



## LM-79-08 Test Report

for

**ABBlighting, Inc.**

3 Adams St Belvidere, NJ 07823.

**Flood Light**

**Model: ABBFL100501**

**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.: HZ15070048h

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

Reviewed by:

*April Zou*

Engineer: April Zou  
Jul. 29, 2015



*Jim Zhang*

Manager: Jim Zhang  
Jul. 29, 2015

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: **ABBFL100501**

Luminous Efficacy (Lumens /Watt)	Total Luminous Flux (Lumens)	Power (Watts)	Power Factor
100.6	9849.6	97.91	0.9929
CCT (K)	CRI	Stabilization Time (Light & Power)	
4860	66.2	60	

Table 1: Executive Data Summary

### Test specifications:

**Date of Receipt** : Jul. 25, 2015

**Date of Test** : Jul. 28, 2015

**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)

<b>Name</b>	: Flood light
<b>Model</b>	: ABBFL100501
<b>Electrical Ratings</b>	: 100~277VAC, 50/60Hz, 100W
<b>Product Description</b>	: 5000K, Architectural Flood and Spot Luminaires Manufacturer of light source: Philips Model of light source: LUXEON Rebel ES Quantity of LED light source: 45 pcs
<b>Manufacturer</b>	: ABB Lighting (shanghai) Co., Ltd.
<b>Address</b>	: Room 1012, North Minch Fortune 108 Plaza,# 1839 Qixin road, Shanghai

## TEST RESULTS

Test ambient temperature was 25.2°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 is 30m.

Luminous data was taken at 0.5°vertical intervals and 10°horizontal intervals.

Parameter	Result			Special Color Rendering Indices	
Test Voltage (V)	120.0	100.0	277.0	R1	64
Voltage frequency (Hz)	60	60	60	R2	69
Test Current (A)	0.821	0.989	0.386	R3	74
Power Factor	0.9929	0.9951	0.9141	R4	68
Test Power (W)	97.91	98.42	97.72	R5	65
THD A%	8.09	7.69	16.32	R6	60
Luminous Efficacy (lm/W)	100.6	100.1	100.9	R7	75
Total Luminous Flux (lm)	9849.6	9856.5	9861.0	R8	54
Color Rendering Index (CRI)	66.2			R9	-40
R9	-40			R10	28
Correlated Color Temperature (CCT) (K)	4860			R11	66
Chromaticity (Chroma x, Chroma y)	(0.3520, 0.3797)			R12	38
Chromaticity (Chroma u, Chroma v)	(0.2055, 0.3325)			R13	63
Chromaticity (Chroma u', Chroma v')	(0.2055, 0.4987)			R14	85
Duv	0.0109				
Average Beam Angle (°)	111.7				
Center Beam Candle Power (cd)	3632				
NEMA Type	7H x 7V				
Zonal Lumens in the 0°-60°Zone	84.84%				
Zonal Lumens in the 60°-90°Zone	15.10%				
Zonal Lumens in the 90°-120°Zone	0.02%				
Zonal Lumens in the 120°-180°Zone	0.04%				

