

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: P510416

Luminaire Tested: **CST-CA10-210-730-U-T2-HSS**

Issue Date: 4/6/2021

**Test Information**

Test Method: LM-79-08  
Report Number: P510416  
TEST IS SCALED FROM IESNA LM-79-08 TEST DATA (G3-2102-151-15)  
Test Lab: COOPER LIGHTING SOLUTIONS  
Issue Date: 4/6/2021  
Manufacturer: COOPER LIGHTING SOLUTIONS (FORMERLY EATON)  
Product Line: STREETWORKS  
Catalog Number: CST-CA10-210-730-U-T2-HSS  
Description: CELESTEON HIGH MAST LUMINAIRE  
Light Source: (10) 3000K CCT, 70 CRI LEDS  
Ballast/Driver: ELECTRONIC DRIVER

**Summary**

Lumens per Lamp: N/A  
Luminaire Lumens: 31190 lumens  
Efficiency: N/A  
Efficacy: 146.5 lumens/watt  
Luminous Opening: Circular (Dia: 2.08' x H: 0')  
IES Classification: Type II - Short  
BUG Rating: B3 - U0 - G4

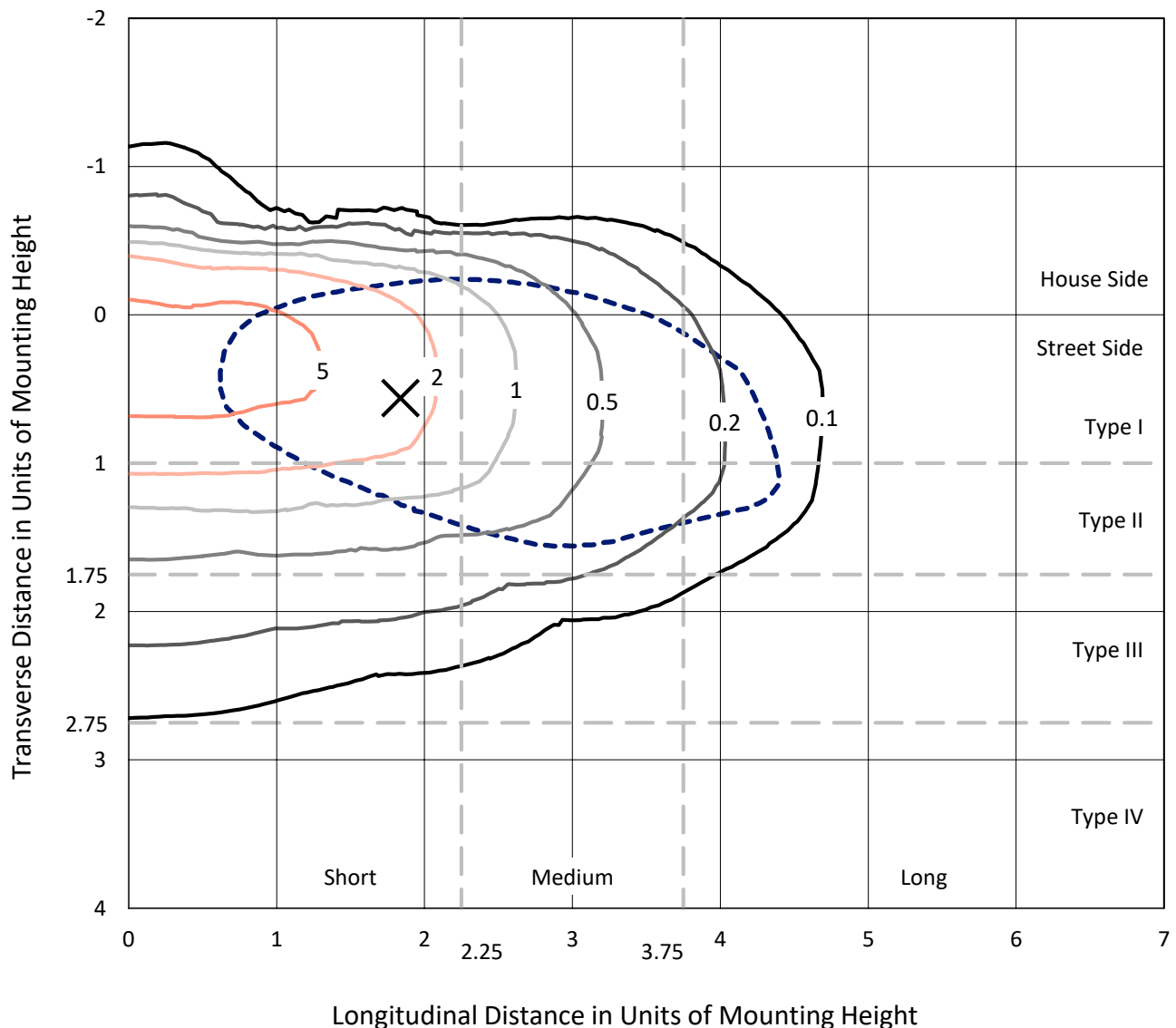
Input Watts (W): 212.9  
Input Voltage (V): 120  
Input Current (Ain): NR  
Voltage Rise (V): NR  
Power Factor: NR  
Total Harmonic Distortion (THDi): NR  
Frequency (hertz): 60  
Stabilization Time: NR  
Operation Time: NR  
Ambient Temperature (°C): NR  
Test Distance: 24 FT



