



LM-79-08 Test Report

for

ABB Lighting, Inc.

3 Adams St Belvidere, NJ 07823.

Linear High bay

Model: LHB150501-82

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.: HZ15080005b

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

Reviewed by:

April Zou

Engineer: April Zou
Aug. 10, 2015



Jim Zhang

Manager: Jim Zhang
Aug. 10, 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: **LHB150501-82**

Luminous Efficacy (Lumens /Watt)	Total Luminous Flux (Lumens)	Power (Watts)	Power Factor
121.2	17218.0	142.05	0.9875
CCT (K)	CRI	Stabilization Time (Light & Power)	
5142	82.0	60	

Table 1: Executive Data Summary

Test specifications:

Date of Receipt	: Aug. 04, 2015
Date of Test	: Aug. 05, 2015
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 Photo



Figure 1- Overview of the sample

Equipment Under Test (EUT)

Name	: Linear High bay
Model	: LHB150501-82
Electrical Ratings	: 100~277VAC, 50/60Hz, 150W
Product Description	: 5300K, High-Bay Luminaires for Commercial and Industrial buildings Manufacturer of light source: LG Model of light source: LGIT 5630 Quantity of LED light source: 336pcs
Manufacturer	: ABB Lighting (shanghai) Co., Ltd.
Address	: Room 1012, North Minch Fortune 108 Plaza,# 1839 Qixin road, Shanghai

TEST RESULTS

Test ambient temperature was 25.2°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.

Parameter	Result			Special Color Rendering Indices	
				R1	79
Test Voltage (V)	120.0	100.0	277.0	R2	87
Voltage frequency (Hz)	60	60	60	R3	93
Test Current (A)	1.198	1.440	0.559	R4	83
Power Factor	0.9875	0.9945	0.9082	R5	82
Test Power (W)	142.05	143.22	140.74	R6	83
THD A%	7.69	5.89	11.47	R7	86
Luminous Efficacy (lm/W)	121.2	120.2	122.4	R8	64
Total Luminous Flux (lm)	17218.0	17217.0	17222.0	R9	-4
Color Rendering Index (CRI)	82.0			R10	70
R9	-4			R11	83
Correlated Color Temperature (CCT) (K)	5142			R12	68
Chromaticity (Chroma x, Chroma y)	(0.3418, 0.3570)			R13	81
Chromaticity (Chroma u, Chroma v)	(0.2071, 0.3245)			R14	96
Chromaticity (Chroma u', Chroma v')	(0.2071, 0.4868)				
Duv	0.0041				
Average Beam Angle (°)	98.8				
Center Beam Candle Power (cd)	7388				
Spacing Criteria	1.40 (0°-180°)/ 1.16 (90°-270°)				
Zonal Lumens in the 0°-60°Zone	92.03%				
Zonal Lumens in the 60°-90°Zone	7.90%				
Zonal Lumens in the 90°-120°Zone	0.02%				
Zonal Lumens in the 120°-180°Zone	0.05%				

