



## 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-200Wi (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.: HZ14050049d

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-200Wi (5700K)**

Luminous Efficacy (Lumens /Watt)	Total Luminous Flux (Lumens)	Power (Watts)	Power Factor
105.2	20311.6	193.1	0.9938
CCT (K)	CRI	Stabilization Time (Light & Power)	
5836	77.2	80	

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-200Wi (5700K)
<b>Electrical Ratings</b>	: 90~277V AC, 50/60Hz, 200W
<b>Product Description</b>	: 5700K, Outdoor Luminaire, Black coating enclosure, 5 LED Bars, Suspended Mounting Manufacturer of light source: Philips Lumileds Model of light source: LXH7-FW57 Quantity of light source: 70pcs
<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 25.3 °C.

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

The stabilization time of the sample was 80 minutes, and the total operating time including stabilization was 105 minutes.

Parameter	Result		
Test Voltage (V)	120.0	90.0	277.0
Voltage frequency (Hz)	60	60	60
Test Current (A)	1.618	2.187	0.739
Power Factor	0.9938	0.9966	0.9429
Test Power (W)	193.1	196.2	193.0
Off-State Power (W)	0	0	0
THD A%	5.14	5.55	15.59
Luminous Efficacy (lm/W)	105.2		
Total Luminous Flux (lm)	20311.6		
Color Rendering Index (CRI)	77.2		
R9	17		
Correlated Color Temperature (CCT) (K)	5836		
Chromaticity (Chroma x, Chroma y)	(0.3254, 0.3318)		
Chromaticity (Chroma u, Chroma v)	(0.2056, 0.3145)		
Chromaticity (Chroma u', Chroma v')	(0.2056, 0.4717)		
Duv	0.0016		
Average Beam Angle (°)	109.3		
Center Beam Candle Power (cd)	6797		
Spacing Criteria	1.45(0°-180°)/ 1.32(90°-270°)		
Zonal Lumens in the 0°-60°Zone	83.15%		
Zonal Lumens in the 60°-90°Zone	16.78%		
Zonal Lumens in the 90°-120°Zone	0.02%		
Zonal Lumens in the 120°-180°Zone	0.04%		

Special Color Rendering Indices	
R1	81
R2	78
R3	72
R4	81
R5	82
R6	69
R7	81
R8	74
R9	17
R10	45
R11	83
R12	50
R13	79
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

