



LM-79-08 Test Report

for

ABB Lighting, Inc.

3 Adams St Belvidere, NJ 07823.

Linear High bay

Model: LHB120501-82

Laboratory: Leading Testing Laboratories

NVLAP CODE: 200960-0

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Report No.: HZ15080005a

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: **LHB120501-82**

Luminous Efficacy (Lumens /Watt)	Total Luminous Flux (Lumens)	Power (Watts)	Power Factor
118.6	14037.0	118.32	0.9886
CCT (K)	CRI	Stabilization Time (Light & Power)	
5125	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	: LHB120501-82
Electrical Ratings	: 100~277VAC, 50/60Hz, 120W
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: 240 pcs
Manufacturer	: ABB Lighting (shanghai) Co., Ltd.
Address	: Room 1012, North Minch Fortune 108 Plaza, # 1839 Qixin road, Shanghai

TEST RESULTS

Test ambient temperature was 24.5°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	
Test Voltage (V)	120.0	100.0	277.0	R1	79
Voltage frequency (Hz)	60	60	60	R2	87
Test Current (A)	0.997	1.203	0.479	R3	93
Power Factor	0.9886	0.8894	0.8824	R4	83
Test Power (W)	118.32	119.10	117.20	R5	81
THD A%	7.66	8.25	10.45	R6	83
Luminous Efficacy (lm/W)	118.6	118.1	120.1	R7	86
Total Luminous Flux (lm)	14037.0	14063.0	14076.0	R8	64
Color Rendering Index (CRI)	82.0			R9	-4
R9	-4			R10	70
Correlated Color Temperature (CCT) (K)	5125			R11	83
Chromaticity (Chroma x, Chroma y)	(0.3423, 0.3574)			R12	68
Chromaticity (Chroma u, Chroma v)	(0.2073, 0.3247)			R13	81
Chromaticity (Chroma u', Chroma v')	(0.2073, 0.4871)			R14	96
Duv	0.0041				
Average Beam Angle (°)	96.9				
Center Beam Candle Power (cd)	6485				
Spacing Criteria	1.29 (0°-180°)/ 1.15 (90°-270°)				
Zonal Lumens in the 0°-60°Zone	91.98%				
Zonal Lumens in the 60°-90°Zone	7.95%				
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

