



LM-79-08 Test Report

for

ABB Lighting, Inc.

1501 Industrial Way N. Toms River, NJ 08755

80W area light

Model: ABAR080LED50III

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.: HZ13100020a

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:



Jim Zhang

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: **ABAR080LED50III**

Luminous Efficacy (Lumens /Watt)	Total Luminous Flux (Lumens)	Power (Watts)	Power Factor
106.7	8367.9	78.4	0.9976
CCT (K)	CRI	Stabilization Time (Light & Power)	
4989	76.7	80	

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

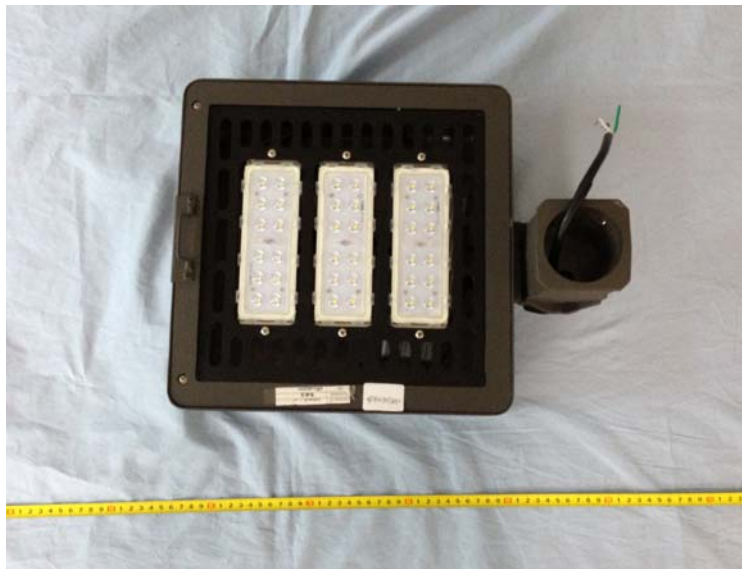


Figure 1- Overview of the sample

Equipment Under Test (EUT)

Name	: Area and Roadway Luminaire
Model	: ABAR080LED50III
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 24.8°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	82
Voltage frequency (Hz)	60	60	60	R2	85
Test Current (A)	0.655	0.796	0.292	R3	83
Power Factor	0.9976	0.9986	0.9571	R4	82
Test Power (W)	78.4	79.5	77.4	R5	82
THD A%	3.31	3.04	16.92	R6	76
Luminous Efficacy (lm/W)	106.7			R7	86
Total Luminous Flux (lm)	8367.9			R8	72
Color Rendering Index (CRI)	76.7			R9	15
R9	15			R10	60
Correlated Color Temperature (CCT) (K)	4989			R11	79
Chromaticity (Chroma x, Chroma y)	(0.3456, 0.3543)			R12	55
Chromaticity (Chroma u, Chroma v)	(0.2107, 0.3240)			R13	82
Chromaticity (Chroma u', Chroma v')	(0.2107, 0.4860)			R14	90
Duv	0.0011				
Average Beam Angle (°)	103.3				
Center Beam Candle Power (cd)	2362				
Spacing Criteria	1.57 (0°-180°)/ 1.97(90°-270°)				
Zonal Lumens in the 0°-60°Zone	79.43%				
Zonal Lumens in the 60°-90°Zone	20.57%				
Zonal Lumens in the 90°-120°Zone	0.00%				
Zonal Lumens in the 120°-180°Zone	0.00%				