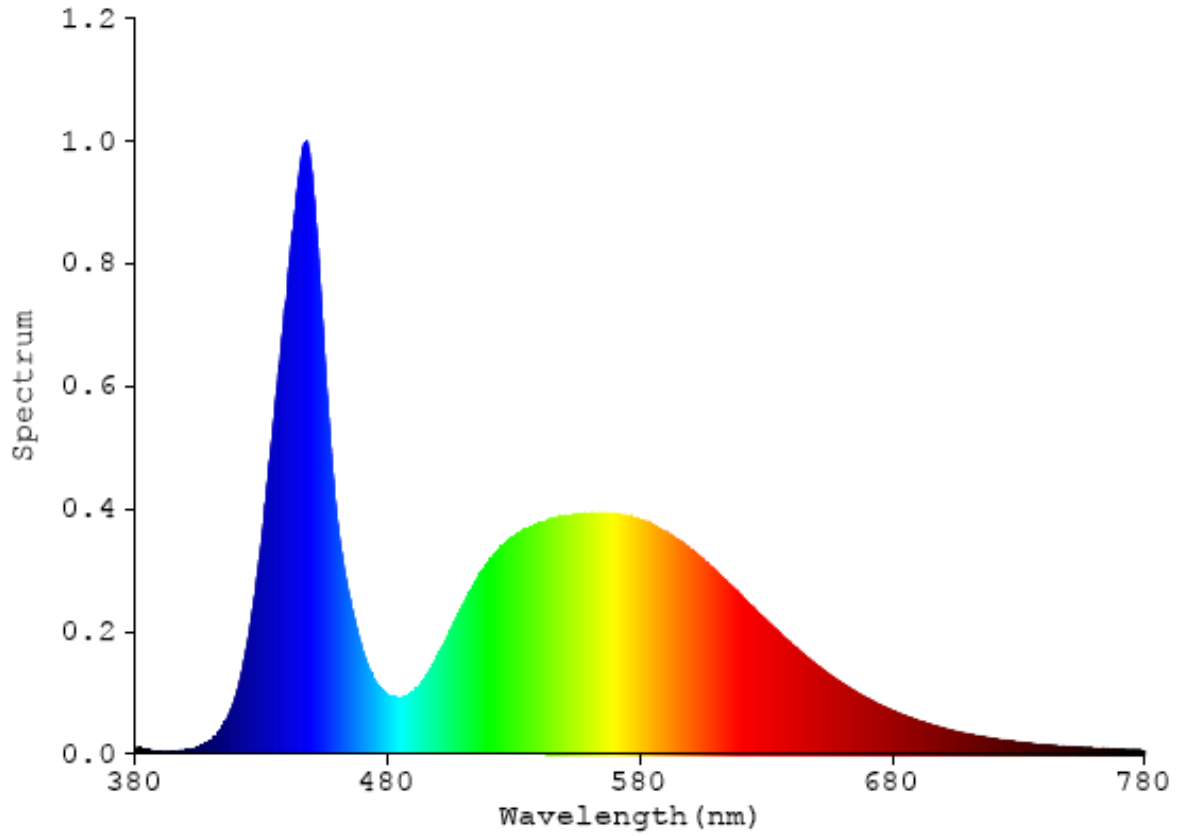


Chart 1: Spectral Power Distribution

### Zonal Lumen Tabulation

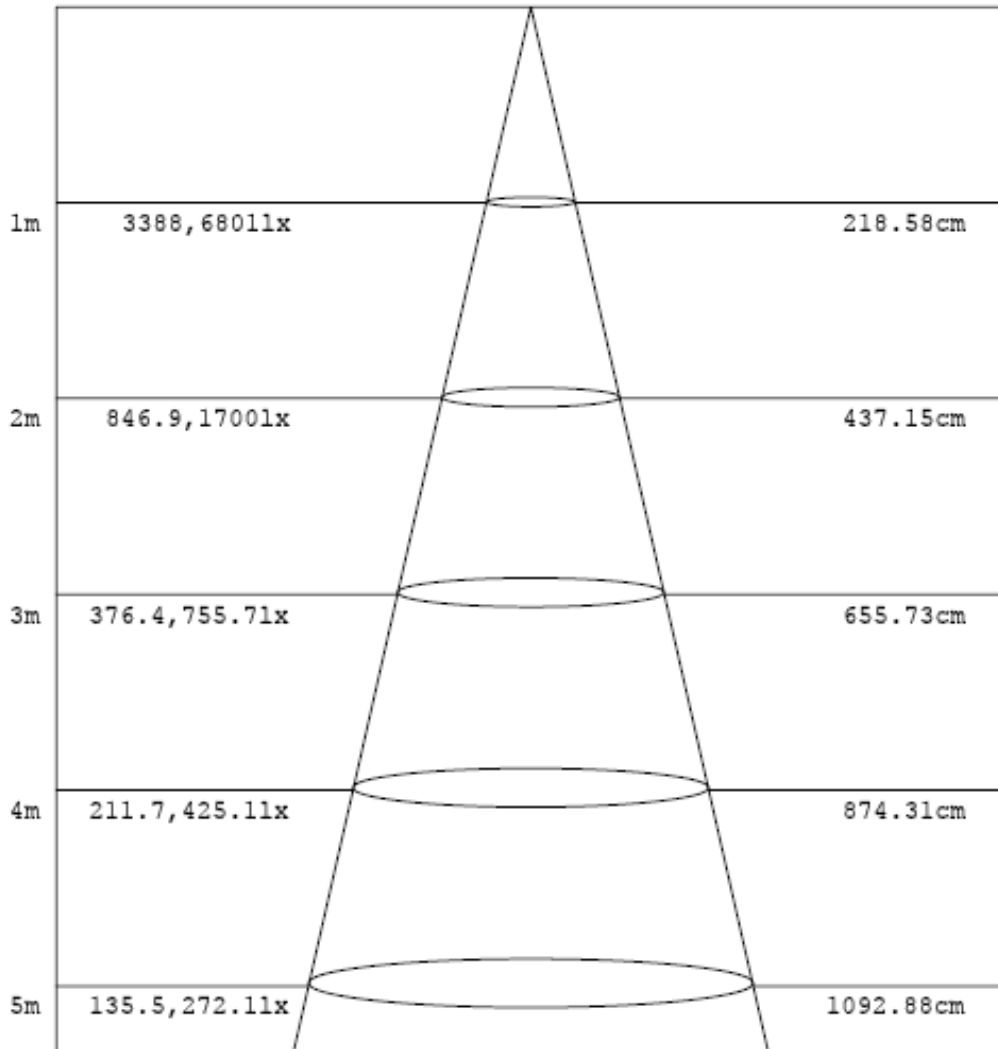
$\gamma(^{\circ})$	Lumens	% Total
0- 10	654.61	3.22%
10- 20	1992.666	9.81%
20- 30	3269.001	16.09%
30- 40	4064.742	20.01%
40- 50	3858.883	19.00%
50- 60	3049.368	15.01%
60- 70	2177.14	10.72%
70- 80	1089.162	5.36%
80- 90	142.729	0.70%
90-100	1.24	0.01%
100-110	1.57	0.01%
110-120	1.686	0.01%
120-130	1.806	0.01%
130-140	1.986	0.01%
140-150	1.909	0.01%
150-160	1.616	0.01%
160-170	1.089	0.01%
170-180	0.404	0.00%
Total	20311.6	100%