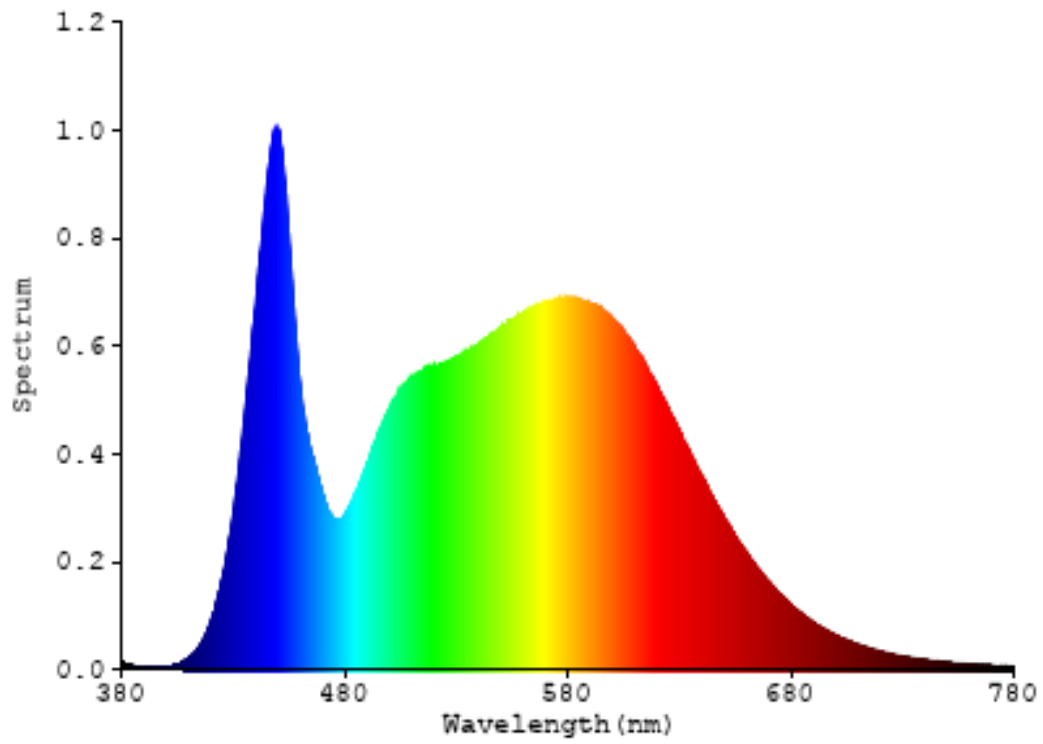


Chart 1: Spectral Power Distribution

Zonal Lumen Tabulation

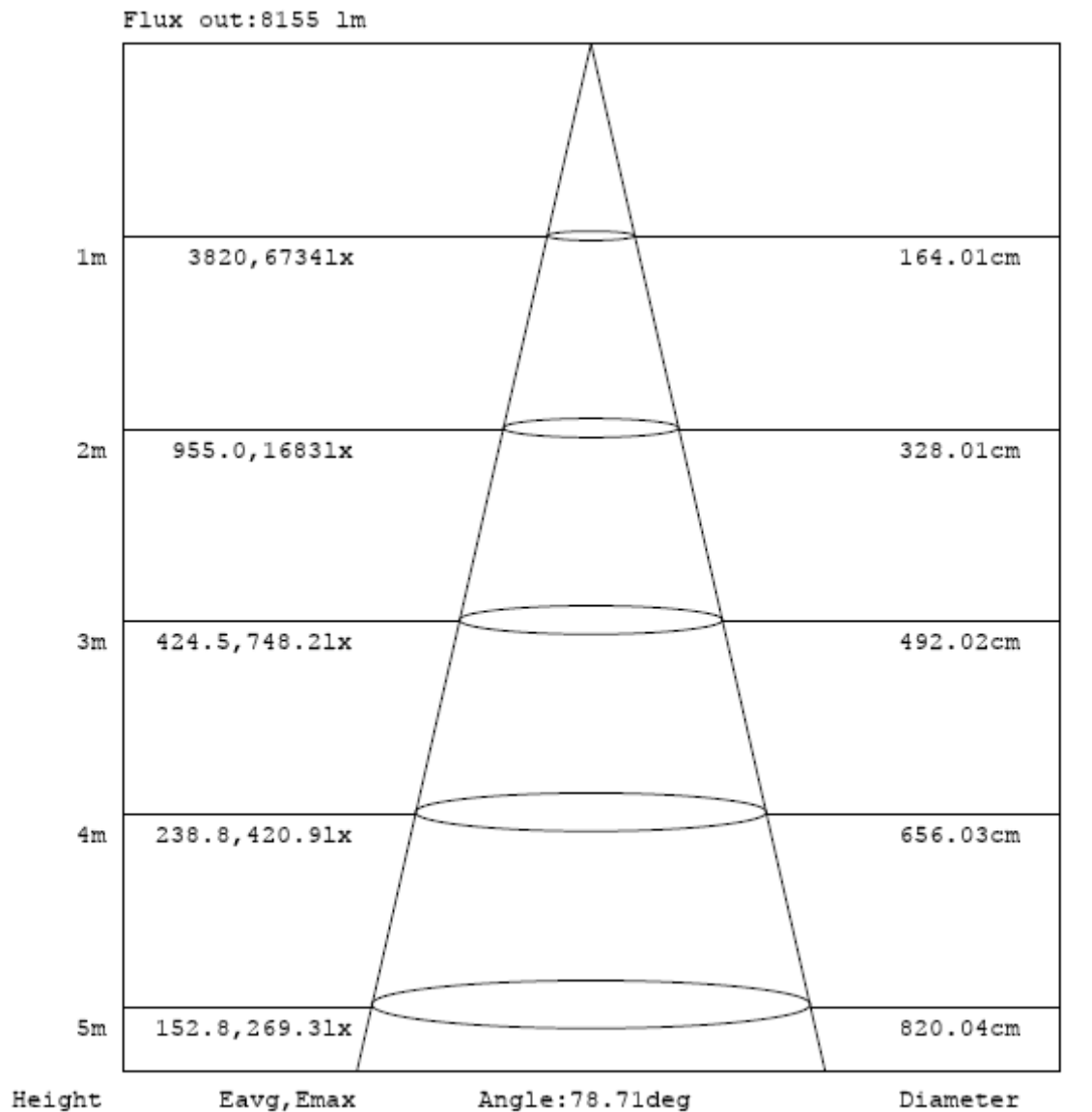
$\gamma(^{\circ})$	Lumens	% Total
0- 10	606.814	4.32%
10- 20	1747.581	12.45%
20- 30	2741.082	19.53%
30- 40	3217.119	22.92%
40- 50	2752.284	19.61%
50- 60	1847.002	13.16%
60- 70	845.217	6.02%
70- 80	244.17	1.74%
80- 90	25.998	0.19%
90-100	0.487	0.00%
100-110	0.872	0.01%
110-120	1.085	0.01%
120-130	1.291	0.01%
130-140	1.548	0.01%
140-150	1.611	0.01%
150-160	1.385	0.01%
160-170	0.94	0.01%
170-180	0.347	0.00%
Total	14036.8	100%

