



LM-79-08 Test Report

for

ABBlighting, Inc.

3 Adams St Belvidere, NJ 07823.

40W PKG

Model: ABPKG40LED50

Laboratory: Leading Testing Laboratories

NVLAP CODE: 200960-0

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www.ledtestlab.com

Report No.: HZ15050026a

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

Reviewed by:

Engineer: April Zou
May 26, 2015



Manager: Jim Zhang
May 26, 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: ABPKG40LED50

Luminous Efficacy (Lumens /Watt)	Total Luminous Flux (Lumens)	Power (Watts)	Power Factor
103.6	3600.8	34.77	0.9943
CCT (K)	CRI	Stabilization Time (Light & Power)	
4902	78.0	60	

Table 1: Executive Data Summary

Test specifications:

Date of Receipt	: May 21, 2015
Date of Test	: May 25, 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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Figure 1- Overview of the sample

Equipment Under Test (EUT)

Name	: 40W PKG
Model	: ABPKG40LED50
Electrical Ratings	: 100~277VAC, 50/60Hz, 40W
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: 60pcs
Manufacturer	: ABB Lighting (shanghai) Co., Ltd.
Address	: Room 1012, North Minch Fortune 108 Plaza,# 1839 Qixin road, Shanghai

TEST RESULTS

Test ambient temperature was 24.3°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			Special Color Rendering Indices	
Test Voltage (V)	120.0	100.0	277.0	R1	76
Voltage frequency (Hz)	60	60	60	R2	84
Test Current (A)	0.292	0.354	0.134	R3	87
Power Factor	0.9943	0.9907	0.9465	R4	76
Test Power (W)	34.77	35.08	35.10	R5	76
THD A%	6.09	5.77	9.55	R6	76
Luminous Efficacy (lm/W)	103.6	102.5	102.5	R7	85
Total Luminous Flux (lm)	3600.8	3596.8	3597.7	R8	63
Color Rendering Index (CRI)	78.0			R9	-4
R9	-4			R10	60
Correlated Color Temperature (CCT) (K)	4902			R11	72
Chromaticity (Chroma x, Chroma y)	(0.3483, 0.3575)			R12	48
Chromaticity (Chroma u, Chroma v)	(0.2113, 0.3253)			R13	78
Chromaticity (Chroma u', Chroma v')	(0.2113, 0.4880)			R14	93
Duv	0.0017				
Average Beam Angle (°)	172.8				
Center Beam Candle Power (cd)	372				
Spacing Criteria	2.01 (0°-180°)/ 1.90 (90°-270°)				
Zonal Lumens in the 0°-60°Zone	47.34%				
Zonal Lumens in the 60°-90°Zone	44.91%				
Zonal Lumens in the 90°-120°Zone	5.28%				
Zonal Lumens in the 120°-180°Zone	2.47%				