$\gamma(^{\circ})$	Lumens	% Total
0- 60	16889.27	83.15%
60- 90	3409.031	16.78%
0-90	20298.301	99.93%
90- 180	13.306	0.07%
0- 180	20311.6	100%

Table 4: Zonal Lumen Data

**Illuminance Plots**

Flux out:13127 lm



Height                      Eavg, Emax                      Angle: 95.08deg                      Diameter

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

Chart 2: Beam Angle



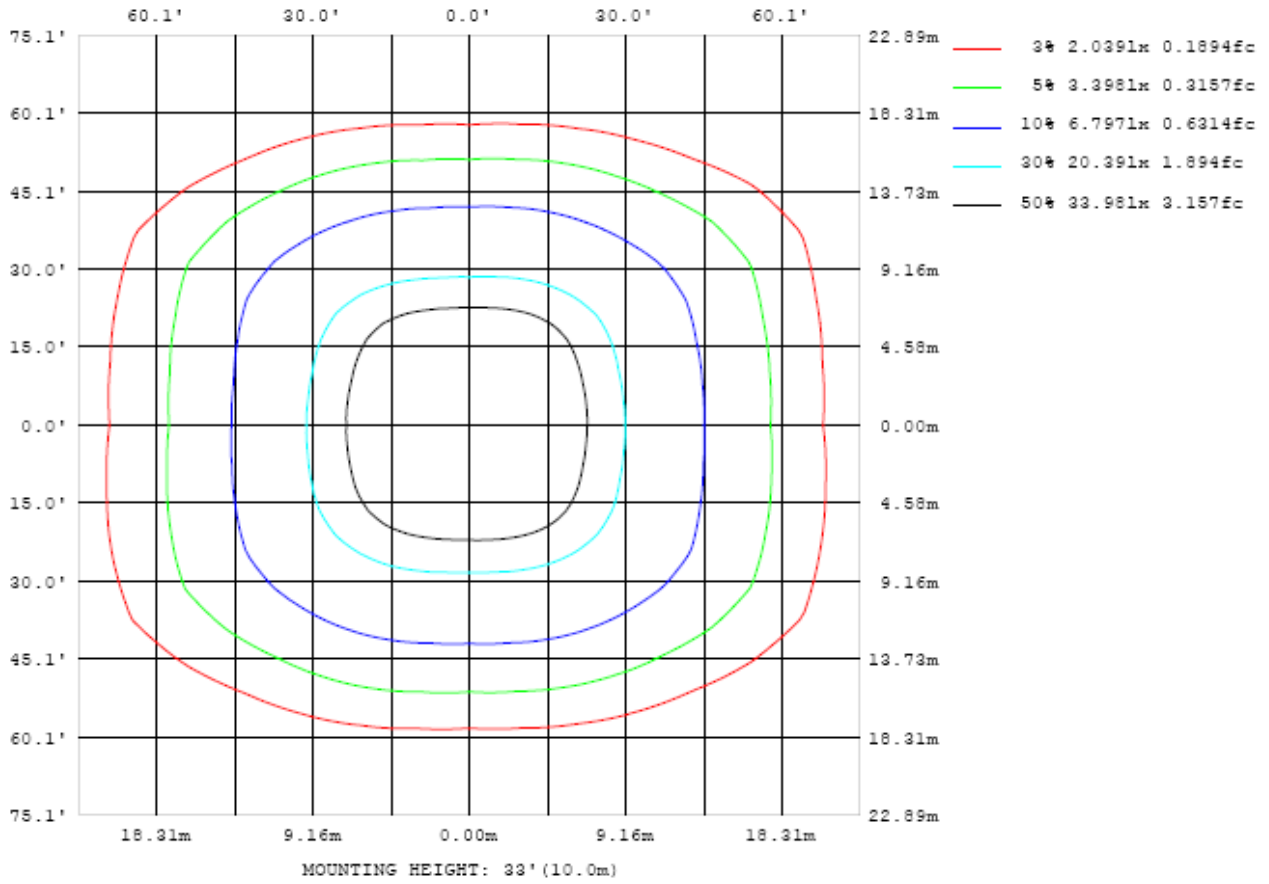


Chart 3: Illuminance Plot (Footcandles)

