



## LM-79-08 Test Report

for

**ABBlighting, Inc.**

3 Adams St Belvidere, NJ 07823.

**Flood Light**

**Model: ABBFL100501-N**

**Laboratory: Leading Testing Laboratories**

**NVLAP CODE: 200960-0**

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Report No.: HZ15070048e

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

Reviewed by:

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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-N

Luminous Efficacy (Lumens /Watt)	Total Luminous Flux (Lumens)	Power (Watts)	Power Factor
99.7	9756.6	97.82	0.9932
CCT (K)	CRI	Stabilization Time (Light & Power)	
4836	65.2	60	

Table 1: Executive Data Summary

### Test specifications:

<b>Date of Receipt</b>	: Jul. 25, 2015
<b>Date of Test</b>	: Jul. 28, 2015
<b>Test item</b>	: Total Luminous Flux, Luminous Distribution Intensity, Luminous Efficacy, Correlated Color Temperature, Color Rendering Index, Chromaticity Coordinate, Electrical parameters
<b>Reference Standard</b>	: 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-N
<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 25.6°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	62
Voltage frequency (Hz)	60	60	60	R2	68
Test Current (A)	0.821	0.988	0.385	R3	75
Power Factor	0.9932	0.9954	0.9154	R4	67
Test Power (W)	97.82	98.31	97.62	R5	63
THD A%	7.63	7.34	15.68	R6	58
Luminous Efficacy (lm/W)	99.7	99.1	99.8	R7	76
Total Luminous Flux (lm)	9756.6	9740.6	9739.7	R8	53
Color Rendering Index (CRI)	65.2			R9	-44
R9	-44			R10	27
Correlated Color Temperature (CCT) (K)	4836			R11	63
Chromaticity (Chroma x, Chroma y)	(0.3527, 0.3795)			R12	34
Chromaticity (Chroma u, Chroma v)	(0.2060, 0.3325)			R13	62
Chromaticity (Chroma u', Chroma v')	(0.2060, 0.4987)			R14	85
Duv	0.0105				
Average Beam Angle (°)	77.4				
Center Beam Candle Power (cd)	7455				
NEMA Type	5H x 5V				
Zonal Lumens in the 0°-60°Zone	99.34%				
Zonal Lumens in the 60°-90°Zone	0.61%				
Zonal Lumens in the 90°-120°Zone	0.00%				
Zonal Lumens in the 120°-180°Zone	0.05%				

