

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: NEO-RAY

Report Number: P921147

Luminaire Tested: DFN2DIP-TR4F0-100D090US935-FLLONL

Issue Date: 11/21/2024

**Test Information**

Test Method: LM-79-2019  
Report Number: P921147  
REPORT IS A COMBINATION OF REPORTS P901991 AND P898849  
Test Lab: INNOVATION CENTER  
Issue Date: 11/21/2024  
Manufacturer: COOPER LIGHTING SOLUTIONS  
Product Line: NEO-RAY  
Catalog Number: DFN2DIP-TR4F0-100D090US935-FLLONL  
Description: 4 foot, Triangle Define Geo, with Direct Frosted Lens, Indirect Open No Lens  
Light Source: -  
Ballast/Driver: -

**Summary**

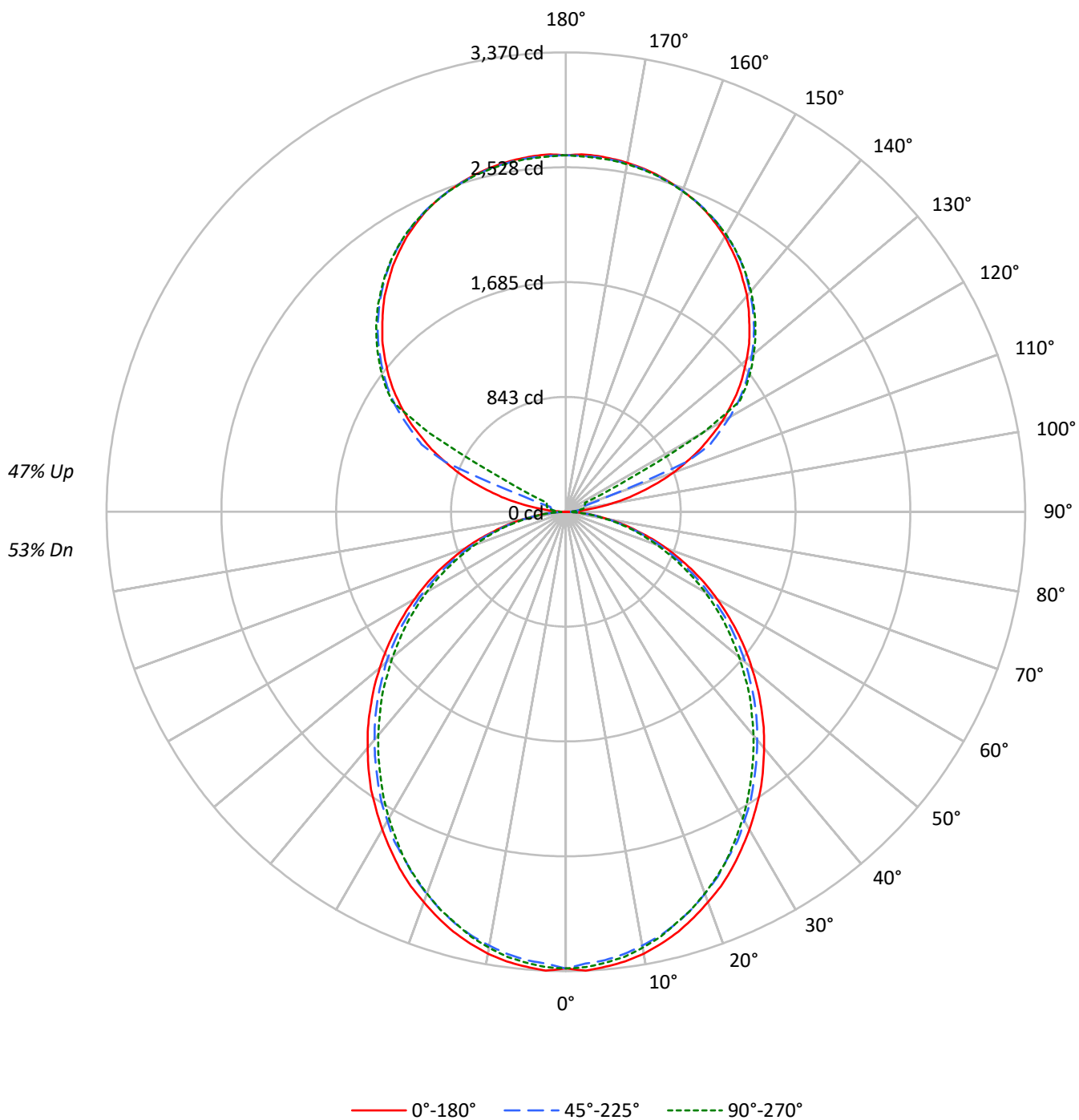
Lumens per Lamp: N/A  
Luminaire Lumens: 16195.4 lumens  
Efficiency: N/A  
Efficacy: 96.0 lumens/watt  
Spacing Criteria (0/90/45): 1.2 / 1.16 / 1.29  
Luminous Opening: Rectangular w/ Sides (W: 3.43' x L: 3.96' x H: 0.1')  
CIE Type: General Diffuse

