

Cooper Lighting Solutions Photometric Lab  
1121 Highway 74 South  
Peachtree City, GA 30269



Scaled data based on original data using  
LM-79-2019 Approved Method: Electrical and Photometric Measurements of Solid-  
State Lighting Products

Test Report Prepared for  
Cooper Lighting Solutions

Brand: METALUX

Report Number: P1433919

Luminaire Tested: EHBR1-48-UNV-W-L940-UPL30

Issue Date: 3/20/2026

**Test Information**

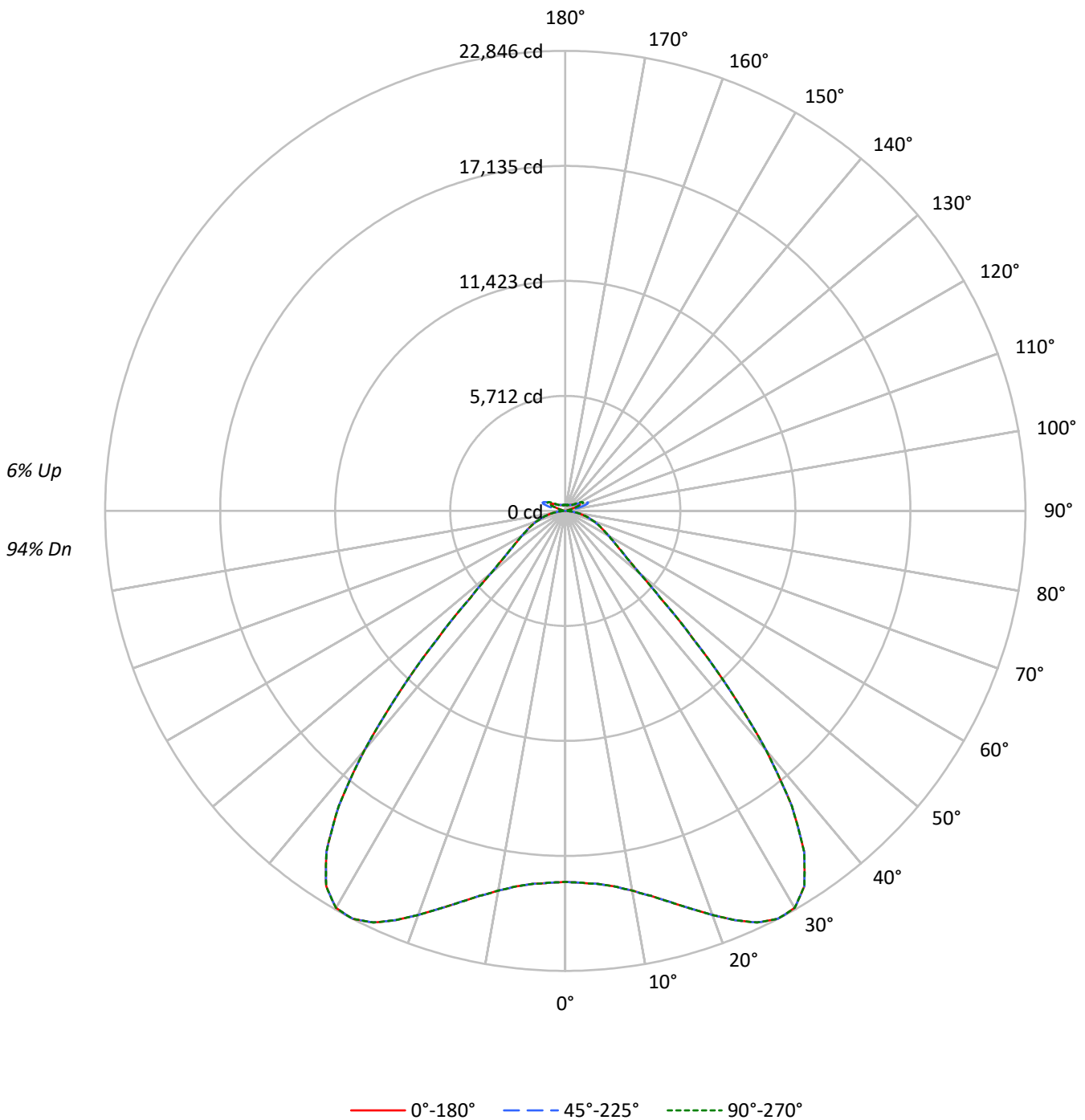
Test Method: LM-79-2019  
Report Number: P1433919  
REPORT IS A COMBINATION OF REPORTS P1431856 AND P1431635  
Test Lab: INNOVATION CENTER  
Issue Date: 3/20/2026  
Manufacturer: COOPER LIGHTING SOLUTIONS  
Product Line: METALUX  
Catalog Number: EHBR1-48-UNV-W-L940-UPL30  
Description: Elevate Round Highbay at, 49000 lumens, 4000K 90CRI LEDs with W lens  
Light Source: -  
Ballast/Driver: -

**Summary**

Lumens per Lamp: N/A  
Luminaire Lumens: 46823.9 lumens  
Efficiency: N/A  
Efficacy: 166.9 lumens/watt  
Spacing Criteria (0/90/45): 1.54 / 1.54 / 1.31  
Luminous Opening: Vertical Cylinder (Dia: 1.71' x H: 0.1')  
CIE Type: Direct  
  
Input Watts (W): 280.6  
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: 24 FT

