

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



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

Test Report Prepared for  
Cooper Lighting Solutions  
(formerly Eaton)

Brand: STREETWORKS

Report Number: P510501

Luminaire Tested: **CST-CA10-310-750-U-T4**

Issue Date: 4/6/2021

**Test Information**

Test Method: LM-79-08  
Report Number: P510501  
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-CA10-310-750-U-T4  
Description: CELESTEON HIGH MAST LUMINAIRE  
Light Source: (10) 5000K CCT, 70 CRI LEDS  
Ballast/Driver: ELECTRONIC DRIVER

**Summary**

Lumens per Lamp: N/A  
Luminaire Lumens: 48684 lumens  
Efficiency: N/A  
Efficacy: 155.8 lumens/watt  
Luminous Opening: Circular (Dia: 2.08' x H: 0')  
IES Classification: Type IV - Short  
BUG Rating: B4 - U0 - G5

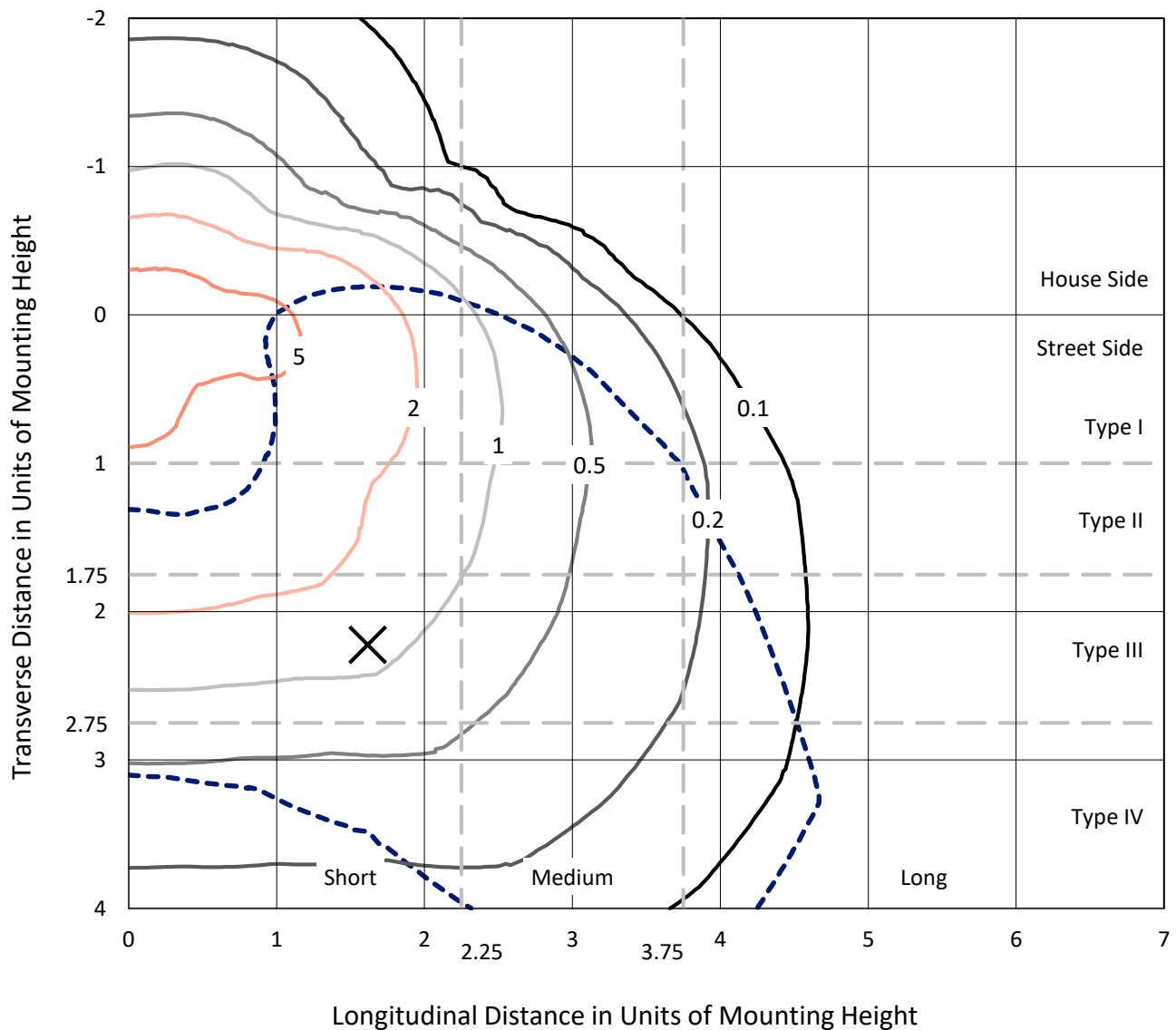
Input Watts (W): 312.4  
Input Voltage (V): 120  
Input Current (Ain): NR  
Voltage Rise (V): NR  
Power Factor: NR  
Total Harmonic Distortion (THDi): NR  
Frequency (hertz): 60  
Stabilization Time: NR  
Operation Time: NR  
Ambient Temperature (°C): NR  
Test Distance: 24 FT