$\gamma(^{\circ})$	Lumens	% Total
0- 60	12911.882	91.98%
60- 90	1115.385	7.95%
0-90	14027.267	99.93%
90- 180	9.566	0.07%
0- 180	14036.8	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

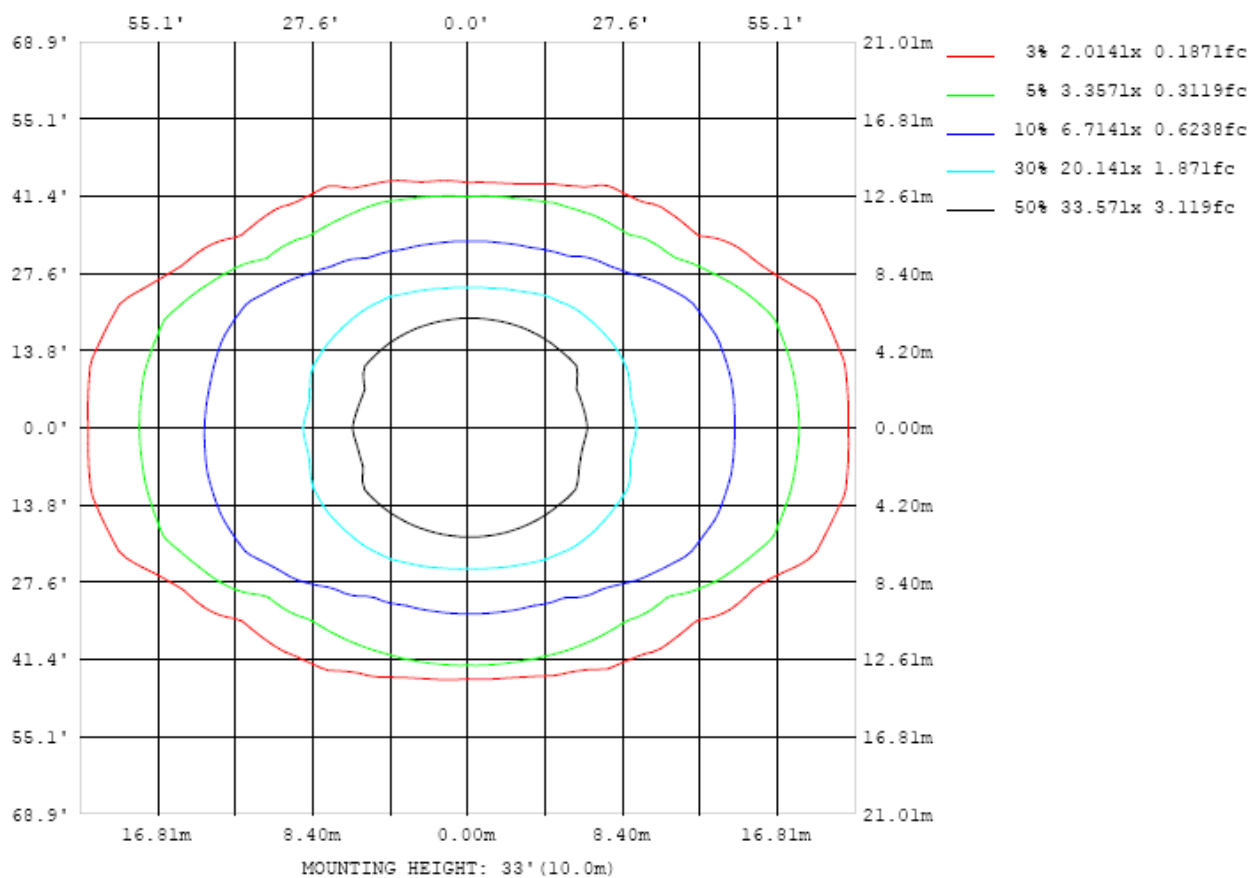


Chart 3: Illuminance Plot (Footcandles)

