

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: P237547

Luminaire Tested: **CTN-8-6-D-E1-T3-7050-HSS**

Issue Date: 3/3/2020

**Test Information**

Test Method: LM-79-08  
Report Number: P237547  
TEST IS SCALED FROM IESNA LM-79-08 TEST DATA (G2-1707-171-26)  
Test Lab: INNOVATION CENTER(G2)  
Issue Date: 3/3/2020  
Manufacturer: COOPER LIGHTING SOLUTIONS (FORMERLY EATON)  
Product Line: MCGRAW-EDISON  
Catalog Number: CTN-8-6-D-E1-T3-7050-HSS  
Description: CELESTEON HIGH MAST LUMINAIRE  
(8) 70 CRI, 5000K LEDS AND TYPE III OPTICS WITH HOUSE SIDE SHIELD  
Light Source: -  
Ballast/Driver: ELECTRONIC DRIVER

**Summary**

Lumens per Lamp: N/A  
Luminaire Lumens: 58588 lumens  
Efficiency: N/A  
Efficacy: 122.8 lumens/watt  
Luminous Opening: Circular (Dia: 2.08' x H: 0')  
IES Classification: Type III - Medium - Non-Cutoff  
BUG Rating: B4 - U0 - G5

Input Watts (W): 477  
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



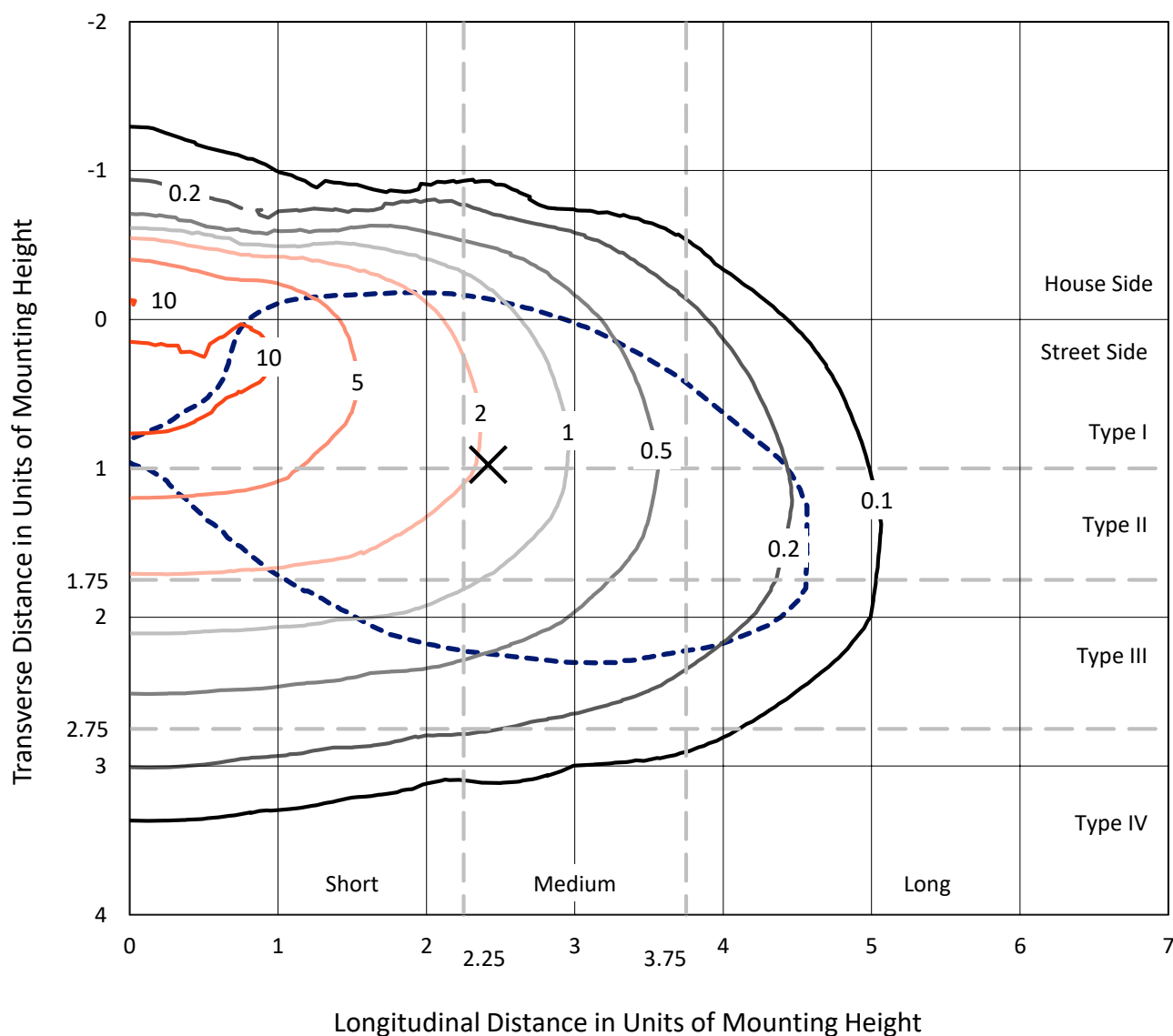
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## Iso-Footcandle Lines of Horizontal Illumination