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## Iso-Footcandle Lines of Horizontal Illumination

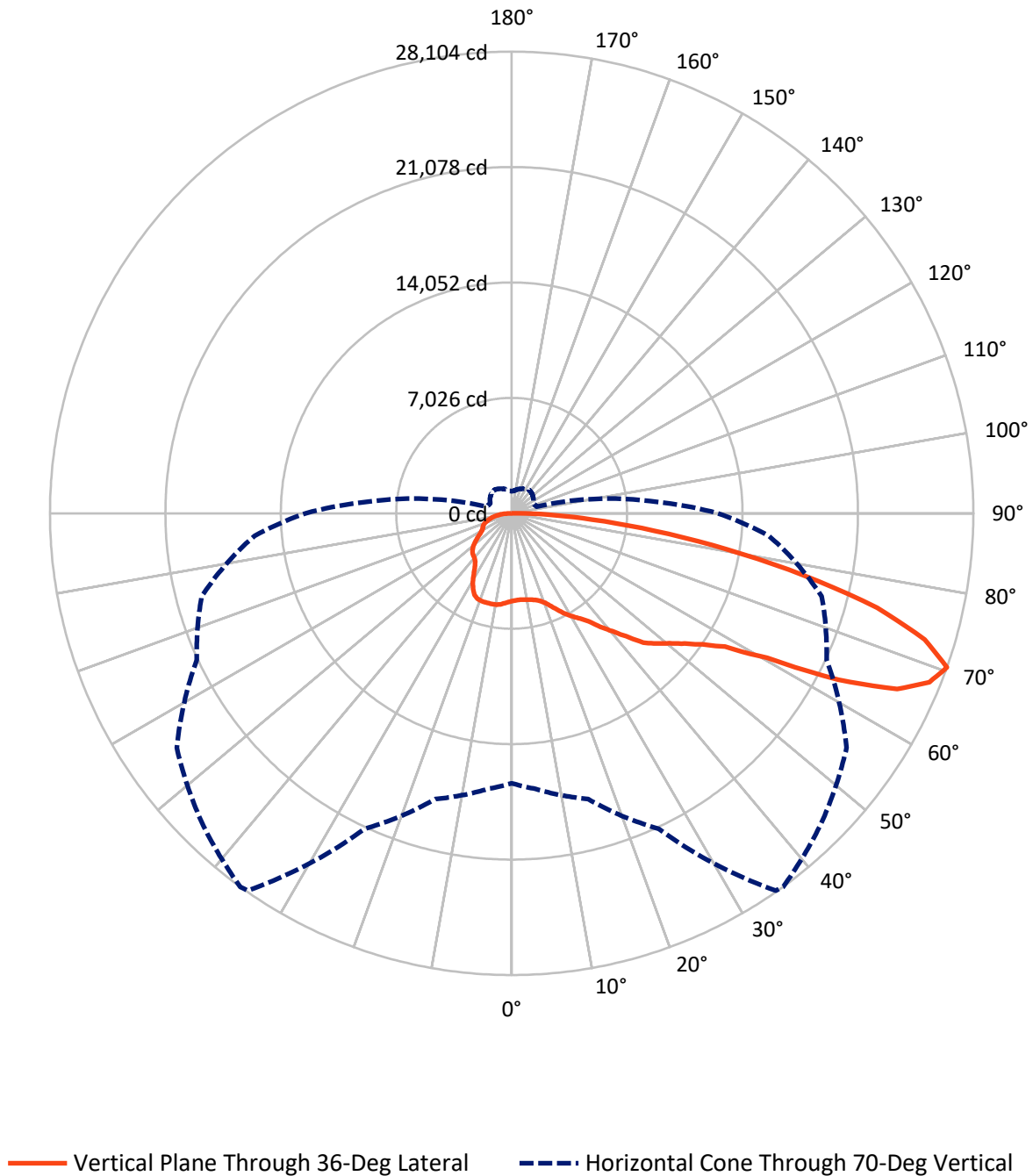
× Max cd  
 - - - 1/2 Max cd



Based on 30 foot mounting height. Maximum calculated value = 6.2 fc  
 Type IV - Short - N/A

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## Luminous Intensity Polar Plot