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

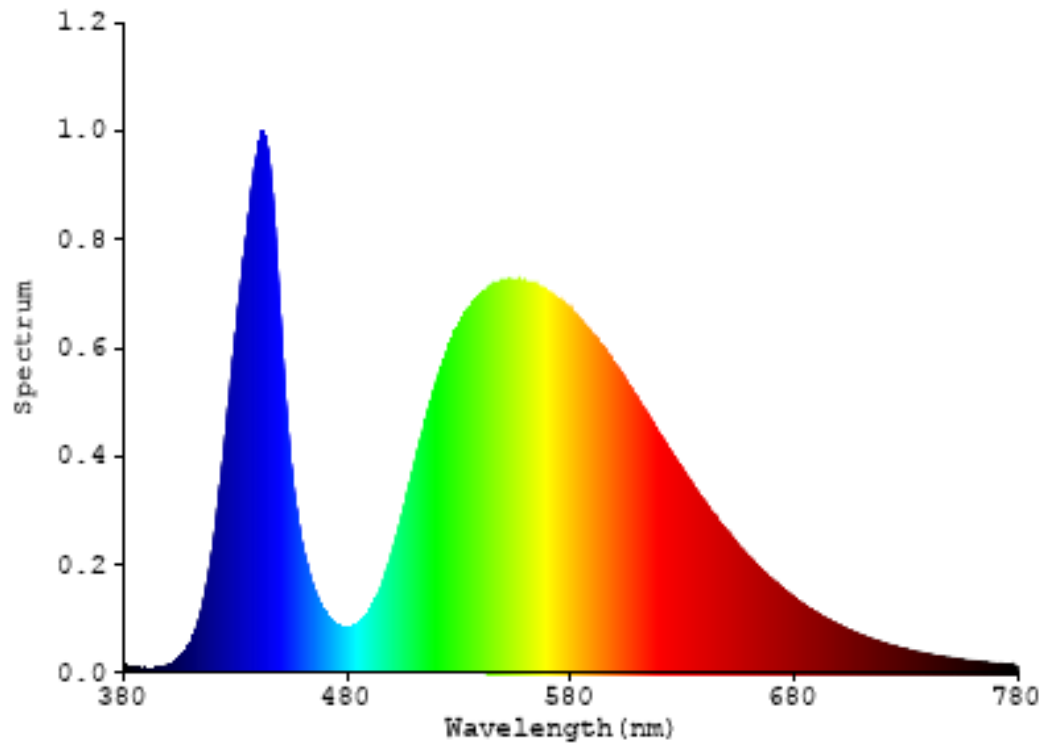


Chart 1: Spectral Power Distribution

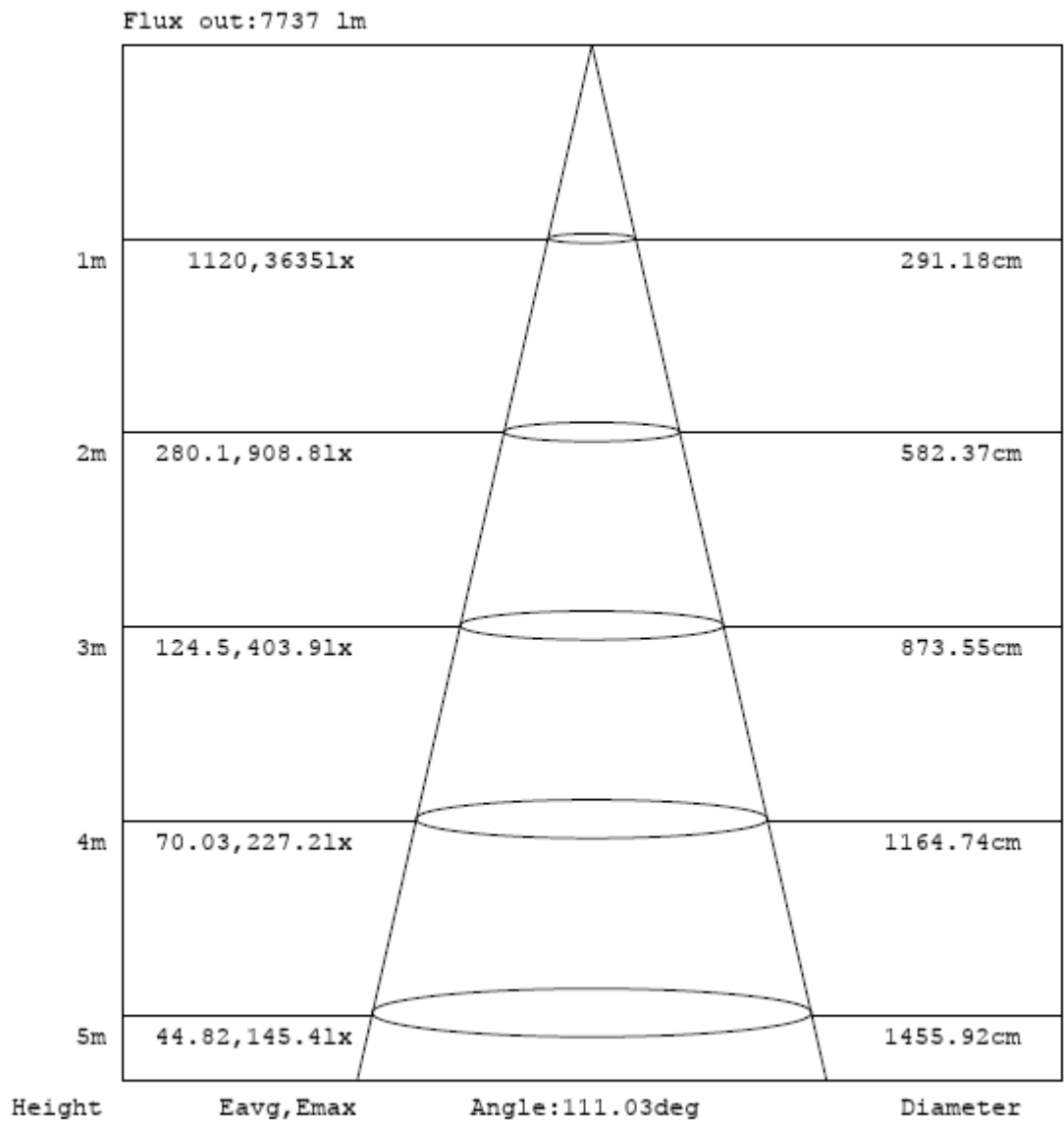
### Zonal Lumen Tabulation

$\gamma(^{\circ})$	Lumens	% Total
0- 10	344.715	3.50%
10- 20	996.392	10.12%
20- 30	1532.736	15.56%
30- 40	1870.195	18.99%
40- 50	1934.64	19.64%
50- 60	1677.41	17.03%
60- 70	1083.657	11.00%
70- 80	379.585	3.85%
80- 90	24.116	0.24%
90-100	0.481	0.00%
100-110	0.749	0.01%
110-120	0.847	0.01%
120-130	0.816	0.01%
130-140	0.91	0.01%
140-150	0.902	0.01%
150-160	0.767	0.01%
160-170	0.518	0.01%
170-180	0.196	0.00%
Total	9849.6	100%

$\gamma(^{\circ})$	Lumens	% Total
0- 60	8356.088	84.84%
60- 90	1487.358	15.10%
0-90	9843.446	99.94%
90- 180	6.186	0.06%
0- 180	9849.6	100%

