



LM-79-08 Test Report

for

ABB Lighting, Inc.

1501 Industrial Way N. Toms River, NJ 08755.

LS Parking Garage

Model: LSPKG65501

Laboratory: Leading Testing Laboratories

NVLAP CODE: 200960-0

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Report No.: HZ16090004b

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

Reviewed by:

Engineer: April Zou
Sep. 12, 2016

Approved by:

Manager: Jim Zhang
Sep. 12, 2016

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: **LSPKG65501**

Luminous Efficacy (Lumens /Watt)	Total Luminous Flux (Lumens)	Power (Watts)	Power Factor
135.2	9213.8	68.16	0.9922
CCT (K)	CRI	Stabilization Time (Light & Power)	
5064	82.7	60	

Table 1: Executive Data Summary

Test specifications:

Date of Receipt	: Sep. 08, 2016
Date of Test	: Sep. 09, 2016
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 Photo



Figure 1- Overview of the sample

Equipment Under Test (EUT)

Name	: LS Parking Garage
Model	: LSPKG65501
Electrical Ratings	: 120~277Vac, 50/60Hz, 65W
Product Description	: 5000K, Aluminum Enclosure, Black Coating, Silver reflector Manufacturer of light source: LG INNOTEK Development Model of light source: LGIT 5630 G2 Quantity of LED light source: 240pcs
Manufacturer	: ABB Lighting (shanghai) Co., Ltd.
Address	: Room 1012, North Minch Fortune 108 Plaza,# 1839 Qixin road, Shanghai

TEST RESULTS

Test ambient temperature was 24.2°C.

Base orientation was Light down. 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 85 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)	0.572	0.255
Power Factor	0.9922	0.9531
Test Power (W)	68.16	67.46
THD A%	8.83	14.03
Luminous Efficacy (lm/W)	135.2	136.0
Total Luminous Flux (lm)	9213.8	9172.5
Color Rendering Index (CRI)	82.7	
R9	2	
Correlated Color Temperature (CCT) (K)	5064	
Chromaticity (Chroma x, Chroma y)	(0.3432, 0.3491)	
Chromaticity (Chroma u, Chroma v)	(0.2111, 0.3221)	
Chromaticity (Chroma u', Chroma v')	(0.2111, 0.4832)	
Duv	0.0005	
Average Beam Angle (°)	189.8	
Center Beam Candle Power (cd)	922	
Spacing Criteria	1.93 (0°-180°)/ 2.06 (90°-270°)	
Zonal Lumens in the 0°-60°Zone	44.95%	
Zonal Lumens in the 60°-90°Zone	46.12%	
Zonal Lumens in the 90°-120°Zone	8.27%	
Zonal Lumens in the 120°-180°Zone	0.65%	

Special Color Rendering Indices	
R1	81
R2	87
R3	92
R4	84
R5	83
R6	84
R7	85
R8	65
R9	2
R10	71
R11	85
R12	71
R13	82
R14	96

