



LM-79-08 Test Report

for

GREEN CREATIVE LTD

756 North Zhongshan Rd., Unit B301 Zhabei District, Shanghai

LED HID

Model: 37HID/850/277V/EX39

37HID/850/277V/E26

Laboratory: Leading Testing Laboratories

NVLAP CODE: 200960-0

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Report No.: HZ18030035f/R1

This report is replaced the old report No. HZ18030035f dated May 22, 2018

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

Review by:

Engineer: April Zou

Jul. 26, 2018

Approved by:



Manager: Jim Zhang

Jul. 26, 2018

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: 37HID/850/277V/EX39

Luminous Efficacy (Lumens /Watt)	Total Luminous Flux (Lumens)	Power (Watts)	Power Factor
144.3	5200.0	36.03	0.9883
CCT (K)	CRI	Stabilization Time (Light & Power)	
5097	84.2	60	

Table 1: Executive Data Summary

Note: The above results are recorded/ derived from measurements made using an Integrating Sphere.

Test specifications:

Date of Receipt : Mar. 20, 2018

Date of Test : Mar. 22, 2018

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 Photos.....	4
TEST RESULTS	5
Goniophotometer Method	6
Spectral Power Distribution - Sphere Spectroradiometer Method	7
Chromaticity Diagram - Sphere Spectroradiometer Method.....	8
Nominal CCT Quadrangles – Sphere Spectroradiometer Method	9
Zonal Lumen Tabulation- Goniophotometer Method	10
Luminous Intensity Distribution Plots- Goniophotometer Method.....	12
Luminous Intensity Data- Goniophotometer Method.....	13
EQUIPMENT LIST	15
TEST METHODS	15
Seasoning of SSL Product.....	15
Sphere-Spectroradiometer Method- Photometric and Electrical Measurements.....	15
Goniophotometer Method	16
Photometric and Electrical Measurements.....	16
Color Characteristics Measurements.....	16
Color Spatial Uniformity	16

Sample Photos



EX39



E26

Equipment Under Test (EUT)

Name	: LED HID
Model	: 37HID/850/277V/EX39, 37HID/850/277V/E26
Electrical Ratings	: 120-277V, 50/60HZ
Product Description	: 5000K
Manufacturer	: GREEN CREATIVE LTD
Address	: 756 North Zhongshan Rd., Unit B301 Zhabei District, Shanghai

Note: Model 37HID/850/277V/EX39 and model 37HID/850/277V/E26 are identical except their different screw base. Model 37HID/850/277V/EX39 is EX39 base. 37HID/850/277V/E26 is E26 base. Model 37HID/850/277V/EX39 was chosen to be representative model in this report.

TEST RESULTS

Test ambient temperature was 24.9°C.

Test 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 65 minutes.

Sphere-Spectroradiometer Method

Parameter	Result	
Test Voltage (V)	120.0	277.0
Voltage frequency (Hz)	60	60
Test Current (A)	0.304	0.143
Power Factor	0.9883	0.9088
Test Power (W)	36.03	36.10
THD A%	12.81	12.91
Luminous Efficacy (lm/W)	144.3	145.3
Total Luminous Flux (lm)	5200.0	5244.0
Color Rendering Index (CRI)	84.2	
R9	11.6	
Correlated Color Temperature (CCT)(K)	5097	
Chromaticity Chroma x	0.3425	
Chromaticity Chroma y	0.3524	
Chromaticity Chroma u	0.2094	
Chromaticity Chroma v	0.3231	
Duv	0.0008	
Chromaticity Chroma u'	0.2094	
Chromaticity Chroma v'	0.4847	

Special Color Rendering Indices	
R1	82.7
R2	90.1
R3	94
R4	83.2
R5	83.2
R6	85.4
R7	86.9
R8	68.1
R9	11.6
R10	75.8
R11	82.3
R12	64.4
R13	84.9
R14	97
Rf	82
Rg	95

Table 2: Test data per Sphere-Spectroradiometer Method

Note: According to CIE 1976 (u',v') diagram, $u' = u = 4x/(-2x+12y+3)$, $v' = 3v/2 = 9y/(-2x+12y+3)$.

Goniophotometer Method

Test ambient temperature was 25.1°C.

The photometric distance is 2.47m.

Luminous data was taken at 0.5°vertical intervals and 10°horizontal intervals.