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

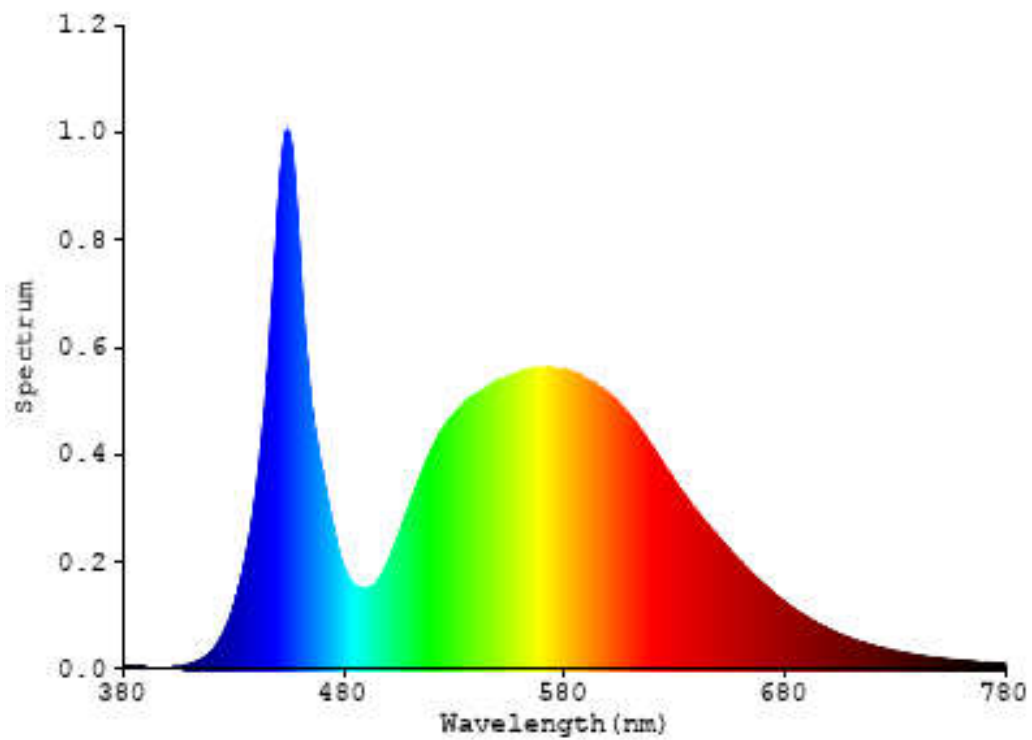


Chart 1: Spectral Power Distribution

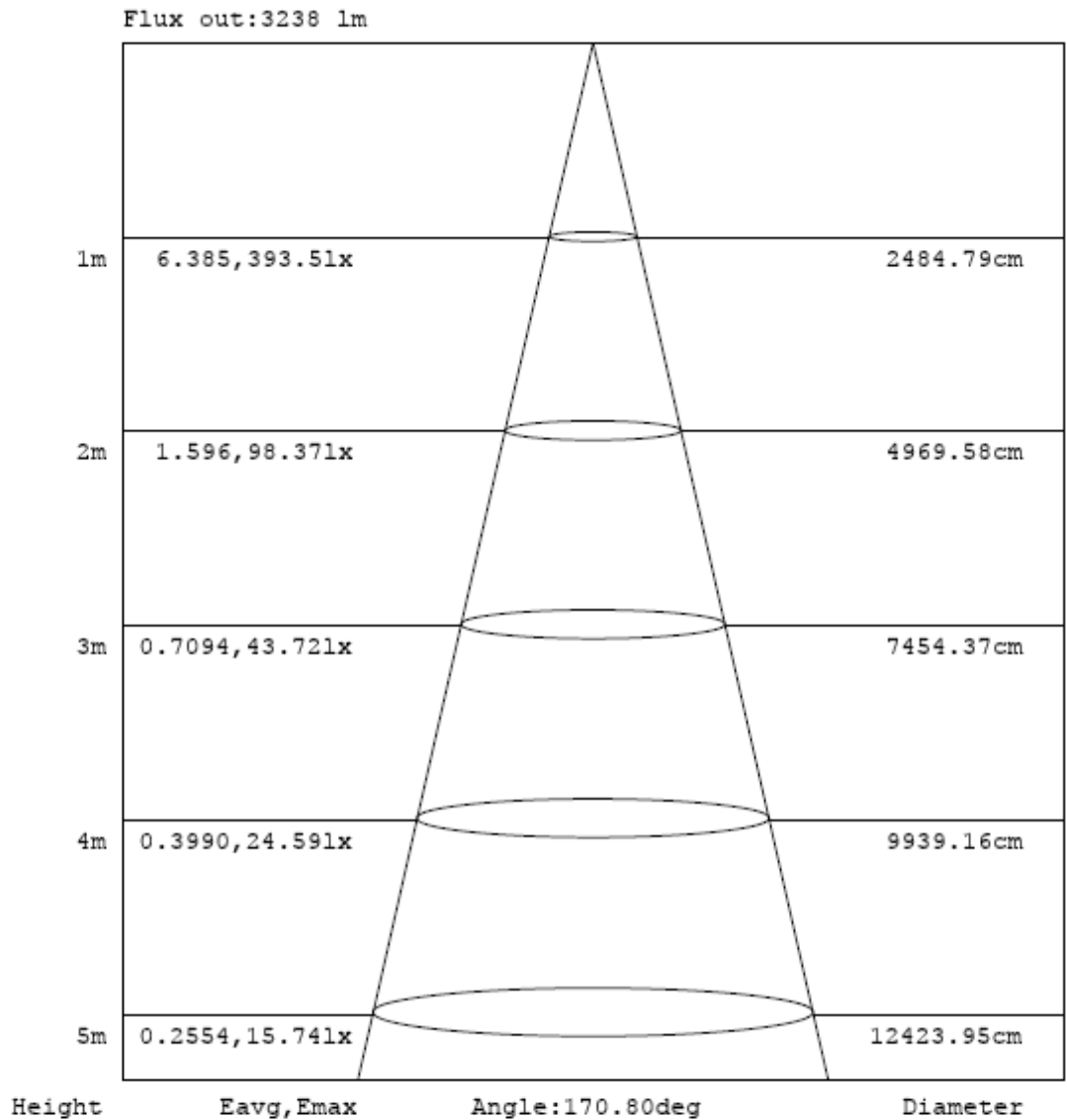
Zonal Lumen Tabulation

$\gamma(^{\circ})$	Lumens	% Total
0- 10	36.798	1.02%
10- 20	118.38	3.29%
20- 30	217.616	6.04%
30- 40	329.941	9.16%
40- 50	408.368	11.34%
50- 60	593.61	16.49%
60- 70	672.795	18.68%
70- 80	624.882	17.35%
80- 90	319.523	8.87%
90-100	81.547	2.26%
100-110	53.47	1.48%
110-120	55.049	1.53%
120-130	50.601	1.41%
130-140	27.179	0.75%
140-150	9.417	0.26%
150-160	1.445	0.04%
160-170	0.159	0.00%
170-180	0.054	0.00%
Total	3600.8	100%

$\gamma(^{\circ})$	Lumens	% Total
0- 60	1704.713	47.34%
60- 90	1617.2	44.91%
0-90	3321.913	92.25%
90- 180	278.921	7.75%
0- 180	3600.8	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

