



LM-79-08 Test Report

for

ABBlighting, Inc.

1501 Industrial Way N. Toms River, NJ 08755

Parking garage light

Model: ABBPKG55501-MS

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.: HZ15120006b

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

Reviewed by:

Engineer: April Zou
Dec. 10, 2015

Approved by:

Manager: Jim Zhang
Dec. 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: **ABBPKG55501-MS**

Luminous Efficacy (Lumens /Watt)	Total Luminous Flux (Lumens)	Power (Watts)	Power Factor
91.0	4668.6	51.31	0.9876
CCT (K)	CRI	Stabilization Time (Light & Power)	
5046	78.3	60	

Table 1: Executive Data Summary

Test specifications:

Date of Receipt : Dec. 10, 2015

Date of Test : Dec. 08, 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 Photos



Figure 1- Overview of the sample

Equipment Under Test (EUT)

Name	: Parking garage light
Model	: ABBPKG55501-MS
Electrical Ratings	: 100~277VAC, 50/60Hz
Product Description	: 5000K, Parking Garage Luminaires, Plastic Light Cover Manufacturer of light source: Philips Lumileds Model of light source: LUXEON 3030 2D Quantity of light source: 60 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 24.1°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 95 minutes.

The photometric distance of Goniophotometer is 2.475 m.

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

Parameter	Result		
Test Voltage (V)	120.0	100.0	277.0
Voltage frequency (Hz)	60	60	60
Test Current (A)	0.433	0.526	0.203
Power Factor	0.9876	0.9902	0.9033
Test Power (W)	51.31	52.07	50.88
THD A%	12.18	12.27	12.07
Luminous Efficacy (lm/W)	91.0	89.3	91.4
Total Luminous Flux (lm)	4668.6	4651.4	4649.8
Color Rendering Index (CRI)	78.3		
R9	-2		
Correlated Color Temperature (CCT) (K)	5046		
Chromaticity (Chroma x, Chroma y)	(0.3440, 0.3523)		
Chromaticity (Chroma u, Chroma v)	(0.2104, 0.3232)		
Chromaticity (Chroma u', Chroma v')	(0.2104, 0.4848)		
Duv	0.0008		
Average Beam Angle (°)	168.1		
Center Beam Candle Power (cd)	543		
Spacing Criteria	1.99 (0°-180°)/ 1.86 (90°-270°)		
Zonal Lumens in the 0°-60°Zone	49.41%		
Zonal Lumens in the 60°-90°Zone	42.21%		
Zonal Lumens in the 90°-120°Zone	5.83%		
Zonal Lumens in the 120°-180°Zone	2.55%		

Special Color Rendering Indices	
R1	77
R2	84
R3	87
R4	77
R5	76
R6	76
R7	85
R8	64
R9	-2
R10	60
R11	72
R12	49
R13	79
R14	92