REPORT NUMBER: P510416  
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## Iso-Footcandle Lines of Horizontal Illumination

✕ Max cd  
 - - - 1/2 Max cd

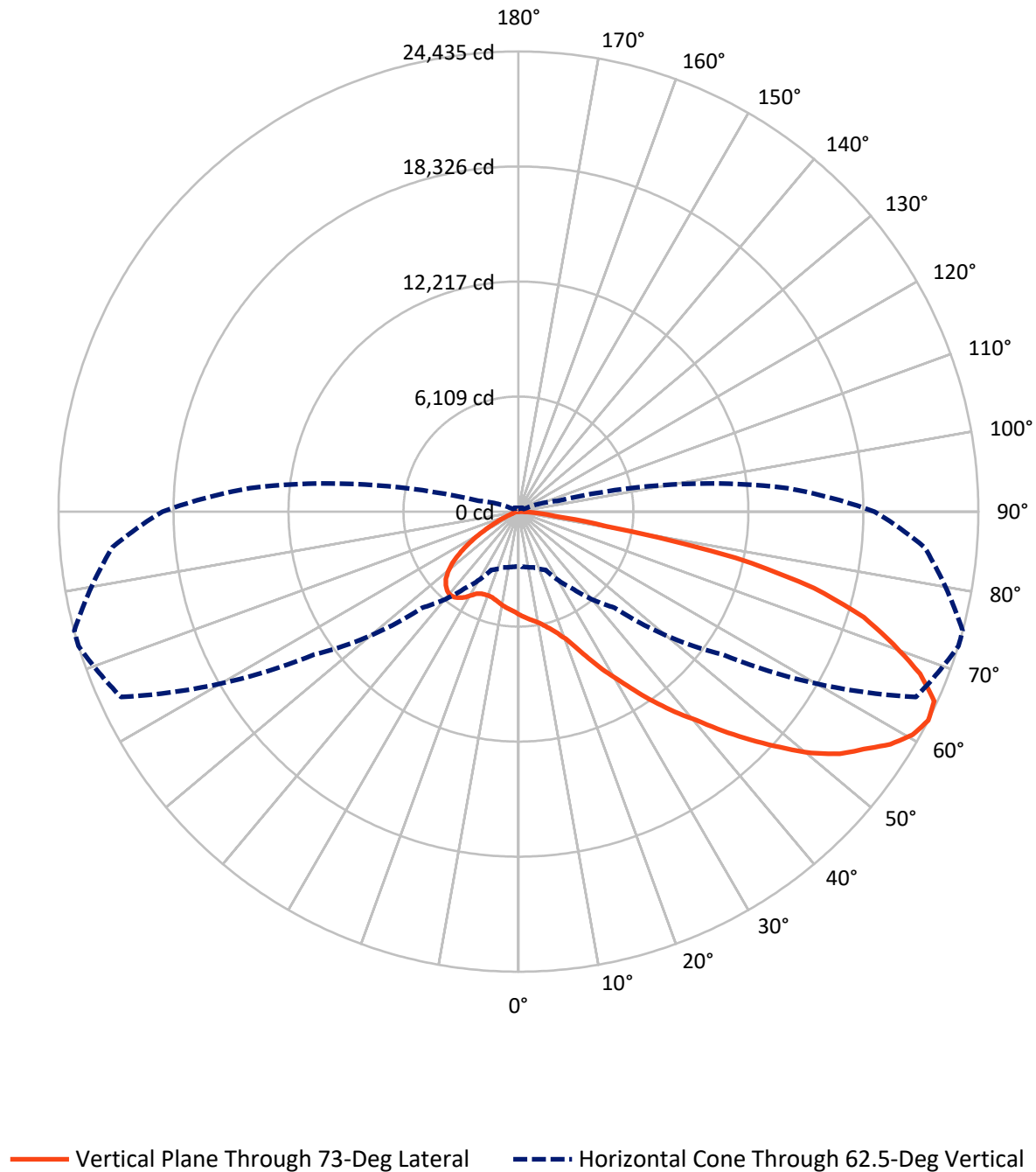


Based on 30 foot mounting height. Maximum calculated value = 7.6 fc  
 Type II - Short - N/A