× Max cd

--- 1/2 Max cd

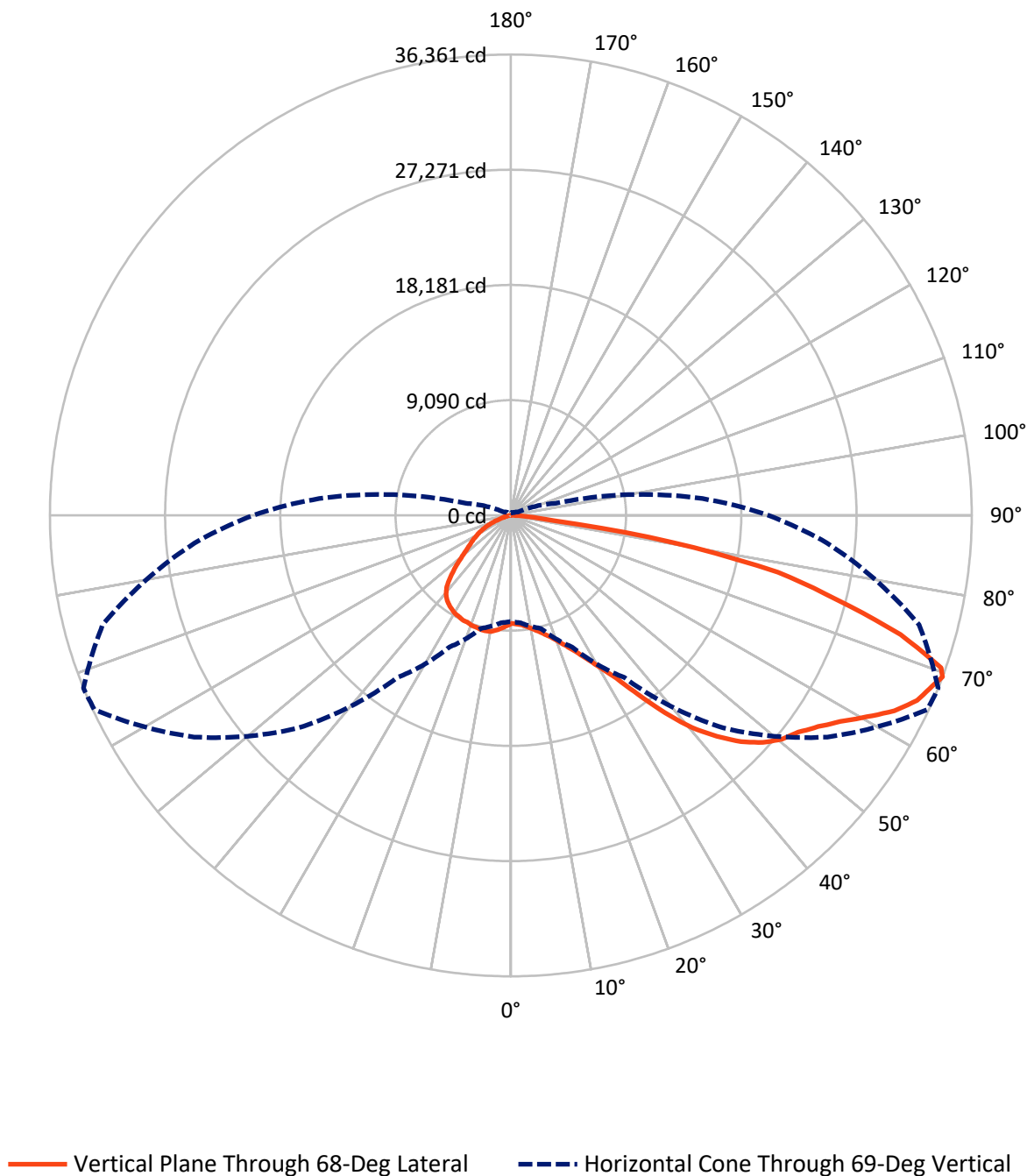


Based on 30 foot mounting height. Maximum calculated value = 11.6 fc  
 Type III - Medium - Non-Cutoff

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## Luminous Intensity Polar Plot



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**FLUX DISTRIBUTION:**

|                    |           | Downward | Upward | Total   |
|--------------------|-----------|----------|--------|---------|
| <b>House Side</b>  | Lumens    | 10514.4  | 0.0    | 10514.4 |
|                    | % Fixture | 17.9     | 0.0    | 17.9    |
| <b>Street Side</b> | Lumens    | 48073.6  | 0.0    | 48073.6 |
|                    | % Fixture | 82.1     | 0.0    | 82.1    |
| <b>Total</b>       | Lumens    | 58588.0  | 0.0    | 58588.0 |