Parameter	Result
Test Voltage (V)	120.0
Voltage frequency (Hz)	60
Test Current (A)	0.305
Power Factor	0.9876
Test Power (W)	36.18
Luminous Efficacy (lm/W)	143.4
Total Luminous Flux (lm)	5187.1
Beam Angle (°)	312.8
Center Beam Candle Power (cd)	214
Spacing Criteria	2.66 (0°-180°) / 2.61 (90°-270°)
Zonal Lumens in the 0°-60°Zone	25.04%
Zonal Lumens in the 60°-90°Zone	30.93%
Zonal Lumens in the 90°-120°Zone	29.05%
Zonal Lumens in the 120°-180°Zone	14.98%

Table 3: Test data per Goniophotometer Method

Spectral Power Distribution - Sphere Spectroradiometer Method

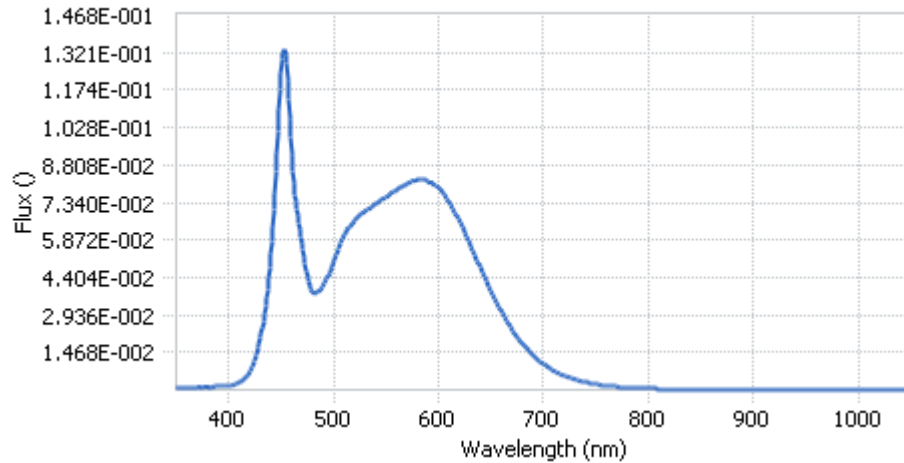
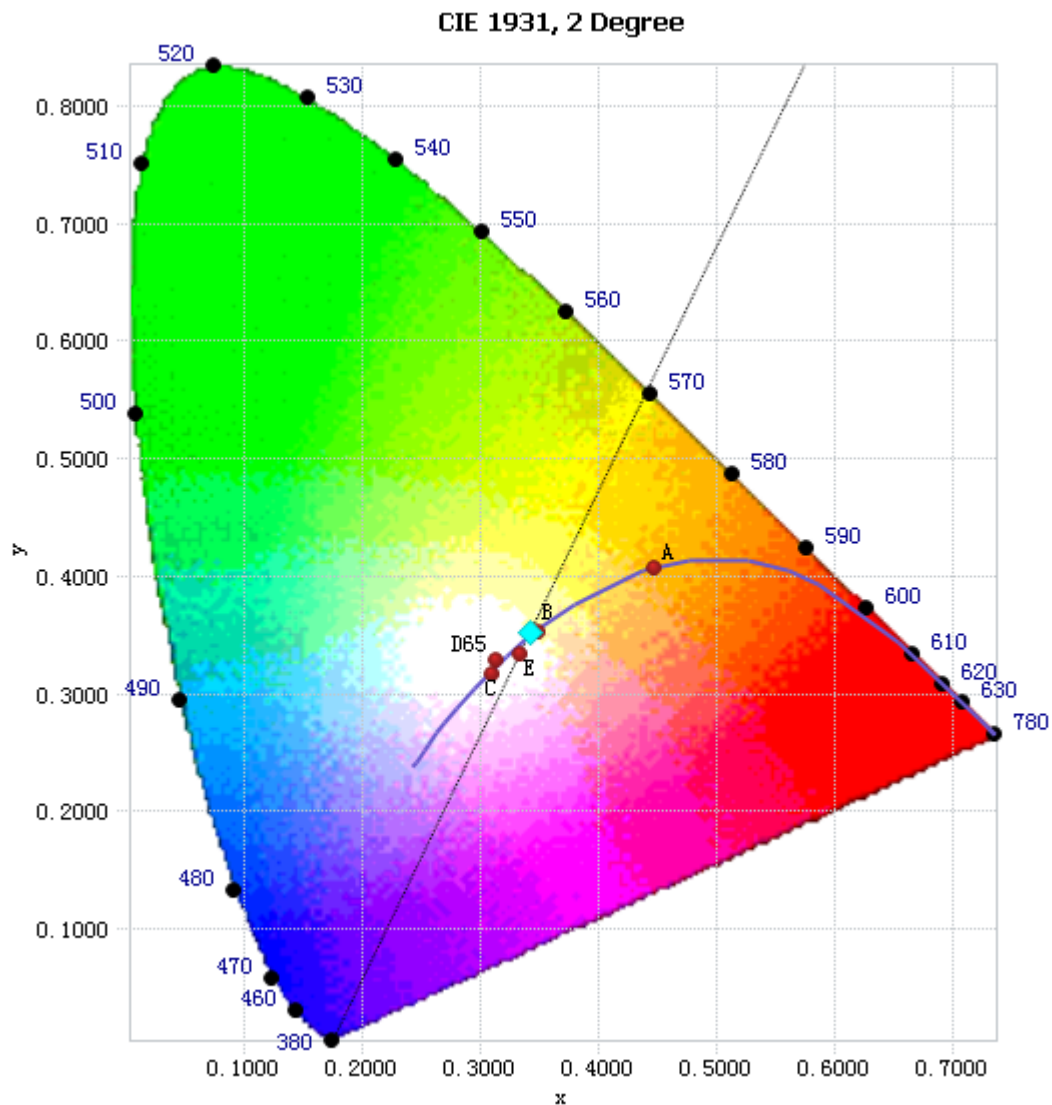