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

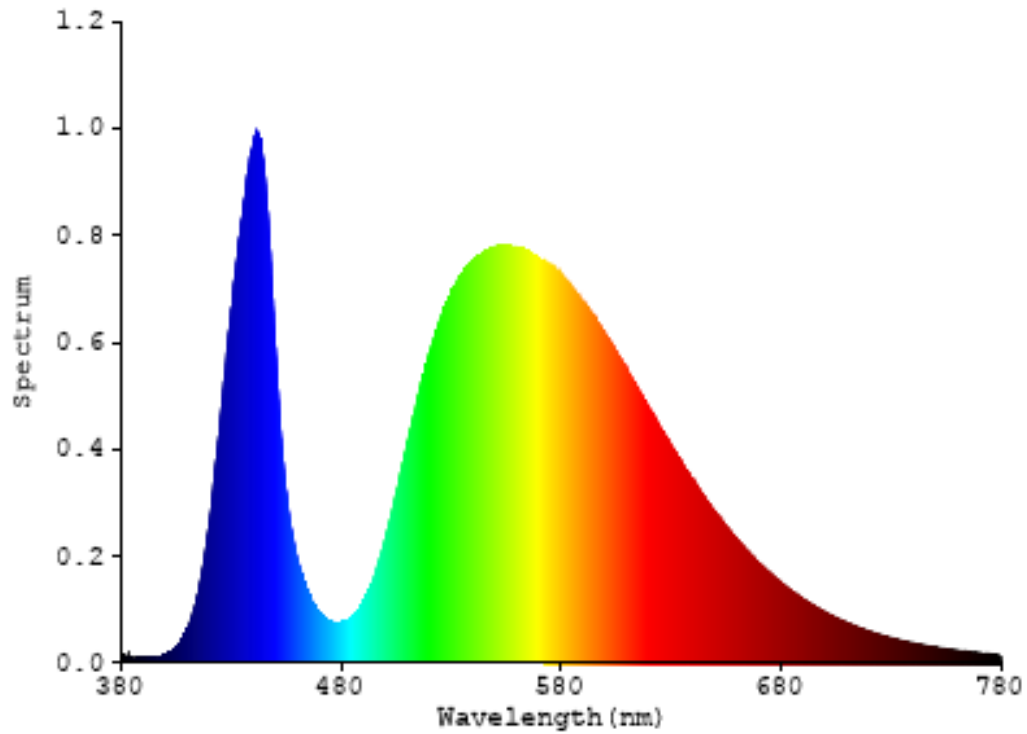


Chart 1: Spectral Power Distribution

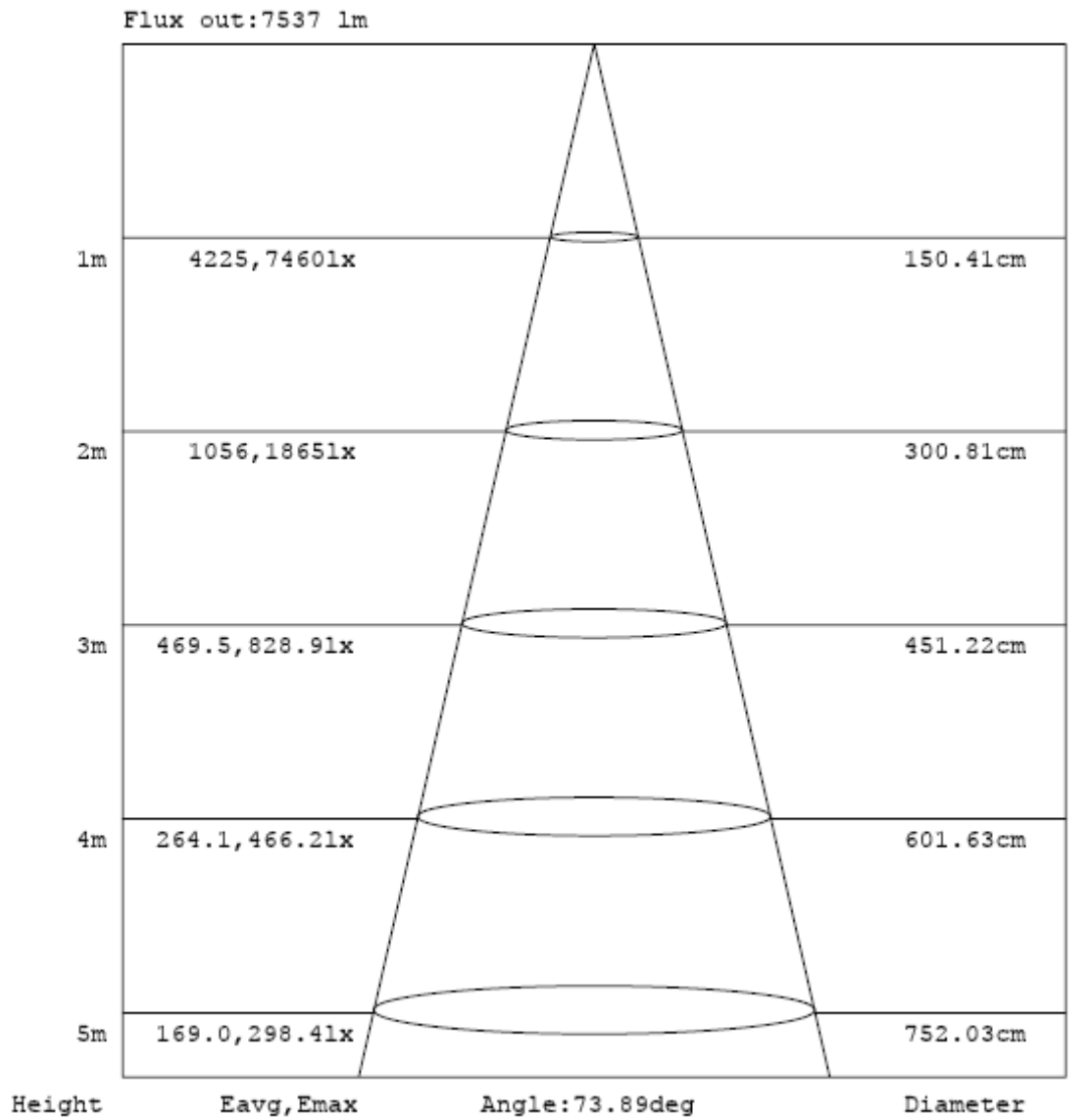
## Zonal Lumen Tabulation

$\gamma(^{\circ})$	Lumens	% Total
0- 10	704.083	7.22%
10- 20	1952.203	20.01%
20- 30	2782.492	28.52%
30- 40	2885.395	29.57%
40- 50	1253.391	12.85%
50- 60	115.057	1.18%
60- 70	38.85	0.40%
70- 80	17.57	0.18%
80- 90	2.486	0.03%
90-100	0.068	0.00%
100-110	0.086	0.00%
110-120	0.212	0.00%
120-130	0.505	0.01%
130-140	0.859	0.01%
140-150	1.082	0.01%
150-160	1.092	0.01%
160-170	0.808	0.01%
170-180	0.315	0.00%
Total	9756.6	100%

$\gamma(^{\circ})$	Lumens	% Total
0- 60	9692.621	99.34%
60- 90	58.906	0.61%
0-90	9751.527	99.95%
90- 180	5.027	0.05%
0- 180	9756.6	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