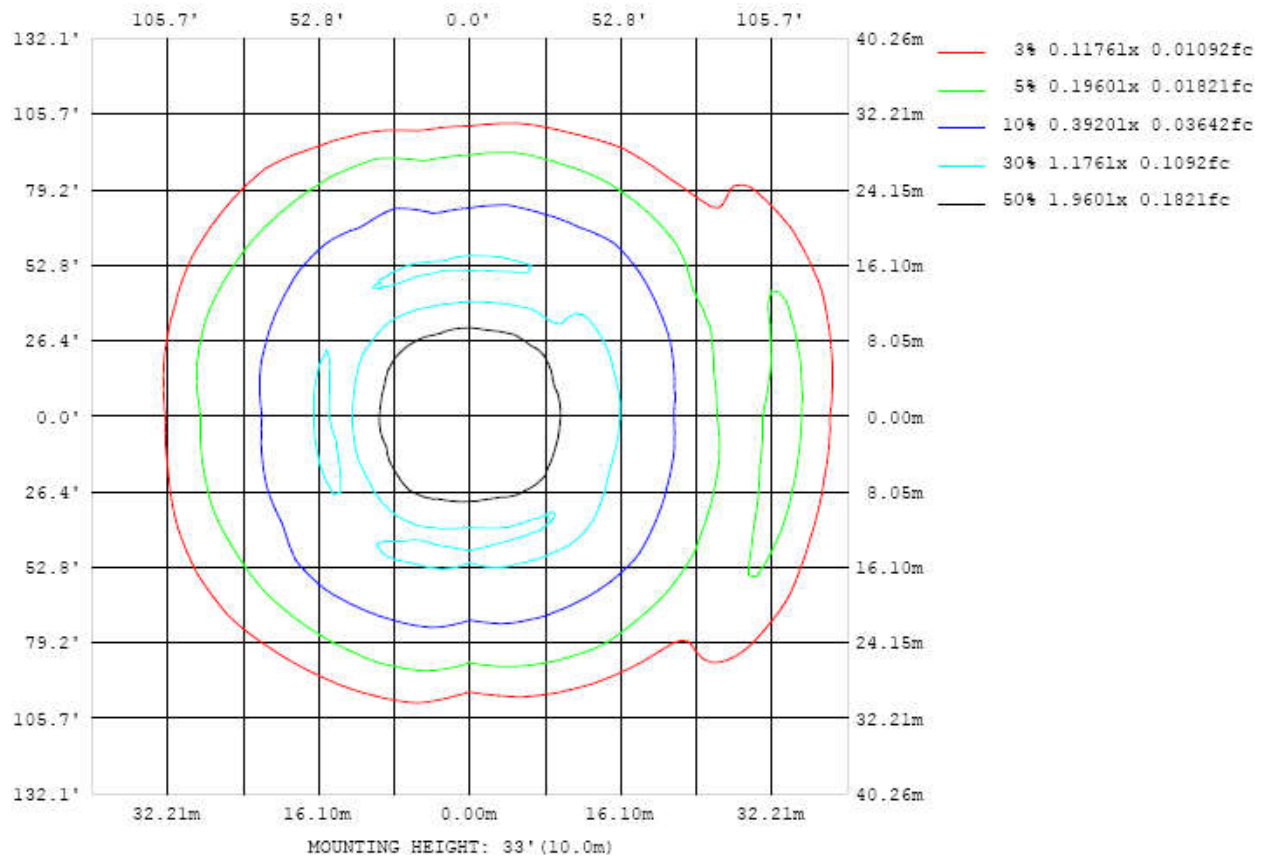


Chart 3: Illuminance Plot (Footcandles)