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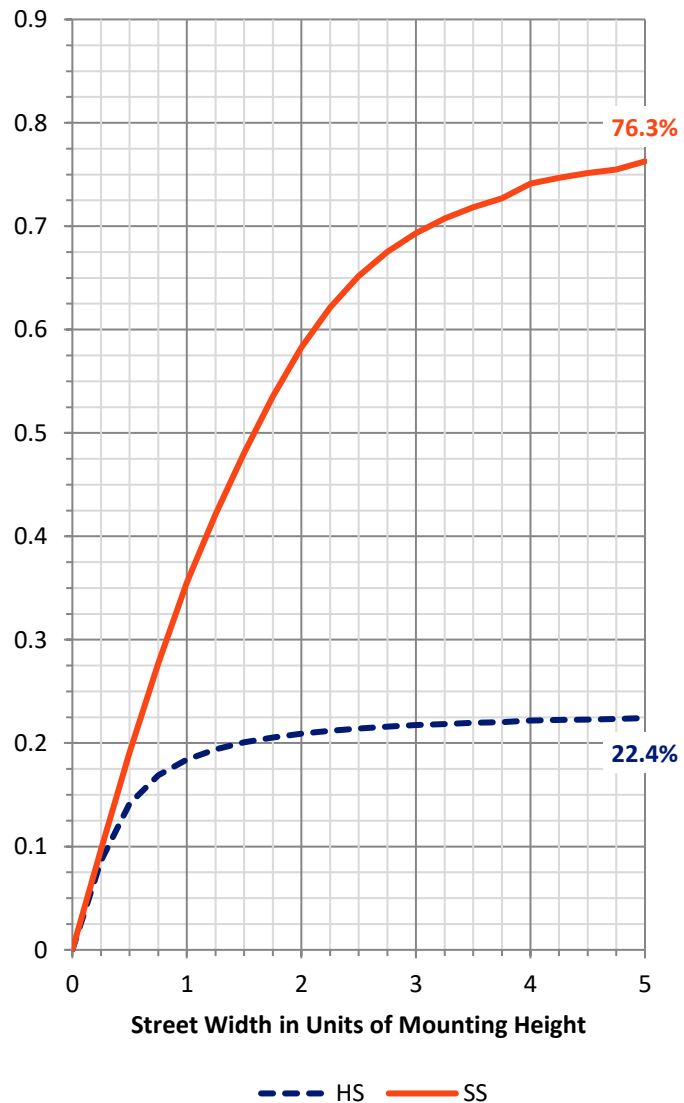
**FLUX DISTRIBUTION:**

|                    |           | Downward | Upward | Total   |
|--------------------|-----------|----------|--------|---------|
| <b>House Side</b>  | Lumens    | 11092.4  | 0.0    | 11092.4 |
|                    | % Fixture | 22.8     | 0.0    | 22.8    |
| <b>Street Side</b> | Lumens    | 37591.6  | 0.0    | 37591.6 |
|                    | % Fixture | 77.2     | 0.0    | 77.2    |
| <b>Total</b>       | Lumens    | 48684.0  | 0.0    | 48684.0 |
|                    | % Fixture | 100.0    | 0.0    | 100.0   |

**ZONAL LUMENS:**

| Zone      | Lumens  | % Fixture |
|-----------|---------|-----------|
| 0°-10°    | 516.6   | 1.1       |
| 10°-20°   | 1597.1  | 3.3       |
| 20°-30°   | 2880.8  | 5.9       |
| 30°-40°   | 4461.9  | 9.2       |
| 40°-50°   | 6777.5  | 13.9      |
| 50°-60°   | 9394.1  | 19.3      |
| 60°-70°   | 12215.6 | 25.1      |
| 70°-80°   | 9021.1  | 18.5      |
| 80°-90°   | 1819.3  | 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°    | 48684.0 | 100.0     |
| 0°-180°   | 48684.0 | 100.0     |