FIELD PERFORMANCE MAY DIFFER FROM LABORATORY PERFORMANCE

REPORT NUMBER: P510416  
CATALOG NUMBER: CST-CA10-210-730-U-T2-HSS

## Luminous Intensity Polar Plot



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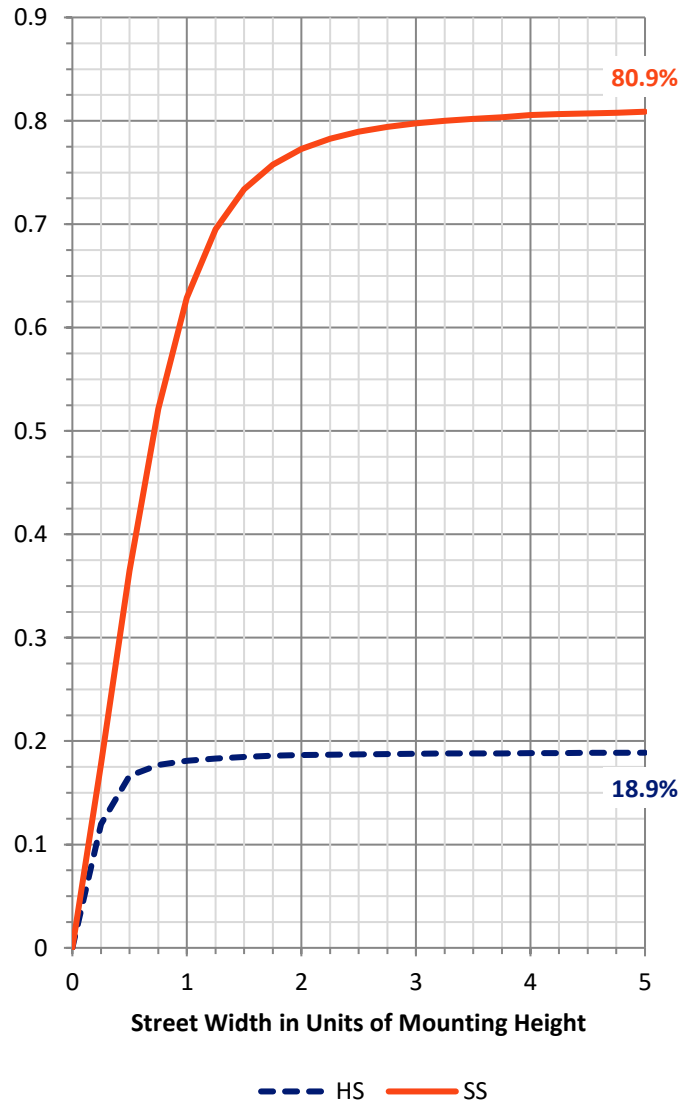
**FLUX DISTRIBUTION:**

|                    |           | Downward | Upward | Total   |
|--------------------|-----------|----------|--------|---------|
| <b>House Side</b>  | Lumens    | 5966.5   | 0.0    | 5966.5  |
|                    | % Fixture | 19.1     | 0.0    | 19.1    |
| <b>Street Side</b> | Lumens    | 25223.5  | 0.0    | 25223.5 |
|                    | % Fixture | 80.9     | 0.0    | 80.9    |
| <b>Total</b>       | Lumens    | 31190.0  | 0.0    | 31190.0 |
|                    | % Fixture | 100.0    | 0.0    | 100.0   |

**ZONAL LUMENS:**

| Zone      | Lumens  | % Fixture |
|-----------|---------|-----------|
| 0°-10°    | 522.4   | 1.7       |
| 10°-20°   | 1571.4  | 5.0       |
| 20°-30°   | 2715.1  | 8.7       |
| 30°-40°   | 4082.9  | 13.1      |
| 40°-50°   | 5444.1  | 17.5      |
| 50°-60°   | 6411.5  | 20.6      |
| 60°-70°   | 6374.2  | 20.4      |
| 70°-80°   | 3659.6  | 11.7      |
| 80°-90°   | 408.8   | 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°    | 31190.0 | 100.0     |
| 0°-180°   | 31190.0 | 100.0     |

**Coefficient of Utilization**



REPORT NUMBER: P510416

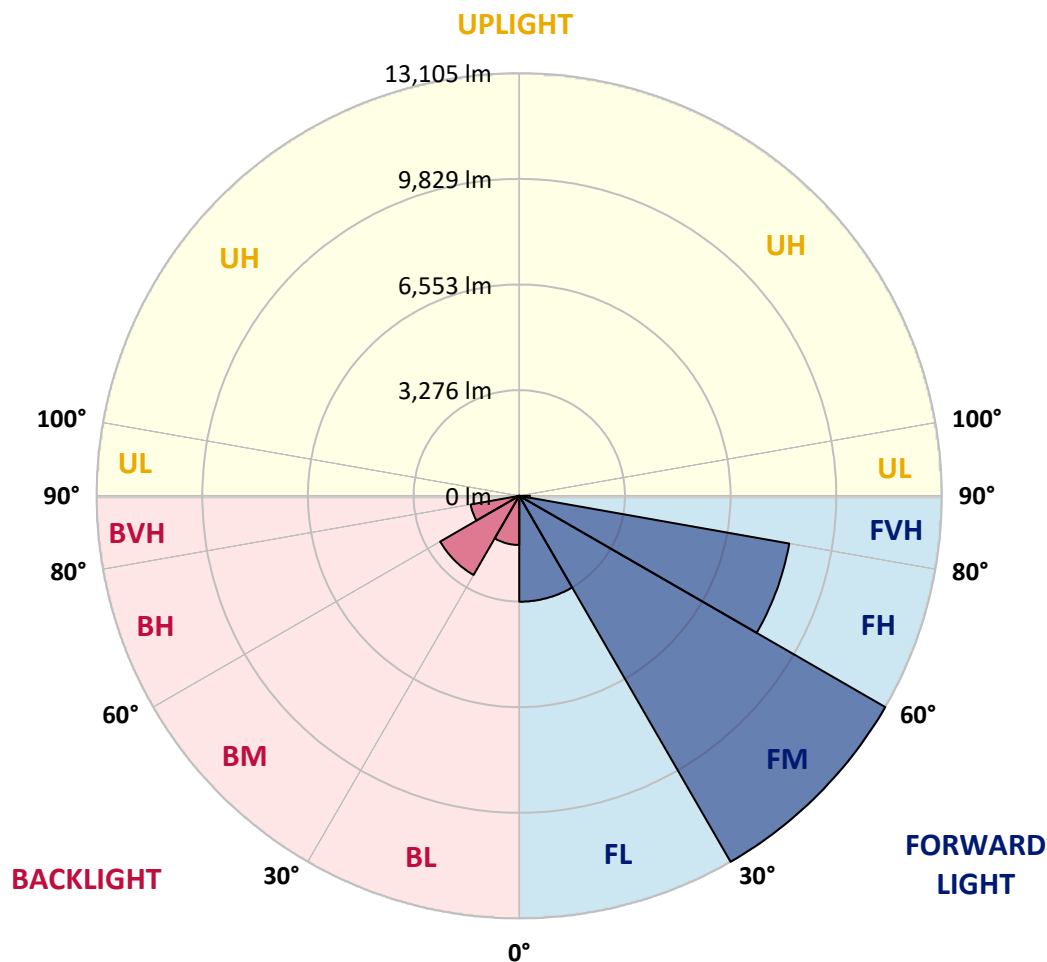
CATALOG NUMBER: CST-CA10-210-730-U-T2-HSS

