



LM-79-08 Test Report

for

ABB Lighting, Inc.

1501 Industrial Way N. Toms River, NJ 08755

80W Area Light

Model: ABAR080LED50VW

Laboratory: Leading Testing Laboratories

NVLAP CODE: 200960-0

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Report No.: HZ13090025a

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

Review by:

April Zou

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Oct. 08 2013

Approved by:



Jim Zhang

Manager: Jim Zhang
Oct. 08, 2013

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: **ABAR080LED50VW**

Luminous Efficacy (Lumens /Watt)	Total Luminous Flux (Lumens)	Power (Watts)	Power Factor
98.6	7692.0	78.0	0.9978
CCT (K)	CRI	Stabilization Time (Light & Power)	
5080	77.9	80	

Table 1: Executive Data Summary

Test specifications:

Date of Receipt	: Oct. 08, 2013
Date of Test	: Oct. 08, 2013
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 Photos



Figure 1- Overview of the sample

Equipment Under Test (EUT)

Name	: 80W Area Light
Model	: ABAR080LED50VW
Electrical Ratings	: 100~277V AC, 50/60Hz, 80W
Product Description	: 5000K, Outdoor Luminaire, 3 LED bars Manufacturer of light source: Philips Quantity of light source: 36 pcs Model of light source: LUXEON T
Manufacturer	: ABB Lighting (Shanghai) Co., Ltd.
Address	: Room 1012, North Minch Fortune 108 Plaza,# 1839 Qixin road, Shanghai

TEST RESULTS

Test ambient temperature was 25.1°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 115 minutes.

Parameter	Result			Special Color Rendering Indices	
Test Voltage (V)	120.0	100.0	277.0	R1	81
Voltage frequency (Hz)	60	60	60	R2	86
Test Current (A)	0.651	0.790	0.291	R3	86
Power Factor	0.9978	0.9987	0.9563	R4	81
Test Power (W)	78.0	79.0	77.0	R5	81
THD A%	3.22	2.92	16.82	R6	78
Luminous Efficacy (lm/W)	98.6			R7	87
Total Luminous Flux (lm)	7692.0			R8	70
Color Rendering Index (CRI)	77.9			R9	12
R9	12			R10	63
Correlated Color Temperature (CCT) (K)	5080			R11	78
Chromaticity (Chroma x, Chroma y)	(0.3430, 0.3514)			R12	55
Chromaticity (Chroma u, Chroma v)	(0.2101, 0.3228)			R13	82
Chromaticity (Chroma u', Chroma v')	(0.2101, 0.4842)			R14	92
Duv	0.0007				
Average Beam Angle (°)	153.1				
Center Beam Candle Power (cd)	519				
Spacing Criteria	2.97 (0°-180°)/ 3.14 (90°-270°)				
Zonal Lumens in the 0°-60°Zone	41.96%				
Zonal Lumens in the 60°-90°Zone	58.00%				
Zonal Lumens in the 90°-120°Zone	0.03%				
Zonal Lumens in the 120°-180°Zone	0.01%				