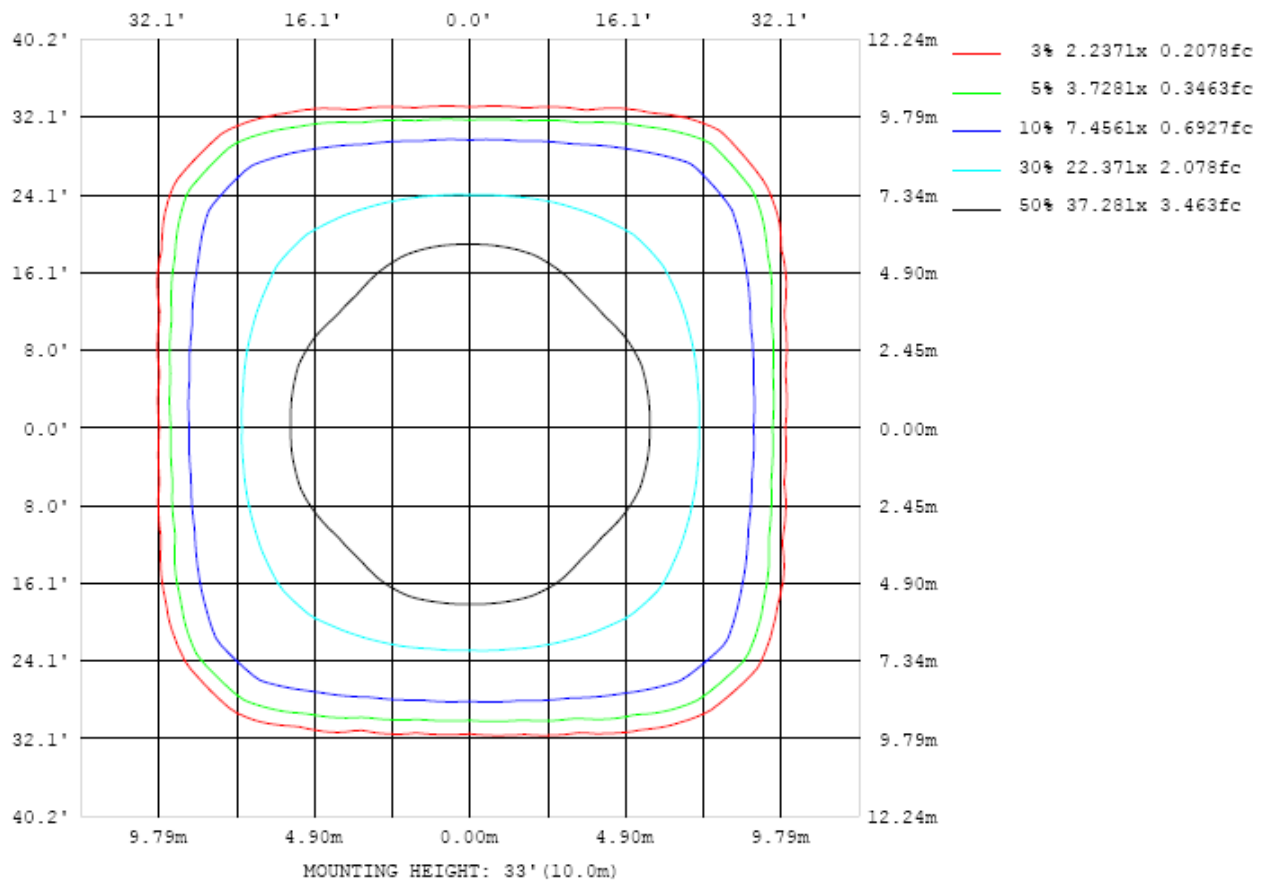


Chart 3: Illuminance Plot (Footcandles)