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

| Zone |             | Lumens  | % Fixture | Zone Rating/Lumen Limit |      |          |
|------|-------------|---------|-----------|-------------------------|------|----------|
|      |             |         |           | B                       | U    | G        |
| FL   | (0°-30°)    | 3284.3  | 10.5      |                         |      |          |
| FM   | (30°-60°)   | 13105.3 | 42.0      |                         |      |          |
| FH   | (60°-80°)   | 8501.9  | 27.3      |                         |      | G4/12000 |
| FVH  | (80°-90°)   | 332.0   | 1.1       |                         |      | G3/500   |
| BL   | (0°-30°)    | 1524.7  | 4.9       | B3/2500                 |      |          |
| BM   | (30°-60°)   | 2833.2  | 9.1       | B3/5000                 |      |          |
| BH   | (60°-80°)   | 1531.8  | 4.9       | B3/2500                 |      | G3/2500  |
| BVH  | (80°-90°)   | 76.8    | 0.2       |                         |      | G1/100   |
| UL   | (90°-100°)  | 0.0     | 0.0       |                         | U0/0 |          |
| UH   | (100°-180°) | 0.0     | 0.0       |                         | U0/0 |          |

**BUG Rating: B3-U0-G4**

Type II Short



FIELD PERFORMANCE MAY DIFFER FROM LABORATORY PERFORMANCE

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**CANDELA DISTRIBUTION (FULL):**