Input Watts (W): 168.7  
Input Voltage (V):  
Input Current (Ain): NR  
Voltage Rise (V): NR  
Power Factor: 0.9972  
Total Harmonic Distortion (THDi): 0.128  
Frequency (hertz): 60  
Stabilization Time: NR  
Operation Time: NR  
Ambient Temperature (°C): NR  
Test Distance: 24 FT

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### Luminous Intensity Polar Plot



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**COEFFICIENT OF UTILIZATION - ZONAL CAVITY METHOD:**

|     |     |     |     |     |     |     |     |     |    |    |    |    |    |    |    |    |    |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|----|----|----|----|----|----|----|----|----|
| RF  | 20  |     |     |     | 20  |     |     |     | 20 |    |    |    | 20 |    |    |    | 20 |
| RC  | 80  |     |     |     | 70  |     |     |     | 50 |    |    |    | 30 |    |    |    | 10 |
| RW  | 70  | 50  | 30  | 10  | 70  | 50  | 30  | 10  | 50 | 30 | 10 | 50 | 30 | 10 | 50 | 30 | 10 |
| RCR |     |     |     |     |     |     |     |     |    |    |    |    |    |    |    |    |    |
| 0   | 108 | 108 | 108 | 108 | 100 | 100 | 100 | 100 | 85 | 85 | 85 | 71 | 71 | 71 | 59 | 59 | 59 |
| 1   | 98  | 94  | 90  | 87  | 91  | 87  | 84  | 81  | 74 | 72 | 70 | 63 | 61 | 59 | 52 | 51 | 49 |
| 2   | 90  | 82  | 76  | 71  | 83  | 76  | 71  | 66  | 65 | 61 | 58 | 55 | 52 | 50 | 46 | 44 | 42 |
| 3   | 82  | 72  | 65  | 59  | 75  | 67  | 61  | 55  | 58 | 53 | 49 | 49 | 45 | 42 | 40 | 38 | 35 |
| 4   | 75  | 64  | 56  | 50  | 69  | 59  | 52  | 47  | 51 | 46 | 41 | 43 | 39 | 36 | 36 | 33 | 31 |
| 5   | 69  | 57  | 49  | 43  | 63  | 53  | 46  | 40  | 46 | 40 | 36 | 39 | 35 | 31 | 33 | 29 | 27 |
| 6   | 63  | 51  | 43  | 37  | 58  | 48  | 40  | 35  | 41 | 35 | 31 | 35 | 31 | 27 | 30 | 26 | 23 |
| 7   | 59  | 46  | 38  | 33  | 54  | 43  | 36  | 31  | 37 | 32 | 27 | 32 | 28 | 24 | 27 | 24 | 21 |
| 8   | 54  | 42  | 34  | 29  | 50  | 39  | 32  | 27  | 34 | 28 | 24 | 29 | 25 | 22 | 25 | 21 | 19 |
| 9   | 51  | 38  | 31  | 26  | 47  | 36  | 29  | 24  | 31 | 26 | 22 | 27 | 23 | 19 | 23 | 19 | 17 |
| 10  | 47  | 35  | 28  | 23  | 44  | 33  | 26  | 22  | 29 | 23 | 20 | 25 | 21 | 18 | 21 | 18 | 15 |