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

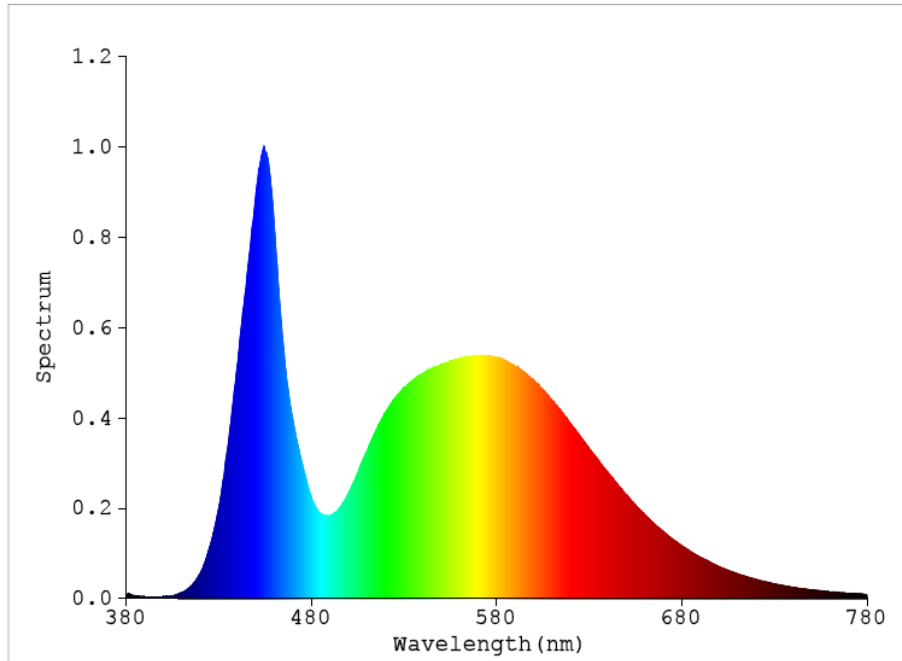


Chart 1: Spectral Power Distribution

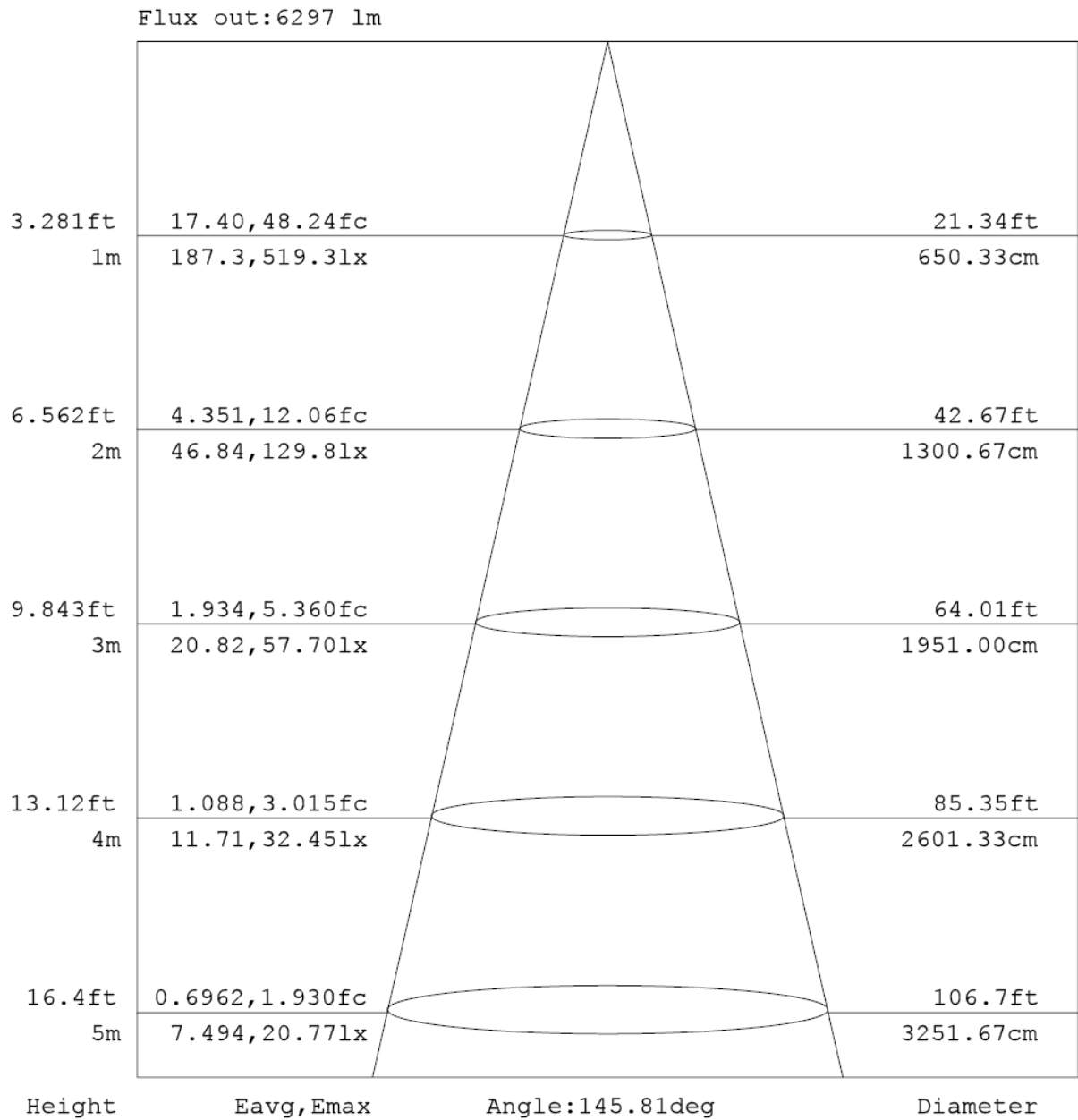
Zonal Lumen Tabulation

$\gamma(^{\circ})$	Lumens	% Total
0- 10	49.219	0.64%
10- 20	147.808	1.92%
20- 30	259.849	3.38%
30- 40	453.031	5.89%
40- 50	818.853	10.65%
50- 60	1498.569	19.48%
60- 70	2323.66	30.21%
70- 80	1920.591	24.97%
80- 90	217.174	2.82%
90-100	1.357	0.02%
100-110	0.545	0.01%
110-120	0.299	0.00%
120-130	0.315	0.00%
130-140	0.26	0.00%
140-150	0.196	0.00%
150-160	0.15	0.00%
160-170	0.1	0.00%
170-180	0.024	0.00%
Total	7692.0	100%

$\gamma(^{\circ})$	Lumens	% Total
0- 60	3227.329	41.96%
60- 90	4461.425	58.00%
0-90	7688.754	99.96%
90- 180	3.246	0.04%
0- 180	7692.0	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

