



LM-79-08 Test Report

for

ABBlighting, Inc.

1501 Industrial Way N. Toms River, NJ 08755.

LS Parking Garage

Model: LSPKG35501

Laboratory: Leading Testing Laboratories

NVLAP CODE: 200960-0

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Report No.: HZ16090004a

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

Reviewed by:

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Sep. 12, 2016

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Manager: Jim Zhang
Sep. 12, 2016

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: **LSPKG35501**

Luminous Efficacy (Lumens /Watt)	Total Luminous Flux (Lumens)	Power (Watts)	Power Factor
133.1	4533.1	34.06	0.9945
CCT (K)	CRI	Stabilization Time (Light & Power)	
5008	82.4	60	

Table 1: Executive Data Summary

Test specifications:

Date of Receipt	: Sep. 08, 2016
Date of Test	: Sep. 09, 2016
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

TABLE OF CONTENT

LM-79-08 Test Report.....	1
Test Summary.....	2
Sample Photo.....	4
TEST RESULTS	5
Spectral Power Distribution	6
Zonal Lumen Tabulation	7
Luminous Intensity Distribution Plots.....	9
Luminous Intensity Data	10
EQUIPMENT LIST	12
TEST METHODS	12
Seasoning of SSL Product.....	12
Goniophotometer Method	12
Photometric and Electrical Measurements.....	12
Color Characteristics Measurements.....	13
Color Spatial Uniformity	13

Sample Photo



Figure 1- Overview of the sample

Equipment Under Test (EUT)

Name	: LS Parking Garage
Model	: LSPKG35501
Electrical Ratings	: 120~277Vac, 50/60Hz, 35W
Product Description	: 5000K, Aluminum Enclosure, Black Coating, Silver reflector Manufacturer of light source: LG INNOTEK Development Model of light source: LGIT 5630 G2 Quantity of LED light source: 120pcs
Manufacturer	: ABB Lighting (shanghai) Co., Ltd.
Address	: Room 1012, North Minch Fortune 108 Plaza,# 1839 Qixin road, Shanghai

TEST RESULTS

Test ambient temperature was 24.2°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.

The photometric distance of Goniophotometer is 2.47 m.

Luminous data was taken at 0.5° vertical intervals and 10.0° horizontal intervals.

Parameter	Result	
Test Voltage (V)	120.0	277.0
Voltage frequency (Hz)	60	60
Test Current (A)	0.285	0.132
Power Factor	0.9945	0.9453
Test Power (W)	34.06	34.61
THD A%	8.05	8.01
Luminous Efficacy (lm/W)	133.1	130.8
Total Luminous Flux (lm)	4533.1	4528.7
Color Rendering Index (CRI)	82.4	
R9	1	
Correlated Color Temperature (CCT) (K)	5008	
Chromaticity (Chroma x, Chroma y)	(0.3449, 0.3513)	
Chromaticity (Chroma u, Chroma v)	(0.2114, 0.3230)	
Chromaticity (Chroma u', Chroma v')	(0.2114, 0.4845)	
Duv	0.0001	
Average Beam Angle (°)	187.4	
Center Beam Candle Power (cd)	404	
Spacing Criteria	2.14 (0°-180°)/ 2.39 (90°-270°)	
Zonal Lumens in the 0°-60°Zone	45.11%	
Zonal Lumens in the 60°-90°Zone	47.86%	
Zonal Lumens in the 90°-120°Zone	6.47%	
Zonal Lumens in the 120°-180°Zone	0.56%	

Special Color Rendering Indices	
R1	81
R2	87
R3	92
R4	84
R5	83
R6	83
R7	85
R8	65
R9	1
R10	70
R11	84
R12	70
R13	82
R14	96

Table 2: Test data per Goniophotometer 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