|       | 0°     | 5°     | 15°    | 25°    | 35°     | 45°     | 55°     | 65°     | 73°     | 75°     | 85°     |
|-------|--------|--------|--------|--------|---------|---------|---------|---------|---------|---------|---------|
| 0°    | 5470.0 | 5470.0 | 5470.0 | 5470.0 | 5470.0  | 5470.0  | 5470.0  | 5470.0  | 5470.0  | 5470.0  | 5470.0  |
| 2.5°  | 5852.3 | 5867.0 | 5849.5 | 5841.8 | 5833.4  | 5778.8  | 5715.1  | 5649.9  | 5597.4  | 5589.0  | 5520.4  |
| 5°    | 6263.2 | 6270.9 | 6242.2 | 6209.3 | 6152.6  | 6062.3  | 5948.2  | 5835.5  | 5730.5  | 5702.5  | 5577.1  |
| 7.5°  | 6579.0 | 6564.3 | 6557.3 | 6529.3 | 6479.6  | 6380.2  | 6207.2  | 6022.4  | 5860.0  | 5820.8  | 5630.3  |
| 10°   | 6875.2 | 6868.9 | 6815.6 | 6780.6 | 6701.5  | 6609.8  | 6467.7  | 6233.1  | 6004.2  | 5941.2  | 5676.6  |
| 12.5° | 7195.8 | 7181.8 | 7160.1 | 7084.5 | 7020.1  | 6865.3  | 6693.8  | 6480.3  | 6225.4  | 6141.4  | 5755.7  |
| 15°   | 7484.3 | 7446.4 | 7434.5 | 7355.4 | 7290.3  | 7172.0  | 6999.8  | 6751.9  | 6479.6  | 6407.5  | 5906.2  |
| 17.5° | 7758.7 | 7741.2 | 7714.6 | 7660.7 | 7587.9  | 7496.9  | 7358.9  | 7093.6  | 6812.1  | 6707.1  | 6161.7  |
| 20°   | 7991.8 | 7970.1 | 7947.0 | 7961.7 | 7945.6  | 7887.5  | 7800.7  | 7574.6  | 7230.8  | 7129.3  | 6472.6  |
| 22.5° | 8154.3 | 8153.6 | 8246.0 | 8299.9 | 8330.7  | 8328.6  | 8307.6  | 8179.5  | 7833.6  | 7730.7  | 6937.5  |
| 25°   | 8289.4 | 8299.9 | 8416.8 | 8621.9 | 8805.4  | 8822.2  | 8970.6  | 8909.7  | 8615.6  | 8508.5  | 7636.9  |
| 27.5° | 8329.3 | 8350.3 | 8562.4 | 8885.2 | 9163.8  | 9431.3  | 9649.0  | 9760.3  | 9488.0  | 9359.9  | 8388.8  |
| 30°   | 8358.0 | 8366.4 | 8574.3 | 8960.8 | 9548.2  | 9971.8  | 10361.0 | 10549.4 | 10314.8 | 10221.0 | 9226.8  |
| 32.5° | 8155.7 | 8158.5 | 8477.0 | 9062.3 | 9830.3  | 10564.8 | 11025.4 | 11380.4 | 11318.8 | 11194.9 | 10143.3 |
| 35°   | 7877.0 | 7928.8 | 8294.3 | 8964.3 | 10062.8 | 11109.5 | 11736.8 | 12266.1 | 12389.3 | 12300.4 | 11059.1 |
| 37.5° | 7532.6 | 7573.2 | 7964.5 | 8818.7 | 10113.9 | 11484.0 | 12289.9 | 13166.4 | 13488.5 | 13473.8 | 12164.5 |
| 40°   | 7109.0 | 7158.7 | 7627.1 | 8505.0 | 10088.7 | 11756.4 | 12938.9 | 14163.4 | 14572.2 | 14526.0 | 13260.9 |
| 42.5° | 6608.4 | 6681.2 | 7135.6 | 8101.8 | 9904.6  | 11923.0 | 13470.3 | 15178.5 | 15914.4 | 15884.3 | 14231.3 |
| 45°   | 6113.4 | 6152.6 | 6567.1 | 7540.3 | 9565.7  | 11976.9 | 13970.1 | 16577.4 | 17290.8 | 17257.2 | 15400.5 |
| 47.5° | 5603.0 | 5637.3 | 6070.0 | 6948.7 | 8977.6  | 11868.4 | 14365.7 | 17778.8 | 18693.1 | 18659.5 | 16562.0 |
| 50°   | 4415.6 | 4545.2 | 5432.2 | 6428.5 | 8307.6  | 11561.0 | 14738.9 | 19275.6 | 20160.6 | 20017.8 | 17579.2 |
| 52.5° | 3777.8 | 3824.7 | 4284.7 | 5904.1 | 7639.0  | 11036.6 | 14988.1 | 20662.6 | 21367.6 | 21161.7 | 18619.6 |
| 55°   | 3531.4 | 3562.9 | 3788.3 | 4937.2 | 7011.0  | 10243.4 | 15281.5 | 22053.0 | 22272.8 | 22220.3 | 19468.2 |
| 57.5° | 3344.5 | 3379.5 | 3540.5 | 4123.7 | 6349.4  | 9131.6  | 15189.7 | 23031.1 | 23306.2 | 23138.2 | 20369.2 |
| 60°   | 3079.8 | 3122.5 | 3336.1 | 3702.2 | 5597.4  | 8003.0  | 14382.5 | 23431.5 | 24057.4 | 23868.4 | 21054.6 |
| 62.5° | 2913.2 | 2941.2 | 3063.7 | 3418.7 | 4974.3  | 7209.1  | 13233.6 | 23302.7 | 24434.8 | 24427.8 | 21649.0 |
| 65°   | 2687.0 | 2728.4 | 2859.3 | 3147.0 | 4419.8  | 6593.7  | 12149.8 | 22666.3 | 24272.4 | 24278.7 | 21771.5 |
| 67.5° | 2450.4 | 2467.2 | 2604.4 | 2835.5 | 3766.6  | 6030.1  | 10747.5 | 21577.6 | 23007.3 | 23151.5 | 20923.7 |
| 70°   | 2155.0 | 2146.6 | 2295.0 | 2463.7 | 3078.4  | 5120.0  | 8650.6  | 19641.1 | 21137.9 | 21197.4 | 19209.1 |
| 72.5° | 1695.7 | 1703.4 | 1744.7 | 1861.6 | 2337.0  | 4029.2  | 6277.3  | 16594.2 | 19183.9 | 19289.6 | 17017.7 |
| 75°   | 1139.8 | 1152.4 | 1344.9 | 1459.0 | 1681.0  | 2895.7  | 3947.3  | 11201.2 | 16217.5 | 16515.8 | 13928.1 |
| 77.5° | 869.5  | 877.2  | 933.3  | 1057.9 | 1216.1  | 2063.9  | 2139.6  | 6103.6  | 11806.8 | 12514.6 | 10895.9 |
| 80°   | 616.1  | 618.9  | 563.6  | 501.3  | 647.6   | 1400.2  | 1263.7  | 2599.5  | 4704.8  | 5559.6  | 6399.8  |
| 82.5° | 275.8  | 271.6  | 320.0  | 266.0  | 373.2   | 541.9   | 596.5   | 1261.6  | 1954.0  | 2100.4  | 2286.6  |
| 85°   | 128.1  | 143.5  | 164.5  | 137.9  | 221.9   | 209.3   | 232.4   | 537.7   | 915.8   | 1011.0  | 1005.4  |
| 87.5° | 31.5   | 34.3   | 43.4   | 55.3   | 80.5    | 71.4    | 70.0    | 158.2   | 204.4   | 203.7   | 313.0   |
| 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: P510416

