



LM-79-08 Test Report

for

GREEN CREATIVE LTD

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

LED HID

Model: 54HID/830/277V/EX39

Laboratory: Leading Testing Laboratories

NVLAP CODE: 200960-0

3rd Floor, Bld. 2, NO. 96 Longchuanwu Rd Qianjiang Economy Dev. Zone, Yuhang Dist,
Hangzhou, Zhejiang Province, China 311100

Tel: +86 571 86376106

www.ledtestlab.com

Report No.: HZ18030035a

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

Review by:

April Zou

Engineer: April Zou
May 22, 2018

Approved by:



Jim Zhang

Manager: Jim Zhang
May 22, 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: **54HID/830/277V/EX39**

Luminous Efficacy (Lumens /Watt)	Total Luminous Flux (Lumens)	Power (Watts)	Power Factor
129.5	7002.0	54.07	0.9920
CCT (K)	CRI	Stabilization Time (Light & Power)	
3073	82.4	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. 21, 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

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Sample Photos



Equipment Under Test (EUT)

Name	: LED HID
Model	: 54HID/830/277V/EX39
Electrical Ratings	: 120-277V, 50/60HZ
Product Description	: 3000K
Manufacturer	: GREEN CREATIVE LTD
Address	: 756 North Zhongshan Rd., Unit B301 Zhabei District, Shanghai

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)	0.454	0.209
Power Factor	0.9920	0.9200
Test Power (W)	54.07	53.34
THD A%	10.27	14.83
Luminous Efficacy (lm/W)	129.5	130.6
Total Luminous Flux (lm)	7002.0	6966.0
Color Rendering Index (CRI)	82.4	
R9	7.4	
Correlated Color Temperature (CCT)(K)	3073	
Chromaticity Chroma x	0.4315	
Chromaticity Chroma y	0.4018	
Chromaticity Chroma u	0.2480	
Chromaticity Chroma v	0.3465	
Duv	0.0001	
Chromaticity Chroma u'	0.2480	
Chromaticity Chroma v'	0.5197	

Special Color Rendering Indices	
R1	80.6
R2	90.9
R3	96.2
R4	79.8
R5	80.8
R6	88.6
R7	82.9
R8	59.3
R9	7.4
R10	79.1
R11	78.7
R12	70.4
R13	83.1
R14	98.5
Rf	83
Rg	96

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 24.7°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)	0.444
Power Factor	0.9918
Test Power (W)	52.84
Luminous Efficacy (lm/W)	132.3
Total Luminous Flux (lm)	6991.2
Beam Angle (°)	291.3
Center Beam Candle Power (cd)	514
Spacing Criteria	2.05 (0°-180°)/ 2.06 (90°-270°)
Zonal Lumens in the 0°-60°Zone	30.84%
Zonal Lumens in the 60°-90°Zone	29.22%
Zonal Lumens in the 90°-120°Zone	26.12%
Zonal Lumens in the 120°-180°Zone	13.83%