Luminous Intensity Distribution Plots

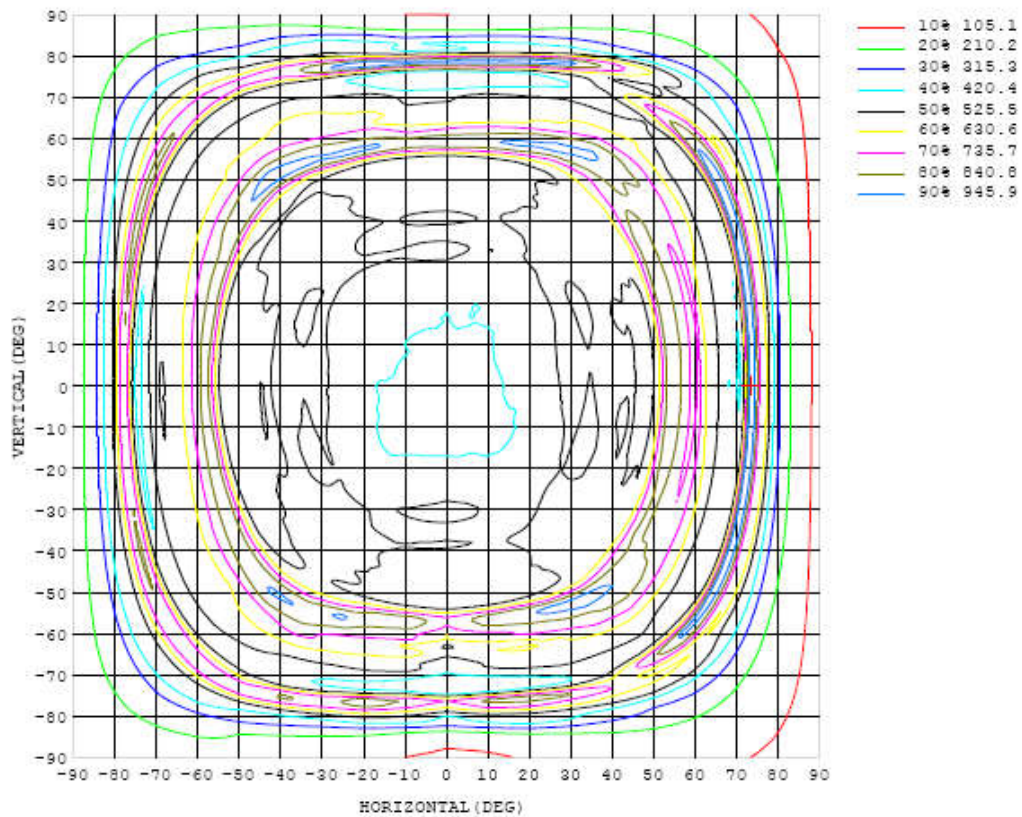


Chart 4: Isocandela Plot

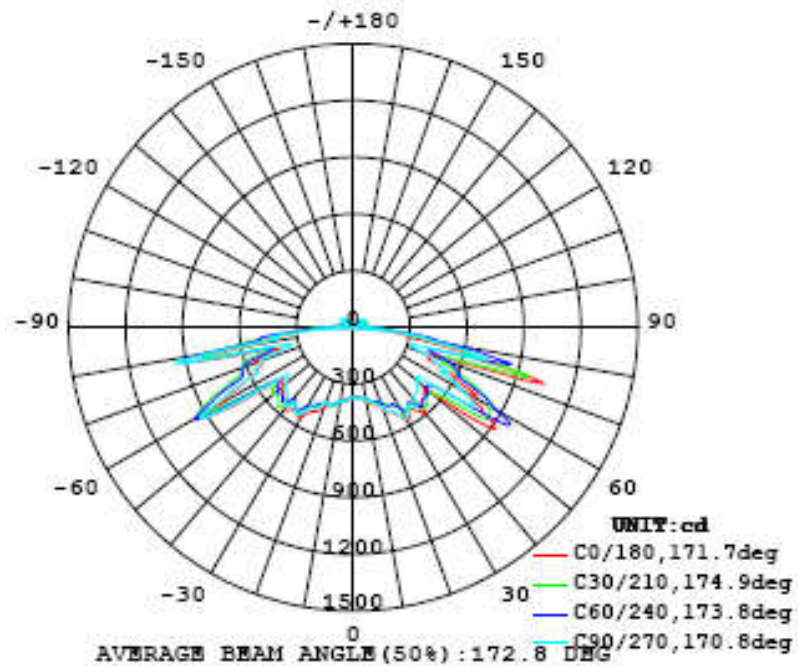


Chart 5: Polar Candela Distribution

Luminous Intensity Data

Table--1

UNIT: cd

C (DEG) γ (DEG)	0	10	20	30	40	50	60	70	80	90	100	110	120	130	140	150	160	170	180
0	372	372	372	372	372	372	372	372	372	372	372	372	372	372	372	372	372	372	372
5	379	378	377	375	378	375	371	373	376	376	373	372	371	374	379	382	382	381	382
10	397	395	389	387	384	389	385	386	388	390	380	386	392	389	392	397	401	404	402
15	424	421	420	412	407	401	403	409	409	412	407	409	408	406	406	412	414	417	416
20	459	450	436	423	420	417	424	443	443	452	447	436	425	414	416	423	441	449	448
25	498	484	465	457	449	455	455	463	479	488	475	463	449	448	447	458	471	485	489
30	569	552	520	494	493	488	496	512	535	554	537	511	484	480	494	498	514	541	548
35	522	498	496	515	539	519	503	481	495	507	499	499	524	526	529	513	501	521	531
40	589	573	554	555	566	567	549	517	510	514	525	529	552	560	548	545	542	552	563
45	528	527	529	541	572	554	529	495	483	476	490	515	546	576	552	535	521	528	526
50	533	533	524	539	554	561	507	481	444	432	456	490	532	540	537	512	509	509	492
55	917	905	847	834	734	629	617	685	684	620	647	626	568	544	525	517	563	578	530
60	720	724	737	830	923	969	869	798	737	641	790	843	961	901	904	893	856	806	806
65	556	593	610	676	744	700	614	645	625	547	684	702	693	779	746	675	640	595	576
70	422	458	486	506	531	531	547	504	463	405	498	537	533	556	569	546	574	579	543
75	837	820	844	901	783	567	507	559	547	466	535	442	418	431	460	443	466	459	405
80	345	369	418	487	528	524	523	527	495	424	540	650	668	723	790	719	626	576	586
85	160	171	194	219	231	230	212	195	169	151	175	216	239	259	283	295	301	276	280
90	88.2	97.6	109	115	118	115	114	111	96.7	89.3	106	121	125	133	136	133	128	113	115