**Coefficient of Utilization**



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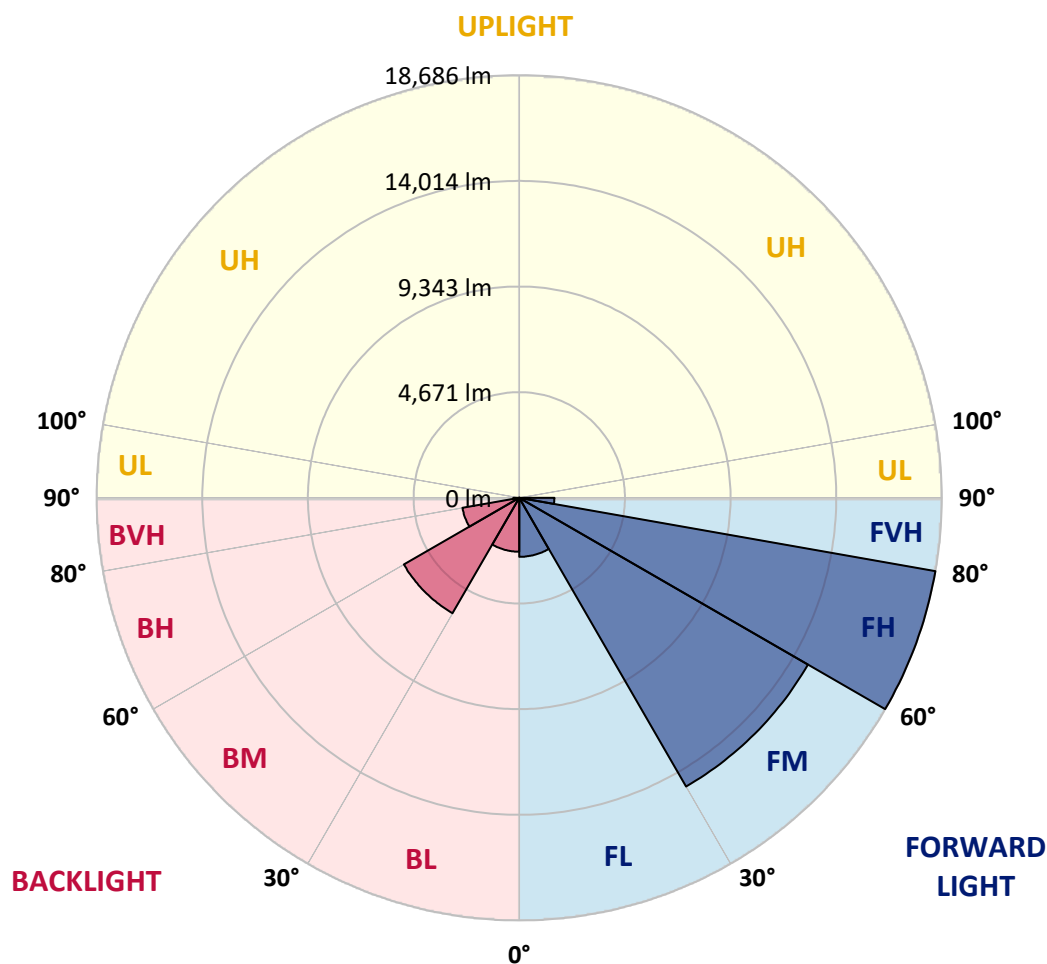
CATALOG NUMBER: CST-CA10-310-750-U-T4

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

| Zone |             | Lumens  | % Fixture | Zone Rating/Lumen Limit |      |         |
|------|-------------|---------|-----------|-------------------------|------|---------|
|      |             |         |           | B                       | U    | G       |
| FL   | (0°-30°)    | 2610.0  | 5.4       |                         |      |         |
| FM   | (30°-60°)   | 14741.4 | 30.3      |                         |      |         |
| FH   | (60°-80°)   | 18686.0 | 38.4      |                         |      | G5      |
| FVH  | (80°-90°)   | 1554.3  | 3.2       |                         |      | G5      |
| BL   | (0°-30°)    | 2384.6  | 4.9       | B3/2500                 |      |         |
| BM   | (30°-60°)   | 5892.1  | 12.1      | B4/8500                 |      |         |
| BH   | (60°-80°)   | 2550.6  | 5.2       | B4/5000                 |      | G4/5000 |
| BVH  | (80°-90°)   | 265.0   | 0.5       |                         |      | G3/500  |
| UL   | (90°-100°)  | 0.0     | 0.0       |                         | U0/0 |         |
| UH   | (100°-180°) | 0.0     | 0.0       |                         | U0/0 |         |

**BUG Rating: B4-U0-G5**

Type IV Short



FIELD PERFORMANCE MAY DIFFER FROM LABORATORY PERFORMANCE

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**CANDELA DISTRIBUTION (FULL):**