TEST NUMBER: P1433919  
CATALOG NUMBER: EHBR1-48-UNV-W-L940-UPL30

### Luminous Intensity Polar Plot





TEST NUMBER: P1433919  
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**COEFFICIENT OF UTILIZATION - ZONAL CAVITY METHOD:**

|     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |    |    |    |    |    |    |    |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|----|----|----|----|----|----|----|
| RF  | 20  |     |     |     | 20  |     |     |     | 20  |     |     |     | 20  |     |    |    | 20 |    |    |    |    |
| RC  | 80  |     |     |     | 70  |     |     |     | 50  |     |     |     | 30  |     |    |    | 10 |    |    | 0  |    |
| RW  | 70  | 50  | 30  | 10  | 70  | 50  | 30  | 10  | 50  | 30  | 10  | 50  | 30  | 10  | 50 | 30 | 10 | 50 | 30 | 10 | 0  |
| RCR |     |     |     |     |     |     |     |     |     |     |     |     |     |     |    |    |    |    |    |    |    |
| 0   | 118 | 118 | 118 | 118 | 114 | 114 | 114 | 114 | 108 | 108 | 108 | 102 | 102 | 102 | 97 | 97 | 97 | 97 | 97 | 97 | 94 |
| 1   | 110 | 106 | 103 | 100 | 107 | 103 | 100 | 98  | 98  | 96  | 93  | 93  | 91  | 90  | 89 | 87 | 86 | 86 | 86 | 86 | 84 |
| 2   | 102 | 95  | 90  | 85  | 99  | 93  | 88  | 84  | 89  | 85  | 81  | 85  | 81  | 79  | 81 | 78 | 76 | 76 | 76 | 76 | 74 |
| 3   | 95  | 86  | 79  | 74  | 92  | 84  | 78  | 73  | 81  | 75  | 71  | 77  | 73  | 69  | 74 | 70 | 67 | 67 | 67 | 67 | 65 |
| 4   | 88  | 78  | 71  | 65  | 85  | 76  | 70  | 64  | 73  | 68  | 63  | 70  | 66  | 62  | 68 | 64 | 60 | 60 | 60 | 60 | 58 |
| 5   | 82  | 71  | 63  | 58  | 79  | 70  | 62  | 57  | 67  | 61  | 56  | 64  | 59  | 55  | 62 | 58 | 54 | 54 | 54 | 54 | 52 |
| 6   | 76  | 65  | 57  | 52  | 74  | 64  | 56  | 51  | 61  | 55  | 50  | 59  | 54  | 49  | 57 | 52 | 49 | 49 | 49 | 49 | 47 |
| 7   | 71  | 59  | 52  | 46  | 69  | 58  | 51  | 46  | 56  | 50  | 45  | 54  | 49  | 45  | 53 | 48 | 44 | 44 | 44 | 44 | 42 |
| 8   | 67  | 55  | 47  | 42  | 65  | 54  | 47  | 42  | 52  | 46  | 41  | 50  | 45  | 41  | 49 | 44 | 40 | 40 | 40 | 40 | 38 |
| 9   | 62  | 50  | 43  | 38  | 61  | 50  | 43  | 38  | 48  | 42  | 37  | 47  | 41  | 37  | 45 | 40 | 36 | 36 | 36 | 36 | 35 |
| 10  | 59  | 47  | 40  | 35  | 57  | 46  | 39  | 35  | 45  | 38  | 34  | 43  | 38  | 34  | 42 | 37 | 33 | 33 | 33 | 33 | 32 |

**AVERAGE LUMINANCE (cd/sqm):**

|     | 0°     | 45°    | 90°    |
|-----|--------|--------|--------|
| 0°  | 86514  | 86514  | 86514  |
| 5°  | 87088  | 87088  | 87088  |
| 10° | 90114  | 90114  | 90114  |
| 15° | 95825  | 95825  | 95825  |
| 20° | 103876 | 103876 | 103876 |
| 25° | 112923 | 112923 | 112923 |
| 30° | 118363 | 118363 | 118363 |
| 35° | 112662 | 112662 | 112662 |
| 40° | 89397  | 89397  | 89397  |
| 45° | 55255  | 55255  | 55255  |
| 50° | 31995  | 31995  | 31995  |
| 55° | 24208  | 24208  | 24208  |
| 60° | 20766  | 20766  | 20766  |
| 65° | 18757  | 18757  | 18757  |
| 70° | 17253  | 17253  | 17253  |
| 75° | 15243  | 15243  | 15243  |
| 80° | 12422  | 12422  | 12422  |
| 85° | 7323   | 7323   | 7323   |

**MAXIMUM LUMINANCE 45°-90°:**

Horizontal Angle: 0°  
 Vertical Angle: 45°  
 Luminance: 55255 cd/sqm



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**ZONAL LUMENS:**

| Zone      | Lumens  | % Fixture |
|-----------|---------|-----------|
| 0°-10°    | 1792.4  | 3.8       |
| 10°-20°   | 5746.3  | 12.3      |
| 20°-30°   | 10372.3 | 22.2      |
| 30°-40°   | 12533.8 | 26.8      |
| 40°-50°   | 7161.0  | 15.3      |
| 50°-60°   | 3032.9  | 6.5       |
| 60°-70°   | 1956.2  | 4.2       |
| 70°-80°   | 1137.4  | 2.4       |
| 80°-90°   | 306.0   | 0.7       |
| 90°-100°  | 80.0    | 0.2       |
| 100°-110° | 494.3   | 1.1       |
| 110°-120° | 883.3   | 1.9       |
| 120°-130° | 519.4   | 1.1       |
| 130°-140° | 321.6   | 0.7       |
| 140°-150° | 225.9   | 0.5       |
| 150°-160° | 147.9   | 0.3       |
| 160°-170° | 84.9    | 0.2       |
| 170°-180° | 28.2    | 0.1       |
| 0°-30°    | 17911.0 | 38.3      |
| 0°-40°    | 30444.8 | 65.0      |
| 0°-60°    | 40638.7 | 86.8      |
| 0°-90°    | 44038.4 | 94.1      |
| 90°-120°  | 1457.6  | 3.1       |
| 90°-150°  | 2524.5  | 5.4       |
| 90°-180°  | 2786.0  | 5.9       |
| 0°-180°   | 46823.9 | 100.0     |

