NVLAP LAB CODE 200960-0

LM-79-08 Test Report

for

ABBlighting,Inc.

1501 Industrial Way N. Toms River, NJ 08755

110W Area Light

Model: ABAR110LED50VW

Laboratory: Leading Testing Laboratories

NVLAP CODE: 200960-0

No.1805, DongLiu road, BinJiang District, Hangzhou, China

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www.ledtestlab.com

Report No.: HZ13100020b

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

Review by: April. Zou

Engineer: April Zou

Oct. 22, 2013

Approved by:

Manager: Jim Zhang

Oct. 22, 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: **ABAR110LED50VW**

Luminous Efficacy (Lumens /Watt)	Total Luminous Flux (Lumens)	Power (Watts)	Power Factor
108.2	11365.0	105.0	0.9962

CCT (K)	CRI	Stabilization Time (Light & Power)
5089	77.0	70

Table 1: Executive Data Summary

Test specifications:

Date of Receipt	: Oct. 21, 2013
Date of Test	: Oct. 22, 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

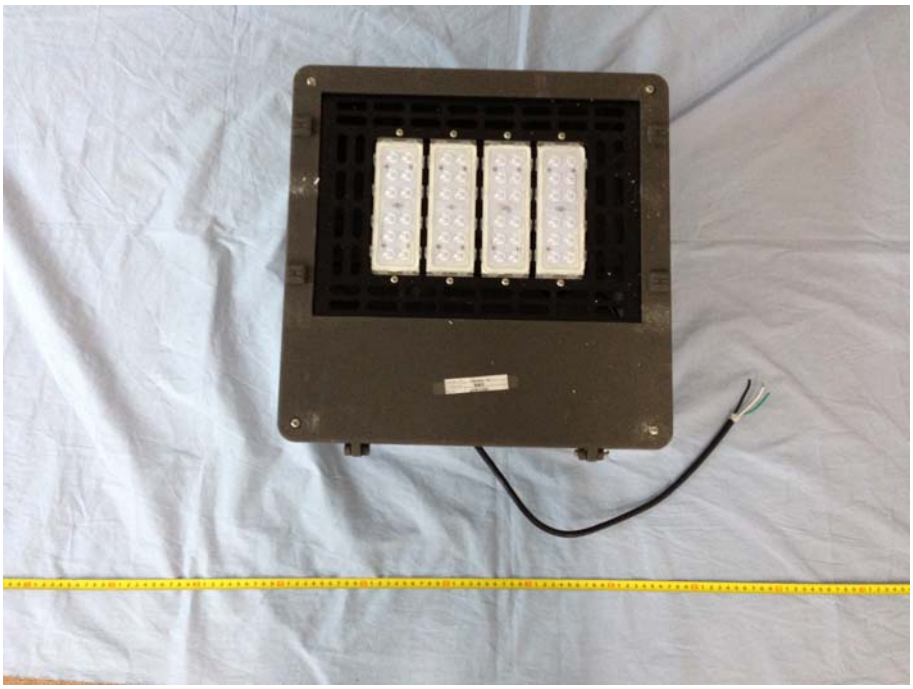


Figure 1- Overview of the sample

Equipment Under Test (EUT)	
Name	: 110W Area Light
Model	: ABAR110LED50VW
Electrical Ratings	: 100~277V AC, 50/60Hz, 110W
Product Description	: 5000K, Outdoor Luminaire, 4 LED bars Manufacturer of light source: Philips Quantity of light source: 48 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 25.0℃.

Base orientation was Light down. Test was conducted without a dimmer in the circuit.

The stabilization time of the sample was 70 minutes, and the total operating time including stabilization was 105 minutes.

