



## LM-79-08 Test Report

for

**ABBlighting, Inc.**

3 Adams St Belvidere, NJ 07823.

**Flood Light**

**Model: ABBFL70501-N**

**Laboratory: Leading Testing Laboratories**

**NVLAP CODE: 200960-0**

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Report No.: HZ15070048d

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: ABBFL70501-N

Luminous Efficacy (Lumens /Watt)	Total Luminous Flux (Lumens)	Power (Watts)	Power Factor
99.6	5792.7	58.15	0.9967
CCT (K)	CRI	Stabilization Time (Light & Power)	
4853	65.0	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>	: ABBFL70501-N
<b>Electrical Ratings</b>	: 100~277VAC, 50/60Hz, 62W
<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: 27pcs
<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 25.5°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)	0.486	0.589	0.216	R3	74
Power Factor	0.9967	0.9972	0.9652	R4	67
Test Power (W)	58.15	58.73	57.79	R5	63
THD A%	5.05	4.38	13.92	R6	58
Luminous Efficacy (lm/W)	99.6	98.5	100.1	R7	75
Total Luminous Flux (lm)	5792.7	5784.5	5785.9	R8	53
Color Rendering Index (CRI)	65.0			R9	-45
R9	-45			R10	26
Correlated Color Temperature (CCT) (K)	4853			R11	64
Chromaticity (Chroma x, Chroma y)	(0.3520, 0.3782)			R12	34
Chromaticity (Chroma u, Chroma v)	(0.2060, 0.3321)			R13	61
Chromaticity (Chroma u', Chroma v')	(0.2060, 0.4981)			R14	85
Duv	0.0102				
Average Beam Angle (°)	77.6				
Center Beam Candle Power (cd)	4382				
NEMA Type	5H x 5V				
Zonal Lumens in the 0°-60°Zone	99.31%				
Zonal Lumens in the 60°-90°Zone	0.64%				
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