### Luminous Intensity Distribution Plots

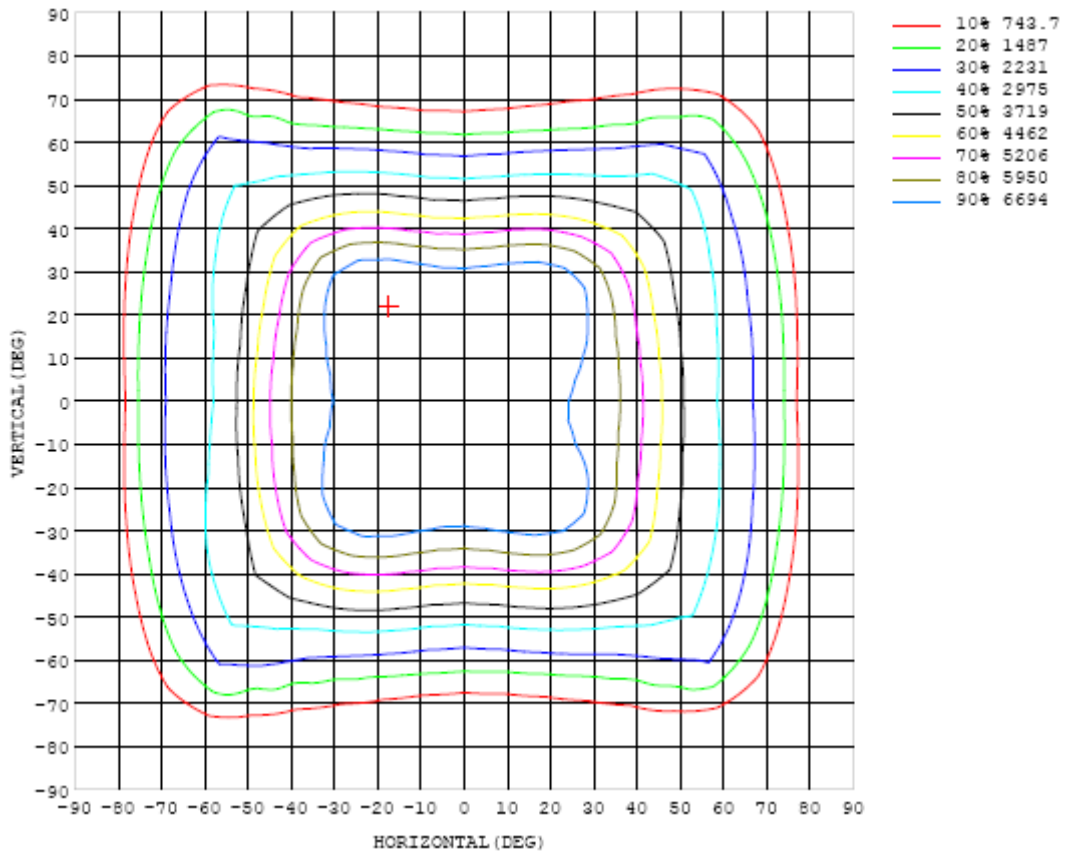


Chart 4: Isocandela Plot

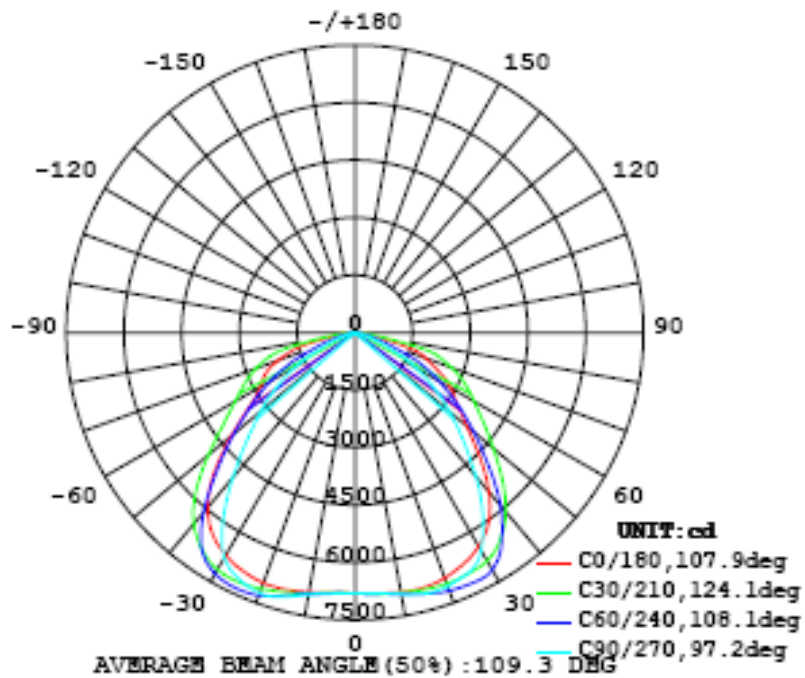


Chart 5: Polar Candela Distribution

### 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	6797	6797	6797	6797	6797	6797	6797	6797	6797	6797	6797	6797	6797	6797	6797	6797	6797	6797	6797
5	6830	6832	6839	6843	6843	6840	6837	6833	6829	6828	6827	6827	6828	6828	6829	6827	6823	6816	6814
10	6876	6881	6888	6891	6898	6908	6921	6929	6931	6930	6928	6927	6922	6913	6905	6893	6891	6882	6875
15	6889	6891	6908	6944	6993	7028	7050	7053	7049	7044	7040	7044	7051	7047	7031	7002	6971	6956	6940
20	6818	6823	6874	6973	7085	7161	7168	7123	7069	7046	7055	7101	7155	7182	7167	7104	7028	6974	6950
25	6666	6676	6769	6944	7151	7246	7211	7100	6992	6935	6951	7046	7176	7281	7276	7160	7014	6902	6866
30	6436	6460	6599	6876	7135	7241	7143	6908	6673	6563	6633	6859	7108	7278	7294	7135	6926	6764	6709
35	6059	6084	6256	6588	6887	6928	6660	6255	5933	5798	5909	6244	6693	7034	7128	6957	6680	6502	6440
40	5418	5469	5693	6096	6390	6265	5888	5414	5030	4891	5042	5444	5970	6476	6722	6564	6209	5996	5940
45	4592	4676	4965	5419	5597	5360	4915	4456	4118	3993	4131	4518	5073	5617	6015	5941	5581	5264	5176
50	3811	3914	4241	4699	4750	4415	4034	3648	3341	3217	3343	3681	4137	4632	5055	5092	4676	4339	4200