## Luminous Intensity Distribution Plots

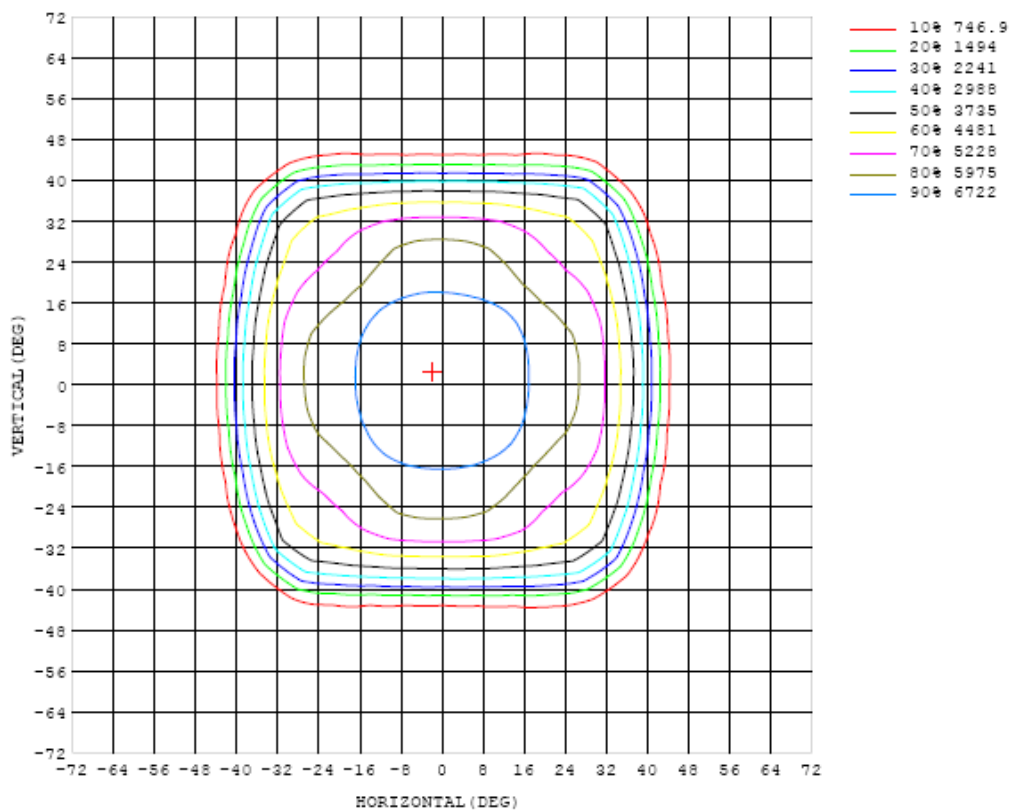


Chart 4: Isocandela Plot

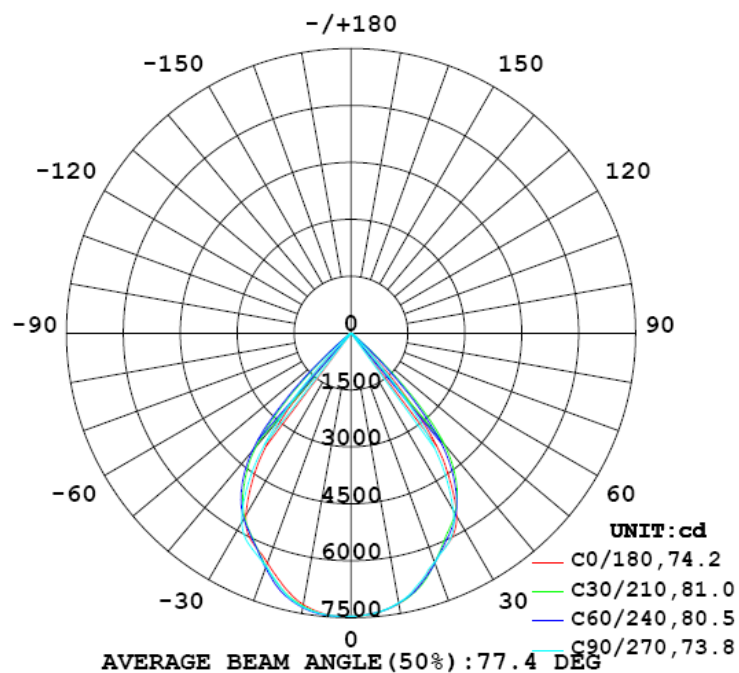


Chart 5: Polar Candela Distribution

## 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	7455	7455	7455	7455	7455	7455	7455	7455	7455	7455	7455	7455	7455	7455	7455	7455	7455	7455	7455
5	7400	7405	7402	7404	7396	7395	7397	7399	7398	7400	7406	7412	7419	7429	7432	7437	7440	7438	7442
10	7237	7232	7229	7228	7230	7232	7226	7220	7215	7215	7228	7248	7262	7266	7262	7261	7261	7260	7261
15	6903	6904	6922	6939	6939	6937	6912	6878	6855	6850	6864	6899	6935	6963	6958	6933	6910	6894	6892
20	6433	6432	6436	6446	6455	6464	6445	6429	6422	6421	6436	6443	6470	6454	6442	6439	6437	6435	6442
25	6089	6070	6022	5913	5812	5860	5981	6058	6083	6088	6099	6083	5985	5834	5810	5923	6039	6091	6111
30	5562	5596	5610	5481	5322	5338	5523	5564	5454	5388	5449	5564	5495	5324	5317	5474	5604	5582	5551
35	4398	4483	4679	4840	4924	4880	4749	4497	4207	4076	4185	4488	4718	4876	4903	4823	4658	4452	4362
40	2568	2707	3190	3836	4293	4188	3548	2780	2243	2046	2219	2749	3502	4161	4261	3777	3069	2578	2441
45	571	629	1041	1931	2931	2697	1577	784	511	425	492	736	1507	2674	2766	1795	884	578	491
50	192	184	206	371	731	645	299	170	165	168	163	172	262	582	584	317	192	178	183
55	98.2	86.5	97.4	98.1	85.5	74.8	82.6	81.4	81.3	87.5	75.9	77.7	74.0	70.3	72.9	93.1	89.3	84.6	93.9
60	71.0	58.3	50.9	53.4	52.0	45.4	42.3	45.1	56.9	66.3	55.3	44.4	41.3	41.1	46.1	52.2	52.3	58.5	68.5
65	52.4	45.1	38.8	39.0	34.1	30.2	31.2	34.9	42.3	47.3	41.3	34.1	30.7	27.2	30.8	37.1	38.7	42.8	48.8
70	35.3	31.3	26.1	25.9	22.0	19.7	21.2	24.6	30.2	33.4	29.6	23.6	20.7	18.2	19.6	24.1	25.9	29.6	33.3
75	20.6	18.1	15.3	14.7	12.5	12.0	13.3	15.0	19.3	20.4	18.5	14.3	12.5	11.2	11.5	14.1	15.4	18.7	20.7
80	9.10	8.07	6.19	5.51	5.29	5.47	6.00	6.98	8.80	8.94	8.64	6.55	5.54	5.43	5.37	5.78	6.56	8.37	9.30