CATALOG NUMBER: CST-CA10-210-730-U-T2-HSS

**CANDELA DISTRIBUTION (continued):**

|       | 90°     | 95°     | 105°   | 115°   | 125°   | 135°   | 145°   | 155°   | 165°   | 175°   | 180°   |
|-------|---------|---------|--------|--------|--------|--------|--------|--------|--------|--------|--------|
| 0°    | 5470.0  | 5470.0  | 5470.0 | 5470.0 | 5470.0 | 5470.0 | 5470.0 | 5470.0 | 5470.0 | 5470.0 | 5470.0 |
| 2.5°  | 5473.5  | 5437.1  | 5351.0 | 5267.7 | 5188.6 | 5136.1 | 5077.3 | 5015.6 | 4978.5 | 4961.0 | 4998.8 |
| 5°    | 5500.8  | 5431.5  | 5267.0 | 5101.8 | 4961.7 | 4842.0 | 4758.0 | 4686.6 | 4648.1 | 4651.6 | 4653.7 |
| 7.5°  | 5523.9  | 5426.6  | 5196.3 | 4963.1 | 4744.7 | 4596.3 | 4486.4 | 4409.3 | 4365.2 | 4331.6 | 4356.8 |
| 10°   | 5544.2  | 5406.3  | 5113.7 | 4802.8 | 4565.5 | 4345.6 | 4196.5 | 4103.4 | 4022.2 | 3976.7 | 4012.4 |
| 12.5° | 5565.9  | 5398.6  | 5021.2 | 4659.3 | 4351.9 | 4106.2 | 3901.8 | 3809.3 | 3729.5 | 3695.2 | 3716.9 |
| 15°   | 5660.4  | 5428.0  | 4935.1 | 4490.6 | 4141.2 | 3823.3 | 3602.8 | 3489.4 | 3426.4 | 3385.1 | 3394.2 |
| 17.5° | 5822.9  | 5505.7  | 4879.8 | 4314.1 | 3906.0 | 3569.9 | 3284.2 | 3151.9 | 3047.6 | 3018.2 | 3010.5 |
| 20°   | 6053.9  | 5653.4  | 4879.8 | 4165.0 | 3639.2 | 3288.5 | 2959.4 | 2736.1 | 2573.6 | 2512.7 | 2559.6 |
| 22.5° | 6441.8  | 5904.8  | 4928.1 | 4029.9 | 3409.6 | 2996.5 | 2604.4 | 2263.5 | 2044.3 | 1955.4 | 2007.2 |
| 25°   | 6984.4  | 6293.4  | 5006.5 | 3911.6 | 3200.2 | 2660.4 | 2154.3 | 1762.2 | 1520.7 | 1414.9 | 1413.5 |
| 27.5° | 7692.9  | 6887.8  | 5164.8 | 3814.9 | 2949.6 | 2225.7 | 1684.5 | 1307.1 | 1080.3 | 1016.6 | 1025.7 |
| 30°   | 8478.4  | 7531.9  | 5463.7 | 3674.9 | 2645.0 | 1739.1 | 1226.6 | 960.6  | 800.9  | 716.9  | 718.3  |
| 32.5° | 9235.9  | 8199.1  | 5818.7 | 3583.9 | 2249.5 | 1311.3 | 874.4  | 685.4  | 586.0  | 536.3  | 544.0  |
| 35°   | 10048.1 | 8774.6  | 6082.6 | 3431.3 | 1785.3 | 948.0  | 618.2  | 513.9  | 472.6  | 446.7  | 448.1  |
| 37.5° | 10925.3 | 9407.5  | 6299.7 | 3226.8 | 1349.8 | 651.1  | 456.5  | 440.4  | 422.9  | 390.0  | 387.2  |
| 40°   | 11841.8 | 10140.5 | 6429.2 | 2896.4 | 938.2  | 450.9  | 387.9  | 406.1  | 396.3  | 353.6  | 350.1  |
| 42.5° | 12618.9 | 10706.2 | 6461.4 | 2458.8 | 607.0  | 365.5  | 351.5  | 379.5  | 381.6  | 338.2  | 332.6  |
| 45°   | 13365.2 | 11210.3 | 6398.4 | 1882.6 | 420.8  | 343.8  | 329.1  | 367.6  | 370.4  | 331.2  | 322.1  |
| 47.5° | 14200.5 | 11899.9 | 6284.3 | 1256.0 | 348.0  | 324.9  | 321.4  | 348.0  | 357.8  | 325.6  | 314.4  |
| 50°   | 15214.9 | 12460.7 | 5946.1 | 771.5  | 328.4  | 313.0  | 313.0  | 329.1  | 342.4  | 314.4  | 308.8  |
| 52.5° | 16255.3 | 12949.4 | 5445.5 | 529.3  | 316.5  | 300.4  | 309.5  | 316.5  | 321.4  | 296.1  | 301.1  |
| 55°   | 17000.9 | 13382.7 | 4699.2 | 425.7  | 309.5  | 291.9  | 313.7  | 299.7  | 292.6  | 270.9  | 266.0  |
| 57.5° | 17828.5 | 13898.0 | 3936.1 | 377.4  | 300.4  | 296.8  | 299.7  | 273.0  | 253.4  | 231.0  | 226.1  |
| 60°   | 18406.1 | 14175.3 | 3002.1 | 355.0  | 289.8  | 291.9  | 276.5  | 240.8  | 205.1  | 189.0  | 185.5  |
| 62.5° | 18910.2 | 14333.5 | 2200.5 | 326.3  | 280.0  | 279.3  | 250.6  | 205.8  | 168.7  | 151.2  | 148.4  |
| 65°   | 18833.9 | 14086.4 | 1426.1 | 303.2  | 272.3  | 263.2  | 224.7  | 176.4  | 140.7  | 127.4  | 126.0  |
| 67.5° | 17994.4 | 12992.8 | 898.3  | 279.3  | 259.0  | 242.9  | 201.6  | 157.5  | 129.5  | 114.1  | 112.7  |
| 70°   | 16232.2 | 11482.6 | 549.6  | 248.5  | 230.3  | 214.9  | 178.5  | 147.7  | 122.5  | 104.3  | 100.8  |
| 72.5° | 13796.5 | 9834.5  | 388.6  | 219.1  | 200.9  | 182.7  | 151.2  | 140.7  | 116.9  | 93.8   | 91.0   |
| 75°   | 11334.9 | 7244.1  | 325.6  | 191.1  | 171.5  | 147.0  | 128.8  | 130.9  | 109.9  | 85.4   | 83.3   |
| 77.5° | 7982.0  | 4516.5  | 303.2  | 156.1  | 135.1  | 116.9  | 111.3  | 119.7  | 100.8  | 78.4   | 76.3   |
| 80°   | 4658.6  | 2536.5  | 250.6  | 123.2  | 101.5  | 90.3   | 93.1   | 101.5  | 88.2   | 70.7   | 67.9   |
| 82.5° | 1880.5  | 1004.0  | 176.4  | 95.9   | 74.2   | 72.1   | 76.3   | 82.6   | 72.8   | 59.5   | 58.1   |
| 85°   | 671.4   | 313.7   | 100.1  | 63.0   | 47.6   | 49.7   | 49.0   | 58.8   | 52.5   | 43.4   | 42.7   |
| 87.5° | 176.4   | 62.3    | 44.8   | 25.2   | 20.3   | 20.3   | 18.9   | 27.3   | 25.2   | 19.6   | 21.7   |
| 90°   | 0.0     | 0.0     | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    |