Chart 1: Spectral Power Distribution

Spectral Distribution over Visible Wavelength							
WL(nm)	Radiant(Watts)	WL(nm)	Radiant(Watts)	WL(nm)	Radiant(Watts)	WL(nm)	Radiant(Watts)
380	1.24E-03	485	3.85E-02	590	8.19E-02	695	1.17E-02
385	1.21E-03	490	4.08E-02	595	8.09E-02	700	1.01E-02
390	1.34E-03	495	4.51E-02	600	7.91E-02	705	8.75E-03
395	1.45E-03	500	5.06E-02	605	7.68E-02	710	7.49E-03
400	1.65E-03	505	5.59E-02	610	7.37E-02	715	6.47E-03
405	2.01E-03	510	6.03E-02	615	7.01E-02	720	5.54E-03
410	2.86E-03	515	6.40E-02	620	6.60E-02	725	4.77E-03
415	4.43E-03	520	6.66E-02	625	6.15E-02	730	4.11E-03
420	7.02E-03	525	6.87E-02	630	5.70E-02	735	3.50E-03
425	1.18E-02	530	7.03E-02	635	5.23E-02	740	3.00E-03
430	2.02E-02	535	7.14E-02	640	4.76E-02	745	2.59E-03
435	3.29E-02	540	7.29E-02	645	4.30E-02	750	2.22E-03
440	5.32E-02	545	7.42E-02	650	3.87E-02	755	1.92E-03
445	8.52E-02	550	7.54E-02	655	3.44E-02	760	1.66E-03
450	1.24E-01	555	7.69E-02	660	3.06E-02	765	1.43E-03
455	1.28E-01	560	7.82E-02	665	2.69E-02	770	1.23E-03
460	9.17E-02	565	7.96E-02	670	2.36E-02	775	1.06E-03
465	7.04E-02	570	8.10E-02	675	2.07E-02	780	9.14E-04
470	5.77E-02	575	8.19E-02	680	1.81E-02		
475	4.44E-02	580	8.24E-02	685	1.57E-02		
480	3.81E-02	585	8.24E-02	690	1.36E-02		

Table 4: Spectral Power Distribution Numerical Data per Sphere - Spectroradiometer Method

Chromaticity Diagram - Sphere Spectroradiometer Method



Tristimulus values(x, y) : (0.3425, 0.3524)

Chart 2: Chromaticity Diagram per Sphere - Spectroradiometer Method

Note: The location on the diagram of the tristimulus coordinates are indicated by the blue diamond.