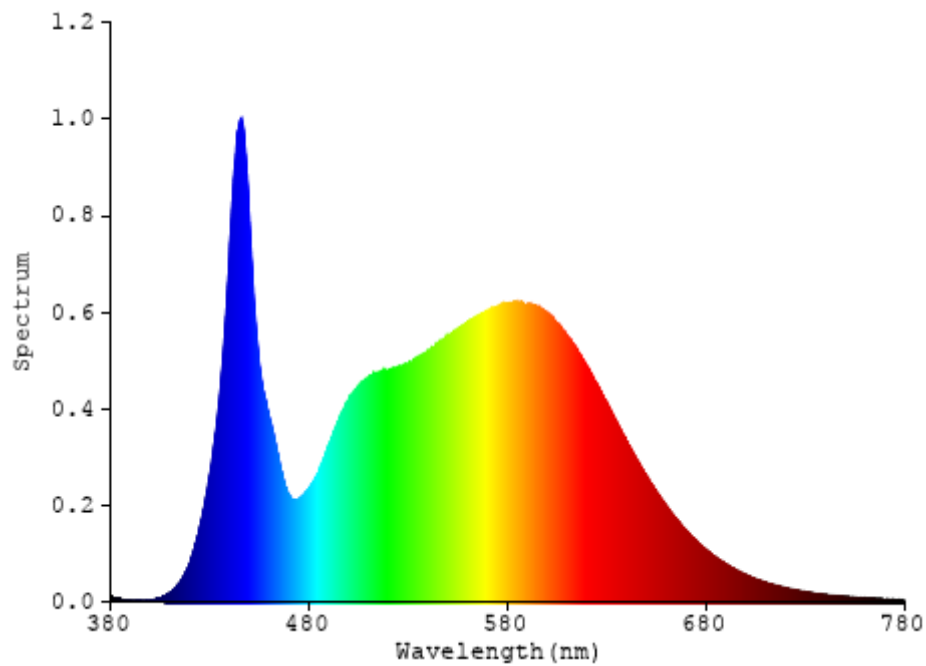


Chart 1: Spectral Power Distribution

Zonal Lumen Tabulation

$\gamma(^{\circ})$	Lumens	% Total
0- 10	34.656	0.76%
10- 20	103.454	2.28%
20- 30	202.871	4.48%
30- 40	355.7	7.85%
40- 50	562.914	12.42%
50- 60	785.462	17.33%
60- 70	856.998	18.91%
70- 80	762.208	16.81%
80- 90	550.157	12.14%
90-100	219.583	4.84%
100-110	46.955	1.04%
110-120	26.932	0.59%
120-130	15.748	0.35%
130-140	6.858	0.15%
140-150	1.965	0.04%
150-160	0.441	0.01%
160-170	0.172	0.00%
170-180	0.054	0.00%
Total	4533.1	100%

$\gamma(^{\circ})$	Lumens	% Total
0- 60	2045.057	45.11%
60- 90	2169.363	47.86%
0-90	4214.42	92.97%
90- 180	318.708	7.03%
0- 180	4533.1	100%