|       | 0°      | 5°      | 15°     | 25°     | 35°     | 36°     | 45°     | 55°     | 65°     | 75°     | 85°     |
|-------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|
| 0°    | 5332.3  | 5332.3  | 5332.3  | 5332.3  | 5332.3  | 5332.3  | 5332.3  | 5332.3  | 5332.3  | 5332.3  | 5332.3  |
| 2.5°  | 5300.1  | 5293.0  | 5289.0  | 5297.1  | 5300.1  | 5301.1  | 5303.1  | 5301.1  | 5296.1  | 5314.2  | 5336.4  |
| 5°    | 5301.1  | 5297.1  | 5289.0  | 5281.9  | 5281.9  | 5281.9  | 5283.0  | 5306.1  | 5316.2  | 5314.2  | 5341.4  |
| 7.5°  | 5309.2  | 5306.1  | 5291.0  | 5286.0  | 5298.1  | 5302.1  | 5322.3  | 5315.2  | 5326.3  | 5344.4  | 5367.6  |
| 10°   | 5310.2  | 5306.1  | 5293.0  | 5304.1  | 5338.4  | 5344.4  | 5353.5  | 5373.7  | 5377.7  | 5399.9  | 5423.1  |
| 12.5° | 5320.3  | 5320.3  | 5325.3  | 5349.5  | 5385.8  | 5392.8  | 5427.1  | 5443.2  | 5467.4  | 5478.5  | 5506.7  |
| 15°   | 5373.7  | 5372.7  | 5384.8  | 5412.0  | 5470.4  | 5474.5  | 5516.8  | 5565.2  | 5583.3  | 5610.6  | 5655.9  |
| 17.5° | 5500.7  | 5506.7  | 5507.7  | 5527.9  | 5597.5  | 5599.5  | 5669.0  | 5714.4  | 5755.7  | 5804.1  | 5907.9  |
| 20°   | 5802.1  | 5791.0  | 5778.9  | 5778.9  | 5806.1  | 5820.2  | 5873.6  | 5946.2  | 6030.9  | 6116.6  | 6238.5  |
| 22.5° | 6181.1  | 6203.3  | 6158.9  | 6135.7  | 6148.8  | 6132.7  | 6173.0  | 6231.5  | 6330.3  | 6458.3  | 6612.5  |
| 25°   | 6633.7  | 6635.7  | 6632.7  | 6538.9  | 6509.7  | 6519.8  | 6553.0  | 6607.5  | 6738.5  | 6840.3  | 7064.1  |
| 27.5° | 7075.2  | 7066.1  | 7033.9  | 6935.1  | 6906.9  | 6921.0  | 6920.0  | 7070.2  | 7204.2  | 7334.2  | 7597.3  |
| 30°   | 7476.4  | 7500.6  | 7443.1  | 7276.8  | 7279.8  | 7277.8  | 7324.2  | 7517.7  | 7762.7  | 8004.6  | 8274.7  |
| 32.5° | 8184.0  | 8110.4  | 8032.8  | 7704.2  | 7643.7  | 7636.7  | 7663.9  | 7952.2  | 8315.0  | 8723.3  | 9047.9  |
| 35°   | 8850.3  | 8832.1  | 8755.5  | 8421.9  | 8072.1  | 8066.1  | 8028.8  | 8379.6  | 8889.6  | 9645.6  | 10050.8 |
| 37.5° | 9531.7  | 9505.5  | 9429.9  | 9145.6  | 8797.9  | 8764.6  | 8451.1  | 8835.2  | 9524.6  | 10724.2 | 11301.8 |
| 40°   | 10344.2 | 10328.0 | 10211.1 | 9847.2  | 9490.4  | 9440.0  | 9114.4  | 9314.0  | 10326.0 | 12160.6 | 12567.8 |
| 42.5° | 11056.8 | 11053.8 | 10919.7 | 10582.0 | 10278.6 | 10228.2 | 9951.0  | 10158.7 | 11439.9 | 13567.8 | 13807.7 |
| 45°   | 11580.0 | 11659.6 | 11665.6 | 11473.1 | 11263.5 | 11219.1 | 11145.5 | 11431.8 | 12728.1 | 14844.9 | 14809.6 |
| 47.5° | 12021.5 | 12090.0 | 12018.5 | 11919.7 | 11848.1 | 11851.1 | 11965.0 | 12533.5 | 14000.2 | 15957.7 | 15683.6 |
| 50°   | 12759.3 | 12717.0 | 12345.0 | 12286.6 | 12377.3 | 12430.7 | 12761.4 | 13723.0 | 15456.8 | 17002.0 | 16467.8 |
| 52.5° | 13823.8 | 13661.5 | 12931.7 | 12812.8 | 13156.5 | 13176.6 | 13702.8 | 14786.4 | 16912.3 | 17898.1 | 17185.5 |
| 55°   | 15280.4 | 15146.3 | 14321.7 | 13772.4 | 13945.8 | 14081.8 | 14822.7 | 15876.1 | 18100.8 | 18740.8 | 17737.9 |
| 57.5° | 17433.5 | 17443.5 | 16771.2 | 15747.1 | 15157.4 | 15302.5 | 15881.1 | 16935.5 | 19082.6 | 19446.4 | 18082.6 |
| 60°   | 19159.2 | 19478.7 | 19278.1 | 18810.4 | 17963.7 | 17864.9 | 17424.4 | 18039.3 | 19921.2 | 20046.2 | 18412.2 |
| 62.5° | 20355.7 | 20500.8 | 21190.3 | 21289.1 | 22256.8 | 22298.1 | 20188.3 | 19332.5 | 20842.5 | 20439.3 | 18481.8 |
| 65°   | 20295.2 | 20384.9 | 21474.6 | 22801.1 | 25659.8 | 25787.8 | 24553.0 | 21289.1 | 21473.5 | 20614.7 | 18279.2 |
| 67.5° | 18882.0 | 19017.0 | 20402.0 | 22881.7 | 27473.2 | 27424.8 | 26641.6 | 24012.7 | 21681.2 | 20333.5 | 17313.5 |
| 70°   | 16427.5 | 16843.8 | 18007.0 | 21181.2 | 28039.7 | 28104.2 | 26660.7 | 24882.6 | 21145.9 | 19538.2 | 15703.7 |
| 72.5° | 13539.5 | 13670.6 | 14769.3 | 18321.5 | 26383.5 | 26288.8 | 25568.1 | 23734.5 | 20178.3 | 18099.7 | 12886.3 |
| 75°   | 10296.8 | 10296.8 | 11627.3 | 14601.0 | 22656.9 | 22989.6 | 23269.8 | 21496.7 | 17876.0 | 14752.2 | 8774.7  |
| 77.5° | 6835.3  | 7080.2  | 8151.7  | 10972.1 | 17934.4 | 18180.4 | 19148.1 | 18323.5 | 14636.2 | 10817.9 | 4007.8  |
| 80°   | 3625.8  | 3656.0  | 4805.2  | 7290.9  | 12827.9 | 13291.6 | 14622.1 | 14132.2 | 10527.6 | 5068.3  | 1013.0  |
| 82.5° | 1268.1  | 1384.0  | 2112.8  | 4225.6  | 8452.1  | 8741.4  | 9700.0  | 8397.7  | 3718.5  | 1121.9  | 560.5   |
| 85°   | 630.0   | 652.2   | 930.4   | 2012.0  | 4758.8  | 4898.9  | 5667.0  | 3271.0  | 598.8   | 489.9   | 381.0   |
| 87.5° | 303.4   | 310.5   | 356.8   | 719.7   | 2068.4  | 2164.2  | 2291.2  | 1064.5  | 221.8   | 186.5   | 165.3   |
| 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: P510501