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

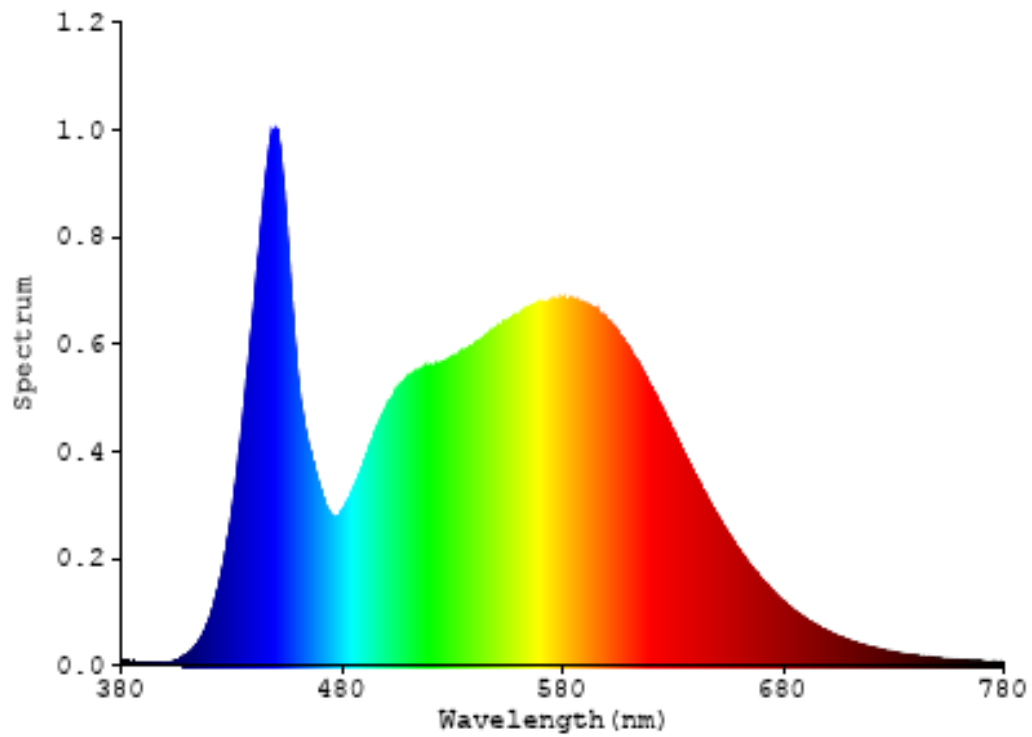


Chart 1: Spectral Power Distribution

Zonal Lumen Tabulation

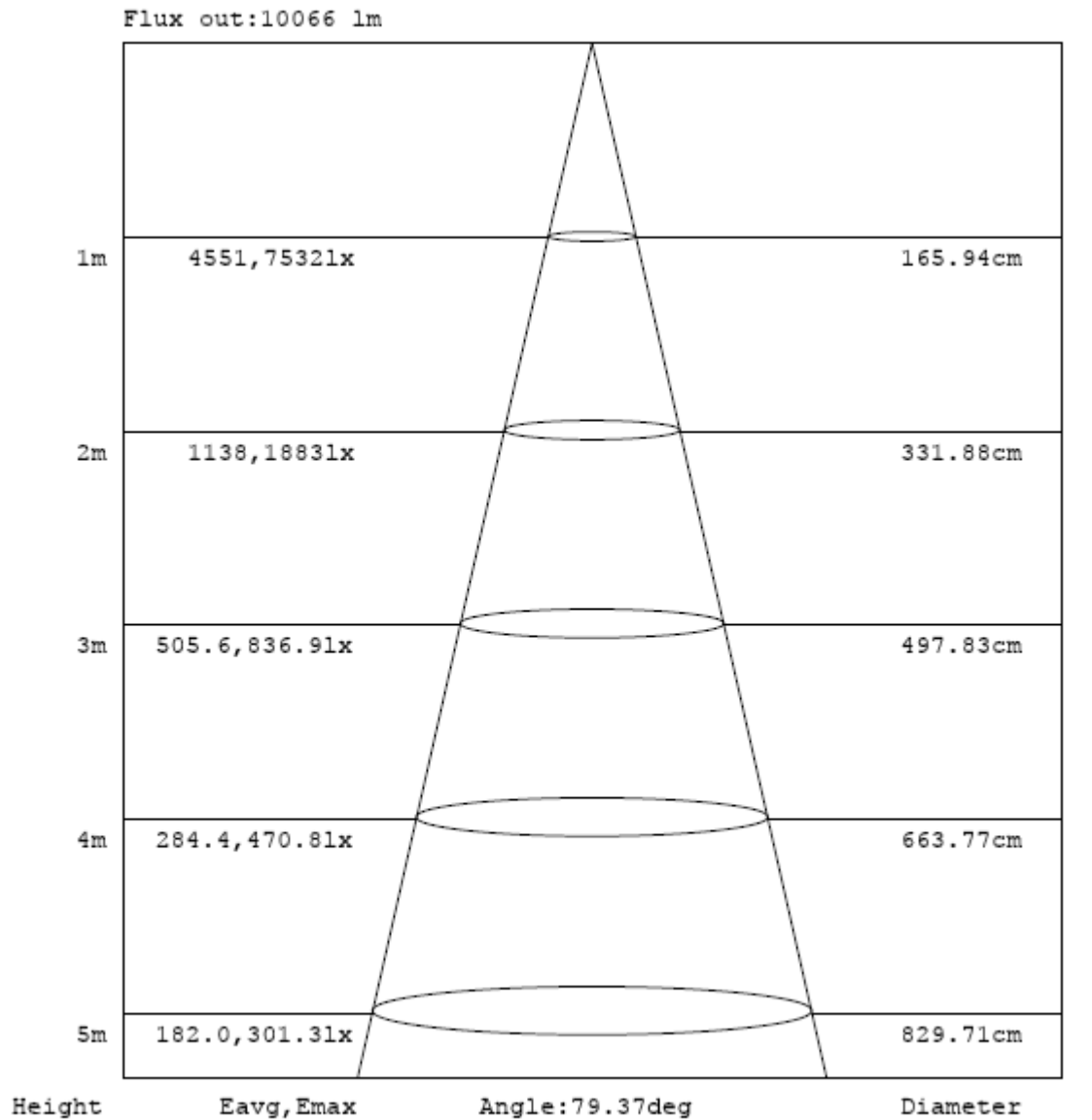
$\gamma(^{\circ})$	Lumens	% Total
0- 10	699.715	4.06%
10- 20	2076.277	12.06%
20- 30	3330.194	19.34%
30- 40	3959.937	23.00%
40- 50	3448.933	20.03%
50- 60	2331.158	13.54%
60- 70	1034.902	6.01%
70- 80	298.206	1.73%
80- 90	27.169	0.16%
90-100	0.564	0.00%
100-110	1.017	0.01%
110-120	1.301	0.01%
120-130	1.534	0.01%
130-140	1.841	0.01%
140-150	1.893	0.01%
150-160	1.632	0.01%
160-170	1.11	0.01%
170-180	0.42	0.00%
Total	17217.8	100%

$\gamma(^{\circ})$	Lumens	% Total
0- 60	15846.214	92.03%
60- 90	1360.277	7.90%
0-90	17206.491	99.93%
90- 180	11.312	0.07%
0- 180	17217.8	100%

Table 3: Zonal Lumen Data

Note: The Flux in this table might be a little different from the total flux in Table 2 due to rounding.

Illuminance Plots



Note:The Curves indicate the illuminated area and the average illumination when the luminaire is at different distance.