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

|     | 0°   | 45°  | 90°  |
|-----|------|------|------|
| 0°  | 2662 | 2662 | 2662 |
| 5°  | 2666 | 2624 | 2642 |
| 10° | 2644 | 2589 | 2606 |
| 15° | 2605 | 2546 | 2550 |
| 20° | 2553 | 2487 | 2493 |
| 25° | 2501 | 2416 | 2427 |
| 30° | 2435 | 2350 | 2342 |
| 35° | 2373 | 2273 | 2253 |
| 40° | 2297 | 2194 | 2169 |
| 45° | 2221 | 2115 | 2082 |
| 50° | 2137 | 2033 | 1982 |
| 55° | 2050 | 1937 | 1889 |
| 60° | 1951 | 1824 | 1783 |
| 65° | 1844 | 1706 | 1658 |
| 70° | 1707 | 1563 | 1524 |
| 75° | 1518 | 1391 | 1400 |
| 80° | 1290 | 1173 | 1163 |
| 85° | 933  | 796  | 771  |

**MAXIMUM LUMINANCE 45°-90°:**

Horizontal Angle: 0°

Vertical Angle: 45°

Luminance: 2221 cd/sqm

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**ZONAL LUMENS:**

| Zone      | Lumens  | % Fixture |
|-----------|---------|-----------|
| 0°-10°    | 315.3   | 1.9       |
| 10°-20°   | 887.2   | 5.5       |
| 20°-30°   | 1303.8  | 8.1       |
| 30°-40°   | 1514.3  | 9.4       |
| 40°-50°   | 1512.4  | 9.3       |
| 50°-60°   | 1318.8  | 8.1       |
| 60°-70°   | 974.9   | 6.0       |
| 70°-80°   | 551.6   | 3.4       |
| 80°-90°   | 150.2   | 0.9       |
| 90°-100°  | 86.2    | 0.5       |
| 100°-110° | 321.5   | 2.0       |
| 110°-120° | 852.6   | 5.3       |
| 120°-130° | 1414.1  | 8.7       |
| 130°-140° | 1502.1  | 9.3       |
| 140°-150° | 1396.0  | 8.6       |
| 150°-160° | 1122.4  | 6.9       |
| 160°-170° | 723.2   | 4.5       |
| 170°-180° | 248.9   | 1.5       |
| 0°-30°    | 2506.3  | 15.5      |
| 0°-40°    | 4020.6  | 24.8      |
| 0°-60°    | 6851.8  | 42.3      |
| 0°-90°    | 8528.5  | 52.7      |
| 90°-120°  | 1260.3  | 7.8       |
| 90°-150°  | 5572.4  | 34.4      |
| 90°-180°  | 7667.0  | 47.3      |
| 0°-180°   | 16195.4 | 100.0     |

**CANDELA DISTRIBUTION:**

|      | 0°   | 22.5° | 45°  | 67.5° | 90°  | Flux |
|------|------|-------|------|-------|------|------|
| 0°   | 3350 | 3350  | 3350 | 3350  | 3350 |      |
| 5°   | 3350 | 3338  | 3302 | 3328  | 3322 | 318  |
| 15°  | 3189 | 3170  | 3128 | 3141  | 3125 | 898  |
| 25°  | 2886 | 2861  | 2806 | 2812  | 2806 | 1328 |
| 35°  | 2490 | 2458  | 2406 | 2387  | 2371 | 1555 |
| 45°  | 2026 | 2004  | 1955 | 1920  | 1907 | 1564 |
| 55°  | 1534 | 1514  | 1476 | 1437  | 1421 | 1371 |
| 65°  | 1034 | 1015  | 983  | 954   | 938  | 1023 |
| 75°  | 541  | 535   | 518  | 499   | 506  | 578  |
| 85°  | 132  | 129   | 126  | 116   | 113  | 147  |
| 90°  | 2    | 23    | 38   | 47    | 51   | 15   |
| 95°  | 123  | 60    | 74   | 83    | 81   | 146  |
| 105° | 575  | 632   | 116  | 136   | 144  | 615  |
| 115° | 1088 | 1120  | 1168 | 291   | 155  | 1071 |
| 125° | 1538 | 1563  | 1599 | 1612  | 1618 | 1372 |
| 135° | 1904 | 1934  | 1951 | 1970  | 1966 | 1471 |
| 145° | 2208 | 2206  | 2239 | 2252  | 2242 | 1381 |
| 155° | 2432 | 2415  | 2437 | 2449  | 2434 | 1121 |
| 165° | 2562 | 2551  | 2557 | 2570  | 2557 | 724  |
| 175° | 2621 | 2608  | 2611 | 2625  | 2606 | 249  |
| 180° | 2615 | 2615  | 2615 | 2615  | 2615 |      |