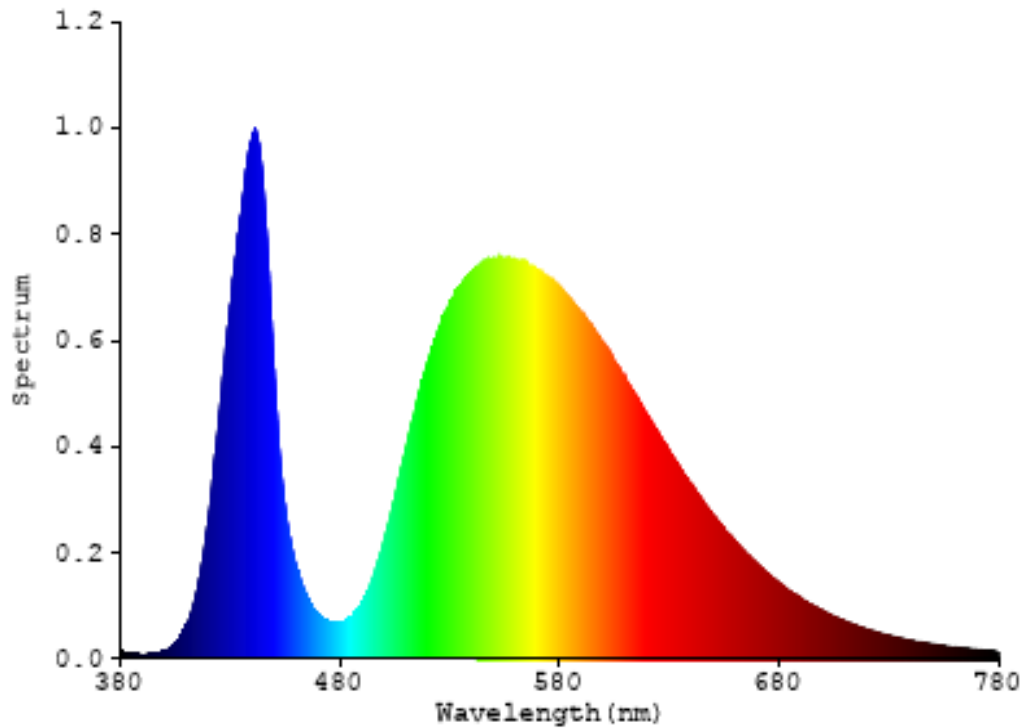


Chart 1: Spectral Power Distribution

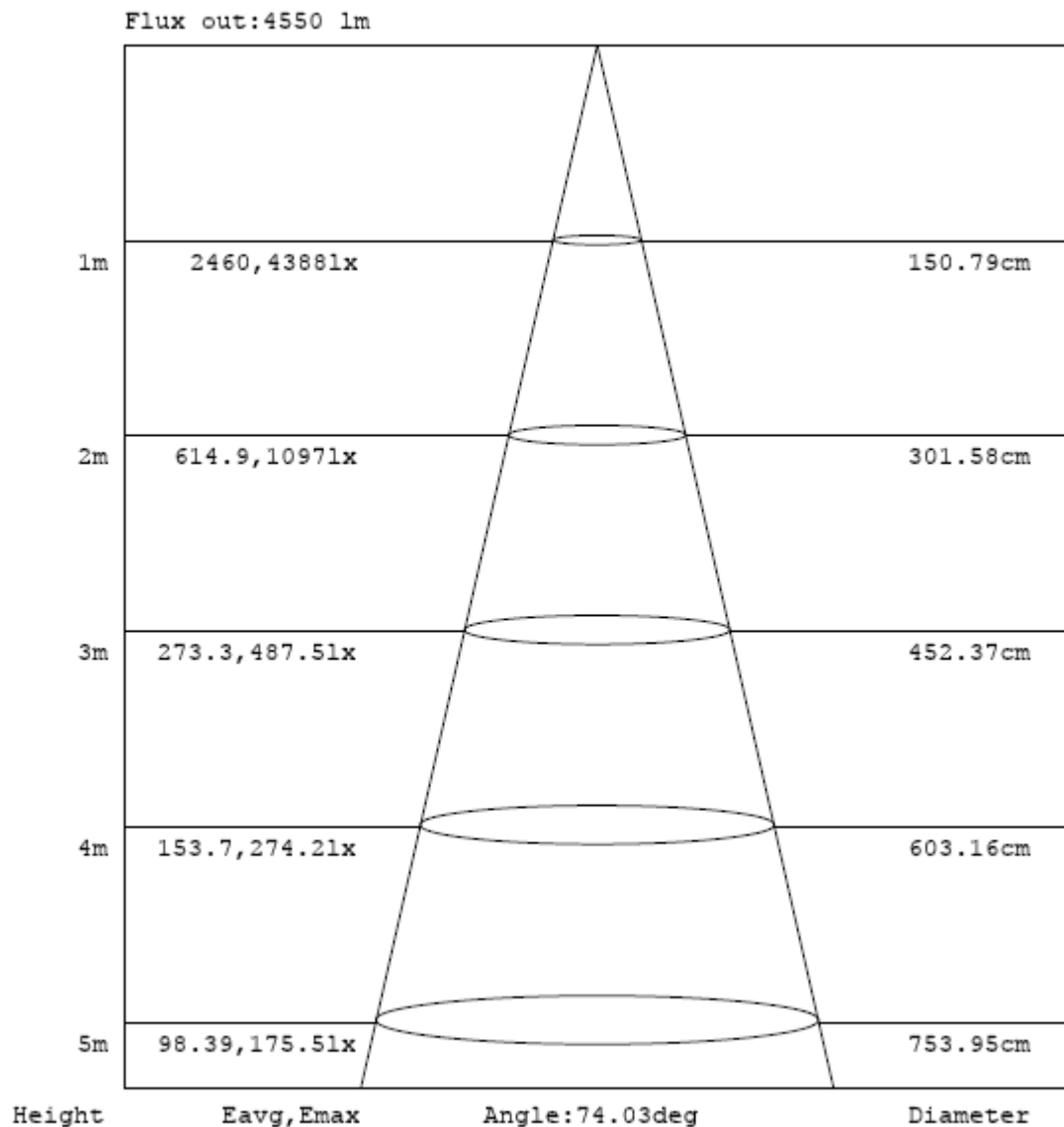
## Zonal Lumen Tabulation

$\gamma(^{\circ})$	Lumens	% Total
0- 10	414.319	7.15%
10- 20	1155.181	19.94%
20- 30	1652.862	28.53%
30- 40	1711.333	29.54%
40- 50	747.756	12.91%
50- 60	71.063	1.23%
60- 70	23.839	0.41%
70- 80	11.462	0.20%
80- 90	1.888	0.03%
90-100	0.043	0.00%
100-110	0.055	0.00%
110-120	0.129	0.00%
120-130	0.301	0.01%
130-140	0.511	0.01%
140-150	0.643	0.01%
150-160	0.648	0.01%
160-170	0.479	0.01%
170-180	0.187	0.00%
Total	5792.7	100%