Table 3: Zonal Lumen Data

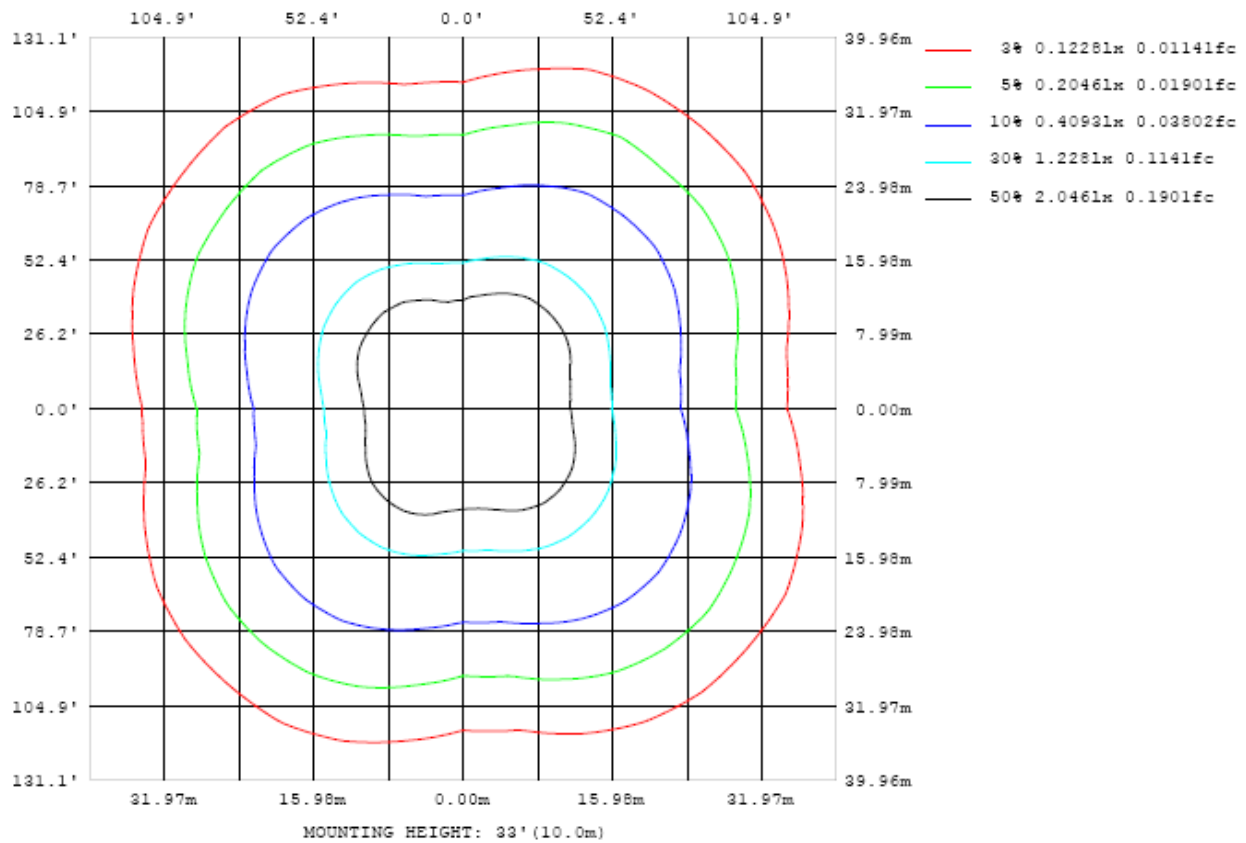


Chart 2: Illuminance Plot (Footcandles)

