NVLAP LAB CODE 200960-0

LM-79-08 Test Report

for

ABBlighting,Inc.

1501 Industrial Way N. Toms River, NJ 08755

55W Area Light

Model: ABAR055LED50VW

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.: HZ13110005a

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

Review by:

Engineer: April Zou
Nov. 8, 2013

Approved by

Manager: Jim Zhang
Nov. 8, 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: **ABAR055LED50VW**

Luminous Efficacy (Lumens /Watt)	Total Luminous Flux (Lumens)	Power (Watts)	Power Factor
102.6	5448.3	53.1	0.9926

CCT (K)	CRI	Stabilization Time (Light & Power)
5057	77.3	80

Table 1: Executive Data Summary

Test specifications:

Date of Receipt : Nov. 6, 2013

Date of Test : Nov. 6, 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

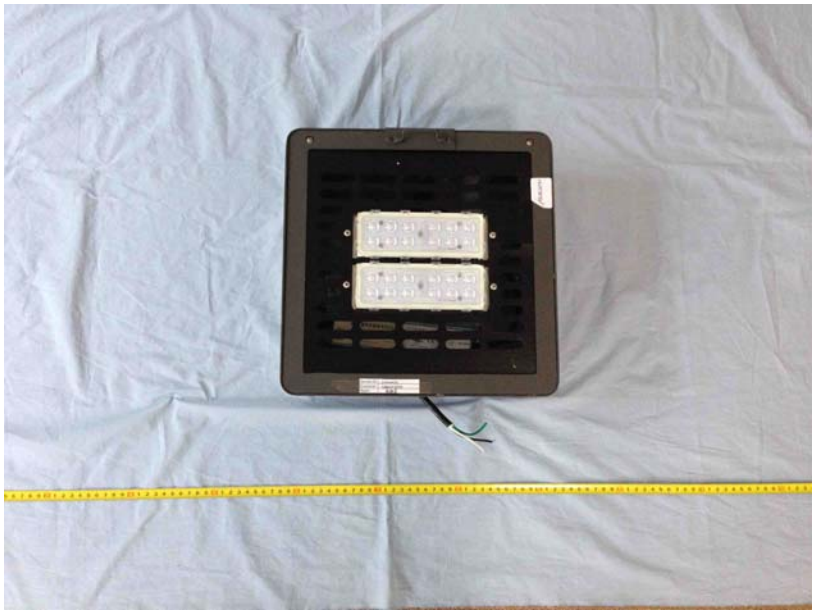


Figure 1- Overview of the sample

Equipment Under Test (EUT)	
Name	: 55W Area Light
Model	: ABAR055LED50VW
Electrical Ratings	: 100~277V AC, 50/60Hz, 55W
Product Description	: 5000K, Outdoor Luminaire, 2 LED bars Manufacturer of light source: Philips Quantity of light source: 24 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℃.

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		
Test Voltage (V)	120.0	100.0	277.0
Voltage frequency (Hz)	60	60	60
Test Current (A)	0.445	0.544	0.200
Power Factor	0.9926	0.9891	0.9556
Test Power (W)	53.1	53.8	52.8
THD A%	7.51	8.01	7.65
Luminous Efficacy (lm/W)	102.6		
Total Luminous Flux (lm)	5448.3		
Color Rendering Index (CRI)	77.3		
R9	12		
Correlated Color Temperature (CCT) (K)	5057		
Chromaticity (Chroma x, Chroma y)	(0.3436, 0.3513)		
Chromaticity (Chroma u, Chroma v)	(0.2105, 0.3229)		
Chromaticity (Chroma u', Chroma v')	(0.2105, 0.4843)		
Duv	0.0005		
Average Beam Angle (°)	153.8		
Center Beam Candle Power (cd)	349		
Spacing Criteria	3.45 (0°-180°)/ 3.38(90°-270°)		
Zonal Lumens in the 0°-60°Zone	41.29%		
Zonal Lumens in the 60°-90°Zone	58.71%		
Zonal Lumens in the 90°-120°Zone	0.00%		
Zonal Lumens in the 120°-180°Zone	0.00%		

