# LM-79-08 Test Report

For

## ELEC-TECH INTERNATIONAL CO LTD

No.1 Jinfeng Road, Tangjiawan Town, Xiangzhou District, Zhuhai City, Guangdong Province, P.R. China 519085

## Inseparable SSL Luminaire

Model name(s):

546775XX 546774XX

Representative (Tested) Model:

54677441

**Model Difference: All model is identical to each other, except model name designed. XX=41-50 intends CCT is 4000K.**

Prepare By:

Engineer: Leo Liu

Date: 2017-06-22

Review By:

Technical Lead: Vincent Yuan

Date: 2017-06-22

Note: This report does not imply product certification, approval, or endorsement by NVLAP, NIST, or any agency of the Federal Government.

**Product Information:**

| | |
|---|---|
| Client Name: | ELEC-TECH INTERNATIONAL CO LTD |
| Brand Name: | ETI, Commercial Electric |
| Model Number: | 546774XX, 546775XX(XX=41-50) |
| Product type: | Inseparable SSL Luminaire |
| Rating Input: | AC120-277V, 60Hz, 57W |
| Declared CCT: | 4000K |
| Declared Light output: | 5200lm |
| LED Manufacturer: | Samsung |
| LED Model: | SPMWH1228 |
| LED Quantity: | 220 pcs |
| Forward current of LED Chip: | 80 mA |
| Date of Receipt Samples: | 2017-06-18 |
| Quantity of Receipt Samples: | 3 |
| Sample Number: | 170618003-S1 |

**Laboratory Information:**

| | |
|---|---|
| Test Laboratory: | Dongguan New Testing Centre Co., Ltd |
| Laboratory Address: | 3F, No. 1 the 1st North Industry Road, Songshan Lake Science & Technology Park, Dongguan, Guangdong, China |
| Laboratory Contact Name: | Neil Zhong |
| Laboratory Contact E-mail: | Neil_ntc@163.com |

**Report Information**

| | |
|---|---|
| Issued Date of Test Report: | 2017-06-22 |
| Revised Date of Test Report: | N/A |
| Test Report No.: | NTCR17060045 |
| Remark (*If applicable*) | N/A |

| Test Specifications: | |
|---|---|
| Date of Test | 2017-06-21 |
| Test item | 1. Total Luminous Flux<br>2. Luminous Distribution Intensity<br>3. Luminous Efficacy<br>4. Correlated Color Temperature<br>5. Color Rendering Index<br>6. Chromaticity Coordinate |
| Reference Standard | IES LM-79-2008 Electrical and Photometric Measurements of Solid-State Lighting Products<br>ANSI C78.377-2008 Specifications for the Chromaticity of Solid State Lighting Products<br>CIE 13.3-1995 Method of Measuring and Specifying Color Rendering Properties of Light Sources<br>CIE 15-2004 Technical Report Colorimetry |

## Test Methods

**1. Photometric and Electrical measurements – Light Distribution Method:**

Photometric parameters were measured using the goniophotometer and software. The ambient temperature shall be maintained at 25° C ± 1° C, measured at a point not more than 1 m from the sample and at the same height as the sample. The sample was operated at 120 Volts AC, 60Hz. It was stabilized before measurement was made. Luminous flux, luminaire efficacy, zonal lumen were calculated from the software taken at 1° vertical intervals and 22.5° Vertical intervals.

**2. Photometric and Electrical Measurements – Integrating Sphere Method:**

Photometric parameters were measured using an integrating sphere, a spectroradiometer and software. The ambient temperature condition inside the sphere was maintained at 25º C ± 1º C. The sample measurements were made using a spectroradiometer connected by a fiber optic cable and detector through the detector port of the integrating sphere. The sample was operated at 120 Volts AC, 60Hz. It was stabilized before measurement was made. Chromaticity coordinates, correlated color temperature and color rendering index were calculated from the spectral radiant flux measurements taken at least 5 nm intervals over the range of 380 to 780 nm.