**CANDELA DISTRIBUTION:**

|      | 0°    | 22.5° | 45°   | 67.5° | 90°   | Flux  |
|------|-------|-------|-------|-------|-------|-------|
| 0°   | 18422 | 18422 | 18422 | 18422 | 18422 |       |
| 5°   | 18595 | 18595 | 18595 | 18595 | 18595 | 1792  |
| 15°  | 20104 | 20104 | 20104 | 20104 | 20104 | 5746  |
| 25°  | 22551 | 22551 | 22551 | 22551 | 22551 | 10372 |
| 35°  | 20678 | 20678 | 20678 | 20678 | 20678 | 12534 |
| 45°  | 8940  | 8940  | 8940  | 8940  | 8940  | 7161  |
| 55°  | 3272  | 3272  | 3272  | 3272  | 3272  | 3033  |
| 65°  | 1958  | 1958  | 1958  | 1958  | 1958  | 1956  |
| 75°  | 1074  | 1074  | 1074  | 1074  | 1074  | 1137  |
| 85°  | 252   | 252   | 252   | 252   | 252   | 290   |
| 90°  | 22    | 35    | 58    | 38    | 22    | 21    |
| 95°  | 36    | 60    | 129   | 65    | 41    | 35    |
| 105° | 174   | 341   | 868   | 376   | 229   | 232   |
| 115° | 795   | 836   | 1027  | 984   | 978   | 732   |
| 125° | 574   | 536   | 551   | 559   | 626   | 523   |
| 135° | 423   | 410   | 424   | 399   | 397   | 330   |
| 145° | 352   | 347   | 368   | 363   | 362   | 223   |
| 155° | 311   | 308   | 322   | 322   | 322   | 145   |
| 165° | 294   | 294   | 301   | 301   | 300   | 84    |
| 175° | 292   | 292   | 296   | 296   | 296   | 28    |
| 180° | 296   | 296   | 296   | 296   | 296   |       |



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**CANDELA DISTRIBUTION (FULL):**

|        | 0°      | 22.5°   | 45°     | 67.5°   | 90°     |
|--------|---------|---------|---------|---------|---------|
| 0°     | 18422.5 | 18422.5 | 18422.5 | 18422.5 | 18422.5 |
| 2.5°   | 18484.3 | 18484.3 | 18484.3 | 18484.3 | 18484.3 |
| 5°     | 18594.7 | 18594.7 | 18594.7 | 18594.7 | 18594.7 |
| 7.5°   | 18811.8 | 18811.8 | 18811.8 | 18811.8 | 18811.8 |
| 10°    | 19146.0 | 19146.0 | 19146.0 | 19146.0 | 19146.0 |
| 12.5°  | 19580.2 | 19580.2 | 19580.2 | 19580.2 | 19580.2 |
| 15°    | 20103.5 | 20103.5 | 20103.5 | 20103.5 | 20103.5 |
| 17.5°  | 20702.6 | 20702.6 | 20702.6 | 20702.6 | 20702.6 |
| 20°    | 21349.5 | 21349.5 | 21349.5 | 21349.5 | 21349.5 |
| 22.5°  | 22000.8 | 22000.8 | 22000.8 | 22000.8 | 22000.8 |
| 25°    | 22550.7 | 22550.7 | 22550.7 | 22550.7 | 22550.7 |
| 27.5°  | 22846.5 | 22846.5 | 22846.5 | 22846.5 | 22846.5 |
| 30°    | 22767.0 | 22767.0 | 22767.0 | 22767.0 | 22767.0 |
| 32.5°  | 22092.1 | 22092.1 | 22092.1 | 22092.1 | 22092.1 |
| 35°    | 20677.5 | 20677.5 | 20677.5 | 20677.5 | 20677.5 |
| 37.5°  | 18471.8 | 18471.8 | 18471.8 | 18471.8 | 18471.8 |
| 40°    | 15494.8 | 15494.8 | 15494.8 | 15494.8 | 15494.8 |
| 42.5°  | 12127.6 | 12127.6 | 12127.6 | 12127.6 | 12127.6 |
| 45°    | 8940.1  | 8940.1  | 8940.1  | 8940.1  | 8940.1  |
| 47.5°  | 6389.9  | 6389.9  | 6389.9  | 6389.9  | 6389.9  |
| 50°    | 4768.4  | 4768.4  | 4768.4  | 4768.4  | 4768.4  |
| 52.5°  | 3861.0  | 3861.0  | 3861.0  | 3861.0  | 3861.0  |
| 55°    | 3271.5  | 3271.5  | 3271.5  | 3271.5  | 3271.5  |
| 57.5°  | 2840.9  | 2840.9  | 2840.9  | 2840.9  | 2840.9  |
| 60°    | 2496.4  | 2496.4  | 2496.4  | 2496.4  | 2496.4  |
| 62.5°  | 2209.4  | 2209.4  | 2209.4  | 2209.4  | 2209.4  |
| 65°    | 1957.8  | 1957.8  | 1957.8  | 1957.8  | 1957.8  |
| 67.5°  | 1735.5  | 1735.5  | 1735.5  | 1735.5  | 1735.5  |
| 70°    | 1513.9  | 1513.9  | 1513.9  | 1513.9  | 1513.9  |
| 72.5°  | 1293.1  | 1293.1  | 1293.1  | 1293.1  | 1293.1  |
| 75°    | 1073.8  | 1073.8  | 1073.8  | 1073.8  | 1073.8  |
| 77.5°  | 862.6   | 862.6   | 862.6   | 862.6   | 862.6   |
| 80°    | 653.5   | 653.5   | 653.5   | 653.5   | 653.5   |
| 82.5°  | 448.2   | 448.2   | 448.2   | 448.2   | 448.2   |
| 85°    | 251.7   | 251.7   | 251.7   | 251.7   | 251.7   |
| 87.5°  | 79.5    | 79.5    | 79.5    | 79.5    | 79.5    |
| 90°    | 22.0    | 34.7    | 58.3    | 37.8    | 22.0    |
| 92.5°  | 30.7    | 51.2    | 92.3    | 48.1    | 27.6    |
| 95°    | 36.2    | 59.9    | 129.3   | 64.7    | 41.0    |
| 97.5°  | 45.7    | 66.2    | 148.3   | 78.8    | 63.1    |
| 100°   | 59.9    | 77.2    | 230.4   | 96.2    | 83.6    |
| 102.5° | 100.9   | 162.5   | 487.6   | 179.9   | 126.2   |
| 105°   | 173.6   | 340.9   | 868.1   | 375.6   | 228.8   |
| 107.5° | 299.8   | 609.2   | 1144.3  | 664.4   | 432.4   |
| 110°   | 559.5   | 808.9   | 1200.3  | 913.0   | 692.0   |