Luminous Intensity Distribution Plots

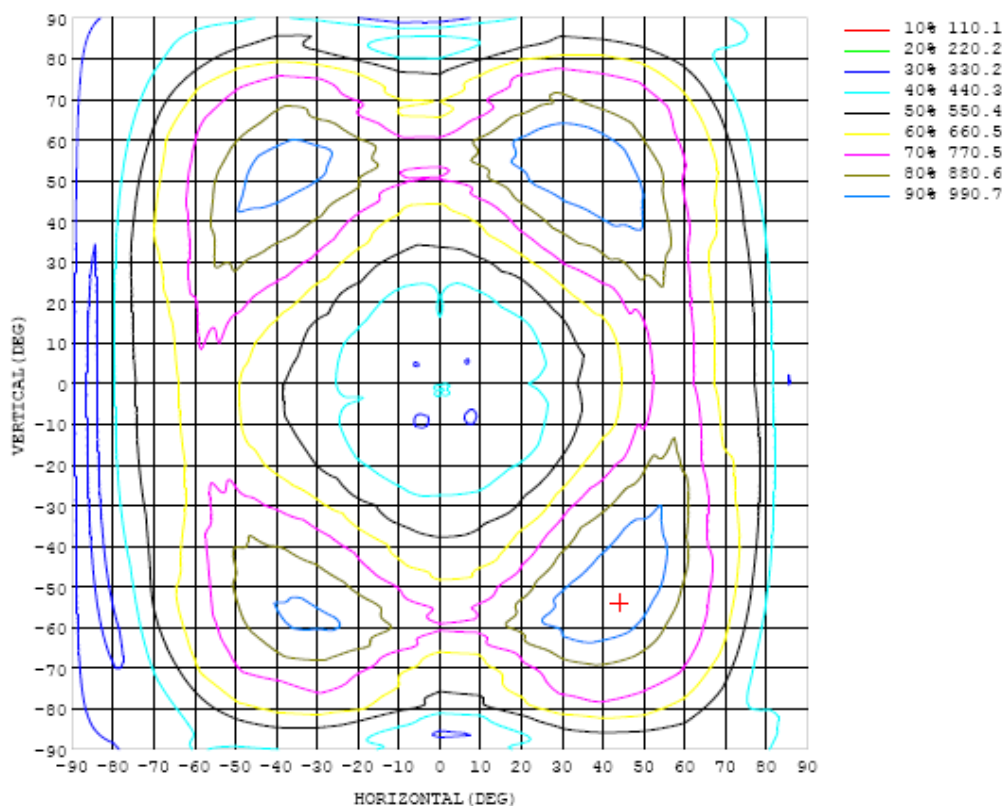


Chart 3: Isocandela Plot

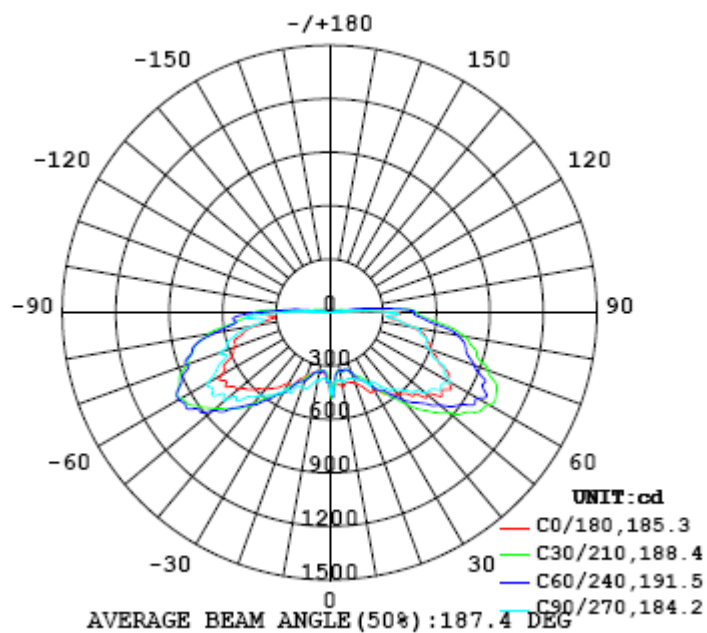


Chart 4: Polar Candela Distribution

Luminous Intensity Data

Table--1

UNIT: cd

C (DEG) y (DEG)	0	10	20	30	40	50	60	70	80	90	100	110	120	130	140	150	160	170	180
0	404	404	404	404	404	404	404	404	404	404	404	404	404	404	404	404	404	404	404
5	400	386	403	391	353	349	363	404	374	386	385	345	343	354	397	413	393	411	340
10	423	414	337	331	325	326	329	338	393	389	332	331	329	335	346	351	419	430	350
15	404	348	337	332	343	342	330	333	380	385	334	334	349	353	346	353	360	416	349
20	424	366	360	363	356	358	360	363	383	395	365	369	369	370	386	381	388	455	381
25	470	402	396	397	405	414	422	406	411	417	408	422	425	426	427	425	425	470	425
30	504	460	480	470	468	472	476	480	464	464	478	490	489	486	484	511	487	478	457
35	557	540	544	557	564	561	533	528	514	510	526	539	577	578	573	544	540	530	516
40	597	603	640	674	685	657	639	607	562	559	598	638	658	683	660	632	597	574	560
45	663	677	719	780	808	784	717	655	619	620	649	706	764	778	766	706	650	626	611
50	715	767	840	875	901	881	807	745	702	702	737	791	844	859	848	786	719	686	669
55	765	844	931	975	979	964	903	824	765	756	809	875	919	928	918	861	798	736	714
60	776	865	975	1033	1057	1036	964	881	797	780	852	927	987	1004	977	900	824	729	703
65	682	799	933	1035	1088	1047	950	841	729	703	800	898	981	1021	975	877	764	649	622
70	596	699	846	945	995	964	863	740	622	595	692	809	898	935	905	805	694	592	567
75	564	665	776	854	863	854	792	697	589	564	654	752	814	816	808	756	664	559	530
80	474	580	699	769	777	785	729	630	514	488	580	685	743	748	722	679	562	448	418
85	332	420	533	599	633	618	556	476	366	344	425	522	567	596	565	509	418	325	306
90	372	441	493	488	476	478	475	455	380	363	416	464	457	444	440	450	408	325	296