## Integrating Sphere Test Results

**Test Condition:**

| Test Ambient | Test Humidity | Orientation | Stabilization Time | Test Time |
|---|---|---|---|---|
| 25.0 °C | 51 % | Face Down | 90 mins | 25 mins |

**Electrical Data:**

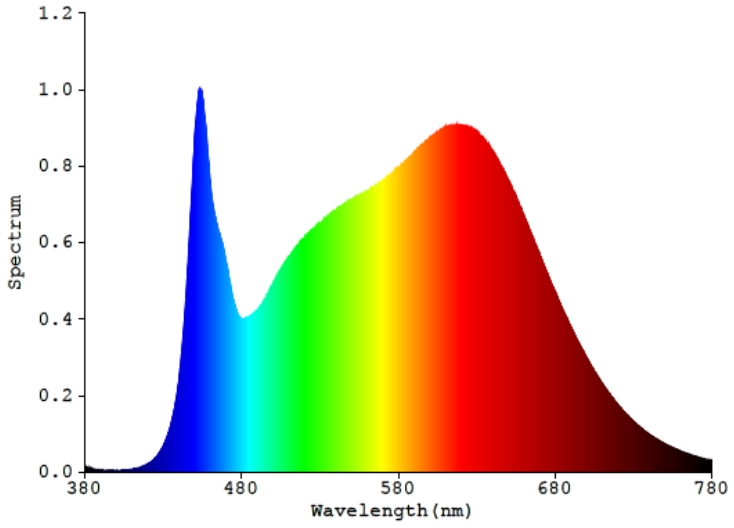
| Voltage (Vac) | Frequency (Hz) | Current (A) | Power (W) | Power Factor |
|---|---|---|---|---|
| 120.0 | 60 | 0.4456 | 52.77 | 0.9869 |

**Color Data:**

| Parameter | Result |
|---|---|
| CCT (K) | 3795 |
| Color Rendering Index (CRI) | 95.2 |
| R9 | 77 |
| Chromaticity, x | 0.3874 |
| Chromaticity, y | 0.3745 |
| Chromaticity u′ | 0.2307 |
| Chromaticity v′ | 0.5016 |
| Duv | -0.00303 |

| Special Color Rendering | | | |
|---|---|---|---|
| R1 | 97 | R9 | 77 |
| R2 | 99 | R10 | 98 |
| R3 | 98 | R11 | 95 |
| R4 | 94 | R12 | 75 |
| R5 | 96 | R13 | 99 |
| R6 | 95 | R14 | 99 |
| R7 | 93 | R15 | 95 |
| R8 | 89 | - | - |

## Spectrum Diagram:



## Goniophotometer Test Results:

**Test Condition:**

| Test Ambient | Test Humidity | Orientation | Stabilization Time | Test Time |
|---|---|---|---|---|
| 24.6 °C | 45 % | Face Down | 90 mins | 25 mins |

