



## LM-79-08 Test Report

for

### AOK LED LIGHT CO. LTD

3<sup>rd</sup> Floor Building 23 No.152 Guanpu Road, Jianxin Town,  
Cangshan District Fuzhou City, Fujian, China

### LED HIGH BAY LIGHT

**Model: AOK-120Wi (5700K)**

### Laboratory: Leading Testing Laboratories

**NVLAP CODE: 200960-0**

No.1805, DongLiu road, BinJiang District, Hangzhou, China

Tel: +86-571-56680806

www.ledtestlab.com

Report No.: HZ14050049b

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

Review by:

Engineer: April Zou  
Jul. 07, 2014

Approved



Manager: Jim Zhang  
Jul. 07, 2014

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: **AOK-120Wi (5700K)**

Luminous Efficacy (Lumens /Watt)	Total Luminous Flux (Lumens)	Power (Watts)	Power Factor
105.1	12148.6	115.6	0.9922
CCT (K)	CRI	Stabilization Time (Light & Power)	
5732	75.8	100	

Table 1: Executive Data Summary

### Test specifications:

**Date of Receipt** : May 30, 2014

**Date of Test** : Jun. 05, 2014

**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

## TABLE OF CONTENT

LM-79-08 Test Report.....	1
Test Summary.....	2
Photo.....	4
TEST RESULTS .....	5
Spectral Power Distribution .....	6
Zonal Lumen Tabulation.....	7
Illuminance Plots.....	8
Luminous Intensity Distribution Plots.....	10
Luminous Intensity Data .....	11
EQUIPMENT LIST .....	13
TEST METHODS .....	13
Seasoning of SSL Product.....	13
Sphere-Spectroradiometer Method- Photometric and Electrical Measurements.....	13
Goniophotometer Method .....	14
Photometric and Electrical Measurements.....	14
Color Characteristics Measurements.....	14
Color Spatial Uniformity .....	14

## Photo



Figure 1- Overview of the sample

### Equipment Under Test (EUT)

<b>Name</b>	: LED HIGH BAY LIGHT
<b>Model</b>	: AOK-120Wi (5700K)
<b>Electrical Ratings</b>	: 90~277V AC, 50/60Hz, 120W
<b>Product Description</b>	: 5700K, Outdoor Luminaire, Black coating enclosure, 3 LED Bars, Suspended Mounting Manufacturer of light source: Philips Lumileds Model of light source: LXH7-FW57 Quantity of light source: 42pcs
<b>Manufacturer</b>	: Shenzhen AOK LED LIGHT CO. LTD
<b>Address</b>	: 1#3 Building, Sans Souci Technology Industrial Park, Shajin street, Shenzhen city, Guangdong Province, China

**TEST RESULTS**

Test ambient temperature was 25.4 °C.

Base orientation was Light down. Test was conducted without a dimmer in the circuit.

The stabilization time of the sample was 100 minutes, and the total operating time including stabilization was 115 minutes.

Parameter	Result		
Test Voltage (V)	120.0	90.0	277.0
Voltage frequency (Hz)	60	60	60
Test Current (A)	0.971	1.303	0.451
Power Factor	0.9922	0.9956	0.9246
Test Power (W)	115.6	116.8	115.6
Off-State Power (W)	0	0	0
THD A%	8.17	7.47	17.67
Luminous Efficacy (lm/W)	105.1		
Total Luminous Flux (lm)	12148.6		
Color Rendering Index (CRI)	75.8		
R9	10		
Correlated Color Temperature (CCT) (K)	5732		
Chromaticity (Chroma x, Chroma y)	(0.3274, 0.3367)		
Chromaticity (Chroma u, Chroma v)	(0.2051, 0.3163)		
Chromaticity (Chroma u', Chroma v')	(0.2051, 0.4745)		
Duv	0		
Average Beam Angle (°)	108.6		
Center Beam Candle Power (cd)	4102		
Spacing Criteria	1.42(0°-180°)/ 1.27(90°-270°)		
Zonal Lumens in the 0°-60°Zone	83.43%		
Zonal Lumens in the 60°-90°Zone	16.50%		
Zonal Lumens in the 90°-120°Zone	0.02%		
Zonal Lumens in the 120°-180°Zone	0.04%		

Special Color Rendering Indices	
R1	80
R2	77
R3	71
R4	79
R5	80
R6	68
R7	79
R8	72
R9	10
R10	42
R11	81
R12	50
R13	77
R14	83

Table 2: Test data per Sphere-Spectroradiometer 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