Luminous Intensity Distribution Plots

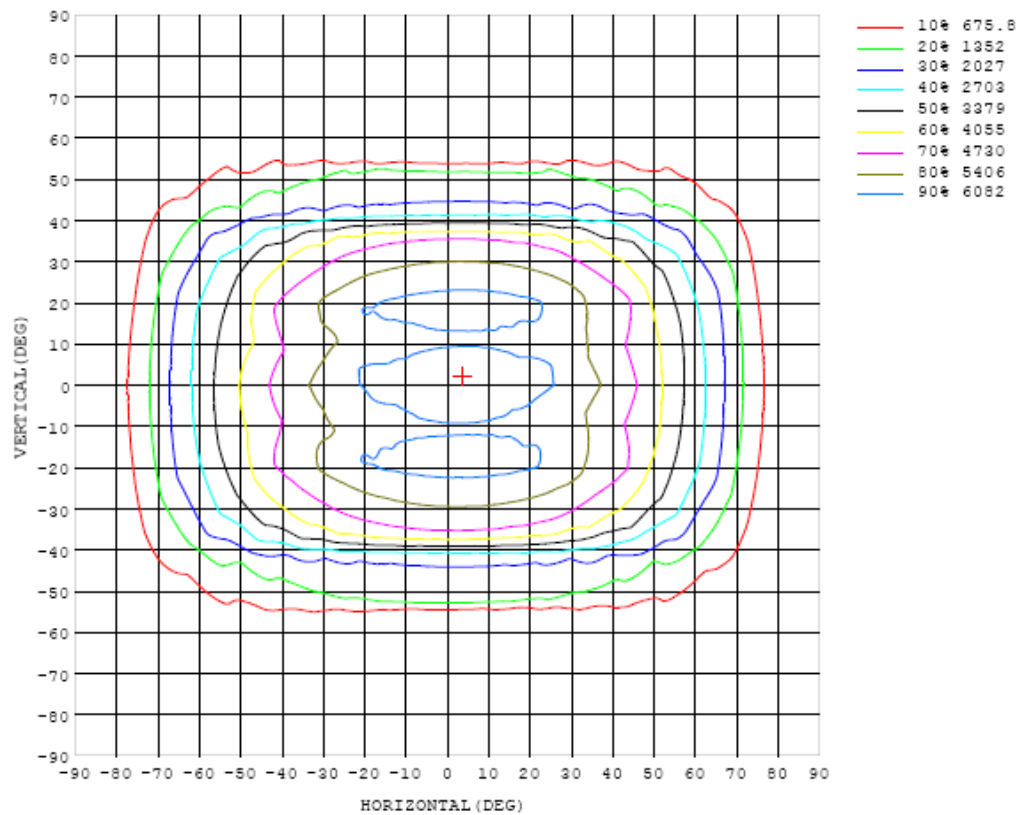


Chart 4: Isocandela Plot

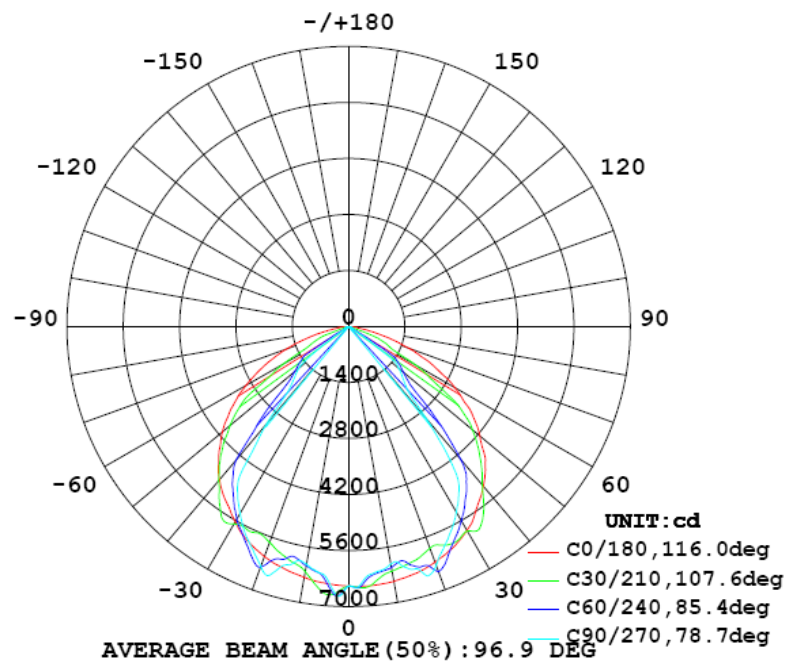


Chart 5: Polar Candela Distribution

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	6485	6485	6485	6485	6485	6485	6485	6485	6485	6485	6485	6485	6485	6485	6485	6485	6485	6485	6485
5	6500	6528	6548	6486	6375	6298	6259	6236	6221	6214	6213	6216	6237	6277	6353	6449	6488	6451	6443
10	6464	6517	6323	6205	6165	6143	6114	6074	6043	6028	6027	6044	6072	6097	6102	6134	6256	6410	6367
15	6392	6377	6133	6088	6006	6014	6184	6264	6281	6277	6255	6202	6105	5910	5917	5983	6019	6257	6259
20	6265	6136	5991	5898	6125	6215	6519	6474	6400	6353	6369	6408	6414	6104	5964	5759	5850	5997	6118
25	6107	5909	5819	5998	6234	6262	6063	5950	5877	5852	5852	5879	5967	6162	6034	5777	5647	5732	5920
30	5882	5664	5612	5904	6005	5755	5602	5490	5385	5351	5354	5406	5505	5625	5857	5677	5368	5439	5636
35	5544	5311	5547	5820	5503	5294	5100	4941	4836	4772	4798	4860	4983	5151	5322	5588	5275	5108	5323
40	5205	4996	5175	5168	5002	4740	4318	3656	3157	2993	3129	3662	4308	4600	4780	5008	4974	4786	4996
45	4805	4618	4994	4618	4325	3601	2564	2059	1987	1956	1970	2024	2498	3617	4198	4468	4773	4386	4569
50	4252	4227	4288	4013	3189	1958	1776	1701	1649	1628	1636	1665	1732	1945	3276	3857	4158	4013	4098
