

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: STREETWORKS

Report Number: P510861

Luminaire Tested: **CST-CA8-480-750-U-T4**

Issue Date: 4/6/2021

**Test Information**

Test Method: LM-79-08  
Report Number: P510861  
TEST IS SCALED FROM IESNA LM-79-08 TEST DATA (G3-2102-151-12)  
Test Lab: COOPER LIGHTING SOLUTIONS  
Issue Date: 4/6/2021  
Manufacturer: COOPER LIGHTING SOLUTIONS (FORMERLY EATON)  
Product Line: STREETWORKS  
Catalog Number: CST-CA8-480-750-U-T4  
Description: CELESTEON HIGH MAST LUMINAIRE  
Light Source: (8) 5000K CCT, 70 CRI LEDS  
Ballast/Driver: ELECTRONIC DRIVER

**Summary**

Lumens per Lamp: N/A  
Luminaire Lumens: 71407 lumens  
Efficiency: N/A  
Efficacy: 148.5 lumens/watt  
Luminous Opening: Circular (Dia: 2.08' x H: 0')  
IES Classification: Type IV - Short  
BUG Rating: B5 - U0 - G5

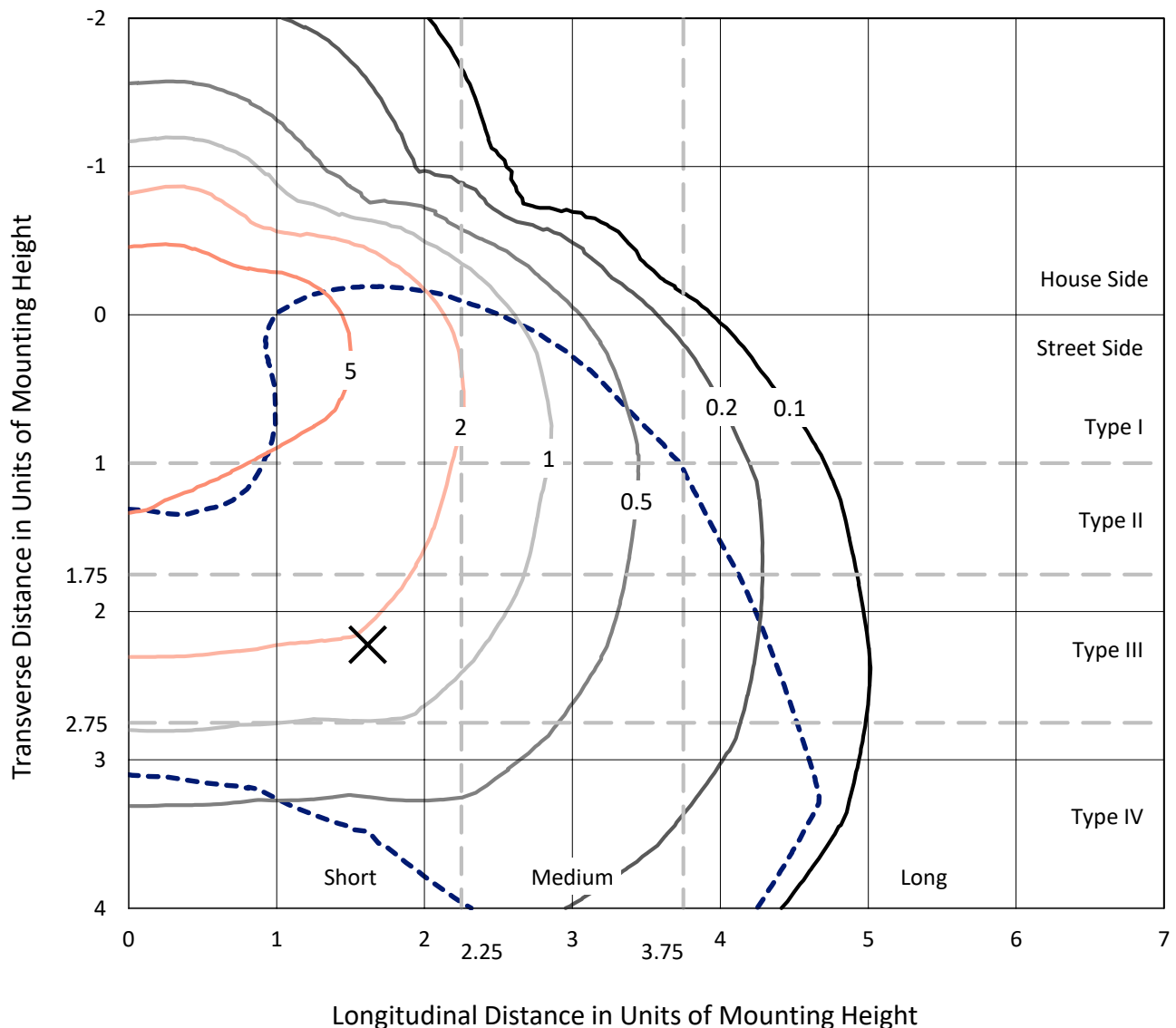
Input Watts (W): 480.8  
Input Voltage (V): 120  
Input Current (Ain): NR  
Voltage Rise (V): NR  
Power Factor: NR  
Total Harmonic Distortion (THDi): NR  
Frequency (hertz): 60  
Stabilization Time: NR  
Operation Time: NR  
Ambient Temperature (°C): NR  
Test Distance: 24 FT



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## Iso-Footcandle Lines of Horizontal Illumination