Parameter	Result		
Test Voltage (V)	120.0	100.0	277.0
Voltage frequency (Hz)	60	60	60
Test Current (A)	0.878	1.064	0.407
Power Factor	0.9962	0.9977	0.9124
Test Power (W)	105.0	106.1	102.9
THD A%	4.16	3.72	8.50
Luminous Efficacy (lm/W)	108.2		
Total Luminous Flux (lm)	11365.0		
Color Rendering Index (CRI)	77.0		
R9	13		
Correlated Color Temperature (CCT) (K)	5089		
Chromaticity (Chroma x, Chroma y)	(0.3426, 0.3493)		
Chromaticity (Chroma u, Chroma v)	(0.2106, 0.3221)		
Chromaticity (Chroma u', Chroma v')	(0.2106, 0.4832)		
Duv	0.0001		
Average Beam Angle (°)	152.8		
Center Beam Candle Power (cd)	740		
Spacing Criteria	3.36 (0°-180°)/ 3.38(90°-270°)		
Zonal Lumens in the 0°-60°Zone	42.78%		
Zonal Lumens in the 60°-90°Zone	57.22%		
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	84
R3	83
R4	82
R5	81
R6	76
R7	86
R8	71
R9	13
R10	59
R11	79
R12	55
R13	81
R14	90

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

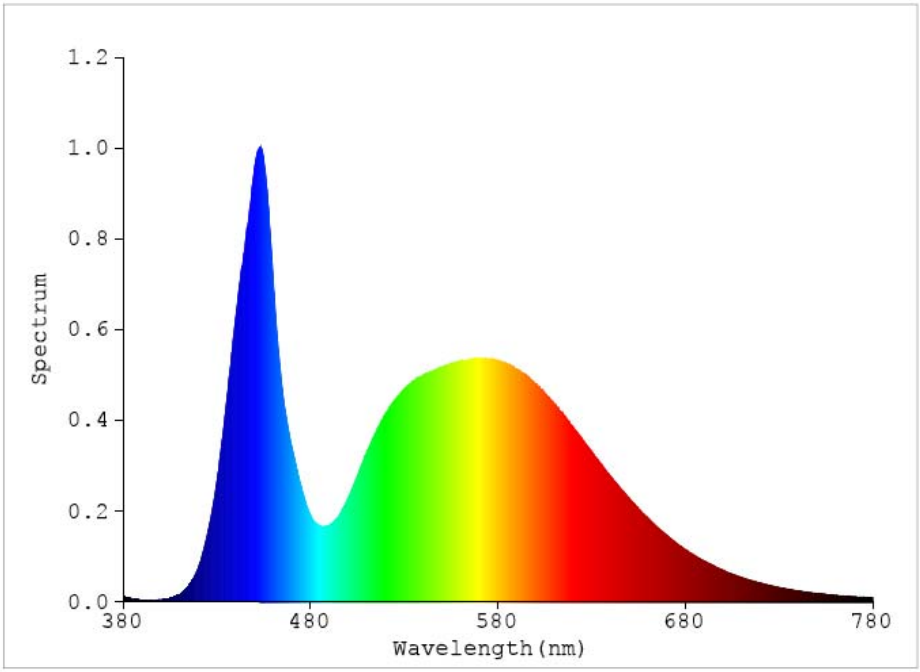


Chart 1: Spectral Power Distribution

Zonal Lumen Tabulation

γ(°)	Lumens	% Total
0- 10	69.993	0.62%
10- 20	209.245	1.84%
20- 30	366.779	3.23%
30- 40	670.195	5.90%
40- 50	1242.907	10.94%
50- 60	2302.279	20.26%
60- 70	3566.047	31.38%
70- 80	2681.88	23.60%
80- 90	255.254	2.25%
90-100	0.012	0.00%
Total	11365.0	100%

γ(°)	Lumens	% Total
0- 60	4861.398	42.78%
60- 90	6503.181	57.22%
0-90	11365.0	100.00%
90- 180	0.012	0.00%
0- 180	11365.0	100%