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

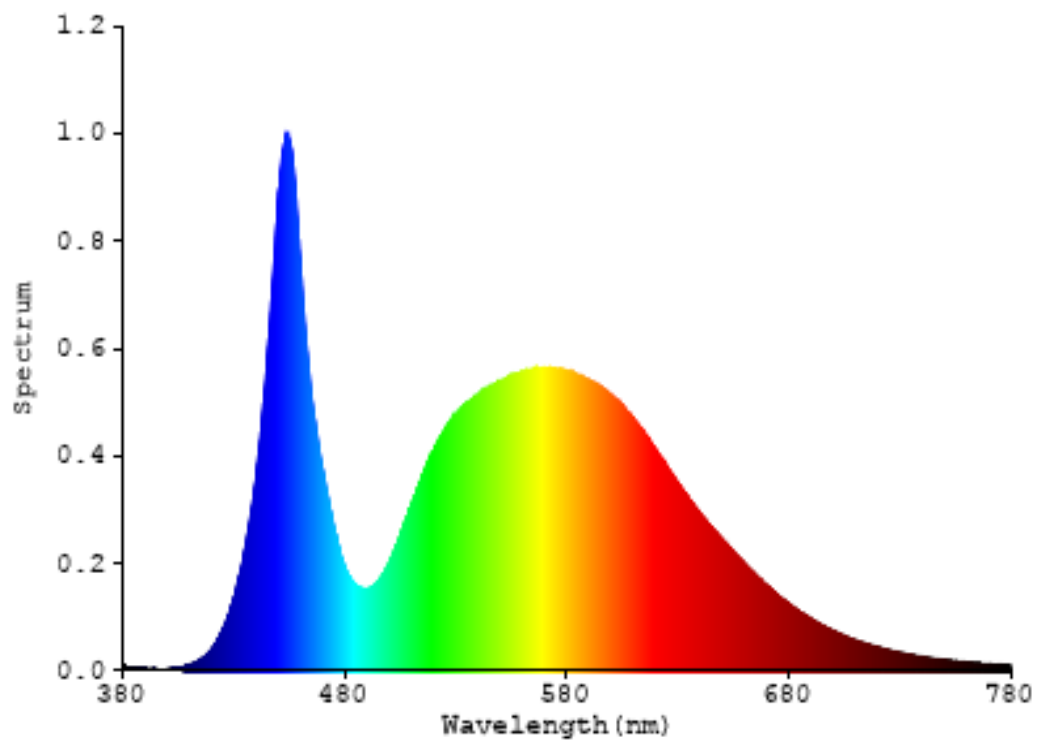


Chart 1: Spectral Power Distribution

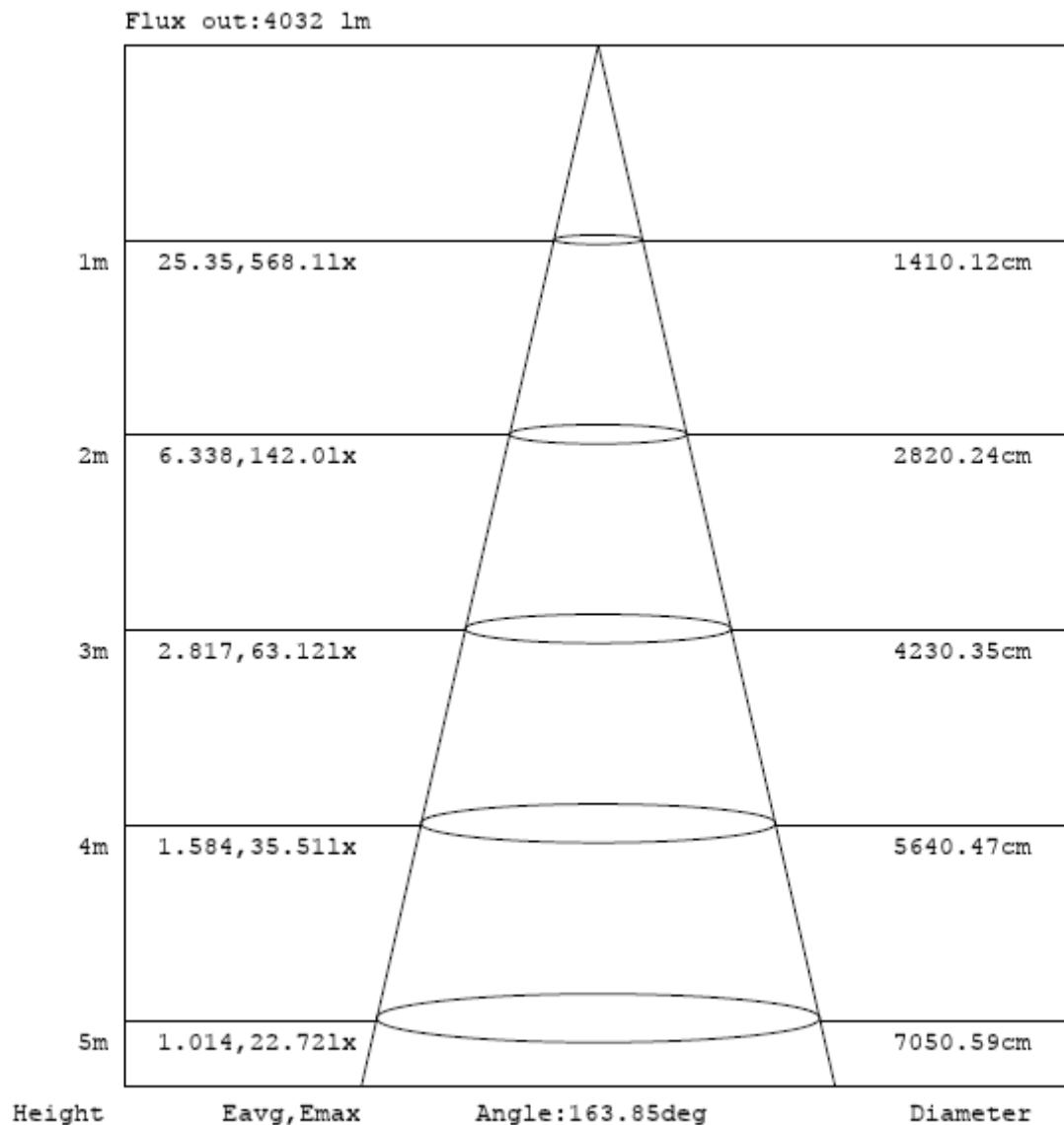
Zonal Lumen Tabulation

$\gamma(^{\circ})$	Lumens	% Total
0- 10	53.345	1.14%
10- 20	166.424	3.56%
20- 30	294.342	6.30%
30- 40	433.642	9.29%
40- 50	560.697	12.01%
50- 60	798.179	17.10%
60- 70	800.017	17.14%
70- 80	799.273	17.12%
80- 90	371.297	7.95%
90-100	111.099	2.38%
100-110	82.24	1.76%
110-120	79.169	1.70%
120-130	68.513	1.47%
130-140	36.368	0.78%
140-150	11.894	0.25%
150-160	1.776	0.04%
160-170	0.242	0.01%
170-180	0.084	0.00%
Total	4668.6	100%

$\gamma(^{\circ})$	Lumens	% Total
0- 60	2306.629	49.41%
60- 90	1970.587	42.21%
0-90	4277.216	91.62%
90- 180	391.385	8.38%
0- 180	4668.6	100%