$\gamma(^{\circ})$	Lumens	% Total
0- 60	5752.514	99.31%
60- 90	37.189	0.64%
0-90	5789.703	99.95%
90- 180	2.996	0.05%
0- 180	5792.7	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



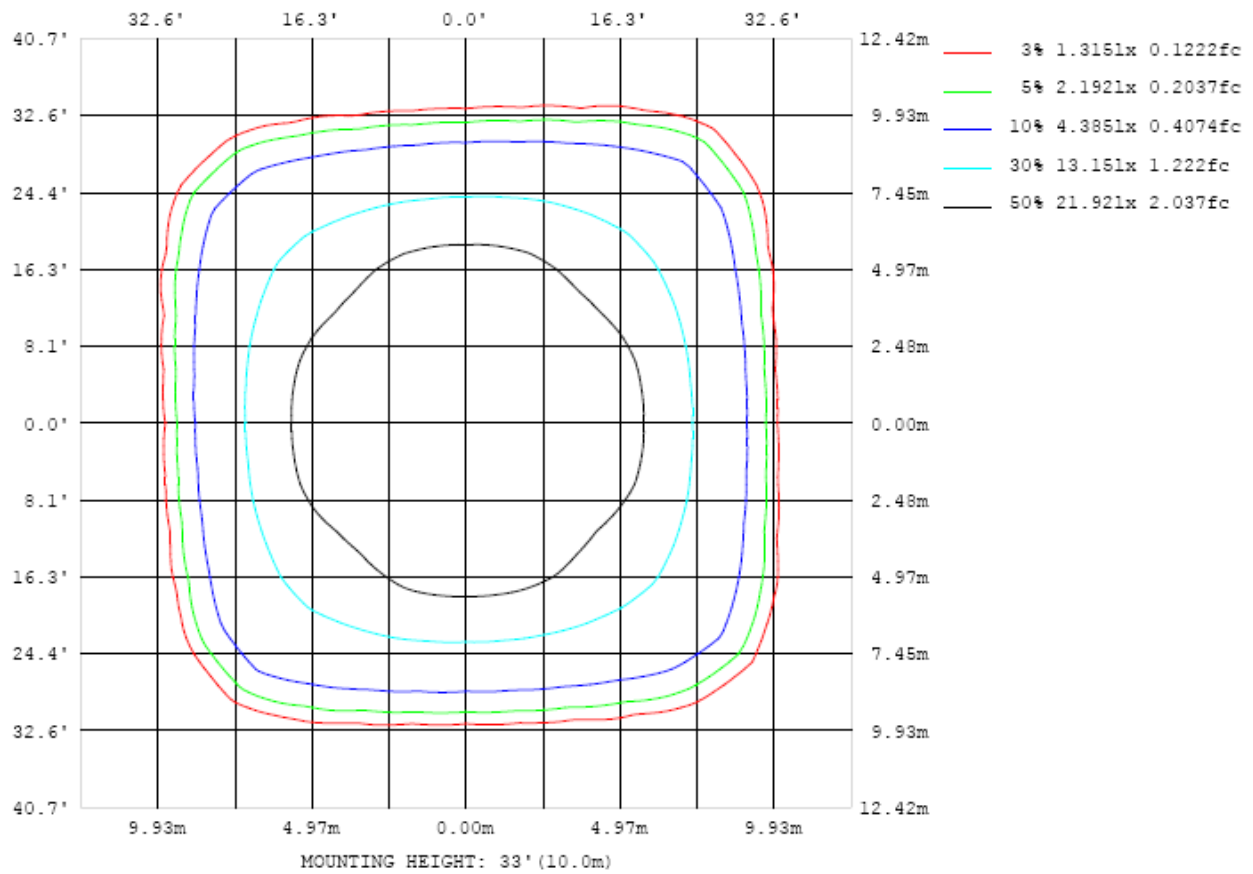


Chart 3: Illuminance Plot (Footcandles)