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

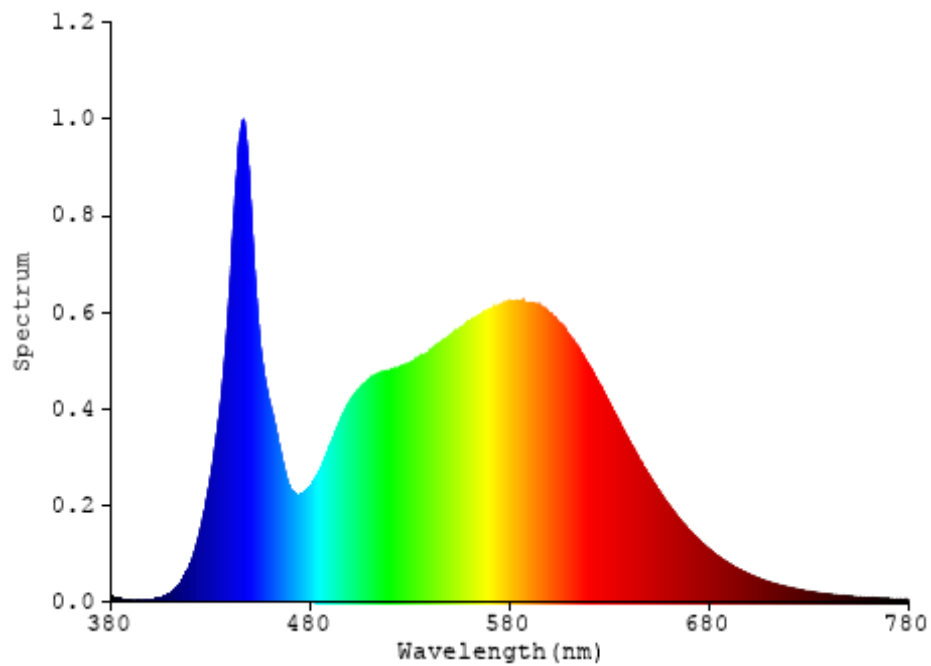


Chart 1: Spectral Power Distribution

Zonal Lumen Tabulation

$\gamma(^{\circ})$	Lumens	% Total
0- 10	78.812	0.86%
10- 20	224.455	2.44%
20- 30	425.962	4.62%
30- 40	756.192	8.21%
40- 50	1155.81	12.54%
50- 60	1500.613	16.29%
60- 70	1618.855	17.57%
70- 80	1485.91	16.13%
80- 90	1144.954	12.43%
90-100	534.9	5.81%
100-110	150.441	1.63%
110-120	77.092	0.84%
120-130	37.961	0.41%
130-140	15.808	0.17%
140-150	4.525	0.05%
150-160	1.021	0.01%
160-170	0.397	0.00%
170-180	0.124	0.00%
Total	9213.8	100%

$\gamma(^{\circ})$	Lumens	% Total
0- 60	4141.844	44.95%
60- 90	4249.719	46.12%
0-90	8391.563	91.08%
90- 180	822.269	8.92%
0- 180	9213.8	100%