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**CANDELA DISTRIBUTION (FULL):**

|        | 0°     | 22.5°  | 45°    | 67.5°  | 90°    |
|--------|--------|--------|--------|--------|--------|
| 0°     | 3350.2 | 3350.2 | 3350.2 | 3350.2 | 3350.2 |
| 2.5°   | 3369.7 | 3353.6 | 3318.0 | 3350.2 | 3344.0 |
| 5°     | 3350.2 | 3337.6 | 3302.0 | 3327.7 | 3321.5 |
| 7.5°   | 3327.7 | 3308.5 | 3272.9 | 3298.9 | 3292.5 |
| 10°    | 3292.5 | 3269.9 | 3231.2 | 3256.9 | 3247.3 |
| 12.5°  | 3243.9 | 3224.8 | 3186.1 | 3202.2 | 3195.7 |
| 15°    | 3189.2 | 3170.1 | 3128.0 | 3141.0 | 3125.0 |
| 17.5°  | 3121.5 | 3102.4 | 3060.3 | 3076.4 | 3060.3 |
| 20°    | 3047.3 | 3028.2 | 2983.1 | 2992.7 | 2980.0 |
| 22.5°  | 2973.5 | 2944.5 | 2902.4 | 2902.4 | 2896.0 |
| 25°    | 2886.4 | 2860.8 | 2806.1 | 2812.2 | 2806.1 |
| 27.5°  | 2789.6 | 2767.1 | 2725.4 | 2715.8 | 2699.7 |
| 30°    | 2693.3 | 2667.3 | 2619.1 | 2609.5 | 2596.5 |
| 32.5°  | 2590.1 | 2570.9 | 2519.3 | 2499.8 | 2486.8 |
| 35°    | 2490.3 | 2458.1 | 2406.5 | 2387.0 | 2370.9 |
| 37.5°  | 2377.5 | 2348.4 | 2296.8 | 2274.2 | 2258.1 |
| 40°    | 2261.6 | 2235.6 | 2184.0 | 2155.3 | 2142.3 |
| 42.5°  | 2148.8 | 2122.8 | 2071.6 | 2039.1 | 2020.0 |
| 45°    | 2026.4 | 2003.9 | 1955.3 | 1920.1 | 1907.2 |
| 47.5°  | 1907.2 | 1884.6 | 1833.0 | 1797.4 | 1778.3 |
| 50°    | 1781.4 | 1765.3 | 1720.2 | 1675.1 | 1659.1 |
| 52.5°  | 1659.1 | 1636.5 | 1594.7 | 1559.3 | 1536.7 |
| 55°    | 1533.6 | 1514.2 | 1475.5 | 1436.8 | 1420.8 |
| 57.5°  | 1407.8 | 1391.7 | 1349.7 | 1311.1 | 1298.1 |
| 60°    | 1282.0 | 1269.4 | 1224.3 | 1188.7 | 1179.1 |
| 62.5°  | 1159.7 | 1137.1 | 1105.0 | 1072.9 | 1059.9 |
| 65°    | 1034.2 | 1014.8 | 982.7  | 953.6  | 937.5  |
| 67.5°  | 905.4  | 889.0  | 860.3  | 837.8  | 824.7  |
| 70°    | 786.1  | 773.1  | 744.1  | 721.5  | 708.9  |
| 72.5°  | 663.7  | 650.7  | 634.7  | 612.2  | 602.5  |
| 75°    | 541.1  | 534.9  | 518.5  | 499.4  | 505.8  |
| 77.5°  | 431.7  | 418.7  | 412.2  | 402.6  | 393.0  |
| 80°    | 322.3  | 318.9  | 312.4  | 302.8  | 296.4  |
| 82.5°  | 219.1  | 219.1  | 216.0  | 203.0  | 203.0  |
| 85°    | 131.9  | 128.9  | 125.8  | 115.9  | 112.8  |
| 87.5°  | 58.1   | 51.6   | 45.1   | 35.6   | 32.1   |
| 90°    | 1.8    | 22.7   | 37.7   | 47.4   | 51.0   |
| 92.5°  | 47.4   | 39.8   | 45.4   | 49.2   | 51.0   |
| 95°    | 123.0  | 60.4   | 73.7   | 83.3   | 81.4   |
| 97.5°  | 221.4  | 66.3   | 96.4   | 102.2  | 104.0  |
| 100°   | 335.0  | 75.8   | 107.9  | 123.0  | 126.7  |
| 102.5° | 459.8  | 456.2  | 111.7  | 132.3  | 138.2  |
| 105°   | 575.2  | 632.1  | 115.5  | 136.2  | 143.8  |
| 107.5° | 709.6  | 756.8  | 119.3  | 140.0  | 147.7  |
| 110°   | 838.4  | 878.0  | 331.2  | 142.0  | 149.5  |



