



LM-79-08 Test Report

for

P.Q.L., Inc.

2285 Ward Avenue / Simi Valley, CA 93065

FLOOD light

Model: 84134

Laboratory: Leading Testing Laboratories

NVLAP CODE: 200960-0

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Report No.: HZ18050002c

The laboratory that conducted the testing detailed in this report has been accredited for SSL by NVLAP.

Review by:

Engineer: April Zou
May 14, 2018

Approved by



Manager: Jim Zhang
May 14, 2018

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

Test Summary

Sample Tested: **84134**

Luminous Efficacy (Lumens /Watt)	Total Luminous Flux (Lumens)	Power (Watts)	Power Factor
121.1	3679.1	30.37	0.9956
CCT (K)	CRI	Stabilization Time (Light & Power)	
4055	71.5	60	

Table 1: Executive Data Summary

Note: The above results are recorded/ derived from measurements made using an Integrating Sphere.

Test specifications:

Date of Receipt	: May 04, 2018
Date of Test	: May 08, 2018
Test item	: Total Luminous Flux, Luminous Distribution Intensity, Luminous Efficacy, Correlated Color Temperature, Color Rendering Index, Chromaticity Coordinate, Electrical parameters
Reference Standard	: IESNA LM-79-2008 Approved Method for the Electrical and Photometric Measurements of Solid-State Lighting Products

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Sample Photos



Overview of the sample

Equipment Under Test (EUT)

Name	: FLOOD light
Model	: 84134
Electrical Ratings	: 120-277V, 50/60Hz
Product Description	: 4000K
Manufacturer	: P.Q.L., Inc.
Address	: 2285 Ward Avenue / Simi Valley, CA 93065

TEST RESULTS

Test ambient temperature was 25.1 °C.

Base orientation was base up. Test was conducted without a dimmer in the circuit.

The stabilization time of the sample was 60 minutes, and the total operating time including stabilization was 95 minutes.

The photometric distance of Goniophotometer is 2.47 m.

Luminous data was taken at 0.5° vertical intervals and 10.0° horizontal intervals.

Parameter	Result	
Test Voltage (V)	120.0	277.0
Voltage frequency (Hz)	60	60
Test Current (A)	0.254	0.114
Power Factor	0.9956	0.9446
Test Power (W)	30.37	29.87
THD A%	5.17	7.94
Luminous Efficacy (lm/W)	121.1	122.5
Total Luminous Flux (lm)	3679.1	3657.8
Color Rendering Index (CRI)	71.5	
R9	-16	
Correlated Color Temperature (CCT) (K)	4055	
Chromaticity (Chroma x, Chroma y)	(0.3778, 0.3745)	
Chromaticity (Chroma u, Chroma v)	(0.2243, 0.3335)	
Chromaticity (Chroma u', Chroma v')	(0.2243, 0.5002)	
Duv	-0.0003	
Average Beam Angle (°)	93.8	
Center Beam Candle Power (cd)	1881	
Spacing Criteria	1.10 (0°-180°)/ 1.28 (90°-270°)	
Zonal Lumens in the 0°-60°Zone	96.54%	
Zonal Lumens in the 60°-90°Zone	3.37%	
Zonal Lumens in the 90°-120°Zone	0.01%	
Zonal Lumens in the 120°-180°Zone	0.08%	

Special Color Rendering Indices	
R1	70
R2	78
R3	79
R4	70
R5	68
R6	65
R7	83
R8	58
R9	-16
R10	43
R11	62
R12	32
R13	71
R14	88

Table 2: Test data per Goniophotometer Method

Note: According to CIE 1976 (u', v') diagram, $u' = u = 4x/(-2x+12y+3)$, $v' = 3v/2 = 9y/(-2x+12y+3)$.