95	43.2	52.8	63.5	173	302	352	290	217	161	157	187	255	322	348	250	118	51.8	42.3	38.4
100	70.1	76.3	102	80.8	68.5	64.2	62.9	70.3	60.4	62.0	60.3	66.5	56.3	59.7	66.9	77.8	75.1	56.8	61.6
105	51.0	46.3	51.9	68.5	53.8	46.3	31.1	21.6	20.7	21.0	20.6	26.9	38.0	50.1	65.9	68.1	51.2	50.2	56.1
110	40.6	35.3	34.0	47.0	47.2	34.3	17.5	7.89	7.37	7.92	8.12	13.8	29.6	42.2	50.1	48.3	39.3	40.9	45.9
115	32.9	27.9	26.7	34.5	35.5	31.1	22.7	15.4	12.8	12.3	13.6	18.9	27.9	36.6	37.2	36.6	30.5	32.1	36.5
120	27.0	22.7	21.9	26.6	26.2	26.1	24.2	19.1	18.0	18.0	18.1	21.7	25.3	26.7	28.0	28.8	24.5	25.9	29.4
125	21.3	17.7	16.7	19.5	19.0	18.5	17.1	16.8	18.3	18.8	17.4	15.9	17.6	18.9	20.1	20.7	18.0	19.3	21.9
130	13.0	12.9	11.7	13.3	12.8	12.0	11.4	12.5	13.9	14.4	13.4	11.7	11.3	12.4	13.7	14.1	13.6	12.2	12.8
135	10.5	8.77	8.71	7.51	8.02	7.64	8.21	9.80	11.3	11.9	10.9	9.00	7.29	7.81	8.64	8.87	10.4	9.58	11.6
140	7.76	5.60	6.15	4.13	3.90	4.24	5.75	7.23	8.44	8.87	8.09	6.55	4.90	3.58	4.16	5.70	7.06	6.93	7.92
145	1.07	0.72	1.62	2.52	1.55	1.99	3.25	4.37	5.18	5.48	4.97	3.89	2.57	1.51	1.78	1.96	3.54	4.49	4.64
150	2.19	1.83	1.27	1.21	1.17	1.12	1.06	1.62	2.16	2.32	1.95	1.31	1.14	1.19	1.23	1.24	1.19	1.77	1.87
155	1.01	0.98	0.79	0.85	0.83	0.81	0.81	0.82	0.83	0.84	0.84	0.86	0.87	0.88	0.87	0.87	0.84	1.00	1.10
160	0.76	0.75	0.70	0.62	0.64	0.61	0.60	0.60	0.64	0.64	0.63	0.64	0.65	0.66	0.66	0.66	0.63	0.73	0.76
165	0.63	0.62	0.62	0.60	0.54	0.49	0.44	0.45	0.48	0.46	0.45	0.49	0.54	0.55	0.56	0.62	0.64	0.64	0.70
170	0.59	0.59	0.58	0.58	0.57	0.51	0.42	0.38	0.41	0.41	0.40	0.46	0.54	0.59	0.61	0.61	0.60	0.61	0.64
175	0.58	0.59	0.59	0.60	0.60	0.56	0.48	0.45	0.49	0.49	0.50	0.51	0.60	0.62	0.62	0.62	0.60	0.60	0.61
180	0.55	0.56	0.57	0.58	0.58	0.56	0.54	0.51	0.51	0.50	0.50	0.51	0.55	0.56	0.56	0.55	0.55	0.53	0.54