55	3717	3737	3612	3107	1734	1534	1445	1120	567	536	501	1187	1394	1493	1725	3147	3480	3597	3560
60	3037	2972	2845	1916	1295	976	116	105	102	101	100	103	230	1096	1269	1859	2798	2913	2950
65	2327	2373	1794	1041	602	101	100	105	112	114	109	103	98.7	103	751	1024	1984	2357	2304
70	1591	1542	879	393	88.5	103	89.0	61.7	54.3	51.3	52.4	60.1	98.0	98.2	89.2	568	961	1622	1644
75	879	780	318	72.0	68.3	43.4	39.0	35.9	34.3	33.0	32.9	34.7	38.9	47.6	78.7	74.0	431	875	969
80	344	233	50.9	30.7	27.7	25.8	24.4	23.2	22.6	22.1	21.5	21.7	23.1	25.2	28.3	36.3	57.6	290	425
85	52.6	18.8	14.9	13.2	12.3	11.8	11.1	10.6	10.3	10.3	10.0	10.3	10.8	11.4	12.1	13.5	16.9	35.4	79.4
90	0.37	1.88	0.28	0.16	0.13	0.12	0.14	0.16	0.16	0.13	0.11	0.11	0.12	0.15	0.19	0.23	0.26	0.39	0.95
95	0.40	0.33	0.32	0.33	0.27	0.18	0.19	0.21	0.21	0.18	0.14	0.15	0.18	0.22	0.28	0.32	0.34	0.33	1.26
100	0.59	0.48	0.55	0.40	0.33	0.30	0.33	0.35	0.33	0.29	0.27	0.29	0.27	0.33	0.42	0.47	0.49	0.50	1.67
105	1.68	0.64	0.61	0.57	0.45	0.39	0.41	0.42	0.39	0.35	0.35	0.40	0.42	0.50	0.61	0.65	0.67	0.63	1.92
110	0.82	0.87	0.76	0.88	0.71	0.56	0.57	0.55	0.50	0.46	0.46	0.58	0.65	0.72	0.83	0.87	0.86	0.85	1.77
115	1.07	1.10	0.90	0.91	0.85	0.80	0.80	0.79	0.70	0.64	0.69	0.80	0.90	1.03	1.07	1.12	1.07	1.12	1.53