Spectral Power Distribution

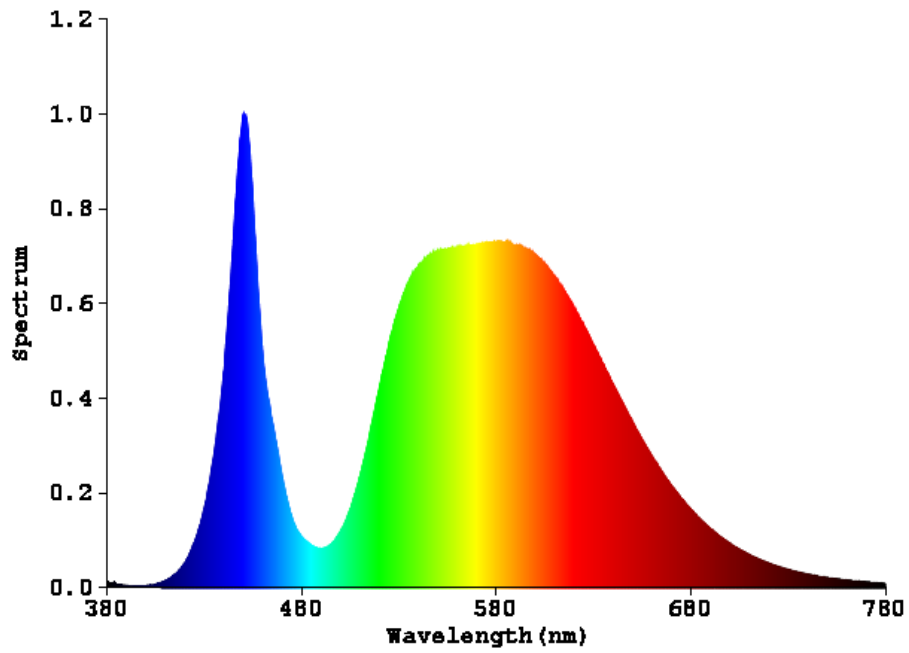


Chart 1: Spectral Power Distribution

Zonal Lumen Tabulation

$\gamma(^{\circ})$	Lumens	% Total
0- 10	179.7	4.88%
10- 20	517.377	14.06%
20- 30	783.463	21.29%
30- 40	918.372	24.96%
40- 50	752.351	20.45%
50- 60	400.674	10.89%
60- 70	114.819	3.12%
70- 80	7.479	0.20%
80- 90	1.543	0.04%
90-100	0.041	0.00%
100-110	0.118	0.00%
110-120	0.234	0.01%
120-130	0.408	0.01%
130-140	0.613	0.02%
140-150	0.711	0.02%
150-160	0.629	0.02%
160-170	0.424	0.01%
170-180	0.151	0.00%
Total	3679.1	100%

$\gamma(^{\circ})$	Lumens	% Total
0- 60	3551.937	96.54%
60- 90	123.841	3.37%
0-90	3675.778	99.91%
90- 180	3.329	0.09%
0- 180	3679.1	100%