Nominal CCT Quadrangles – Sphere Spectroradiometer Method

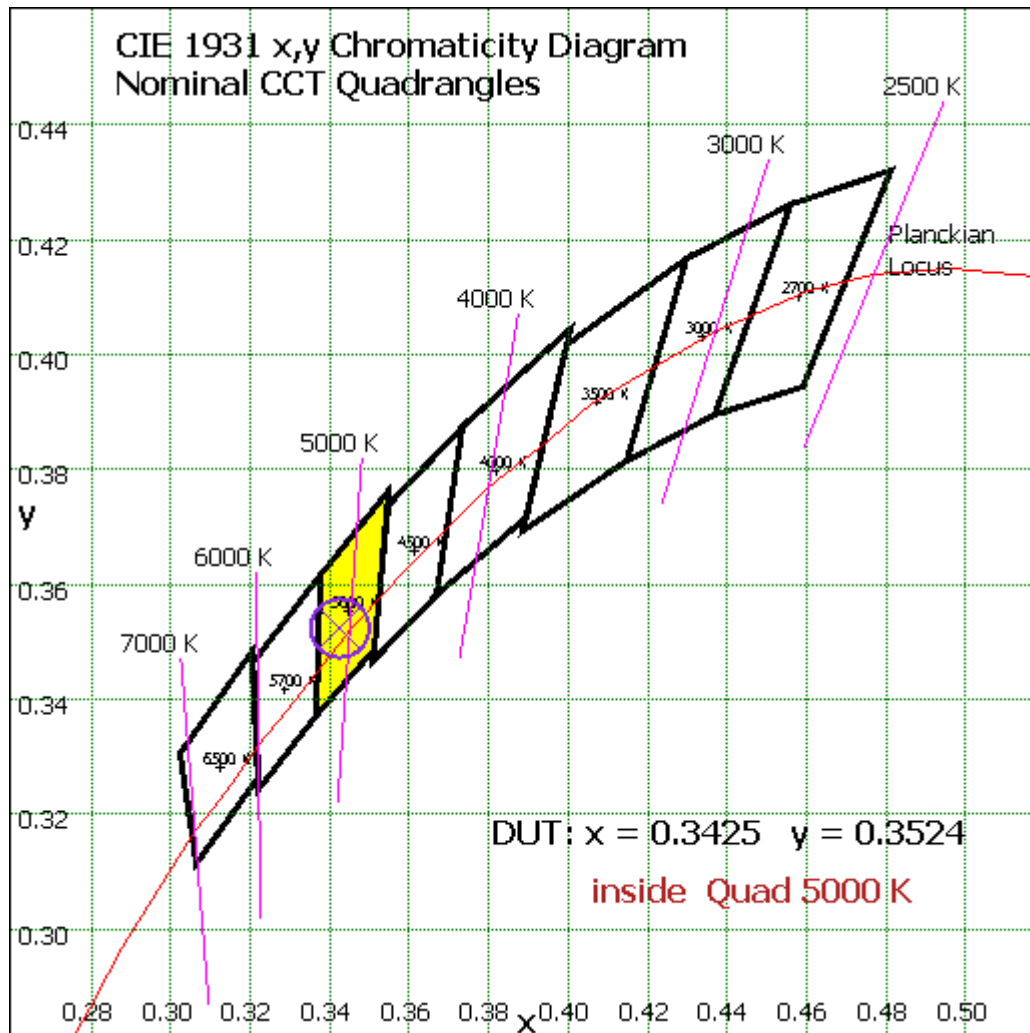


Chart 3: Plot of Lamp x/y coordinates on CIE 1931 Chromaticity Diagram

Zonal Lumen Tabulation- Goniophotometer Method

$\gamma(^{\circ})$	Lumens	% Total
0- 10	21.131	0.41%
10- 20	72.109	1.39%
20- 30	149.065	2.87%
30- 40	248.001	4.78%
40- 50	354.236	6.83%
50- 60	454.199	8.76%
60- 70	515.256	9.93%
70- 80	538.069	10.37%
80- 90	551.095	10.62%
90-100	548.588	10.58%
100-110	515.044	9.93%
110-120	443.477	8.55%
120-130	335.859	6.47%
130-140	230.576	4.45%
140-150	137.559	2.65%
150-160	58.451	1.13%
160-170	13.502	0.26%
170-180	0.932	0.02%
Total	5187.1	100%

$\gamma(^{\circ})$	Lumens	% Total
0- 60	1298.741	25.04%
60- 90	1604.42	30.93%
0-90	2903.161	55.97%
90- 180	2283.988	44.03%
0- 180	5187.1	100%