Table 3: 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



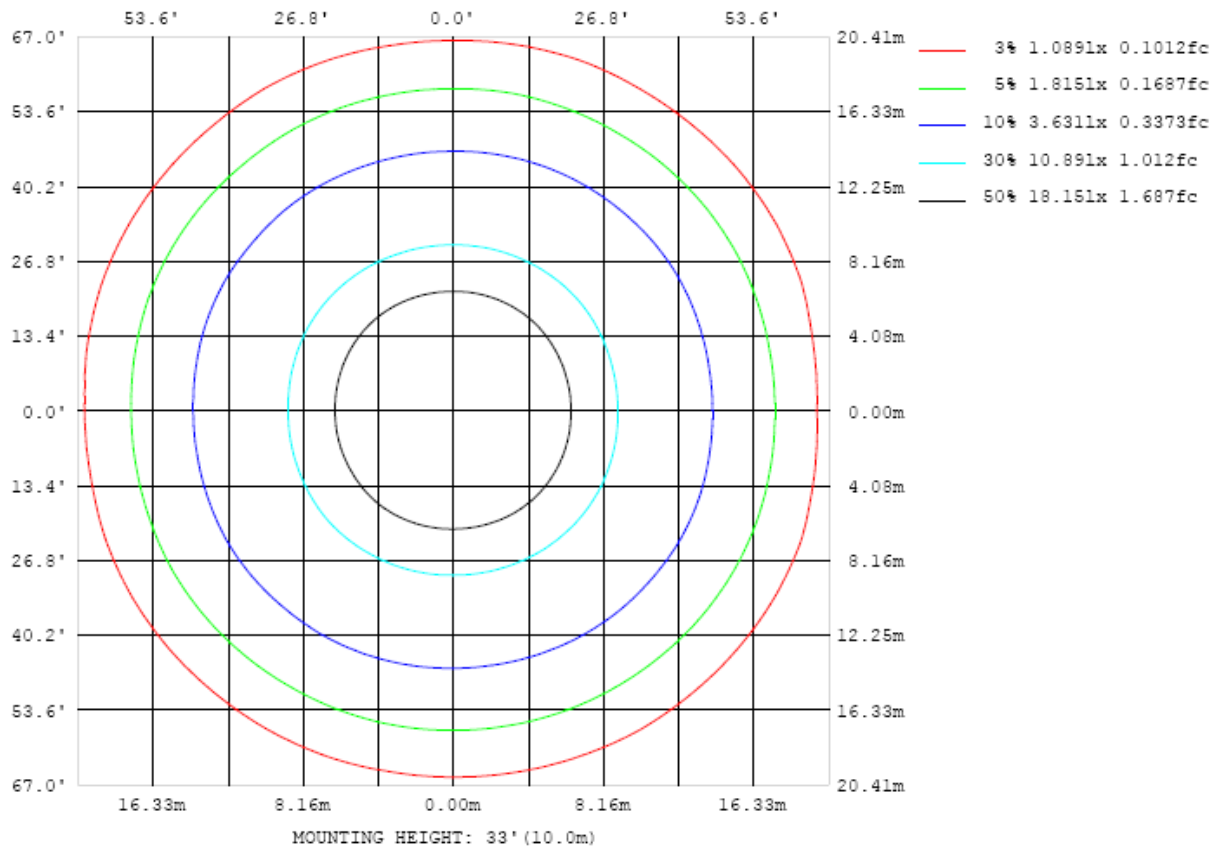


Chart 3: Illuminance Plot (Footcandles)