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

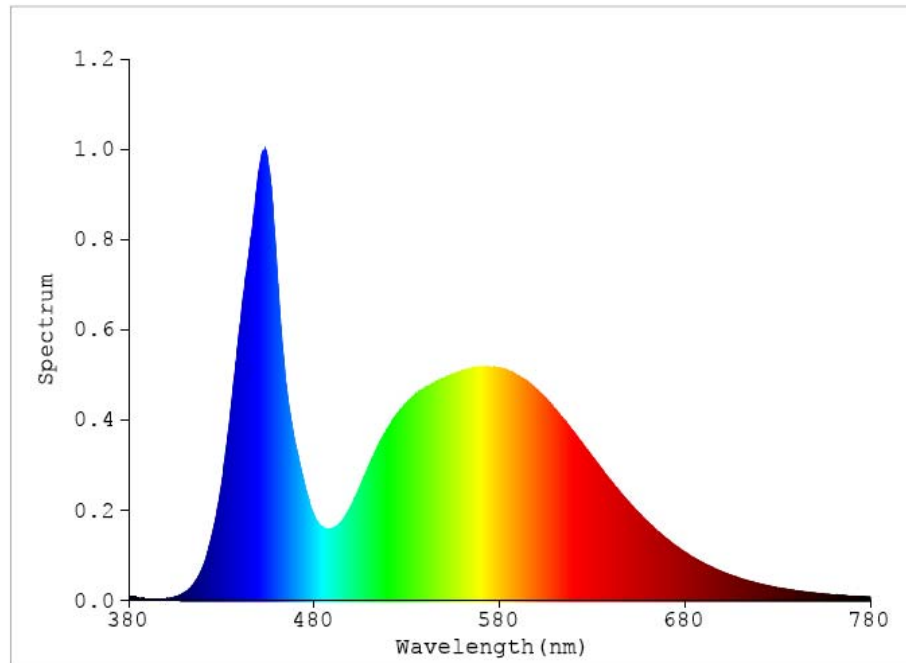


Chart 1: Spectral Power Distribution

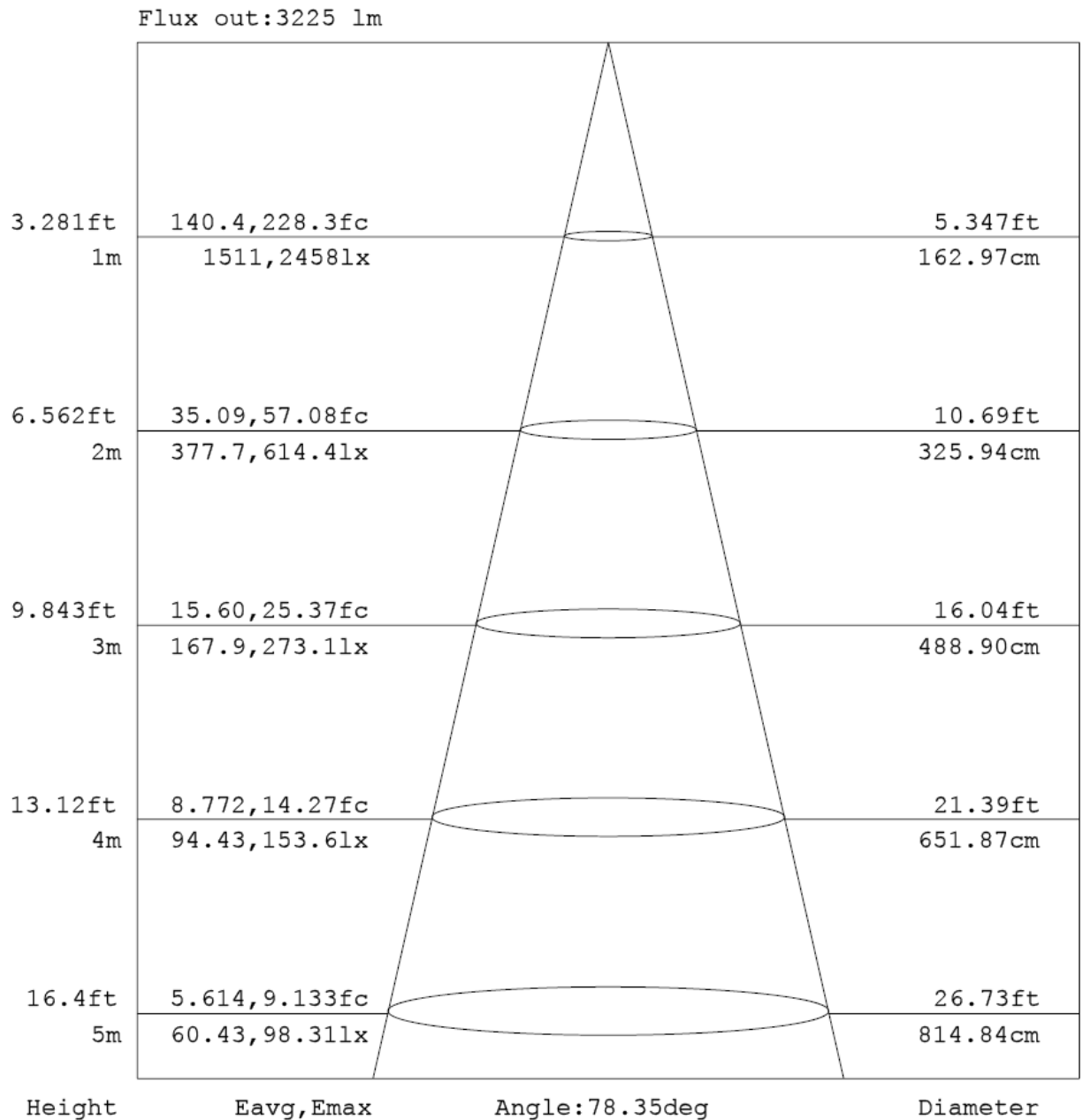
Zonal Lumen Tabulation

$\gamma(^{\circ})$	Lumens	% Total
0- 10	224.571	2.68%
10- 20	648.595	7.75%
20- 30	1027.612	12.28%
30- 40	1405.59	16.80%
40- 50	1702.085	20.34%
50- 60	1637.968	19.57%
60- 70	1302.441	15.56%
70- 80	383.132	4.58%
80- 90	35.888	0.43%
90-100	0.012	0.00%
Total	8367.9	100%

$\gamma(^{\circ})$	Lumens	% Total
0- 60	6646.421	79.43%
60- 90	1721.461	20.57%
0-90	8367.9	100.00%
90- 180	0.012	0.00%
0- 180	8367.9	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