Table 4: Zonal Lumen Data

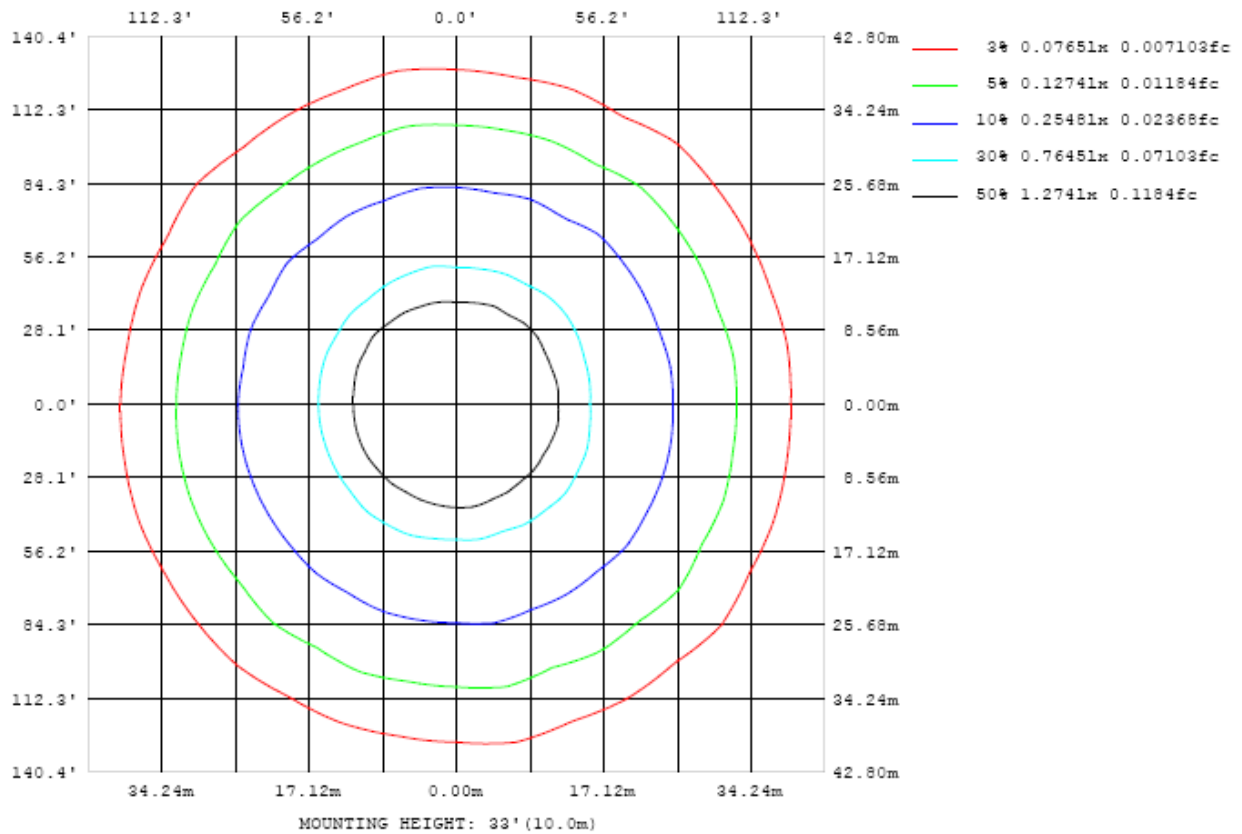


Chart 4: Illuminance Plot (Footcandles)