## Luminous Intensity Distribution Plots

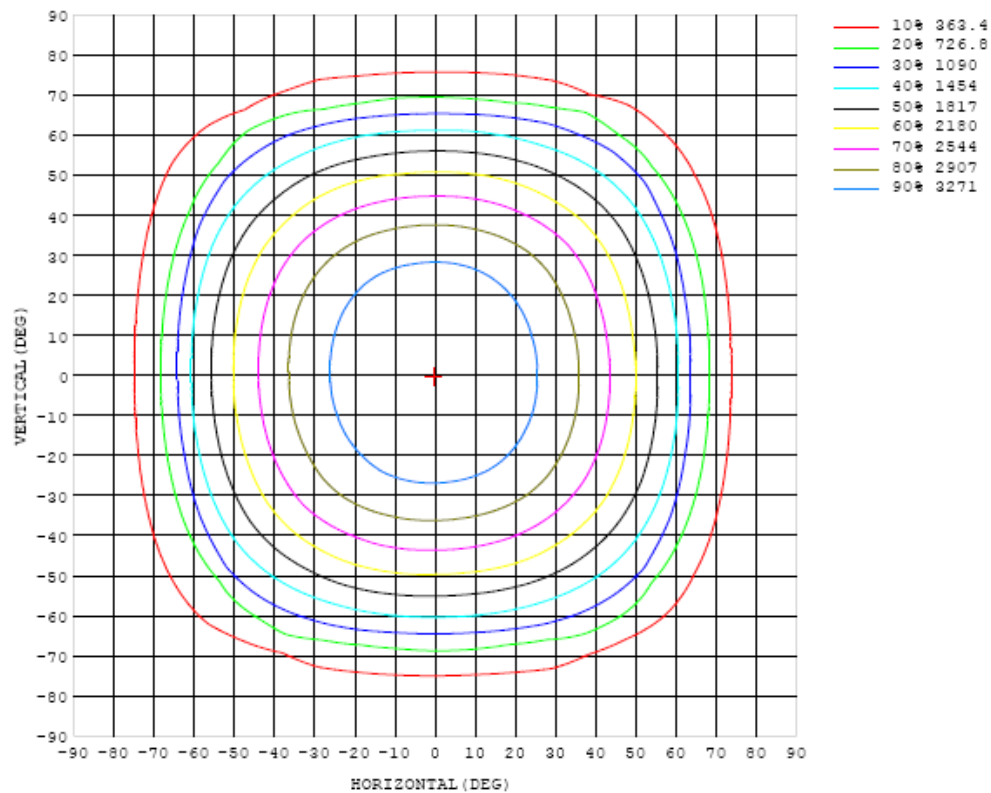


Chart 4: Isocandela Plot

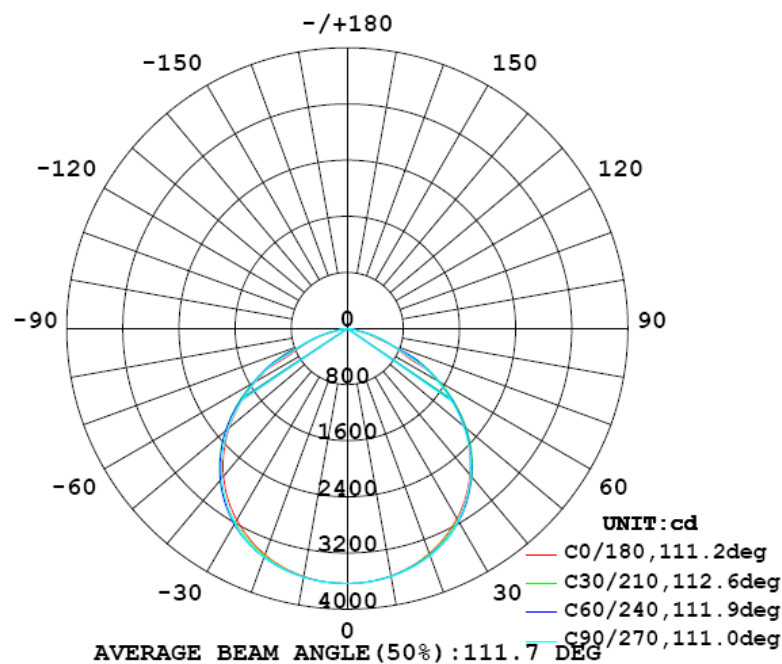


Chart 5: Polar Candela Distribution

## Luminous Intensity Data

Table--1

UNIT: cd

C (DEG) γ (DEG)	0	10	20	30	40	50	60	70	80	90	100	110	120	130	140	150	160	170	180
0	3632	3632	3632	3632	3632	3632	3632	3632	3632	3632	3632	3632	3632	3632	3632	3632	3632	3632	3632
5	3622	3621	3619	3619	3619	3619	3620	3620	3621	3622	3621	3622	3623	3623	3623	3623	3623	3623	3624
10	3579	3579	3580	3580	3581	3583	3585	3585	3587	3588	3588	3588	3589	3588	3585	3582	3582	3582	3585
15	3509	3510	3512	3513	3517	3521	3523	3525	3527	3528	3529	3530	3529	3528	3525	3521	3521	3522	3524
20	3410	3412	3416	3422	3429	3433	3438	3440	3443	3445	3446	3445	3445	3441	3434	3430	3430	3429	3431
25	3284	3287	3294	3303	3312	3318	3324	3325	3327	3328	3331	3333	3334	3323	3316	3314	3307	3304	3305
30	3127	3131	3141	3155	3166	3173	3175	3171	3167	3166	3171	3181	3191	3187	3174	3163	3158	3153	3153
35	2939	2946	2958	2974	2987	2990	2982	2971	2964	2963	2970	2984	3001	3010	2999	2981	2977	2970	2970
40	2716	2726	2743	2760	2765	2763	2751	2741	2736	2734	2738	2751	2768	2785	2789	2772	2758	2747	2747
45	2461	2472	2493	2508	2504	2496	2488	2480	2473	2469	2482	2497	2504	2520	2533	2518	2504	2490	2490
