

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: P1436605

Luminaire Tested: EHBR1-48-UNV-M-L940-UPL18

Issue Date: 3/25/2026

**Test Information**

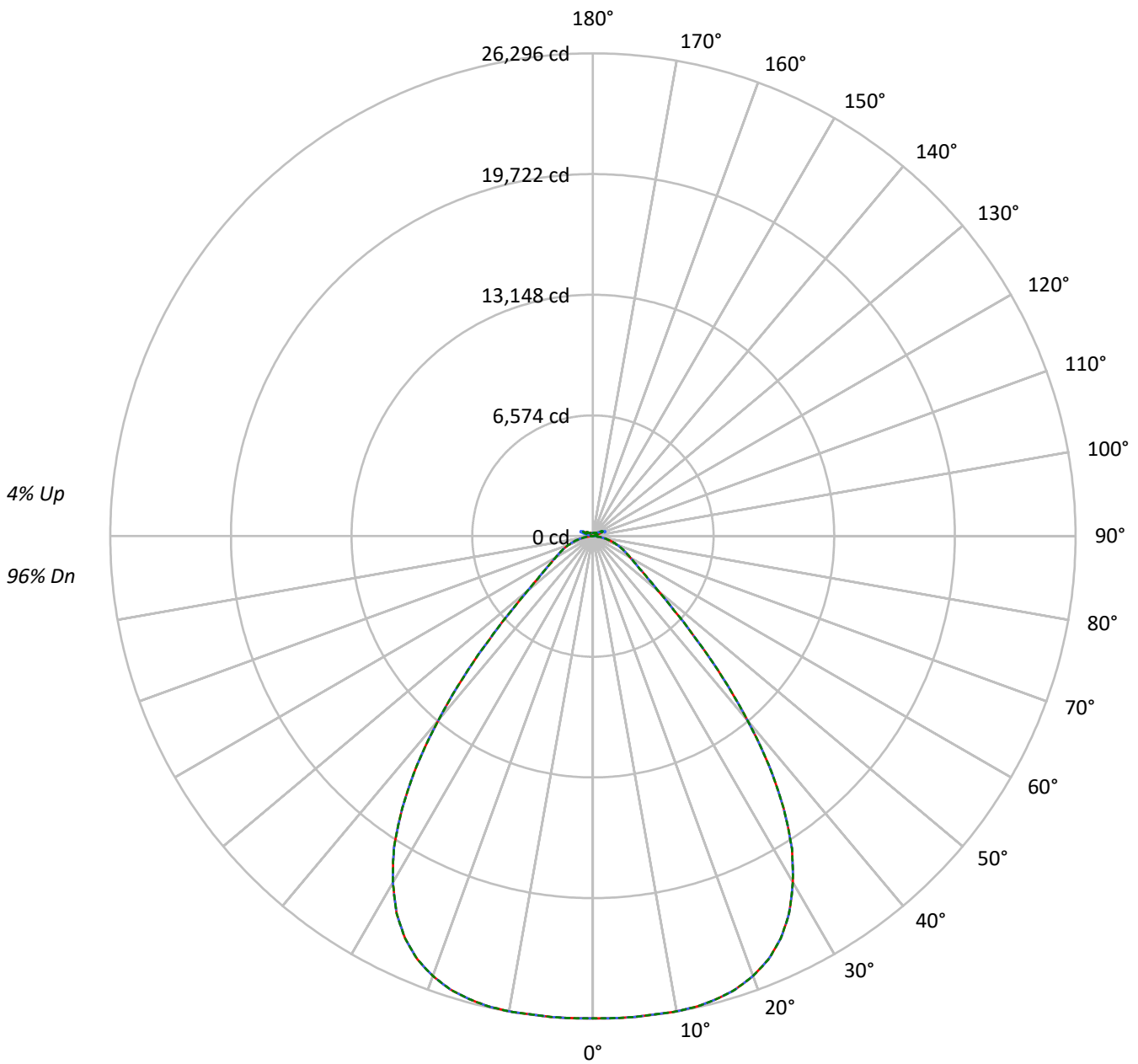
Test Method: LM-79-2019  
Report Number: P1436605  
REPORT IS A COMBINATION OF REPORTS P1436101 AND P1431635  
Test Lab: INNOVATION CENTER  
Issue Date: 3/25/2026  
Manufacturer: COOPER LIGHTING SOLUTIONS  
Product Line: METALUX  
Catalog Number: EHBR1-48-UNV-M-L940-UPL18  
Description: Elevate Round Highbay at, 48000 lumens, 4000K 90CRI LEDs with M lens  
Light Source: -  
Ballast/Driver: -