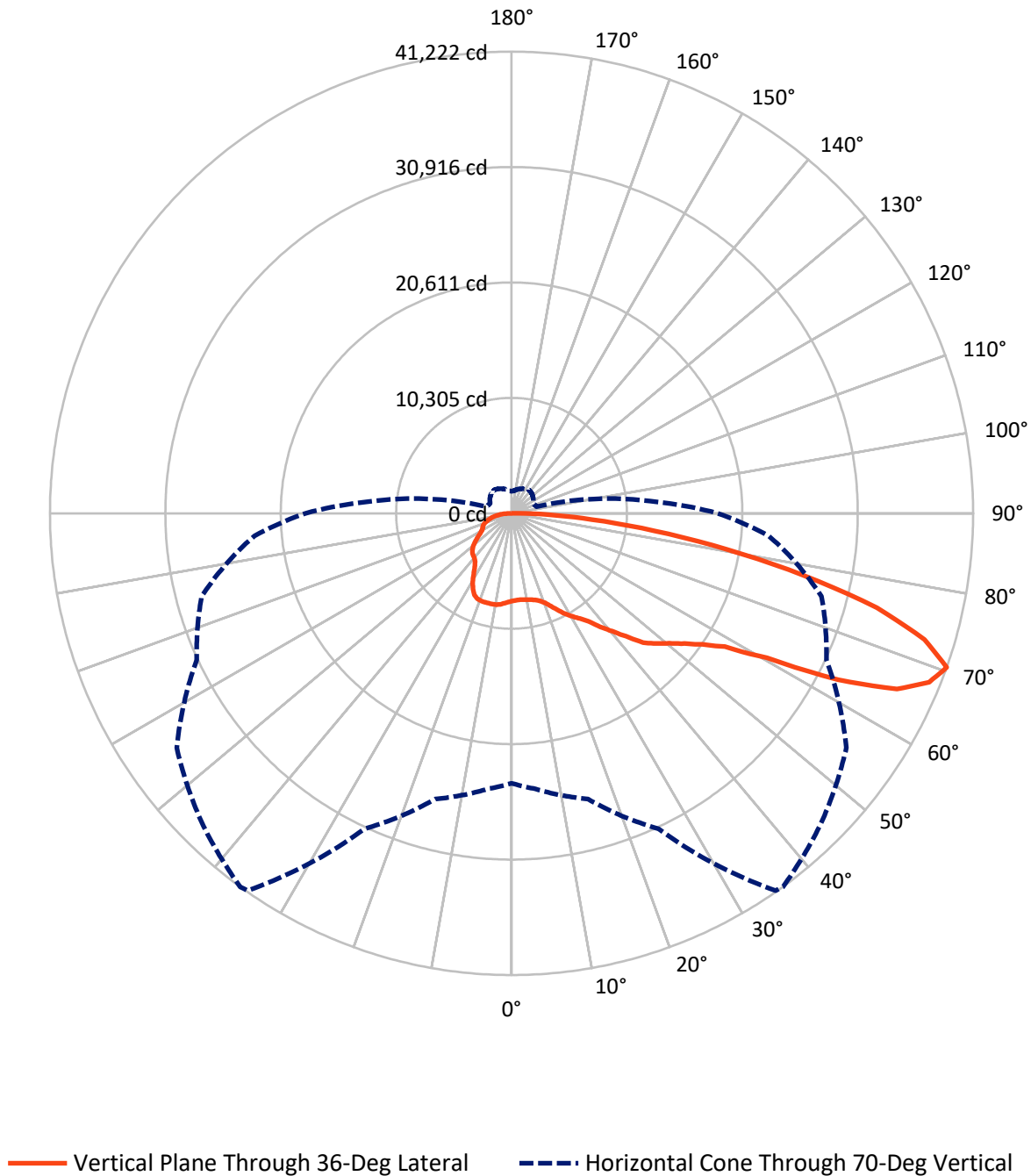
✕ Max cd  
 - - - 1/2 Max cd



Based on 30 foot mounting height. Maximum calculated value = 9.1 fc  
 Type IV - Short - N/A

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## Luminous Intensity Polar Plot



FIELD PERFORMANCE MAY DIFFER FROM LABORATORY PERFORMANCE

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CATALOG NUMBER: CST-CA8-480-750-U-T4

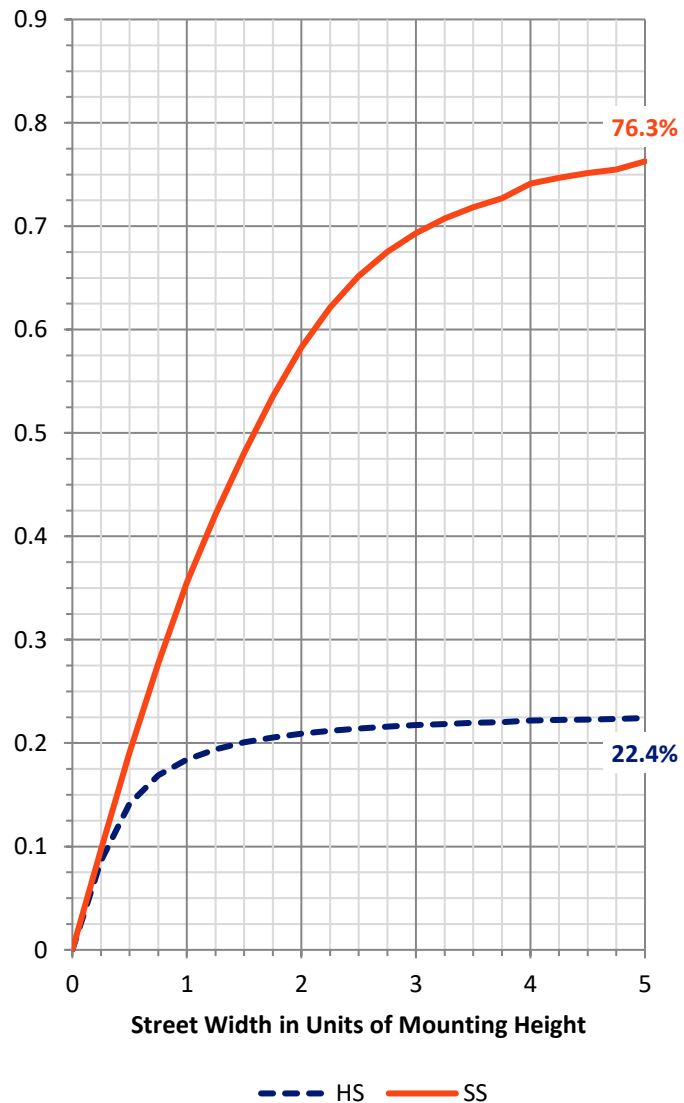
**FLUX DISTRIBUTION:**

|                    |           | Downward | Upward | Total   |
|--------------------|-----------|----------|--------|---------|
| <b>House Side</b>  | Lumens    | 16269.6  | 0.0    | 16269.6 |
|                    | % Fixture | 22.8     | 0.0    | 22.8    |
| <b>Street Side</b> | Lumens    | 55137.3  | 0.0    | 55137.3 |
|                    | % Fixture | 77.2     | 0.0    | 77.2    |
| <b>Total</b>       | Lumens    | 71407.0  | 0.0    | 71407.0 |
|                    | % Fixture | 100.0    | 0.0    | 100.0   |

**ZONAL LUMENS:**

| Zone      | Lumens  | % Fixture |
|-----------|---------|-----------|
| 0°-10°    | 757.7   | 1.1       |
| 10°-20°   | 2342.5  | 3.3       |
| 20°-30°   | 4225.4  | 5.9       |
| 30°-40°   | 6544.4  | 9.2       |
| 40°-50°   | 9940.9  | 13.9      |
| 50°-60°   | 13778.7 | 19.3      |
| 60°-70°   | 17917.1 | 25.1      |
| 70°-80°   | 13231.6 | 18.5      |
| 80°-90°   | 2668.5  | 3.7       |
| 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°    | 71407.0 | 100.0     |
| 0°-180°   | 71407.0 | 100.0     |

**Coefficient of Utilization**



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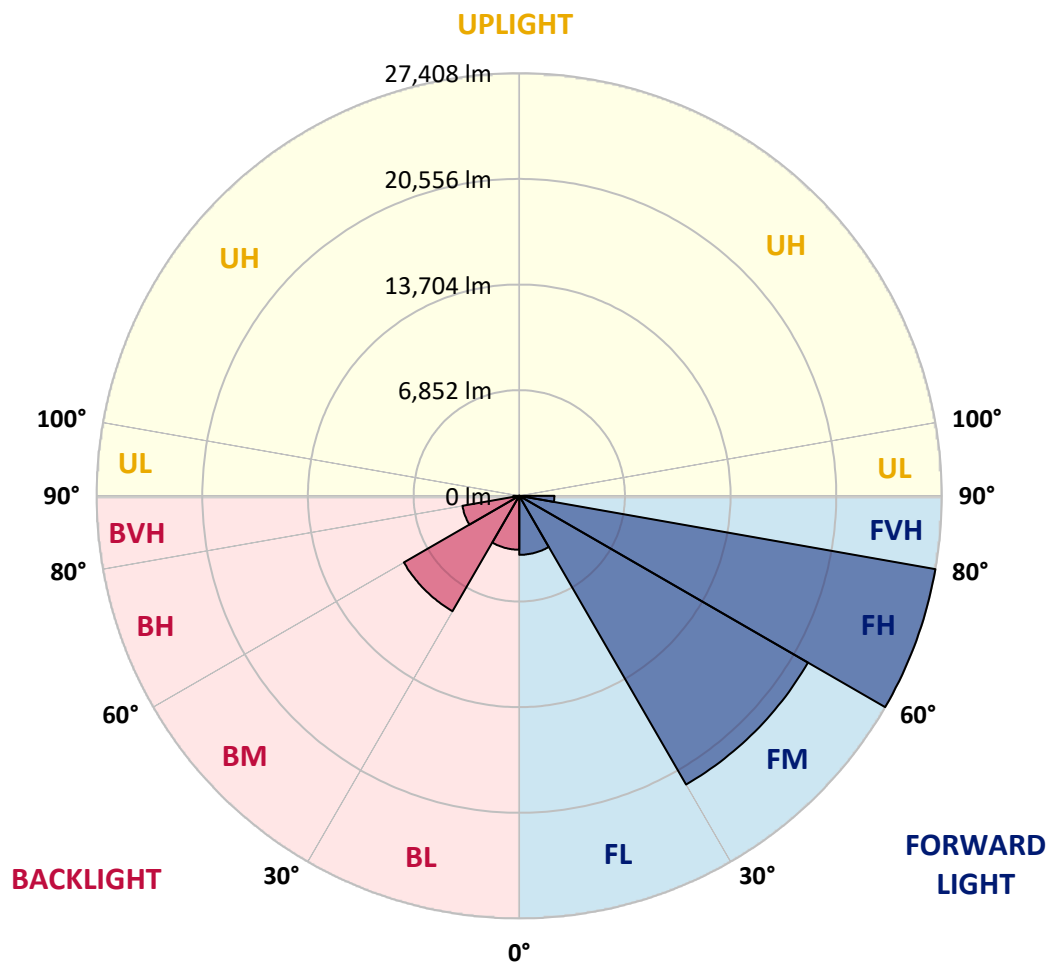
CATALOG NUMBER: CST-CA8-480-750-U-T4