Table 3: 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

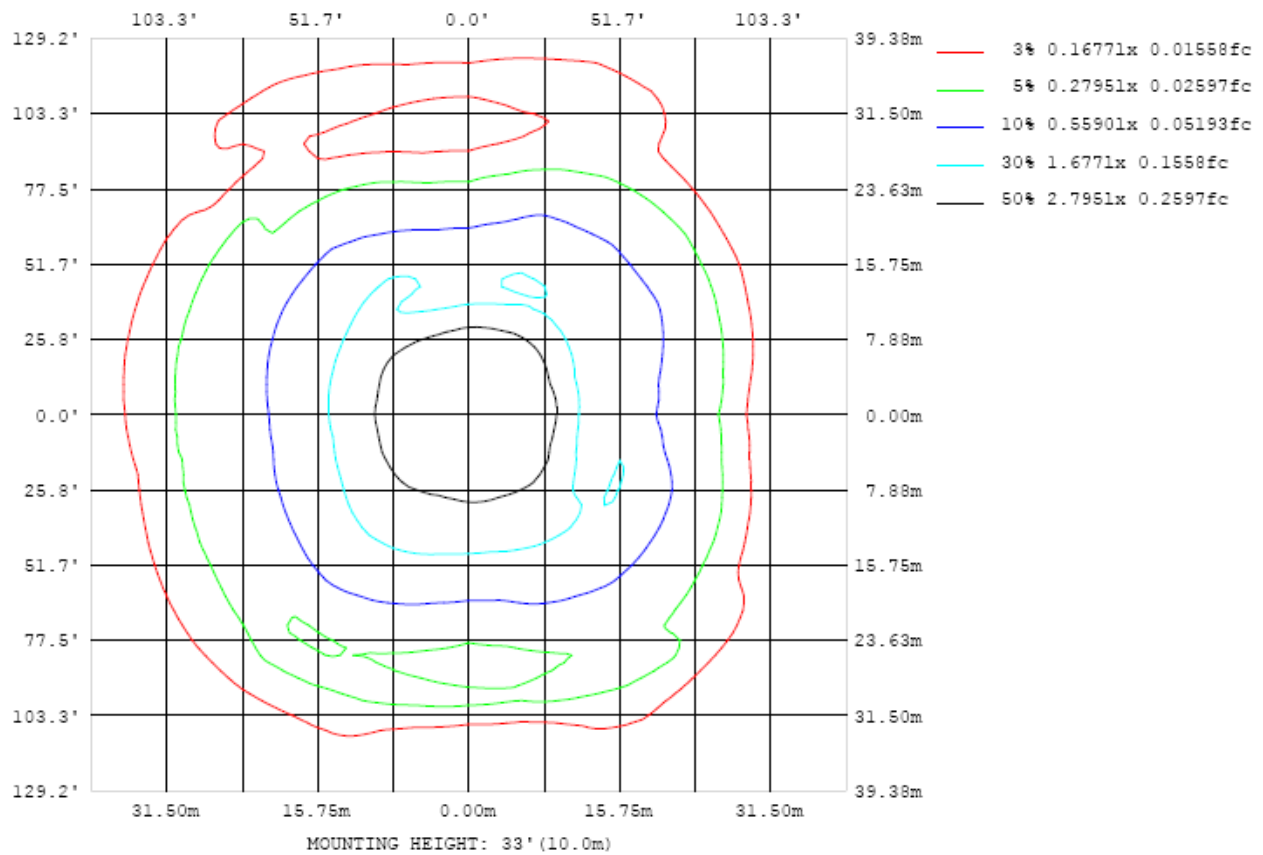


Chart 3: Illuminance Plot (Footcandles)