**Summary**

Lumens per Lamp: N/A  
Luminaire Lumens: 46134.8 lumens  
Efficiency: N/A  
Efficacy: 170.6 lumens/watt  
Spacing Criteria (0/90/45): 1.21 / 1.21 / 1.15  
Luminous Opening: Vertical Cylinder (Dia: 1.71' x H: 0.1')  
CIE Type: Direct  
  
Input Watts (W): 270.5  
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: P1436605  
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### Luminous Intensity Polar Plot



— 0°-180°    - - 45°-225°    - - - 90°-270°



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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 | 115 | 115 | 115 | 115 | 109 | 109 | 109 | 104 | 104 | 104 | 99 | 99 | 99 | 99 | 99 | 99 | 96 |
| 1   | 111 | 107 | 104 | 101 | 108 | 105 | 102 | 99  | 100 | 97  | 95  | 95  | 94  | 92  | 91 | 90 | 89 | 89 | 89 | 89 | 86 |
| 2   | 103 | 97  | 92  | 87  | 101 | 95  | 90  | 86  | 91  | 87  | 84  | 87  | 84  | 81  | 84 | 81 | 79 | 79 | 79 | 79 | 77 |
| 3   | 96  | 88  | 82  | 77  | 94  | 86  | 80  | 76  | 83  | 78  | 74  | 80  | 76  | 72  | 77 | 74 | 71 | 71 | 71 | 71 | 69 |
| 4   | 90  | 80  | 73  | 68  | 87  | 79  | 72  | 67  | 76  | 70  | 66  | 73  | 69  | 65  | 71 | 67 | 64 | 64 | 64 | 64 | 62 |
| 5   | 84  | 73  | 66  | 61  | 82  | 72  | 65  | 60  | 70  | 64  | 59  | 68  | 63  | 58  | 66 | 61 | 58 | 58 | 58 | 58 | 56 |
| 6   | 78  | 67  | 60  | 55  | 77  | 66  | 59  | 54  | 64  | 58  | 54  | 63  | 57  | 53  | 61 | 56 | 52 | 52 | 52 | 52 | 51 |
| 7   | 74  | 62  | 55  | 50  | 72  | 61  | 54  | 49  | 60  | 53  | 49  | 58  | 52  | 48  | 56 | 52 | 48 | 48 | 48 | 48 | 46 |
| 8   | 69  | 58  | 50  | 45  | 68  | 57  | 50  | 45  | 55  | 49  | 45  | 54  | 48  | 44  | 53 | 48 | 44 | 44 | 44 | 44 | 42 |
| 9   | 65  | 53  | 46  | 42  | 64  | 53  | 46  | 41  | 51  | 45  | 41  | 50  | 45  | 41  | 49 | 44 | 40 | 40 | 40 | 40 | 39 |
| 10  | 61  | 50  | 43  | 38  | 60  | 49  | 43  | 38  | 48  | 42  | 38  | 47  | 41  | 38  | 46 | 41 | 37 | 37 | 37 | 37 | 36 |

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

|     | 0°     | 45°    | 90°    |
|-----|--------|--------|--------|
| 0°  | 123368 | 123368 | 123368 |
| 5°  | 123157 | 123157 | 123157 |
| 10° | 123735 | 123735 | 123735 |
| 15° | 124445 | 124445 | 124445 |
| 20° | 124070 | 124070 | 124070 |
| 25° | 121172 | 121172 | 121172 |
| 30° | 113305 | 113305 | 113305 |
| 35° | 98678  | 98678  | 98678  |
| 40° | 75625  | 75625  | 75625  |
| 45° | 49404  | 49404  | 49404  |
| 50° | 31144  | 31144  | 31144  |
| 55° | 23217  | 23217  | 23217  |
| 60° | 19546  | 19546  | 19546  |
| 65° | 17773  | 17773  | 17773  |
| 70° | 16191  | 16191  | 16191  |
| 75° | 13862  | 13862  | 13862  |
| 80° | 10673  | 10673  | 10673  |
| 85° | 5598   | 5598   | 5598   |

