

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: P923341

Luminaire Tested: DFN2DIP-SQ4F0-160D110US940-FLLONL

Issue Date: 11/21/2024

**Test Information**

Test Method: LM-79-2019  
Report Number: P923341  
REPORT IS A COMBINATION OF REPORTS P901685 AND P898471  
Test Lab: INNOVATION CENTER  
Issue Date: 11/21/2024  
Manufacturer: COOPER LIGHTING SOLUTIONS  
Product Line: NEO-RAY  
Catalog Number: DFN2DIP-SQ4F0-160D110US940-FLLONL  
Description: 4 foot, Square Define Geo, with Direct Frosted Lens, Indirect Open No Lens  
Light Source: -  
Ballast/Driver: -

**Summary**

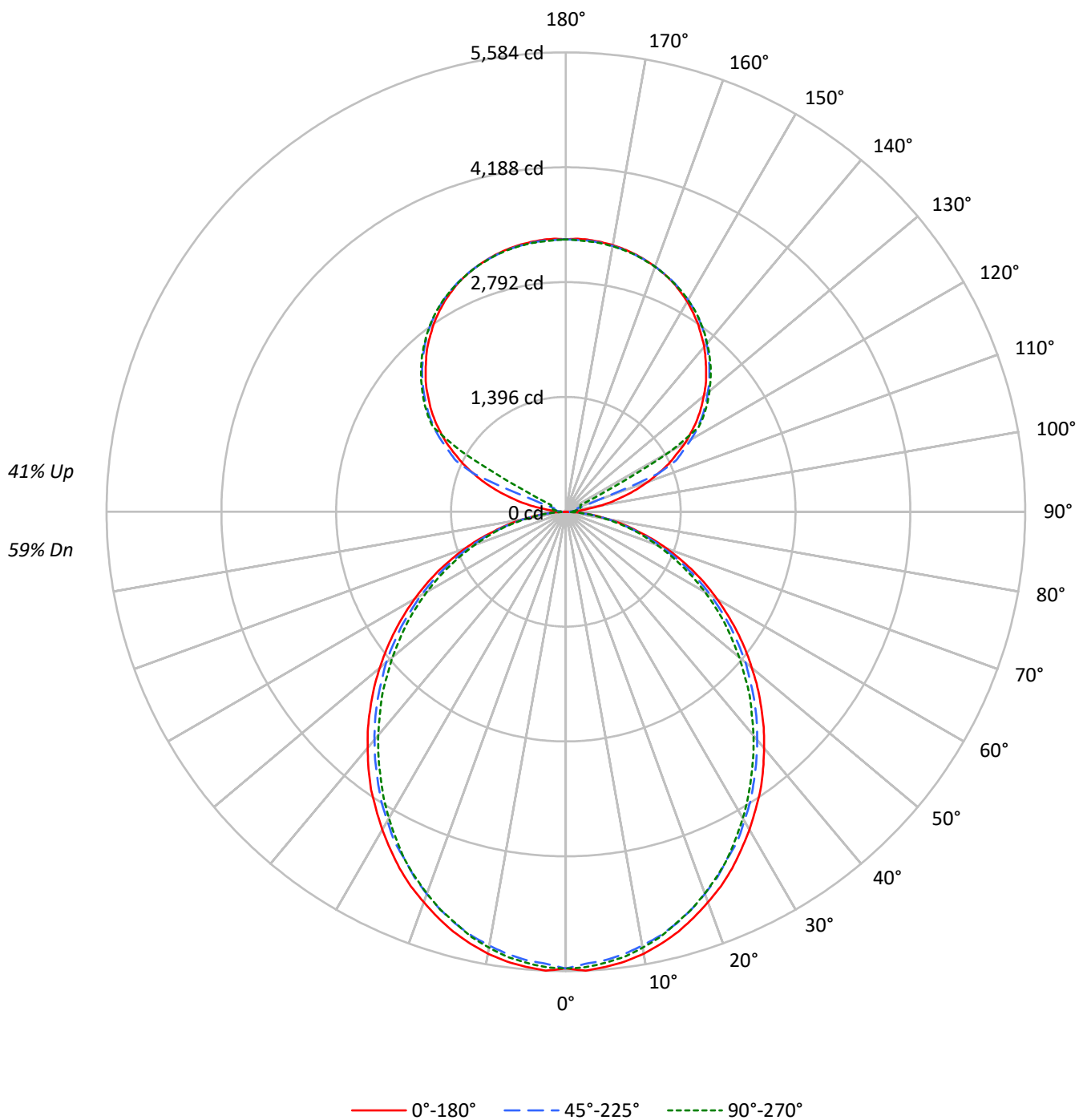
Lumens per Lamp: N/A  
Luminaire Lumens: 23835.4 lumens  
Efficiency: N/A  
Efficacy: 95.5 lumens/watt  
Spacing Criteria (0/90/45): 1.2 / 1.16 / 1.29  
Luminous Opening: Rectangular w/ Sides (W: 3.92' x L: 3.92' x H: 0.1')  
CIE Type: General Diffuse