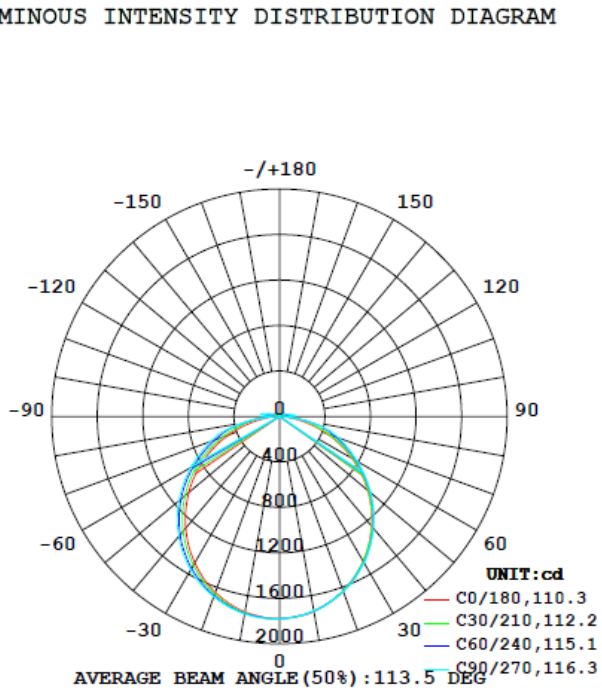
**Electrical Data:**

| Voltage (Vac) | Frequency (Hz) | Current (A) | Power (W) | Power Factor |
|---|---|---|---|---|
| 120.0 | 60 | 0.4459 | 52.81 | 0.9869 |

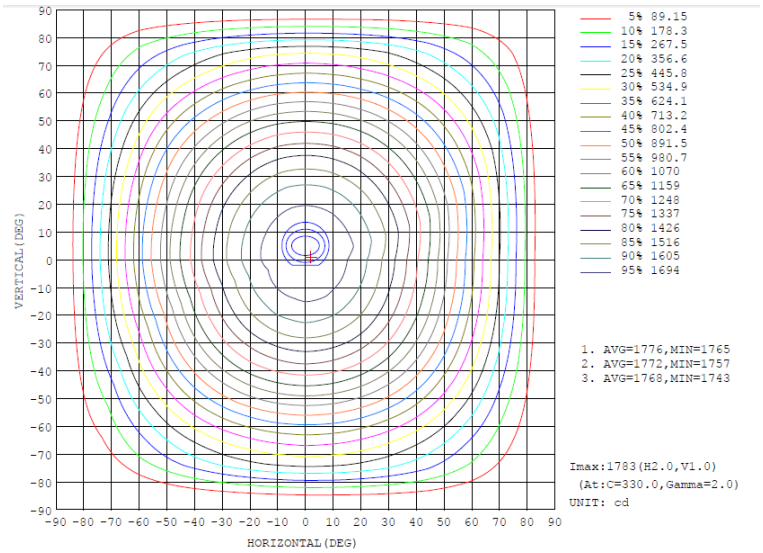
**Goniophotometer Data:**

| Parameter | Result |
|---|---|
| Total Luminous (lm) | 5430.7 |
| Total Luminous per foot (lm/ft) | N/A |
| Luminous Efficacy (lm/w) | 102.83 |
| Zonal Lumens Distribution (0-90°) | 96.0% |
| Beam Angle (°) | 113.5 |
| Center Beam Candle Power (cd) | 1782 |

## Luminous Intensity Distribution Diagram:



**Isocandela Diagram:**



## Zonal Flux Diagram:

ZONAL FLUX DIAGRAM:

| γ | C0 | C45 | C90 | C135 | C180 | C225 | C270 | C315 | γ | Φ zone | Φ total | %lum,lamp |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 10 | 1740 | 1737 | 1736 | 1733 | 1746 | 1756 | 1764 | 1761 | 0- 10 | 168.3 | 168.3 | 3.1,3.1 |
| 20 | 1640 | 1631 | 1636 | 1626 | 1647 | 1668 | 1688 | 1679 | 10- 20 | 481.7 | 650.0 | 12,12 |
| 30 | 1468 | 1476 | 1487 | 1465 | 1487 | 1528 | 1559 | 1541 | 20- 30 | 729.9 | 1380 | 25.4,25.4 |
| 40 | 1258 | 1273 | 1282 | 1261 | 1282 | 1336 | 1377 | 1353 | 30- 40 | 880.7 | 2260 | 41.6,41.6 |
| 50 | 1010 | 1032 | 1045 | 1017 | 1040 | 1106 | 1153 | 1123 | 40- 50 | 917.2 | 3178 | 58.5,58.5 |
| 60 | 736.5 | 766.1 | 787.9 | 748.9 | 769.2 | 843.3 | 899.6 | 861.9 | 50- 60 | 837.7 | 4015 | 73.9,73.9 |
| 70 | 444.0 | 496.6 | 553.9 | 482.2 | 477.7 | 567.1 | 643.0 | 583.9 | 60- 70 | 659.8 | 4675 | 86.1,86.1 |
| 80 | 154.2 | 249.8 | 248.7 | 219.8 | 185.5 | 301.7 | 325.9 | 317.4 | 70- 80 | 417.6 | 5093 | 93.8,93.8 |
| 90 | 1.565 | 32.76 | 60.92 | 52.95 | 1.629 | 31.32 | 51.49 | 29.56 | 80- 90 | 120.8 | 5213 | 96,96 |
| 100 | 2.992 | 56.50 | 104.1 | 54.52 | 3.194 | 74.56 | 143.8 | 75.37 | 90-100 | 74.30 | 5288 | 97.4,97.4 |
| 110 | 3.885 | 40.99 | 64.34 | 40.87 | 6.578 | 42.19 | 77.31 | 41.78 | 100-110 | 52.96 | 5341 | 98.3,98.3 |
| 120 | 3.294 | 32.75 | 51.30 | 32.86 | 6.578 | 34.21 | 52.82 | 33.48 | 110-120 | 34.57 | 5375 | 99,99 |
| 130 | 3.776 | 24.10 | 39.41 | 24.50 | 4.743 | 26.74 | 41.24 | 26.06 | 120-130 | 24.39 | 5400 | 99.4,99.4 |
| 140 | 3.254 | 16.43 | 27.90 | 16.27 | 4.172 | 19.39 | 30.67 | 19.49 | 130-140 | 15.79 | 5415 | 99.7,99.7 |
| 150 | 4.428 | 8.038 | 17.34 | 8.658 | 4.332 | 12.64 | 21.38 | 12.42 | 140-150 | 8.913 | 5424 | 99.9,99.9 |
| 160 | 4.619 | 5.740 | 6.436 | 5.448 | 4.559 | 6.038 | 9.746 | 6.630 | 150-160 | 4.073 | 5428 | 100,100 |
| 170 | 5.023 | 6.356 | 5.742 | 6.695 | 5.796 | 5.302 | 5.117 | 5.118 | 160-170 | 1.684 | 5430 | 100,100 |
| 180 | 5.796 | 7.336 | 6.033 | 7.088 | 5.926 | 7.074 | 6.099 | 7.220 | 170-180 | 0.6092 | 5431 | 100,100 |
| DEG | LUMINOUS INTENSITY:cd Less than 25% Percent = 10.1 % | | | | | | | | | UNIT:lm | | |