**MAXIMUM LUMINANCE 45°-90°:**

Horizontal Angle: 0°  
 Vertical Angle: 45°  
 Luminance: 49404 cd/sqm



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**ZONAL LUMENS:**

| Zone      | Lumens  | % Fixture |
|-----------|---------|-----------|
| 0°-10°    | 2509.1  | 5.4       |
| 10°-20°   | 7368.4  | 16.0      |
| 20°-30°   | 11055.9 | 24.0      |
| 30°-40°   | 11123.4 | 24.1      |
| 40°-50°   | 6367.3  | 13.8      |
| 50°-60°   | 2912.3  | 6.3       |
| 60°-70°   | 1847.8  | 4.0       |
| 70°-80°   | 1036.5  | 2.2       |
| 80°-90°   | 246.1   | 0.5       |
| 90°-100°  | 47.5    | 0.1       |
| 100°-110° | 298.0   | 0.6       |
| 110°-120° | 532.9   | 1.2       |
| 120°-130° | 312.7   | 0.7       |
| 130°-140° | 191.8   | 0.4       |
| 140°-150° | 133.1   | 0.3       |
| 150°-160° | 86.4    | 0.2       |
| 160°-170° | 49.3    | 0.1       |
| 170°-180° | 16.3    | 0.0       |
| 0°-30°    | 20933.4 | 45.4      |
| 0°-40°    | 32056.8 | 69.5      |
| 0°-60°    | 41336.4 | 89.6      |
| 0°-90°    | 44466.8 | 96.4      |
| 90°-120°  | 878.5   | 1.9       |
| 90°-150°  | 1516.1  | 3.3       |
| 90°-180°  | 1668.0  | 3.6       |
| 0°-180°   | 46134.8 | 100.0     |

**CANDELA DISTRIBUTION:**

|      | 0°    | 22.5° | 45°   | 67.5° | 90°   | Flux  |
|------|-------|-------|-------|-------|-------|-------|
| 0°   | 26270 | 26270 | 26270 | 26270 | 26270 |       |
| 5°   | 26296 | 26296 | 26296 | 26296 | 26296 | 2509  |
| 15°  | 26108 | 26108 | 26108 | 26108 | 26108 | 7368  |
| 25°  | 24198 | 24198 | 24198 | 24198 | 24198 | 11056 |
| 35°  | 18111 | 18111 | 18111 | 18111 | 18111 | 11123 |
| 45°  | 7993  | 7993  | 7993  | 7993  | 7993  | 6367  |
| 55°  | 3138  | 3138  | 3138  | 3138  | 3138  | 2912  |
| 65°  | 1855  | 1855  | 1855  | 1855  | 1855  | 1848  |
| 75°  | 976   | 976   | 976   | 976   | 976   | 1037  |
| 85°  | 192   | 192   | 192   | 192   | 192   | 236   |
| 90°  | 12    | 20    | 34    | 22    | 12    | 13    |
| 95°  | 21    | 35    | 77    | 38    | 24    | 20    |
| 105° | 104   | 205   | 524   | 226   | 138   | 139   |
| 115° | 479   | 504   | 620   | 594   | 590   | 442   |
| 125° | 346   | 323   | 331   | 336   | 377   | 315   |
| 135° | 252   | 244   | 253   | 238   | 237   | 197   |
| 145° | 207   | 204   | 217   | 214   | 213   | 131   |
| 155° | 181   | 180   | 188   | 188   | 188   | 85    |
| 165° | 170   | 170   | 175   | 175   | 174   | 49    |
| 175° | 168   | 168   | 171   | 171   | 171   | 16    |
| 180° | 170   | 170   | 170   | 170   | 170   |       |