Special Color Rendering Indices	
R1	81
R2	85
R3	84
R4	81
R5	81
R6	77
R7	86
R8	71
R9	12
R10	61
R11	79
R12	55
R13	81
R14	91

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

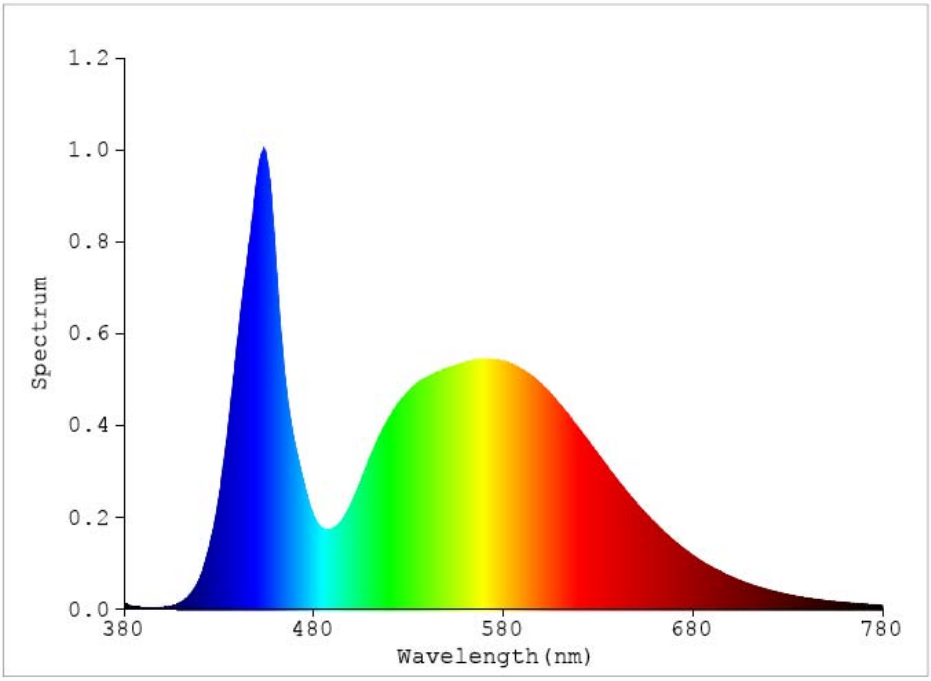


Chart 1: Spectral Power Distribution

Zonal Lumen Tabulation

γ(°)	Lumens	% Total
0- 10	33.015	0.61%
10- 20	98.994	1.82%
20- 30	173.779	3.19%
30- 40	307.154	5.64%
40- 50	565.491	10.38%
50- 60	1071.367	19.66%
60- 70	1704.597	31.29%
70- 80	1361.575	24.99%
80- 90	132.313	2.43%
90-100	0.006	0.00%
Total	5448.3	100%

γ(°)	Lumens	% Total
0- 60	2249.8	41.29%
60- 90	3198.485	58.71%
0-90	5448.285	100.00%
90- 180	0.006	0.00%
0- 180	5448.3	100%