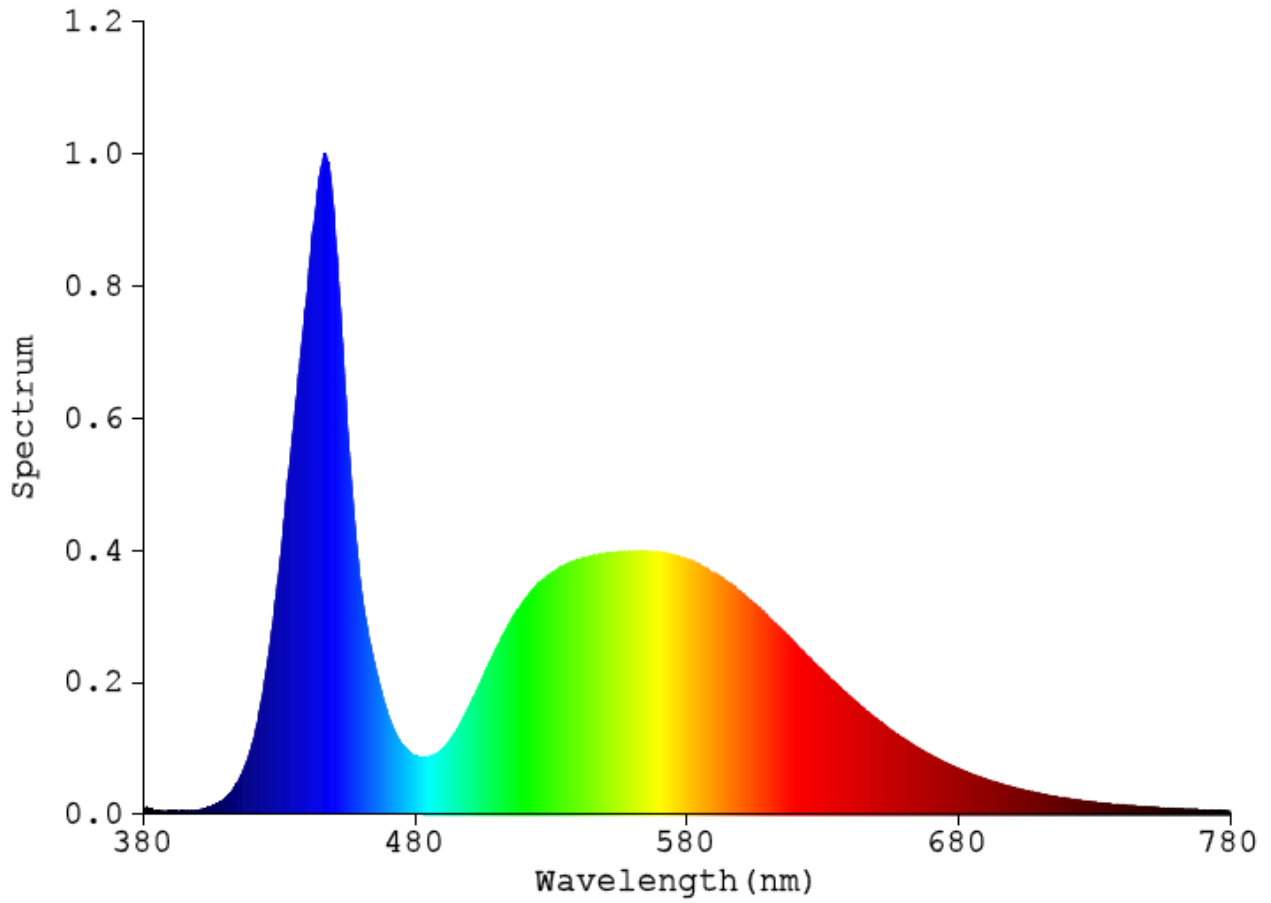


Chart 1: Spectral Power Distribution

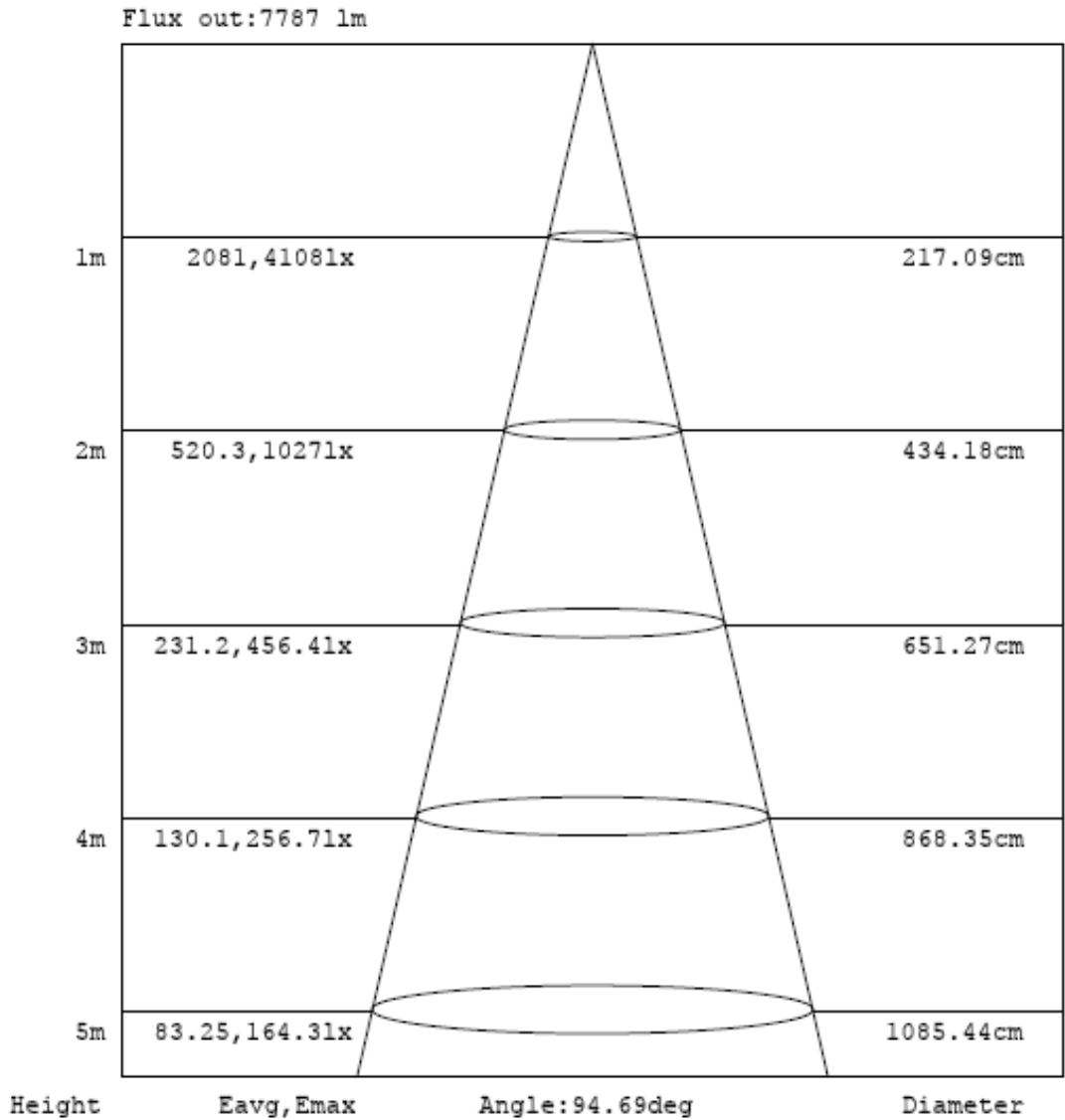
### Zonal Lumen Tabulation

$\gamma(^{\circ})$	Lumens	% Total
0- 10	395.334	3.25%
10- 20	1203.548	9.91%
20- 30	1974.222	16.25%
30- 40	2444.418	20.12%
40- 50	2301.286	18.94%
50- 60	1817.068	14.96%
60- 70	1299.188	10.69%
70- 80	624.993	5.14%
80- 90	80.476	0.66%
90-100	0.75	0.01%
100-110	0.957	0.01%
110-120	1.008	0.01%
120-130	1.079	0.01%
130-140	1.194	0.01%
140-150	1.155	0.01%
150-160	0.98	0.01%
160-170	0.663	0.01%
170-180	0.245	0.00%
Total	12148.6	100%

$\gamma(^{\circ})$	Lumens	% Total
0- 60	10135.876	83.43%
60- 90	2004.657	16.50%
0-90	12140.533	99.93%
90- 180	8.031	0.07%
0- 180	12148.6	100%

Table 4: Zonal Lumen Data

### Illuminance Plots



Note: The Curves indicate the illuminated area and the average illumination when the luminaire is at different distance.