Luminous Intensity Distribution Plots

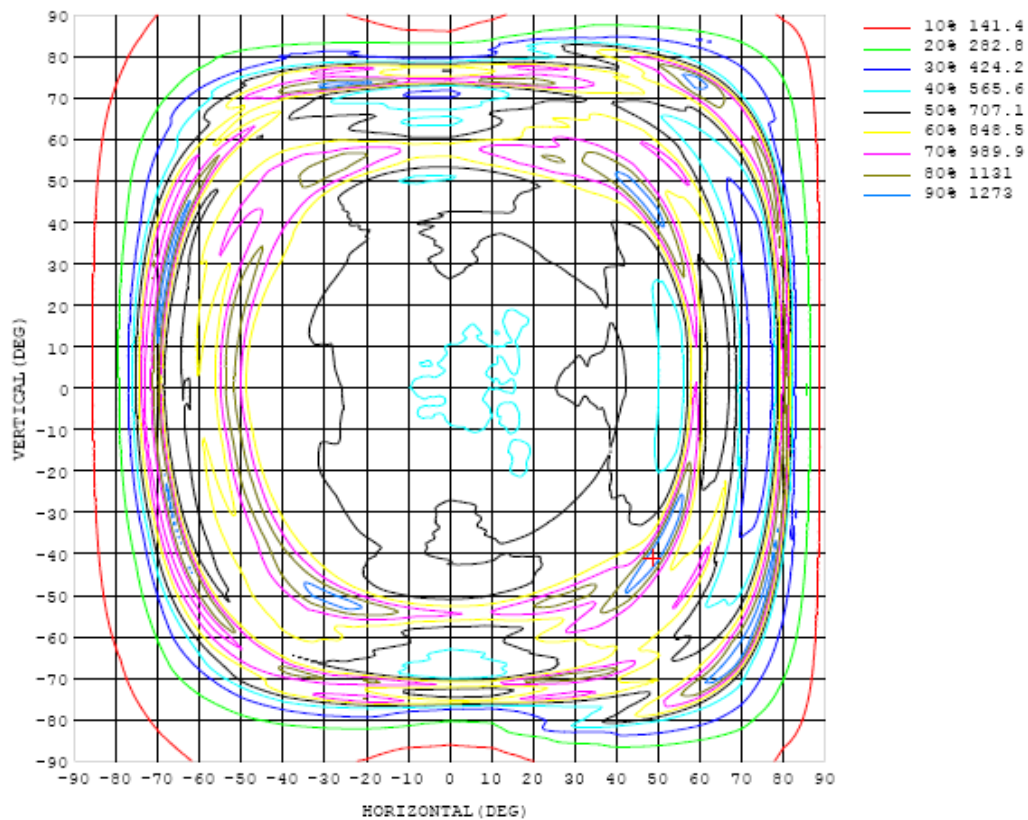


Chart 4: Isocandela Plot

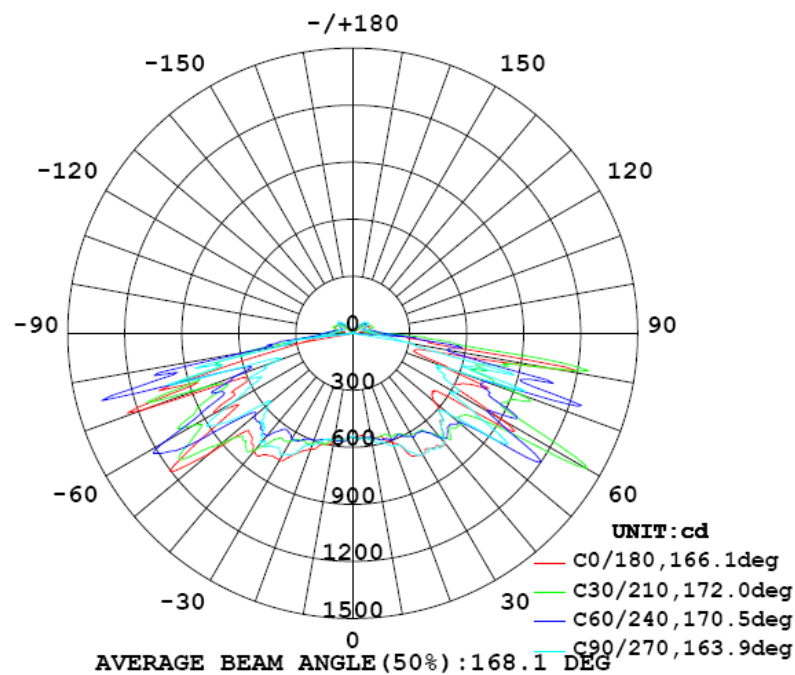


Chart 5: Polar Candela Distribution

Luminous Intensity Data

Table--1

UNIT: cd

C (DEG) y (DEG)	0	10	20	30	40	50	60	70	80	90	100	110	120	130	140	150	160	170	180
0	543	543	543	543	543	543	543	543	543	543	543	543	543	543	543	543	543	543	543
5	539	544	548	556	555	552	551	549	548	550	557	560	565	568	569	565	562	553	557
10	564	578	574	560	558	551	556	566	569	573	579	575	569	565	563	571	587	586	574
15	563	570	559	561	571	582	580	583	590	591	598	599	598	599	593	597	602	606	604
20	613	606	584	577	563	572	598	605	631	631	626	609	608	605	613	622	627	650	647
25	702	666	614	583	567	557	588	631	670	681	650	624	602	609	614	638	662	694	697
30	737	695	663	620	603	597	627	687	714	734	694	664	627	625	640	686	721	744	769
35	736	689	638	623	641	653	630	679	730	750	688	635	627	656	675	686	721	756	783
40	756	726	693	706	724	725	716	719	759	753	703	676	691	716	768	802	782	786	811
45	649	632	650	722	774	761	703	680	677	656	647	665	714	778	779	770	755	745	759
50	567	573	632	751	768	776	727	677	671	660	644	661	752	803	844	909	1009	1041	979
55	523	543	630	760	935	1089	1175	1084	965	976	1051	1205	1248	1236	1218	1106	1001	902	997
60	895	1056	1364	1420	1216	964	818	707	642	626	675	774	926	1003	954	931	948	855	837
65	629	691	842	866	907	922	810	694	573	533	591	701	812	902	850	784	701	636	649
70	518	583	758	935	911	832	735	668	544	552	622	675	702	700	776	1017	1259	1293	1187
75	343	414	579	710	786	865	934	892	770	780	839	933	897	957	959	888	796	664	756
80	1085	1195	1214	1063	775	598	506	416	329	310	364	430	454	464	442	382	315	249	256
85	292	341	474	504	489	425	343	251	175	162	178	207	220	225	215	197	174	147	151
90	120	135	164	171	175	172	162	142	114	108	116	139	149	155	153	144	128	108	108