## Luminous Distribution Intensity Data:

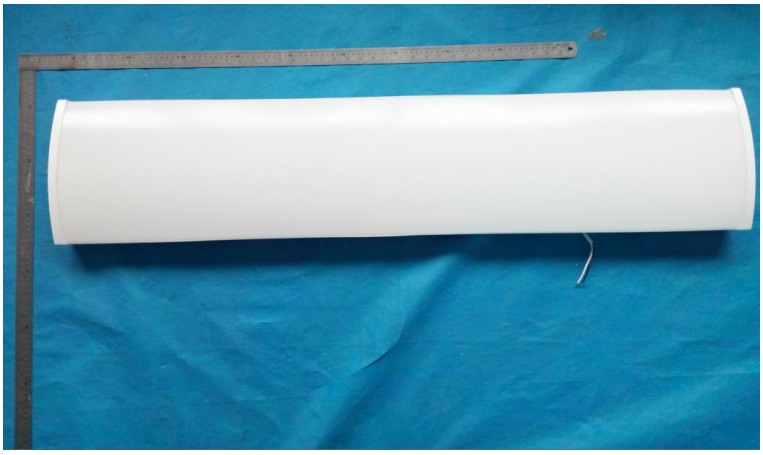
Table--1 UNIT: cd

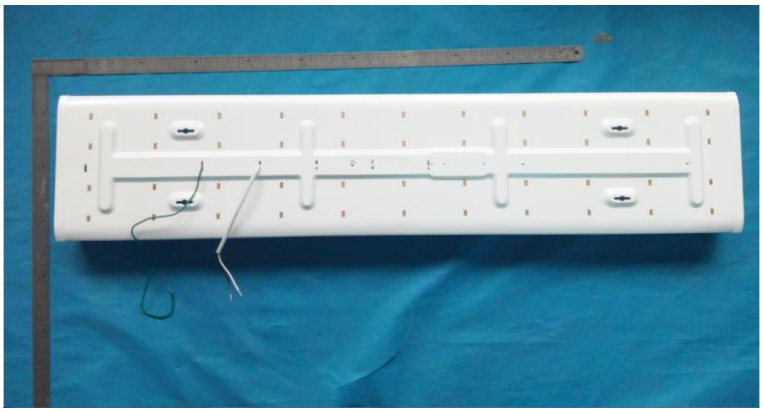
| γ (DEG) \ C (DEG) | 0 | 15 | 30 | 45 | 60 | 75 | 90 | 105 | 120 | 135 | 150 | 165 | 180 | 195 | 210 | 225 | 240 | 255 | 270 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0 | 1777 | 1779 | 1781 | 1777 | 1779 | 1780 | 1781 | 1779 | 1778 | 1780 | 1779 | 1782 | 1777 | 1779 | 1781 | 1777 | 1779 | 1780 | 1781 |
| 5 | 1769 | 1770 | 1766 | 1766 | 1765 | 1766 | 1767 | 1762 | 1763 | 1764 | 1765 | 1767 | 1771 | 1773 | 1775 | 1775 | 1775 | 1779 | 1781 |
| 10 | 1740 | 1739 | 1737 | 1737 | 1738 | 1736 | 1736 | 1733 | 1733 | 1733 | 1733 | 1734 | 1746 | 1750 | 1754 | 1756 | 1759 | 1763 | 1764 |
| 15 | 1696 | 1690 | 1692 | 1689 | 1695 | 1694 | 1695 | 1689 | 1687 | 1689 | 1687 | 1685 | 1704 | 1710 | 1716 | 1720 | 1726 | 1729 | 1734 |
| 20 | 1640 | 1630 | 1631 | 1631 | 1636 | 1637 | 1636 | 1637 | 1634 | 1626 | 1624 | 1619 | 1647 | 1654 | 1661 | 1668 | 1680 | 1687 | 1688 |
| 25 | 1559 | 1554 | 1558 | 1561 | 1568 | 1567 | 1571 | 1560 | 1557 | 1555 | 1546 | 1543 | 1576 | 1582 | 1593 | 1606 | 1618 | 1630 | 1632 |
| 30 | 1468 | 1464 | 1470 | 1476 | 1483 | 1482 | 1487 | 1477 | 1475 | 1465 | 1456 | 1453 | 1487 | 1498 | 1512 | 1528 | 1545 | 1558 | 1559 |
| 35 | 1370 | 1365 | 1370 | 1382 | 1387 | 1386 | 1391 | 1385 | 1379 | 1368 | 1355 | 1348 | 1390 | 1400 | 1421 | 1438 | 1457 | 1472 | 1474 |
| 40 | 1258 | 1254 | 1264 | 1273 | 1280 | 1283 | 1282 | 1278 | 1269 | 1261 | 1245 | 1238 | 1282 | 1294 | 1317 | 1336 | 1358 | 1374 | 1377 |
| 45 | 1141 | 1136 | 1145 | 1157 | 1163 | 1167 | 1168 | 1162 | 1156 | 1142 | 1129 | 1117 | 1164 | 1178 | 1204 | 1226 | 1248 | 1266 | 1271 |
| 50 | 1010 | 1009 | 1021 | 1032 | 1042 | 1045 | 1045 | 1041 | 1030 | 1017 | 1002 | 990 | 1040 | 1055 | 1083 | 1106 | 1130 | 1149 | 1153 |