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

| Zone |             | Lumens  | % Fixture | Zone Rating/Lumen Limit |      |         |
|------|-------------|---------|-----------|-------------------------|------|---------|
|      |             |         |           | B                       | U    | G       |
| FL   | (0°-30°)    | 3828.1  | 5.4       |                         |      |         |
| FM   | (30°-60°)   | 21621.8 | 30.3      |                         |      |         |
| FH   | (60°-80°)   | 27407.6 | 38.4      |                         |      | G5      |
| FVH  | (80°-90°)   | 2279.8  | 3.2       |                         |      | G5      |
| BL   | (0°-30°)    | 3497.5  | 4.9       | B4/5000                 |      |         |
| BM   | (30°-60°)   | 8642.2  | 12.1      | B5                      |      |         |
| BH   | (60°-80°)   | 3741.1  | 5.2       | B4/5000                 |      | G4/5000 |
| BVH  | (80°-90°)   | 388.7   | 0.5       |                         |      | G3/500  |
| UL   | (90°-100°)  | 0.0     | 0.0       |                         | U0/0 |         |
| UH   | (100°-180°) | 0.0     | 0.0       |                         | U0/0 |         |

**BUG Rating: B5-U0-G5**

Type IV Short



FIELD PERFORMANCE MAY DIFFER FROM LABORATORY PERFORMANCE

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CATALOG NUMBER: CST-CA8-480-750-U-T4

**CANDELA DISTRIBUTION (FULL):**

|       | 0°      | 5°      | 15°     | 25°     | 35°     | 36°     | 45°     | 55°     | 65°     | 75°     | 85°     |
|-------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|
| 0°    | 7821.2  | 7821.2  | 7821.2  | 7821.2  | 7821.2  | 7821.2  | 7821.2  | 7821.2  | 7821.2  | 7821.2  | 7821.2  |
| 2.5°  | 7773.9  | 7763.5  | 7757.6  | 7769.4  | 7773.9  | 7775.4  | 7778.3  | 7775.4  | 7768.0  | 7794.6  | 7827.1  |
| 5°    | 7775.4  | 7769.4  | 7757.6  | 7747.3  | 7747.3  | 7747.3  | 7748.7  | 7782.8  | 7797.5  | 7794.6  | 7834.5  |
| 7.5°  | 7787.2  | 7782.8  | 7760.6  | 7753.2  | 7770.9  | 7776.8  | 7806.4  | 7796.1  | 7812.3  | 7838.9  | 7872.9  |
| 10°   | 7788.7  | 7782.8  | 7763.5  | 7779.8  | 7830.1  | 7838.9  | 7852.2  | 7881.8  | 7887.7  | 7920.3  | 7954.3  |
| 12.5° | 7803.5  | 7803.5  | 7810.8  | 7846.3  | 7899.6  | 7909.9  | 7960.2  | 7983.8  | 8019.3  | 8035.6  | 8077.0  |
| 15°   | 7881.8  | 7880.3  | 7898.1  | 7938.0  | 8023.7  | 8029.7  | 8091.8  | 8162.7  | 8189.3  | 8229.3  | 8295.8  |
| 17.5° | 8068.1  | 8077.0  | 8078.5  | 8108.0  | 8210.0  | 8213.0  | 8315.0  | 8381.5  | 8442.2  | 8513.1  | 8665.4  |
| 20°   | 8510.2  | 8493.9  | 8476.2  | 8476.2  | 8516.1  | 8536.8  | 8615.1  | 8721.6  | 8845.8  | 8971.5  | 9150.4  |
| 22.5° | 9066.1  | 9098.6  | 9033.6  | 8999.5  | 9018.8  | 8995.1  | 9054.3  | 9140.0  | 9284.9  | 9472.7  | 9698.9  |
| 25°   | 9729.9  | 9732.9  | 9728.4  | 9590.9  | 9548.1  | 9562.9  | 9611.6  | 9691.5  | 9883.7  | 10033.0 | 10361.2 |
| 27.5° | 10377.5 | 10364.2 | 10316.9 | 10172.0 | 10130.6 | 10151.3 | 10149.8 | 10370.1 | 10566.7 | 10757.5 | 11143.4 |
| 30°   | 10965.9 | 11001.4 | 10917.1 | 10673.2 | 10677.6 | 10674.7 | 10742.7 | 11026.6 | 11385.8 | 11740.7 | 12136.9 |
| 32.5° | 12003.8 | 11895.9 | 11782.1 | 11300.1 | 11211.4 | 11201.0 | 11240.9 | 11663.8 | 12196.0 | 12794.8 | 13270.9 |
| 35°   | 12981.1 | 12954.5 | 12842.1 | 12352.8 | 11839.7 | 11830.9 | 11776.1 | 12290.7 | 13038.8 | 14147.6 | 14742.0 |
| 37.5° | 13980.6 | 13942.1 | 13831.2 | 13414.3 | 12904.2 | 12855.4 | 12395.6 | 12958.9 | 13970.2 | 15729.6 | 16576.8 |
| 40°   | 15172.2 | 15148.6 | 14977.1 | 14443.3 | 13920.0 | 13846.0 | 13368.5 | 13661.2 | 15145.6 | 17836.5 | 18433.8 |
| 42.5° | 16217.5 | 16213.1 | 16016.4 | 15521.2 | 15076.1 | 15002.2 | 14595.6 | 14900.2 | 16779.3 | 19900.4 | 20252.3 |
| 45°   | 16984.9 | 17101.7 | 17110.5 | 16828.1 | 16520.6 | 16455.6 | 16347.6 | 16767.5 | 18668.9 | 21773.7 | 21721.9 |
| 47.5° | 17632.4 | 17733.0 | 17628.0 | 17483.1 | 17378.1 | 17382.6 | 17549.6 | 18383.5 | 20534.7 | 23405.9 | 23003.8 |
| 50°   | 18714.7 | 18652.6 | 18107.0 | 18021.3 | 18154.3 | 18232.7 | 18717.6 | 20128.1 | 22671.1 | 24937.6 | 24154.0 |
| 52.5° | 20276.0 | 20037.9 | 18967.5 | 18793.0 | 19297.2 | 19326.8 | 20098.6 | 21687.9 | 24806.1 | 26252.0 | 25206.7 |
| 55°   | 22412.4 | 22215.7 | 21006.3 | 20200.6 | 20454.9 | 20654.5 | 21741.1 | 23286.2 | 26549.2 | 27488.0 | 26016.9 |
| 57.5° | 25570.4 | 25585.2 | 24599.1 | 23096.9 | 22232.0 | 22444.9 | 23293.6 | 24840.1 | 27989.2 | 28523.0 | 26522.6 |
| 60°   | 28101.6 | 28570.3 | 28276.1 | 27590.0 | 26348.1 | 26203.2 | 25557.1 | 26459.0 | 29219.3 | 29402.7 | 27006.0 |
| 62.5° | 29856.6 | 30069.5 | 31080.8 | 31225.6 | 32645.0 | 32705.6 | 29611.1 | 28355.9 | 30570.7 | 29979.3 | 27108.1 |
| 65°   | 29767.9 | 29899.4 | 31497.7 | 33443.4 | 37636.4 | 37824.1 | 36013.0 | 31225.6 | 31496.2 | 30236.5 | 26810.9 |
| 67.5° | 27695.0 | 27893.1 | 29924.6 | 33561.7 | 40296.2 | 40225.2 | 39076.4 | 35220.5 | 31800.8 | 29824.0 | 25394.5 |
| 70°   | 24094.9 | 24705.5 | 26411.7 | 31067.4 | 41127.1 | 41221.7 | 39104.5 | 36496.4 | 31015.7 | 28657.5 | 23033.3 |
| 72.5° | 19859.0 | 20051.2 | 21662.8 | 26873.0 | 38697.9 | 38558.9 | 37501.8 | 34812.5 | 29596.3 | 26547.7 | 18901.0 |
| 75°   | 15102.7 | 15102.7 | 17054.3 | 21415.9 | 33231.9 | 33719.8 | 34130.9 | 31530.2 | 26219.5 | 21637.7 | 12870.2 |
| 77.5° | 10025.6 | 10384.9 | 11956.5 | 16093.3 | 26305.2 | 26666.0 | 28085.3 | 26875.9 | 21467.6 | 15867.1 | 5878.5  |
| 80°   | 5318.1  | 5362.5  | 7047.9  | 10693.9 | 18815.2 | 19495.3 | 21446.9 | 20728.4 | 15441.3 | 7433.8  | 1485.9  |
| 82.5° | 1859.9  | 2030.0  | 3098.9  | 6197.8  | 12397.1 | 12821.4 | 14227.5 | 12317.3 | 5454.1  | 1645.6  | 822.0   |
| 85°   | 924.1   | 956.6   | 1364.6  | 2951.1  | 6979.9  | 7185.4  | 8312.1  | 4797.7  | 878.2   | 718.5   | 558.9   |
| 87.5° | 445.0   | 455.4   | 523.4   | 1055.6  | 3033.9  | 3174.3  | 3360.6  | 1561.3  | 325.3   | 273.5   | 242.5   |
| 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: P510861