Report Prepared for

Cooper Lighting Solutions

(formerly Eaton)

STREETWORKS

Report Number: SP1-2104-215-6

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

Test Date: 04/22/2021

### Test Information

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

### Spectral Parameters

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



### Test Conditions

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

REPORT NUMBER: SP1-2104-215-6

| Measurement and Test Equipment |                       |                  |                      |
|--------------------------------|-----------------------|------------------|----------------------|
| Instrument                     | Identification Number | Calibration Date | Calibration Due Date |
| Photometer                     | IN0058                | 1/31/2021        | 7/31/2021            |
| Power Meter                    | IN0071                | 12/1/2020        | 12/1/2021            |
| AC Power Source                | IN0063                | 12/1/2020        | 12/1/2021            |
| DC Power Source                | IN0208                | 12/1/2020        | 12/1/2021            |
| Sphere Thermometer             | IN0085                | 12/1/2020        | 12/1/2021            |
| Room Thermometer               | IN0046                | 12/1/2020        | 12/1/2021            |



REPORT NUMBER: SP1-2104-215-6

**CIE 1931 Chromaticity Diagram**



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



REPORT NUMBER: SP1-2104-215-6

### Photopic Flux vs. Wavelength



#####

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

REPORT NUMBER: SP1-2104-215-6

### Scotopic Flux vs. Wavelength



Scotopic Lumens: 43125.2

S/P: 1.19

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

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### Melanopic Flux vs. Wavelength