Table 4: Zonal Lumen Data

Illuminance Plots

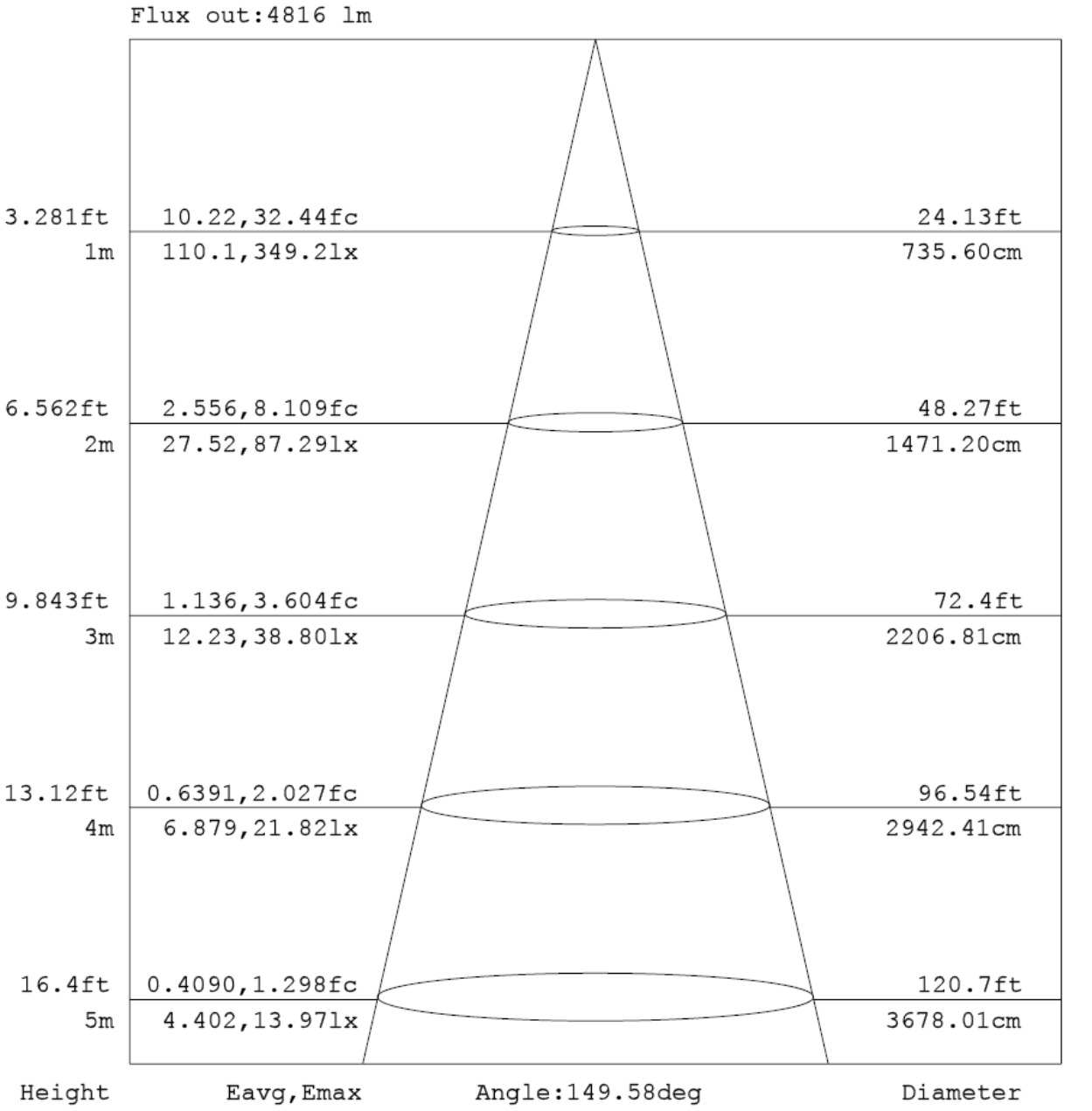