50	2172	2185	2203	2217	2205	2195	2190	2178	2165	2165	2181	2195	2210	2215	2228	2224	2206	2196	2201
55	1844	1858	1880	1885	1871	1866	1855	1840	1827	1826	1839	1857	1872	1871	1888	1896	1879	1866	1869
60	1496	1505	1522	1523	1516	1502	1492	1490	1485	1482	1488	1493	1497	1509	1522	1531	1518	1507	1513
65	919	942	1061	1148	1143	1137	1122	1084	1040	1030	1044	1096	1125	1132	1143	1146	1058	947	956
70	613	625	636	650	704	725	655	641	657	659	646	643	663	739	661	638	629	631	637
75	303	304	316	313	310	325	386	370	366	369	372	367	371	308	319	367	358	357	366
80	59.3	66.6	81.6	79.6	82.8	98.3	102	112	91.5	94.6	93.1	106	105	97.0	105	93.1	91.2	85.8	91.2
85	0.74	0.75	0.85	2.48	2.65	4.67	8.08	11.1	11.7	11.4	10.5	11.0	10.7	7.12	5.31	5.89	4.52	3.63	3.79
90	0.14	0.14	0.14	0.14	0.14	0.15	0.14	0.14	0.14	0.15	0.14	0.15	0.15	0.15	0.15	0.14	0.14	0.15	0.48
95	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.20	0.20	0.20	0.19	0.20	0.19	0.19	0.18	0.19	0.66
100	0.25	0.25	0.25	0.26	0.26	0.26	0.26	0.26	0.26	0.26	0.26	0.27	0.27	0.28	0.27	0.26	0.25	0.25	0.87
105	0.33	0.33	0.32	0.32	0.33	0.33	0.34	0.34	0.34	0.34	0.34	0.35	0.35	0.35	0.34	0.33	0.33	0.33	1.03
110	0.44	0.44	0.44	0.43	0.43	0.44	0.45	0.45	0.44	0.44	0.44	0.45	0.45	0.45	0.46	0.68	0.43	0.43	1.03
115	0.59	0.57	0.57	0.56	0.55	0.56	0.56	0.58	0.56	0.56	0.57	0.58	0.57	0.57	0.62	5.26	0.57	0.58	0.98