Table 3: Test data per Goniophotometer Method

Spectral Power Distribution - Sphere Spectroradiometer Method

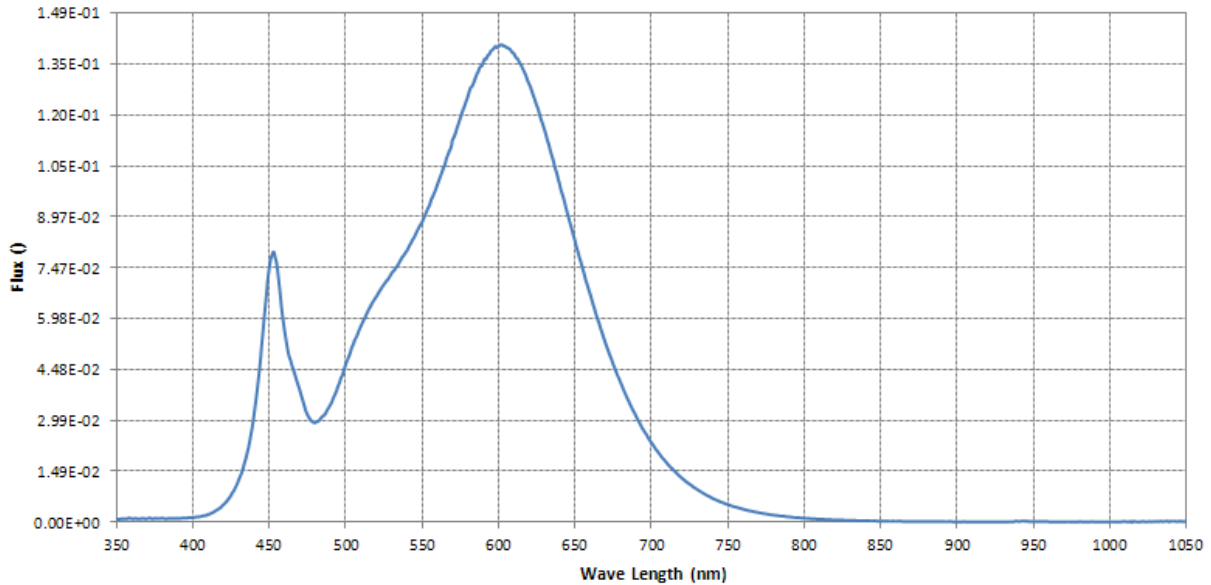
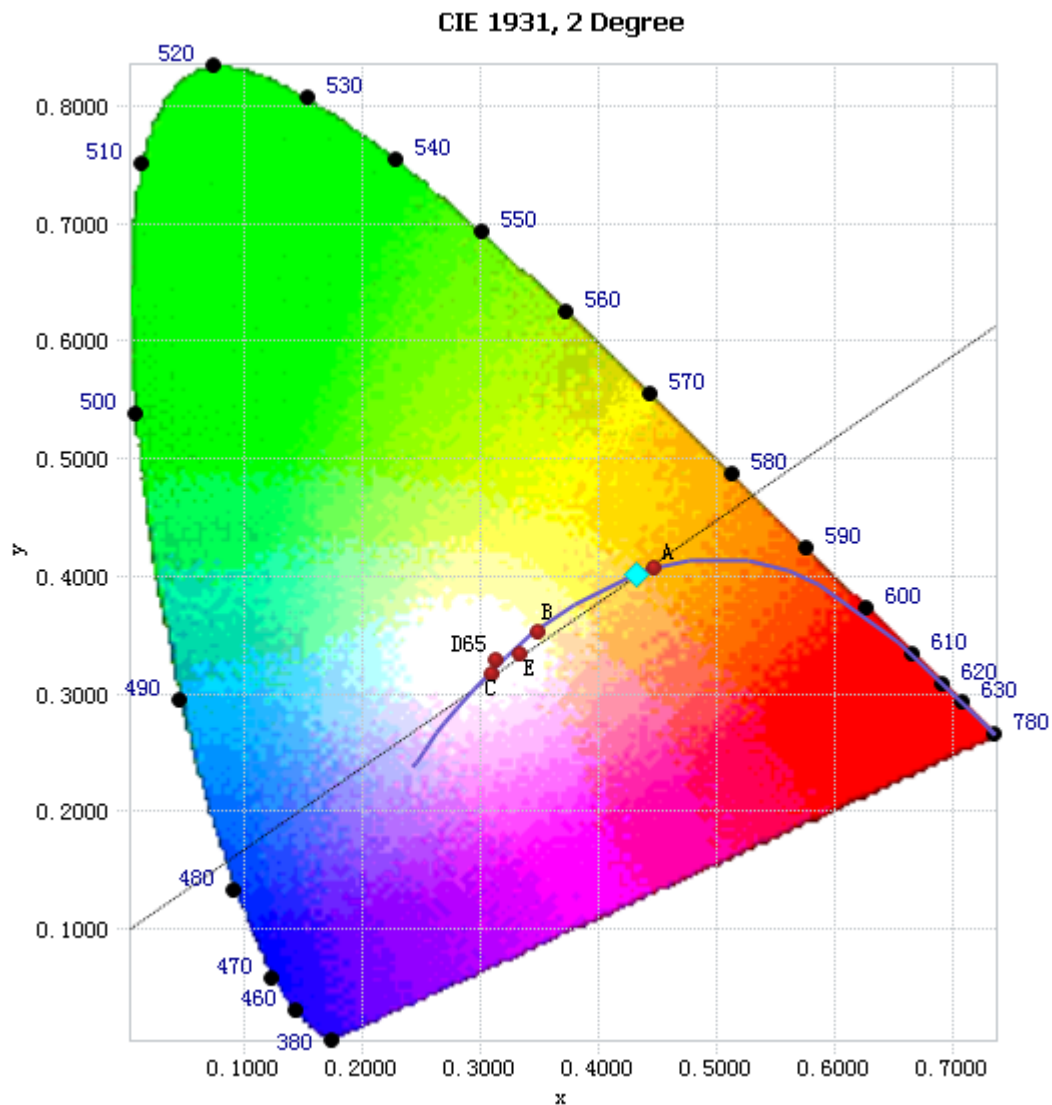