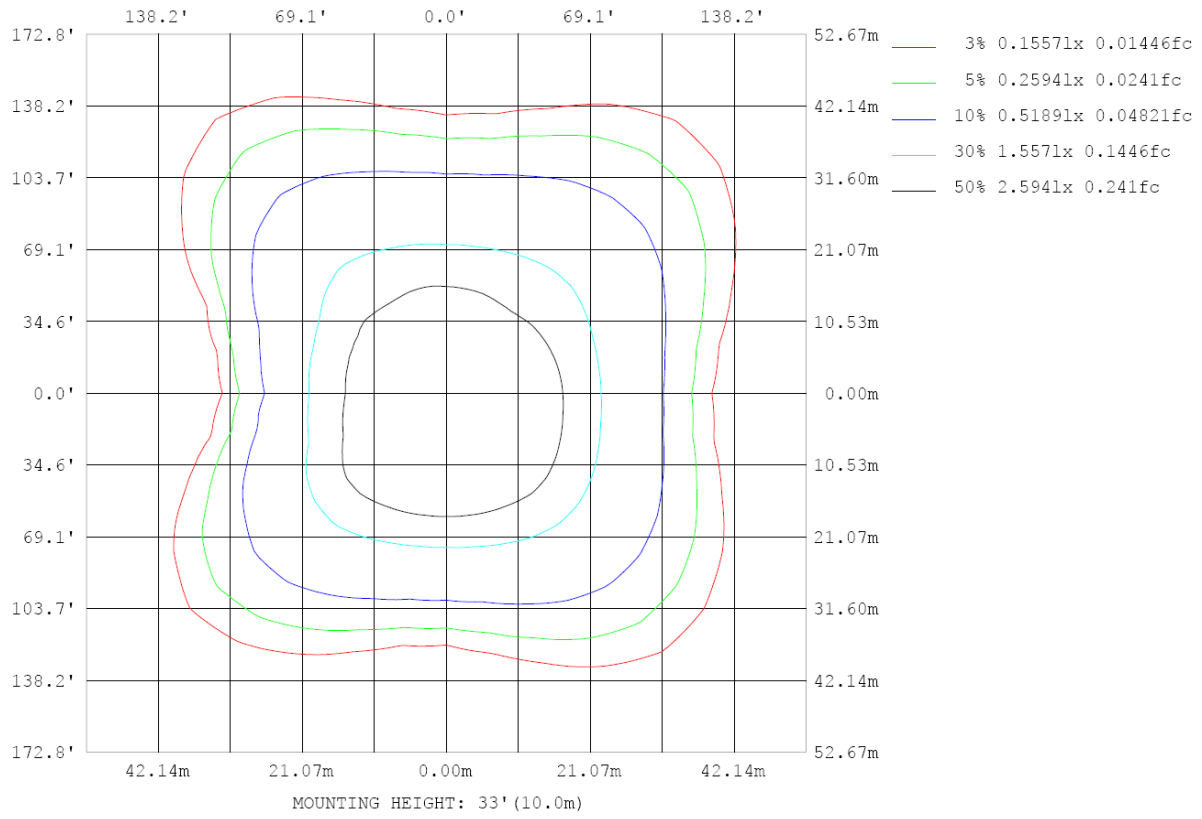


Chart 3: Illuminance Plot (Footcandles)