Chart 2: Beam Angle

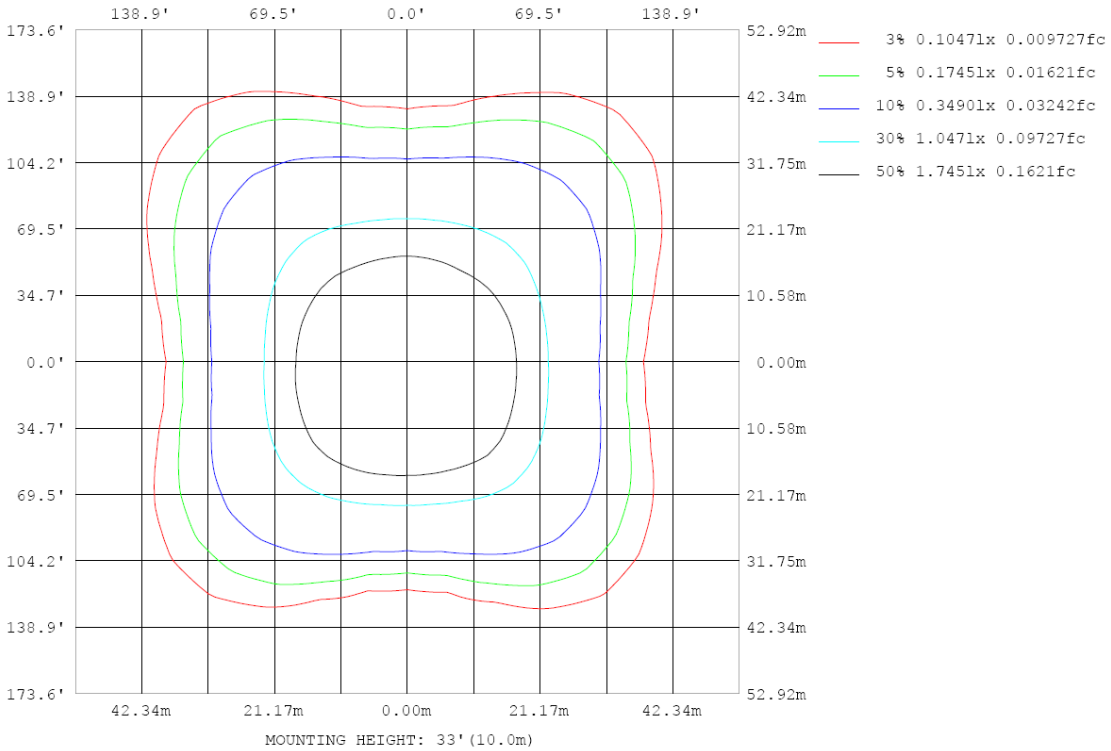


Chart 3: Illuminance Plot (Footcandles)