Chart 1: Spectral Power Distribution

Spectral Distribution over Visible Wavelength							
WL(nm)	Radiant(Watts)	WL(nm)	Radiant(Watts)	WL(nm)	Radiant(Watts)	WL(nm)	Radiant(Watts)
380	1.22E-03	485	3.11E-02	590	1.35E-01	695	2.70E-02
385	1.10E-03	490	3.44E-02	595	1.38E-01	700	2.34E-02
390	1.14E-03	495	3.99E-02	600	1.40E-01	705	2.03E-02
395	1.20E-03	500	4.62E-02	605	1.39E-01	710	1.75E-02
400	1.33E-03	505	5.22E-02	610	1.38E-01	715	1.51E-02
405	1.65E-03	510	5.75E-02	615	1.34E-01	720	1.30E-02
410	2.27E-03	515	6.23E-02	620	1.29E-01	725	1.12E-02
415	3.38E-03	520	6.61E-02	625	1.22E-01	730	9.62E-03
420	5.08E-03	525	6.97E-02	630	1.15E-01	735	8.25E-03
425	7.82E-03	530	7.29E-02	635	1.07E-01	740	7.06E-03
430	1.23E-02	535	7.61E-02	640	9.93E-02	745	6.04E-03
435	1.91E-02	540	7.96E-02	645	9.10E-02	750	5.20E-03
440	3.12E-02	545	8.37E-02	650	8.28E-02	755	4.48E-03
445	5.12E-02	550	8.79E-02	655	7.46E-02	760	3.85E-03
450	7.43E-02	555	9.31E-02	660	6.70E-02	765	3.30E-03
455	7.57E-02	560	9.90E-02	665	5.95E-02	770	2.84E-03
460	5.64E-02	565	1.05E-01	670	5.27E-02	775	2.45E-03
465	4.58E-02	570	1.12E-01	675	4.65E-02	780	2.08E-03
470	3.89E-02	575	1.19E-01	680	4.09E-02		
475	3.16E-02	580	1.25E-01	685	3.58E-02		
480	2.92E-02	585	1.31E-01	690	3.12E-02		

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

Chromaticity Diagram - Sphere Spectroradiometer Method



Tristimulus values(x, y) : (0.4315, 0.4018)