CATALOG NUMBER: CST-CA10-310-750-U-T4

**CANDELA DISTRIBUTION (continued):**

|       | 90°     | 95°     | 105°    | 115°   | 125°   | 135°   | 145°   | 155°   | 165°   | 175°   | 180°   |
|-------|---------|---------|---------|--------|--------|--------|--------|--------|--------|--------|--------|
| 0°    | 5332.3  | 5332.3  | 5332.3  | 5332.3 | 5332.3 | 5332.3 | 5332.3 | 5332.3 | 5332.3 | 5332.3 | 5332.3 |
| 2.5°  | 5341.4  | 5350.5  | 5367.6  | 5372.7 | 5360.6 | 5382.7 | 5403.9 | 5423.1 | 5422.1 | 5429.1 | 5454.3 |
| 5°    | 5353.5  | 5372.7  | 5390.8  | 5423.1 | 5454.3 | 5472.5 | 5489.6 | 5505.7 | 5510.8 | 5525.9 | 5541.0 |
| 7.5°  | 5390.8  | 5410.0  | 5451.3  | 5507.7 | 5509.8 | 5555.1 | 5584.4 | 5589.4 | 5593.4 | 5593.4 | 5628.7 |
| 10°   | 5448.3  | 5483.6  | 5550.1  | 5589.4 | 5624.7 | 5609.6 | 5639.8 | 5620.6 | 5606.5 | 5612.6 | 5636.8 |
| 12.5° | 5547.1  | 5578.3  | 5674.1  | 5717.4 | 5685.2 | 5679.1 | 5648.9 | 5605.5 | 5556.1 | 5551.1 | 5573.3 |
| 15°   | 5702.3  | 5760.8  | 5846.4  | 5887.8 | 5807.1 | 5735.6 | 5633.7 | 5545.0 | 5449.3 | 5414.0 | 5428.1 |
| 17.5° | 5952.3  | 6022.8  | 6116.6  | 6088.4 | 5941.2 | 5800.1 | 5631.7 | 5444.2 | 5258.8 | 5129.7 | 5163.0 |
| 20°   | 6318.2  | 6370.6  | 6447.2  | 6333.3 | 6118.6 | 5885.7 | 5609.6 | 5313.2 | 4999.7 | 4764.8 | 4737.6 |
| 22.5° | 6702.2  | 6781.9  | 6735.5  | 6524.8 | 6243.6 | 5919.0 | 5563.2 | 5122.7 | 4637.8 | 4343.5 | 4299.1 |
| 25°   | 7164.9  | 7191.1  | 7030.8  | 6713.3 | 6278.9 | 5866.6 | 5413.0 | 4844.5 | 4267.9 | 3990.7 | 3977.6 |
| 27.5° | 7655.8  | 7596.3  | 7298.0  | 6800.0 | 6239.6 | 5711.4 | 5111.6 | 4405.0 | 3933.2 | 3688.3 | 3650.0 |
| 30°   | 8210.2  | 8072.1  | 7518.7  | 6809.1 | 6091.4 | 5409.0 | 4730.6 | 4061.3 | 3661.1 | 3415.1 | 3375.8 |
| 32.5° | 8923.9  | 8598.3  | 7723.3  | 6715.3 | 5778.9 | 4965.4 | 4272.9 | 3767.9 | 3416.1 | 3169.2 | 3133.9 |
| 35°   | 9836.1  | 9286.8  | 7940.1  | 6546.0 | 5393.8 | 4521.9 | 3893.9 | 3518.9 | 3217.6 | 2920.2 | 2872.8 |
| 37.5° | 10887.5 | 10247.4 | 8199.1  | 6332.3 | 4971.5 | 4131.8 | 3637.9 | 3360.7 | 3070.4 | 2733.7 | 2677.3 |
| 40°   | 12109.2 | 11209.0 | 8598.3  | 6077.3 | 4592.5 | 3850.6 | 3513.9 | 3306.3 | 2988.7 | 2638.0 | 2573.4 |