Table 3: Zonal Lumen Data

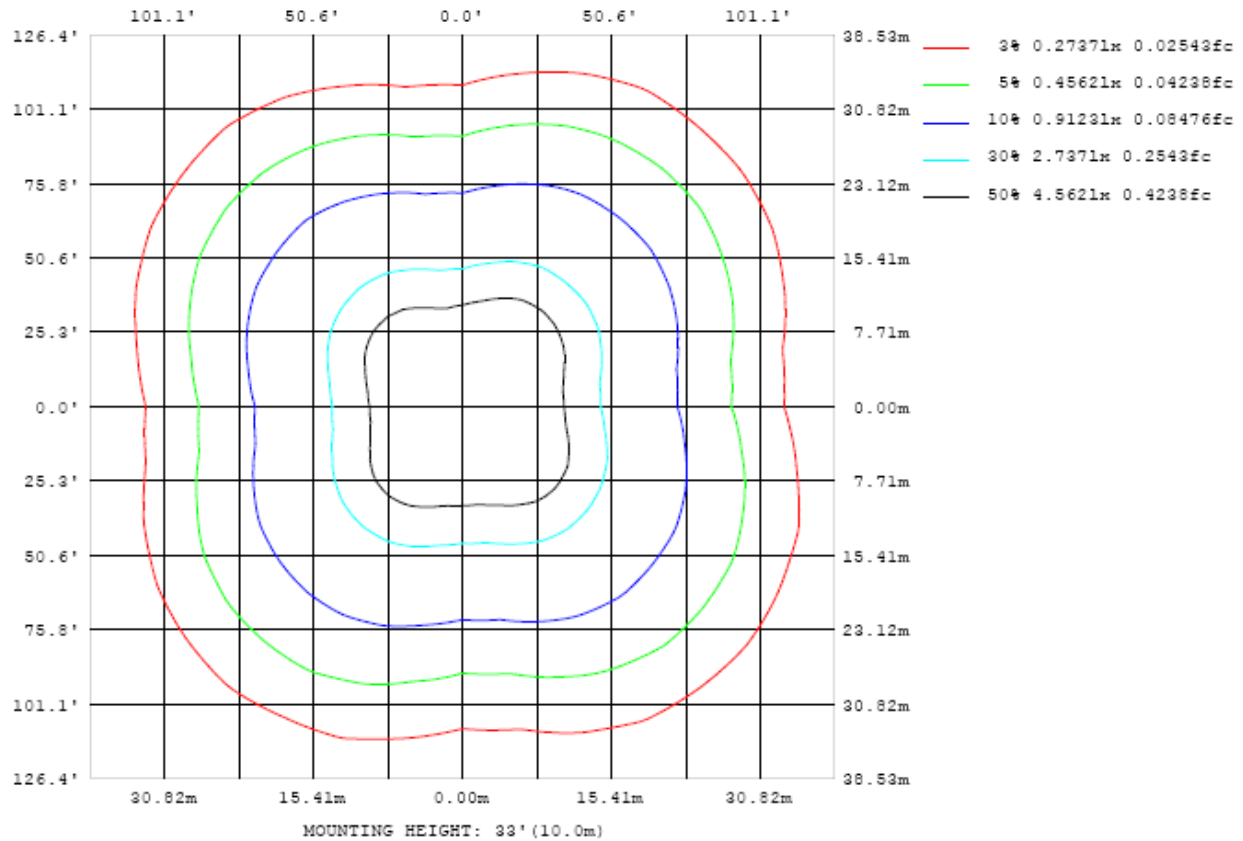


Chart 2: Illuminance Plot (Footcandles)