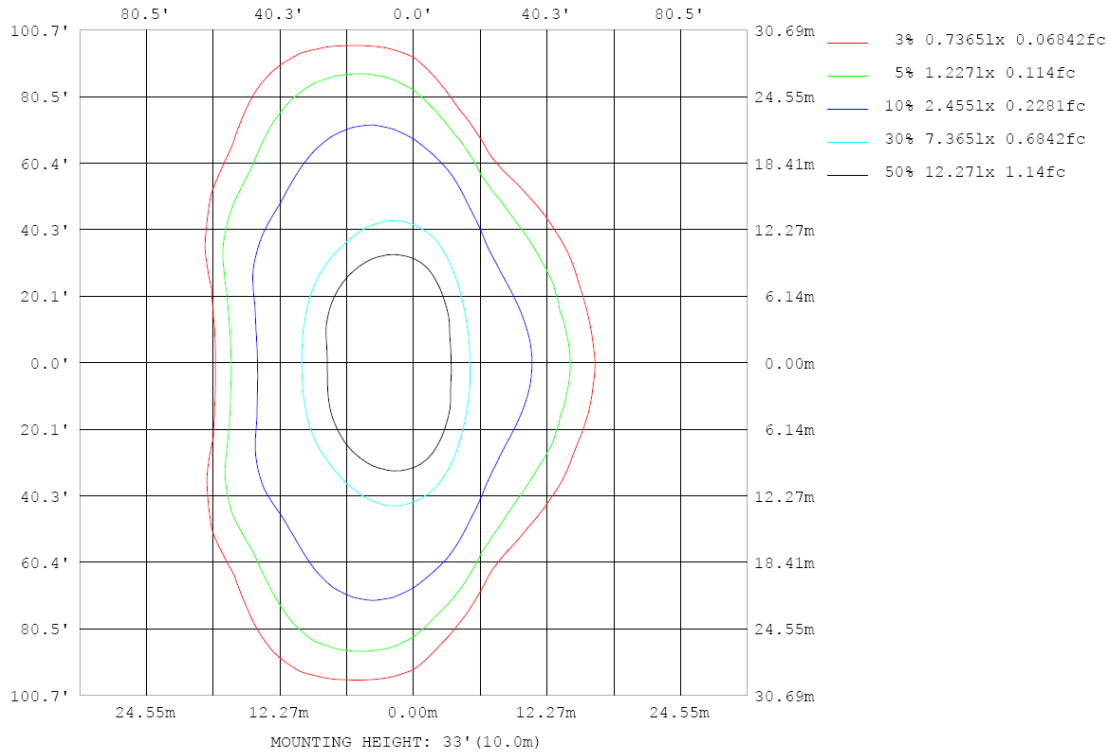


Chart 3: Illuminance Plot (Footcandles)