CATALOG NUMBER: CST-CA8-480-750-U-T4

**CANDELA DISTRIBUTION (continued):**

|       | 90°     | 95°     | 105°    | 115°   | 125°   | 135°   | 145°   | 155°   | 165°   | 175°   | 180°   |
|-------|---------|---------|---------|--------|--------|--------|--------|--------|--------|--------|--------|
| 0°    | 7821.2  | 7821.2  | 7821.2  | 7821.2 | 7821.2 | 7821.2 | 7821.2 | 7821.2 | 7821.2 | 7821.2 | 7821.2 |
| 2.5°  | 7834.5  | 7847.8  | 7872.9  | 7880.3 | 7862.6 | 7895.1 | 7926.2 | 7954.3 | 7952.8 | 7963.1 | 8000.1 |
| 5°    | 7852.2  | 7880.3  | 7906.9  | 7954.3 | 8000.1 | 8026.7 | 8051.8 | 8075.5 | 8082.9 | 8105.1 | 8127.2 |
| 7.5°  | 7906.9  | 7935.0  | 7995.7  | 8078.5 | 8081.4 | 8147.9 | 8190.8 | 8198.2 | 8204.1 | 8204.1 | 8255.9 |
| 10°   | 7991.2  | 8043.0  | 8140.5  | 8198.2 | 8250.0 | 8227.8 | 8272.1 | 8244.0 | 8223.3 | 8232.2 | 8267.7 |
| 12.5° | 8136.1  | 8181.9  | 8322.4  | 8386.0 | 8338.7 | 8329.8 | 8285.4 | 8221.9 | 8149.4 | 8142.0 | 8174.6 |
| 15°   | 8363.8  | 8449.6  | 8575.2  | 8635.8 | 8517.6 | 8412.6 | 8263.3 | 8133.2 | 7992.7 | 7941.0 | 7961.7 |
| 17.5° | 8730.5  | 8834.0  | 8971.5  | 8930.1 | 8714.2 | 8507.2 | 8260.3 | 7985.3 | 7713.3 | 7524.0 | 7572.8 |
| 20°   | 9267.2  | 9344.0  | 9456.4  | 9289.3 | 8974.4 | 8632.9 | 8227.8 | 7793.1 | 7333.3 | 6988.8 | 6948.9 |
| 22.5° | 9830.5  | 9947.3  | 9879.2  | 9570.2 | 9157.7 | 8681.7 | 8159.8 | 7513.7 | 6802.5 | 6370.8 | 6305.7 |
| 25°   | 10509.1 | 10547.5 | 10312.4 | 9846.7 | 9209.5 | 8604.8 | 7939.5 | 7105.6 | 6259.9 | 5853.3 | 5834.1 |
| 27.5° | 11229.1 | 11141.9 | 10704.2 | 9973.9 | 9151.8 | 8377.1 | 7497.4 | 6461.0 | 5769.1 | 5409.8 | 5353.6 |
| 30°   | 12042.3 | 11839.7 | 11028.0 | 9987.2 | 8934.5 | 7933.6 | 6938.5 | 5956.8 | 5369.9 | 5009.1 | 4951.5 |
| 32.5° | 13089.0 | 12611.5 | 11328.2 | 9849.7 | 8476.2 | 7283.0 | 6267.3 | 5526.6 | 5010.6 | 4648.4 | 4596.6 |
| 35°   | 14427.1 | 13621.3 | 11646.0 | 9601.3 | 7911.4 | 6632.5 | 5711.4 | 5161.4 | 4719.3 | 4283.2 | 4213.7 |
| 37.5° | 15969.1 | 15030.3 | 12026.0 | 9287.9 | 7291.9 | 6060.3 | 5335.9 | 4929.3 | 4503.5 | 4009.7 | 3926.9 |
| 40°   | 17761.1 | 16440.8 | 12611.5 | 8913.8 | 6736.0 | 5647.8 | 5154.0 | 4849.4 | 4383.7 | 3869.2 | 3774.6 |
| 42.5° | 19313.5 | 17932.6 | 13307.9 | 8511.6 | 6211.1 | 5304.8 | 5072.7 | 4796.2 | 4308.3 | 3764.2 | 3656.3 |
| 45°   | 20749.1 | 19164.1 | 13988.0 | 8023.7 | 5658.2 | 5069.7 | 4975.1 | 4663.1 | 4175.2 | 3634.1 | 3521.8 |
| 47.5° | 21915.6 | 20159.2 | 14579.4 | 7575.8 | 5216.1 | 4853.9 | 4762.2 | 4410.3 | 3952.0 | 3477.4 | 3394.6 |
| 50°   | 22811.6 | 20907.3 | 14903.1 | 7219.5 | 4748.9 | 4608.4 | 4487.2 | 4125.0 | 3684.4 | 3274.8 | 3203.9 |
| 52.5° | 23728.2 | 21656.9 | 15062.8 | 7237.2 | 4314.2 | 4243.3 | 4119.1 | 3808.6 | 3471.5 | 3156.6 | 3079.7 |
| 55°   | 24262.0 | 21964.4 | 14894.3 | 6807.0 | 3915.0 | 3832.2 | 3724.3 | 3563.2 | 3362.1 | 3082.6 | 3010.2 |
| 57.5° | 24573.9 | 22155.1 | 14381.2 | 5551.7 | 3434.5 | 3356.2 | 3373.9 | 3360.6 | 3195.0 | 2900.8 | 2834.3 |
| 60°   | 24798.7 | 21741.1 | 13330.0 | 4080.6 | 3025.0 | 2965.8 | 3112.2 | 3064.9 | 2921.5 | 2692.3 | 2636.1 |
| 62.5° | 24616.8 | 20953.1 | 11437.6 | 3067.9 | 2690.8 | 2816.5 | 2945.1 | 2857.9 | 2662.8 | 2454.3 | 2389.2 |
| 65°   | 23507.9 | 19406.6 | 8693.5  | 2464.6 | 2582.9 | 2755.9 | 2859.4 | 2718.9 | 2520.8 | 2273.9 | 2244.3 |
| 67.5° | 21489.8 | 16603.4 | 5127.4  | 2259.1 | 2501.6 | 2684.9 | 2770.7 | 2584.4 | 2409.9 | 2173.4 | 2137.9 |
| 70°   | 18410.1 | 12429.6 | 2290.2  | 2103.9 | 2359.7 | 2541.5 | 2597.7 | 2421.8 | 2232.5 | 2010.7 | 1975.3 |
| 72.5° | 13702.6 | 7494.4  | 1543.5  | 1942.7 | 2149.7 | 2310.9 | 2373.0 | 2186.7 | 2052.1 | 1951.6 | 1941.3 |
| 75°   | 7609.8  | 2602.1  | 1423.8  | 1759.4 | 1920.6 | 2065.4 | 2142.3 | 2010.7 | 1904.3 | 1766.8 | 1710.6 |
| 77.5° | 2423.2  | 1105.9  | 1352.8  | 1573.1 | 1777.1 | 1896.9 | 1885.1 | 1687.0 | 1652.9 | 1485.9 | 1471.1 |
| 80°   | 966.9   | 964.0   | 1250.8  | 1287.8 | 1516.9 | 1617.5 | 1590.9 | 1341.0 | 1385.3 | 1287.8 | 1249.3 |
| 82.5° | 758.5   | 882.7   | 1002.4  | 983.2  | 1179.8 | 1298.1 | 1261.1 | 984.7  | 1113.3 | 1023.1 | 935.9  |
| 85°   | 576.6   | 773.2   | 643.1   | 640.2  | 823.5  | 964.0  | 987.6  | 757.0  | 758.5  | 690.5  | 615.1  |
| 87.5° | 297.2   | 285.3   | 246.9   | 245.4  | 275.0  | 391.8  | 480.5  | 430.2  | 340.1  | 255.8  | 245.4  |
| 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: SP1-2104-215-7