Chart 2: Beam Angle

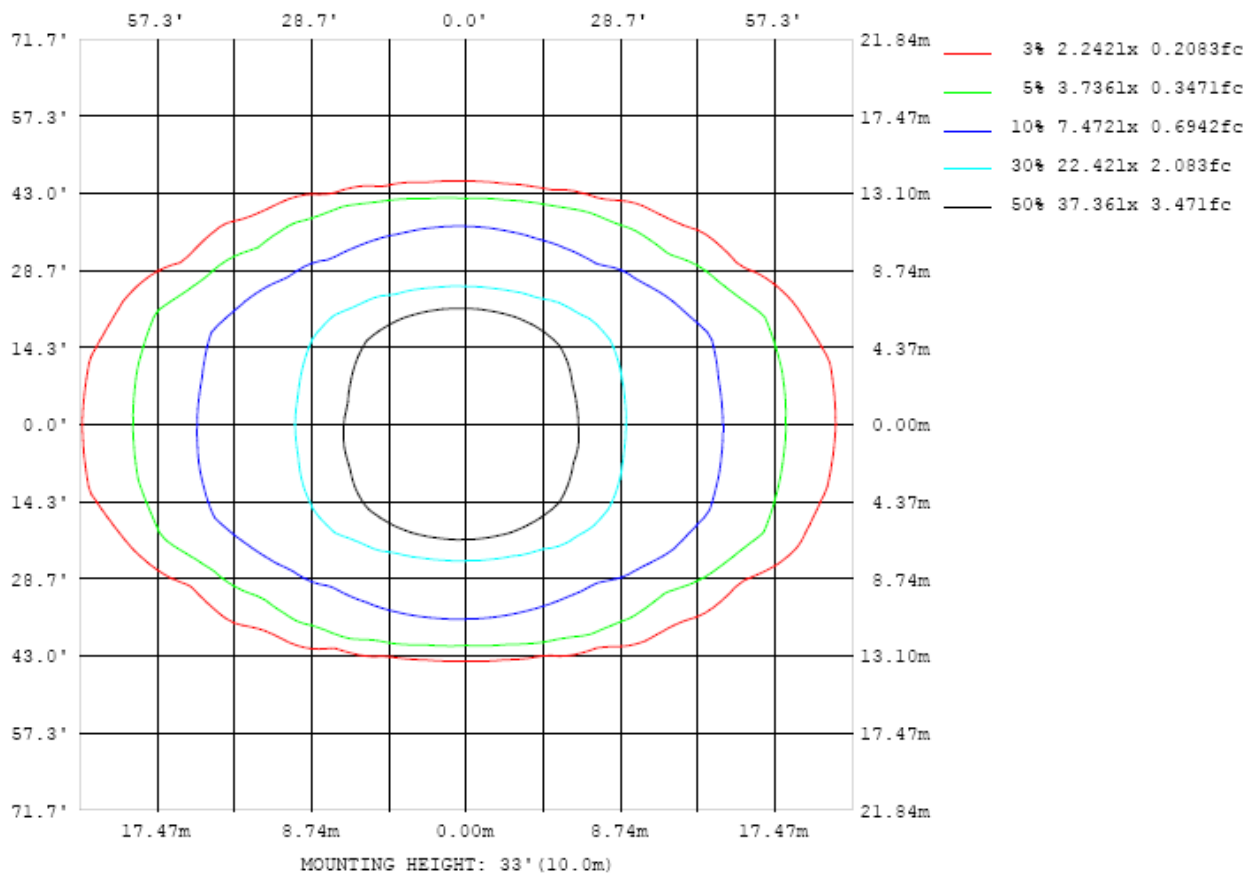


Chart 3: Illuminance Plot (Footcandles)