| 55 | 879 | 877 | 888 | 902 | 909 | 916 | 919 | 913 | 903 | 888 | 868 | 856 | 908 | 924 | 954 | 977 | 1004 | 1024 | 1030 |
| 60 | 736 | 738 | 751 | 766 | 777 | 789 | 788 | 782 | 768 | 749 | 728 | 715 | 769 | 788 | 818 | 843 | 871 | 892 | 900 |
| 65 | 593 | 596 | 608 | 628 | 648 | 662 | 666 | 656 | 637 | 613 | 587 | 571 | 625 | 646 | 678 | 705 | 735 | 759 | 770 |
| 70 | 444 | 450 | 466 | 497 | 525 | 547 | 554 | 539 | 514 | 482 | 445 | 424 | 478 | 500 | 535 | 567 | 603 | 631 | 643 |
| 75 | 295 | 304 | 332 | 376 | 412 | 428 | 427 | 417 | 399 | 361 | 313 | 278 | 329 | 353 | 394 | 435 | 481 | 506 | 514 |
| 80 | 154 | 170 | 214 | 250 | 252 | 252 | 249 | 240 | 231 | 220 | 197 | 149 | 185 | 213 | 263 | 302 | 313 | 322 | 326 |
| 85 | 42.5 | 66.6 | 84.5 | 91.7 | 89.0 | 83.3 | 79.4 | 72.4 | 66.6 | 63.3 | 55.7 | 45.3 | 64.5 | 95.7 | 127 | 131 | 137 | 141 | 142 |
| 90 | 1.56 | 7.92 | 21.8 | 32.8 | 45.4 | 56.0 | 60.9 | 62.9 | 61.2 | 53.0 | 41.0 | 18.3 | 1.63 | 5.08 | 17.1 | 31.3 | 41.7 | 48.9 | 51.5 |
| 95 | 1.63 | 13.2 | 42.5 | 79.5 | 113 | 134 | 140 | 134 | 110 | 77.0 | 41.2 | 13.9 | 2.22 | 17.1 | 58.3 | 104 | 131 | 143 | 147 |
| 100 | 2.99 | 11.6 | 31.8 | 56.5 | 81.4 | 99.4 | 104 | 96.1 | 78.6 | 54.5 | 31.6 | 12.3 | 3.19 | 13.2 | 38.8 | 74.6 | 110 | 136 | 144 |
| 105 | 3.84 | 10.4 | 28.4 | 45.8 | 61.7 | 74.7 | 78.1 | 72.5 | 60.1 | 45.1 | 28.3 | 11.1 | 4.96 | 12.3 | 29.9 | 52.8 | 79.0 | 97.1 | 105 |
| 110 | 3.88 | 9.57 | 25.6 | 41.0 | 53.6 | 61.7 | 64.3 | 60.9 | 52.8 | 40.9 | 25.7 | 9.34 | 6.58 | 11.7 | 26.9 | 42.2 | 59.5 | 72.4 | 77.3 |
| 115 | 3.67 | 7.55 | 22.8 | 36.8 | 48.2 | 55.8 | 57.4 | 54.9 | 47.6 | 36.9 | 23.1 | 7.71 | 6.75 | 11.1 | 24.2 | 37.9 | 49.6 | 57.9 | 61.7 |