95	62.4	66.5	72.6	92.4	112	120	125	115	96.5	93.8	101	116	120	119	106	85.8	66.9	62.5	72.0
100	49.7	53.8	74.1	66.5	71.0	83.3	94.6	100	87.6	87.4	95.6	97.8	89.1	81.3	70.7	67.0	67.4	53.0	47.3
105	94.0	84.4	100	105	73.8	66.9	64.5	62.2	62.9	63.0	62.8	61.6	63.5	70.4	80.9	112	88.5	83.8	98.6
110	95.1	80.1	97.1	110	95.1	80.0	64.4	46.7	47.3	47.0	47.9	48.6	64.2	85.1	99.1	103	81.0	81.0	97.6
115	87.5	70.8	82.9	103	104	95.3	73.2	60.4	56.0	55.5	60.6	62.4	83.0	102	102	96.5	70.9	77.1	92.8
120	81.5	64.5	75.4	94.5	94.9	88.3	83.5	87.3	84.8	85.7	89.5	89.1	88.1	92.2	93.2	89.5	63.6	75.4	91.2
125	68.2	53.0	63.7	82.5	83.1	75.5	85.0	92.5	93.3	97.0	96.0	92.5	82.8	79.3	81.8	73.5	47.6	62.2	74.6
130	33.2	37.4	29.0	49.9	54.0	69.9	82.2	88.3	90.0	93.9	91.7	88.6	80.8	64.9	57.4	55.7	37.5	51.4	25.9
135	19.9	15.9	9.97	18.1	36.8	54.6	67.4	73.8	75.8	78.7	76.5	73.9	65.6	51.3	31.4	17.0	18.4	32.6	37.1
140	4.41	2.69	1.20	3.66	23.7	39.2	49.7	56.4	59.3	60.8	59.0	55.2	48.1	35.9	17.8	1.12	2.71	5.38	9.99
145	1.09	0.93	1.06	1.07	9.73	23.3	32.0	38.3	41.9	43.3	41.3	37.4	30.1	20.2	4.78	0.98	0.97	0.99	1.13
150	0.99	1.01	0.98	1.01	0.99	7.48	16.4	22.7	25.6	26.4	25.0	21.9	14.8	4.64	0.94	0.92	0.80	0.93	1.01
155	0.91	0.94	0.84	0.94	0.92	0.90	1.02	6.17	10.0	11.0	9.55	5.08	0.91	0.88	0.89	0.88	0.79	0.90	0.94
160	0.88	0.90	0.91	0.83	0.89	0.86	0.81	0.78	0.77	0.74	0.74	0.76	0.82	0.86	0.87	0.80	0.88	0.89	0.93
165	0.88	0.90	0.92	0.92	0.82	0.78	0.75	0.71	0.69	0.69	0.70	0.73	0.81	0.82	0.83	0.91	0.93	0.90	0.92
170	0.89	0.90	0.91	0.89	0.86	0.80	0.71	0.66	0.69	0.69	0.67	0.71	0.80	0.88	0.91	0.94	0.93	0.92	0.96
175	0.92	0.92	0.92	0.92	0.92	0.89	0.82	0.80	0.81	0.78	0.80	0.80	0.87	0.90	0.93	0.96	0.96	0.94	0.95
180	0.88	0.92	0.95	0.98	0.98	0.98	0.95	0.89	0.90	0.90	0.89	0.88	0.91	0.94	0.95	0.95	0.92	0.88	0.88