Input Watts (W): 249.5  
Input Voltage (V):  
Input Current (Ain): NR  
Voltage Rise (V): NR  
Power Factor: 0.9971  
Total Harmonic Distortion (THDi): 0.049  
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   | 109 | 109 | 109 | 109 | 102 | 102 | 102 | 102 | 88 | 88 | 88 | 76 | 76 | 76 | 65 | 65 | 65 |
| 1   | 100 | 95  | 92  | 88  | 93  | 89  | 86  | 83  | 78 | 75 | 73 | 67 | 65 | 63 | 57 | 56 | 55 |
| 2   | 91  | 83  | 77  | 72  | 85  | 78  | 73  | 68  | 68 | 64 | 60 | 59 | 56 | 53 | 50 | 48 | 46 |
| 3   | 83  | 73  | 66  | 60  | 77  | 69  | 62  | 57  | 60 | 55 | 51 | 52 | 48 | 45 | 45 | 42 | 39 |
| 4   | 76  | 65  | 57  | 51  | 71  | 61  | 54  | 48  | 53 | 48 | 43 | 46 | 42 | 38 | 40 | 37 | 34 |
| 5   | 70  | 58  | 50  | 44  | 65  | 54  | 47  | 41  | 48 | 42 | 37 | 42 | 37 | 33 | 36 | 32 | 29 |
| 6   | 64  | 52  | 44  | 38  | 60  | 49  | 42  | 36  | 43 | 37 | 33 | 38 | 33 | 29 | 33 | 29 | 26 |
| 7   | 60  | 47  | 39  | 33  | 55  | 44  | 37  | 32  | 39 | 33 | 29 | 34 | 30 | 26 | 30 | 26 | 23 |
| 8   | 55  | 43  | 35  | 30  | 52  | 40  | 33  | 28  | 36 | 30 | 26 | 31 | 27 | 23 | 27 | 24 | 21 |
| 9   | 52  | 39  | 32  | 26  | 48  | 37  | 30  | 25  | 33 | 27 | 23 | 29 | 24 | 21 | 25 | 22 | 19 |
| 10  | 48  | 36  | 29  | 24  | 45  | 34  | 27  | 23  | 30 | 25 | 21 | 27 | 22 | 19 | 24 | 20 | 17 |