Luminous Intensity Distribution Plots

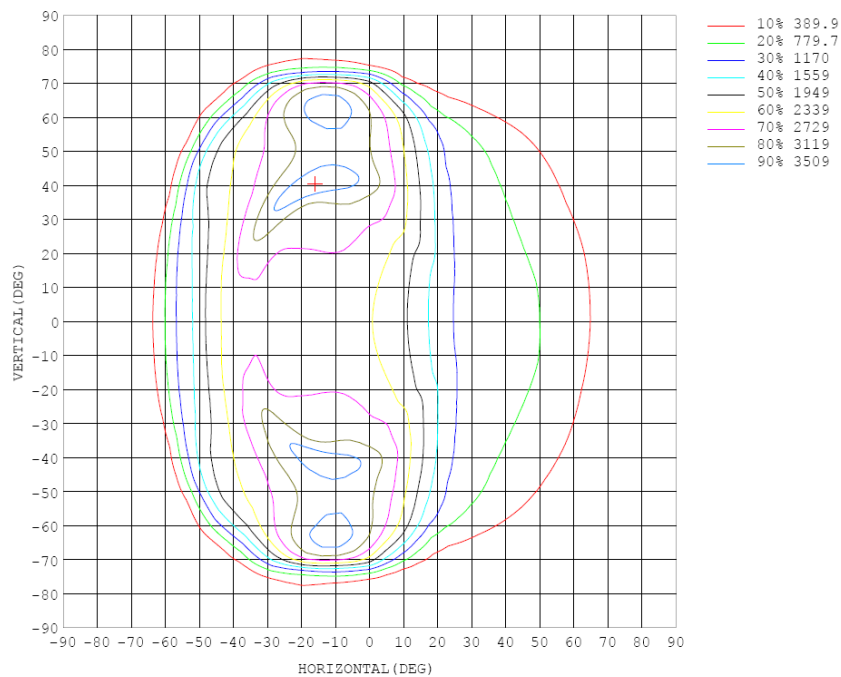


Chart 4: Isocandela Plot

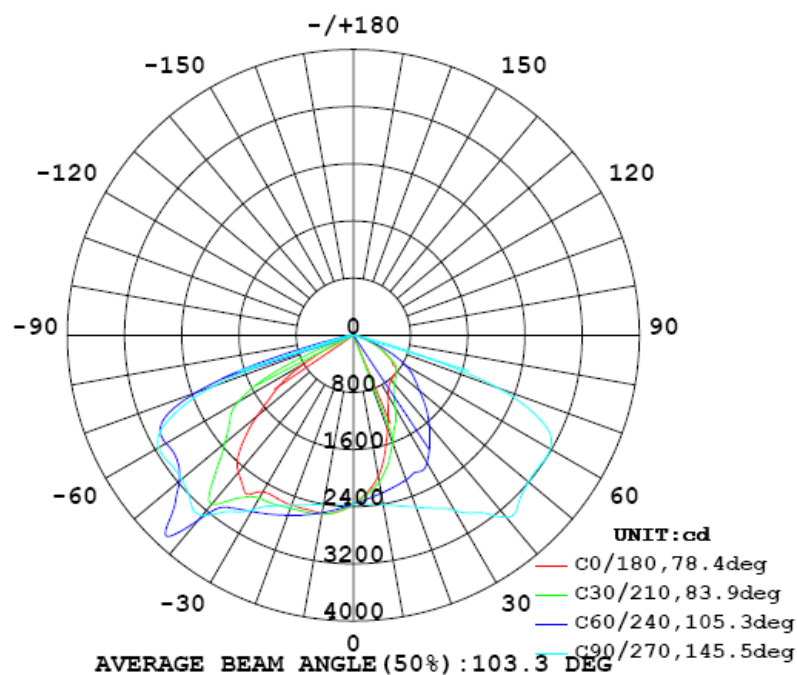


Chart 5: Polar Candela Distribution

Luminous Intensity Data

Table--1

UNIT: cd

C (DEG) γ (DEG)	0	5	10	15	20	25	30	35	40	45	50	55	60	65	70	75	80	85	90
0	2362	2362	2362	2362	2362	2362	2362	2362	2362	2362	2362	2362	2362	2362	2362	2362	2362	2362	2362
5	2209	2209	2211	2215	2220	2226	2234	2243	2253	2263	2274	2286	2299	2311	2324	2336	2349	2361	2373
10	2003	2006	2013	2024	2038	2057	2078	2103	2129	2157	2186	2215	2245	2275	2304	2332	2359	2385	2409
15	1708	1714	1729	1752	1783	1821	1867	1918	1972	2028	2086	2142	2198	2252	2304	2351	2394	2435	2472
20	1399	1406	1423	1450	1489	1538	1600	1675	1762	1859	1960	2058	2153	2239	2317	2388	2452	2510	2562
25	1150	1156	1174	1205	1248	1307	1380	1467	1571	1694	1829	1970	2109	2233	2346	2443	2530	2606	2673
30	965	972	988	1013	1049	1100	1168	1259	1371	1508	1668	1858	2060	2265	2453	2599	2710	2787	2830