Luminous Intensity Distribution Plots

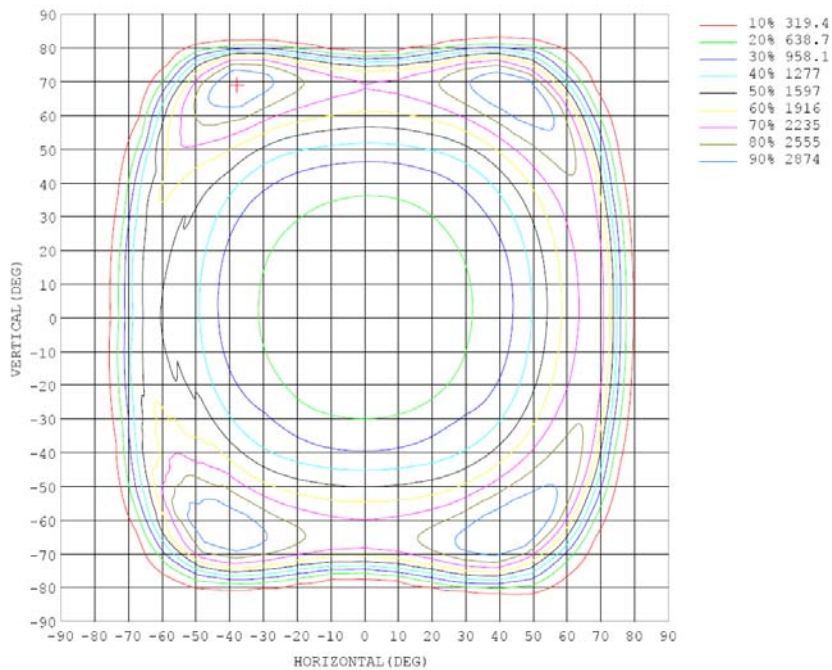


Chart 4: Isocandela Plot

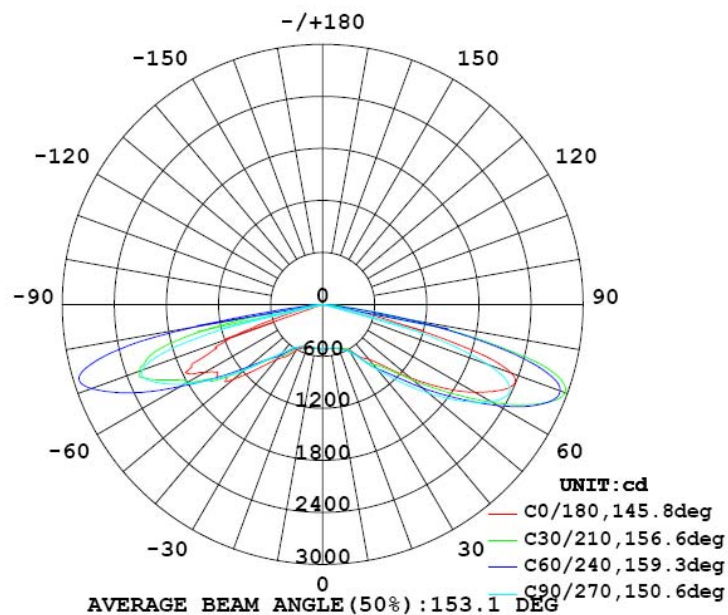


Chart 5: Polar Candela Distribution

Luminous Intensity Data

Table--1

UNIT: cd

C (DEG) γ (DEG)	0	10	20	30	40	50	60	70	80	90	100	110	120	130	140	150	160	170	180
0	519	519	519	519	519	519	519	519	519	519	519	519	519	519	519	519	519	519	519
5	517	517	517	517	517	516	516	516	515	515	515	515	515	515	516	516	516	516	516
10	518	518	519	518	518	517	516	515	514	514	514	514	514	515	515	516	516	516	515
15	525	525	524	524	526	527	526	526	525	525	524	523	522	523	522	522	521	521	521
20	539	538	536	538	542	545	548	548	547	547	544	542	540	538	539	538	536	536	535
25	561	561	559	562	568	575	578	579	579	579	577	573	569	568	568	569	565	561	558
30	604	607	608	612	620	627	631	635	638	641	638	633	627	624	627	627	622	614	607
35	736	749	757	763	767	767	757	754	759	762	761	754	752	763	777	780	770	751	734
40	827	844	868	905	947	965	964	969	977	982	974	962	960	962	959	929	890	856	830
45	1015	1028	1035	1057	1103	1133	1171	1222	1254	1265	1252	1225	1185	1146	1128	1107	1080	1062	1039
50	1319	1338	1349	1363	1400	1444	1498	1553	1588	1592	1588	1562	1519	1469	1445	1421	1398	1380	1346
55	1672	1705	1739	1775	1832	1871	1886	1923	1940	1941	1941	1942	1917	1893	1884	1834	1638	1544	1459
60	2027	2078	2167	2262	2359	2390	2333	2303	2265	2243	2261	2313	2357	2422	2429	2096	1800	1646	1568
65	2316	2384	2542	2719	2873	2888	2742	2574	2431	2376	2417	2555	2734	2906	2875	2570	2065	1869	1676
70	2310	2398	2661	2971	3182	3170	2910	2518	2166	2017	2090	2384	2791	3152	3117	2756	1864	1456	1149
75	1173	1330	1867	2518	2890	2856	2371	1682	1148	827	940	1411	2052	2656	2785	2160	1342	587	357
80	274	276	490	987	1533	1472	998	435	173	95.4	106	258	652	1147	1360	976	358	123	80.5
85	67.8	73.0	98.0	206	287	174	91.6	51.8	20.2	14.5	14.5	29.2	57.0	76.6	107	126	66.5	37.2	20.0