## Luminous Intensity Distribution Plots

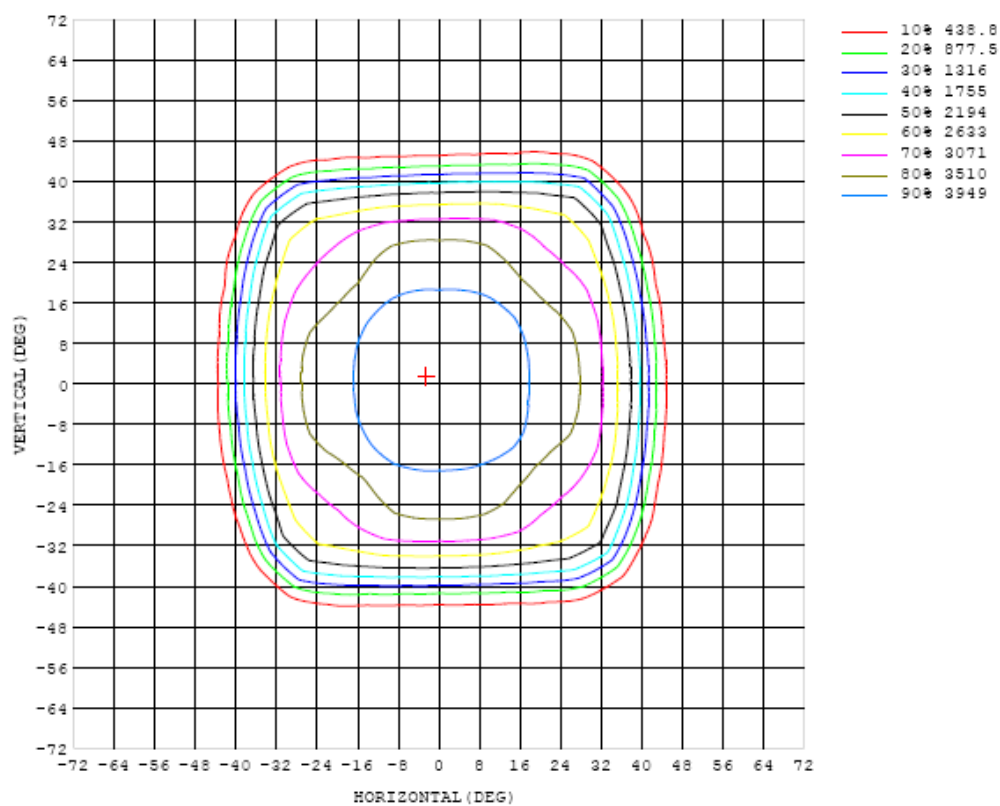


Chart 4: Isocandela Plot

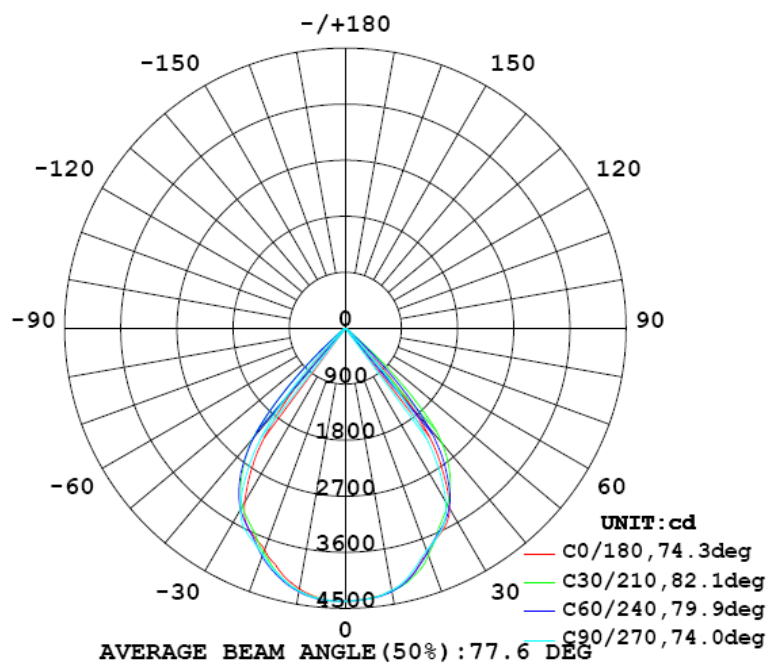


Chart 5: Polar Candela Distribution

## Luminous Intensity Data

Table--1 UNIT: cd

C (DEG) y (DEG)	0	10	20	30	40	50	60	70	80	90	100	110	120	130	140	150	160	170	180
0	4382	4382	4382	4382	4382	4382	4382	4382	4382	4382	4382	4382	4382	4382	4382	4382	4382	4382	4382
5	4358	4359	4362	4356	4362	4362	4362	4364	4362	4365	4367	4373	4370	4370	4371	4370	4367	4367	4364
10	4278	4280	4285	4289	4296	4297	4292	4282	4275	4273	4281	4291	4289	4293	4295	4286	4272	4264	4251
15	4114	4121	4139	4148	4150	4140	4115	4094	4072	4071	4087	4103	4120	4125	4109	4095	4077	4053	4047
20	3836	3842	3861	3886	3903	3867	3837	3817	3803	3801	3814	3816	3818	3818	3801	3814	3823	3798	3791
25	3624	3625	3609	3541	3500	3538	3582	3609	3611	3606	3607	3598	3517	3421	3447	3545	3601	3613	3606
30	3338	3369	3386	3275	3175	3221	3328	3306	3249	3220	3260	3311	3223	3133	3161	3279	3317	3258	3231
35	2663	2730	2876	2932	2964	2908	2824	2667	2515	2462	2543	2720	2819	2912	2902	2803	2669	2528	2499
40	1644	1762	2067	2410	2621	2475	2081	1640	1352	1261	1391	1736	2172	2522	2456	2069	1637	1377	1327
45	391	488	787	1362	1920	1581	878	472	280	244	286	536	1018	1660	1482	841	452	284	276
50	121	123	151	229	558	382	158	113	109	106	99.2	109	160	384	249	158	121	109	112
55	65.6	60.2	62.4	63.1	56.2	46.3	58.1	54.2	56.7	57.9	49.1	52.5	45.9	48.7	46.1	55.6	49.3	52.1	54.6
60	43.2	34.0	30.8	31.7	30.0	27.9	27.7	30.7	38.4	41.7	31.8	28.4	27.2	27.7	29.4	28.7	29.7	35.8	40.4
65	31.5	25.5	23.2	22.9	19.1	18.7	20.5	23.5	28.0	29.3	24.1	21.4	20.1	18.0	20.2	21.5	22.1	25.9	28.6
70	21.6	18.4	15.5	15.1	12.3	12.4	13.9	17.0	20.3	21.2	18.1	14.8	13.4	11.8	13.1	14.5	15.4	18.9	21.1
75	13.7	12.3	9.56	9.05	7.47	7.91	8.95	10.7	13.6	13.0	12.4	9.25	8.39	7.38	7.52	8.78	9.46	13.1	13.3
80	5.82	5.88	4.44	4.41	3.91	3.99	4.21	5.29	6.56	6.08	5.98	4.47	3.91	3.68	3.81	4.18	5.11	6.57	6.84