55	3239	3349	3653	4079	3994	3619	3249	2898	2612	2505	2638	2943	3319	3714	4125	4225	3818	3475	3333
60	2864	3014	3255	3575	3357	2894	2530	2192	1924	1817	1940	2241	2585	2954	3425	3676	3305	3009	2843
65	2404	2595	2866	3153	2766	2230	1814	1404	1134	1050	1161	1531	1888	2312	2861	3275	3026	2754	2572
70	1966	2143	2394	2670	2154	1437	962	707	568	529	597	771	1056	1622	2305	2834	2555	2276	2120
75	1274	1552	1906	2141	1266	715	456	343	270	232	273	354	501	809	1357	2171	1926	1671	1538
80	431	559	825	788	449	222	147	102	70.5	50.8	71.3	97.6	135	250	556	1003	1044	763	566
85	49.1	151	187	121	59.2	30.3	26.4	19.8	13.8	13.0	14.6	22.9	33.7	40.8	76.6	216	280	205	179
90	1.85	1.87	1.87	1.79	1.59	1.30	0.98	0.77	0.66	0.36	0.40	0.47	0.54	0.62	0.77	2.48	1.75	1.49	2.51
95	2.21	2.22	2.18	2.08	1.92	1.64	1.29	1.01	0.87	0.35	0.38	0.44	0.51	0.57	0.63	0.69	0.76	0.79	0.76
100	2.47	2.47	2.41	2.30	2.16	1.96	1.66	1.36	1.19	0.44	0.49	0.54	0.61	0.66	0.71	0.78	0.86	0.90	0.87
105	2.66	2.65	2.60	2.48	2.36	2.19	1.94	1.67	1.50	0.58	0.63	0.68	0.71	0.77	0.84	0.93	1.00	1.04	1.02
110	2.65	2.63	2.55	2.42	2.31	2.16	1.96	1.74	1.59	0.77	0.83	0.88	0.92	0.96	1.04	1.14	1.23	1.25	1.27
115	3.05	2.49	2.40	2.24	2.10	1.98	1.85	1.69	1.57	1.07	1.07	1.11	1.15	1.17	1.29	1.35	1.49	1.51	1.83
