 46287            | 0.0              | 860       | 18086            | 0.0              | 990       | 25187            | 0.0              |
| 475       | 78445            | 59.9             | 605       | 756483           | 2.1              | 735       | 40164            | 0.0              | 865       | 19763            | 0.0              | 995       | 35676            | 0.0              |
| 480       | 68887            | 55.4             | 610       | 730981           | 1.3              | 740       | 35097            | 0.0              | 870       | 19416            | 0.0              | 1000      | 32909            | 0.0              |
| 485       | 69832            | 57.6             | 615       | 694682           | 0.8              | 745       | 32334            | 0.0              | 875       | 19352            | 0.0              |           |                  |                  |

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TM-30-18

### Summary

$R_f = 75.3$   
 $R_g = 95.7$   
 CIE  $R_a = 73.2$   
 $R_g = -27.2$

### Spectral Power Distribution Comparison



### Color Vector Graphics

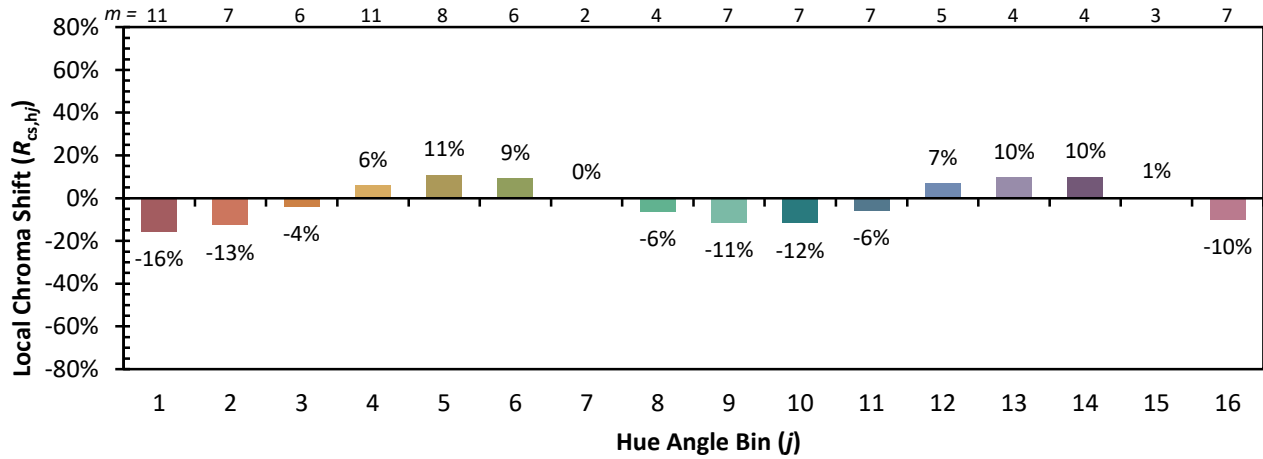


**Individual Sample Fidelity Index ( $R_{f,i}$ )**

|            |            |            |            |
|------------|------------|------------|------------|
| CES01 = 86 | CES26 = 65 | CES51 = 87 | CES76 = 59 |
| CES02 = 63 | CES27 = 88 | CES52 = 86 | CES77 = 78 |
| CES03 = 31 | CES28 = 85 | CES53 = 77 | CES78 = 63 |
| CES04 = 71 | CES29 = 64 | CES54 = 86 | CES79 = 86 |
| CES05 = 49 | CES30 = 77 | CES55 = 85 | CES80 = 84 |
| CES06 = 51 | CES31 = 68 | CES56 = 75 | CES81 = 72 |
| CES07 = 42 | CES32 = 62 | CES57 = 75 | CES82 = 93 |
| CES08 = 40 | CES33 = 74 | CES58 = 76 | CES83 = 89 |
| CES09 = 29 | CES34 = 75 | CES59 = 86 | CES84 = 89 |
| CES10 = 76 | CES35 = 87 | CES60 = 92 | CES85 = 77 |
| CES11 = 59 | CES36 = 98 | CES61 = 84 | CES86 = 64 |
| CES12 = 65 | CES37 = 84 | CES62 = 92 | CES87 = 78 |
| CES13 = 43 | CES38 = 85 | CES63 = 75 | CES88 = 80 |
| CES14 = 74 | CES39 = 95 | CES64 = 70 | CES89 = 67 |
| CES15 = 71 | CES40 = 90 | CES65 = 67 | CES90 = 79 |
| CES16 = 47 | CES41 = 89 | CES66 = 65 | CES91 = 84 |
| CES17 = 50 | CES42 = 84 | CES67 = 63 | CES92 = 60 |
| CES18 = 56 | CES43 = 75 | CES68 = 69 | CES93 = 75 |
| CES19 = 73 | CES44 = 99 | CES69 = 78 | CES94 = 52 |
| CES20 = 66 | CES45 = 83 | CES70 = 63 | CES95 = 70 |
| CES21 = 87 | CES46 = 80 | CES71 = 61 | CES96 = 78 |
| CES22 = 79 | CES47 = 81 | CES72 = 86 | CES97 = 83 |
| CES23 = 92 | CES48 = 72 | CES73 = 55 | CES98 = 77 |
| CES24 = 91 | CES49 = 77 | CES74 = 96 | CES99 = 66 |
| CES25 = 73 | CES50 = 86 | CES75 = 63 |            |



Color Rendition by Hue-Angle Bin



**Measure Comparisons**



(END OF REPORT)