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

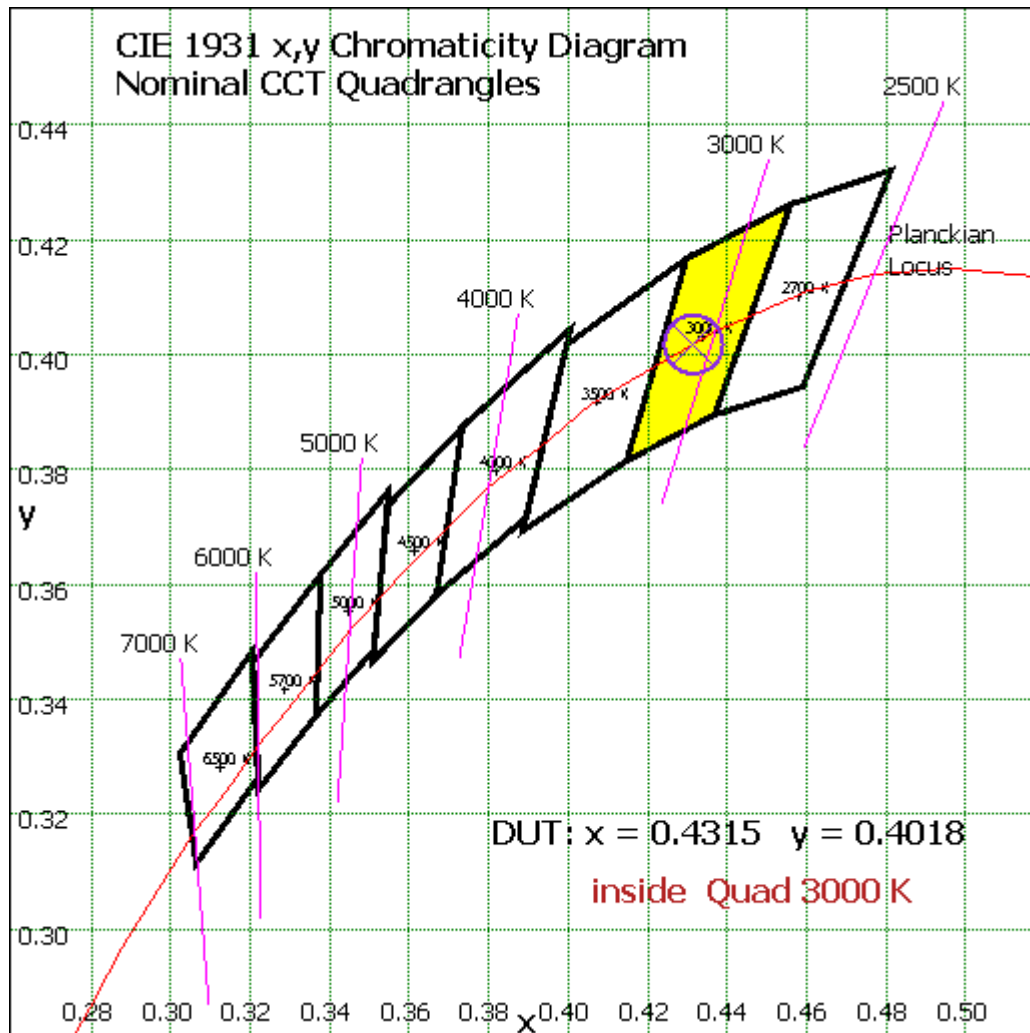


Chart 3: Plot of Lamp x/y coordinates on CIE 1931 Chromaticity Diagram

Zonal Lumen Tabulation- Goniophotometer Method

$\gamma(^{\circ})$	Lumens	% Total
0- 10	49.649	0.71%
10- 20	157.665	2.26%
20- 30	288.677	4.13%
30- 40	440.066	6.29%
40- 50	567.716	8.12%
50- 60	652.095	9.33%
60- 70	690.128	9.87%
70- 80	679.392	9.72%
80- 90	673.008	9.63%
90-100	664.505	9.50%
100-110	621.636	8.89%
110-120	539.686	7.72%
120-130	421.457	6.03%
130-140	285.311	4.08%
140-150	167.19	2.39%
150-160	74.291	1.06%
160-170	17.6	0.25%
170-180	1.142	0.02%
Total	6991.2	100%

$\gamma(^{\circ})$	Lumens	% Total
0- 60	2155.868	30.84%
60- 90	2042.528	29.22%
0-90	4198.396	60.05%
90- 180	2792.818	39.95%
0- 180	6991.2	100%