Luminous Intensity Distribution Plots

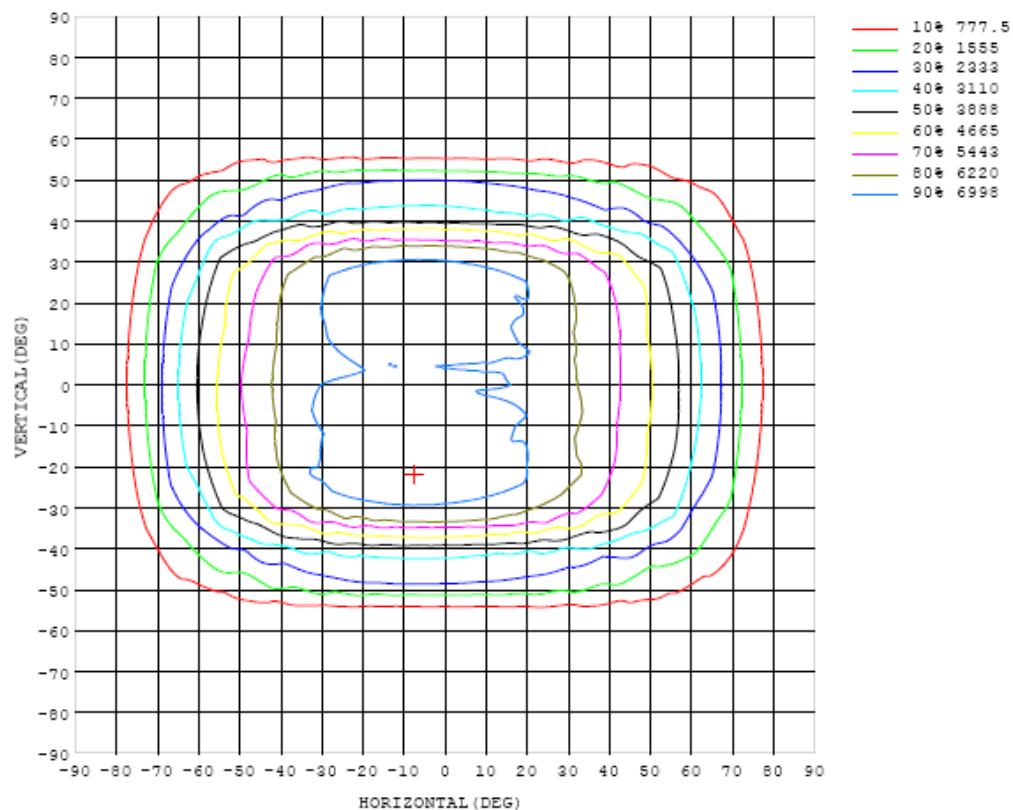


Chart 4: Isocandela Plot

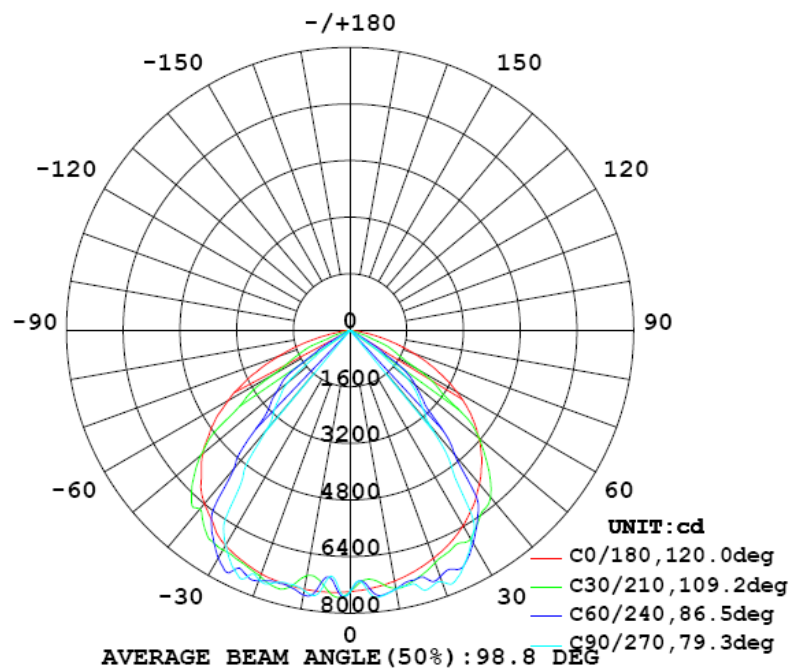


Chart 5: Polar Candela Distribution

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	7388	7388	7388	7388	7388	7388	7388	7388	7388	7388	7388	7388	7388	7388	7388	7388	7388	7388	7388
5	7311	7141	7036	7071	7187	7332	7441	7507	7540	7554	7554	7537	7486	7384	7245	7141	7127	7247	7431
10	7202	6929	7116	7408	7450	7439	7422	7419	7421	7435	7466	7497	7527	7577	7612	7584	7305	7127	7432
15	7049	6828	7258	7269	7219	7214	7274	7322	7436	7507	7495	7433	7438	7428	7476	7542	7564	7127	7397
20	6862	6777	7072	6998	7052	7345	7420	7428	7500	7572	7580	7584	7637	7636	7373	7385	7486	7222	7329
25	6647	6709	6792	6808	7135	7147	7425	7446	7450	7476	7558	7661	7749	7508	7542	7253	7276	7271	7193
30	6381	6517	6462	6805	6882	7041	6944	6871	6831	6855	6941	7102	7287	7505	7390	7354	7047	7151	7027
35	6058	6164	6157	6402	6633	6452	6293	6055	5443	5290	5516	6243	6650	6936	7248	7033	6791	6788	6712
40	5673	5723	5948	6158	5981	5746	4597	4174	3606	3484	3672	4299	4839	6197	6595	6837	6605	6377	6393
45	5256	5226	5414	5512	5241	4053	3005	2832	2755	2756	2824	2964	3205	4287	5694	6165	6113	5892	5936
50	4744	4716	4965	4751	3631	2594	2385	2242	2124	2091	2188	2357	2566	2813	3889	5298	5728	5334	5428