Luminaire Tested: CST-CA6-230-750-U-T4

Test Date: 04/22/2021

### Test Information

Test Method: LM-79-08  
 Report Number: SP1-2104-215-7  
 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-CA6-230-750-U-T4**  
 Description: STREETWORKS HIGH MAST LUMINAIRE

### Spectral Parameters

|                           |        |           |      |      |       |
|---------------------------|--------|-----------|------|------|-------|
| CCT (K):                  | 4852   | CRI (Ra): | 74.1 |      |       |
| CIE u':                   | 0.2118 | R1:       | 71.0 | R9:  | -25.4 |
| CIE v':                   | 0.4888 | R2:       | 79.6 | R10: | 51.4  |
| Duv:                      | 0.0017 | R3:       | 85.8 | R11: | 70.1  |
| CIE x:                    | 0.3498 | R4:       | 73.5 | R12: | 42.9  |
| CIE y:                    | 0.3588 | R5:       | 71.4 | R13: | 72.5  |
| CIE z:                    | 0.2914 | R6:       | 71.2 | R14: | 92.1  |
| Peak Wavelength (nm):     | 449    | R7:       | 82.9 |      |       |
| Dominant Wavelength (nm): | 572    | R8:       | 57.2 |      |       |
| Purity:                   | 12.7   |           |      |      |       |
| Rf:                       | 75.2   |           |      |      |       |
| Rg:                       | 94.7   |           |      |      |       |



### Test Conditions

Stabilization Time: 72M  
 Operation Time: 12H  
 Room Temperature (°C) / RH%: 25.4/13%  
 Sphere Temperature (°C): 24.0