Luminous Intensity Distribution Plots- Goniophotometer Method

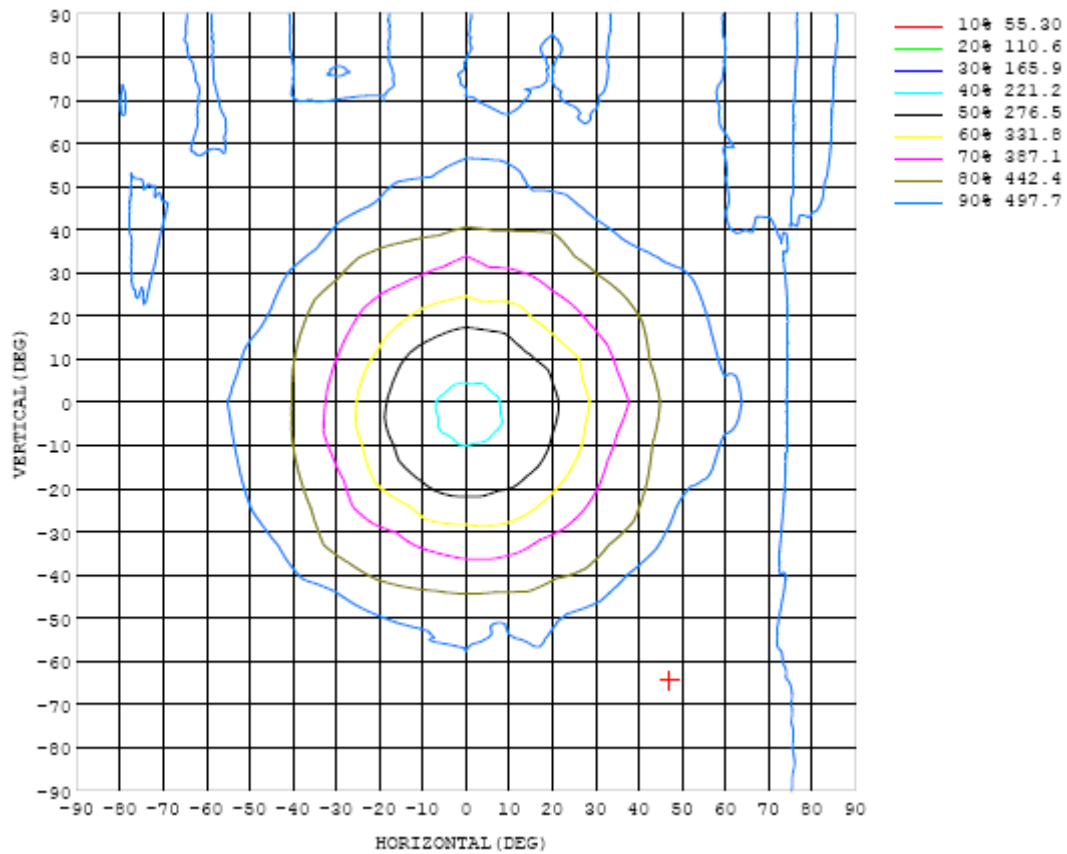


Chart 5: Isocandela Plot

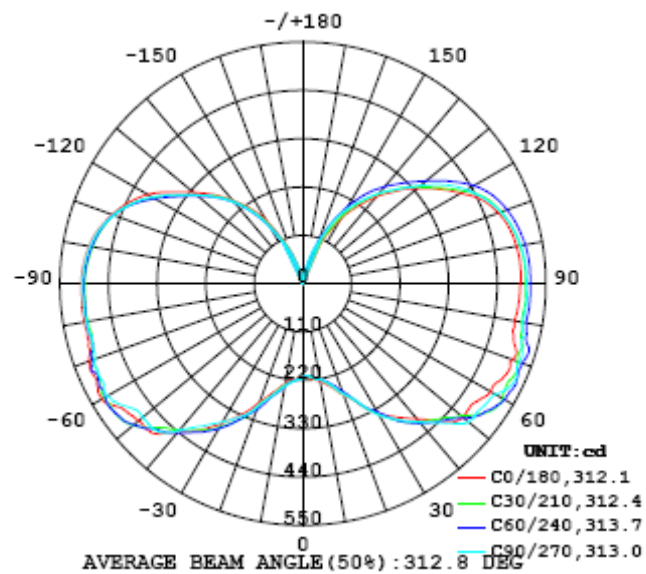


Chart 6: Polar Candela Distribution

Luminous Intensity Data- Goniophotometer Method

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	214	214	214	214	214	214	214	214	214	214	214	214	214	214	214	214	214	214	214
5	218	217	215	214	212	212	211	211	212	213	213	215	216	216	217	218	218	218	219
10	225	225	223	222	222	222	221	221	222	221	221	223	224	224	224	226	228	229	231
15	242	241	240	238	237	236	235	236	237	237	236	238	242	242	243	247	249	252	255
20	269	269	269	267	265	263	261	263	265	266	265	265	272	273	273	281	281	282	288
25	301	302	305	300	296	297	300	297	294	298	303	304	308	310	309	320	324	325	329
30	341	347	346	344	343	342	338	337	340	345	345	344	358	352	351	362	363	362	366
35	371	383	386	381	379	378	382	374	376	378	384	387	393	388	386	399	401	396	406
40	402	416	415	411	409	410	415	409	409	411	415	418	419	413	414	428	430	433	439
45	444	451	442	435	441	435	443	438	448	448	448	445	442	443	441	458	469	476	481
50	472	486	476	468	473	465	477	474	495	489	483	480	476	482	480	488	489	488	486
55	473	491	507	509	525	507	506	491	502	493	498	515	520	525	507	506	501	503	497
60	491	506	518	523	541	521	527	506	519	504	510	530	524	531	516	521	523	520	525
65	501	515	517	518	535	519	533	527	538	527	525	527	524	528	526	524	526	523	515
70	505	514	522	517	542	518	529	518	542	522	519	524	510	531	507	518	519	520	515
75	494	499	510	513	544	512	524	513	536	512	508	522	507	526	517	508	516	508	502
80	487	493	502	503	536	507	514	500	528	506	503	515	500	529	508	506	508	504	502
85	490	494	503	505	539	509	515	502	531	508	505	516	503	534	513	505	509	501	503
90	492	494	502	504	540	508	514	502	530	506	505	514	500	536	515	506	510	499	502
95	494	494	501	504	541	508	515	502	529	506	504	513	499	536	515	504	508	494	499
100	491	490	498	499	537	504	511	498	525	501	500	509	495	532	510	497	502	486	491
105	484	483	489	491	528	496	503	491	517	492	492	501	486	522	499	487	493	474	479
110	471	472	478	478	513	482	492	479	502	477	480	488	474	503	483	473	478	458	460
115	450	453	460	459	489	463	475	461	481	455	462	469	454	477	461	449	455	433	436
120	413	412	418	422	456	435	447	435	453	428	435	440	424	444	432	414	419	399	406
125	376	368	373	380	417	396	407	397	418	393	398	398	384	404	396	372	376	360	364
130	338	335	339	342	374	354	364	355	374	348	355	354	341	359	354	329	336	322	323
135	299	299	305	306	331	315	325	315	330	305	315	314	303	317	313	291	300	290	287
140	259	254	258	267	283	279	288	279	291	269	281	277	270	278	272	255	264	256	248
145	215	218	222	225	238	237	250	242	249	231	244	239	232	238	228	214	223	216	210
150	170	169	171	180	190	195	203	197	206	193	206	193	187	195	185	172	173	172	166
155	119	119	120	128	139	147	152	150	156	147	154	145	138	139	128	122	122	120	113
160	74.8	75.4	77.9	83.8	89.5	95.6	102	101	103	98.1	99.4	95.8	88.4	91.7	86.4	84.5	77.0	79.3	75.1
165	38.2	37.6	40.9	45.2	51.6	57.0	60.1	61.2	63.1	61.5	60.7	59.1	52.9	51.7	48.8	45.1	41.3	41.2	39.0