TEST NUMBER: P1433919

CATALOG NUMBER: EHBR1-48-UNV-W-L940-UPL30

**CANDELA DISTRIBUTION (continued):**

|        | 0°    | 22.5° | 45°    | 67.5°  | 90°   |
|--------|-------|-------|--------|--------|-------|
| 112.5° | 755.2 | 868.9 | 1149.8 | 1007.8 | 900.4 |
| 115°   | 794.6 | 835.7 | 1026.7 | 984.1  | 977.8 |
| 117.5° | 767.8 | 763.1 | 872.0  | 884.6  | 944.6 |
| 120°   | 710.9 | 679.4 | 728.4  | 772.5  | 853.0 |
| 122.5° | 639.9 | 602.0 | 624.2  | 657.3  | 737.9 |
| 125°   | 574.4 | 536.5 | 550.7  | 558.6  | 626.5 |
| 127.5° | 516.0 | 490.7 | 498.6  | 489.1  | 531.8 |
| 130°   | 477.2 | 455.1 | 466.1  | 444.0  | 464.5 |
| 132.5° | 445.5 | 431.4 | 443.9  | 417.1  | 423.4 |
| 135°   | 422.6 | 409.9 | 424.2  | 398.9  | 397.3 |
| 137.5° | 402.8 | 391.8 | 406.0  | 387.0  | 382.3 |
| 140°   | 385.3 | 375.9 | 391.7  | 377.5  | 374.3 |
| 142.5° | 365.6 | 359.2 | 378.2  | 368.7  | 365.6 |
| 145°   | 352.2 | 347.4 | 367.9  | 363.2  | 361.6 |
| 147.5° | 340.2 | 337.1 | 356.1  | 354.5  | 354.5 |
| 150°   | 329.2 | 326.1 | 345.0  | 343.4  | 345.0 |
| 152.5° | 318.2 | 315.0 | 332.3  | 330.7  | 332.3 |
| 155°   | 310.9 | 307.7 | 322.0  | 322.0  | 322.0 |
| 157.5° | 304.6 | 303.0 | 314.1  | 314.1  | 314.1 |
| 160°   | 300.6 | 299.1 | 308.5  | 308.5  | 306.9 |
| 162.5° | 296.6 | 295.1 | 306.0  | 304.5  | 304.5 |
| 165°   | 293.5 | 293.5 | 301.4  | 301.4  | 299.8 |
| 167.5° | 293.5 | 291.9 | 299.8  | 299.8  | 298.2 |
| 170°   | 291.9 | 291.9 | 298.2  | 296.6  | 295.1 |
| 172.5° | 292.6 | 292.6 | 299.0  | 297.4  | 295.8 |
| 175°   | 291.8 | 291.8 | 296.5  | 296.5  | 296.5 |
| 177.5° | 293.4 | 293.4 | 296.5  | 296.5  | 295.0 |
| 180°   | 295.7 | 295.7 | 295.7  | 295.7  | 295.7 |



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 CATALOG NUMBER: EHBR1-48-UNV-W-L940-UPL30