Table 4: Luminous Intensity Data

Table--2

UNIT: cd

C (DEG) y (DEG)	190	200	210	220	230	240	250	260	270	280	290	300	310	320	330	340	350		
0	404	404	404	404	404	404	404	404	404	404	404	404	404	404	404	404	404		
5	331	331	333	332	330	332	358	385	371	399	372	348	344	345	344	343	346		
10	349	341	334	334	339	342	337	381	382	361	347	352	339	338	339	348	351		
15	351	349	358	352	360	356	362	380	427	374	365	360	366	361	350	349	351		
20	382	391	389	394	400	407	394	396	448	404	409	414	400	395	392	381	379		
25	426	429	440	447	443	436	427	438	475	437	447	448	455	446	432	426	421		
30	483	514	506	500	521	519	493	483	506	493	518	536	513	514	518	502	475		
35	541	547	573	613	593	594	572	554	567	579	602	610	631	614	589	581	553		
40	587	626	677	697	698	672	626	602	611	637	682	727	751	743	697	649	613		
45	641	698	763	793	791	757	703	678	683	710	774	830	871	856	791	724	686		
50	710	772	839	883	882	855	808	763	762	803	867	947	955	938	897	814	743		
55	781	855	912	959	964	943	886	810	808	885	956	1027	1036	1030	985	894	800		
60	783	883	965	1016	1030	976	888	799	791	889	986	1070	1094	1084	1027	910	815		
65	712	830	933	1007	1007	916	804	692	678	791	923	1038	1078	1063	972	839	723		
70	655	760	848	925	899	852	766	665	648	753	835	930	973	974	874	738	638		
75	613	714	791	821	837	799	695	590	576	689	796	855	854	856	795	705	604		
80	498	612	688	721	732	654	550	450	443	547	675	740	767	775	713	611	505		
85	372	452	510	549	571	531	474	413	407	455	524	566	586	569	530	450	356		
90	340	397	423	424	449	412	330	265	272	352	455	487	473	484	494	456	389		
95	34.6	32.8	31.0	180	210	198	162	135	139	168	215	247	241	185	75.8	29.3	33.0		
100	63.7	86.5	76.2	68.7	56.8	42.0	38.9	40.9	42.2	43.6	44.3	51.8	63.5	76.9	103	85.0	61.2		
105	48.5	50.4	64.8	61.2	37.5	26.1	15.1	15.7	15.9	16.2	23.5	34.7	53.1	63.3	64.3	47.7	41.5		
110	38.4	36.1	46.2	45.3	36.2	21.7	11.1	7.21	7.16	9.72	17.9	31.2	40.3	46.2	42.9	35.7	33.8		
115	30.0	27.4	34.4	33.5	30.7	23.0	16.8	14.3	14.8	17.4	22.3	30.4	34.1	34.2	33.0	28.1	28.4		
120	24.0	21.9	25.4	24.2	22.3	20.5	19.8	20.3	21.6	21.8	22.6	24.1	24.9	25.8	26.1	22.6	24.2		
125	16.1	15.5	18.1	16.6	15.4	14.0	14.5	15.8	16.7	16.2	15.9	17.0	17.7	18.6	19.0	15.6	19.8		
130	13.3	11.5	11.9	10.8	9.64	9.51	10.7	12.1	12.6	11.8	10.6	10.6	11.4	12.4	11.3	12.6	12.7		
135	9.31	8.59	6.67	6.48	5.65	6.77	8.06	9.27	9.57	8.77	7.34	6.29	6.86	7.28	8.23	9.65	10.5		
140	6.10	5.69	4.12	2.49	3.25	4.46	5.67	6.61	6.81	6.14	4.90	3.64	2.93	3.84	5.73	6.69	7.99		
145	3.86	1.31	1.87	1.52	1.41	2.30	3.22	3.90	4.00	3.48	2.54	1.50	1.44	2.10	2.04	0.88	0.91		
150	1.54	1.21	1.23	1.18	1.13	1.09	1.06	1.23	1.25	1.02	1.06	1.09	1.16	1.22	1.25	1.66	2.33		
155	1.09	0.93	0.92	0.90	0.89	0.88	0.88	0.86	0.86	0.84	0.86	0.86	0.87	0.92	0.93	1.07	1.15		
160	0.85	0.82	0.74	0.74	0.71	0.70	0.69	0.69	0.68	0.69	0.68	0.66	0.69	0.74	0.78	0.87	0.89		
165	0.70	0.71	0.70	0.66	0.62	0.58	0.54	0.51	0.50	0.51	0.50	0.50	0.56	0.64	0.71	0.71	0.71		
170	0.65	0.66	0.66	0.67	0.66	0.64	0.56	0.49	0.47	0.47	0.47	0.49	0.54	0.61	0.64	0.65	0.65		
175	0.62	0.63	0.64	0.66	0.65	0.64	0.57	0.53	0.53	0.52	0.54	0.51	0.56	0.63	0.65	0.64	0.63		
180	0.55	0.56	0.57	0.58	0.58	0.57	0.54	0.52	0.51	0.52	0.52	0.52	0.55	0.58	0.58	0.58	0.56		

Table 5: Luminous Intensity Data

EQUIPMENT LIST

Test Equipment	Model	Equipment No.	Calibration Date	Calibration Due date
Goniophotometer system	GO-R5000	HZTE011-01	Jul. 27, 2016	Jul. 26, 2017
Digital Power Meter	PF2010A	HZTE028-01	Jul. 27, 2016	Jul. 26, 2017
AC Power Supply	PCR 500L	HZTE001-08	Jul. 27, 2016	Jul. 26, 2017
DC Power Supply	WY12010	HZTE004-03	Jul. 27, 2016	Jul. 26, 2017
Temperature Meter	TES1310	HZTE017-01	Jul. 27, 2016	Jul. 26, 2017
Standard Source	D908	HZTE012-01	Jul. 27, 2016	Jul. 26, 2017
Standard source	SCL-1400	HZTE012-02	Jul. 27, 2016	Jul. 26, 2017

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 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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