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

|     | 0°   | 45°  | 90°  |
|-----|------|------|------|
| 0°  | 3895 | 3895 | 3895 |
| 5°  | 3902 | 3842 | 3868 |
| 10° | 3870 | 3791 | 3817 |
| 15° | 3813 | 3729 | 3736 |
| 20° | 3736 | 3643 | 3653 |
| 25° | 3659 | 3540 | 3558 |
| 30° | 3563 | 3445 | 3436 |
| 35° | 3473 | 3332 | 3306 |
| 40° | 3361 | 3218 | 3184 |
| 45° | 3249 | 3103 | 3058 |
| 50° | 3127 | 2983 | 2912 |
| 55° | 2999 | 2844 | 2779 |
| 60° | 2855 | 2679 | 2626 |
| 65° | 2698 | 2509 | 2445 |
| 70° | 2497 | 2301 | 2252 |
| 75° | 2219 | 2053 | 2075 |
| 80° | 1885 | 1736 | 1733 |
| 85° | 1362 | 1188 | 1165 |

**MAXIMUM LUMINANCE 45°-90°:**

Horizontal Angle: 0°

Vertical Angle: 45°

Luminance: 3249 cd/sqm

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**ZONAL LUMENS:**

| Zone      | Lumens  | % Fixture |
|-----------|---------|-----------|
| 0°-10°    | 522.5   | 2.2       |
| 10°-20°   | 1470.1  | 6.2       |
| 20°-30°   | 2160.5  | 9.1       |
| 30°-40°   | 2509.3  | 10.5      |
| 40°-50°   | 2506.2  | 10.5      |
| 50°-60°   | 2185.3  | 9.2       |
| 60°-70°   | 1615.4  | 6.8       |
| 70°-80°   | 914.0   | 3.8       |
| 80°-90°   | 247.0   | 1.0       |
| 90°-100°  | 109.2   | 0.5       |
| 100°-110° | 406.9   | 1.7       |
| 110°-120° | 1079.2  | 4.5       |
| 120°-130° | 1789.9  | 7.5       |
| 130°-140° | 1901.3  | 8.0       |
| 140°-150° | 1767.1  | 7.4       |
| 150°-160° | 1420.7  | 6.0       |
| 160°-170° | 915.4   | 3.8       |
| 170°-180° | 315.1   | 1.3       |
| 0°-30°    | 4153.2  | 17.4      |
| 0°-40°    | 6662.5  | 28.0      |
| 0°-60°    | 11354.0 | 47.6      |
| 0°-90°    | 14130.5 | 59.3      |
| 90°-120°  | 1595.3  | 6.7       |
| 90°-150°  | 7053.7  | 29.6      |
| 90°-180°  | 9705.0  | 40.7      |
| 0°-180°   | 23835.4 | 100.0     |

**CANDELA DISTRIBUTION:**

|      | 0°   | 22.5° | 45°  | 67.5° | 90°  | Flux |
|------|------|-------|------|-------|------|------|
| 0°   | 5552 | 5552  | 5552 | 5552  | 5552 |      |
| 5°   | 5552 | 5531  | 5472 | 5514  | 5504 | 527  |
| 15°  | 5285 | 5253  | 5183 | 5205  | 5178 | 1488 |
| 25°  | 4783 | 4740  | 4650 | 4660  | 4650 | 2201 |
| 35°  | 4127 | 4073  | 3988 | 3955  | 3929 | 2577 |
| 45°  | 3358 | 3321  | 3240 | 3182  | 3160 | 2592 |
| 55°  | 2541 | 2509  | 2445 | 2381  | 2354 | 2272 |
| 65°  | 1714 | 1682  | 1628 | 1580  | 1554 | 1694 |
| 75°  | 896  | 886   | 859  | 827   | 838  | 957  |
| 85°  | 219  | 214   | 208  | 192   | 187  | 244  |
| 90°  | 2    | 29    | 48   | 60    | 65   | 22   |
| 95°  | 156  | 76    | 93   | 106   | 103  | 184  |
| 105° | 728  | 800   | 146  | 172   | 182  | 778  |
| 115° | 1377 | 1418  | 1478 | 369   | 196  | 1356 |
| 125° | 1947 | 1979  | 2024 | 2041  | 2048 | 1737 |
| 135° | 2410 | 2448  | 2470 | 2494  | 2489 | 1862 |
| 145° | 2796 | 2793  | 2834 | 2850  | 2838 | 1748 |
| 155° | 3078 | 3057  | 3085 | 3100  | 3080 | 1418 |
| 165° | 3243 | 3229  | 3236 | 3253  | 3236 | 916  |
| 175° | 3317 | 3301  | 3306 | 3322  | 3298 | 316  |
| 180° | 3310 | 3310  | 3310 | 3310  | 3310 |      |