35	870	873	881	894	914	942	985	1047	1137	1264	1427	1629	1861	2132	2398	2618	2800	2937	3031
40	824	826	830	838	850	866	891	925	982	1076	1212	1408	1652	1950	2272	2599	2902	3140	3326
45	802	803	805	807	812	820	835	855	891	945	1042	1207	1436	1739	2083	2447	2791	3063	3278
50	779	781	783	781	779	780	786	797	821	857	924	1034	1211	1499	1854	2269	2670	2970	3198
55	666	666	663	656	657	683	714	726	742	775	830	904	1037	1275	1603	2060	2528	2889	3182
60	519	518	513	503	499	516	545	582	622	655	697	751	848	1004	1272	1760	2305	2761	3177
65	384	375	366	365	367	369	376	394	416	439	467	498	550	605	774	1211	1766	2331	2941
70	180	178	180	189	201	212	223	230	236	244	253	261	276	281	356	577	939	1463	2142
75	48.4	44.9	48.5	71.8	96.9	107	111	114	116	119	122	122	123	122	131	151	210	341	532
80	33.9	32.5	34.6	44.9	56.4	63.6	67.7	68.0	65.9	62.2	58.2	55.8	54.2	51.9	52.8	62.4	74.3	83.0	90.4
85	13.6	14.1	16.4	20.3	24.7	28.6	30.9	29.1	25.4	21.0	16.8	14.6	13.3	12.3	11.9	12.4	12.6	11.0	8.17
90	0.11	0.13	0.16	0.17	0.17	0.17	0.17	0.17	0.18	0.20	0.23	0.25	0.27	0.28	0.29	0.29	0.29	0.29	0.30