Luminous Intensity Distribution Plots

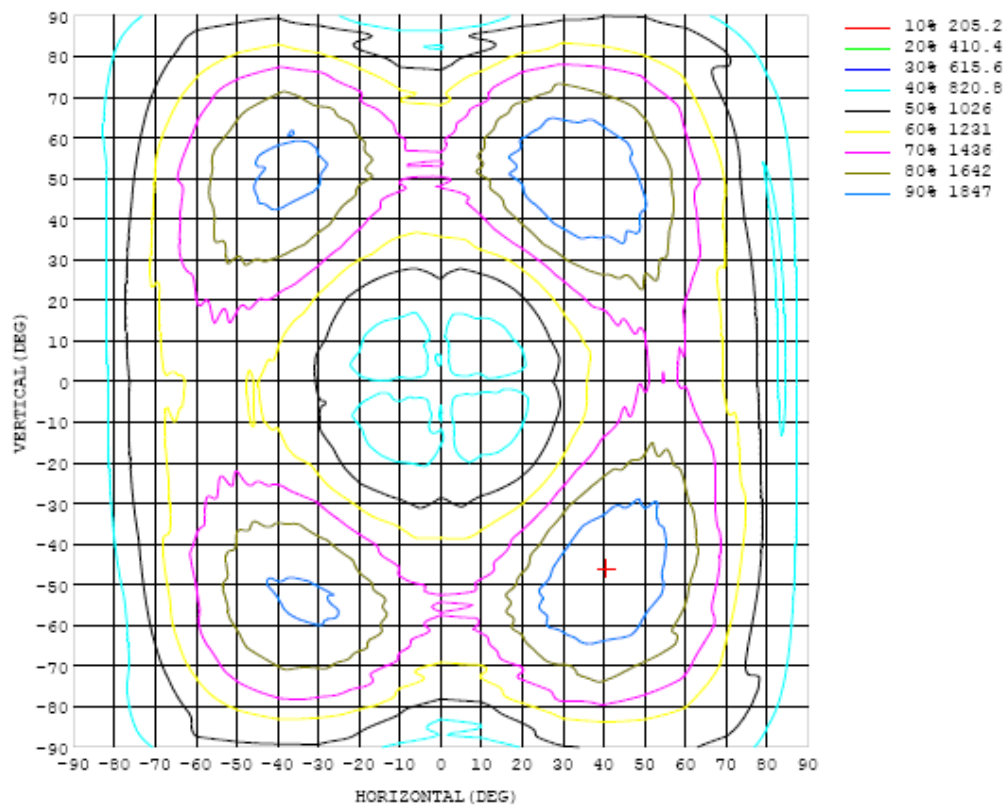


Chart 3: Isocandela Plot

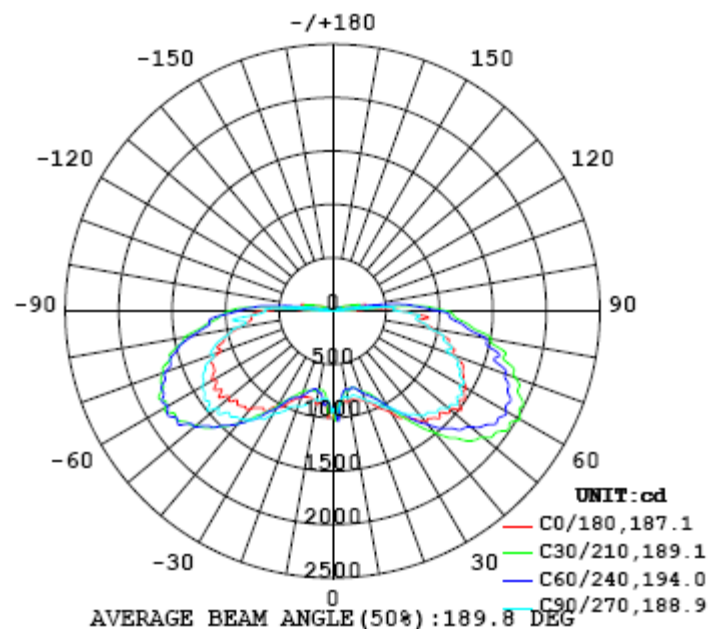


Chart 4: Polar Candela Distribution

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	922	922	922	922	922	922	922	922	922	922	922	922	922	922	922	922	922	922	922
5	836	857	842	882	848	826	849	919	857	834	848	891	896	864	887	848	843	832	873
10	857	867	803	767	744	739	742	786	911	829	886	755	737	733	743	776	878	865	881
15	862	821	747	740	764	768	743	744	849	820	776	736	739	774	739	736	764	818	837
20	892	810	791	802	782	781	814	799	868	884	800	787	785	767	772	770	773	849	859
25	991	904	901	870	879	891	893	891	910	947	864	885	863	856	848	854	849	925	935
30	1101	1042	1046	1038	1027	1021	1032	1035	1011	1049	997	1005	987	978	969	995	992	1020	1027
35	1224	1201	1244	1255	1248	1224	1189	1182	1143	1172	1145	1144	1165	1167	1155	1128	1141	1105	1120
40	1358	1370	1410	1486	1516	1459	1387	1306	1265	1276	1263	1308	1359	1381	1371	1275	1203	1170	1199
45	1418	1468	1572	1700	1757	1686	1552	1423	1338	1343	1349	1426	1532	1595	1540	1429	1307	1230	1249
50	1430	1531	1708	1838	1926	1846	1687	1540	1428	1417	1442	1552	1664	1733	1687	1547	1384	1261	1266
55	1454	1583	1814	1960	2009	1968	1850	1639	1447	1417	1511	1692	1779	1823	1773	1657	1446	1272	1276
60	1441	1599	1805	2021	2052	2038	1876	1621	1427	1385	1492	1701	1841	1870	1830	1691	1447	1285	1290
65	1342	1537	1756	1951	1988	1992	1809	1584	1376	1321	1456	1637	1819	1830	1827	1654	1432	1242	1229
70	1196	1422	1693	1816	1894	1851	1719	1503	1232	1166	1362	1580	1702	1740	1722	1593	1404	1156	1122
75	1122	1299	1555	1651	1751	1679	1616	1391	1144	1081	1255	1480	1542	1643	1576	1486	1286	1075	1049
80	947	1113	1356	1505	1570	1501	1450	1209	976	922	1073	1322	1405	1476	1421	1335	1117	924	897
85	851	960	1127	1249	1283	1248	1179	1005	823	781	896	1071	1182	1210	1186	1092	926	774	759