Table 3: Zonal Lumen Data

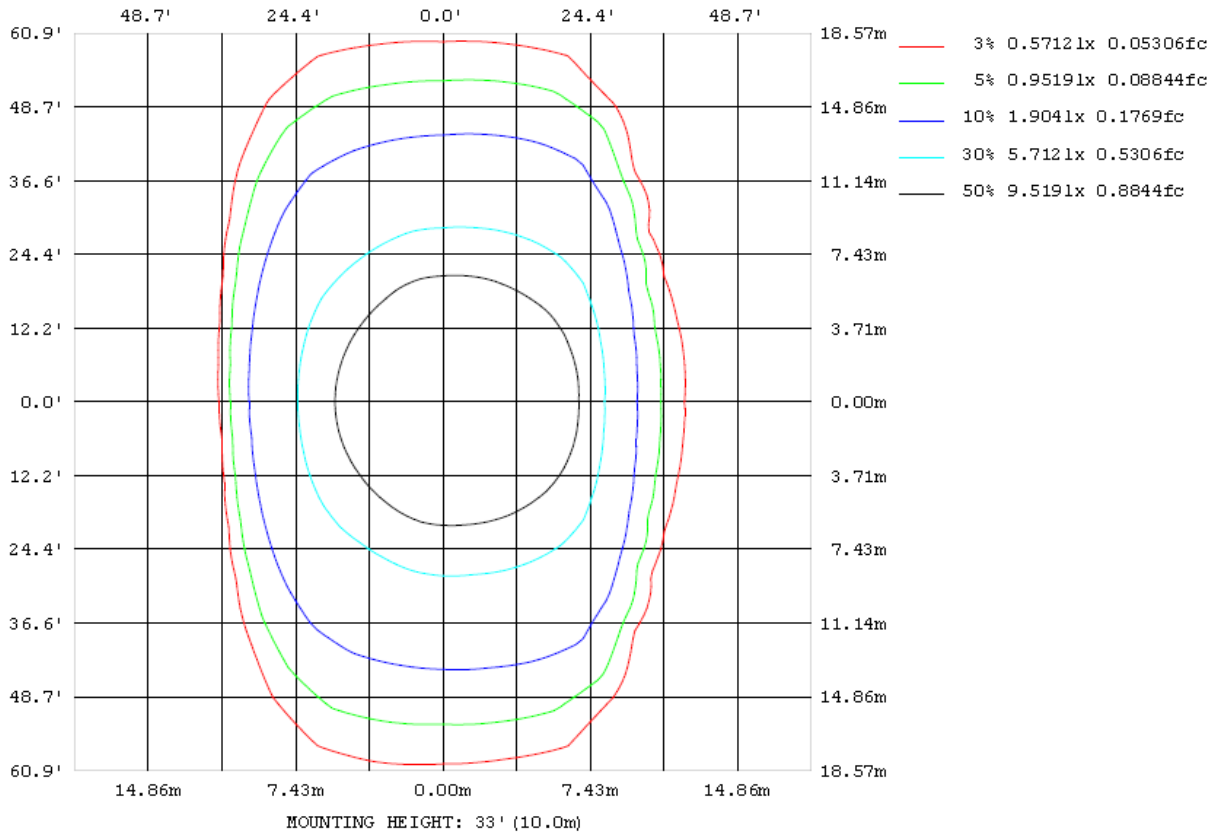


Chart 2: Illuminance Plot (Footcandles)