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**CANDELA DISTRIBUTION (FULL):**

|        | 0°     | 22.5°  | 45°    | 67.5°  | 90°    |
|--------|--------|--------|--------|--------|--------|
| 0°     | 5551.5 | 5551.5 | 5551.5 | 5551.5 | 5551.5 |
| 2.5°   | 5583.8 | 5557.1 | 5498.3 | 5551.5 | 5541.3 |
| 5°     | 5551.5 | 5530.6 | 5471.6 | 5514.2 | 5503.9 |
| 7.5°   | 5514.2 | 5482.4 | 5423.5 | 5466.5 | 5455.8 |
| 10°    | 5455.8 | 5418.4 | 5354.5 | 5396.9 | 5381.0 |
| 12.5°  | 5375.4 | 5343.7 | 5279.6 | 5306.3 | 5295.5 |
| 15°    | 5284.7 | 5253.1 | 5183.3 | 5204.9 | 5178.3 |
| 17.5°  | 5172.6 | 5140.9 | 5071.2 | 5097.8 | 5071.2 |
| 20°    | 5049.7 | 5018.0 | 4943.2 | 4959.1 | 4938.1 |
| 22.5°  | 4927.4 | 4879.3 | 4809.5 | 4809.5 | 4798.8 |
| 25°    | 4783.0 | 4740.5 | 4649.8 | 4660.1 | 4649.8 |
| 27.5°  | 4622.6 | 4585.3 | 4516.2 | 4500.4 | 4473.7 |
| 30°    | 4462.9 | 4419.9 | 4340.0 | 4324.2 | 4302.7 |
| 32.5°  | 4291.9 | 4260.2 | 4174.6 | 4142.4 | 4120.9 |
| 35°    | 4126.6 | 4073.3 | 3987.7 | 3955.4 | 3928.9 |
| 37.5°  | 3939.7 | 3891.5 | 3806.0 | 3768.5 | 3742.0 |
| 40°    | 3747.6 | 3704.6 | 3619.1 | 3571.5 | 3550.0 |
| 42.5°  | 3560.8 | 3517.7 | 3432.7 | 3379.0 | 3347.2 |
| 45°    | 3358.0 | 3320.6 | 3240.2 | 3181.8 | 3160.3 |
| 47.5°  | 3160.3 | 3122.9 | 3037.4 | 2978.5 | 2946.8 |
| 50°    | 2951.9 | 2925.3 | 2850.5 | 2775.7 | 2749.1 |
| 52.5°  | 2749.1 | 2711.8 | 2642.7 | 2583.7 | 2546.4 |
| 55°    | 2541.3 | 2509.0 | 2445.0 | 2381.0 | 2354.4 |
| 57.5°  | 2332.9 | 2306.2 | 2236.6 | 2172.6 | 2151.1 |
| 60°    | 2124.4 | 2103.5 | 2028.7 | 1969.8 | 1953.9 |
| 62.5°  | 1921.6 | 1884.3 | 1831.0 | 1777.8 | 1756.3 |
| 65°    | 1713.8 | 1681.5 | 1628.3 | 1580.2 | 1553.5 |
| 67.5°  | 1500.3 | 1473.1 | 1425.6 | 1388.1 | 1366.6 |
| 70°    | 1302.6 | 1281.1 | 1233.0 | 1195.6 | 1174.7 |
| 72.5°  | 1099.8 | 1078.3 | 1051.8 | 1014.3 | 998.5  |
| 75°    | 896.5  | 886.4  | 859.2  | 827.4  | 838.2  |
| 77.5°  | 715.3  | 693.8  | 683.1  | 667.2  | 651.3  |
| 80°    | 534.0  | 528.4  | 517.6  | 501.8  | 491.1  |
| 82.5°  | 363.0  | 363.0  | 357.9  | 336.4  | 336.4  |
| 85°    | 218.6  | 213.5  | 208.4  | 192.0  | 186.9  |
| 87.5°  | 96.3   | 85.5   | 74.7   | 58.9   | 53.2   |
| 90°    | 2.3    | 28.7   | 47.8   | 60.0   | 64.6   |
| 92.5°  | 60.0   | 50.4   | 57.4   | 62.3   | 64.6   |
| 95°    | 155.6  | 76.5   | 93.3   | 105.5  | 103.0  |
| 97.5°  | 280.2  | 83.9   | 122.0  | 129.4  | 131.7  |
| 100°   | 424.1  | 95.9   | 136.5  | 155.6  | 160.4  |
| 102.5° | 581.9  | 577.4  | 141.3  | 167.6  | 175.0  |
| 105°   | 728.2  | 800.1  | 146.2  | 172.4  | 182.1  |
| 107.5° | 898.3  | 958.0  | 151.1  | 177.2  | 186.9  |
| 110°   | 1061.2 | 1111.3 | 419.3  | 179.8  | 189.1  |