Luminous Intensity Distribution Plots

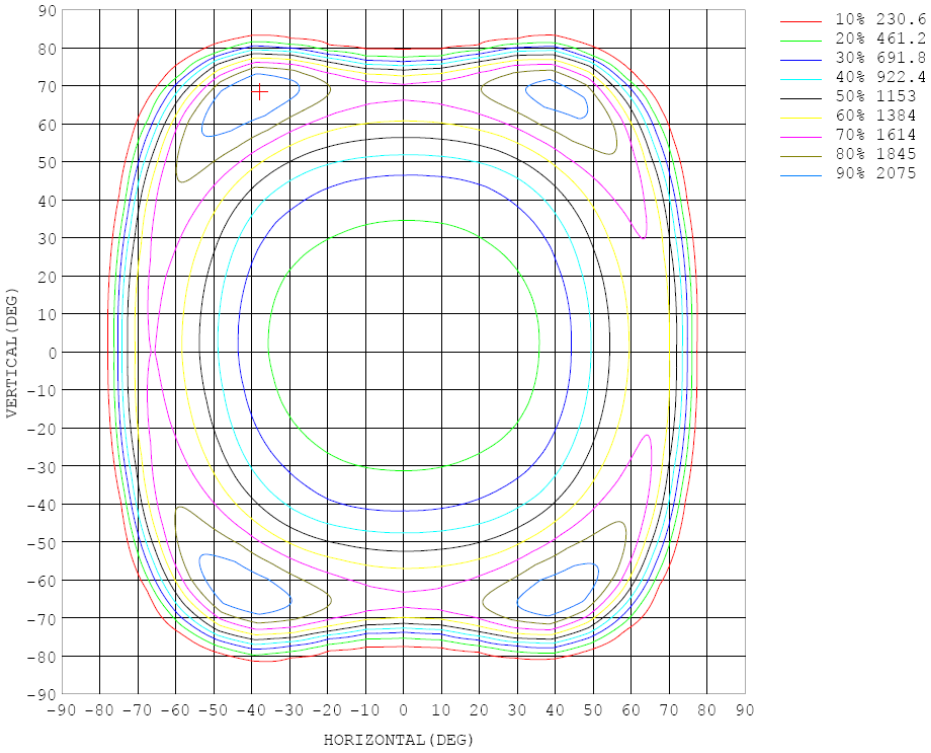


Chart 4: Isocandela Plot

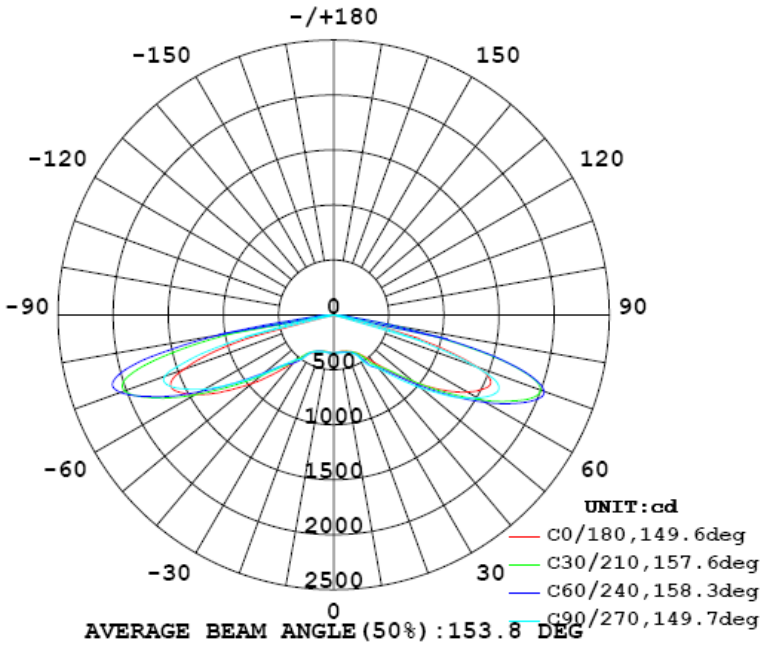


Chart 5: Polar Candela Distribution

Luminous Intensity Data

Table--1 UNIT: cd

γ (DEG) \ C (DEG)	0	10	20	30	40	50	60	70	80	90	100	110	120	130	140	150	160	170	180
0	349	349	349	349	349	349	349	349	349	349	349	349	349	349	349	349	349	349	349
5	345	345	345	345	345	345	346	346	346	347	347	347	347	347	347	347	346	346	346
10	340	340	341	342	344	345	346	347	348	348	348	348	348	347	347	346	345	343	342
15	344	344	345	346	348	348	349	352	355	355	354	352	350	349	349	349	348	347	346
20	354	353	354	355	357	359	360	363	366	366	364	360	357	358	360	361	361	359	356
25	370	369	370	371	374	379	381	382	384	385	382	377	374	376	379	380	379	376	373
30	397	398	398	400	407	415	419	421	426	429	424	416	412	413	414	412	408	405	399
35	450	453	456	466	487	517	540	558	557	557	561	566	560	536	509	484	470	463	451
40	559	566	581	600	620	630	631	629	633	636	631	624	630	646	651	637	613	592	568
45	726	724	720	717	724	745	764	786	802	808	799	779	758	752	753	756	768	770	748
50	952	955	949	937	937	965	986	1012	1027	1032	1030	1020	991	971	972	984	1002	1003	973
55	1186	1197	1212	1223	1247	1266	1268	1274	1286	1288	1294	1302	1288	1279	1274	1267	1266	1253	1214
60	1404	1431	1486	1547	1618	1639	1591	1549	1519	1510	1531	1588	1629	1658	1654	1599	1546	1498	1450
65	1546	1596	1705	1845	1972	2005	1890	1757	1666	1643	1684	1805	1930	2023	2018	1895	1769	1664	1606
70	1385	1473	1708	1996	2202	2239	2030	1698	1457	1366	1470	1728	2028	2228	2238	2061	1766	1531	1444
75	639	748	1066	1554	1919	1958	1578	1047	605	506	577	1004	1556	1920	1968	1652	1200	858	750
80	59.2	67.9	168	497	786	854	516	195	109	98.0	105	174	513	914	905	604	220	69.4	59.3
85	8.59	9.26	22.1	41.2	54.5	72.3	73.4	42.5	25.9	24.0	24.4	39.2	78.3	77.9	62.6	36.7	20.0	7.21	7.50
90	0.12	0.12	0.13	0.15	0.16	0.16	0.15	0.13	0.12	0.11	0.12	0.14	0.16	0.17	0.17	0.14	0.12	0.11	0.15