Luminous Intensity Distribution Plots

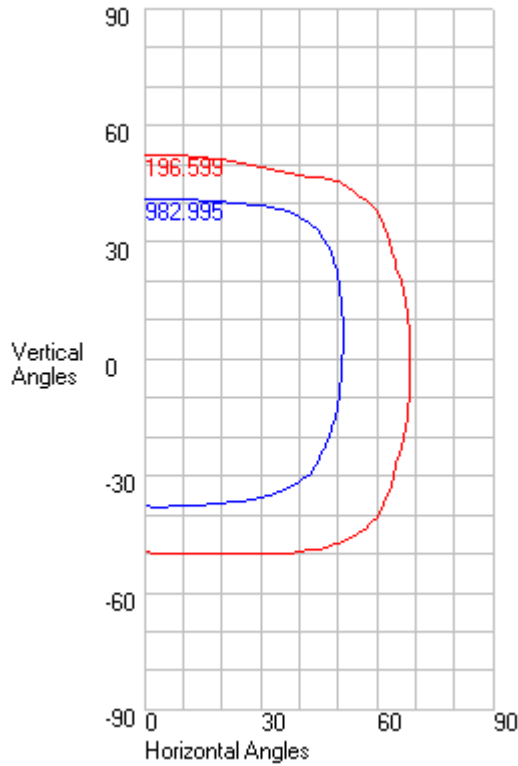


Chart 3: Isocandela Plot

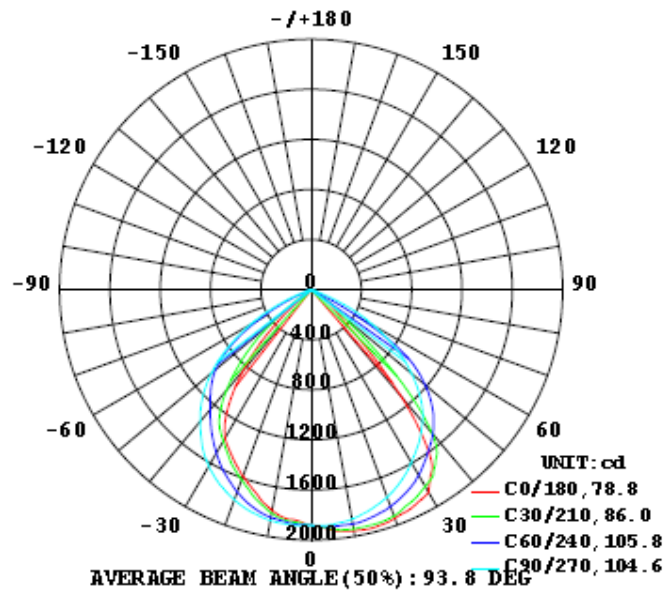


Chart 4: Polar Candela Distribution

Luminous Intensity Data

Table --1 **UNIT: cd**

C (DEG) γ (DEG)	0	10	20	30	40	50	60	70	80	90	100	110	120	130	140	150	160	170	180
0	1881	1881	1881	1881	1881	1881	1881	1881	1881	1881	1881	1881	1881	1881	1881	1881	1881	1881	1881
5	1927	1926	1922	1917	1912	1906	1899	1892	1886	1883	1881	1876	1872	1867	1862	1856	1849	1845	1843
10	1956	1956	1951	1940	1927	1915	1900	1881	1869	1861	1856	1848	1840	1828	1818	1808	1801	1794	1791
15	1964	1964	1955	1940	1926	1903	1879	1855	1833	1818	1811	1802	1784	1759	1735	1717	1702	1691	1686
20	1943	1945	1931	1923	1900	1876	1842	1809	1779	1764	1754	1734	1695	1665	1632	1610	1597	1589	1585
25	1913	1913	1894	1875	1847	1829	1787	1741	1705	1689	1677	1642	1595	1554	1527	1504	1488	1481	1479
30	1866	1870	1848	1813	1782	1743	1711	1657	1616	1594	1581	1533	1481	1440	1407	1392	1383	1372	1370
35	1664	1688	1712	1716	1705	1655	1608	1559	1513	1492	1470	1407	1348	1316	1302	1260	1203	1162	1155
40	1114	1170	1318	1494	1578	1560	1506	1453	1398	1376	1347	1281	1233	1211	1133	1016	911	848	838
45	440	492	649	914	1252	1408	1370	1317	1253	1230	1202	1150	1129	1044	871	698	565	472	460
50	238	248	275	347	644	1075	1183	1142	1074	1042	1024	1006	973	785	560	327	175	104	95.6
55	124	131	144	165	221	497	921	907	855	829	830	838	726	484	191	61.7	33.5	24.1	22.7
60	4.77	5.85	19.4	65.6	92.3	137	429	622	593	582	605	611	436	129	26.6	13.8	11.1	10.3	9.29
65	0.79	0.80	0.90	2.65	10.9	41.9	69.9	310	303	311	345	328	117	15.6	9.01	9.48	9.43	9.19	8.36
70	0.37	0.39	0.44	0.58	0.98	2.94	9.71	45.3	70.3	77.8	105	78.8	10.5	6.55	7.32	8.12	8.43	8.52	7.72
75	0.12	0.14	0.21	0.27	0.27	0.41	0.69	2.02	6.61	7.60	9.08	6.45	4.67	4.85	6.11	7.05	7.60	7.87	7.19
80	0.06	0.06	0.06	0.06	0.06	0.10	0.18	0.29	0.23	0.33	1.00	2.00	3.17	4.32	5.23	6.04	6.88	7.36	6.86