Table 4: Zonal Lumen Data

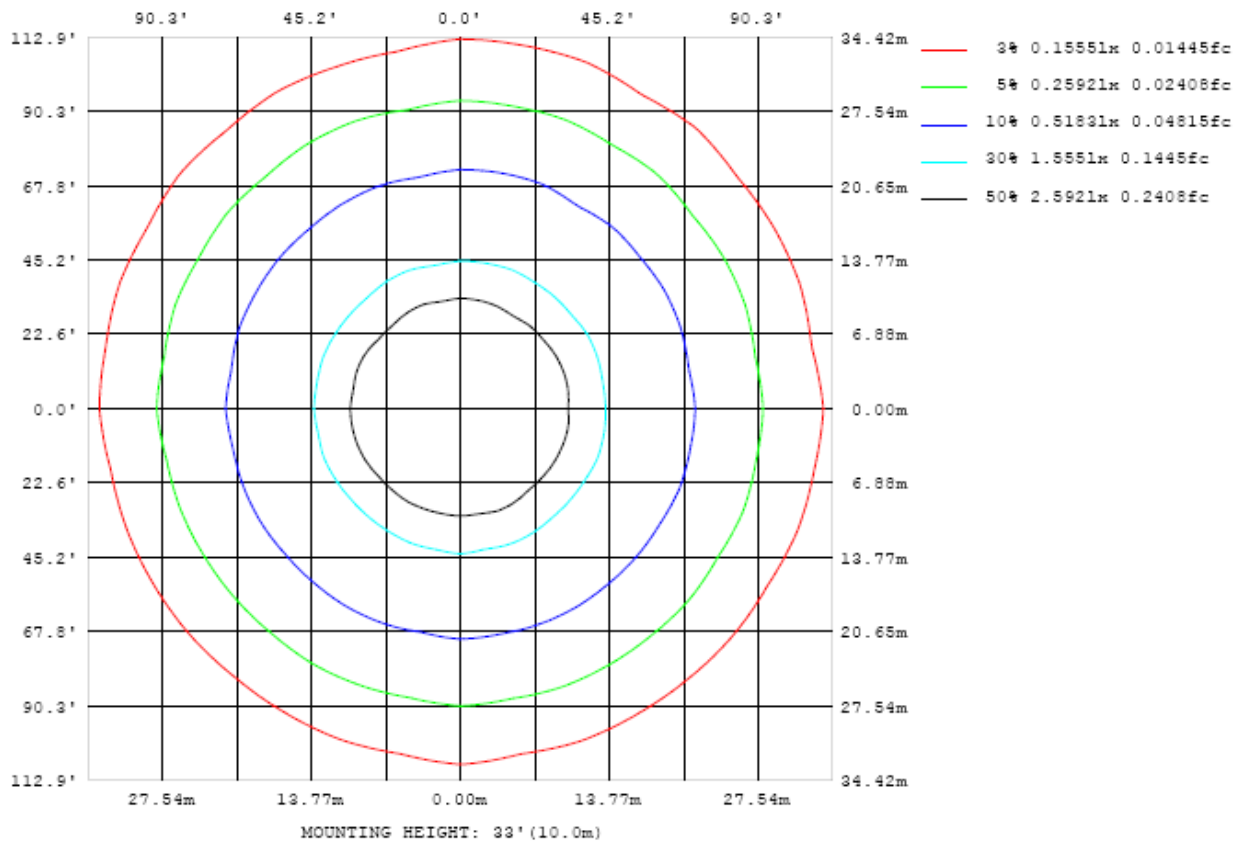


Chart 4: Illuminance Plot (Footcandles)