120	2.79	2.29	2.17	1.99	1.91	1.84	1.78	1.71	1.64	1.44	1.43	1.44	1.46	1.49	1.64	1.72	1.75	1.82	2.06
125	2.99	2.25	2.10	1.92	1.84	1.79	1.78	1.74	1.73	1.85	1.82	1.77	1.83	1.86	2.02	2.11	2.08	2.24	3.40
130	3.48	2.47	2.36	2.13	2.03	1.93	1.99	1.96	1.94	2.23	2.21	2.20	2.21	2.15	2.30	2.43	2.48	2.59	3.47
135	2.93	2.74	2.56	2.45	2.33	2.37	2.33	2.35	2.33	2.63	2.59	2.55	2.52	2.45	2.52	2.66	2.79	2.84	3.85
140	3.22	2.98	2.79	2.70	2.59	2.60	2.61	2.67	2.66	2.91	2.86	2.80	2.76	2.63	2.72	2.77	2.86	2.98	3.43
145	3.44	3.12	3.10	2.99	2.95	2.90	2.93	2.97	2.96	3.18	3.15	3.11	2.96	2.90	2.88	3.00	3.04	3.24	3.57
150	3.37	3.30	3.34	3.20	3.25	3.24	3.37	3.36	3.37	3.45	3.43	3.44	3.34	3.17	3.10	3.12	3.27	3.40	3.63
155	3.57	3.62	3.44	3.41	3.36	3.51	3.68	3.59	3.62	3.70	3.69	3.64	3.67	3.35	3.21	3.24	3.31	3.45	3.43
160	3.43	3.56	3.47	3.56	3.57	3.74	3.94	3.94	3.96	3.89	3.89	3.83	3.84	3.65	3.37	3.25	3.32	3.44	3.26
165	3.58	3.53	3.57	3.62	3.64	3.83	4.01	4.03	3.99	3.92	3.99	4.02	4.03	3.99	3.62	3.51	3.57	3.54	3.49
170	3.86	3.79	3.86	3.82	3.72	4.03	4.28	4.31	4.22	4.09	4.11	4.17	4.22	4.14	3.75	3.62	3.58	3.75	3.64
175	4.04	3.91	4.18	4.13	4.10	4.32	4.48	4.50	4.46	4.59	4.64	4.65	4.66	4.61	4.37	4.20	4.14	4.08	3.89
180	4.11	4.11	4.05	4.13	4.24	4.35	4.39	4.39	4.43	4.45	4.54	4.56	4.59	4.51	4.39	4.34	4.23	4.13	4.09