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**CANDELA DISTRIBUTION (continued):**

|        | 0°     | 22.5°  | 45°    | 67.5°  | 90°    |
|--------|--------|--------|--------|--------|--------|
| 112.5° | 959.5  | 993.4  | 961.3  | 145.6  | 151.4  |
| 115°   | 1088.0 | 1120.2 | 1167.6 | 291.4  | 155.2  |
| 117.5° | 1199.7 | 1237.5 | 1269.8 | 999.1  | 503.3  |
| 120°   | 1324.6 | 1353.0 | 1387.2 | 1409.8 | 1154.3 |
| 122.5° | 1430.5 | 1460.9 | 1498.8 | 1510.0 | 1512.1 |
| 125°   | 1538.3 | 1563.1 | 1599.0 | 1612.3 | 1617.9 |
| 127.5° | 1636.8 | 1663.3 | 1691.9 | 1710.7 | 1712.5 |
| 130°   | 1729.6 | 1760.0 | 1780.6 | 1801.5 | 1799.7 |
| 132.5° | 1824.2 | 1848.9 | 1869.6 | 1886.7 | 1884.9 |
| 135°   | 1903.8 | 1934.1 | 1950.9 | 1970.0 | 1966.3 |
| 137.5° | 1986.9 | 2009.6 | 2028.7 | 2047.5 | 2041.9 |
| 140°   | 2068.2 | 2083.5 | 2104.2 | 2121.2 | 2111.9 |
| 142.5° | 2136.6 | 2149.8 | 2174.3 | 2189.3 | 2180.0 |
| 145°   | 2208.5 | 2206.4 | 2238.6 | 2251.9 | 2242.4 |
| 147.5° | 2270.7 | 2265.1 | 2297.2 | 2306.7 | 2299.2 |
| 150°   | 2331.4 | 2318.2 | 2348.5 | 2359.7 | 2350.3 |
| 152.5° | 2382.4 | 2367.3 | 2395.6 | 2407.1 | 2393.8 |
| 155°   | 2431.6 | 2414.8 | 2437.4 | 2448.7 | 2433.6 |
| 157.5° | 2471.4 | 2456.3 | 2473.4 | 2486.6 | 2471.4 |
| 160°   | 2505.5 | 2494.1 | 2505.5 | 2516.8 | 2503.5 |
| 162.5° | 2535.6 | 2524.4 | 2533.8 | 2547.1 | 2530.0 |
| 165°   | 2562.2 | 2550.9 | 2556.6 | 2569.8 | 2556.6 |
| 167.5° | 2583.1 | 2571.6 | 2577.4 | 2590.7 | 2573.6 |
| 170°   | 2600.1 | 2588.7 | 2592.5 | 2605.7 | 2588.7 |
| 172.5° | 2611.4 | 2600.1 | 2603.9 | 2617.2 | 2600.1 |
| 175°   | 2620.8 | 2607.5 | 2611.4 | 2624.6 | 2605.7 |
| 177.5° | 2624.6 | 2611.4 | 2613.4 | 2626.6 | 2609.6 |
| 180°   | 2615.2 | 2615.2 | 2615.2 | 2615.2 | 2615.2 |