85	0.04	0.04	0.04	0.04	0.05	0.05	0.05	0.05	0.09	0.11	0.73	1.72	2.69	3.69	4.72	5.22	5.96	6.51	6.13
90	0.01	0.01	0.01	0.01	0.01	0.02	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.02	0.02	0.03	0.04	0.02	0.02
95	0.01	0.01	0.01	0.01	0.02	0.03	0.04	0.05	0.06	0.06	0.05	0.05	0.04	0.03	0.02	0.02	0.02	0.01	0.01
100	0.01	0.01	0.02	0.03	0.04	0.06	0.07	0.09	0.10	0.10	0.09	0.09	0.08	0.06	0.04	0.02	0.02	0.02	0.02
105	0.02	0.02	0.03	0.05	0.07	0.09	0.12	0.15	0.16	0.16	0.15	0.14	0.12	0.10	0.07	0.04	0.03	0.03	0.04
110	0.03	0.04	0.06	0.08	0.11	0.14	0.18	0.21	0.23	0.23	0.22	0.20	0.18	0.15	0.13	0.09	0.06	0.05	0.07
115	0.07	0.08	0.10	0.13	0.16	0.22	0.25	0.29	0.31	0.31	0.30	0.27	0.25	0.22	0.19	0.15	0.12	0.10	0.14
120	0.14	0.15	0.18	0.21	0.25	0.31	0.35	0.37	0.41	0.41	0.39	0.36	0.34	0.31	0.28	0.23	0.20	0.18	0.27
125	0.24	0.26	0.28	0.31	0.35	0.41	0.46	0.49	0.53	0.54	0.51	0.48	0.44	0.42	0.39	0.35	0.32	0.31	0.43
130	0.36	0.38	0.41	0.44	0.46	0.52	0.59	0.64	0.64	0.68	0.65	0.61	0.58	0.54	0.51	0.50	0.47	0.47	0.64
135	0.51	0.53	0.56	0.58	0.61	0.66	0.71	0.78	0.79	0.85	0.82	0.77	0.73	0.69	0.67	0.65	0.63	0.65	0.87
140	0.64	0.65	0.67	0.71	0.76	0.82	0.86	0.90	0.94	1.02	0.98	0.93	0.89	0.86	0.81	0.78	0.77	0.81	1.09
145	0.79	0.79	0.81	0.83	0.88	0.90	0.98	1.02	1.07	1.14	1.13	1.08	1.03	0.98	0.94	0.90	0.90	0.94	1.32
150	0.95	0.93	0.97	0.98	0.97	0.99	1.02	1.08	1.10	1.13	1.17	1.14	1.11	1.09	1.08	1.05	1.05	1.09	1.50
155	1.11	1.09	1.11	1.14	1.10	1.08	1.10	1.12	1.14	1.13	1.18	1.19	1.19	1.20	1.22	1.23	1.20	1.24	1.61
160	1.29	1.24	1.24	1.24	1.22	1.17	1.15	1.14	1.16	1.14	1.24	1.26	1.27	1.30	1.33	1.32	1.30	1.38	1.74
165	1.37	1.30	1.33	1.35	1.35	1.29	1.28	1.26	1.27	1.29	1.35	1.39	1.39	1.40	1.40	1.38	1.37	1.44	1.71
170	1.51	1.41	1.44	1.46	1.46	1.39	1.36	1.35	1.38	1.37	1.39	1.44	1.43	1.45	1.45	1.46	1.45	1.53	1.67
175	1.68	1.58	1.61	1.64	1.64	1.61	1.56	1.55	1.54	1.48	1.55	1.58	1.58	1.59	1.61	1.62	1.61	1.64	1.66
180	1.57	1.57	1.57	1.57	1.57	1.57	1.57	1.57	1.57	1.57	1.57	1.57	1.57	1.57	1.57	1.57	1.57	1.57	1.57