170	13.2	15.4	19.0	19.9	22.8	26.0	26.4	28.4	29.9	29.3	29.2	27.5	24.5	22.8	22.8	21.8	19.2	17.0	15.6
175	6.24	4.85	4.47	6.56	8.75	9.39	8.82	8.64	8.80	9.21	9.63	9.89	9.95	9.55	8.68	8.60	8.23	7.46	6.12
180	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Table 6: 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	214	214	214	214	214	214	214	214	214	214	214	214	214	214	214	214	214		
5	219	221	221	221	221	222	222	222	222	222	222	221	220	220	220	219	218		
10	233	235	235	236	236	238	237	237	237	238	236	233	231	232	231	228	225		
15	259	262	262	263	264	265	265	263	263	263	263	257	257	256	253	247	244		
20	294	296	296	299	302	305	305	301	296	296	293	289	289	288	284	274	273		
25	334	338	342	341	342	341	340	339	334	343	333	328	335	331	325	314	311		
30	375	378	378	377	377	381	379	373	363	375	372	368	371	368	363	349	352		
35	408	408	408	405	410	412	412	412	396	411	404	401	408	402	398	388	383		
40	438	437	435	441	438	442	447	451	437	441	433	424	436	435	426	417	419		
45	475	466	464	470	469	469	475	484	472	479	468	451	463	461	452	450	459		
50	492	504	502	516	501	501	489	487	472	479	496	482	494	494	477	470	480		
55	510	522	517	535	510	516	511	510	488	489	510	515	540	535	512	479	482		
60	525	526	519	524	508	517	525	536	511	522	528	516	540	542	531	513	511		
65	518	516	509	533	511	512	511	520	507	505	515	514	527	531	510	511	514		
70	506	514	505	534	506	508	503	522	501	488	511	494	532	517	517	493	512		
75	497	501	493	523	494	495	493	511	495	486	499	484	525	512	501	490	504		
80	497	503	494	525	495	497	494	515	498	486	499	483	526	507	497	485	499		
85	498	503	495	525	495	496	493	514	499	484	498	484	529	511	498	485	504		
90	498	502	494	526	495	496	493	514	500	484	497	481	530	509	497	484	505		
95	496	500	491	521	491	493	489	511	497	481	495	479	527	507	496	483	506		
100	488	493	483	512	484	485	482	503	490	475	489	472	519	499	490	477	502		
105	478	482	473	496	470	474	471	489	477	465	478	462	506	487	481	467	495		
110	462	466	457	472	450	456	453	468	456	449	462	446	483	470	466	453	480		
115	436	440	429	442	423	427	425	438	429	422	436	421	453	444	444	431	455		
120	400	401	391	405	387	387	386	400	395	384	396	389	419	410	408	398	418		
125	357	358	350	362	349	347	344	355	353	343	354	350	375	369	367	358	376		
130	320	320	314	322	313	311	309	315	314	308	318	313	333	330	328	320	332		
135	288	286	281	284	280	278	276	280	279	276	284	282	296	296	293	285	290		
140	251	251	245	241	240	242	239	239	242	240	247	248	255	260	257	247	247		
145	208	206	203	201	198	197	196	197	200	197	202	210	214	219	214	208	207		
150	162	159	156	153	149	150	150	147	149	149	154	166	169	171	167	170	162		
155	110	109	106	101	99.1	100	101	99.0	101	103	104	112	115	120	117	119	114		
160	70.8	69.5	66.7	63.1	60.5	61.5	61.7	59.7	60.6	62.9	64.4	72.1	76.7	77.9	74.6	77.0	73.6		
165	37.5	34.9	32.3	31.1	28.7	28.3	28.0	27.7	28.8	30.4	30.6	35.3	38.6	38.8	38.9	38.9	38.1		
170	15.9	14.3	11.6	9.84	10.8	8.44	9.69	10.4	11.0	11.0	11.7	14.0	15.1	15.0	15.0	16.3	15.4		
175	6.19	4.95	3.27	1.63	1.15	0.94	1.04	1.72	2.06	2.97	3.96	4.44	5.05	5.04	5.33	6.02	6.35		
180	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		