TEST NUMBER: P1436605

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**CANDELA DISTRIBUTION (FULL):**

|        | 0°      | 22.5°   | 45°     | 67.5°   | 90°     |
|--------|---------|---------|---------|---------|---------|
| 0°     | 26270.4 | 26270.4 | 26270.4 | 26270.4 | 26270.4 |
| 2.5°   | 26283.1 | 26283.1 | 26283.1 | 26283.1 | 26283.1 |
| 5°     | 26295.9 | 26295.9 | 26295.9 | 26295.9 | 26295.9 |
| 7.5°   | 26277.9 | 26277.9 | 26277.9 | 26277.9 | 26277.9 |
| 10°    | 26289.2 | 26289.2 | 26289.2 | 26289.2 | 26289.2 |
| 12.5°  | 26244.0 | 26244.0 | 26244.0 | 26244.0 | 26244.0 |
| 15°    | 26108.0 | 26108.0 | 26108.0 | 26108.0 | 26108.0 |
| 17.5°  | 25883.3 | 25883.3 | 25883.3 | 25883.3 | 25883.3 |
| 20°    | 25499.9 | 25499.9 | 25499.9 | 25499.9 | 25499.9 |
| 22.5°  | 24973.0 | 24973.0 | 24973.0 | 24973.0 | 24973.0 |
| 25°    | 24198.0 | 24198.0 | 24198.0 | 24198.0 | 24198.0 |
| 27.5°  | 23155.4 | 23155.4 | 23155.4 | 23155.4 | 23155.4 |
| 30°    | 21794.1 | 21794.1 | 21794.1 | 21794.1 | 21794.1 |
| 32.5°  | 20182.5 | 20182.5 | 20182.5 | 20182.5 | 20182.5 |
| 35°    | 18110.9 | 18110.9 | 18110.9 | 18110.9 | 18110.9 |
| 37.5°  | 15764.2 | 15764.2 | 15764.2 | 15764.2 | 15764.2 |
| 40°    | 13107.7 | 13107.7 | 13107.7 | 13107.7 | 13107.7 |
| 42.5°  | 10474.6 | 10474.6 | 10474.6 | 10474.6 | 10474.6 |
| 45°    | 7993.3  | 7993.3  | 7993.3  | 7993.3  | 7993.3  |
| 47.5°  | 6017.1  | 6017.1  | 6017.1  | 6017.1  | 6017.1  |
| 50°    | 4641.6  | 4641.6  | 4641.6  | 4641.6  | 4641.6  |
| 52.5°  | 3750.2  | 3750.2  | 3750.2  | 3750.2  | 3750.2  |
| 55°    | 3137.5  | 3137.5  | 3137.5  | 3137.5  | 3137.5  |
| 57.5°  | 2686.5  | 2686.5  | 2686.5  | 2686.5  | 2686.5  |
| 60°    | 2349.7  | 2349.7  | 2349.7  | 2349.7  | 2349.7  |
| 62.5°  | 2089.7  | 2089.7  | 2089.7  | 2089.7  | 2089.7  |
| 65°    | 1855.1  | 1855.1  | 1855.1  | 1855.1  | 1855.1  |
| 67.5°  | 1639.4  | 1639.4  | 1639.4  | 1639.4  | 1639.4  |
| 70°    | 1420.7  | 1420.7  | 1420.7  | 1420.7  | 1420.7  |
| 72.5°  | 1200.4  | 1200.4  | 1200.4  | 1200.4  | 1200.4  |
| 75°    | 976.5   | 976.5   | 976.5   | 976.5   | 976.5   |
| 77.5°  | 763.7   | 763.7   | 763.7   | 763.7   | 763.7   |
| 80°    | 561.5   | 561.5   | 561.5   | 561.5   | 561.5   |
| 82.5°  | 366.0   | 366.0   | 366.0   | 366.0   | 366.0   |
| 85°    | 192.4   | 192.4   | 192.4   | 192.4   | 192.4   |
| 87.5°  | 54.9    | 54.9    | 54.9    | 54.9    | 54.9    |
| 90°    | 12.4    | 20.0    | 34.4    | 22.0    | 12.4    |
| 92.5°  | 18.2    | 30.6    | 55.3    | 28.6    | 16.2    |
| 95°    | 21.0    | 35.3    | 77.3    | 38.2    | 23.9    |
| 97.5°  | 26.7    | 39.1    | 88.8    | 46.8    | 37.3    |
| 100°   | 35.3    | 45.8    | 138.4   | 57.3    | 49.7    |
| 102.5° | 60.2    | 97.4    | 294.1   | 107.9   | 75.5    |
| 105°   | 104.1   | 205.3   | 524.2   | 226.3   | 137.5   |
| 107.5° | 180.5   | 367.6   | 691.3   | 401.1   | 260.7   |
| 110°   | 337.1   | 487.9   | 724.7   | 551.0   | 417.3   |