Chart 2: Beam Angle



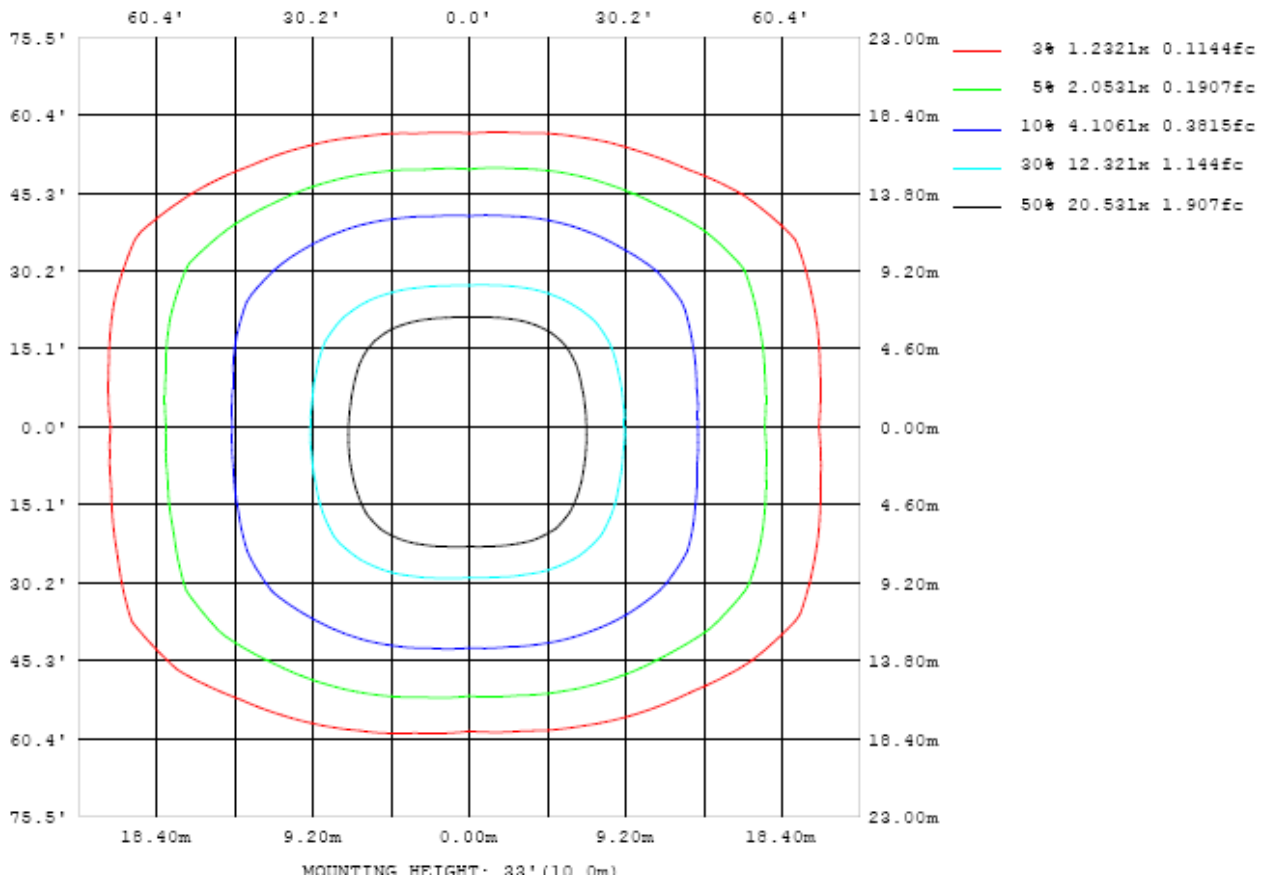


Chart 3: Illuminance Plot (Footcandles)