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**CANDELA DISTRIBUTION (continued):**

|        | 0°     | 22.5°  | 45°    | 67.5°  | 90°    |
|--------|--------|--------|--------|--------|--------|
| 112.5° | 1214.6 | 1257.5 | 1216.8 | 184.3  | 191.7  |
| 115°   | 1377.2 | 1417.9 | 1478.0 | 368.9  | 196.5  |
| 117.5° | 1518.7 | 1566.5 | 1607.4 | 1264.6 | 637.1  |
| 120°   | 1676.8 | 1712.6 | 1755.9 | 1784.6 | 1461.2 |
| 122.5° | 1810.8 | 1849.1 | 1897.2 | 1911.5 | 1914.1 |
| 125°   | 1947.3 | 1978.6 | 2024.1 | 2040.9 | 2048.0 |
| 127.5° | 2071.9 | 2105.4 | 2141.5 | 2165.4 | 2167.7 |
| 130°   | 2189.3 | 2227.8 | 2253.9 | 2280.4 | 2278.1 |
| 132.5° | 2309.1 | 2340.4 | 2366.6 | 2388.2 | 2385.9 |
| 135°   | 2409.8 | 2448.2 | 2469.5 | 2493.8 | 2488.9 |
| 137.5° | 2515.1 | 2543.8 | 2567.9 | 2591.8 | 2584.7 |
| 140°   | 2618.1 | 2637.3 | 2663.5 | 2685.1 | 2673.2 |
| 142.5° | 2704.5 | 2721.2 | 2752.3 | 2771.3 | 2759.4 |
| 145°   | 2795.5 | 2792.9 | 2833.6 | 2850.4 | 2838.5 |
| 147.5° | 2874.3 | 2867.2 | 2907.9 | 2919.8 | 2910.5 |
| 150°   | 2951.1 | 2934.4 | 2972.7 | 2987.0 | 2975.0 |
| 152.5° | 3015.7 | 2996.6 | 3032.4 | 3047.0 | 3030.2 |
| 155°   | 3078.0 | 3056.6 | 3085.3 | 3099.6 | 3080.5 |
| 157.5° | 3128.3 | 3109.2 | 3130.9 | 3147.6 | 3128.3 |
| 160°   | 3171.5 | 3157.0 | 3171.5 | 3185.7 | 3169.0 |
| 162.5° | 3209.6 | 3195.4 | 3207.4 | 3224.2 | 3202.6 |
| 165°   | 3243.2 | 3229.0 | 3236.1 | 3252.9 | 3236.1 |
| 167.5° | 3269.6 | 3255.2 | 3262.6 | 3279.4 | 3257.8 |
| 170°   | 3291.3 | 3276.8 | 3281.6 | 3298.4 | 3276.8 |
| 172.5° | 3305.5 | 3291.3 | 3296.1 | 3312.9 | 3291.3 |
| 175°   | 3317.4 | 3300.7 | 3305.5 | 3322.3 | 3298.4 |
| 177.5° | 3322.3 | 3305.5 | 3308.1 | 3324.8 | 3303.3 |
| 180°   | 3310.4 | 3310.4 | 3310.4 | 3310.4 | 3310.4 |