120	0.76	0.75	0.71	0.70	0.68	0.71	0.72	0.70	0.71	0.70	0.71	0.71	0.70	0.70	0.73	0.82	0.74	0.75	0.98
125	0.94	0.92	0.88	0.87	0.85	0.89	0.90	0.85	0.87	0.85	0.86	0.87	0.86	0.88	0.89	0.93	0.91	0.91	0.96
130	1.08	1.08	1.06	1.04	0.99	1.02	1.07	1.04	1.03	1.03	1.03	1.03	1.03	1.03	1.03	1.08	1.07	1.06	1.06
135	1.26	1.26	1.24	1.21	1.16	1.18	1.20	1.22	1.16	1.21	1.18	1.18	1.16	1.17	1.18	1.20	1.22	1.22	1.23
140	1.39	1.37	1.36	1.33	1.27	1.31	1.28	1.27	1.26	1.29	1.27	1.26	1.23	1.27	1.27	1.28	1.31	1.33	1.35
145	1.52	1.52	1.52	1.45	1.40	1.40	1.40	1.36	1.40	1.40	1.37	1.37	1.37	1.39	1.40	1.39	1.44	1.43	1.48
150	1.65	1.67	1.68	1.63	1.56	1.49	1.48	1.49	1.49	1.51	1.48	1.48	1.49	1.53	1.55	1.57	1.59	1.58	1.62
155	1.75	1.77	1.73	1.75	1.62	1.52	1.50	1.52	1.53	1.52	1.54	1.55	1.57	1.63	1.69	1.71	1.66	1.67	1.72
160	1.82	1.83	1.80	1.79	1.71	1.57	1.51	1.54	1.56	1.47	1.59	1.62	1.66	1.74	1.80	1.79	1.76	1.77	1.86
165	1.89	1.92	1.91	1.88	1.83	1.69	1.64	1.66	1.64	1.61	1.69	1.77	1.81	1.87	1.87	1.86	1.86	1.85	1.89
170	1.98	1.98	1.97	1.97	1.93	1.78	1.69	1.69	1.78	1.74	1.66	1.80	1.86	1.91	1.93	1.92	1.93	1.93	2.05
175	2.23	2.27	2.26	2.25	2.22	2.12	2.03	2.03	2.00	1.93	2.00	2.05	2.11	2.14	2.18	2.20	2.20	2.21	2.18
180	2.18	2.21	2.20	2.22	2.20	2.15	2.11	2.10	2.06	2.08	2.02	2.02	2.08	2.16	2.16	2.15	2.18	2.19	2.17