**Luminous Intensity Distribution Plots**

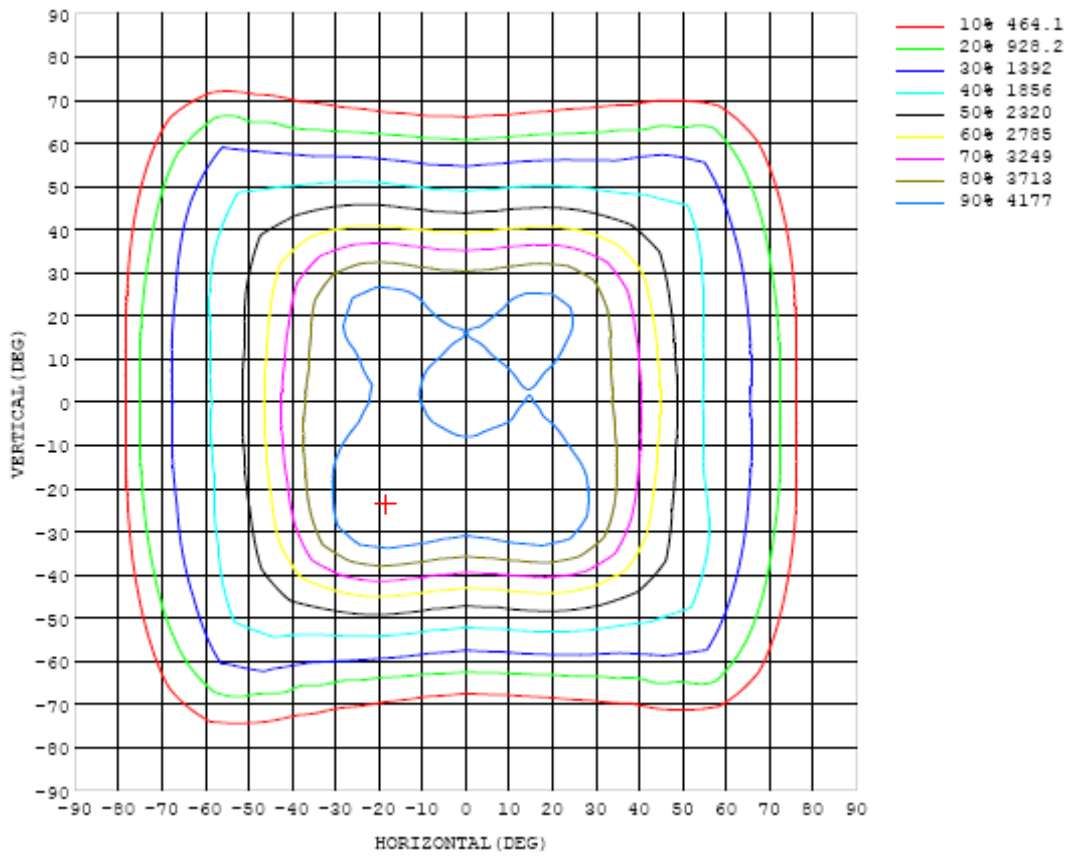


Chart 4: Isocandela Plot

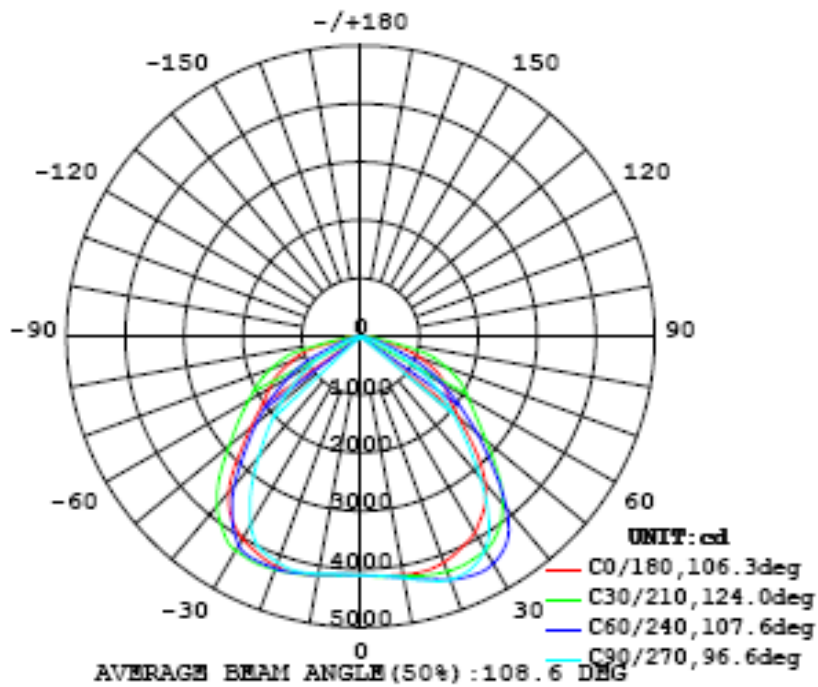


Chart 5: Polar Candela Distribution

### Luminous Intensity Data

Table--1 UNIT: cd

C (DEG) y (DEG)	0	10	20	30	40	50	60	70	80	90	100	110	120	130	140	150	160	170	180
0	4102	4102	4102	4102	4102	4102	4102	4102	4102	4102	4102	4102	4102	4102	4102	4102	4102	4102	4102
5	4135	4137	4139	4138	4135	4133	4131	4130	4130	4130	4130	4129	4129	4130	4134	4137	4138	4135	4133
10	4154	4160	4163	4176	4192	4205	4213	4214	4214	4215	4215	4216	4217	4217	4209	4194	4184	4180	4174
15	4178	4192	4215	4251	4278	4303	4323	4331	4335	4340	4342	4342	4337	4329	4309	4286	4246	4222	4205
20	4133	4159	4225	4296	4368	4415	4447	4455	4448	4447	4463	4483	4486	4459	4418	4356	4289	4232	4201
25	4023	4068	4168	4294	4430	4521	4527	4486	4442	4416	4454	4521	4584	4597	4517	4401	4280	4179	4125
30	3885	3941	4067	4241	4434	4537	4506	4399	4285	4229	4299	4432	4568	4639	4560	4372	4209	4084	4016
35	3650	3709	3847	4076	4299	4406	4326	4107	3887	3793	3908	4138	4373	4505	4451	4238	4035	3893	3823
40	3296	3340	3501	3758	4020	4084	3857	3518	3258	3165	3301	3592	3938	4202	4190	3931	3691	3556	3491
45	2759	2793	2991	3296	3544	3473	3191	2879	2636	2551	2677	2957	3323	3629	3747	3489	3180	3009	2951
50	2188	2249	2475	2787	2948	2807	2585	2321	2113	2048	2154	2385	2678	2944	3149	2963	2662	2492	2442
55	1830	1898	2110	2397	2433	2253	2034	1840	1675	1607	1709	1908	2132	2359	2608	2521	2266	2102	2041
60	1659	1745	1908	2112	2032	1780	1578	1387	1226	1155	1258	1462	1682	1912	2180	2206	1982	1838	1796
65	1421	1520	1694	1879	1666	1349	1112	863	697	645	723	938	1225	1512	1875	2009	1782	1626	1557
70	1085	1189	1369	1553	1287	837	581	433	339	312	371	504	704	1034	1508	1704	1473	1314	1255
75	676	805	999	1171	707	409	264	195	149	134	166	222	333	591	938	1330	1139	1015	943
80	236	295	446	454	282	139	81.9	56.6	37.1	27.7	47.9	66.6	98.7	178	437	682	619	420	318