Table 5: Luminous Intensity Data

Table--2

UNIT: cd

C (DEG) γ (DEG)	95	100	105	110	115	120	125	130	135	140	145	150	155	160	165	170	175	180	185
0	2362	2362	2362	2362	2362	2362	2362	2362	2362	2362	2362	2362	2362	2362	2362	2362	2362	2362	2362
5	2384	2395	2405	2415	2423	2430	2437	2443	2449	2454	2459	2463	2467	2470	2473	2476	2478	2479	2480
10	2429	2447	2463	2477	2489	2498	2505	2511	2515	2518	2520	2520	2521	2521	2523	2526	2529	2532	2534
15	2502	2527	2546	2559	2568	2572	2571	2567	2560	2552	2544	2537	2529	2524	2521	2521	2522	2524	2526
20	2602	2634	2655	2667	2668	2662	2648	2630	2610	2591	2574	2560	2549	2540	2534	2530	2528	2530	2532
25	2725	2763	2785	2792	2780	2756	2727	2696	2671	2647	2622	2598	2575	2555	2539	2528	2522	2521	2524
30	2877	2907	2923	2920	2888	2844	2806	2769	2735	2701	2663	2626	2593	2567	2551	2541	2536	2533	2533
35	3087	3108	3085	3040	2990	2940	2904	2874	2838	2809	2800	2795	2785	2769	2733	2696	2674	2662	2665
40	3472	3544	3523	3463	3411	3366	3359	3348	3296	3216	3105	2978	2848	2724	2618	2538	2502	2500	2526
45	3443	3558	3625	3640	3593	3505	3393	3260	3108	2955	2826	2705	2577	2459	2364	2293	2251	2236	2250
50	3352	3438	3452	3408	3315	3185	3025	2862	2737	2616	2474	2326	2177	2038	1923	1834	1779	1761	1791
55	3374	3464	3444	3341	3168	2967	2791	2629	2499	2372	2220	2051	1845	1647	1495	1385	1326	1314	1345
60	3466	3603	3575	3425	3173	2885	2630	2415	2294	2181	1995	1767	1476	1200	1019	897	820	796	828
65	3391	3631	3643	3481	3161	2772	2402	2077	1895	1725	1445	1126	762	457	352	327	299	291	295
70	2589	2875	3017	2968	2636	2180	1707	1277	1028	821	514	253	168	157	167	188	186	181	189
75	696	807	856	873	925	903	658	385	253	181	149	140	126	122	140	159	153	144	153
80	93.8	114	163	205	201	180	156	132	120	113	112	112	107	104	111	118	118	117	120
85	6.68	8.75	15.3	23.6	32.9	38.8	33.0	26.7	30.7	37.8	45.3	51.0	50.5	47.6	44.9	42.2	40.6	39.8	39.6
90	0.36	0.41	0.45	0.48	0.51	0.54	0.57	0.60	0.63	0.67	0.70	0.72	0.75	0.77	0.81	0.83	0.82	0.80	0.81

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

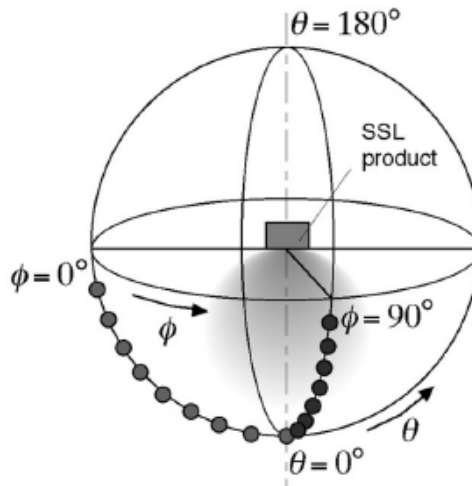
The color characteristics of SSL products include chromaticity coordinates, correlated color temperature, and color rendering index. These characteristics of SSL products may be spatially non-uniform, and thus, in order that they can be specified accurately, the color quantities shall be measured as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