| 42.5° | 13167.6 | 12226.1 | 9073.1  | 5803.1 | 4234.6 | 3616.7 | 3458.5 | 3270.0 | 2937.3 | 2566.4 | 2492.8 |
| 45°   | 14146.4 | 13065.8 | 9536.7  | 5470.4 | 3857.6 | 3456.5 | 3391.9 | 3179.2 | 2846.6 | 2477.7 | 2401.1 |
| 47.5° | 14941.7 | 13744.2 | 9939.9  | 5165.0 | 3556.2 | 3309.3 | 3246.8 | 3006.9 | 2694.4 | 2370.8 | 2314.4 |
| 50°   | 15552.5 | 14254.2 | 10160.7 | 4922.1 | 3237.7 | 3142.0 | 3059.3 | 2812.3 | 2511.9 | 2232.7 | 2184.3 |
| 52.5° | 16177.5 | 14765.3 | 10269.6 | 4934.2 | 2941.4 | 2893.0 | 2808.3 | 2596.6 | 2366.8 | 2152.1 | 2099.7 |
| 55°   | 16541.4 | 14974.9 | 10154.6 | 4640.9 | 2669.2 | 2612.8 | 2539.2 | 2429.3 | 2292.2 | 2101.7 | 2052.3 |
| 57.5° | 16754.1 | 15105.0 | 9804.9  | 3785.1 | 2341.6 | 2288.2 | 2300.3 | 2291.2 | 2178.3 | 1977.7 | 1932.3 |
| 60°   | 16907.3 | 14822.7 | 9088.2  | 2782.1 | 2062.4 | 2022.1 | 2121.9 | 2089.6 | 1991.8 | 1835.6 | 1797.3 |
| 62.5° | 16783.3 | 14285.5 | 7797.9  | 2091.6 | 1834.6 | 1920.3 | 2007.9 | 1948.5 | 1815.4 | 1673.3 | 1628.9 |
| 65°   | 16027.3 | 13231.1 | 5927.1  | 1680.3 | 1761.0 | 1878.9 | 1949.5 | 1853.7 | 1718.6 | 1550.3 | 1530.2 |
| 67.5° | 14651.4 | 11319.9 | 3495.8  | 1540.2 | 1705.5 | 1830.5 | 1889.0 | 1762.0 | 1643.0 | 1481.8 | 1457.6 |
| 70°   | 12551.7 | 8474.3  | 1561.4  | 1434.4 | 1608.8 | 1732.8 | 1771.1 | 1651.1 | 1522.1 | 1370.9 | 1346.7 |
| 72.5° | 9342.2  | 5109.6  | 1052.4  | 1324.5 | 1465.6 | 1575.5 | 1617.8 | 1490.8 | 1399.1 | 1330.6 | 1323.5 |
| 75°   | 5188.2  | 1774.1  | 970.7   | 1199.5 | 1309.4 | 1408.2 | 1460.6 | 1370.9 | 1298.3 | 1204.6 | 1166.3 |
| 77.5° | 1652.1  | 754.0   | 922.3   | 1072.5 | 1211.6 | 1293.3 | 1285.2 | 1150.1 | 1127.0 | 1013.0 | 1003.0 |
| 80°   | 659.2   | 657.2   | 852.8   | 878.0  | 1034.2 | 1102.8 | 1084.6 | 914.3  | 944.5  | 878.0  | 851.8  |
| 82.5° | 517.1   | 601.8   | 683.4   | 670.3  | 804.4  | 885.0  | 859.8  | 671.3  | 759.0  | 697.5  | 638.1  |
| 85°   | 393.1   | 527.2   | 438.5   | 436.5  | 561.5  | 657.2  | 673.3  | 516.1  | 517.1  | 470.7  | 419.3  |
| 87.5° | 202.6   | 194.5   | 168.3   | 167.3  | 187.5  | 267.1  | 327.6  | 293.3  | 231.8  | 174.4  | 167.3  |
| 90°   | 0.0     | 0.0     | 0.0     | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    |