Table 4: Zonal Lumen Data

Illuminance Plots

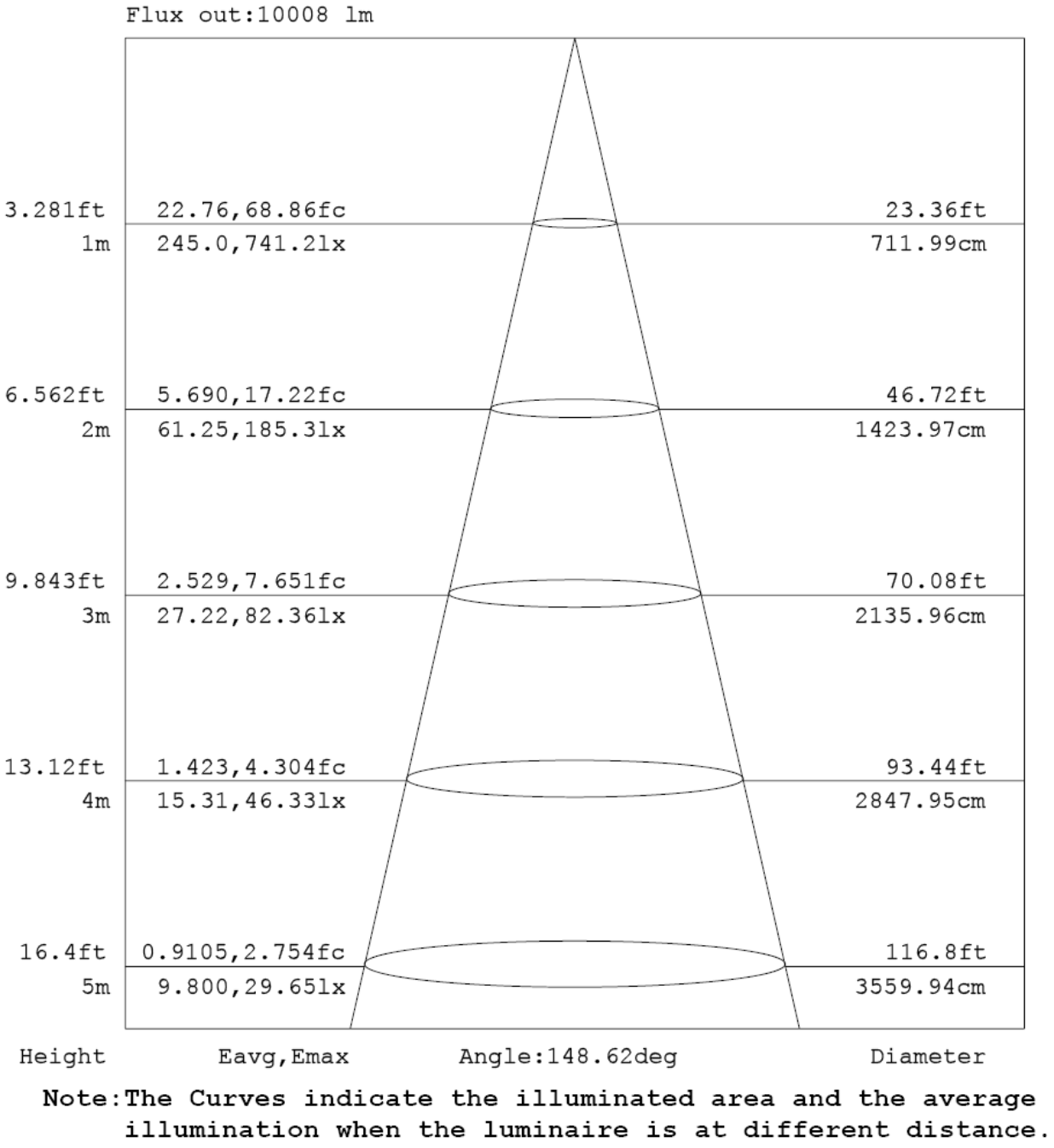