Table 7: Luminous Intensity Data

EQUIPMENT LIST

Test Equipment	Model	Equipment No.	Calibration Date	Calibration Due date
Goniophotometer system	GO-R5000	HZTE011-01	Aug. 23, 2017	Aug. 22, 2018
Digital Power Meter	PF2010A	HZTE028-01	Aug. 10, 2017	Aug. 09, 2018
AC Power Supply	DPS1060	HZTE001-06	Aug. 10, 2017	Aug. 09, 2018
DC Power Supply	WY12010	HZTE004-03	Aug. 10, 2017	Aug. 09, 2018
Temperature recorder	JM624U	HZTE018-08	Aug. 17, 2017	Aug. 16, 2018
Temperature and humidity recorder	JR900	HZTE018-01	Aug. 16, 2017	Aug. 15, 2018
Standard source	D908	HZTE012-01	Aug. 20, 2017	Aug. 19, 2018
Integrate Sphere system	2M	HZTE015-01	Aug. 23, 2017	Aug. 22, 2018
Digital Power Meter	WT210	HZTE008-01	Aug. 10, 2017	Aug. 09, 2018
AC Power Supply	PCR 500L	HZTE001-07	Aug. 10, 2017	Aug. 09, 2018
DC Power Supply	IT6154	HZTE004-04	Aug. 10, 2017	Aug. 09, 2018
Standard source	SCL-1400	HZTE012-02	Aug. 20, 2017	Aug. 19, 2018
Temperature and humidity recorder	JR900	HZTE018-02	Aug. 16, 2017	Aug. 15, 2018
Temperature Meter	TES1310	HZTE017-01	Aug. 17, 2017	Aug. 16, 2018

Table 8: 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.

Sphere-Spectroradiometer Method- Photometric and Electrical Measurements

A Labsphere Model CDS 2100 Spectroradiometer and Two Meter Sphere was used to measure correlated color temperature, chromaticity coordinates, and the color rendering index for each SSL unit. The coating reflectance of each sphere is 98%. The measure geometry is 4π . Self-absorption correction is conducted in testing. Bandwidth of spectroradiometer is 350nm-1050nm.

Ambient temperature was measured at a position inside the sphere. 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 Yokogawa Power Analyzer.

The standard reference of the integrated sphere system is halogen incandescent lamp, the intensity distribution type is omni-directional, and is traceable to the National Institute of Standards and Technology.

The uncertainty of integrating sphere system reported in this document is expanded uncertainty is 2.1% with a coverage factor $k=2$.

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 2.3% 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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