95	44.6	45.8	46.1	59.0	67.5	74.9	78.7	74.7	63.4	61.4	69.1	77.8	79.3	79.6	73.6	63.1	53.2	51.6	56.2
100	36.6	38.6	50.0	51.8	48.0	49.3	51.3	49.5	47.2	48.6	50.1	52.2	52.6	49.6	46.0	44.4	41.7	29.9	30.8
105	70.6	60.9	62.6	73.2	53.4	45.4	42.5	39.1	41.4	42.6	41.4	40.4	42.1	43.7	47.8	67.5	52.2	51.9	62.6
110	70.8	60.3	60.9	75.6	68.4	52.7	41.2	32.3	34.6	34.4	35.1	33.7	42.0	50.0	63.4	68.8	51.7	52.4	62.6
115	69.1	56.7	54.3	70.6	72.8	66.0	48.0	41.6	38.2	36.7	40.4	41.9	53.1	65.4	65.7	62.9	47.4	51.7	62.5
120	66.3	53.0	50.4	67.2	68.4	63.4	61.1	66.0	65.5	63.6	63.9	62.8	61.7	63.1	62.7	58.7	43.4	49.7	59.8
125	59.9	46.8	41.8	57.4	56.1	51.7	61.3	73.0	76.0	75.7	72.9	68.2	57.3	51.1	53.2	50.1	35.5	43.3	53.8
130	28.3	36.7	27.8	37.3	35.8	43.9	56.1	66.0	69.4	69.6	66.8	61.9	51.6	38.9	34.1	33.4	27.6	34.1	22.0
135	22.7	22.8	13.8	13.4	22.6	35.8	47.1	53.4	56.2	57.1	54.3	51.2	43.0	30.6	17.0	7.82	13.5	20.4	20.8
140	6.92	5.44	1.47	0.82	14.5	26.4	36.0	41.4	44.2	45.3	42.8	39.2	32.0	21.3	8.47	0.79	2.10	4.49	6.21
145	0.75	0.73	0.73	0.73	4.11	15.2	23.3	29.0	31.7	32.5	30.6	26.5	20.2	10.9	0.69	0.72	0.72	0.72	0.80
150	0.69	0.69	0.63	0.68	0.67	2.50	10.7	15.4	18.7	19.3	17.7	13.8	8.35	0.63	0.65	0.66	0.62	0.67	0.71
155	0.64	0.65	0.59	0.63	0.61	0.59	0.57	0.85	4.16	5.30	3.77	0.57	0.57	0.61	0.63	0.61	0.56	0.62	0.64
160	0.62	0.62	0.61	0.56	0.58	0.56	0.54	0.51	0.51	0.52	0.55	0.54	0.56	0.59	0.60	0.56	0.60	0.60	0.62
165	0.62	0.61	0.61	0.60	0.56	0.52	0.49	0.48	0.48	0.49	0.50	0.52	0.56	0.57	0.57	0.62	0.62	0.60	0.61
170	0.62	0.61	0.60	0.59	0.57	0.54	0.49	0.45	0.49	0.49	0.46	0.48	0.56	0.62	0.62	0.62	0.62	0.61	0.63
175	0.62	0.61	0.61	0.60	0.61	0.59	0.55	0.52	0.55	0.54	0.53	0.53	0.58	0.62	0.63	0.64	0.63	0.62	0.63
180	0.58	0.59	0.60	0.62	0.62	0.61	0.58	0.55	0.57	0.57	0.55	0.54	0.59	0.61	0.61	0.59	0.59	0.55	0.58