|                    | % Fixture | 100.0    | 0.0    | 100.0   |

**ZONAL LUMENS:**

| Zone      | Lumens  | % Fixture |
|-----------|---------|-----------|
| 0°-10°    | 855.8   | 1.5       |
| 10°-20°   | 2685.6  | 4.6       |
| 20°-30°   | 4590.8  | 7.8       |
| 30°-40°   | 7073.8  | 12.1      |
| 40°-50°   | 10151.3 | 17.3      |
| 50°-60°   | 12217.5 | 20.9      |
| 60°-70°   | 12821.2 | 21.9      |
| 70°-80°   | 7427.7  | 12.7      |
| 80°-90°   | 764.3   | 1.3       |
| 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°    | 58588.0 | 100.0     |
| 0°-180°   | 58588.0 | 100.0     |

**Coefficient of Utilization**



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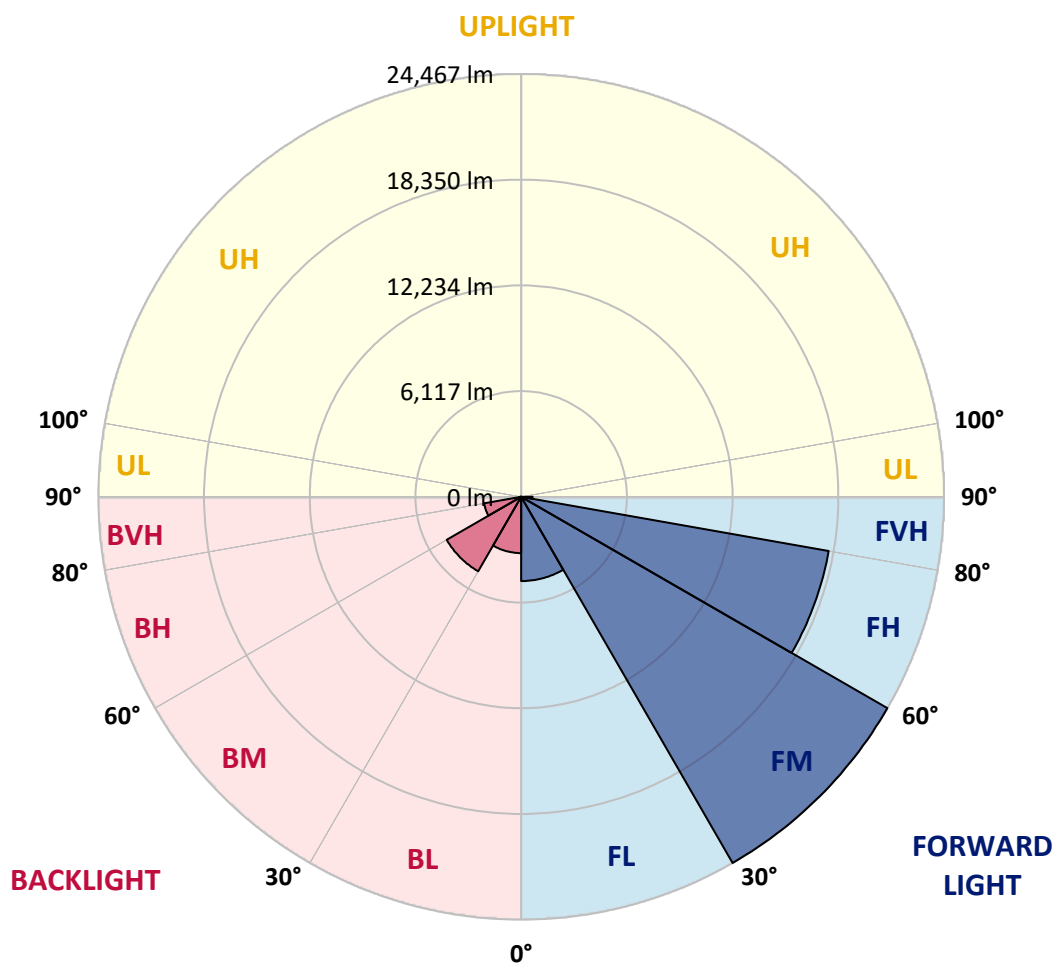
CATALOG NUMBER: CTN-8-6-D-E1-T3-7050-HSS