REPORT NUMBER: SP1-2104-215-7

| 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: SP1-2104-215-7

**CIE 1931 Chromaticity Diagram**



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



Point lies inside the ANSI 5000K 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       | 15077            | 0.0              | 490       | 146327           | 20.8             | 620       | 434415           | 113.0            | 750       | 22886            | 0.0              | 880       | 20960            | 0.0              |
| 365       | 12138            | 0.0              | 495       | 188585           | 34.2             | 625       | 400670           | 88.4             | 755       | 19692            | 0.0              | 885       | 20315            | 0.0              |
| 370       | 12993            | 0.0              | 500       | 245069           | 54.1             | 630       | 360611           | 65.3             | 760       | 18199            | 0.0              | 890       | 15211            | 0.0              |
| 375       | 14513            | 0.0              | 505       | 307682           | 86.1             | 635       | 326986           | 49.1             | 765       | 19191            | 0.0              | 895       | 15502            | 0.0              |
| 380       | 15679            | 0.0              | 510       | 367102           | 126.1            | 640       | 295583           | 35.3             | 770       | 16229            | 0.0              | 900       | 15935            | 0.0              |
| 385       | 14569            | 0.0              | 515       | 416068           | 172.4            | 645       | 264664           | 25.5             | 775       | 16351            | 0.0              | 905       | 15965            | 0.0              |
| 390       | 13091            | 0.0              | 520       | 457470           | 221.8            | 650       | 238441           | 17.4             | 780       | 14567            | 0.0              | 910       | 16119            | 0.0              |
| 395       | 10927            | 0.0              | 525       | 486980           | 261.4            | 655       | 210047           | 12.1             | 785       | 13349            | 0.0              | 915       | 13972            | 0.0              |
| 400       | 9655             | 0.0              | 530       | 511184           | 301.0            | 660       | 186019           | 7.8              | 790       | 12552            | 0.0              | 920       | 14830            | 0.0              |
| 405       | 10895            | 0.0              | 535       | 527191           | 326.9            | 665       | 164001           | 5.2              | 795       | 11517            | 0.0              | 925       | 13744            | 0.0              |
| 410       | 14929            | 0.0              | 540       | 540658           | 352.3            | 670       | 142007           | 3.1              | 800       | 13250            | 0.0              | 930       | 20340            | 0.0              |
| 415       | 25993            | 0.0              | 545       | 555639           | 369.8            | 675       | 123441           | 2.1              | 805       | 15135            | 0.0              | 935       | 13272            | 0.0              |
| 420       | 49620            | 0.1              | 550       | 572229           | 388.9            | 680       | 106894           | 1.2              | 810       | 9873             | 0.0              | 940       | 16357            | 0.0              |
| 425       | 95836            | 0.5              | 555       | 589788           | 402.8            | 685       | 94026            | 0.8              | 815       | 11566            | 0.0              | 945       | 19257            | 0.0              |
| 430       | 178101           | 1.4              | 560       | 608278           | 413.4            | 690       | 82099            | 0.5              | 820       | 11216            | 0.0              | 950       | 19804            | 0.0              |
| 435       | 300144           | 3.5              | 565       | 619317           | 411.8            | 695       | 70275            | 0.3              | 825       | 15165            | 0.0              | 955       | 14877            | 0.0              |
| 440       | 512674           | 8.1              | 570       | 627176           | 407.8            | 700       | 61784            | 0.2              | 830       | 14983            | 0.0              | 960       | 9882             | 0.0              |
| 445       | 857336           | 17.9             | 575       | 631114           | 392.7            | 705       | 55550            | 0.1              | 835       | 13993            | 0.0              | 965       | 11741            | 0.0              |
| 450       | 1021494          | 26.5             | 580       | 630436           | 374.6            | 710       | 50234            | 0.1              | 840       | 15281            | 0.0              | 970       | 11068            | 0.0              |
| 455       | 730207           | 24.4             | 585       | 625204           | 347.4            | 715       | 44909            | 0.0              | 845       | 15737            | 0.0              | 975       | 18108            | 0.0              |
| 460       | 467897           | 19.2             | 590       | 612752           | 316.8            | 720       | 41441            | 0.0              | 850       | 15148            | 0.0              | 980       | 17506            | 0.0              |
| 465       | 344659           | 17.8             | 595       | 589048           | 279.2            | 725       | 36834            | 0.0              | 855       | 17198            | 0.0              | 985       | 23821            | 0.0              |
| 470       | 230541           | 14.3             | 600       | 567479           | 244.6            | 730       | 32988            | 0.0              | 860       | 19169            | 0.0              | 990       | 25862            | 0.0              |
| 475       | 157156           | 12.3             | 605       | 542722           | 210.2            | 735       | 28984            | 0.0              | 865       | 18632            | 0.0              | 995       | 21133            | 0.0              |
| 480       | 134805           | 12.8             | 610       | 507118           | 174.2            | 740       | 26177            | 0.0              | 870       | 18831            | 0.0              | 1000      | 25640            | 0.0              |
| 485       | 132031           | 15.6             | 615       | 472188           | 142.5            | 745       | 22680            | 0.0              | 875       | 16978            | 0.0              |           |                  |                  |

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### Scotopic Flux vs. Wavelength



Scotopic Lumens: 66024.8

S/P: 1.78

| $\lambda$<br>(nm) | Power<br>( $\mu\text{W/nm}$ ) | Lumens<br>( $\Phi/\text{nm}$ ) | $\lambda$<br>(nm) | Power<br>( $\mu\text{W/nm}$ ) | Lumens<br>( $\Phi/\text{nm}$ ) | $\lambda$<br>(nm) | Power<br>( $\mu\text{W/nm}$ ) | Lumens<br>( $\Phi/\text{nm}$ ) | $\lambda$<br>(nm) | Power<br>( $\mu\text{W/nm}$ ) | Lumens<br>( $\Phi/\text{nm}$ ) | $\lambda$<br>(nm) | Power<br>( $\mu\text{W/nm}$ ) | Lumens<br>( $\Phi/\text{nm}$ ) |
|-------------------|-------------------------------|--------------------------------|-------------------|-------------------------------|--------------------------------|-------------------|-------------------------------|--------------------------------|-------------------|-------------------------------|--------------------------------|-------------------|-------------------------------|--------------------------------|
| 360               | 15077                         | 0.0                            | 490               | 146327                        | 225.3                          | 620               | 434415                        | 5.4                            | 750               | 22886                         | 0.0                            | 880               | 20960                         | 0.0                            |
| 365               | 12138                         | 0.0                            | 495               | 188585                        | 304.9                          | 625               | 400670                        | 3.4                            | 755               | 19692                         | 0.0                            | 885               | 20315                         | 0.0                            |
| 370               | 12993                         | 0.0                            | 500               | 245069                        | 409.9                          | 630               | 360611                        | 2.0                            | 760               | 18199                         | 0.0                            | 890               | 15211                         | 0.0                            |
| 375               | 14513                         | 0.0                            | 505               | 307682                        | 523.1                          | 635               | 326986                        | 1.2                            | 765               | 19191                         | 0.0                            | 895               | 15502                         | 0.0                            |
| 380               | 15679                         | 0.0                            | 510               | 367102                        | 622.2                          | 640               | 295583                        | 0.8                            | 770               | 16229                         | 0.0                            | 900               | 15935                         | 0.0                            |
| 385               | 14569                         | 0.0                            | 515               | 416068                        | 689.6                          | 645               | 264664                        | 0.5                            | 775               | 16351                         | 0.0                            | 905               | 15965                         | 0.0                            |
| 390               | 13091                         | 0.0                            | 520               | 457470                        | 727.1                          | 650               | 238441                        | 0.3                            | 780               | 14567                         | 0.0                            | 910               | 16119                         | 0.0                            |
| 395               | 10927                         | 0.1                            | 525               | 486980                        | 728.5                          | 655               | 210047                        | 0.2                            | 785               | 13349                         | 0.0                            | 915               | 13972                         | 0.0                            |
| 400               | 9655                          | 0.2                            | 530               | 511184                        | 704.8                          | 660               | 186019                        | 0.1                            | 790               | 12552                         | 0.0                            | 920               | 14830                         | 0.0                            |
| 405               | 10895                         | 0.3                            | 535               | 527191                        | 656.9                          | 665               | 164001                        | 0.1                            | 795               | 11517                         | 0.0                            | 925               | 13744                         | 0.0                            |
| 410               | 14929                         | 0.9                            | 540               | 540658                        | 597.4                          | 670               | 142007                        | 0.0                            | 800               | 13250                         | 0.0                            | 930               | 20340                         | 0.0                            |
| 415               | 25993                         | 2.7                            | 545               | 555639                        | 532.7                          | 675               | 123441                        | 0.0                            | 805               | 15135                         | 0.0                            | 935               | 13272                         | 0.0                            |
| 420               | 49620                         | 8.2                            | 550               | 572229                        | 467.9                          | 680               | 106894                        | 0.0                            | 810               | 9873                          | 0.0                            | 940               | 16357                         | 0.0                            |
| 425               | 95836                         | 23.4                           | 555               | 589788                        | 403.1                          | 685               | 94026                         | 0.0                            | 815               | 11566                         | 0.0                            | 945               | 19257                         | 0.0                            |
| 430               | 178101                        | 60.6                           | 560               | 608278                        | 340.0                          | 690               | 82099                         | 0.0                            | 820               | 11216                         | 0.0                            | 950               | 19804                         | 0.0                            |
| 435               | 300144                        | 134.2                          | 565               | 619317                        | 277.8                          | 695               | 70275                         | 0.0                            | 825               | 15165                         | 0.0                            | 955               | 14877                         | 0.0                            |
| 440               | 512674                        | 286.5                          | 570               | 627176                        | 221.3                          | 700               | 61784                         | 0.0                            | 830               | 14983                         | 0.0                            | 960               | 9882                          | 0.0                            |
| 445               | 857336                        | 574.1                          | 575               | 631114                        | 171.9                          | 705               | 55550                         | 0.0                            | 835               | 13993                         | 0.0                            | 965               | 11741                         | 0.0                            |
| 450               | 1021494                       | 791.7                          | 580               | 630436                        | 129.9                          | 710               | 50234                         | 0.0                            | 840               | 15281                         | 0.0                            | 970               | 11068                         | 0.0                            |
| 455               | 730207                        | 638.1                          | 585               | 625204                        | 95.5                           | 715               | 44909                         | 0.0                            | 845               | 15737                         | 0.0                            | 975               | 18108                         | 0.0                            |
| 460               | 467897                        | 451.9                          | 590               | 612752                        | 68.2                           | 720               | 41441                         | 0.0                            | 850               | 15148                         | 0.0                            | 980               | 17506                         | 0.0                            |
| 465               | 344659                        | 364.0                          | 595               | 589048                        | 47.0                           | 725               | 36834                         | 0.0                            | 855               | 17198                         | 0.0                            | 985               | 23821                         | 0.0                            |
| 470               | 230541                        | 265.5                          | 600               | 567479                        | 32.0                           | 730               | 32988                         | 0.0                            | 860               | 19169                         | 0.0                            | 990               | 25862                         | 0.0                            |
| 475               | 157156                        | 196.5                          | 605               | 542722                        | 21.3                           | 735               | 28984                         | 0.0                            | 865               | 18632                         | 0.0                            | 995               | 21133                         | 0.0                            |
| 480               | 134805                        | 182.1                          | 610               | 507118                        | 13.7                           | 740               | 26177                         | 0.0                            | 870               | 18831                         | 0.0                            | 1000              | 25640                         | 0.0                            |
| 485               | 132031                        | 191.4                          | 615               | 472188                        | 8.7                            | 745               | 22680                         | 0.0                            | 875               | 16978                         | 0.0                            |                   |                               |                                |