Table 5: Luminous Intensity Data

Table--2 UNIT: cd

γ (DEG) \ C (DEG)	190	200	210	220	230	240	250	260	270	280	290	300	310	320	330	340	350		
0	349	349	349	349	349	349	349	349	349	349	349	349	349	349	349	349	349		
5	346	346	347	347	347	347	348	348	348	348	348	348	347	347	346	345	345		
10	342	342	343	344	345	346	347	347	347	347	347	346	346	344	343	341	340		
15	345	344	344	345	346	347	348	350	350	349	348	347	347	345	344	344	343		
20	354	353	352	352	353	352	353	356	356	355	351	350	352	353	354	354	353		
25	370	367	365	366	367	367	366	369	369	366	361	360	364	368	369	369	369		
30	394	390	388	388	391	393	391	392	392	389	383	383	387	390	391	392	394		
35	444	439	435	440	452	463	468	473	473	467	456	449	444	439	437	438	443		
40	554	546	550	569	583	576	559	542	533	532	535	545	555	554	544	539	544		
45	725	696	668	663	662	649	647	646	647	644	633	623	635	643	664	681	703		
50	950	911	863	823	815	815	825	837	839	828	808	787	790	813	850	901	931		
55	1194	1168	1129	1094	1080	1072	1075	1081	1079	1073	1059	1043	1048	1075	1112	1150	1167		
60	1448	1457	1454	1453	1437	1396	1370	1352	1349	1346	1354	1358	1385	1406	1408	1413	1398		
65	1629	1703	1786	1858	1862	1762	1656	1593	1574	1589	1638	1706	1778	1775	1686	1614	1558		
70	1549	1768	2019	2180	2210	2059	1835	1681	1631	1680	1815	1979	2084	2049	1878	1654	1446		
75	910	1276	1777	2169	2263	1975	1490	1098	972	1115	1511	1893	2122	2051	1648	1129	808		
80	75.5	355	833	1305	1437	1049	416	219	208	220	443	1043	1357	1231	687	276	75.2		
85	9.05	27.2	56.1	139	214	156	84.0	58.6	56.9	58.6	85.3	153	214	93.6	58.5	29.3	12.2		
90	0.16	0.19	0.25	0.31	0.32	0.31	0.26	0.24	0.21	0.26	0.28	0.35	0.36	0.35	0.31	0.25	0.22		

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 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 expended uncertainty is 1.94% with a coverage factor k=2.

Color Characteristics Measurements

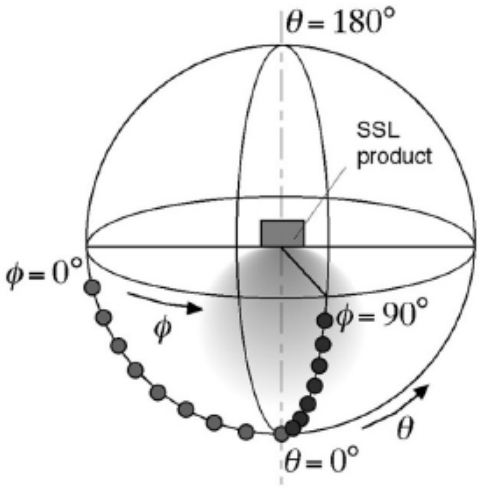
The color characteristics of SSL products include chromaticity coordinates, correlated color temperature, and color rendering index. These characteristics of SSL products may be spatially non-uniform, and thus, in order that they can be specified accurately, the color quantities shall be measured as 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°/180° and C=90°/270°) 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, Δu'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.



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