Report 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            |

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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 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

| 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           | 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**

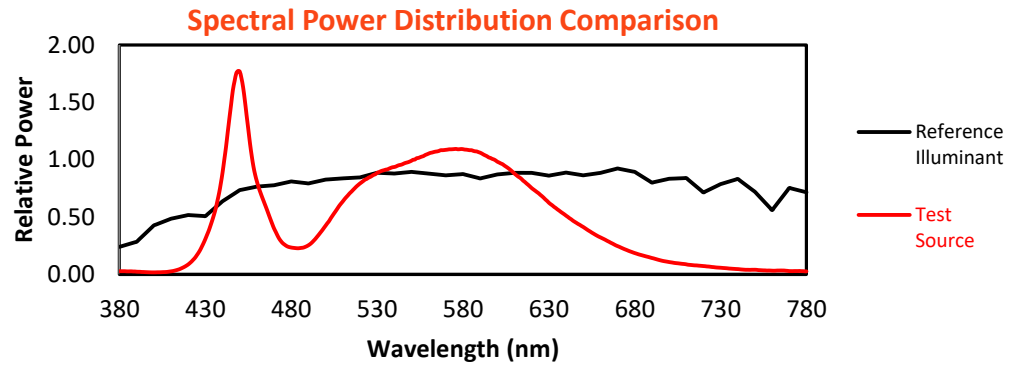
| λ<br>(nm) | Power<br>(μW/nm) | Lumens<br>(Φ/nm) | λ<br>(nm) | Power<br>(μW/nm) | Lumens<br>(Φ/nm) | λ<br>(nm) | Power<br>(μW/nm) | Lumens<br>(Φ/nm) | λ<br>(nm) | Power<br>(μW/nm) | Lumens<br>(Φ/nm) | λ<br>(nm) | Power<br>(μW/nm) | Lumens<br>(Φ/nm) |
|-----------|------------------|------------------|-----------|------------------|------------------|-----------|------------------|------------------|-----------|------------------|------------------|-----------|------------------|------------------|
| 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

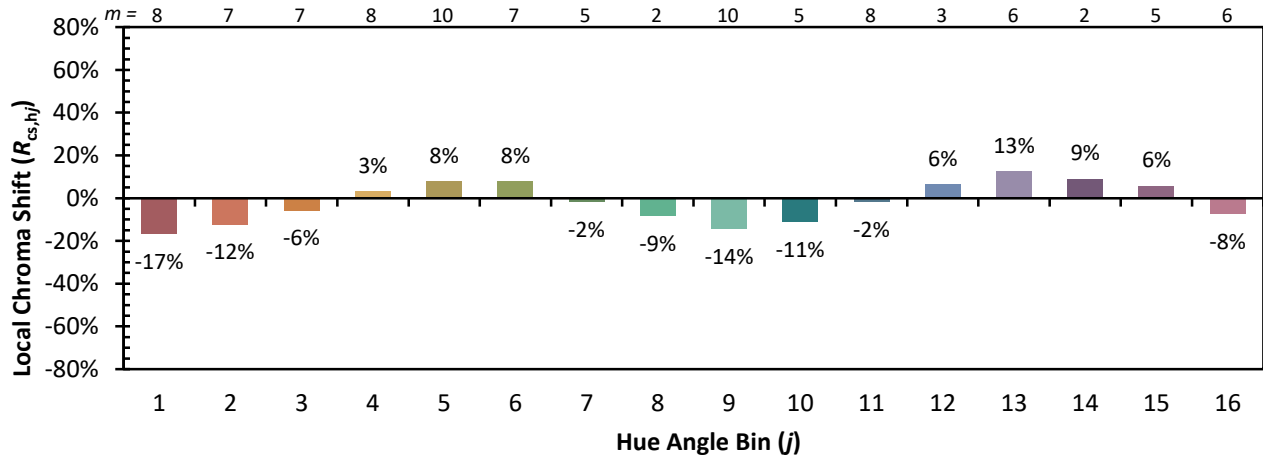


**Individual Sample Fidelity Index ( $R_{f,i}$ )**

|            |            |            |            |
|------------|------------|------------|------------|
| 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)