90	651	774	947	1068	1061	1059	1009	835	655	626	739	918	1007	996	999	959	827	674	650
95	96.0	102	183	480	728	783	706	602	486	474	540	648	731	757	620	343	114	106	165
100	277	241	313	253	162	138	188	230	234	232	231	224	171	131	183	250	249	222	251
105	189	164	201	242	181	118	74.9	49.7	47.8	48.5	46.4	62.9	98.5	143	216	253	179	179	202
110	126	108	121	156	150	122	72.2	23.2	16.9	15.3	18.5	50.0	108	144	163	156	117	123	143
115	91.9	78.3	76.0	102	105	89.6	66.6	53.7	45.8	44.0	47.8	59.3	82.1	107	108	101	81.7	88.8	105
120	66.1	55.0	56.2	69.6	68.9	65.9	58.6	50.7	48.3	48.2	47.7	55.1	65.0	70.1	74.2	73.5	59.0	63.1	75.4
125	49.7	41.0	39.6	47.1	45.6	43.2	39.9	39.2	42.5	43.7	40.7	38.9	43.0	47.7	49.9	51.6	43.1	46.4	55.3
130	28.1	29.2	27.1	30.7	29.5	27.2	25.9	28.5	31.9	32.8	30.4	27.1	27.4	30.4	33.7	33.7	31.6	28.8	31.5
135	23.8	19.2	19.5	16.8	17.9	16.9	18.6	22.0	25.5	26.6	24.2	20.3	17.2	19.0	21.2	21.3	24.6	23.3	28.7
140	17.0	12.7	13.6	9.55	8.19	9.57	13.0	16.2	18.9	19.8	18.0	14.9	11.5	9.28	10.3	13.8	16.8	17.4	20.0
145	6.17	4.23	3.28	5.11	3.66	4.33	7.13	9.71	11.7	12.3	11.1	8.91	6.13	3.81	4.86	4.96	8.99	11.3	12.0
150	4.05	3.50	2.62	2.79	2.68	2.61	2.47	3.49	4.77	5.16	4.37	3.15	2.86	2.99	3.08	3.15	3.44	4.86	5.37
155	2.20	2.20	1.83	1.95	1.90	1.87	1.93	2.00	2.01	2.03	2.01	2.10	2.16	2.22	2.24	2.20	2.05	2.48	2.80
160	1.62	1.62	1.55	1.38	1.47	1.44	1.47	1.51	1.57	1.56	1.54	1.57	1.64	1.67	1.64	1.52	1.79	1.87	2.17
165	1.35	1.33	1.33	1.29	1.15	1.11	1.11	1.14	1.19	1.15	1.13	1.19	1.29	1.32	1.34	1.48	1.53	1.54	1.75
170	1.33	1.33	1.33	1.33	1.30	1.15	0.97	0.89	0.94	0.94	0.93	1.03	1.18	1.31	1.38	1.41	1.41	1.43	1.59
175	1.37	1.37	1.37	1.38	1.38	1.28	1.11	1.05	1.13	1.12	1.13	1.15	1.32	1.37	1.38	1.38	1.36	1.34	1.45
180	1.29	1.32	1.36	1.37	1.36	1.32	1.28	1.22	1.21	1.21	1.20	1.21	1.26	1.28	1.29	1.26	1.24	1.19	1.28