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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 | 12.82            | 13.78 | 13.70 | 14.67 | 15.80 | 12.38          | 13.33 | 13.25 | 14.23 | 15.36 |
|                 | 3H   | 14.50            | 15.35 | 15.38 | 16.25 | 17.41 | 14.01          | 14.86 | 14.89 | 15.76 | 16.92 |
|                 | 4H   | 15.09            | 15.90 | 15.99 | 16.81 | 17.97 | 14.60          | 15.40 | 15.50 | 16.31 | 17.48 |
|                 | 6H   | 15.50            | 16.24 | 16.41 | 17.16 | 18.34 | 15.00          | 15.74 | 15.91 | 16.66 | 17.84 |
|                 | 8H   | 15.61            | 16.32 | 16.53 | 17.25 | 18.43 | 15.11          | 15.81 | 16.03 | 16.75 | 17.93 |
|                 | 12H  | 15.66            | 16.34 | 16.59 | 17.26 | 18.47 | 15.15          | 15.83 | 16.08 | 16.75 | 17.96 |
| 4H              | 2H   | 13.30            | 14.10 | 14.20 | 15.01 | 16.18 | 12.94          | 13.75 | 13.85 | 14.66 | 15.83 |
|                 | 3H   | 15.18            | 15.85 | 16.09 | 16.79 | 17.97 | 14.77          | 15.44 | 15.68 | 16.38 | 17.56 |
|                 | 4H   | 15.90            | 16.51 | 16.82 | 17.45 | 18.66 | 15.47          | 16.09 | 16.40 | 17.02 | 18.23 |
|                 | 6H   | 16.42            | 16.95 | 17.36 | 17.91 | 19.12 | 15.99          | 16.52 | 16.93 | 17.48 | 18.69 |
|                 | 8H   | 16.58            | 17.07 | 17.52 | 18.02 | 19.25 | 16.14          | 16.63 | 17.08 | 17.59 | 18.81 |
|                 | 12H  | 16.65            | 17.10 | 17.62 | 18.07 | 19.30 | 16.21          | 16.65 | 17.17 | 17.62 | 18.85 |
| 8H              | 4H   | 16.10            | 16.60 | 17.04 | 17.55 | 18.77 | 15.72          | 16.22 | 16.67 | 17.17 | 18.40 |
|                 | 6H   | 16.74            | 17.15 | 17.71 | 18.15 | 19.37 | 16.36          | 16.77 | 17.33 | 17.76 | 18.98 |
|                 | 8H   | 16.97            | 17.33 | 17.94 | 18.31 | 19.55 | 16.57          | 16.94 | 17.55 | 17.92 | 19.16 |
|                 | 12H  | 17.10            | 17.42 | 18.09 | 18.40 | 19.69 | 16.69          | 17.01 | 17.68 | 17.99 | 19.28 |
| 12H             | 4H   | 16.09            | 16.54 | 17.05 | 17.51 | 18.74 | 15.72          | 16.17 | 16.69 | 17.14 | 18.37 |
|                 | 6H   | 16.77            | 17.14 | 17.75 | 18.12 | 19.36 | 16.40          | 16.76 | 17.38 | 17.75 | 18.99 |
|                 | 8H   | 17.02            | 17.34 | 18.00 | 18.32 | 19.61 | 16.64          | 16.96 | 17.62 | 17.94 | 19.23 |

END OF REPORT