Luminous Intensity Distribution Plots- Goniophotometer Method

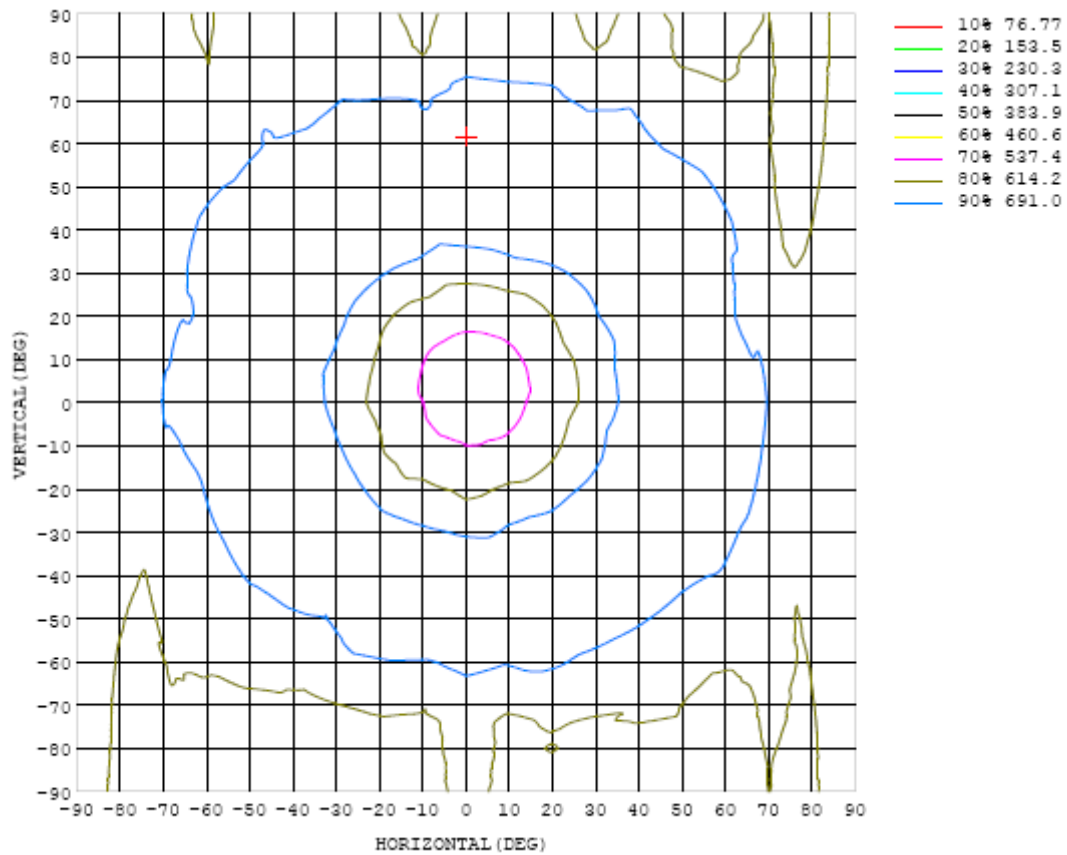


Chart 5: Isocandela Plot

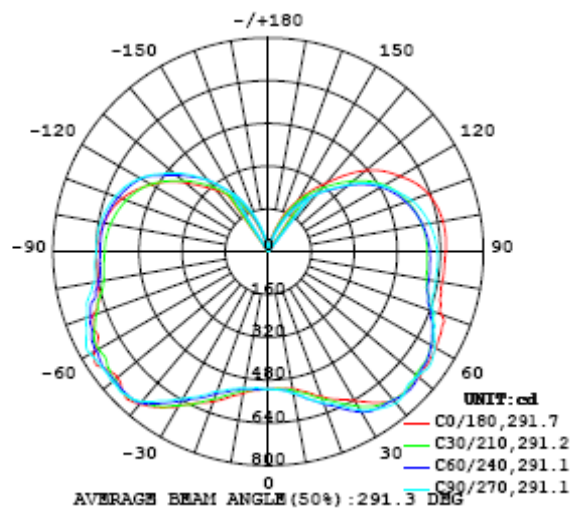


Chart 6: Polar Candela Distribution

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	514	514	514	514	514	514	514	514	514	514	514	514	514	514	514	514	514	514	514
5	514	514	515	515	516	517	519	518	518	520	520	521	520	521	520	519	519	519	519
10	521	523	525	526	529	534	537	537	538	538	542	541	542	539	540	539	538	539	538
15	542	547	550	550	555	562	570	569	571	568	575	574	576	569	571	567	570	567	562
20	576	583	585	585	590	594	606	607	604	600	610	612	612	602	606	601	607	603	596
25	609	622	622	623	627	634	647	651	638	636	650	648	649	635	637	636	642	637	623
30	644	661	660	667	672	680	692	693	678	683	691	691	688	680	684	689	686	681	667
35	690	705	697	703	714	706	713	723	714	717	718	722	731	715	715	722	725	716	710
40	725	724	722	722	719	708	724	739	736	738	731	739	742	723	721	728	749	746	743
45	728	745	739	732	721	716	736	744	719	724	719	718	724	714	713	735	746	752	756
50	732	743	740	717	712	712	726	726	704	725	705	713	708	703	703	724	728	723	731
55	726	729	734	714	713	701	717	724	708	735	713	713	703	696	703	715	734	730	754
60	720	718	717	699	703	694	700	707	695	716	689	701	697	680	687	694	701	712	744
65	709	696	697	676	673	668	673	669	666	680	654	659	663	655	657	671	678	680	708
70	684	667	674	649	655	646	645	645	636	653	626	634	638	629	635	640	652	655	697
75	662	636	639	617	622	615	614	618	604	632	603	610	607	605	612	620	625	624	652
80	656	615	620	596	611	612	606	615	605	632	600	605	601	599	606	610	615	612	645
85	657	611	617	593	611	613	603	612	602	630	596	603	599	598	605	608	612	607	639