55	4165	4183	4260	3300	2241	2016	1514	1020	543	470	526	1015	1503	2183	2447	3638	4811	4804	4764
60	3475	3447	3380	2169	1654	920	257	102	83.7	78.0	79.3	92.8	255	937	1812	2231	3810	3930	3976
65	2707	2625	2060	1319	698	108	85.4	79.9	75.5	74.4	74.0	73.2	73.0	90.2	663	1454	2285	3056	3123
70	1919	1915	1109	539	88.5	79.5	73.7	60.7	51.3	47.9	50.8	59.1	67.2	67.9	71.0	498	1079	2120	2163
75	1134	1003	393	75.2	62.7	45.2	36.0	31.5	27.7	25.3	26.3	28.7	31.5	38.6	52.9	59.6	398	917	1237
80	464	330	60.5	37.0	25.6	21.4	18.8	17.0	15.4	14.3	14.6	15.6	16.5	18.1	21.4	28.6	40.7	290	460
85	76.7	34.8	15.8	11.4	9.20	7.80	7.14	6.61	6.10	5.70	5.68	6.01	6.47	6.96	7.82	8.77	10.9	18.1	65.7
90	1.92	0.31	0.25	0.20	0.15	0.13	0.17	0.21	0.21	0.18	0.14	0.12	0.13	0.16	0.21	0.25	0.29	0.35	1.19
95	0.41	0.38	0.35	0.31	0.23	0.23	0.24	0.28	0.28	0.24	0.19	0.18	0.21	0.26	0.32	0.36	0.40	0.41	1.59
100	0.57	0.58	0.51	0.44	0.33	0.31	0.34	0.37	0.36	0.31	0.26	0.27	0.32	0.39	0.48	0.53	0.59	0.62	2.05
105	0.74	0.76	0.65	0.61	0.50	0.45	0.48	0.50	0.47	0.41	0.36	0.41	0.47	0.57	0.71	0.75	0.80	0.82	2.78
110	0.91	0.97	0.84	0.82	0.70	0.69	0.70	0.69	0.65	0.55	0.54	0.61	0.71	0.83	0.95	0.99	1.02	1.17	2.15
115	1.24	1.22	1.03	1.02	0.92	0.96	0.99	0.98	0.89	0.77	0.82	0.90	1.00	1.15	1.25	1.25	1.26	1.45	2.00