85	26.4	73.9	109	62.2	35.4	16.0	12.8	8.94	6.27	7.02	7.17	13.0	20.7	24.3	61.1	156	181	113	89.9
90	1.11	1.13	1.12	1.07	0.94	0.76	0.57	0.44	0.38	0.20	0.21	0.25	0.29	0.32	0.36	2.78	1.38	0.98	0.47
95	1.34	1.35	1.32	1.25	1.14	0.96	0.75	0.59	0.50	0.20	0.22	0.26	0.29	0.32	0.36	0.40	0.44	0.46	0.45
100	1.51	1.51	1.48	1.41	1.31	1.16	0.96	0.78	0.68	0.26	0.28	0.32	0.36	0.39	0.43	0.47	0.51	0.53	0.52
105	1.63	1.63	1.59	1.51	1.41	1.28	1.11	0.94	0.85	0.33	0.35	0.39	0.42	0.45	0.50	0.55	0.59	0.62	0.61
110	1.80	1.60	1.55	1.45	1.37	1.26	1.12	0.98	0.90	0.43	0.46	0.50	0.53	0.55	0.60	0.66	0.71	0.73	0.75
115	1.73	1.50	1.44	1.34	1.24	1.15	1.06	0.96	0.89	0.60	0.61	0.62	0.66	0.67	0.74	0.77	0.86	0.88	1.02
120	1.36	1.36	1.29	1.18	1.13	1.08	1.02	0.97	0.93	0.81	0.81	0.82	0.84	0.86	0.95	1.00	1.01	1.06	1.06
125	1.47	1.32	1.24	1.12	1.09	1.05	1.04	1.00	0.98	1.04	1.04	1.03	1.05	1.07	1.17	1.23	1.24	1.30	1.39
130	2.06	1.47	1.38	1.24	1.20	1.14	1.16	1.13	1.11	1.26	1.26	1.26	1.28	1.24	1.34	1.44	1.48	1.53	2.18
135	1.73	1.61	1.49	1.45	1.38	1.40	1.36	1.36	1.34	1.50	1.49	1.47	1.46	1.42	1.47	1.56	1.66	1.63	1.87
140	1.89	1.75	1.67	1.59	1.53	1.54	1.54	1.57	1.54	1.67	1.66	1.62	1.60	1.54	1.59	1.64	1.72	1.77	1.88
145	1.95	1.81	1.84	1.77	1.75	1.72	1.74	1.76	1.73	1.84	1.85	1.83	1.74	1.71	1.69	1.79	1.82	1.90	1.87
150	1.96	1.99	1.99	1.89	1.92	1.93	2.01	2.00	1.97	2.01	2.01	2.02	1.97	1.87	1.83	1.86	1.96	1.95	1.96
155	2.03	2.09	2.02	2.02	2.00	2.10	2.20	2.13	2.13	2.16	2.16	2.15	2.18	1.99	1.91	1.92	1.96	1.99	1.95
160	2.06	2.11	2.07	2.12	2.14	2.25	2.36	2.34	2.33	2.29	2.30	2.28	2.30	2.19	2.01	1.95	1.99	2.01	1.87
165	2.18	2.14	2.17	2.20	2.21	2.34	2.42	2.41	2.37	2.33	2.37	2.40	2.42	2.42	2.20	2.13	2.17	2.13	2.09
170	2.34	2.31	2.35	2.34	2.28	2.48	2.61	2.60	2.52	2.45	2.45	2.49	2.54	2.51	2.27	2.20	2.18	2.28	2.22
175	2.42	2.36	2.52	2.49	2.48	2.63	2.72	2.71	2.68	2.75	2.78	2.78	2.80	2.78	2.63	2.53	2.51	2.48	2.36
180	2.49	2.49	2.46	2.51	2.58	2.65	2.67	2.65	2.67	2.67	2.71	2.72	2.68	2.61	2.60	2.57	2.49	2.48	2.40