TEST NUMBER: P1436605

CATALOG NUMBER: EHBR1-48-UNV-M-L940-UPL18

**CANDELA DISTRIBUTION (continued):**

|        | 0°    | 22.5° | 45°   | 67.5° | 90°   |
|--------|-------|-------|-------|-------|-------|
| 112.5° | 455.5 | 524.2 | 694.2 | 608.3 | 543.3 |
| 115°   | 479.3 | 504.2 | 619.7 | 593.9 | 590.1 |
| 117.5° | 463.1 | 460.2 | 526.1 | 533.7 | 570.1 |
| 120°   | 428.7 | 409.6 | 439.3 | 466.0 | 514.6 |
| 122.5° | 385.8 | 362.9 | 376.2 | 396.2 | 445.0 |
| 125°   | 345.6 | 322.7 | 331.3 | 336.1 | 377.1 |
| 127.5° | 310.3 | 295.1 | 299.8 | 294.1 | 319.8 |
| 130°   | 286.5 | 273.1 | 279.8 | 266.5 | 278.8 |
| 132.5° | 266.5 | 257.8 | 265.4 | 249.2 | 253.0 |
| 135°   | 252.1 | 244.5 | 253.0 | 237.8 | 236.8 |
| 137.5° | 239.7 | 233.0 | 241.6 | 230.1 | 227.2 |
| 140°   | 228.3 | 222.5 | 232.1 | 223.4 | 221.5 |
| 142.5° | 215.8 | 211.9 | 223.4 | 217.7 | 215.8 |
| 145°   | 207.2 | 204.3 | 216.8 | 213.9 | 213.0 |
| 147.5° | 199.6 | 197.7 | 209.2 | 208.1 | 208.1 |
| 150°   | 192.9 | 191.0 | 202.4 | 201.5 | 202.4 |
| 152.5° | 186.2 | 184.3 | 194.8 | 193.9 | 194.8 |
| 155°   | 181.4 | 179.5 | 188.1 | 188.1 | 188.1 |
| 157.5° | 177.6 | 176.6 | 183.3 | 183.3 | 183.3 |
| 160°   | 174.8 | 173.8 | 179.5 | 179.5 | 178.6 |
| 162.5° | 171.9 | 171.0 | 177.6 | 176.6 | 176.6 |
| 165°   | 169.9 | 169.9 | 174.8 | 174.8 | 173.8 |
| 167.5° | 169.9 | 169.0 | 173.8 | 173.8 | 172.8 |
| 170°   | 169.0 | 169.0 | 172.8 | 171.9 | 171.0 |
| 172.5° | 169.0 | 169.0 | 172.8 | 171.9 | 171.0 |
| 175°   | 168.1 | 168.1 | 171.0 | 171.0 | 171.0 |
| 177.5° | 169.0 | 169.0 | 171.0 | 171.0 | 169.9 |
| 180°   | 169.9 | 169.9 | 169.9 | 169.9 | 169.9 |



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 CATALOG NUMBER: EHBR1-48-UNV-M-L940-UPL18