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

| Zone |             | Lumens  | % Fixture | Zone Rating/Lumen Limit |      |         |
|------|-------------|---------|-----------|-------------------------|------|---------|
|      |             |         |           | B                       | U    | G       |
| FL   | (0°-30°)    | 4874.3  | 8.3       |                         |      |         |
| FM   | (30°-60°)   | 24467.2 | 41.8      |                         |      |         |
| FH   | (60°-80°)   | 18067.9 | 30.8      |                         |      | G5      |
| FVH  | (80°-90°)   | 664.2   | 1.1       |                         |      | G4/750  |
| BL   | (0°-30°)    | 3257.9  | 5.6       | B4/5000                 |      |         |
| BM   | (30°-60°)   | 4975.4  | 8.5       | B3/5000                 |      |         |
| BH   | (60°-80°)   | 2181.0  | 3.7       | B3/2500                 |      | G3/2500 |
| BVH  | (80°-90°)   | 100.0   | 0.2       |                         |      | G2/225  |
| UL   | (90°-100°)  | 0.0     | 0.0       |                         | U0/0 |         |
| UH   | (100°-180°) | 0.0     | 0.0       |                         | U0/0 |         |

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

Type III Medium



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**CANDELA DISTRIBUTION (FULL):**

|       | 0°      | 5°      | 15°     | 25°     | 35°     | 45°     | 55°     | 65°     | 68°     | 75°     | 85°     |
|-------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|
| 0°    | 8521.9  | 8521.9  | 8521.9  | 8521.9  | 8521.9  | 8521.9  | 8521.9  | 8521.9  | 8521.9  | 8521.9  | 8521.9  |
| 2.5°  | 8617.3  | 8548.3  | 8556.4  | 8611.2  | 8448.8  | 8517.9  | 8475.2  | 8564.6  | 8578.8  | 8536.1  | 8574.7  |
| 5°    | 8787.9  | 8729.0  | 8727.0  | 8781.8  | 8601.1  | 8653.9  | 8586.9  | 8647.8  | 8666.1  | 8621.4  | 8688.4  |
| 7.5°  | 9118.7  | 9055.8  | 9043.6  | 9098.4  | 8869.1  | 8885.3  | 8793.9  | 8824.4  | 8840.6  | 8779.7  | 8846.7  |
| 10°   | 9593.8  | 9524.7  | 9480.1  | 9510.5  | 9252.7  | 9212.1  | 9055.8  | 9051.8  | 9076.1  | 8992.9  | 9100.5  |
| 12.5° | 10125.6 | 10044.4 | 9979.5  | 9985.6  | 9691.2  | 9622.2  | 9415.1  | 9342.0  | 9358.3  | 9246.6  | 9376.6  |
| 15°   | 10704.2 | 10586.4 | 10525.5 | 10527.6 | 10196.7 | 10081.0 | 9815.0  | 9695.3  | 9685.1  | 9577.5  | 9652.6  |
| 17.5° | 11400.5 | 11305.1 | 11227.9 | 11187.3 | 10836.1 | 10606.7 | 10290.1 | 10133.7 | 10076.9 | 10005.9 | 9967.3  |
| 20°   | 12218.6 | 12098.8 | 12017.6 | 12003.4 | 11573.0 | 11268.5 | 10848.3 | 10641.2 | 10574.3 | 10515.4 | 10342.8 |
| 22.5° | 13130.0 | 13008.2 | 12896.6 | 12878.3 | 12421.6 | 12054.1 | 11489.8 | 11234.0 | 11175.1 | 11108.1 | 10763.0 |
| 25°   | 13970.4 | 13956.2 | 13832.4 | 13812.1 | 13371.6 | 12894.5 | 12232.8 | 11905.9 | 11905.9 | 11826.8 | 11296.9 |
| 27.5° | 14908.3 | 14928.6 | 14816.9 | 14792.6 | 14378.5 | 13850.7 | 13063.0 | 12750.4 | 12815.4 | 12673.3 | 11968.9 |
| 30°   | 15896.9 | 15854.3 | 15823.8 | 15850.2 | 15466.5 | 14908.3 | 14088.2 | 13824.3 | 13925.8 | 13763.4 | 12870.2 |