Table 5: 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	4102	4102	4102	4102	4102	4102	4102	4102	4102	4102	4102	4102	4102	4102	4102	4102	4102		
5	4130	4128	4125	4120	4116	4112	4108	4105	4104	4106	4109	4114	4119	4124	4128	4131	4132		
10	4168	4167	4163	4157	4153	4152	4147	4141	4138	4141	4146	4149	4147	4149	4151	4151	4151		
15	4201	4207	4217	4224	4220	4206	4194	4182	4175	4180	4189	4201	4214	4214	4196	4185	4176		
20	4195	4224	4265	4290	4286	4243	4186	4147	4133	4151	4191	4244	4275	4266	4229	4173	4138		
25	4127	4196	4283	4347	4326	4238	4139	4064	4036	4069	4141	4236	4299	4289	4205	4114	4043		
30	4020	4104	4247	4344	4311	4145	3943	3793	3738	3804	3950	4120	4228	4243	4138	4000	3911		
35	3822	3918	4080	4177	4067	3809	3529	3326	3258	3339	3540	3797	4000	4049	3937	3747	3660		
40	3491	3604	3802	3848	3658	3344	3005	2771	2698	2795	3023	3302	3581	3709	3594	3414	3308		
45	2983	3153	3390	3378	3122	2787	2484	2280	2212	2293	2498	2759	3007	3210	3178	2962	2799		
50	2494	2700	2916	2849	2584	2309	2043	1836	1766	1844	2014	2223	2454	2665	2679	2428	2234		
55	2109	2342	2534	2378	2118	1858	1603	1424	1365	1445	1595	1773	1959	2204	2276	2054	1893		
60	1874	2057	2200	1979	1677	1432	1202	1041	981	1049	1202	1380	1575	1857	2027	1851	1732		
65	1661	1823	1929	1615	1279	1026	760	600	539	595	766	985	1238	1566	1805	1654	1513		
70	1343	1526	1620	1243	792	530	372	290	266	298	379	523	747	1201	1476	1298	1166		
75	1035	1206	1282	716	401	249	179	134	117	139	169	221	352	644	1084	913	754		
80	477	622	543	281	131	80.1	54.1	37.6	26.4	37.3	46.8	60.2	95.3	211	364	375	262		
85	124	164	107	42.6	19.6	15.7	10.2	6.35	6.78	6.47	8.69	11.2	11.9	25.8	50.6	88.4	67.7		
90	1.49	0.95	0.50	0.40	0.34	0.27	0.22	0.21	0.38	0.42	0.51	0.66	0.86	1.03	1.12	1.14	1.13		
95	0.42	0.40	0.39	0.38	0.34	0.28	0.24	0.22	0.53	0.58	0.70	0.89	1.10	1.25	1.32	1.35	1.34		
100	0.49	0.48	0.48	0.47	0.43	0.36	0.31	0.29	0.74	0.79	0.92	1.12	1.32	1.45	1.51	1.52	1.52		
105	0.57	0.56	0.55	0.54	0.51	0.45	0.39	0.38	0.93	0.98	1.11	1.31	1.48	1.58	1.61	1.61	1.62		
110	0.70	0.67	0.66	0.65	0.63	0.57	0.52	0.51	0.99	1.04	1.16	1.34	1.48	1.55	1.56	1.57	1.59		
115	0.87	0.84	0.82	0.81	0.79	0.75	0.70	0.69	0.99	1.03	1.12	1.25	1.36	1.42	1.43	1.45	1.48		
120	1.06	1.05	1.02	1.02	1.02	0.97	0.93	0.93	1.04	1.07	1.13	1.22	1.27	1.29	1.28	1.28	1.32		
125	1.28	1.28	1.26	1.27	1.25	1.22	1.18	1.19	1.08	1.10	1.16	1.22	1.27	1.27	1.24	1.25	1.32		
130	1.55	1.50	1.48	1.45	1.44	1.46	1.41	1.43	1.23	1.26	1.30	1.38	1.38	1.36	1.37	1.37	1.49		
135	1.67	1.65	1.60	1.60	1.62	1.63	1.63	1.67	1.47	1.49	1.51	1.57	1.60	1.58	1.55	1.55	1.60		
140	1.75	1.70	1.67	1.70	1.71	1.73	1.80	1.85	1.68	1.72	1.73	1.75	1.77	1.78	1.74	1.74	1.81		
145	1.85	1.85	1.82	1.83	1.85	1.89	1.99	1.99	1.88	1.91	1.92	1.92	1.92	1.91	1.90	1.91	1.91		
150	1.97	1.95	1.94	1.98	2.05	2.11	2.19	2.17	2.09	2.11	2.13	2.09	2.07	2.03	2.01	2.03	2.01		
155	2.03	2.05	2.08	2.15	2.26	2.38	2.35	2.33	2.23	2.26	2.29	2.32	2.24	2.15	2.10	2.08	2.07		
160	2.10	2.18	2.24	2.34	2.47	2.49	2.46	2.45	2.39	2.40	2.41	2.43	2.42	2.33	2.27	2.20	2.17		
165	2.24	2.38	2.45	2.54	2.59	2.56	2.54	2.48	2.38	2.40	2.45	2.49	2.52	2.50	2.43	2.37	2.24		
170	2.22	2.43	2.51	2.57	2.62	2.61	2.57	2.56	2.51	2.51	2.57	2.65	2.69	2.67	2.61	2.55	2.39		
175	2.55	2.68	2.75	2.80	2.85	2.86	2.84	2.85	2.70	2.69	2.74	2.75	2.80	2.74	2.71	2.62	2.54		
180	2.49	2.47	2.63	2.62	2.58	2.58	2.63	2.70	2.68	2.66	2.70	2.71	2.74	2.69	2.64	2.61	2.55		