| 120 | 3.29 | 6.00 | 19.7 | 32.7 | 43.2 | 49.8 | 51.3 | 49.2 | 42.9 | 32.9 | 20.1 | 6.79 | 6.58 | 9.52 | 22.1 | 34.2 | 44.3 | 50.5 | 52.8 |
| 125 | 3.47 | 5.15 | 17.5 | 28.5 | 38.0 | 44.3 | 45.7 | 43.7 | 37.8 | 28.6 | 17.2 | 5.49 | 5.81 | 8.03 | 19.2 | 30.3 | 39.8 | 44.8 | 46.9 |
| 130 | 3.78 | 4.90 | 14.9 | 24.1 | 33.1 | 38.3 | 39.4 | 38.2 | 33.0 | 24.5 | 14.5 | 5.33 | 4.74 | 6.97 | 17.2 | 26.7 | 34.9 | 39.5 | 41.2 |
| 135 | 2.81 | 5.02 | 12.2 | 19.8 | 27.8 | 32.6 | 34.2 | 32.6 | 27.7 | 19.7 | 12.4 | 5.49 | 4.03 | 6.33 | 14.6 | 22.5 | 30.3 | 34.5 | 36.1 |
| 140 | 3.25 | 5.04 | 9.68 | 16.4 | 22.4 | 25.7 | 27.9 | 26.0 | 22.2 | 16.3 | 9.77 | 5.34 | 4.17 | 6.97 | 11.8 | 19.4 | 24.8 | 29.6 | 30.7 |
| 145 | 4.17 | 5.10 | 7.46 | 12.6 | 18.3 | 20.7 | 21.9 | 21.1 | 18.4 | 12.7 | 6.87 | 5.23 | 4.33 | 6.93 | 8.48 | 16.2 | 20.7 | 23.6 | 24.6 |
| 150 | 4.43 | 5.16 | 6.54 | 8.04 | 13.5 | 15.6 | 17.3 | 15.9 | 13.5 | 8.66 | 5.70 | 5.28 | 4.33 | 6.91 | 6.86 | 12.6 | 16.9 | 20.4 | 21.4 |
| 155 | 4.42 | 5.22 | 6.00 | 5.63 | 8.15 | 10.1 | 11.8 | 10.2 | 8.34 | 5.45 | 5.83 | 5.69 | 4.36 | 6.97 | 6.66 | 8.84 | 12.3 | 14.4 | 15.5 |
| 160 | 4.62 | 5.28 | 5.96 | 5.74 | 5.42 | 5.59 | 6.44 | 6.10 | 5.06 | 5.45 | 5.79 | 5.76 | 4.56 | 7.04 | 6.01 | 6.04 | 7.60 | 9.05 | 9.75 |
| 165 | 4.82 | 6.24 | 6.93 | 5.52 | 5.15 | 4.92 | 5.51 | 5.24 | 4.93 | 5.56 | 7.40 | 6.93 | 5.39 | 7.10 | 6.02 | 5.25 | 4.85 | 5.72 | 5.44 |
| 170 | 5.02 | 6.71 | 7.11 | 6.36 | 5.96 | 5.72 | 5.74 | 5.90 | 5.60 | 6.69 | 7.86 | 6.74 | 5.80 | 7.72 | 6.63 | 5.30 | 4.66 | 4.92 | 5.12 |
| 175 | 5.20 | 7.49 | 7.17 | 6.81 | 6.76 | 6.10 | 5.51 | 5.90 | 7.02 | 7.08 | 7.96 | 7.00 | 5.21 | 7.23 | 7.39 | 6.03 | 6.57 | 6.15 | 5.49 |
| 180 | 5.80 | 7.49 | 8.04 | 7.34 | 6.63 | 6.30 | 6.03 | 6.16 | 6.95 | 7.09 | 8.05 | 7.13 | 5.93 | 7.56 | 8.04 | 7.07 | 7.09 | 6.10 | 6.10 |