**CIE UGR TABLE:**

| Reflectances:   |      |                  |       |       |       |       |                |       |       |       |       |
|-----------------|------|------------------|-------|-------|-------|-------|----------------|-------|-------|-------|-------|
| Ceiling         |      | 0.7              | 0.7   | 0.5   | 0.5   | 0.3   | 0.7            | 0.7   | 0.5   | 0.5   | 0.3   |
| Wall            |      | 0.5              | 0.3   | 0.5   | 0.3   | 0.3   | 0.5            | 0.3   | 0.5   | 0.3   | 0.3   |
| Reference plane |      | 0.2              | 0.2   | 0.2   | 0.2   | 0.2   | 0.2            | 0.2   | 0.2   | 0.2   | 0.2   |
| Room dimensions |      | Viewed crosswise |       |       |       |       | Viewed endwise |       |       |       |       |
| X=2H            | Y=2H | 19.52            | 20.72 | 19.98 | 21.16 | 21.63 | 19.52          | 20.72 | 19.98 | 21.16 | 21.63 |
|                 | 3H   | 21.02            | 22.09 | 21.50 | 22.54 | 23.05 | 21.02          | 22.09 | 21.50 | 22.54 | 23.05 |
|                 | 4H   | 21.58            | 22.58 | 22.08 | 23.05 | 23.58 | 21.58          | 22.58 | 22.08 | 23.05 | 23.58 |
|                 | 6H   | 21.96            | 22.88 | 22.48 | 23.37 | 23.91 | 21.96          | 22.88 | 22.48 | 23.37 | 23.91 |
|                 | 8H   | 22.06            | 22.93 | 22.59 | 23.44 | 23.99 | 22.06          | 22.93 | 22.59 | 23.44 | 23.99 |
|                 | 12H  | 22.10            | 22.93 | 22.63 | 23.43 | 24.00 | 22.10          | 22.93 | 22.63 | 23.43 | 24.00 |
| 4H              | 2H   | 19.96            | 20.96 | 20.47 | 21.43 | 21.96 | 19.96          | 20.96 | 20.47 | 21.43 | 21.96 |
|                 | 3H   | 21.68            | 22.50 | 22.20 | 23.02 | 23.57 | 21.68          | 22.50 | 22.20 | 23.02 | 23.57 |
|                 | 4H   | 22.36            | 23.10 | 22.89 | 23.63 | 24.21 | 22.36          | 23.10 | 22.89 | 23.63 | 24.21 |
|                 | 6H   | 22.86            | 23.49 | 23.42 | 24.05 | 24.65 | 22.86          | 23.49 | 23.42 | 24.05 | 24.65 |
|                 | 8H   | 22.99            | 23.58 | 23.55 | 24.14 | 24.74 | 22.99          | 23.58 | 23.55 | 24.14 | 24.74 |
|                 | 12H  | 23.05            | 23.57 | 23.63 | 24.16 | 24.77 | 23.05          | 23.57 | 23.63 | 24.16 | 24.77 |
| 8H              | 4H   | 22.56            | 23.16 | 23.13 | 23.71 | 24.32 | 22.56          | 23.16 | 23.13 | 23.71 | 24.32 |
|                 | 6H   | 23.16            | 23.64 | 23.76 | 24.25 | 24.86 | 23.16          | 23.64 | 23.76 | 24.25 | 24.86 |
|                 | 8H   | 23.34            | 23.78 | 23.96 | 24.39 | 25.02 | 23.34          | 23.78 | 23.96 | 24.39 | 25.02 |
|                 | 12H  | 23.45            | 23.84 | 24.06 | 24.43 | 25.13 | 23.45          | 23.84 | 24.06 | 24.43 | 25.13 |
| 12H             | 4H   | 22.56            | 23.09 | 23.14 | 23.67 | 24.28 | 22.56          | 23.09 | 23.14 | 23.67 | 24.28 |
|                 | 6H   | 23.17            | 23.61 | 23.79 | 24.22 | 24.85 | 23.17          | 23.61 | 23.79 | 24.22 | 24.85 |
|                 | 8H   | 23.40            | 23.78 | 24.01 | 24.38 | 25.08 | 23.40          | 23.78 | 24.01 | 24.38 | 25.08 |

LM-79-2019: Approved Method: Electrical and Photometric Measurements of Solid-  
State Lighting Products

Report Prepared for

Cooper Lighting Solutions

Metalux

Report Number: SP1-2506-472-7

Test Date: 08/04/2025

Luminaire Tested: EHBR-60-L940-N

Data in this report applies to families of products including EHBR-60-L940-N

**Test Information**

Test Method: LM-79-2019  
 Report Number: SP1-2506-472-7  
 Test Lab: COOPER LIGHTING SOLUTIONS  
 Photometer: SP1 - 76IN SPHERE  
 Measurement Geometry: 4π  
 Issue Date: 08/05/2025  
 Manufacturer: COOPER LIGHTING SOLUTIONS  
 Product Line: Metalux  
 Catalog Number: **EHBR-60-L940-N**  
 Description: Elevate Round Highbay at, 60000 lumens, 4000K 90CRI LEDs with N lens

**Spectral Parameters**

CCT (K): 3963  
 CIE u': 0.2267  
 CIE v': 0.5003  
 Duv: -0.0016  
 CIE x: 0.3810  
 CIE y: 0.3738  
 CIE z: 0.2453  
 Peak Wavelength (nm): 630  
 Dominant Wavelength (nm): 580  
 Purity: 26.49712  
 Rf: 90.7  
 Rg: 101

|           |      |      |      |
|-----------|------|------|------|
| CRI (Ra): | 93.4 |      |      |
| R1:       | 95.2 | R9:  | 66.4 |
| R2:       | 95.1 | R10: | 86.6 |
| R3:       | 93.3 | R11: | 94.4 |
| R4:       | 94.5 | R12: | 75.4 |
| R5:       | 94.2 | R13: | 95.0 |
| R6:       | 92.9 | R14: | 95.4 |
| R7:       | 94.0 | R15: | 92.8 |
| R8:       | 87.7 |      |      |



**Test Conditions**

Stabilization Time: 44M  
 Operation Time: 1H 44M  
 Sphere Temperature (°C): 25.0

REPORT NUMBER: SP1-2506-472-7

| Measurement and Test Equipment |                       |                  |                      |
|--------------------------------|-----------------------|------------------|----------------------|
| Instrument                     | Identification Number | Calibration Date | Calibration Due Date |
| Photometer                     | 76INCH SPHERE IN0058  | 6/16/2025        | 12/16/2025           |
| Power Meter                    | XITRON INXT2011004    | 1/21/2025        | 1/21/2026            |
| AC Power Source                | CHROMA 61603 IN0063   | 10/22/2024       | 10/22/2025           |
| DC Power Source                | AGILENT E3634A IN0208 | 10/22/2024       | 10/22/2025           |
| Sphere Thermometer             | ONSET IN0085          | 10/22/2024       | 10/22/2025           |
| Room Thermometer               | ONSET IN0046          | 10/22/2024       | 10/22/2025           |

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CIE 1931 Chromaticity Diagram