85	0.04	0.04	0.05	0.09	0.26	0.52	0.97	1.37	1.61	1.55	1.55	1.11	1.02	1.02	1.10	1.24	1.48	1.87	2.12
90	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.05
95	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.05
100	0.02	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.06
105	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.04	0.04	0.04	0.03	0.03	0.06
110	0.04	0.04	0.05	0.06	0.06	0.07	0.06	0.05	0.05	0.05	0.05	0.06	0.07	0.07	0.07	0.08	0.06	0.05	0.09
115	0.09	0.09	0.10	0.11	0.12	0.13	0.13	0.12	0.11	0.11	0.11	0.12	0.13	0.13	0.14	0.14	0.13	0.11	0.11
120	0.18	0.18	0.18	0.19	0.19	0.21	0.22	0.23	0.22	0.23	0.23	0.22	0.22	0.22	0.22	0.23	0.22	0.21	0.20
125	0.33	0.32	0.32	0.31	0.32	0.33	0.35	0.36	0.39	0.39	0.38	0.36	0.35	0.34	0.33	0.35	0.35	0.35	0.31
130	0.49	0.48	0.47	0.47	0.47	0.49	0.52	0.55	0.54	0.56	0.54	0.52	0.49	0.47	0.46	0.49	0.50	0.50	0.44
135	0.70	0.69	0.67	0.66	0.65	0.69	0.73	0.76	0.72	0.77	0.74	0.71	0.66	0.64	0.63	0.64	0.68	0.69	0.63
140	0.88	0.85	0.83	0.81	0.81	0.86	0.88	0.94	0.92	0.95	0.91	0.87	0.82	0.78	0.77	0.78	0.82	0.85	0.80
145	1.07	1.05	1.04	0.97	0.98	1.01	1.06	1.09	1.13	1.10	1.08	1.04	0.99	0.96	0.94	0.95	1.03	1.02	1.02
150	1.24	1.26	1.26	1.23	1.19	1.19	1.23	1.26	1.25	1.25	1.22	1.20	1.17	1.17	1.17	1.21	1.24	1.22	1.25
155	1.42	1.45	1.42	1.45	1.36	1.34	1.36	1.38	1.38	1.34	1.33	1.33	1.32	1.35	1.43	1.47	1.41	1.39	1.43
160	1.56	1.57	1.54	1.56	1.53	1.46	1.43	1.45	1.44	1.34	1.43	1.45	1.47	1.54	1.61	1.60	1.55	1.54	1.65
165	1.64	1.68	1.69	1.69	1.69	1.60	1.56	1.56	1.52	1.48	1.57	1.63	1.64	1.70	1.71	1.67	1.65	1.61	1.71
170	1.77	1.78	1.79	1.82	1.80	1.68	1.64	1.62	1.66	1.63	1.60	1.70	1.71	1.76	1.77	1.73	1.72	1.72	1.88
175	2.07	2.12	2.14	2.15	2.14	2.06	2.02	2.00	1.92	1.85	1.96	2.03	2.02	2.03	2.07	2.06	2.05	2.04	2.03
180	2.09	2.13	2.12	2.16	2.16	2.13	2.11	2.08	2.10	1.96	2.03	2.04	2.06	2.10	2.07	2.04	2.09	2.13	2.08