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### Melanopic Flux vs. Wavelength



**Melanopic Lumens: 26696.3**      **M/P: 0.72**

| 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       | 15077            | 0.0              | 490       | 146327           | 121.8            | 620       | 434415           | 0.3              | 750       | 22886            | 0.0              | 880       | 20960            | 0.0              |
| 365       | 12138            | 0.0              | 495       | 188585           | 155.7            | 625       | 400670           | 0.2              | 755       | 19692            | 0.0              | 885       | 20315            | 0.0              |
| 370       | 12993            | 0.0              | 500       | 245069           | 197.0            | 630       | 360611           | 0.1              | 760       | 18199            | 0.0              | 890       | 15211            | 0.0              |
| 375       | 14513            | 0.0              | 505       | 307682           | 236.1            | 635       | 326986           | 0.1              | 765       | 19191            | 0.0              | 895       | 15502            | 0.0              |
| 380       | 15679            | 0.0              | 510       | 367102           | 263.6            | 640       | 295583           | 0.0              | 770       | 16229            | 0.0              | 900       | 15935            | 0.0              |
| 385       | 14569            | 0.0              | 515       | 416068           | 271.9            | 645       | 264664           | 0.0              | 775       | 16351            | 0.0              | 905       | 15965            | 0.0              |
| 390       | 13091            | 0.0              | 520       | 457470           | 266.3            | 650       | 238441           | 0.0              | 780       | 14567            | 0.0              | 910       | 16119            | 0.0              |
| 395       | 10927            | 0.1              | 525       | 486980           | 247.0            | 655       | 210047           | 0.0              | 785       | 13349            | 0.0              | 915       | 13972            | 0.0              |
| 400       | 9655             | 0.1              | 530       | 511184           | 220.9            | 660       | 186019           | 0.0              | 790       | 12552            | 0.0              | 920       | 14830            | 0.0              |
| 405       | 10895            | 0.2              | 535       | 527191           | 189.7            | 665       | 164001           | 0.0              | 795       | 11517            | 0.0              | 925       | 13744            | 0.0              |
| 410       | 14929            | 0.6              | 540       | 540658           | 158.2            | 670       | 142007           | 0.0              | 800       | 13250            | 0.0              | 930       | 20340            | 0.0              |
| 415       | 25993            | 1.7              | 545       | 555639           | 129.1            | 675       | 123441           | 0.0              | 805       | 15135            | 0.0              | 935       | 13272            | 0.0              |
| 420       | 49620            | 5.7              | 550       | 572229           | 102.7            | 680       | 106894           | 0.0              | 810       | 9873             | 0.0              | 940       | 16357            | 0.0              |
| 425       | 95836            | 14.9             | 555       | 589788           | 79.5             | 685       | 94026            | 0.0              | 815       | 11566            | 0.0              | 945       | 19257            | 0.0              |
| 430       | 178101           | 37.6             | 560       | 608278           | 60.0             | 690       | 82099            | 0.0              | 820       | 11216            | 0.0              | 950       | 19804            | 0.0              |
| 435       | 300144           | 80.1             | 565       | 619317           | 43.5             | 695       | 70275            | 0.0              | 825       | 15165            | 0.0              | 955       | 14877            | 0.0              |
| 440       | 512674           | 171.3            | 570       | 627176           | 30.6             | 700       | 61784            | 0.0              | 830       | 14983            | 0.0              | 960       | 9882             | 0.0              |
| 445       | 857336           | 338.2            | 575       | 631114           | 21.0             | 705       | 55550            | 0.0              | 835       | 13993            | 0.0              | 965       | 11741            | 0.0              |
| 450       | 1021494          | 470.7            | 580       | 630436           | 14.1             | 710       | 50234            | 0.0              | 840       | 15281            | 0.0              | 970       | 11068            | 0.0              |
| 455       | 730207           | 382.6            | 585       | 625204           | 9.3              | 715       | 44909            | 0.0              | 845       | 15737            | 0.0              | 975       | 18108            | 0.0              |
| 460       | 467897           | 275.7            | 590       | 612752           | 6.0              | 720       | 41441            | 0.0              | 850       | 15148            | 0.0              | 980       | 17506            | 0.0              |
| 465       | 344659           | 225.2            | 595       | 589048           | 3.8              | 725       | 36834            | 0.0              | 855       | 17198            | 0.0              | 985       | 23821            | 0.0              |
| 470       | 230541           | 165.0            | 600       | 567479           | 2.4              | 730       | 32988            | 0.0              | 860       | 19169            | 0.0              | 990       | 25862            | 0.0              |
| 475       | 157156           | 120.0            | 605       | 542722           | 1.5              | 735       | 28984            | 0.0              | 865       | 18632            | 0.0              | 995       | 21133            | 0.0              |
| 480       | 134805           | 108.3            | 610       | 507118           | 0.9              | 740       | 26177            | 0.0              | 870       | 18831            | 0.0              | 1000      | 25640            | 0.0              |
| 485       | 132031           | 108.8            | 615       | 472188           | 0.6              | 745       | 22680            | 0.0              | 875       | 16978            | 0.0              |           |                  |                  |