90	659	606	614	592	609	614	601	611	601	629	594	600	597	597	604	607	610	605	637
95	662	600	611	589	605	609	594	604	594	621	586	593	589	589	596	601	604	600	632
100	659	590	603	581	597	600	583	593	583	609	574	580	578	576	584	591	594	588	621
105	650	575	590	568	583	585	567	578	567	591	557	564	561	559	566	575	578	574	605
110	634	555	572	551	563	565	545	556	545	566	536	543	539	534	543	554	557	552	580
115	606	530	549	529	536	537	518	530	519	530	507	515	511	503	513	527	531	526	544
120	566	498	519	499	501	500	484	497	484	492	469	475	474	467	475	492	498	492	503
125	525	459	478	459	460	459	439	450	441	447	424	427	427	425	429	445	450	447	457
130	473	416	426	412	408	407	384	394	387	391	374	376	376	371	372	389	393	391	401
135	406	366	374	360	351	348	329	339	334	334	322	324	324	317	319	336	340	335	347
140	336	314	321	311	299	295	283	291	289	282	274	275	276	269	273	289	294	291	301
145	279	268	270	263	249	238	236	241	239	230	221	226	226	219	223	240	246	243	254
150	222	216	215	212	196	183	183	185	186	177	166	170	171	168	171	185	192	193	203
155	171	168	156	155	144	135	130	125	128	115	110	115	116	113	116	127	132	139	153
160	114	106	101	100	88.0	80.6	76.8	72.4	73.8	65.7	61.4	65.1	64.6	64.8	67.4	75.7	77.4	84.8	96.6
165	68.0	62.7	57.5	52.2	47.5	43.1	35.9	32.1	31.7	29.1	26.3	27.4	26.6	27.6	30.1	35.8	35.3	40.7	52.6
170	30.7	27.8	23.0	20.9	17.1	14.9	13.1	10.8	9.34	8.09	7.86	7.37	7.54	8.04	8.90	10.3	12.3	14.8	17.4
175	9.42	8.07	7.15	5.97	5.23	4.60	4.21	3.41	2.51	1.55	0.91	0.82	0.82	0.97	1.77	2.62	3.02	3.65	2.29
180	0.77	0.77	0.77	0.77	0.77	0.77	0.77	0.77	0.77	0.77	0.77	0.77	0.77	0.77	0.77	0.77	0.77	0.77	0.77