Table 4: Luminous Intensity Data

Table--2

UNIT: cd

C (DEG) y (DEG)	190	200	210	220	230	240	250	260	270	280	290	300	310	320	330	340	350		
0	922	922	922	922	922	922	922	922	922	922	922	922	922	922	922	922	922		
5	848	799	779	791	829	889	841	815	821	895	829	791	762	756	762	800	842		
10	800	771	752	747	756	770	843	836	841	820	763	754	747	750	751	758	819		
15	757	751	769	774	778	765	789	883	896	797	773	781	765	760	746	741	777		
20	792	806	798	811	828	852	833	940	949	846	860	842	826	809	811	792	798		
25	879	883	886	909	904	902	896	983	1018	920	930	924	932	914	904	910	902		
30	1019	1035	1025	1018	1036	1054	1046	1055	1112	1059	1079	1081	1065	1073	1072	1060	1031		
35	1157	1164	1182	1213	1212	1226	1189	1168	1222	1212	1278	1280	1300	1291	1276	1217	1170		
40	1221	1277	1377	1427	1431	1379	1312	1274	1318	1345	1433	1515	1574	1548	1453	1374	1315		
45	1304	1416	1535	1627	1610	1536	1423	1339	1361	1437	1598	1720	1788	1751	1622	1483	1384		
50	1352	1520	1670	1764	1765	1687	1516	1398	1411	1508	1714	1884	1930	1874	1755	1551	1405		
55	1390	1582	1780	1856	1885	1770	1597	1466	1457	1593	1773	1976	2016	1982	1836	1617	1448		
60	1414	1589	1810	1903	1936	1786	1613	1437	1412	1588	1786	1955	2030	2006	1842	1632	1447		
65	1383	1567	1761	1880	1867	1759	1568	1353	1316	1503	1749	1870	1957	1912	1772	1572	1358		
70	1300	1509	1686	1797	1746	1663	1420	1231	1195	1367	1617	1750	1838	1783	1693	1450	1216		
75	1197	1413	1583	1642	1663	1533	1326	1144	1110	1291	1488	1644	1650	1631	1526	1323	1138		
80	1033	1228	1403	1454	1458	1329	1142	948	921	1097	1285	1403	1449	1443	1320	1136	960		
85	870	1015	1141	1205	1224	1160	1059	952	943	1060	1141	1188	1198	1179	1096	989	863		
90	737	871	969	1011	1010	894	752	631	628	727	855	958	1022	1014	887	768	648		
95	167	87.4	292	483	601	594	474	390	390	449	578	659	608	469	224	164	153		
100	228	296	242	196	146	154	156	174	180	184	190	161	134	195	267	253	252		
105	176	197	231	193	125	78.5	41.7	40.1	41.7	41.3	53.6	84.3	126	198	221	162	169		
110	118	124	153	151	123	67.9	20.2	11.9	12.6	13.0	37.8	88.1	125	142	138	104	106		
115	85.8	78.7	103	105	86.9	58.5	42.1	38.6	39.1	42.9	50.7	73.8	92.8	94.4	85.5	71.8	76.8		
120	61.1	59.8	70.4	66.4	59.3	52.4	46.9	43.2	44.7	47.8	52.7	56.2	60.1	63.1	62.6	51.8	55.5		
125	44.4	41.5	47.0	43.6	39.3	35.3	35.2	36.9	38.2	36.6	35.8	37.6	40.1	42.0	43.5	38.4	43.1		
130	33.4	28.9	30.8	28.0	24.4	22.8	24.8	27.2	28.0	26.1	23.7	23.1	24.9	27.3	26.0	27.3	27.2		
135	24.4	21.5	17.8	17.0	14.4	15.7	18.1	20.5	21.0	19.1	16.2	13.4	14.5	16.0	17.5	20.8	22.4		
140	15.6	14.5	10.8	7.17	7.75	10.2	12.6	14.4	14.8	13.2	10.6	8.07	5.81	8.08	11.6	14.2	16.5		
145	9.76	3.41	5.25	3.76	3.45	5.31	7.15	8.48	8.68	7.48	5.43	3.34	3.21	3.75	3.88	2.21	2.14		
150	4.61	3.11	3.03	2.83	2.68	2.58	2.44	2.70	2.75	2.23	2.22	2.28	2.42	2.52	2.76	2.94	4.12		
155	2.77	2.36	2.28	2.17	2.06	2.02	1.94	1.89	1.88	1.84	1.81	1.73	1.76	1.92	2.07	2.23	2.41		
160	2.17	2.07	1.81	1.79	1.67	1.58	1.50	1.49	1.46	1.47	1.45	1.38	1.43	1.56	1.64	1.80	1.82		
165	1.76	1.76	1.73	1.59	1.50	1.34	1.22	1.15	1.12	1.14	1.13	1.13	1.19	1.30	1.47	1.46	1.46		
170	1.59	1.62	1.60	1.58	1.53	1.45	1.27	1.13	1.08	1.06	1.05	1.09	1.20	1.34	1.42	1.43	1.42		
175	1.45	1.48	1.50	1.52	1.49	1.45	1.32	1.21	1.21	1.18	1.21	1.14	1.26	1.39	1.43	1.41	1.39		
180	1.28	1.32	1.35	1.38	1.36	1.33	1.28	1.23	1.21	1.21	1.21	1.21	1.27	1.32	1.32	1.31	1.27		

Table 5: Luminous Intensity Data

EQUIPMENT LIST

Test Equipment	Model	Equipment No.	Calibration Date	Calibration Due date
Goniophotometer system	GO-R5000	HZTE011-01	Jul. 27, 2016	Jul. 26, 2017
Digital Power Meter	PF2010A	HZTE028-01	Jul. 27, 2016	Jul. 26, 2017
AC Power Supply	PCR 500L	HZTE001-08	Jul. 27, 2016	Jul. 26, 2017
DC Power Supply	WY12010	HZTE004-03	Jul. 27, 2016	Jul. 26, 2017
Temperature Meter	TES1310	HZTE017-01	Jul. 27, 2016	Jul. 26, 2017
Standard Source	D908	HZTE012-01	Jul. 27, 2016	Jul. 26, 2017
Standard source	SCL-1400	HZTE012-02	Jul. 27, 2016	Jul. 26, 2017

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 expended uncertainty is 1.94% 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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