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

| λ<br>(nm) | Power<br>(μW/nm) | Lumens<br>(Φ/nm) | λ<br>(nm) | Power<br>(μW/nm) | Lumens<br>(Φ/nm) | λ<br>(nm) | Power<br>(μW/nm) | Lumens<br>(Φ/nm) | λ<br>(nm) | Power<br>(μW/nm) | Lumens<br>(Φ/nm) | λ<br>(nm) | Power<br>(μW/nm) | Lumens<br>(Φ/nm) |
|-----------|------------------|------------------|-----------|------------------|------------------|-----------|------------------|------------------|-----------|------------------|------------------|-----------|------------------|------------------|
| 360       | 12827            | 0.0              | 490       | 80096            | 66.7             | 620       | 649050           | 0.5              | 750       | 30187            | 0.0              | 880       | 19756            | 0.0              |
| 365       | 11336            | 0.0              | 495       | 104447           | 86.2             | 625       | 608162           | 0.3              | 755       | 27442            | 0.0              | 885       | 21245            | 0.0              |
| 370       | 11776            | 0.0              | 500       | 142477           | 114.5            | 630       | 557990           | 0.2              | 760       | 25382            | 0.0              | 890       | 17771            | 0.0              |
| 375       | 13009            | 0.0              | 505       | 187724           | 144.1            | 635       | 506861           | 0.1              | 765       | 23778            | 0.0              | 895       | 14356            | 0.0              |
| 380       | 13906            | 0.0              | 510       | 232209           | 166.7            | 640       | 460827           | 0.1              | 770       | 21474            | 0.0              | 900       | 16683            | 0.0              |
| 385       | 12960            | 0.0              | 515       | 273388           | 178.6            | 645       | 418064           | 0.0              | 775       | 21394            | 0.0              | 905       | 16548            | 0.0              |
| 390       | 11750            | 0.0              | 520       | 308378           | 179.5            | 650       | 376246           | 0.0              | 780       | 18945            | 0.0              | 910       | 15630            | 0.0              |
| 395       | 10399            | 0.1              | 525       | 336804           | 170.8            | 655       | 332016           | 0.0              | 785       | 16318            | 0.0              | 915       | 20907            | 0.0              |
| 400       | 9192             | 0.1              | 530       | 361609           | 156.3            | 660       | 294638           | 0.0              | 790       | 17841            | 0.0              | 920       | 16083            | 0.0              |
| 405       | 8943             | 0.2              | 535       | 382440           | 137.6            | 665       | 259105           | 0.0              | 795       | 16506            | 0.0              | 925       | 20203            | 0.0              |
| 410       | 11120            | 0.4              | 540       | 401976           | 117.6            | 670       | 223041           | 0.0              | 800       | 15058            | 0.0              | 930       | 22625            | 0.0              |
| 415       | 18193            | 1.2              | 545       | 426232           | 99.0             | 675       | 193569           | 0.0              | 805       | 16851            | 0.0              | 935       | 24828            | 0.0              |
| 420       | 32317            | 3.7              | 550       | 455969           | 81.9             | 680       | 167520           | 0.0              | 810       | 16679            | 0.0              | 940       | 21275            | 0.0              |
| 425       | 59220            | 9.2              | 555       | 490448           | 66.1             | 685       | 144697           | 0.0              | 815       | 15851            | 0.0              | 945       | 23270            | 0.0              |
| 430       | 100522           | 21.2             | 560       | 530799           | 52.4             | 690       | 125032           | 0.0              | 820       | 15536            | 0.0              | 950       | 21756            | 0.0              |
| 435       | 155311           | 41.4             | 565       | 572799           | 40.2             | 695       | 107458           | 0.0              | 825       | 16381            | 0.0              | 955       | 24823            | 0.0              |
| 440       | 239817           | 80.1             | 570       | 615361           | 30.1             | 700       | 93549            | 0.0              | 830       | 16149            | 0.0              | 960       | 19499            | 0.0              |
| 445       | 368265           | 145.3            | 575       | 659689           | 22.0             | 705       | 81608            | 0.0              | 835       | 16687            | 0.0              | 965       | 27077            | 0.0              |
| 450       | 439895           | 202.7            | 580       | 700037           | 15.7             | 710       | 71559            | 0.0              | 840       | 16206            | 0.0              | 970       | 28727            | 0.0              |
| 455       | 329010           | 172.4            | 585       | 734518           | 10.9             | 715       | 65193            | 0.0              | 845       | 16062            | 0.0              | 975       | 21725            | 0.0              |
| 460       | 207545           | 122.3            | 590       | 760906           | 7.5              | 720       | 58466            | 0.0              | 850       | 18530            | 0.0              | 980       | 33536            | 0.0              |
| 465       | 154577           | 101.0            | 595       | 763605           | 4.9              | 725       | 52265            | 0.0              | 855       | 17709            | 0.0              | 985       | 30537            | 0.0              |
| 470       | 110708           | 79.3             | 600       | 766048           | 3.2              | 730       | 46287            | 0.0              | 860       | 18086            | 0.0              | 990       | 25187            | 0.0              |
| 475       | 78445            | 59.9             | 605       | 756483           | 2.1              | 735       | 40164            | 0.0              | 865       | 19763            | 0.0              | 995       | 35676            | 0.0              |
| 480       | 68887            | 55.4             | 610       | 730981           | 1.3              | 740       | 35097            | 0.0              | 870       | 19416            | 0.0              | 1000      | 32909            | 0.0              |
| 485       | 69832            | 57.6             | 615       | 694682           | 0.8              | 745       | 32334            | 0.0              | 875       | 19352            | 0.0              |           |                  |                  |

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TM-30-18

### Summary

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

### Spectral Power Distribution Comparison



### Color Vector Graphics

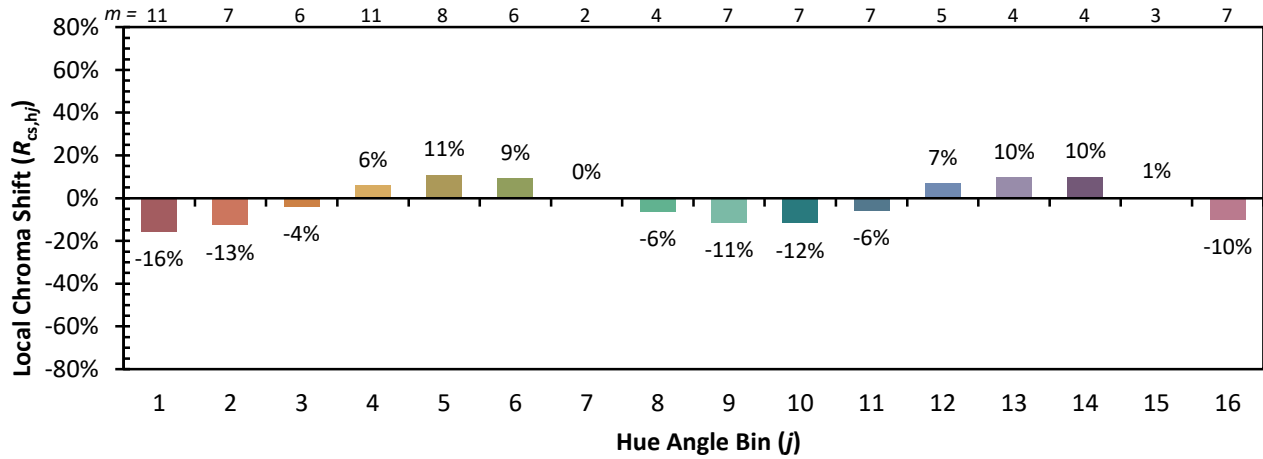


**Individual Sample Fidelity Index ( $R_{f,i}$ )**

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



Color Rendition by Hue-Angle Bin



**Measure Comparisons**


(END OF REPORT)