Table 4: Luminous Intensity Data

Table --2

UNIT: cd

γ (DEG) \ C (DEG)	190	200	210	220	230	240	250	260	270	280	290	300	310	320	330	340	350		
0	1881	1881	1881	1881	1881	1881	1881	1881	1881	1881	1881	1881	1881	1881	1881	1881	1881		
5	1845	1851	1859	1864	1868	1873	1878	1881	1886	1889	1895	1900	1909	1915	1921	1925	1925		
10	1795	1804	1812	1821	1835	1847	1854	1862	1872	1882	1894	1911	1926	1938	1949	1957	1957		
15	1692	1707	1724	1743	1769	1797	1816	1827	1838	1855	1879	1903	1924	1940	1950	1963	1967		
20	1591	1601	1617	1643	1683	1720	1757	1775	1786	1809	1836	1865	1895	1922	1931	1937	1949		
25	1483	1495	1516	1541	1571	1622	1677	1708	1718	1743	1778	1817	1841	1863	1885	1900	1920		
30	1374	1385	1397	1422	1458	1507	1576	1618	1629	1659	1697	1735	1758	1795	1820	1853	1878		
35	1175	1220	1275	1307	1332	1383	1454	1499	1513	1549	1590	1624	1670	1720	1724	1709	1695		
40	869	943	1051	1161	1210	1250	1306	1363	1375	1417	1468	1524	1577	1577	1490	1324	1189		
45	505	611	753	921	1077	1130	1163	1212	1223	1273	1336	1388	1405	1258	918	642	498		
50	132	221	391	624	847	994	1005	1028	1034	1092	1155	1196	1080	641	328	276	255		
55	23.5	31.6	66.0	263	558	781	827	814	812	862	915	918	500	208	168	149	137		
60	8.94	9.10	14.3	22.5	219	495	606	580	564	596	631	451	125	91.0	68.5	41.0	7.00		
65	7.82	7.51	7.44	7.73	16.8	197	357	329	301	309	323	60.5	34.8	17.5	1.29	0.88	0.79		
70	7.04	6.65	6.35	5.90	5.16	18.4	108	97.8	74.0	71.5	34.0	7.93	2.26	0.90	0.65	0.53	0.39		
75	6.42	6.03	5.62	4.95	4.03	3.75	7.34	9.81	7.23	6.92	2.18	0.79	0.49	0.30	0.28	0.23	0.17		
80	6.01	5.52	5.09	4.46	3.54	2.79	1.76	0.86	0.35	0.28	0.41	0.22	0.09	0.06	0.06	0.06	0.06		
85	5.27	5.02	4.68	4.13	3.26	2.29	1.47	0.59	0.11	0.09	0.07	0.06	0.05	0.04	0.04	0.04	0.04		
90	0.02	0.02	0.01	0.01	0.02	0.03	0.04	0.04	0.04	0.04	0.04	0.04	0.02	0.02	0.01	0.01	0.01		
95	0.01	0.01	0.02	0.02	0.04	0.06	0.07	0.08	0.08	0.08	0.07	0.06	0.04	0.02	0.01	0.01	0.01		
100	0.02	0.02	0.03	0.05	0.09	0.12	0.15	0.16	0.16	0.15	0.14	0.11	0.08	0.05	0.03	0.02	0.01		
105	0.04	0.05	0.07	0.11	0.16	0.20	0.23	0.25	0.25	0.24	0.22	0.19	0.14	0.10	0.06	0.03	0.03		
110	0.07	0.09	0.13	0.19	0.24	0.29	0.32	0.34	0.35	0.33	0.30	0.25	0.20	0.15	0.10	0.07	0.05		
115	0.15	0.17	0.22	0.28	0.33	0.37	0.40	0.42	0.42	0.40	0.36	0.32	0.27	0.21	0.16	0.13	0.11		
120	0.28	0.30	0.34	0.40	0.44	0.47	0.49	0.51	0.52	0.49	0.45	0.40	0.35	0.31	0.26	0.22	0.20		
125	0.43	0.46	0.50	0.54	0.57	0.60	0.63	0.65	0.65	0.63	0.58	0.52	0.46	0.42	0.38	0.34	0.32		
130	0.65	0.67	0.70	0.72	0.76	0.81	0.83	0.84	0.85	0.82	0.76	0.70	0.64	0.59	0.56	0.53	0.50		
135	0.88	0.90	0.93	0.97	1.00	1.03	1.06	1.08	1.08	1.04	0.97	0.90	0.85	0.82	0.77	0.73	0.70		
140	1.10	1.12	1.15	1.21	1.24	1.27	1.28	1.28	1.26	1.23	1.16	1.12	1.07	1.03	0.97	0.93	0.89		
145	1.31	1.33	1.35	1.39	1.45	1.48	1.48	1.46	1.45	1.41	1.37	1.33	1.28	1.22	1.17	1.15	1.11		
150	1.49	1.50	1.51	1.54	1.57	1.60	1.59	1.58	1.56	1.51	1.52	1.46	1.43	1.38	1.38	1.36	1.33		
155	1.60	1.63	1.67	1.66	1.65	1.65	1.62	1.60	1.60	1.58	1.57	1.53	1.51	1.51	1.54	1.48	1.46		
160	1.72	1.72	1.74	1.74	1.71	1.69	1.65	1.64	1.59	1.59	1.57	1.58	1.56	1.58	1.61	1.61	1.62		
165	1.71	1.73	1.73	1.75	1.76	1.73	1.70	1.66	1.63	1.60	1.57	1.59	1.59	1.59	1.61	1.63	1.65		
170	1.68	1.71	1.73	1.73	1.73	1.72	1.69	1.63	1.63	1.63	1.61	1.61	1.57	1.59	1.64	1.66	1.67		
175	1.68	1.69	1.70	1.69	1.68	1.67	1.64	1.62	1.63	1.56	1.62	1.64	1.61	1.61	1.65	1.69	1.69		
180	1.57	1.57	1.57	1.57	1.57	1.57	1.57	1.57	1.57	1.57	1.57	1.57	1.57	1.57	1.57	1.57	1.57		