Table 4: Luminous Intensity Data

Table--2

UNIT: cd

C (DEG) γ (DEG)	190	200	210	220	230	240	250	260	270	280	290	300	310	320	330	340	350		
0	3632	3632	3632	3632	3632	3632	3632	3632	3632	3632	3632	3632	3632	3632	3632	3632	3632		
5	3625	3625	3625	3625	3625	3625	3625	3626	3626	3625	3625	3626	3625	3625	3624	3623	3623		
10	3588	3591	3592	3592	3594	3596	3596	3598	3597	3597	3596	3594	3590	3586	3584	3580	3579		
15	3529	3532	3535	3539	3544	3548	3548	3548	3546	3542	3539	3535	3530	3525	3519	3514	3509		
20	3436	3442	3450	3460	3466	3470	3472	3471	3469	3465	3459	3453	3446	3436	3427	3418	3412		
25	3312	3321	3338	3351	3360	3364	3365	3364	3362	3358	3355	3346	3334	3320	3307	3292	3285		
30	3162	3178	3197	3211	3220	3224	3218	3213	3210	3209	3210	3207	3193	3175	3156	3139	3129		
35	2983	3005	3026	3040	3046	3040	3028	3020	3014	3014	3020	3023	3021	3001	2978	2956	2942		
40	2764	2794	2819	2829	2827	2818	2802	2794	2788	2791	2793	2800	2803	2793	2768	2739	2718		
45	2511	2541	2568	2576	2568	2556	2544	2531	2524	2531	2537	2538	2539	2541	2517	2484	2462		
50	2219	2250	2271	2273	2270	2265	2251	2227	2223	2231	2241	2242	2235	2245	2228	2200	2173		
55	1894	1924	1937	1921	1928	1918	1896	1885	1879	1887	1898	1904	1902	1908	1904	1875	1849		
60	1532	1560	1566	1562	1552	1552	1545	1531	1527	1538	1536	1534	1543	1546	1543	1523	1503		
65	1037	1172	1187	1184	1180	1187	1134	1134	1123	1128	1171	1173	1167	1176	1169	1007	931		
70	643	651	668	795	761	671	671	693	692	679	677	695	796	675	655	646	640		
75	373	392	372	322	353	409	392	393	397	401	406	403	340	372	333	320	312		
80	94.0	114	107	122	114	114	128	121	128	128	135	120	124	91.5	87.1	92.5	75.4		
85	4.38	6.36	6.98	11.5	16.8	18.0	21.3	17.5	19.8	19.9	19.0	15.5	5.75	2.00	1.64	1.31	1.10		
90	0.54	0.59	0.64	0.65	0.64	0.61	0.58	0.55	0.49	0.48	0.49	0.49	0.49	0.49	0.48	0.47	0.47		
95	0.66	0.67	0.69	0.70	0.70	0.69	0.69	0.68	0.68	0.68	0.69	0.69	0.70	0.70	0.69	0.68	0.67		
100	0.87	0.89	0.90	0.91	0.91	0.90	0.90	0.89	0.89	0.89	0.90	0.91	0.91	0.91	0.91	0.89	0.89		
105	1.04	1.04	1.06	1.07	1.08	1.08	1.07	1.06	1.06	1.07	1.08	1.08	1.09	1.09	1.08	1.07	1.07		
110	1.05	1.61	2.84	1.08	1.09	1.10	1.10	1.09	1.09	1.10	1.10	1.10	1.10	1.10	1.07	1.06	1.06		
115	0.99	1.07	4.98	0.99	1.02	1.03	1.03	1.02	1.02	1.03	1.04	1.04	1.03	1.02	1.00	1.00	1.01		
120	0.97	0.99	0.92	0.91	0.91	0.91	0.91	0.91	0.92	0.92	0.93	0.92	0.93	0.93	0.94	0.96	0.99		
125	0.96	0.93	0.91	0.90	0.88	0.88	0.89	0.89	0.89	0.87	0.89	0.88	0.88	0.91	0.91	0.96	1.00		
130	1.06	1.04	1.04	0.98	0.96	0.97	0.97	0.97	0.98	0.96	0.98	0.95	0.98	0.96	1.02	1.04	1.08		
135	1.23	1.23	1.23	1.20	1.17	1.14	1.14	1.17	1.15	1.14	1.13	1.12	1.12	1.19	1.19	1.22	1.25		
140	1.38	1.37	1.37	1.36	1.35	1.32	1.30	1.31	1.29	1.25	1.22	1.27	1.28	1.32	1.32	1.34	1.35		
145	1.50	1.49	1.49	1.48	1.49	1.47	1.46	1.46	1.48	1.38	1.41	1.41	1.46	1.46	1.45	1.47	1.48		
150	1.61	1.62	1.61	1.61	1.60	1.56	1.58	1.56	1.52	1.50	1.57	1.54	1.61	1.60	1.64	1.65	1.65		
155	1.72	1.73	1.76	1.74	1.69	1.64	1.64	1.64	1.61	1.65	1.62	1.66	1.67	1.72	1.82	1.77	1.75		
160	1.86	1.85	1.87	1.86	1.83	1.76	1.75	1.73	1.64	1.73	1.69	1.74	1.75	1.87	1.92	1.90	1.91		
165	1.88	1.89	1.91	1.94	1.96	1.92	1.87	1.80	1.76	1.77	1.77	1.81	1.83	1.91	1.95	1.96	1.95		
170	2.05	2.07	2.09	2.11	2.12	2.10	2.06	1.97	1.97	1.98	1.98	1.96	1.93	2.03	2.10	2.10	2.06		
175	2.19	2.22	2.21	2.24	2.20	2.19	2.13	2.09	2.05	2.07	2.15	2.06	2.08	2.19	2.24	2.22	2.22		
180	2.17	2.20	2.19	2.21	2.19	2.15	2.11	2.09	2.05	2.08	2.02	2.02	2.08	2.15	2.15	2.14	2.16		

Table 5: Luminous Intensity Data

## EQUIPMENT LIST

Test Equipment	Model	Equipment No.	Calibration Date	Calibration Due date
Goniophotometer system	GO-R5000	HZTE011-01	Sep. 18, 2014	Sep. 17, 2015
Digital Power Meter	PF2010A	HZTE028-01	Sep. 18, 2014	Sep. 17, 2015
AC Power Supply	PCR 500L	HZTE001-08	Sep. 18, 2014	Sep. 17, 2015
DC Power Supply	WY12010	HZTE004-03	Sep. 18, 2014	Sep. 17, 2015
Temperature Meter	TES1310	HZTE017-01	Sep. 18, 2014	Sep. 17, 2015
Standard source	D908	HZTE012-01	Sep. 18, 2014	Sep. 17, 2015
Standard source	SCL-1400	HZTE012-02	Sep. 18, 2014	Sep. 17, 2015

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

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