Chart 2: Beam Angle

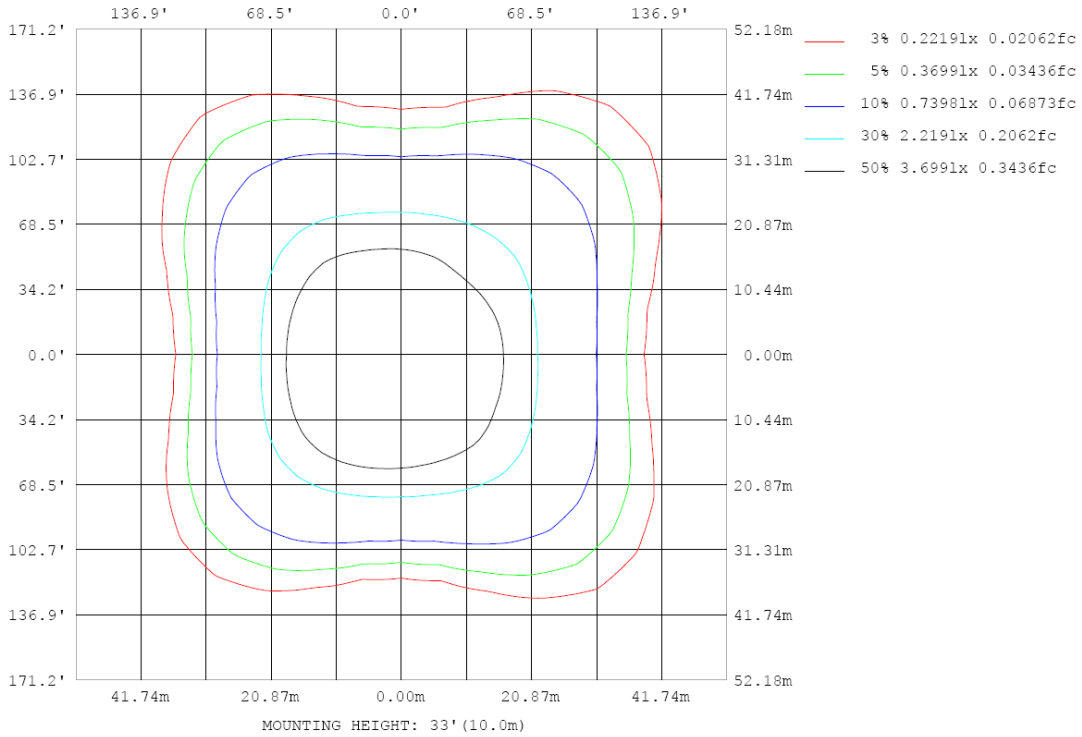


Chart 3: Illuminance Plot (Footcandles)