| 32.5° | 16782.0 | 16749.5 | 16769.8 | 16871.3 | 16595.2 | 16079.6 | 15375.2 | 15210.8 | 15308.2 | 15409.7 | 14486.1 |
| 35°   | 17482.3 | 17413.3 | 17669.1 | 17892.4 | 17813.2 | 17324.0 | 16757.6 | 17104.8 | 17372.7 | 17835.6 | 16867.2 |
| 37.5° | 18099.5 | 18048.7 | 18359.3 | 18816.0 | 18915.5 | 18643.5 | 18468.9 | 19437.2 | 19743.8 | 20367.0 | 18956.1 |
| 40°   | 18408.0 | 18397.9 | 18779.5 | 19374.3 | 19778.3 | 19954.9 | 20261.4 | 21580.9 | 22027.5 | 22198.0 | 20545.6 |
| 42.5° | 18308.5 | 18341.0 | 19015.0 | 19932.5 | 20586.2 | 21343.4 | 21960.5 | 23412.0 | 23822.0 | 23681.9 | 21938.2 |
| 45°   | 18030.4 | 18046.7 | 18730.8 | 20161.9 | 21286.6 | 22770.5 | 23594.7 | 25109.0 | 25472.4 | 24979.1 | 23046.6 |
| 47.5° | 17644.7 | 17650.8 | 18373.5 | 20003.6 | 21859.0 | 24061.6 | 25003.5 | 26465.1 | 26759.4 | 26063.1 | 23844.3 |
| 50°   | 17123.0 | 17133.2 | 17995.9 | 19804.7 | 22352.3 | 25119.2 | 26105.8 | 27516.6 | 27744.0 | 26832.5 | 24534.5 |
| 52.5° | 16463.3 | 16552.6 | 17496.5 | 19485.9 | 22660.9 | 25870.3 | 26940.1 | 28288.0 | 28399.7 | 27752.1 | 25145.6 |
| 55°   | 15702.0 | 15795.4 | 16861.2 | 19053.6 | 22780.6 | 26296.6 | 27524.7 | 29238.0 | 29416.7 | 28779.3 | 25642.9 |
| 57.5° | 14800.7 | 14928.6 | 16051.2 | 18351.2 | 22500.5 | 26475.2 | 28119.5 | 30411.4 | 30653.0 | 29853.1 | 26154.5 |
| 60°   | 13755.3 | 13913.6 | 15095.1 | 17474.2 | 21852.9 | 26664.0 | 29232.0 | 31984.6 | 32264.8 | 31008.2 | 26601.1 |
| 62.5° | 12663.1 | 12764.6 | 13832.4 | 16278.5 | 20815.6 | 26810.2 | 30429.7 | 33923.3 | 33947.6 | 32021.2 | 26848.7 |
| 65°   | 11201.5 | 11309.1 | 12265.2 | 14768.2 | 19258.6 | 26345.3 | 31034.6 | 35283.4 | 35210.3 | 32814.9 | 26765.5 |
| 67.5° | 9528.8  | 9630.3  | 10411.9 | 12890.5 | 17121.0 | 25042.0 | 30827.5 | 35825.4 | 35874.1 | 33391.4 | 25967.7 |
| 69°   | 8367.6  | 8501.6  | 9238.5  | 11463.4 | 15610.7 | 23708.3 | 30480.4 | 36247.6 | 36361.3 | 33338.6 | 25044.1 |
| 70°   | 7375.0  | 7547.5  | 8247.9  | 10202.8 | 14331.8 | 22496.4 | 29810.5 | 36008.1 | 36016.2 | 32804.8 | 24193.5 |
| 72.5° | 4817.2  | 4922.7  | 5044.5  | 6619.8  | 10310.4 | 17827.4 | 26379.8 | 31933.9 | 32145.0 | 29272.6 | 21152.6 |
| 75°   | 2383.2  | 2476.6  | 2931.3  | 3501.7  | 5302.4  | 11942.5 | 20915.1 | 26162.6 | 26562.5 | 24859.3 | 17330.1 |
| 77.5° | 1315.4  | 1333.7  | 1494.1  | 2293.9  | 2748.6  | 5399.8  | 14295.2 | 20856.2 | 21556.5 | 20259.4 | 12445.9 |
| 80°   | 820.1   | 816.1   | 852.6   | 1067.8  | 1540.8  | 2559.8  | 6037.2  | 11705.0 | 12963.6 | 10578.3 | 4918.7  |
| 82.5° | 639.4   | 627.3   | 629.3   | 690.2   | 651.6   | 1205.8  | 2513.1  | 3408.4  | 3438.8  | 3053.1  | 1914.3  |
| 85°   | 326.8   | 369.5   | 438.5   | 458.8   | 385.7   | 655.7   | 1157.1  | 1345.9  | 1378.4  | 1207.8  | 996.7   |
| 87.5° | 109.6   | 111.6   | 117.7   | 115.7   | 103.5   | 225.3   | 428.3   | 499.4   | 444.6   | 251.7   | 341.0   |
| 90°   | 0.0     | 0.0     | 0.0     | 0.0     | 0.0     | 0.0     | 0.0     | 0.0     | 0.0     | 0.0     | 0.0     |