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



CCT = 3963K  
 CIE x = 0.3810  
 CIE y = 0.3738  
 Duv = -0.0016

Point lies inside the ANSI 4000K 4-step quadrangle

REPORT NUMBER: SP1-2506-472-7

**Photopic Flux vs. Wavelength**



**Photopic Lumens: NR**

| λ (nm) | Power W <sup>^</sup> /nm | Lumens (φ/nm) | λ (nm) | Power W <sup>^</sup> /nm | Lumens (φ/nm) | λ (nm) | Power W <sup>^</sup> /nm | Lumens (φ/nm) | λ (nm) | Power W <sup>^</sup> /nm | Lumens (φ/nm) | λ (nm) | Power W <sup>^</sup> /nm | Lumens (φ/nm) |
|--------|--------------------------|---------------|--------|--------------------------|---------------|--------|--------------------------|---------------|--------|--------------------------|---------------|--------|--------------------------|---------------|
| 360    | 0                        | NR            | 490    | 141                      | NR            | 620    | 276                      | NR            | 750    | 5                        | NR            | 880    | 0                        | NR            |
| 365    | 0                        | NR            | 495    | 167                      | NR            | 625    | 279                      | NR            | 755    | 4                        | NR            | 885    | 0                        | NR            |
| 370    | 0                        | NR            | 500    | 193                      | NR            | 630    | 1000                     | NR            | 760    | 4                        | NR            | 890    | 0                        | NR            |
| 375    | 0                        | NR            | 505    | 215                      | NR            | 635    | 628                      | NR            | 765    | 3                        | NR            | 895    | 0                        | NR            |
| 380    | 0                        | NR            | 510    | 230                      | NR            | 640    | 164                      | NR            | 770    | 3                        | NR            | 900    | 0                        | NR            |
| 385    | 0                        | NR            | 515    | 243                      | NR            | 645    | 161                      | NR            | 775    | 2                        | NR            | 905    | 0                        | NR            |
| 390    | 1                        | NR            | 520    | 251                      | NR            | 650    | 137                      | NR            | 780    | 2                        | NR            | 910    | 0                        | NR            |
| 395    | 2                        | NR            | 525    | 256                      | NR            | 655    | 111                      | NR            | 785    | 2                        | NR            | 915    | 0                        | NR            |
| 400    | 3                        | NR            | 530    | 262                      | NR            | 660    | 92                       | NR            | 790    | 1                        | NR            | 920    | 0                        | NR            |
| 405    | 4                        | NR            | 535    | 267                      | NR            | 665    | 76                       | NR            | 795    | 1                        | NR            | 925    | 0                        | NR            |
| 410    | 6                        | NR            | 540    | 271                      | NR            | 670    | 71                       | NR            | 800    | 1                        | NR            | 930    | 0                        | NR            |
| 415    | 11                       | NR            | 545    | 276                      | NR            | 675    | 56                       | NR            | 805    | 1                        | NR            | 935    | 0                        | NR            |
| 420    | 20                       | NR            | 550    | 280                      | NR            | 680    | 47                       | NR            | 810    | 1                        | NR            | 940    | 0                        | NR            |
| 425    | 37                       | NR            | 555    | 285                      | NR            | 685    | 40                       | NR            | 815    | 1                        | NR            | 945    | 0                        | NR            |
| 430    | 63                       | NR            | 560    | 290                      | NR            | 690    | 34                       | NR            | 820    | 1                        | NR            | 950    | 0                        | NR            |
| 435    | 108                      | NR            | 565    | 294                      | NR            | 695    | 29                       | NR            | 825    | 1                        | NR            | 955    | 0                        | NR            |
| 440    | 186                      | NR            | 570    | 296                      | NR            | 700    | 25                       | NR            | 830    | 0                        | NR            | 960    | 0                        | NR            |
| 445    | 323                      | NR            | 575    | 298                      | NR            | 705    | 21                       | NR            | 835    | 0                        | NR            | 965    | 0                        | NR            |
| 450    | 403                      | NR            | 580    | 299                      | NR            | 710    | 18                       | NR            | 840    | 0                        | NR            | 970    | 0                        | NR            |
| 455    | 293                      | NR            | 585    | 298                      | NR            | 715    | 15                       | NR            | 845    | 0                        | NR            | 975    | 0                        | NR            |
| 460    | 214                      | NR            | 590    | 296                      | NR            | 720    | 13                       | NR            | 850    | 0                        | NR            | 980    | 0                        | NR            |
| 465    | 180                      | NR            | 595    | 288                      | NR            | 725    | 11                       | NR            | 855    | 0                        | NR            | 985    | 0                        | NR            |
| 470    | 132                      | NR            | 600    | 286                      | NR            | 730    | 9                        | NR            | 860    | 0                        | NR            | 990    | 0                        | NR            |
| 475    | 109                      | NR            | 605    | 282                      | NR            | 735    | 8                        | NR            | 865    | 0                        | NR            | 995    | 0                        | NR            |
| 480    | 110                      | NR            | 610    | 311                      | NR            | 740    | 7                        | NR            | 870    | 0                        | NR            | 1000   | 0                        | NR            |
| 485    | 121                      | NR            | 615    | 334                      | NR            | 745    | 6                        | NR            | 875    | 0                        | NR            |        |                          |               |

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**Scotopic Flux vs. Wavelength**