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	372	372	372	372	372	372	372	372	372	372	372	372	372	372	372	372	372		
5	384	387	385	383	385	387	386	388	386	386	387	387	388	383	381	381	379		
10	410	410	408	403	409	406	404	401	396	400	405	403	398	397	401	398	398		
15	426	425	430	421	422	423	423	423	417	423	420	409	413	420	431	434	426		
20	455	446	424	430	431	430	422	432	427	432	418	424	434	429	446	465	463		
25	494	479	463	437	437	452	465	476	472	465	448	443	442	470	484	493	504		
30	542	511	482	470	470	478	493	514	517	492	469	469	490	486	519	561	581		
35	531	524	539	528	532	535	520	529	527	509	523	518	529	547	530	516	529		
40	561	533	529	578	548	497	505	546	546	521	495	528	585	556	549	572	600		
45	515	521	558	557	552	527	482	485	487	473	506	551	545	594	543	520	529		
50	484	509	540	538	545	523	487	461	463	472	514	527	551	563	546	509	514		
55	517	490	529	528	513	486	456	451	456	465	480	509	579	655	838	901	916		
60	836	887	923	871	931	965	952	866	908	938	961	899	864	864	790	730	697		
65	626	690	733	810	745	679	630	536	555	588	636	730	839	799	689	642	584		
70	582	591	612	609	652	613	601	504	514	555	562	591	588	566	482	490	447		
75	429	443	458	467	458	443	399	327	333	368	382	413	498	706	909	963	914		
80	644	706	738	731	776	762	722	621	666	743	891	983	806	579	498	449	387		
85	336	377	325	317	356	385	346	276	285	310	316	312	291	269	238	205	173		
90	128	151	155	151	151	136	128	105	104	118	130	136	133	129	121	111	93.5		
95	61.8	67.2	75.2	85.3	89.2	88.3	81.5	68.7	66.9	78.0	87.0	90.4	91.8	81.8	69.0	57.2	48.9		
100	33.1	34.9	43.1	48.5	54.5	58.1	57.0	52.7	51.8	55.3	60.0	58.9	54.9	49.9	41.7	38.2	30.2		
105	55.0	56.9	61.2	46.4	42.4	42.7	41.8	43.2	43.2	42.2	42.9	44.2	46.5	51.4	74.2	64.6	60.2		
110	52.8	56.6	68.7	57.6	45.9	41.2	35.1	35.9	36.0	35.6	36.9	45.7	53.0	69.1	77.7	61.9	60.5		
115	49.0	52.8	64.7	65.9	63.3	48.6	42.6	38.4	37.5	39.1	42.1	57.1	70.6	71.5	69.2	53.9	58.1		
120	46.2	50.5	62.2	64.6	65.0	64.0	67.5	65.8	64.1	64.8	61.7	63.3	68.5	69.7	63.9	47.7	55.7		
125	40.2	44.2	56.8	57.5	57.1	66.9	75.6	80.2	81.0	75.8	68.0	56.8	57.7	61.6	56.7	40.6	50.7		
130	30.9	30.4	40.7	41.6	50.4	62.3	70.6	74.7	75.7	71.4	64.4	52.4	41.8	42.5	42.4	31.1	30.0		
135	17.6	11.9	18.5	28.8	42.8	52.6	58.8	63.5	64.9	60.5	55.6	45.3	32.0	21.0	16.0	17.3	26.3		
140	3.84	1.49	7.31	21.0	32.7	42.2	47.5	51.2	52.1	49.0	44.2	35.5	24.2	10.9	0.97	4.07	6.88		
145	0.67	0.78	0.79	11.6	22.0	30.3	34.9	38.6	39.2	36.4	32.2	24.6	14.5	1.59	0.73	0.72	0.75		
150	0.69	0.69	0.71	0.69	10.2	17.5	21.8	24.9	25.5	23.1	19.2	12.4	3.20	0.65	0.66	0.57	0.67		
155	0.64	0.55	0.63	0.65	0.63	3.26	8.49	10.6	11.2	9.66	5.81	0.58	0.59	0.61	0.61	0.54	0.63		
160	0.63	0.62	0.54	0.61	0.61	0.58	0.56	0.56	0.53	0.50	0.51	0.56	0.57	0.59	0.55	0.61	0.62		
165	0.61	0.62	0.63	0.55	0.56	0.57	0.52	0.49	0.47	0.48	0.47	0.51	0.53	0.53	0.55	0.61	0.61		
170	0.63	0.64	0.64	0.65	0.64	0.56	0.50	0.47	0.47	0.48	0.44	0.46	0.50	0.56	0.60	0.61	0.62		
175	0.63	0.63	0.63	0.63	0.61	0.59	0.53	0.49	0.51	0.52	0.50	0.48	0.53	0.57	0.58	0.58	0.59		
180	0.58	0.59	0.60	0.61	0.61	0.61	0.58	0.56	0.57	0.59	0.55	0.55	0.59	0.62	0.61	0.60	0.57		

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 expanded uncertainty is 1.94% with a coverage factor $k=2$.

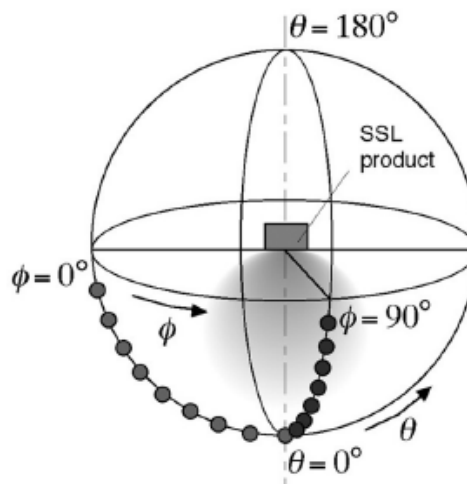
Color Characteristics Measurements

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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