120	1.45	1.37	1.11	1.04	0.98	1.03	1.08	1.05	0.97	0.95	1.03	1.09	1.18	1.26	1.31	1.34	1.33	1.44	1.65
125	1.76	3.47	1.33	1.24	1.23	1.29	1.38	1.34	1.30	1.26	1.33	1.41	1.48	1.51	1.49	1.53	1.61	1.71	1.43
130	2.54	2.17	1.66	1.57	1.41	1.48	1.63	1.65	1.60	1.64	1.66	1.73	1.74	1.73	1.71	1.82	1.91	1.90	2.06
135	2.29	2.26	2.08	1.86	1.74	1.74	1.87	1.96	1.90	2.02	1.98	2.02	2.00	1.96	1.93	2.03	2.15	2.24	2.17
140	2.41	2.30	2.29	2.19	2.37	2.10	2.09	2.25	2.19	2.33	2.23	2.25	2.19	2.23	2.24	2.25	2.34	2.37	2.05
145	4.05	3.47	2.52	2.39	2.30	2.35	2.40	2.49	2.47	2.53	2.39	2.48	2.47	2.42	2.39	2.50	2.67	2.60	2.47
150	2.77	2.82	3.01	2.70	2.61	2.48	2.63	2.74	2.80	2.76	2.69	2.65	2.63	2.59	2.60	2.62	2.98	2.81	2.69
155	3.26	2.93	2.88	3.22	2.66	2.72	2.84	2.83	2.90	2.82	2.85	2.76	2.78	2.76	2.82	2.99	2.89	2.80	2.63
160	3.05	3.08	3.00	3.10	3.17	2.88	3.08	3.03	3.11	2.94	3.02	3.04	2.96	2.91	3.08	3.08	3.01	2.93	2.81
165	3.34	3.37	3.39	3.38	3.28	3.16	3.30	3.13	3.11	3.18	3.18	3.20	3.30	3.33	3.26	3.20	3.16	3.12	2.86
170	3.64	3.63	3.63	3.61	3.44	3.32	3.16	3.17	3.44	3.32	3.18	3.36	3.33	3.36	3.35	3.22	3.25	3.26	3.12
175	3.82	3.86	3.83	3.84	3.76	3.72	3.58	3.69	3.93	3.78	3.71	3.48	3.57	3.44	3.41	3.48	3.56	3.62	3.58
180	3.60	3.67	3.66	3.65	3.60	3.60	3.64	3.70	3.75	3.84	3.55	3.56	3.63	3.29	3.23	3.39	3.44	3.49	3.59