120	1.70	1.59	1.27	1.19	1.12	1.24	1.33	1.30	1.19	1.09	1.18	1.26	1.35	1.42	2.22	1.50	1.61	1.75	3.27
125	2.07	1.70	1.53	1.41	1.36	1.52	1.66	1.66	1.59	1.53	1.59	1.64	1.69	1.88	1.77	1.75	1.96	2.06	2.60
130	2.51	2.17	1.96	1.82	1.63	1.76	1.96	2.02	1.95	1.98	1.95	1.97	1.93	1.89	1.96	2.11	2.28	2.56	2.29
135	2.58	2.48	2.37	2.18	2.03	2.04	2.25	2.36	2.26	2.42	2.30	2.28	2.20	2.14	2.22	2.38	3.42	4.24	3.59
140	2.96	2.79	2.62	2.50	2.44	2.53	2.55	2.65	2.64	2.84	2.63	2.56	2.43	2.52	2.60	2.60	2.71	2.78	4.07
145	3.20	3.09	2.96	2.81	2.71	2.84	2.97	2.99	2.98	3.09	2.86	2.89	2.85	2.75	2.86	2.73	3.06	3.06	3.17
150	3.47	3.37	3.40	3.10	3.03	3.06	3.15	3.17	3.36	3.36	3.20	3.19	3.11	2.94	2.97	2.95	3.69	3.13	2.98
155	3.44	3.58	3.47	3.41	3.13	3.21	3.28	3.26	3.56	3.43	3.40	3.35	3.34	3.32	3.13	3.25	3.26	3.37	3.25
160	3.64	3.78	3.68	3.73	3.33	3.20	3.22	3.41	3.72	3.60	3.62	3.48	3.42	3.40	3.54	3.67	3.64	3.66	3.54
165	3.86	3.97	3.97	3.87	3.54	3.40	3.48	3.52	3.56	3.65	3.65	3.64	3.74	3.97	4.12	4.22	4.28	4.19	3.89
170	4.02	4.00	4.00	4.10	3.99	3.84	3.66	3.71	4.21	4.17	3.94	3.97	4.12	4.24	4.27	4.30	4.39	4.45	4.34
175	4.55	4.59	4.57	4.56	4.46	4.39	4.29	4.34	4.78	4.70	4.63	4.39	4.37	4.20	4.16	4.28	4.40	4.50	4.49
180	4.41	4.49	4.45	4.44	4.38	4.38	4.42	4.50	4.81	4.99	4.78	4.51	4.29	4.12	3.98	3.93	4.04	4.12	4.39