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**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 | 10.91            | 11.80 | 11.84 | 12.75 | 13.98 | 10.48          | 11.36 | 11.41 | 12.32 | 13.55 |
|                 | 3H   | 12.57            | 13.37 | 13.52 | 14.33 | 15.58 | 12.10          | 12.89 | 13.05 | 13.86 | 15.11 |
|                 | 4H   | 13.16            | 13.91 | 14.12 | 14.88 | 16.14 | 12.69          | 13.44 | 13.65 | 14.40 | 15.67 |
|                 | 6H   | 13.56            | 14.25 | 14.53 | 15.23 | 16.50 | 13.09          | 13.78 | 14.06 | 14.75 | 16.03 |
|                 | 8H   | 13.67            | 14.33 | 14.64 | 15.31 | 16.59 | 13.19          | 13.85 | 14.17 | 14.84 | 16.12 |
|                 | 12H  | 13.72            | 14.34 | 14.70 | 15.33 | 16.63 | 13.24          | 13.86 | 14.22 | 14.84 | 16.15 |
| 4H              | 2H   | 11.38            | 12.13 | 12.34 | 13.09 | 14.36 | 11.03          | 11.78 | 12.00 | 12.75 | 14.01 |
|                 | 3H   | 13.24            | 13.87 | 14.22 | 14.87 | 16.14 | 12.85          | 13.48 | 13.83 | 14.47 | 15.75 |
|                 | 4H   | 13.96            | 14.53 | 14.94 | 15.52 | 16.82 | 13.55          | 14.13 | 14.54 | 15.11 | 16.42 |
|                 | 6H   | 14.47            | 14.97 | 15.47 | 15.98 | 17.28 | 14.07          | 14.56 | 15.06 | 15.57 | 16.87 |
|                 | 8H   | 14.63            | 15.09 | 15.62 | 16.09 | 17.41 | 14.21          | 14.68 | 15.21 | 15.68 | 17.00 |
|                 | 12H  | 14.70            | 15.12 | 15.72 | 16.14 | 17.46 | 14.28          | 14.69 | 15.29 | 15.72 | 17.04 |
| 8H              | 4H   | 14.16            | 14.62 | 15.15 | 15.62 | 16.94 | 13.80          | 14.26 | 14.80 | 15.26 | 16.58 |
|                 | 6H   | 14.79            | 15.17 | 15.81 | 16.22 | 17.53 | 14.43          | 14.81 | 15.45 | 15.86 | 17.17 |
|                 | 8H   | 15.01            | 15.35 | 16.04 | 16.38 | 17.71 | 14.64          | 14.98 | 15.67 | 16.01 | 17.34 |
|                 | 12H  | 15.14            | 15.44 | 16.18 | 16.47 | 17.84 | 14.76          | 15.06 | 15.79 | 16.08 | 17.46 |
| 12H             | 4H   | 14.14            | 14.56 | 15.16 | 15.58 | 16.90 | 13.79          | 14.21 | 14.81 | 15.23 | 16.55 |
|                 | 6H   | 14.82            | 15.16 | 15.85 | 16.19 | 17.52 | 14.47          | 14.81 | 15.50 | 15.84 | 17.17 |
|                 | 8H   | 15.06            | 15.36 | 16.10 | 16.39 | 17.76 | 14.71          | 15.00 | 15.74 | 16.03 | 17.41 |

END OF REPORT