Table 5: Luminous Intensity Data

EQUIPMENT LIST

Test Equipment	Model	Equipment No.	Calibration Date	Calibration Due date
Goniophotometer system	GO-R5000	HZTE011-01	Aug. 23, 2017	Aug. 22, 2018
Digital Power Meter	PF2010A	HZTE028-01	Aug. 10, 2017	Aug. 09, 2018
AC Power Supply	DPS1060	HZTE001-06	Aug. 10, 2017	Aug. 09, 2018
DC Power Supply	WY12010	HZTE004-03	Aug. 10, 2017	Aug. 09, 2018
Standard Source	D908	HZTE012-01	Aug. 20, 2017	Aug. 19, 2018
Standard source	SCL-1400	HZTE012-02	Aug. 20, 2017	Aug. 19, 2018
Temperature and humidity recorder	JR900	HZTE018-01	Aug. 16, 2017	Aug. 15, 2018
Temperature recorder	JM624U	HZTE018-08	Aug. 17, 2017	Aug. 16, 2018

Table 6: Test Equipment List

TEST METHODS

Seasoning of SSL Product

For the purpose of rating new SSL products, SSL products shall be tested with no seasoning. Therefore, no seasoning was performed.

Goniophotometer Method

Photometric and Electrical Measurements

An EVERFINE Type C Model GO-R5000 Goniophotometer was used to measure the intensity at each angle of distribution for each sample. The photometric distance is 2.475m for near-field measurement or 30m for far-field measurement. Bandwidth of spectroradiometer is 380nm-780nm.

Ambient temperature was measured at the same height of the sample mounted on the Goniophotometer equipment. Each SSL unit was operated on the client provided driver at the rated input voltage in its designated orientation.

The stabilization time typically ranges from 30 min (small integrated LED lamps) to 2 or more hours for large SSL luminaires). It can be judged that stability is reached when the variation (maximum – minimum) of at least 3 readings of the light output and electrical power over a period of 30 min, taken 15 minutes apart, is less than 0.5 %.

Electrical measurements including voltage, current, and power were measured using the Everfine Digital Power Meter.

Some graphics were created with Photometric Plus software.

The standard reference of the Goniophotometer system is halogen incandescent lamp, the intensity distribution type is omni-directional, and is traceable to the National Institute of Metrology P.R. China.

The uncertainty of goniophotometer system reported in this document is expanded uncertainty is 2.3% with a coverage factor k=2.

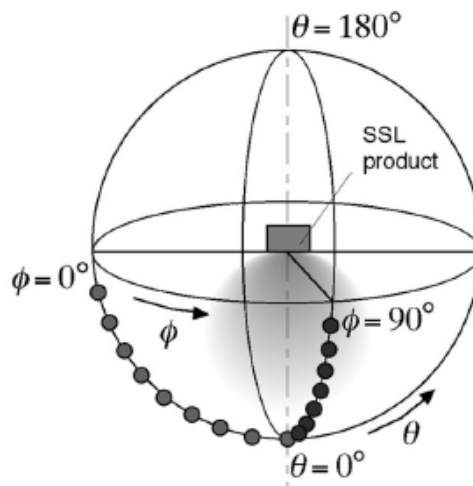
Color Characteristics Measurements

The color characteristics of SSL products include chromaticity coordinates, correlated color temperature, and color rendering index. These characteristics of SSL products may be spatially non-uniform, and thus, in order that they can be specified accurately, the color quantities shall be measured as values that are spatially average, weighted to intensity, over the angular range where light is intentionally emitted from the SSL product. The color characteristics measurements are using gonio-spectroradiometer.

Color Spatial Uniformity

The characteristics of SSL products may be spatially non-uniform, the chromaticity coordinate shall be measured at two vertical planes ($C=0^\circ/180^\circ$ and $C=90^\circ/270^\circ$) and at 10° or less intervals for vertical angle until the light output dropped to below 10% of the peak intensity. The averaged weighted chromaticity coordinate was calculated from these points. The data was then analyzed to check for delta color differences of the u' , v' chromaticity coordinates. The spatial non-uniformity of chromaticity, $\Delta u'v'$, is determined as the maximum deviation (distance on the CIE (u' , v') diagram) among all measured points from the spatially averaged chromaticity coordinate.

The geometry for the chromaticity measurement using gonio-spectroradiometer is shown as following.



*** End of Report ***

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