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	7388	7388	7388	7388	7388	7388	7388	7388	7388	7388	7388	7388	7388	7388	7388	7388	7388		
5	7561	7555	7379	7175	7045	6999	7002	7018	7018	7003	6969	6941	6956	7053	7234	7407	7430		
10	7548	7133	7045	7422	7614	7595	7546	7501	7469	7461	7459	7472	7465	7285	6900	6895	7284		
15	7321	7015	7575	7519	7442	7418	7420	7397	7376	7338	7292	7240	7215	7244	7283	6797	6939		
20	7001	7406	7411	7367	7419	7536	7597	7554	7503	7468	7441	7312	7121	7007	7005	7042	6562		
25	6742	7333	7243	7392	7487	7413	7715	7652	7583	7545	7513	7176	7130	6979	6750	6820	6317		
30	6628	7050	7170	7293	7577	7442	7258	7115	7025	6988	7017	7081	7128	6788	6616	6449	6238		
35	6602	6762	7046	7317	7088	6807	6475	5782	5492	5611	6148	6415	6585	6701	6410	6112	6117		
40	6410	6471	6594	6752	6387	5084	4564	3868	3636	3753	4324	4730	5831	6097	6127	5831	5744		
45	5905	6129	6317	5907	4652	3366	3135	3011	2938	2935	2968	3119	4218	5284	5632	5450	5249		
50	5308	5473	5500	4244	2977	2714	2521	2394	2302	2311	2376	2497	2702	3763	4842	4885	4685		
55	4676	4961	3922	2623	2317	1928	1193	1025	870	994	1106	1627	2090	2335	3322	4351	4119		
60	3951	4000	2545	1969	1087	524	137	107	97.2	106	138	400	937	1729	2119	3440	3490		
65	3066	2430	1596	839	130	86.0	80.0	79.7	79.4	80.2	84.0	91.4	131	724	1386	2112	2679		
70	2117	1312	623	98.1	78.2	74.9	70.3	68.1	67.6	69.3	74.1	81.0	83.6	98.5	535	1089	1938		
75	1103	488	74.2	62.5	55.1	42.4	36.3	34.4	34.3	35.2	38.0	44.4	58.6	68.2	78.0	388	910		
80	359	51.7	38.3	28.4	26.1	23.9	22.0	21.3	21.4	21.7	22.8	25.1	28.0	31.6	44.2	60.3	347		
85	34.6	16.5	13.4	12.2	11.8	11.1	10.4	10.1	10.3	10.5	10.9	11.6	12.4	13.4	15.7	20.6	38.0		
90	1.33	1.16	0.88	0.60	0.42	0.32	0.28	0.32	0.38	0.44	0.47	0.51	0.63	0.65	0.84	1.09	1.33		
95	1.45	1.23	0.93	0.60	0.38	0.26	0.21	0.23	0.28	0.32	0.32	0.32	0.39	0.59	0.93	1.26	1.49		
100	1.93	1.70	1.39	0.98	0.66	0.47	0.35	0.33	0.38	0.44	0.48	0.54	0.64	0.96	1.40	1.76	1.97		
105	2.20	2.03	1.81	1.43	1.01	0.76	0.60	0.54	0.58	0.68	0.76	0.85	1.02	1.44	1.89	2.15	2.32		
110	2.28	1.99	1.92	1.75	1.30	1.01	0.83	0.72	0.75	0.87	0.99	1.11	1.35	1.73	2.05	2.16	2.37		
115	1.89	1.68	1.77	1.68	1.43	1.20	1.03	0.93	0.94	1.08	1.24	1.36	1.52	1.80	1.94	1.93	2.17		
120	1.84	1.59	1.61	1.57	1.46	1.29	1.17	1.14	1.12	1.28	1.43	1.49	1.59	1.77	1.82	1.86	2.08		
125	1.84	1.72	1.66	1.65	1.59	1.48	1.38	1.40	1.35	1.48	1.64	1.67	1.73	1.78	1.79	1.89	2.00		
130	1.99	1.97	1.94	1.84	1.87	1.85	1.78	1.82	1.80	1.89	2.02	1.99	1.94	1.92	2.02	2.12	2.21		
135	2.47	2.56	2.37	2.18	2.26	2.29	2.29	2.40	2.46	2.45	2.52	2.42	2.30	2.29	2.42	2.45	2.46		
140	2.61	2.59	2.73	2.66	2.60	2.67	2.73	2.86	2.98	2.88	2.97	2.81	2.66	2.67	2.64	2.58	2.58		
145	3.25	3.50	3.06	3.01	3.06	3.10	3.08	3.31	3.46	3.28	3.33	3.25	3.21	2.97	2.85	2.76	2.86		
150	3.11	3.22	3.22	3.27	3.34	3.54	3.63	3.74	3.70	3.78	3.85	3.59	3.41	3.20	3.17	3.12	3.11		
155	3.89	3.34	3.44	3.48	3.76	3.79	3.87	4.00	4.07	4.00	3.82	3.84	3.63	3.52	3.45	3.36	3.28		
160	3.61	3.62	3.71	3.65	4.11	4.00	4.09	4.29	4.22	4.36	4.19	4.02	3.96	3.71	3.72	3.65	3.56		
165	3.94	4.09	4.16	3.91	3.96	3.94	4.16	4.25	4.42	4.50	4.36	4.22	4.02	3.92	3.88	3.78	3.66		
170	4.36	4.47	4.57	4.57	4.55	4.48	4.41	4.39	4.64	4.74	4.53	4.46	4.33	4.34	4.19	3.94	3.72		
175	4.50	4.57	4.56	4.63	4.55	4.67	4.76	4.73	4.92	5.13	5.11	4.56	4.48	4.45	4.35	4.20	4.13		
180	4.39	4.47	4.43	4.43	4.37	4.36	4.42	4.51	4.73	5.00	4.67	4.50	4.33	4.19	4.05	4.02	4.12		

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° 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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