90	5.68	5.84	5.81	5.66	5.30	4.68	3.92	3.23	2.53	1.70	1.09	0.88	0.80	0.89	0.76	0.88	1.65	1.91	1.71
95	1.20	1.23	1.08	0.84	0.61	0.50	1.51	0.52	0.37	0.55	0.38	0.29	0.26	0.50	0.56	0.63	1.02	1.85	1.40
100	0.18	0.22	0.41	0.97	1.51	1.84	1.83	0.83	1.35	0.94	0.59	0.49	0.30	0.26	0.34	0.51	0.68	1.50	1.03
105	0.25	0.27	0.34	0.62	0.88	0.82	0.80	0.55	0.71	0.55	0.43	0.32	0.38	0.29	0.28	0.35	0.47	0.82	0.83
110	0.22	0.22	0.25	0.28	0.40	0.60	0.53	0.41	0.37	0.27	0.24	0.25	0.29	0.33	0.32	0.30	0.24	0.21	0.22
115	0.20	0.20	0.21	0.24	0.27	0.27	0.33	0.32	0.30	0.25	0.21	0.31	0.34	0.38	0.45	0.37	0.27	0.26	0.31
120	0.20	0.19	0.20	0.21	0.22	0.21	0.20	0.19	0.20	0.21	0.24	0.41	0.45	0.50	0.47	0.45	0.33	0.52	0.47
125	0.18	0.16	0.16	0.16	0.17	0.18	0.17	0.16	0.17	0.24	0.35	0.54	0.52	0.50	0.46	0.44	0.50	0.62	0.73
130	0.15	0.14	0.14	0.15	0.15	0.15	0.16	0.15	0.17	0.25	0.54	0.54	0.52	0.49	0.45	0.43	0.49	0.57	0.64
135	0.15	0.13	0.13	0.14	0.14	0.14	0.14	0.14	0.16	0.28	0.44	0.55	0.51	0.48	0.44	0.45	0.49	0.54	0.58
140	0.14	0.12	0.13	0.13	0.14	0.14	0.14	0.14	0.16	0.26	0.32	0.57	0.51	0.48	0.46	0.46	0.49	0.52	0.54
145	0.12	0.11	0.12	0.13	0.13	0.14	0.13	0.14	0.17	0.40	0.29	0.58	0.52	0.51	0.48	0.47	0.48	0.50	0.51
150	0.12	0.10	0.11	0.12	0.12	0.13	0.13	0.15	0.25	0.51	0.19	0.64	0.56	0.53	0.50	0.48	0.48	0.48	0.48
155	0.11	0.09	0.10	0.11	0.12	0.13	0.14	0.18	0.35	0.57	0.28	0.66	0.59	0.56	0.53	0.50	0.48	0.47	0.46
160	0.10	0.09	0.09	0.10	0.11	0.14	0.18	0.22	0.46	0.60	0.40	0.44	0.62	0.58	0.54	0.51	0.48	0.47	0.46
165	0.10	0.09	0.09	0.11	0.13	0.16	0.25	0.42	0.50	0.59	0.33	0.29	0.51	0.59	0.56	0.53	0.49	0.48	0.47
170	0.10	0.09	0.09	0.13	0.19	0.23	0.21	0.25	0.32	0.29	0.09	0.11	0.26	0.48	0.53	0.52	0.50	0.49	0.48
175	0.08	0.08	0.07	0.08	0.09	0.10	0.14	0.16	0.13	0.15	0.18	0.17	0.14	0.14	0.13	0.20	0.35	0.43	0.46
180	0.38	0.38	0.37	0.36	0.36	0.36	0.15	0.10	0.09	0.32	0.04	0.42	0.56	0.25	0.06	0.05	0.02	0.00	0.00