85	0.64	0.54	0.50	0.47	0.49	0.62	0.84	1.23	1.62	1.65	1.58	1.21	0.94	0.92	0.90	0.95	1.24	1.54	1.87
90	0.06	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.07
95	0.06	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.08
100	0.06	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.08
105	0.07	0.04	0.05	0.05	0.06	0.06	0.05	0.05	0.05	0.04	0.05	0.05	0.06	0.06	0.06	0.05	0.05	0.04	0.08
110	0.09	0.07	0.08	0.10	0.11	0.11	0.11	0.10	0.08	0.07	0.08	0.09	0.11	0.11	0.12	0.12	0.10	0.07	0.10
115	0.16	0.15	0.17	0.18	0.20	0.21	0.22	0.21	0.19	0.18	0.18	0.20	0.21	0.22	0.23	0.25	0.21	0.18	0.18
120	0.32	0.32	0.32	0.32	0.33	0.35	0.38	0.39	0.38	0.38	0.38	0.38	0.37	0.36	0.36	0.39	0.37	0.34	0.32
125	0.54	0.56	0.55	0.54	0.54	0.56	0.60	0.61	0.65	0.66	0.64	0.61	0.59	0.56	0.55	0.57	0.58	0.58	0.52
130	0.80	0.82	0.81	0.81	0.81	0.83	0.87	0.92	0.93	0.94	0.92	0.88	0.83	0.79	0.77	0.80	0.84	0.84	0.76
135	1.15	1.19	1.15	1.12	1.11	1.16	1.22	1.28	1.23	1.27	1.25	1.19	1.13	1.08	1.05	1.06	1.12	1.15	1.07
140	1.43	1.47	1.42	1.38	1.37	1.44	1.50	1.58	1.57	1.58	1.55	1.48	1.39	1.32	1.29	1.29	1.35	1.41	1.36
145	1.76	1.79	1.78	1.68	1.66	1.72	1.79	1.84	1.90	1.88	1.82	1.77	1.69	1.61	1.58	1.58	1.68	1.70	1.70
150	2.11	2.14	2.16	2.12	2.06	2.02	2.08	2.14	2.12	2.10	2.08	2.04	1.98	1.96	1.96	2.00	2.06	2.03	2.08
155	2.41	2.46	2.44	2.47	2.38	2.30	2.31	2.33	2.33	2.29	2.26	2.25	2.24	2.26	2.36	2.46	2.38	2.31	2.37
160	2.70	2.67	2.64	2.65	2.63	2.51	2.43	2.43	2.44	2.31	2.37	2.45	2.47	2.55	2.67	2.70	2.62	2.56	2.73
165	2.85	2.84	2.87	2.89	2.88	2.74	2.65	2.62	2.58	2.51	2.60	2.73	2.78	2.84	2.88	2.83	2.78	2.70	2.84
170	3.06	3.00	3.03	3.07	3.06	2.89	2.77	2.73	2.79	2.77	2.70	2.82	2.89	2.94	2.97	2.93	2.89	2.86	3.11
175	3.48	3.56	3.61	3.63	3.62	3.50	3.41	3.37	3.27	3.13	3.23	3.39	3.42	3.41	3.45	3.46	3.44	3.42	3.44
180	3.51	3.59	3.60	3.63	3.65	3.59	3.55	3.55	3.51	3.44	3.41	3.44	3.47	3.52	3.51	3.45	3.48	3.61	3.56