Table--2 UNIT: cd

| γ (DEG) \ C (DEG) | 285 | 300 | 315 | 330 | 345 |
|---|---|---|---|---|---|
| 0 | 1779 | 1778 | 1780 | 1779 | 1782 |
| 5 | 1778 | 1777 | 1779 | 1779 | 1780 |
| 10 | 1762 | 1763 | 1761 | 1760 | 1758 |
| 15 | 1732 | 1730 | 1728 | 1724 | 1722 |
| 20 | 1688 | 1685 | 1679 | 1671 | 1670 |
| 25 | 1632 | 1626 | 1616 | 1606 | 1600 |
| 30 | 1558 | 1553 | 1541 | 1527 | 1518 |
| 35 | 1474 | 1466 | 1452 | 1435 | 1423 |
| 40 | 1377 | 1370 | 1353 | 1334 | 1319 |
| 45 | 1270 | 1261 | 1242 | 1222 | 1204 |
| 50 | 1152 | 1143 | 1123 | 1101 | 1080 |
| 55 | 1028 | 1016 | 996 | 973 | 951 |
| 60 | 897 | 885 | 862 | 838 | 815 |
| 65 | 764 | 748 | 724 | 698 | 674 |
| 70 | 635 | 615 | 584 | 554 | 527 |
| 75 | 511 | 489 | 448 | 411 | 378 |
| 80 | 327 | 326 | 317 | 276 | 234 |
| 85 | 144 | 147 | 145 | 140 | 109 |
| 90 | 48.8 | 40.2 | 29.6 | 17.7 | 10.3 |
| 95 | 143 | 127 | 103 | 59.3 | 16.7 |
| 100 | 135 | 112 | 75.4 | 38.1 | 11.9 |
| 105 | 98.0 | 79.1 | 52.3 | 28.5 | 11.1 |
| 110 | 72.6 | 58.7 | 41.8 | 25.5 | 10.6 |
| 115 | 58.1 | 48.8 | 36.9 | 23.2 | 10.4 |
| 120 | 50.8 | 43.8 | 33.5 | 20.9 | 8.70 |
| 125 | 45.0 | 39.1 | 29.6 | 18.3 | 7.66 |
| 130 | 39.4 | 34.6 | 26.1 | 16.4 | 6.88 |
| 135 | 34.5 | 29.9 | 22.0 | 12.9 | 6.22 |
| 140 | 29.4 | 24.3 | 19.5 | 10.7 | 6.02 |
| 145 | 23.6 | 20.6 | 15.8 | 8.83 | 6.13 |
| 150 | 20.2 | 16.4 | 12.4 | 8.03 | 6.09 |
| 155 | 14.4 | 12.3 | 8.54 | 7.85 | 6.01 |
| 160 | 9.06 | 7.27 | 6.63 | 7.06 | 5.94 |
| 165 | 5.77 | 4.92 | 5.45 | 6.94 | 5.82 |
| 170 | 5.65 | 5.05 | 5.12 | 7.35 | 6.47 |
| 175 | 6.09 | 7.02 | 6.56 | 8.18 | 6.43 |
| 180 | 6.48 | 6.63 | 7.22 | 8.12 | 7.00 |

**Photo of Sample:**





**Equipment List:**

| Equipment ID | Equipment Name | Last Cal. | Due Cal. |
|---|---|---|---|
| NTC-F01-001 | Goniophotometer System | 2016-12-03 | 2017-12-02 |
| NTC-F01-006 | 2.0 meter Integrating Sphere | 2016-12-03 | 2017-12-02 |
| NTC-F01-013 | Standard Lamp | 2016-12-27 | 2017-12-26 |
| NTC-F01-031 | Digital Power Meter | 2016-12-05 | 2017-12-04 |
| NTC-F01-019 | Temperature & Humidity Meter | 2016-11-28 | 2017-11-27 |

*******END OF DATASHEET*******


Address: 3F, No. 1 the 1st North Industry Road, Songshan Lake Science & Technology Park, Dongguan, Guangdong, China
Tel: 86-755-2344 3526
Website: http://www.ntc-cert.com