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	514	514	514	514	514	514	514	514	514	514	514	514	514	514	514	514	514		
5	519	519	518	518	517	517	515	513	511	511	510	510	510	511	512	512	512		
10	533	530	528	526	522	522	521	519	519	518	516	517	516	516	517	517	518		
15	555	553	553	546	541	538	536	533	531	530	530	529	529	530	532	535	537		
20	595	588	586	576	570	564	568	558	556	556	558	554	554	557	562	564	570		
25	627	629	625	611	607	604	608	597	595	596	594	590	589	594	603	602	604		
30	660	671	665	648	647	643	648	629	634	634	639	628	627	634	646	640	642		
35	700	710	706	698	695	692	692	675	680	682	689	677	670	672	683	675	690		
40	732	747	735	722	730	739	729	713	731	731	725	706	714	708	712	715	731		
45	738	759	753	725	723	749	759	736	754	750	738	715	732	728	742	745	746		
50	734	747	745	732	724	750	757	745	755	748	749	730	744	731	750	752	729		
55	737	742	732	727	725	751	752	724	754	754	759	740	738	729	744	738	722		
60	726	735	726	726	720	741	751	730	763	745	748	722	739	716	732	736	719		
65	690	715	714	717	710	724	729	714	747	744	743	702	728	710	717	708	684		
70	669	689	680	692	685	704	712	687	718	709	715	692	705	679	690	687	662		
75	639	662	647	671	662	667	668	658	694	686	684	660	680	653	650	649	619		
80	621	634	620	644	630	640	641	617	656	653	653	622	643	622	622	623	595		
85	618	628	613	642	622	628	629	607	648	634	632	608	630	609	611	619	591		
90	616	625	609	643	617	624	625	601	640	630	627	603	625	607	607	615	586		
95	613	622	605	645	615	624	624	599	638	628	624	600	623	606	605	614	585		
100	605	614	596	640	607	620	619	595	633	624	621	595	619	603	599	609	580		
105	593	601	581	629	595	610	608	584	621	614	612	585	608	593	588	598	570		
110	575	582	562	612	578	594	592	568	605	600	597	570	592	579	572	583	555		
115	550	558	537	583	556	574	570	548	583	579	577	551	569	559	551	562	534		
120	519	527	505	544	525	547	543	521	550	554	553	527	537	534	525	536	508		
125	475	483	461	500	479	496	496	478	506	519	519	494	500	498	491	502	474		
130	424	431	413	453	430	445	442	437	458	471	472	452	460	456	447	456	433		
135	370	375	364	391	382	396	393	389	406	419	418	402	407	403	393	400	380		
140	320	323	316	325	334	350	346	339	349	364	364	346	350	346	336	345	326		
145	272	272	263	269	283	289	288	285	293	314	315	298	301	300	287	297	280		
150	219	214	212	220	235	241	235	234	241	261	265	249	250	249	240	247	232		
155	161	159	162	164	177	179	178	181	188	203	208	196	197	194	188	193	182		
160	101	99.4	105	108	118	117	119	126	134	144	150	141	141	135	134	133	128		
165	52.9	53.2	55.3	57.6	64.1	68.7	68.4	73.1	76.0	84.2	91.7	89.0	84.5	81.9	81.7	76.6	76.0		
170	18.5	20.3	20.8	23.4	26.4	26.8	28.9	32.5	35.3	40.6	44.2	45.9	42.8	41.1	38.2	36.9	33.7		
175	2.29	2.96	4.12	5.03	6.08	7.18	8.63	10.8	12.6	13.6	13.9	14.2	14.8	14.3	13.4	12.0	11.2		
180	0.77	0.77	0.77	0.77	0.77	0.77	0.77	0.77	0.77	0.77	0.77	0.77	0.77	0.77	0.77	0.77	0.77		

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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