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	6485	6485	6485	6485	6485	6485	6485	6485	6485	6485	6485	6485	6485	6485	6485	6485	6485		
5	6556	6690	6707	6609	6504	6410	6352	6319	6313	6329	6363	6426	6528	6648	6753	6739	6605		
10	6611	6490	6221	6127	6099	6075	6050	6031	6035	6049	6078	6127	6166	6203	6306	6586	6701		
15	6485	6082	5985	5905	5866	5995	6097	6138	6170	6168	6155	6073	5958	6022	6120	6236	6648		
20	6203	5857	5744	5848	6044	6390	6433	6392	6380	6435	6504	6473	6166	6025	5907	6037	6424		
25	5855	5618	5675	6047	6144	6010	5926	5902	5903	5951	6012	6134	6324	6181	5898	5833	6119		
30	5451	5307	5696	5848	5658	5564	5459	5406	5394	5448	5547	5678	5843	6077	5891	5564	5743		
35	5098	5141	5564	5336	5182	5018	4899	4824	4814	4878	4995	5147	5357	5575	5893	5472	5364		
40	4752	4990	5025	4802	4626	4350	3568	3276	3171	3320	3632	4425	4801	5060	5247	5199	5035		
45	4312	4760	4477	4208	3493	2661	2094	2003	1981	2024	2139	2842	3593	4385	4685	5040	4621		
50	3916	4115	3847	3105	2031	1752	1668	1622	1616	1642	1715	1809	2141	3156	4057	4363	4146		
55	3494	3463	3134	1785	1502	1406	956	509	314	399	1002	1466	1547	1953	3227	3663	3741		
60	2916	2767	1878	1260	1101	117	104	102	102	102	108	183	1074	1296	2055	2880	3025		
65	2365	1876	1004	482	103	105	108	108	109	110	107	101	102	531	1043	1849	2397		
70	1585	951	493	94.5	99.7	102	71.5	62.2	60.4	63.5	73.6	98.3	95.3	85.0	434	1042	1619		
75	895	426	79.0	86.9	53.9	40.3	36.3	33.4	32.9	34.7	36.3	38.6	46.9	71.1	69.9	395	834		
80	290	54.7	43.6	28.9	26.1	24.3	22.9	21.8	21.9	22.9	23.4	23.8	25.1	27.2	33.6	49.1	251		
85	27.9	18.0	14.2	12.2	11.3	10.6	10.1	9.74	9.95	10.3	10.7	11.0	11.7	12.4	13.3	15.3	30.2		
90	1.11	0.98	0.74	0.41	0.30	0.26	0.25	0.26	0.28	0.29	0.26	0.24	0.26	0.36	0.58	0.87	0.97		
95	1.16	1.01	0.77	0.50	0.36	0.27	0.25	0.24	0.27	0.29	0.28	0.29	0.36	0.54	0.82	1.10	1.29		
100	1.54	1.37	1.12	0.79	0.56	0.43	0.39	0.31	0.33	0.38	0.42	0.48	0.57	0.87	1.21	1.52	1.78		
105	1.84	1.67	1.46	1.13	0.84	0.64	0.62	0.49	0.52	0.58	0.64	0.71	0.88	1.26	1.60	1.85	2.04		
110	1.75	1.64	1.55	1.31	1.07	0.84	0.79	0.62	0.64	0.72	0.81	0.93	1.14	1.57	1.72	1.85	2.08		
115	1.52	1.41	1.42	1.33	1.19	0.99	0.92	0.79	0.80	0.89	1.01	1.12	1.26	2.01	1.63	1.66	1.99		
120	1.47	1.32	1.30	1.27	1.23	1.10	0.98	0.95	0.94	1.03	1.13	1.21	1.32	1.51	1.53	1.63	1.99		
125	1.50	1.47	1.37	1.35	1.34	1.28	1.17	1.16	1.12	1.20	1.29	1.37	1.41	1.50	1.53	1.69	1.87		
130	1.59	1.69	1.62	1.57	1.60	1.60	1.51	1.52	1.50	1.54	1.60	1.61	1.58	1.62	1.72	1.87	2.19		
135	1.91	1.98	1.97	1.91	1.98	2.01	1.95	2.00	2.02	1.98	2.01	1.96	1.88	1.95	2.01	2.16	2.37		
140	2.16	2.28	2.26	2.35	2.36	2.32	2.31	2.40	2.45	2.35	2.40	2.25	2.20	2.20	2.24	2.30	2.23		
145	2.51	2.62	2.62	2.62	2.71	2.74	2.67	2.79	2.84	2.74	2.73	2.67	2.63	2.48	2.37	2.51	2.77		
150	2.76	2.93	2.78	2.87	2.97	3.04	2.99	3.19	3.06	3.18	3.22	2.97	2.78	2.69	2.62	2.87	2.68		
155	2.75	2.82	3.06	3.00	3.15	3.21	3.19	3.42	3.41	3.36	3.32	3.29	2.97	2.89	3.20	3.03	3.35		
160	2.86	2.94	3.05	3.23	3.24	3.25	3.35	3.59	3.55	3.69	3.55	3.49	3.20	3.50	3.41	3.25	3.00		
165	2.89	3.00	3.08	3.21	3.38	3.46	3.52	3.56	3.61	3.78	3.79	3.86	3.71	3.80	3.70	3.44	3.19		
170	3.14	3.25	3.37	3.45	3.72	3.84	3.73	3.71	3.88	4.12	4.11	4.09	3.90	3.88	3.78	3.66	3.48		
175	3.59	3.66	3.67	3.75	3.70	3.83	3.89	3.80	4.00	4.22	4.29	3.98	3.78	3.79	3.71	3.57	3.51		
180	3.59	3.66	3.64	3.64	3.58	3.59	3.63	3.72	3.83	4.07	3.74	3.71	3.58	3.50	3.39	3.35	3.43		

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.

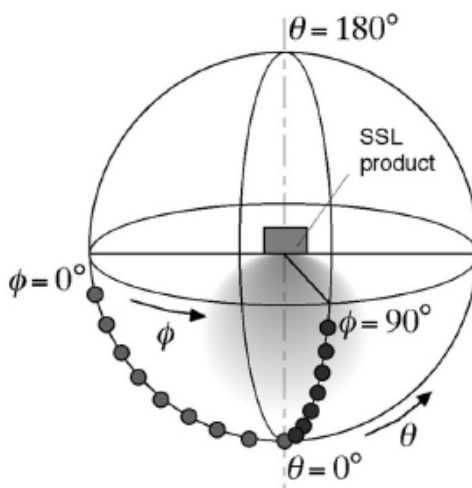
Color Characteristics Measurements

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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