Luminous Intensity Distribution Plots

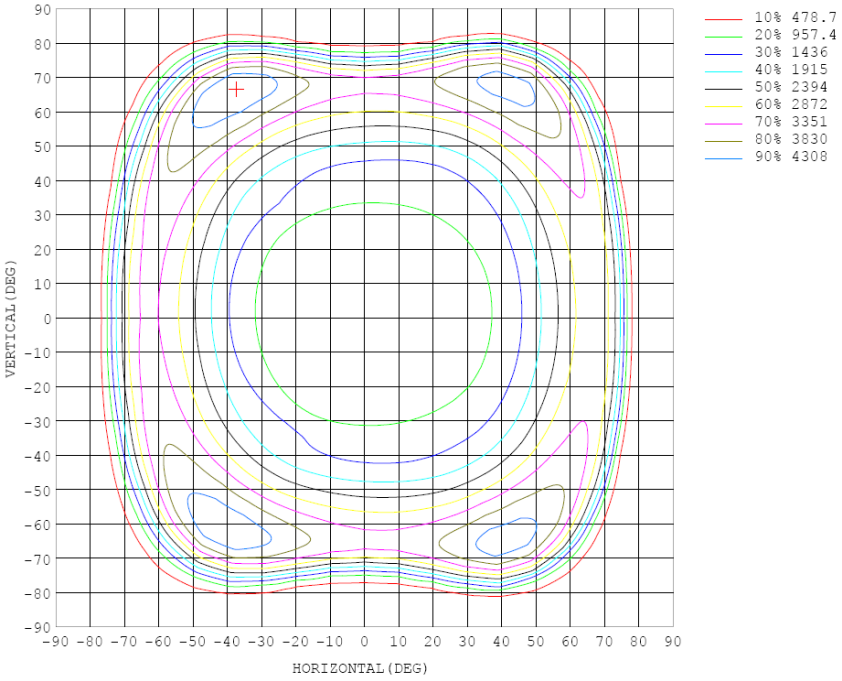


Chart 4: Isocandela Plot

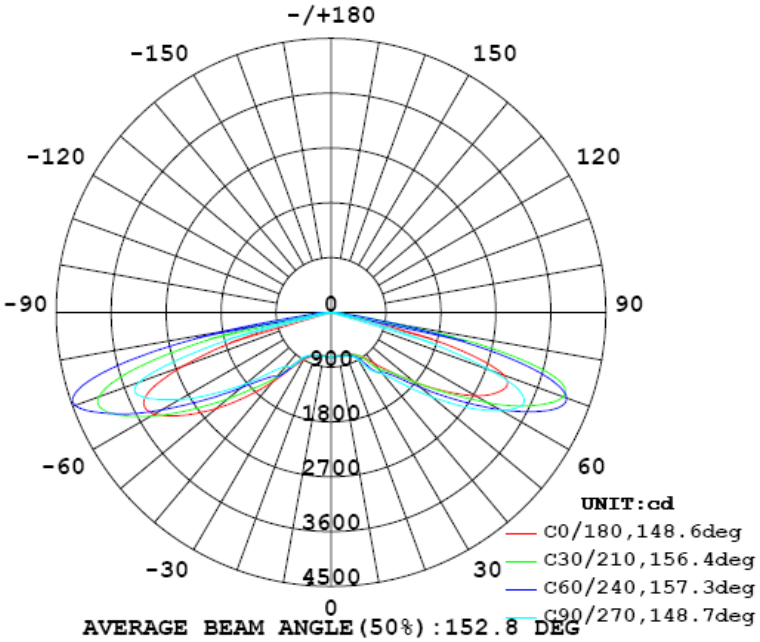


Chart 5: Polar Candela Distribution

Luminous Intensity Data

Table--1 UNIT: cd

C(DEG) / γ (DEG)	0	10	20	30	40	50	60	70	80	90	100	110	120	130	140	150	160	170	180
0	740	740	740	740	740	740	740	740	740	740	740	740	740	740	740	740	740	740	740
5	736	736	737	738	737	737	736	736	736	735	735	735	735	735	734	734	733	732	732
10	721	722	724	726	728	731	734	735	735	735	735	735	735	734	733	730	728	725	723
15	718	719	720	724	728	732	737	743	747	746	745	741	741	743	745	744	742	740	738
20	732	731	733	737	741	747	752	761	767	767	763	757	758	765	773	775	773	769	764
25	759	756	757	761	770	778	785	792	801	803	798	793	798	809	817	821	819	815	809
30	805	804	802	806	823	841	852	864	878	889	890	886	889	899	908	912	912	909	900
35	892	895	897	915	968	1048	1112	1139	1148	1169	1195	1222	1232	1203	1162	1128	1121	1118	1101
40	1087	1104	1146	1210	1285	1316	1290	1271	1281	1314	1349	1399	1473	1556	1592	1584	1559	1525	1487
45	1376	1380	1389	1400	1422	1458	1484	1539	1612	1665	1693	1709	1731	1793	1860	1917	1964	1969	1949
50	1776	1784	1781	1773	1792	1849	1920	2012	2103	2162	2206	2230	2240	2293	2370	2425	2476	2497	2455
55	2245	2265	2287	2295	2354	2440	2501	2579	2658	2719	2785	2845	2888	2957	3017	3022	3034	3008	2946
60	2740	2789	2881	2965	3096	3203	3194	3173	3174	3216	3324	3473	3629	3763	3805	3684	3554	3432	3337
65	3060	3154	3367	3623	3879	3979	3836	3650	3501	3486	3622	3897	4215	4431	4420	4158	3800	3510	3374
70	3003	3138	3542	4047	4435	4524	4105	3502	2982	2776	3006	3562	4202	4616	4583	4070	3331	2767	2571
75	1713	1936	2624	3542	4142	4090	3223	2052	1161	932	1097	1919	2950	3596	3542	2786	1838	1235	985
80	137	163	524	1120	1870	1993	1003	381	220	199	209	308	734	1359	1266	789	427	213	194
85	15.7	16.7	39.8	79.2	117	141	138	94.4	76.5	69.0	69.0	86.6	170	199	173	145	89.0	47.1	40.4
90	0.20	0.20	0.23	0.27	0.30	0.31	0.25	0.24	0.22	0.21	0.23	0.30	0.86	1.41	0.42	0.36	0.28	0.25	0.32