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CATALOG NUMBER: CTN-8-6-D-E1-T3-7050-HSS

**CANDELA DISTRIBUTION (continued):**

|       | 90°     | 95°     | 105°    | 115°   | 125°   | 135°   | 145°   | 155°   | 165°   | 175°   | 180°   |
|-------|---------|---------|---------|--------|--------|--------|--------|--------|--------|--------|--------|
| 0°    | 8521.9  | 8521.9  | 8521.9  | 8521.9 | 8521.9 | 8521.9 | 8521.9 | 8521.9 | 8521.9 | 8521.9 | 8521.9 |
| 2.5°  | 8633.6  | 8615.3  | 8651.8  | 8735.1 | 8666.1 | 8729.0 | 8666.1 | 8877.2 | 8852.8 | 8838.6 | 8879.2 |
| 5°    | 8753.3  | 8751.3  | 8810.2  | 8944.2 | 8938.1 | 9049.7 | 8988.8 | 9197.9 | 9167.5 | 9163.4 | 9199.9 |
| 7.5°  | 8915.7  | 8954.3  | 9017.2  | 9155.3 | 9157.3 | 9248.7 | 9179.6 | 9344.1 | 9277.1 | 9260.8 | 9311.6 |
| 10°   | 9163.4  | 9173.6  | 9222.3  | 9317.7 | 9183.7 | 9224.3 | 9110.6 | 9240.5 | 9147.2 | 9137.0 | 9212.1 |
| 12.5° | 9400.9  | 9415.1  | 9342.0  | 9311.6 | 9139.0 | 9086.3 | 8887.3 | 8956.3 | 8848.8 | 8838.6 | 8875.1 |
| 15°   | 9654.7  | 9559.3  | 9384.7  | 9285.2 | 8986.8 | 8796.0 | 8572.7 | 8436.7 | 8251.9 | 8166.7 | 8199.2 |
| 17.5° | 9918.6  | 9733.8  | 9407.0  | 9165.4 | 8765.5 | 8487.4 | 8042.8 | 7811.4 | 7537.4 | 7397.3 | 7370.9 |
| 20°   | 10206.8 | 9947.0  | 9461.8  | 9104.5 | 8542.2 | 7994.1 | 7452.1 | 6922.3 | 6609.7 | 6465.5 | 6427.0 |
| 22.5° | 10531.6 | 10214.9 | 9539.0  | 8901.5 | 8193.1 | 7527.2 | 6611.7 | 5943.8 | 5489.1 | 5349.0 | 5310.5 |
| 25°   | 10937.6 | 10515.4 | 9644.5  | 8850.8 | 7858.1 | 6764.0 | 5625.1 | 4867.9 | 4338.1 | 4125.0 | 4080.3 |
| 27.5° | 11430.9 | 10929.5 | 9817.1  | 8609.2 | 7269.4 | 5913.4 | 4644.6 | 3773.8 | 3223.6 | 2971.9 | 2917.1 |
| 30°   | 12149.5 | 11459.3 | 9932.8  | 8467.1 | 6745.7 | 5030.3 | 3609.3 | 2637.0 | 2115.3 | 1930.5 | 1881.8 |
| 32.5° | 13566.5 | 12368.8 | 10168.3 | 8140.3 | 5972.3 | 4003.2 | 2484.7 | 1617.9 | 1252.5 | 1146.9 | 1106.3 |
| 35°   | 15671.6 | 14082.1 | 10507.3 | 7752.6 | 5103.4 | 2848.1 | 1475.8 | 937.9  | 753.1  | 714.6  | 702.4  |
| 37.5° | 17589.9 | 15773.1 | 11163.0 | 7155.7 | 3962.6 | 1751.9 | 854.6  | 600.9  | 554.2  | 560.3  | 560.3  |
| 40°   | 19037.3 | 17029.6 | 11928.3 | 6368.1 | 2687.7 | 982.5  | 586.7  | 499.4  | 509.5  | 511.6  | 509.5  |