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TM-30-18

### Summary

$R_f = 75.2$   
 $R_g = 94.7$   
 CIE  $R_a = 74.1$   
 $R_g = -25.4$



### Color Vector Graphics

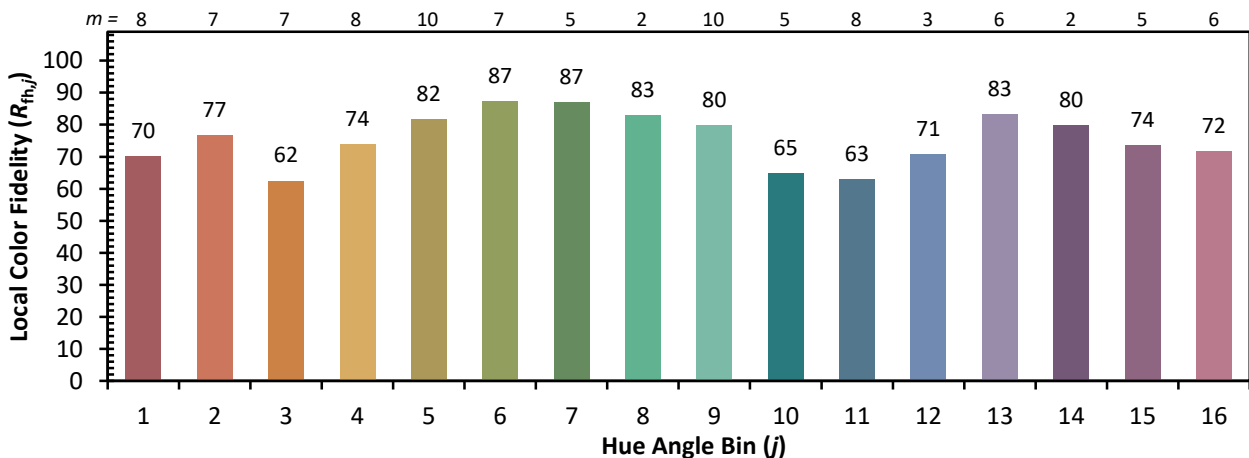
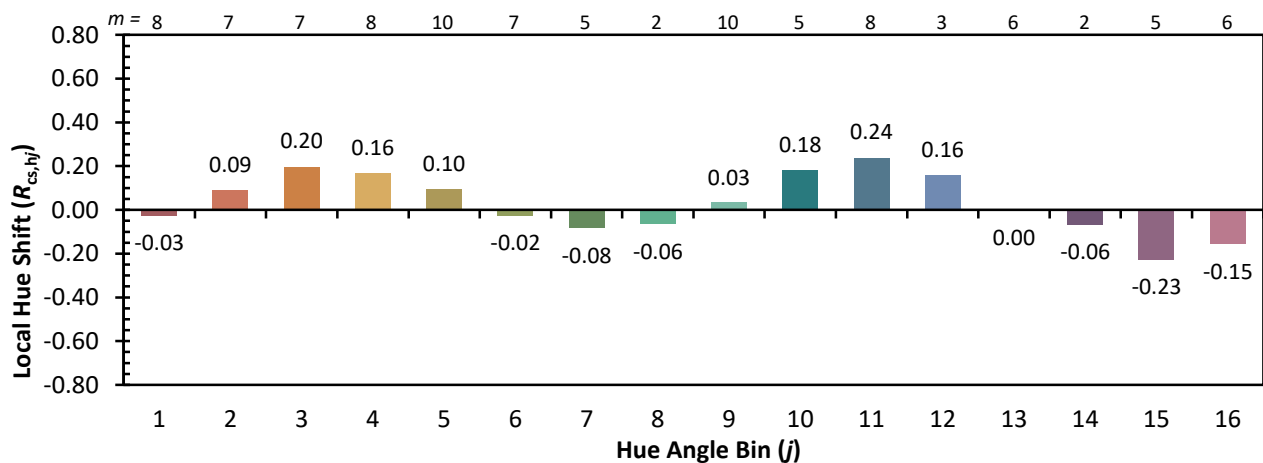
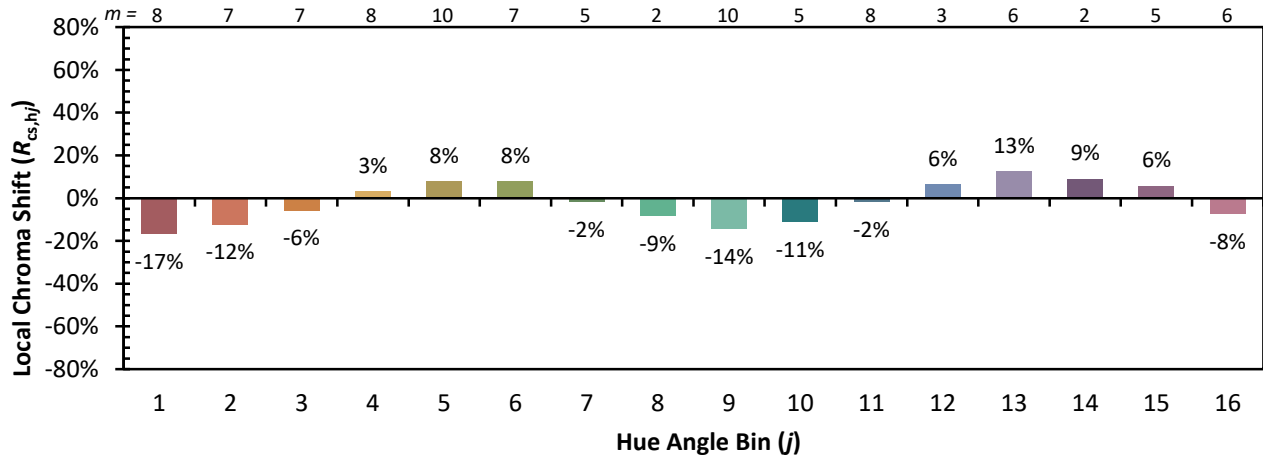


**Individual Sample Fidelity Index ( $R_{f,i}$ )**

|            |            |            |            |
|------------|------------|------------|------------|
| CES01 = 85 | CES26 = 63 | CES51 = 90 | CES76 = 52 |
| CES02 = 60 | CES27 = 88 | CES52 = 90 | CES77 = 68 |
| CES03 = 30 | CES28 = 81 | CES53 = 81 | CES78 = 54 |
| CES04 = 69 | CES29 = 67 | CES54 = 86 | CES79 = 81 |
| CES05 = 46 | CES30 = 85 | CES55 = 84 | CES80 = 77 |
| CES06 = 50 | CES31 = 71 | CES56 = 76 | CES81 = 79 |
| CES07 = 39 | CES32 = 63 | CES57 = 75 | CES82 = 91 |
| CES08 = 38 | CES33 = 79 | CES58 = 76 | CES83 = 89 |
| CES09 = 29 | CES34 = 70 | CES59 = 87 | CES84 = 86 |
| CES10 = 73 | CES35 = 83 | CES60 = 89 | CES85 = 79 |
| CES11 = 56 | CES36 = 90 | CES61 = 83 | CES86 = 76 |
| CES12 = 62 | CES37 = 79 | CES62 = 85 | CES87 = 78 |
| CES13 = 42 | CES38 = 94 | CES63 = 76 | CES88 = 82 |
| CES14 = 74 | CES39 = 96 | CES64 = 67 | CES89 = 74 |
| CES15 = 70 | CES40 = 91 | CES65 = 64 | CES90 = 81 |
| CES16 = 46 | CES41 = 95 | CES66 = 61 | CES91 = 74 |
| CES17 = 49 | CES42 = 80 | CES67 = 58 | CES92 = 61 |
| CES18 = 55 | CES43 = 78 | CES68 = 66 | CES93 = 77 |
| CES19 = 71 | CES44 = 99 | CES69 = 74 | CES94 = 56 |
| CES20 = 64 | CES45 = 86 | CES70 = 58 | CES95 = 67 |
| CES21 = 85 | CES46 = 85 | CES71 = 51 | CES96 = 78 |
| CES22 = 77 | CES47 = 88 | CES72 = 83 | CES97 = 86 |
| CES23 = 91 | CES48 = 80 | CES73 = 48 | CES98 = 77 |
| CES24 = 90 | CES49 = 83 | CES74 = 92 | CES99 = 65 |
| CES25 = 71 | CES50 = 90 | CES75 = 52 |            |



Color Rendition by Hue-Angle Bin



**Measure Comparisons**


(END OF REPORT)