**Scotopic Lumens: NR**

**S/P: 1.76**

| λ (nm) | Power W <sup>^</sup> /nm | Lumens (φ/nm) | λ (nm) | Power W <sup>^</sup> /nm | Lumens (φ/nm) | λ (nm) | Power W <sup>^</sup> /nm | Lumens (φ/nm) | λ (nm) | Power W <sup>^</sup> /nm | Lumens (φ/nm) | λ (nm) | Power W <sup>^</sup> /nm | Lumens (φ/nm) |
|--------|--------------------------|---------------|--------|--------------------------|---------------|--------|--------------------------|---------------|--------|--------------------------|---------------|--------|--------------------------|---------------|
| 360    | 0                        | NR            | 490    | 141                      | NR            | 620    | 276                      | NR            | 750    | 5                        | NR            | 880    | 0                        | NR            |
| 365    | 0                        | NR            | 495    | 167                      | NR            | 625    | 279                      | NR            | 755    | 4                        | NR            | 885    | 0                        | NR            |
| 370    | 0                        | NR            | 500    | 193                      | NR            | 630    | 1000                     | NR            | 760    | 4                        | NR            | 890    | 0                        | NR            |
| 375    | 0                        | NR            | 505    | 215                      | NR            | 635    | 628                      | NR            | 765    | 3                        | NR            | 895    | 0                        | NR            |
| 380    | 0                        | NR            | 510    | 230                      | NR            | 640    | 164                      | NR            | 770    | 3                        | NR            | 900    | 0                        | NR            |
| 385    | 0                        | NR            | 515    | 243                      | NR            | 645    | 161                      | NR            | 775    | 2                        | NR            | 905    | 0                        | NR            |
| 390    | 1                        | NR            | 520    | 251                      | NR            | 650    | 137                      | NR            | 780    | 2                        | NR            | 910    | 0                        | NR            |
| 395    | 2                        | NR            | 525    | 256                      | NR            | 655    | 111                      | NR            | 785    | 2                        | NR            | 915    | 0                        | NR            |
| 400    | 3                        | NR            | 530    | 262                      | NR            | 660    | 92                       | NR            | 790    | 1                        | NR            | 920    | 0                        | NR            |
| 405    | 4                        | NR            | 535    | 267                      | NR            | 665    | 76                       | NR            | 795    | 1                        | NR            | 925    | 0                        | NR            |
| 410    | 6                        | NR            | 540    | 271                      | NR            | 670    | 71                       | NR            | 800    | 1                        | NR            | 930    | 0                        | NR            |
| 415    | 11                       | NR            | 545    | 276                      | NR            | 675    | 56                       | NR            | 805    | 1                        | NR            | 935    | 0                        | NR            |
| 420    | 20                       | NR            | 550    | 280                      | NR            | 680    | 47                       | NR            | 810    | 1                        | NR            | 940    | 0                        | NR            |
| 425    | 37                       | NR            | 555    | 285                      | NR            | 685    | 40                       | NR            | 815    | 1                        | NR            | 945    | 0                        | NR            |
| 430    | 63                       | NR            | 560    | 290                      | NR            | 690    | 34                       | NR            | 820    | 1                        | NR            | 950    | 0                        | NR            |
| 435    | 108                      | NR            | 565    | 294                      | NR            | 695    | 29                       | NR            | 825    | 1                        | NR            | 955    | 0                        | NR            |
| 440    | 186                      | NR            | 570    | 296                      | NR            | 700    | 25                       | NR            | 830    | 0                        | NR            | 960    | 0                        | NR            |
| 445    | 323                      | NR            | 575    | 298                      | NR            | 705    | 21                       | NR            | 835    | 0                        | NR            | 965    | 0                        | NR            |
| 450    | 403                      | NR            | 580    | 299                      | NR            | 710    | 18                       | NR            | 840    | 0                        | NR            | 970    | 0                        | NR            |
| 455    | 293                      | NR            | 585    | 298                      | NR            | 715    | 15                       | NR            | 845    | 0                        | NR            | 975    | 0                        | NR            |
| 460    | 214                      | NR            | 590    | 296                      | NR            | 720    | 13                       | NR            | 850    | 0                        | NR            | 980    | 0                        | NR            |
| 465    | 180                      | NR            | 595    | 288                      | NR            | 725    | 11                       | NR            | 855    | 0                        | NR            | 985    | 0                        | NR            |
| 470    | 132                      | NR            | 600    | 286                      | NR            | 730    | 9                        | NR            | 860    | 0                        | NR            | 990    | 0                        | NR            |
| 475    | 109                      | NR            | 605    | 282                      | NR            | 735    | 8                        | NR            | 865    | 0                        | NR            | 995    | 0                        | NR            |
| 480    | 110                      | NR            | 610    | 311                      | NR            | 740    | 7                        | NR            | 870    | 0                        | NR            | 1000   | 0                        | NR            |
| 485    | 121                      | NR            | 615    | 334                      | NR            | 745    | 6                        | NR            | 875    | 0                        | NR            |        |                          |               |

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Melanopic Flux vs. Wavelength