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	740	740	740	740	740	740	740	740	740	740	740	740	740	740	740	740	740		
5	731	732	732	733	734	735	736	736	737	738	738	738	738	737	736	736	736		
10	723	723	725	729	731	733	735	736	736	737	737	735	733	729	725	722	720		
15	735	734	734	735	737	737	738	741	742	742	739	734	730	727	722	719	717		
20	761	758	757	755	754	754	753	757	758	755	747	737	734	735	734	732	731		
25	802	797	792	790	790	788	783	782	780	775	762	753	754	757	760	759	758		
30	889	878	865	857	855	854	846	837	831	822	805	794	794	799	802	802	802		
35	1078	1050	1020	1013	1034	1051	1060	1059	1049	1036	1001	955	912	893	882	882	884		
40	1445	1408	1392	1406	1422	1380	1290	1210	1159	1134	1142	1178	1206	1192	1141	1094	1077		
45	1900	1831	1740	1658	1611	1546	1472	1426	1391	1336	1282	1258	1284	1292	1302	1330	1358		
50	2409	2325	2208	2078	1991	1926	1882	1853	1818	1748	1660	1582	1554	1586	1641	1711	1756		
55	2913	2868	2776	2678	2594	2491	2414	2365	2317	2254	2182	2101	2065	2081	2140	2199	2232		
60	3345	3382	3404	3415	3370	3199	3041	2930	2859	2820	2810	2770	2761	2773	2758	2763	2742		
65	3458	3684	3939	4119	4156	3935	3631	3424	3327	3328	3412	3506	3561	3573	3417	3251	3106		
70	2770	3316	4042	4565	4731	4460	3916	3495	3343	3461	3775	4095	4267	4227	3899	3468	3128		
75	1252	1899	2986	3981	4390	3912	2981	2042	1764	2012	2952	3890	4436	4402	3692	2709	2005		
80	226	435	983	1847	2255	1733	751	389	339	394	744	1952	2898	2816	1663	681	241		
85	49.0	101	201	285	344	271	159	110	111	116	158	260	377	277	150	59.0	23.4		
90	0.38	0.50	0.76	0.92	0.90	0.81	0.63	0.52	0.40	0.34	0.38	0.45	0.46	0.41	0.37	0.31	0.27		

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

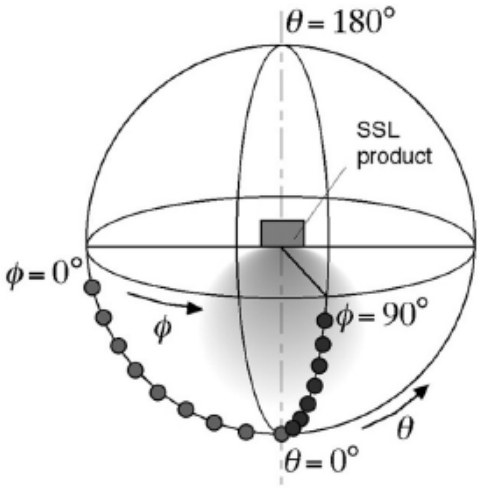
The color characteristics of SSL products include chromaticity coordinates, correlated color temperature, and color rendering index. These characteristics of SSL products may be spatially non-uniform, and thus, in order that they can be specified accurately, the color quantities shall be measured as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