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	7455	7455	7455	7455	7455	7455	7455	7455	7455	7455	7455	7455	7455	7455	7455	7455	7455		
5	7445	7449	7461	7456	7460	7458	7458	7454	7447	7444	7441	7442	7435	7428	7423	7417	7404		
10	7266	7283	7306	7320	7336	7345	7345	7332	7323	7321	7323	7318	7309	7299	7284	7262	7245		
15	6912	6953	7000	7043	7061	7063	7054	7030	7006	7008	7025	7043	7048	7033	7003	6968	6924		
20	6472	6517	6550	6573	6578	6581	6571	6557	6540	6529	6548	6564	6590	6586	6544	6497	6457		
25	6134	6117	6057	5961	5950	6077	6181	6227	6231	6214	6174	6077	5962	5959	6044	6101	6105		
30	5627	5713	5616	5430	5442	5653	5804	5800	5761	5780	5788	5649	5452	5427	5610	5704	5627		
35	4480	4747	4934	5023	5052	5041	4932	4743	4642	4731	4935	5027	5042	5022	4958	4760	4508		
40	2638	3188	3913	4449	4487	4054	3472	3012	2836	3010	3478	4059	4484	4433	3966	3296	2769		
45	554	1027	1993	3199	3276	2283	1322	842	716	836	1338	2298	3337	3226	2142	1147	676		
50	190	218	356	1016	1059	487	226	204	204	204	225	490	1175	1014	437	219	198		
55	87.6	101	109	101	90.5	104	103	104	111	102	110	99.7	108	107	118	110	100		
60	58.8	50.6	54.9	55.1	49.1	45.6	48.2	60.9	71.4	60.1	48.8	47.0	48.7	54.7	59.4	56.5	64.6		
65	43.4	38.0	39.3	35.6	31.7	32.8	37.4	46.2	53.4	45.2	36.9	34.4	31.6	36.6	43.5	43.3	48.3		
70	30.3	25.9	26.3	22.8	20.8	22.5	26.6	32.7	36.2	31.9	26.0	23.7	21.1	23.8	28.0	29.0	32.8		
75	19.4	16.4	15.8	13.6	12.9	14.7	17.2	22.0	24.3	21.4	17.1	15.3	13.4	13.9	16.7	17.2	19.6		
80	8.98	7.46	6.94	6.73	6.83	7.21	8.93	11.9	12.4	11.6	8.88	7.64	6.97	6.42	6.42	7.13	8.81		
85	1.99	1.75	1.51	1.52	1.63	1.86	2.54	3.17	3.35	3.38	2.51	1.80	1.42	1.09	0.89	0.90	0.85		
90	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.07	0.07	0.08	0.08	0.08		
95	0.09	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.09		
100	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.08	0.08	0.09	0.09	0.10		
105	0.10	0.10	0.11	0.12	0.12	0.11	0.10	0.10	0.10	0.10	0.10	0.10	0.11	0.11	0.11	0.10	0.11		
110	0.12	0.14	0.17	0.17	0.16	0.14	0.12	0.11	0.11	0.11	0.12	0.14	0.16	0.16	0.15	0.13	0.12		
115	0.19	0.22	0.26	0.27	0.25	0.23	0.20	0.17	0.16	0.17	0.19	0.23	0.25	0.25	0.23	0.20	0.18		
120	0.33	0.36	0.38	0.39	0.39	0.37	0.34	0.30	0.29	0.30	0.34	0.37	0.39	0.38	0.36	0.34	0.32		
125	0.51	0.53	0.55	0.56	0.56	0.56	0.55	0.53	0.51	0.53	0.55	0.57	0.56	0.55	0.53	0.52	0.50		
130	0.73	0.74	0.75	0.76	0.77	0.79	0.80	0.80	0.80	0.81	0.81	0.80	0.78	0.76	0.75	0.74	0.73		
135	1.02	1.03	1.04	1.06	1.08	1.11	1.14	1.16	1.16	1.16	1.15	1.13	1.11	1.08	1.06	1.06	1.06		
140	1.34	1.32	1.32	1.35	1.39	1.44	1.49	1.51	1.51	1.50	1.48	1.43	1.37	1.36	1.32	1.31	1.31		
145	1.69	1.64	1.61	1.64	1.70	1.77	1.84	1.89	1.89	1.84	1.77	1.72	1.72	1.67	1.60	1.62	1.65		
150	2.08	2.05	2.00	1.99	2.04	2.12	2.18	2.23	2.14	2.14	2.18	2.12	2.07	2.00	2.00	2.05	2.08		
155	2.42	2.42	2.44	2.41	2.38	2.41	2.43	2.46	2.45	2.51	2.47	2.43	2.37	2.33	2.42	2.41	2.38		
160	2.80	2.78	2.81	2.82	2.77	2.74	2.73	2.76	2.71	2.75	2.74	2.73	2.68	2.71	2.75	2.74	2.76		
165	2.91	2.96	3.02	3.08	3.11	3.07	3.04	2.97	2.94	2.94	2.96	3.02	3.01	3.00	3.00	2.97	2.94		
170	3.21	3.23	3.32	3.39	3.45	3.43	3.40	3.30	3.28	3.28	3.30	3.32	3.24	3.27	3.34	3.30	3.21		
175	3.45	3.50	3.54	3.59	3.59	3.56	3.53	3.50	3.44	3.40	3.55	3.54	3.46	3.51	3.59	3.53	3.47		
180	3.51	3.57	3.59	3.62	3.63	3.58	3.54	3.53	3.48	3.44	3.40	3.44	3.48	3.51	3.52	3.47	3.46		

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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