| 42.5° | 20393.4 | 18180.7 | 12297.7 | 5499.3 | 1557.0 | 651.6  | 509.5  | 464.9  | 473.0  | 466.9  | 462.8  |
| 45°   | 21459.1 | 19004.8 | 12407.3 | 4330.0 | 852.6  | 582.6  | 479.1  | 432.4  | 428.3  | 432.4  | 436.4  |
| 47.5° | 22151.3 | 19508.3 | 12157.7 | 3315.0 | 643.5  | 542.0  | 460.8  | 410.1  | 399.9  | 428.3  | 426.3  |
| 50°   | 22664.9 | 19853.4 | 11189.3 | 2521.3 | 627.3  | 507.5  | 438.5  | 383.7  | 387.7  | 422.2  | 418.2  |
| 52.5° | 23038.4 | 19942.7 | 10127.7 | 2021.9 | 598.8  | 483.1  | 418.2  | 371.5  | 367.4  | 393.8  | 395.8  |
| 55°   | 23334.8 | 19703.2 | 9465.9  | 1591.5 | 574.5  | 458.8  | 401.9  | 359.3  | 339.0  | 347.1  | 345.1  |
| 57.5° | 23519.5 | 19429.1 | 8710.7  | 1327.6 | 552.2  | 432.4  | 379.6  | 326.8  | 296.4  | 298.4  | 296.4  |
| 60°   | 23478.9 | 19246.4 | 7843.9  | 1088.1 | 523.7  | 408.0  | 349.2  | 292.3  | 261.9  | 253.7  | 253.7  |
| 62.5° | 23397.7 | 18870.9 | 6948.7  | 948.0  | 499.4  | 399.9  | 312.6  | 265.9  | 243.6  | 235.5  | 235.5  |
| 65°   | 22845.6 | 17975.6 | 5751.0  | 812.0  | 475.0  | 377.6  | 292.3  | 255.8  | 229.4  | 221.3  | 221.3  |
| 67.5° | 21475.3 | 16495.8 | 4453.8  | 706.4  | 456.7  | 341.0  | 286.2  | 249.7  | 221.3  | 211.1  | 211.1  |
| 69°   | 20318.2 | 15180.3 | 3658.1  | 649.6  | 438.5  | 324.8  | 286.2  | 251.7  | 217.2  | 205.0  | 205.0  |
| 70°   | 19414.9 | 14147.1 | 3026.7  | 615.1  | 420.2  | 314.6  | 286.2  | 253.7  | 215.2  | 201.0  | 198.9  |
| 72.5° | 16660.2 | 11045.2 | 1680.8  | 521.7  | 349.2  | 286.2  | 280.1  | 255.8  | 205.0  | 184.7  | 182.7  |
| 75°   | 12782.9 | 7764.7  | 1000.8  | 440.5  | 294.3  | 261.9  | 265.9  | 245.6  | 188.8  | 166.5  | 166.5  |
| 77.5° | 7988.0  | 3566.7  | 745.0   | 345.1  | 239.5  | 227.4  | 231.4  | 217.2  | 170.5  | 152.2  | 152.2  |
| 80°   | 2728.3  | 1609.8  | 562.3   | 265.9  | 172.5  | 176.6  | 190.8  | 182.7  | 152.2  | 138.0  | 136.0  |
| 82.5° | 1494.1  | 1047.5  | 397.9   | 184.7  | 119.8  | 146.2  | 146.2  | 148.2  | 131.9  | 121.8  | 119.8  |
| 85°   | 812.0   | 546.1   | 245.6   | 111.6  | 85.3   | 107.6  | 103.5  | 111.6  | 107.6  | 99.5   | 97.4   |
| 87.5° | 282.2   | 186.8   | 81.2    | 40.6   | 34.5   | 36.5   | 42.6   | 56.8   | 54.8   | 56.8   | 58.9   |
| 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