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	4382	4382	4382	4382	4382	4382	4382	4382	4382	4382	4382	4382	4382	4382	4382	4382	4382		
5	4364	4368	4370	4377	4382	4377	4372	4370	4370	4369	4368	4366	4368	4367	4369	4363	4363		
10	4263	4274	4284	4294	4300	4298	4298	4290	4286	4288	4296	4300	4303	4296	4298	4292	4282		
15	4061	4084	4104	4125	4138	4136	4128	4117	4111	4118	4138	4149	4163	4166	4162	4146	4127		
20	3805	3834	3833	3852	3879	3898	3893	3882	3871	3887	3910	3929	3929	3932	3891	3867	3850		
25	3612	3600	3543	3524	3531	3615	3662	3678	3673	3676	3662	3636	3592	3582	3594	3625	3627		
30	3288	3341	3306	3221	3236	3363	3417	3389	3368	3407	3438	3367	3253	3267	3362	3403	3366		
35	2593	2755	2901	2990	2995	2949	2848	2720	2686	2778	2939	3001	3005	2994	2983	2857	2712		
40	1473	1825	2310	2631	2611	2283	1944	1705	1646	1807	2108	2459	2690	2631	2359	1995	1720		
45	321	568	1170	1857	1783	1161	685	478	443	543	877	1467	2068	1928	1249	716	430		
50	116	148	216	531	508	247	153	129	131	137	185	364	814	634	221	148	128		
55	47.5	57.6	64.1	53.0	52.7	68.8	64.1	61.1	65.4	60.8	72.4	69.3	76.2	68.2	73.8	67.5	60.4		
60	33.3	31.0	33.5	31.6	29.4	30.0	32.3	37.8	43.5	35.7	32.3	30.8	32.1	35.0	32.9	32.5	39.4		
65	25.2	23.6	24.4	20.4	20.0	22.1	24.9	28.2	32.6	26.9	23.9	21.9	20.5	23.0	24.4	24.4	28.8		
70	18.4	16.2	16.0	13.3	13.7	15.7	18.0	21.1	23.2	19.8	16.8	15.0	13.2	15.0	16.3	16.7	20.2		
75	12.9	9.98	9.76	8.29	8.89	10.3	11.9	15.8	15.9	13.9	10.8	9.77	8.44	8.87	10.2	10.8	13.7		
80	6.90	5.14	4.91	4.60	4.72	5.18	6.63	8.43	8.43	8.17	5.69	5.10	4.65	4.70	5.06	5.67	6.49		
85	2.16	1.80	1.64	1.58	1.53	1.63	2.19	2.63	2.64	2.78	1.89	1.59	0.99	0.62	0.33	0.13	0.06		
90	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		
95	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		
100	0.06	0.06	0.05	0.05	0.05	0.05	0.06	0.06	0.06	0.06	0.06	0.05	0.05	0.05	0.06	0.06	0.06		
105	0.06	0.10	0.07	0.08	0.07	0.07	0.06	0.06	0.06	0.06	0.06	0.07	0.07	0.07	0.07	0.06	0.06		
110	0.08	0.14	0.11	0.11	0.11	0.09	0.08	0.07	0.07	0.07	0.08	0.09	0.10	0.10	0.09	0.08	0.07		
115	0.12	0.16	0.16	0.17	0.16	0.14	0.12	0.10	0.10	0.11	0.12	0.14	0.15	0.15	0.13	0.12	0.10		
120	0.21	0.23	0.24	0.24	0.24	0.23	0.20	0.18	0.18	0.19	0.21	0.22	0.23	0.22	0.21	0.20	0.19		
125	0.31	0.32	0.34	0.34	0.34	0.34	0.33	0.32	0.31	0.32	0.33	0.34	0.33	0.32	0.31	0.30	0.29		
130	0.45	0.45	0.46	0.46	0.47	0.48	0.49	0.48	0.48	0.48	0.48	0.47	0.46	0.45	0.44	0.43	0.43		
135	0.62	0.62	0.63	0.64	0.66	0.67	0.69	0.70	0.70	0.69	0.68	0.66	0.65	0.63	0.63	0.62	0.62		
140	0.80	0.79	0.79	0.81	0.84	0.87	0.90	0.90	0.90	0.89	0.87	0.84	0.80	0.80	0.77	0.77	0.78		
145	1.01	0.97	0.97	0.99	1.03	1.07	1.11	1.13	1.13	1.08	1.04	1.01	1.02	0.97	0.94	0.96	0.98		
150	1.24	1.23	1.19	1.20	1.23	1.28	1.31	1.33	1.26	1.30	1.29	1.24	1.22	1.17	1.19	1.21	1.23		
155	1.44	1.45	1.46	1.44	1.42	1.45	1.45	1.47	1.45	1.50	1.45	1.44	1.39	1.38	1.44	1.41	1.40		
160	1.66	1.65	1.68	1.68	1.65	1.63	1.63	1.64	1.60	1.64	1.62	1.62	1.58	1.63	1.63	1.62	1.63		
165	1.72	1.76	1.79	1.84	1.85	1.82	1.80	1.75	1.74	1.74	1.76	1.80	1.77	1.78	1.78	1.75	1.73		
170	1.88	1.92	1.96	2.01	2.04	2.03	2.01	1.95	1.95	1.94	1.96	1.96	1.90	1.95	1.98	1.94	1.88		
175	2.03	2.08	2.09	2.14	2.12	2.12	2.10	2.08	2.03	2.02	2.13	2.06	2.04	2.10	2.14	2.08	2.07		
180	2.08	2.12	2.12	2.16	2.15	2.12	2.11	2.11	2.06	2.04	2.01	2.05	2.07	2.09	2.09	2.06	2.07		

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.

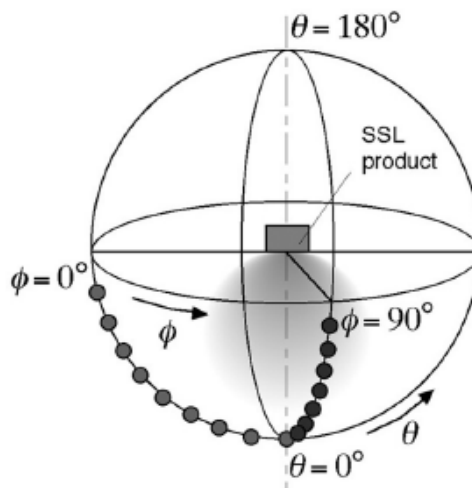
## Color Characteristics Measurements

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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