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	543	543	543	543	543	543	543	543	543	543	543	543	543	543	543	543	543		
5	555	560	566	573	574	572	566	562	559	558	560	559	558	554	545	539	535		
10	578	576	568	568	570	568	573	568	562	562	555	549	549	553	558	569	561		
15	611	603	602	591	581	578	582	586	578	574	560	564	571	564	562	563	565		
20	648	634	613	597	606	599	605	624	625	610	600	577	564	555	575	587	606		
25	671	645	622	608	595	616	633	669	685	656	622	595	569	563	584	621	661		
30	733	707	655	646	636	640	661	699	735	706	667	622	611	619	630	670	706		
35	747	693	673	672	648	617	643	697	731	720	655	642	669	656	618	651	713		
40	789	791	797	762	718	706	675	715	760	737	719	750	745	728	694	688	741		
45	748	775	798	793	733	679	651	637	665	678	695	750	778	763	695	643	649		
50	964	936	902	812	747	668	593	556	576	613	668	755	776	756	713	611	590		
55	1063	1106	1109	1081	1003	958	884	814	818	874	943	890	834	750	641	567	523		
60	892	950	970	1074	1145	1154	944	760	740	855	1001	1091	1122	1171	1230	1180	1024		
65	731	821	875	912	829	744	621	547	545	634	812	901	963	980	843	745	638		
70	1261	1091	832	707	723	662	551	441	429	538	691	784	893	937	968	773	592		
75	829	833	847	894	976	1369	1264	950	875	1069	1270	1051	802	594	502	436	357		
80	317	409	553	662	614	562	469	382	374	447	570	632	686	909	1057	1087	868		
85	181	222	232	241	247	238	205	176	168	227	349	441	470	515	567	520	414		
90	122	142	153	161	161	152	133	110	107	129	165	178	187	185	179	177	133		
95	72.8	77.7	95.0	114	120	117	106	88.7	87.5	99.5	117	124	124	114	96.4	82.9	76.2		
100	48.4	66.5	70.1	74.9	85.9	90.2	85.4	77.2	77.6	83.5	89.7	90.4	80.6	69.7	65.2	54.9	33.8		
105	84.1	103	99.6	77.8	70.9	64.9	63.0	62.9	64.1	64.3	64.2	66.2	68.5	78.4	117	91.1	82.9		
110	79.5	93.1	105	91.5	77.1	60.0	45.4	44.5	45.0	47.1	48.9	69.7	83.2	103	115	89.4	86.6		
115	72.7	84.0	97.2	101	92.6	70.2	54.5	48.3	47.2	52.8	57.7	82.4	98.3	104	99.5	71.8	80.4		
120	69.0	81.2	91.4	90.3	91.2	82.7	83.2	80.0	79.9	82.3	84.5	86.7	90.4	92.6	90.6	60.4	77.4		
125	55.9	64.4	77.3	80.3	80.6	87.1	95.4	95.4	96.7	95.4	93.3	80.4	78.2	84.3	76.2	48.2	66.1		
130	45.5	43.1	58.7	56.6	69.4	83.9	91.7	94.8	97.1	95.1	92.9	81.0	62.4	52.7	47.7	33.1	29.6		
135	33.2	21.7	22.6	36.0	53.2	66.2	71.2	74.7	77.3	75.7	74.7	64.1	46.4	27.1	11.0	16.1	21.1		
140	7.42	2.75	4.45	23.9	39.2	50.8	55.5	59.9	61.9	60.9	55.7	46.7	31.9	13.4	1.21	3.13	4.77		
145	1.01	1.15	1.16	9.95	24.7	34.2	38.5	41.6	43.1	41.9	38.2	29.9	16.5	1.09	1.14	1.11	1.16		
150	1.02	1.03	1.06	1.04	7.53	17.0	22.2	25.0	25.8	24.5	20.4	12.4	0.999	1.03	1.05	0.97	1.06		
155	0.96	0.89	0.97	0.98	0.93	0.88	4.62	8.34	9.20	7.06	2.14	0.91	0.93	0.97	0.98	0.96	0.98		
160	0.94	0.94	0.88	0.95	0.93	0.87	0.84	0.83	0.81	0.85	0.86	0.89	0.90	0.93	0.91	0.97	0.95		
165	0.93	0.95	0.96	0.91	0.90	0.87	0.81	0.79	0.77	0.77	0.80	0.83	0.84	0.86	0.95	0.96	0.94		
170	0.96	0.98	1.00	1.00	0.99	0.93	0.82	0.79	0.79	0.76	0.76	0.77	0.83	0.90	0.96	0.98	0.98		
175	0.95	0.98	0.99	1.00	0.98	0.95	0.86	0.81	0.83	0.83	0.83	0.80	0.84	0.90	0.93	0.95	0.96		
180	0.88	0.92	0.94	0.97	0.98	0.97	0.93	0.89	0.89	0.89	0.88	0.87	0.91	0.94	0.95	0.94	0.91		

Table 5: Luminous Intensity Data

EQUIPMENT LIST

Test Equipment	Model	Equipment No.	Calibration Date	Calibration Due date
Goniophotometer system	GO-R5000	HZTE011-01	Jul. 17, 2015	Jul. 16, 2016
Digital Power Meter	PF2010A	HZTE028-01	Jul. 17, 2015	Jul. 16, 2016
AC Power Supply	PCR 500L	HZTE001-08	Jul. 17, 2015	Jul. 16, 2016
DC Power Supply	WY12010	HZTE004-03	Jul. 17, 2015	Jul. 16, 2016
Temperature Meter	TES1310	HZTE017-01	Jul. 17, 2015	Jul. 16, 2016
Standard source	D908	HZTE012-01	Jul. 23, 2015	Jul. 22, 2016
Standard source	SCL-1400	HZTE012-02	Oct. 21, 2015	Oct. 20, 2016

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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