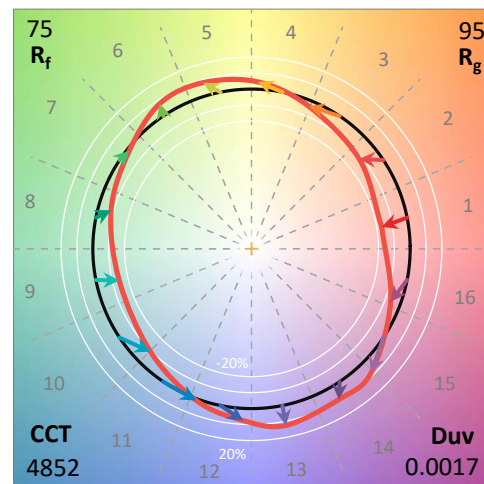
Test Date: 04/22/2021

### 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

| $\lambda$<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**

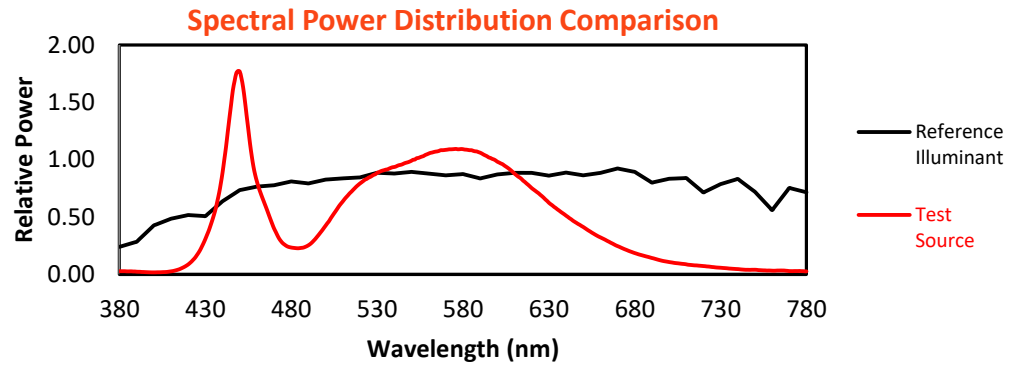
| λ<br>(nm) | Power<br>(μW/nm) | Lumens<br>(Φ/nm) | λ<br>(nm) | Power<br>(μW/nm) | Lumens<br>(Φ/nm) | λ<br>(nm) | Power<br>(μW/nm) | Lumens<br>(Φ/nm) | λ<br>(nm) | Power<br>(μW/nm) | Lumens<br>(Φ/nm) | λ<br>(nm) | Power<br>(μW/nm) | Lumens<br>(Φ/nm) |
|-----------|------------------|------------------|-----------|------------------|------------------|-----------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