Table 6: Luminous Intensity Data

## EQUIPMENT LIST

Test Equipment	Model	Equipment No.	Calibration Date	Calibration Due date
Goniophotometer system	GO-R5000	HZTE011-01	Sep. 18, 2013	Sep. 17, 2014
Digital Power Meter	PF2010A	HZTE028-01	Sep. 18, 2013	Sep. 17, 2014
AC Power Supply	PCR 500L	HZTE001-08	Sep. 18, 2013	Sep. 17, 2014
DC Power Supply	WY12010	HZTE004-03	Sep. 18, 2013	Sep. 17, 2014
Temperature Meter	TES1310	HZTE017-01	Sep. 18, 2013	Sep. 17, 2014
Standard source	D908	HZTE012-01	Sep. 18, 2013	Sep. 17, 2014
Integrate Sphere system	2M	HZTE015-01	Sep. 18, 2013	Sep. 17, 2014
Digital Power Meter	WT210	HZTE008-01	Sep. 18, 2013	Sep. 17, 2014
AC Power Supply	PCR 500L	HZTE001-07	Sep. 18, 2013	Sep. 17, 2014
DC Power Supply	6154	HZTE004-04	Sep. 18, 2013	Sep. 17, 2014
Temperature and humidity recorder	JR900	HZTE018-01	Sep. 18, 2013	Sep. 17, 2014
Standard source	SCL-1400	HZTE012-02	Sep. 18, 2013	Sep. 17, 2014

Table 7: 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.

### Sphere-Spectroradiometer Method- Photometric and Electrical Measurements

A Labsphere Model CDS 2100 Spectroradiometer and Two Meter Sphere was used to measure correlated color temperature, chromaticity coordinates, and the color rendering index for each SSL unit. The coating reflectance of each sphere is 98%. The measure geometry is  $4\pi$ . Self-absorption correction is conducted in testing. Bandwidth of spectroradiometer is 350nm-1050nm.

Ambient temperature was measured at a position inside the sphere. 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 Yokogawa Power Analyzer.

The standard reference of the integrated sphere system is halogen incandescent lamp, the intensity distribution type is omni-directional, and is traceable to the National Institute of Standards and Technology.

The uncertainty of integrating sphere system reported in this document is expanded uncertainty is 1.06% with a coverage factor  $k=2$ .

## **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 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.

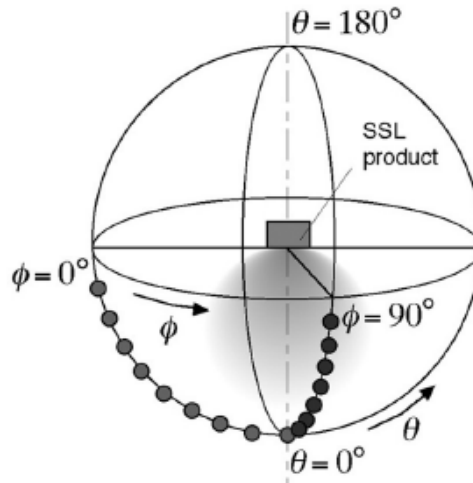
### **Color Spatial Uniformity**

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  $10^\circ$  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 \*\*\*

This report is considered invalidated without the Special Seal for Inspection of the LTL. This report shall not be altered, increased or deleted. The results shown in this test report refer only to the sample(s) tested. Without written approval of LTL, this test report shall not be copied except in full and published as advertisement