Table 5: 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	519	519	519	519	519	519	519	519	519	519	519	519	519	519	519	519	519		
5	516	517	517	517	517	517	517	517	517	517	517	517	517	517	517	517	517		
10	515	515	514	514	514	513	512	510	509	509	509	510	512	513	515	516	517		
15	520	518	515	514	514	512	510	509	507	507	508	509	511	514	517	521	524		
20	532	527	521	519	521	521	521	520	518	517	517	518	520	523	526	531	537		
25	553	545	538	536	539	542	541	540	537	535	534	535	538	543	545	550	557		
30	599	585	575	571	573	573	571	569	566	563	562	562	568	577	582	587	595		
35	720	706	687	667	650	637	628	624	619	616	615	619	631	653	675	693	718		
40	806	788	786	795	794	777	754	738	726	725	732	749	783	812	813	804	812		
45	1002	955	918	902	901	897	902	908	902	895	893	891	900	920	931	947	982		
50	1302	1246	1178	1128	1113	1121	1149	1174	1169	1157	1138	1109	1102	1133	1168	1219	1271		
55	1447	1460	1534	1488	1458	1460	1491	1511	1493	1485	1472	1444	1433	1472	1521	1571	1628		
60	1612	1643	1824	1860	1930	1894	1895	1875	1836	1836	1850	1858	1890	1939	1953	1970	1994		
65	1807	1923	2064	2329	2516	2412	2296	2195	2125	2142	2213	2328	2448	2505	2427	2334	2299		
70	1323	1578	2236	2752	3016	2836	2566	2336	2211	2264	2452	2715	2937	2999	2826	2559	2379		
75	498	881	1912	2755	3154	2818	2249	1745	1489	1615	2065	2648	3055	3141	2756	2089	1453		
80	94.3	173	749	1687	2115	1516	743	285	180	261	630	1368	2080	2055	1401	700	341		
85	19.0	40.8	103	161	205	113	66.9	28.3	22.7	27.9	65.3	164	295	357	284	132	79.7		
90	0.86	0.46	0.52	0.64	0.66	0.96	1.01	1.02	1.36	2.28	3.19	3.87	4.49	5.01	5.35	5.58	5.67		
95	1.08	0.46	0.42	0.40	0.39	0.32	0.20	0.29	0.36	0.52	0.81	1.55	0.85	0.35	0.42	0.82	1.12		
100	1.07	0.54	0.36	0.32	0.27	0.29	0.47	0.50	0.82	1.24	1.50	1.76	1.75	1.36	0.58	0.26	0.28		
105	0.66	0.42	0.29	0.30	0.36	0.44	0.35	0.38	0.57	0.71	0.74	0.70	0.54	0.35	0.31	0.30	0.25		
110	0.22	0.25	0.32	0.37	0.41	0.35	0.26	0.28	0.36	0.34	0.31	0.29	0.31	0.29	0.26	0.23	0.21		
115	0.34	0.40	0.48	0.46	0.44	0.34	0.23	0.22	0.39	0.22	0.22	0.23	0.27	0.26	0.23	0.21	0.19		
120	0.57	0.59	0.68	0.57	0.48	0.37	0.27	0.27	0.60	0.19	0.19	0.21	0.22	0.22	0.21	0.19	0.18		
125	0.87	0.78	0.71	0.63	0.54	0.44	0.34	0.36	0.72	0.16	0.16	0.16	0.18	0.17	0.17	0.16	0.15		
130	0.75	0.75	0.68	0.63	0.56	0.35	0.38	0.44	0.91	0.15	0.14	0.15	0.15	0.15	0.14	0.14	0.13		
135	0.66	0.71	0.65	0.61	0.54	0.32	0.35	0.44	0.78	0.15	0.14	0.14	0.15	0.14	0.14	0.13	0.13		
140	0.59	0.62	0.62	0.57	0.41	0.35	0.35	0.47	0.32	0.13	0.14	0.14	0.14	0.14	0.12	0.12	0.12		
145	0.53	0.55	0.55	0.51	0.41	0.37	0.38	0.36	0.67	0.17	0.14	0.14	0.13	0.13	0.11	0.11	0.11		
150	0.49	0.47	0.44	0.44	0.42	0.41	0.42	0.24	0.53	0.14	0.20	0.13	0.13	0.12	0.11	0.10	0.11		
155	0.45	0.43	0.42	0.43	0.44	0.45	0.47	0.28	0.59	0.32	0.31	0.17	0.12	0.12	0.11	0.10	0.11		
160	0.46	0.44	0.43	0.45	0.46	0.47	0.57	0.31	0.43	0.39	0.38	0.38	0.19	0.12	0.11	0.10	0.10		
165	0.47	0.45	0.46	0.48	0.49	0.53	0.37	0.21	0.46	0.45	0.42	0.43	0.44	0.30	0.12	0.11	0.10		
170	0.48	0.48	0.48	0.52	0.47	0.43	0.34	0.21	0.50	0.51	0.49	0.48	0.39	0.23	0.13	0.11	0.10		
175	0.46	0.46	0.43	0.34	0.19	0.06	0.16	0.14	0.48	0.48	0.45	0.25	0.12	0.12	0.12	0.10	0.09		
180	0.00	0.00	0.00	0.00	0.00	0.00	0.17	0.09	0.31	0.31	0.10	0.14	0.29	0.41	0.42	0.41	0.39		

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 4π . 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 expended 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

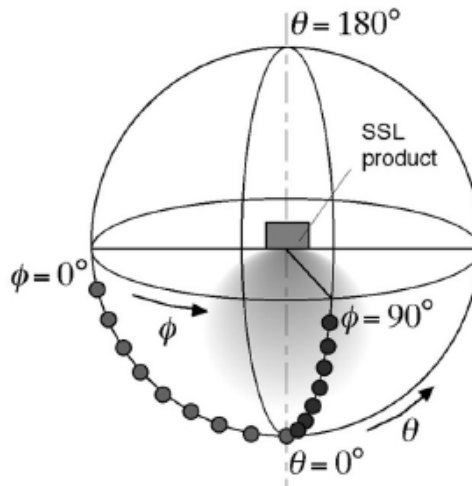
The color characteristics of SSL products include chromaticity coordinates, correlated color temperature, and color rendering index. These characteristics of SSL products may be spatially non-uniform, and thus, in order that they can be specified accurately, the color quantities shall be measured as 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° 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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