Melanopic Lumens: NR

M/P: 3.64

| λ (nm) | Power W <sup>^</sup> /nm | Lumens (φ/nm) | λ (nm) | Power W <sup>^</sup> /nm | Lumens (φ/nm) | λ (nm) | Power W <sup>^</sup> /nm | Lumens (φ/nm) | λ (nm) | Power W <sup>^</sup> /nm | Lumens (φ/nm) | λ (nm) | Power W <sup>^</sup> /nm | Lumens (φ/nm) |
|--------|--------------------------|---------------|--------|--------------------------|---------------|--------|--------------------------|---------------|--------|--------------------------|---------------|--------|--------------------------|---------------|
| 360    | 0                        | NR            | 490    | 141                      | NR            | 620    | 276                      | NR            | 750    | 5                        | NR            | 880    | 0                        | NR            |
| 365    | 0                        | NR            | 495    | 167                      | NR            | 625    | 279                      | NR            | 755    | 4                        | NR            | 885    | 0                        | NR            |
| 370    | 0                        | NR            | 500    | 193                      | NR            | 630    | 1000                     | NR            | 760    | 4                        | NR            | 890    | 0                        | NR            |
| 375    | 0                        | NR            | 505    | 215                      | NR            | 635    | 628                      | NR            | 765    | 3                        | NR            | 895    | 0                        | NR            |
| 380    | 0                        | NR            | 510    | 230                      | NR            | 640    | 164                      | NR            | 770    | 3                        | NR            | 900    | 0                        | NR            |
| 385    | 0                        | NR            | 515    | 243                      | NR            | 645    | 161                      | NR            | 775    | 2                        | NR            | 905    | 0                        | NR            |
| 390    | 1                        | NR            | 520    | 251                      | NR            | 650    | 137                      | NR            | 780    | 2                        | NR            | 910    | 0                        | NR            |
| 395    | 2                        | NR            | 525    | 256                      | NR            | 655    | 111                      | NR            | 785    | 2                        | NR            | 915    | 0                        | NR            |
| 400    | 3                        | NR            | 530    | 262                      | NR            | 660    | 92                       | NR            | 790    | 1                        | NR            | 920    | 0                        | NR            |
| 405    | 4                        | NR            | 535    | 267                      | NR            | 665    | 76                       | NR            | 795    | 1                        | NR            | 925    | 0                        | NR            |
| 410    | 6                        | NR            | 540    | 271                      | NR            | 670    | 71                       | NR            | 800    | 1                        | NR            | 930    | 0                        | NR            |
| 415    | 11                       | NR            | 545    | 276                      | NR            | 675    | 56                       | NR            | 805    | 1                        | NR            | 935    | 0                        | NR            |
| 420    | 20                       | NR            | 550    | 280                      | NR            | 680    | 47                       | NR            | 810    | 1                        | NR            | 940    | 0                        | NR            |
| 425    | 37                       | NR            | 555    | 285                      | NR            | 685    | 40                       | NR            | 815    | 1                        | NR            | 945    | 0                        | NR            |
| 430    | 63                       | NR            | 560    | 290                      | NR            | 690    | 34                       | NR            | 820    | 1                        | NR            | 950    | 0                        | NR            |
| 435    | 108                      | NR            | 565    | 294                      | NR            | 695    | 29                       | NR            | 825    | 1                        | NR            | 955    | 0                        | NR            |
| 440    | 186                      | NR            | 570    | 296                      | NR            | 700    | 25                       | NR            | 830    | 0                        | NR            | 960    | 0                        | NR            |
| 445    | 323                      | NR            | 575    | 298                      | NR            | 705    | 21                       | NR            | 835    | 0                        | NR            | 965    | 0                        | NR            |
| 450    | 403                      | NR            | 580    | 299                      | NR            | 710    | 18                       | NR            | 840    | 0                        | NR            | 970    | 0                        | NR            |
| 455    | 293                      | NR            | 585    | 298                      | NR            | 715    | 15                       | NR            | 845    | 0                        | NR            | 975    | 0                        | NR            |
| 460    | 214                      | NR            | 590    | 296                      | NR            | 720    | 13                       | NR            | 850    | 0                        | NR            | 980    | 0                        | NR            |
| 465    | 180                      | NR            | 595    | 288                      | NR            | 725    | 11                       | NR            | 855    | 0                        | NR            | 985    | 0                        | NR            |
| 470    | 132                      | NR            | 600    | 286                      | NR            | 730    | 9                        | NR            | 860    | 0                        | NR            | 990    | 0                        | NR            |
| 475    | 109                      | NR            | 605    | 282                      | NR            | 735    | 8                        | NR            | 865    | 0                        | NR            | 995    | 0                        | NR            |
| 480    | 110                      | NR            | 610    | 311                      | NR            | 740    | 7                        | NR            | 870    | 0                        | NR            | 1000   | 0                        | NR            |
| 485    | 121                      | NR            | 615    | 334                      | NR            | 745    | 6                        | NR            | 875    | 0                        | NR            |        |                          |               |

**Summary**

$R_f = 90.7$   
 $R_g = 101$   
 $CIE R_a = 93.4$   
 $R_9 = 66.4$



**Color Vector Graphics**



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

|            |            |            |            |
|------------|------------|------------|------------|
| CES01 = 86 | CES26 = 90 | CES51 = 99 | CES76 = 83 |
| CES02 = 62 | CES27 = 93 | CES52 = 97 | CES77 = 87 |
| CES03 = 31 | CES28 = 94 | CES53 = 95 | CES78 = 79 |
| CES04 = 69 | CES29 = 91 | CES54 = 96 | CES79 = 94 |
| CES05 = 49 | CES30 = 98 | CES55 = 95 | CES80 = 91 |
| CES06 = 50 | CES31 = 92 | CES56 = 95 | CES81 = 80 |
| CES07 = 42 | CES32 = 84 | CES57 = 94 | CES82 = 96 |
| CES08 = 41 | CES33 = 95 | CES58 = 95 | CES83 = 95 |
| CES09 = 29 | CES34 = 90 | CES59 = 98 | CES84 = 93 |
| CES10 = 74 | CES35 = 94 | CES60 = 93 | CES85 = 82 |
| CES11 = 57 | CES36 = 84 | CES61 = 93 | CES86 = 84 |
| CES12 = 63 | CES37 = 92 | CES62 = 90 | CES87 = 90 |
| CES13 = 43 | CES38 = 93 | CES63 = 92 | CES88 = 97 |
| CES14 = 74 | CES39 = 98 | CES64 = 91 | CES89 = 84 |
| CES15 = 71 | CES40 = 96 | CES65 = 88 | CES90 = 99 |
| CES16 = 47 | CES41 = 98 | CES66 = 88 | CES91 = 74 |
| CES17 = 49 | CES42 = 89 | CES67 = 87 | CES92 = 78 |
| CES18 = 56 | CES43 = 89 | CES68 = 87 | CES93 = 87 |
| CES19 = 71 | CES44 = 99 | CES69 = 88 | CES94 = 75 |
| CES20 = 66 | CES45 = 93 | CES70 = 84 | CES95 = 83 |
| CES21 = 85 | CES46 = 95 | CES71 = 80 | CES96 = 91 |
| CES22 = 78 | CES47 = 92 | CES72 = 93 | CES97 = 93 |
| CES23 = 91 | CES48 = 96 | CES73 = 78 | CES98 = 93 |
| CES24 = 90 | CES49 = 93 | CES74 = 92 | CES99 = 94 |
| CES25 = 71 | CES50 = 99 | CES75 = 81 |            |



Color Rendition by Hue-Angle Bin



Measure Comparisons



(END OF REPORT)