**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 | 19.32            | 20.53 | 19.75 | 20.92 | 21.33 | 19.32          | 20.53 | 19.75 | 20.92 | 21.33 |
|                 | 3H   | 20.80            | 21.88 | 21.25 | 22.29 | 22.74 | 20.80          | 21.88 | 21.25 | 22.29 | 22.74 |
|                 | 4H   | 21.33            | 22.33 | 21.80 | 22.76 | 23.23 | 21.33          | 22.33 | 21.80 | 22.76 | 23.23 |
|                 | 6H   | 21.66            | 22.58 | 22.13 | 23.02 | 23.50 | 21.66          | 22.58 | 22.13 | 23.02 | 23.50 |
|                 | 8H   | 21.73            | 22.60 | 22.22 | 23.06 | 23.56 | 21.73          | 22.60 | 22.22 | 23.06 | 23.56 |
|                 | 12H  | 21.74            | 22.57 | 22.24 | 23.03 | 23.55 | 21.74          | 22.57 | 22.24 | 23.03 | 23.55 |
| 4H              | 2H   | 19.76            | 20.76 | 20.23 | 21.19 | 21.66 | 19.76          | 20.76 | 20.23 | 21.19 | 21.66 |
|                 | 3H   | 21.46            | 22.28 | 21.94 | 22.76 | 23.25 | 21.46          | 22.28 | 21.94 | 22.76 | 23.25 |
|                 | 4H   | 22.09            | 22.83 | 22.59 | 23.32 | 23.85 | 22.09          | 22.83 | 22.59 | 23.32 | 23.85 |
|                 | 6H   | 22.52            | 23.15 | 23.04 | 23.67 | 24.22 | 22.52          | 23.15 | 23.04 | 23.67 | 24.22 |
|                 | 8H   | 22.61            | 23.20 | 23.14 | 23.72 | 24.27 | 22.61          | 23.20 | 23.14 | 23.72 | 24.27 |
|                 | 12H  | 22.64            | 23.16 | 23.19 | 23.71 | 24.27 | 22.64          | 23.16 | 23.19 | 23.71 | 24.27 |
| 8H              | 4H   | 22.27            | 22.86 | 22.80 | 23.38 | 23.93 | 22.27          | 22.86 | 22.80 | 23.38 | 23.93 |
|                 | 6H   | 22.78            | 23.26 | 23.34 | 23.82 | 24.39 | 22.78          | 23.26 | 23.34 | 23.82 | 24.39 |
|                 | 8H   | 22.92            | 23.35 | 23.50 | 23.93 | 24.50 | 22.92          | 23.35 | 23.50 | 23.93 | 24.50 |
|                 | 12H  | 22.99            | 23.37 | 23.56 | 23.92 | 24.58 | 22.99          | 23.37 | 23.56 | 23.92 | 24.58 |
| 12H             | 4H   | 22.26            | 22.78 | 22.81 | 23.33 | 23.89 | 22.26          | 22.78 | 22.81 | 23.33 | 23.89 |
|                 | 6H   | 22.78            | 23.21 | 23.36 | 23.79 | 24.37 | 22.78          | 23.21 | 23.36 | 23.79 | 24.37 |
|                 | 8H   | 22.95            | 23.33 | 23.53 | 23.89 | 24.55 | 22.95          | 23.33 | 23.53 | 23.89 | 24.55 |

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**



Point lies inside the ANSI 4000K 4-step quadrangle

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**Photopic Flux vs. Wavelength**



**Photopic Lumens: NR**

| $\lambda$<br>(nm) | Power<br>W <sup>^</sup> /nm | Lumens<br>( $\phi$ /nm) | $\lambda$<br>(nm) | Power<br>W <sup>^</sup> /nm | Lumens<br>( $\phi$ /nm) | $\lambda$<br>(nm) | Power<br>W <sup>^</sup> /nm | Lumens<br>( $\phi$ /nm) | $\lambda$<br>(nm) | Power<br>W <sup>^</sup> /nm | Lumens<br>( $\phi$ /nm) | $\lambda$<br>(nm) | Power<br>W <sup>^</sup> /nm | Lumens<br>( $\phi$ /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            |        |                          |               |

REPORT NUMBER: SP1-2506-472-7

**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)