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	6797	6797	6797	6797	6797	6797	6797	6797	6797	6797	6797	6797	6797	6797	6797	6797	6797		
5	6814	6813	6813	6815	6817	6823	6828	6834	6839	6842	6844	6843	6840	6838	6836	6835	6833		
10	6879	6888	6904	6917	6924	6926	6930	6934	6939	6944	6948	6948	6944	6937	6919	6897	6885		
15	6948	6980	7012	7039	7079	7107	7120	7129	7137	7144	7139	7122	7092	7046	7000	6951	6912		
20	6974	7042	7110	7198	7265	7296	7273	7242	7233	7257	7294	7308	7263	7170	7046	6940	6860		
25	6920	7026	7176	7346	7414	7352	7235	7131	7104	7160	7269	7351	7356	7237	7042	6855	6727		
30	6762	6891	7139	7378	7418	7266	7040	6840	6780	6889	7089	7264	7320	7180	6917	6673	6505		
35	6495	6639	6920	7198	7221	6927	6459	6090	5974	6135	6472	6842	7046	6914	6566	6271	6111		
40	5986	6156	6513	6816	6689	6116	5479	5046	4931	5119	5528	6008	6365	6399	6022	5636	5447		
45	5201	5433	5839	6073	5708	5057	4479	4078	3962	4129	4478	4913	5342	5554	5261	4856	4625		
50	4241	4521	4966	5061	4613	4109	3603	3272	3182	3315	3600	3950	4309	4631	4481	4085	3859		
55	3408	3742	4174	4146	3711	3263	2897	2588	2479	2614	2876	3166	3497	3876	3859	3516	3316		
60	2933	3196	3589	3409	2953	2544	2162	1860	1753	1880	2157	2495	2885	3329	3481	3162	2967		
65	2677	2893	3166	2785	2218	1781	1354	1044	970	1073	1337	1727	2226	2854	3138	2778	2514		
70	2258	2519	2735	2177	1396	948	675	517	481	556	734	1000	1408	2131	2485	2205	2039		
75	1706	2002	2199	1248	718	439	298	219	199	241	308	453	781	1286	1935	1698	1477		
80	800	1073	1006	553	248	134	89.2	64.5	47.1	65.9	92.2	129	222	502	807	775	514		
85	206	292	230	81.3	41.0	30.2	19.1	12.5	13.5	13.0	19.4	25.5	28.1	60.9	119	175	135		
90	2.87	1.74	1.86	0.82	0.66	0.53	0.43	0.37	0.67	0.68	0.80	1.03	1.34	1.64	1.82	1.88	1.87		
95	0.72	0.69	0.67	0.64	0.57	0.47	0.39	0.36	0.86	0.92	1.08	1.37	1.72	2.00	2.15	2.20	2.21		
100	0.81	0.77	0.75	0.73	0.67	0.58	0.50	0.46	1.17	1.24	1.43	1.73	2.06	2.29	2.39	2.42	2.45		
105	0.95	0.89	0.88	0.87	0.82	0.72	0.63	0.60	1.47	1.54	1.72	2.02	2.33	2.53	2.58	2.60	2.63		
110	1.17	1.12	1.08	1.07	1.01	0.92	0.83	0.81	1.56	1.63	1.80	2.08	2.33	2.48	2.52	2.54	2.58		
115	1.49	1.41	1.34	1.32	1.27	1.20	1.12	1.10	1.54	1.60	1.74	1.95	2.15	2.28	2.32	2.35	2.42		
120	1.78	1.73	1.67	1.65	1.62	1.54	1.47	1.45	1.61	1.65	1.74	1.88	2.01	2.07	2.06	2.07	2.19		
125	2.19	2.10	2.04	2.03	2.00	1.94	1.86	1.86	1.69	1.71	1.79	1.91	2.02	2.04	2.01	2.04	2.27		
130	2.59	2.43	2.38	2.34	2.29	2.29	2.22	2.23	1.90	1.94	2.01	2.14	2.19	2.20	2.22	2.25	2.49		
135	2.85	2.68	2.57	2.56	2.56	2.57	2.57	2.61	2.29	2.31	2.37	2.46	2.55	2.55	2.52	2.55	2.71		
140	2.93	2.76	2.68	2.72	2.69	2.74	2.82	2.89	2.62	2.67	2.70	2.76	2.82	2.85	2.83	2.86	3.02		
145	3.12	2.99	2.91	2.90	2.93	2.97	3.11	3.13	2.93	2.97	3.00	3.04	3.06	3.06	3.08	3.13	3.19		
150	3.37	3.18	3.10	3.16	3.25	3.30	3.44	3.43	3.28	3.30	3.34	3.30	3.32	3.28	3.26	3.31	3.32		
155	3.44	3.35	3.33	3.42	3.56	3.75	3.73	3.72	3.54	3.57	3.61	3.68	3.56	3.45	3.41	3.43	3.48		
160	3.56	3.54	3.58	3.72	3.91	3.97	3.95	3.98	3.86	3.88	3.87	3.90	3.88	3.74	3.65	3.59	3.59		
165	3.71	3.86	3.91	4.03	4.11	4.11	4.12	4.05	3.89	3.92	4.00	4.04	4.08	4.05	3.94	3.86	3.68		
170	3.63	3.94	4.04	4.13	4.23	4.25	4.22	4.19	4.10	4.13	4.24	4.37	4.43	4.40	4.31	4.20	3.96		
175	4.18	4.37	4.47	4.57	4.67	4.70	4.68	4.68	4.44	4.45	4.55	4.58	4.66	4.57	4.51	4.37	4.24		
180	4.09	4.14	4.22	4.37	4.38	4.38	4.43	4.41	4.43	4.43	4.51	4.54	4.56	4.49	4.38	4.32	4.22		

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.

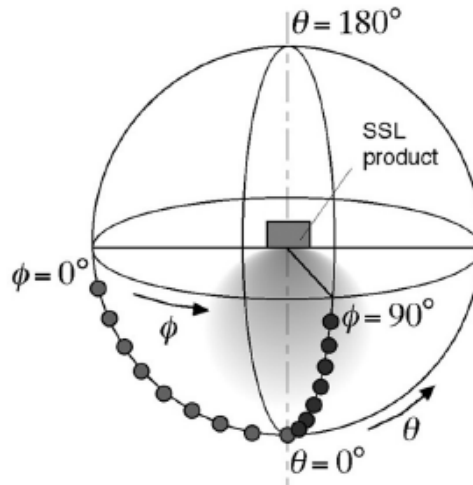
### **Color Spatial Uniformity**

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