

LM-79-08 Test Report

for

GREEN CREATIVE LTD

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

LED Lamp

Model: 25HID/850/277V/EX39/R

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.: HZ18120009a

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

Review by:



Engineer: April Zou
Dec. 13, 2018

Approved by:



Manager: Jim Zhang
Dec. 13, 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: 25HID/850/277V/EX39/R

Luminous Efficacy (Lumens /Watt)	Total Luminous Flux (Lumens)	Power (Watts)	Power Factor
145.5	3489.0	23.98	0.9958
CCT (K)	CRI	Stabilization Time (Light & Power)	
5077	83.0	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 : Dec. 10, 2018

Date of Test : Dec. 12, 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



Figure 1- Overview of the sample

Equipment Under Test (EUT)

Name	: LED Lamp
Model	: 25HID/850/277V/EX39/R
Electrical Ratings	: 120-277V, 50/60Hz, 25W
Product Description	: 5000K
Manufacturer	: GREEN CREATIVE LTD
Address	: 756 North Zhongshan Rd., Unit B301 Zhabei District, Shanghai

TEST RESULTS

Test ambient temperature was 26.0°C.

Base orientation was Base up. 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 70 minutes.

Sphere-Spectroradiometer Method

Parameter	Result	
Test Voltage (V)	120.0	277.0
Voltage frequency (Hz)	60	60
Test Current (A)	0.201	0.091
Power Factor	0.9958	0.9339
Test Power (W)	23.98	23.61
THD A%	6.60	12.01
Luminous Efficacy (lm/W)	145.5	147.9
Total Luminous Flux (lm)	3489.0	3492.0
Color Rendering Index (CRI)	83.0	
R9	5.2	
Correlated Color Temperature (CCT)(K)	5077	
Chromaticity Chroma x	0.3433	
Chromaticity Chroma y	0.3547	
Chromaticity Chroma u	0.2090	
Chromaticity Chroma v	0.3239	
Duv	0.0016	
Chromaticity Chroma u'	0.2090	
Chromaticity Chroma v'	0.4859	

Special Color Rendering Indices	
R1	81.1
R2	89
R3	93.7
R4	81.9
R5	81.8
R6	84.3
R7	86.4
R8	66
R9	5.2
R10	73.5
R11	80.8
R12	63.4
R13	83.3
R14	96.8
Rf	82
Rg	94

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 25.0°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)	0.203
Power Factor	0.9951
Test Power (W)	24.29
Luminous Efficacy (lm/W)	145.7
Total Luminous Flux (lm)	3538.5
Beam Angle (°)	287.9
Center Beam Candle Power (cd)	315
Spacing Criteria	1.64 (0 °-180 °)/ 1.67 (90 °-270 °)
Zonal Lumens in the 0 °-60 °Zone	30.20%
Zonal Lumens in the 60 °-90 °Zone	30.00%
Zonal Lumens in the 90 °-120 °Zone	25.01%
Zonal Lumens in the 120 °-180 °Zone	14.80%

Table 3: Test data per Goniophotometer Method

Spectral Power Distribution - Sphere Spectroradiometer Method

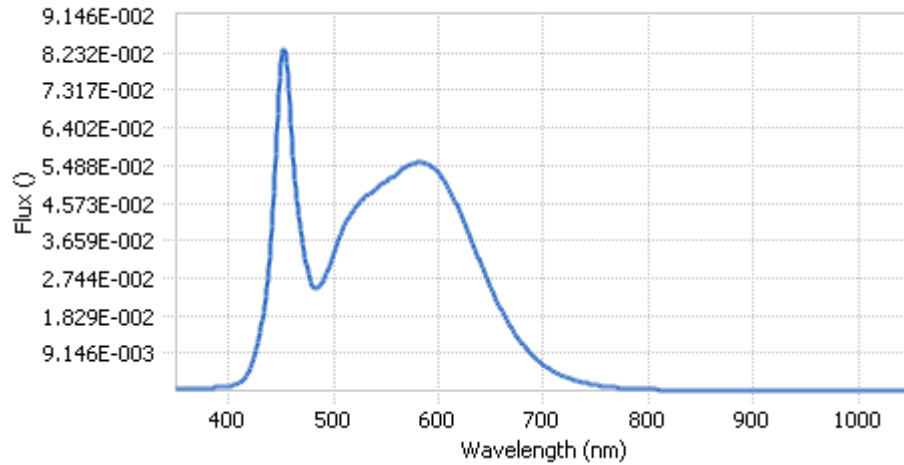
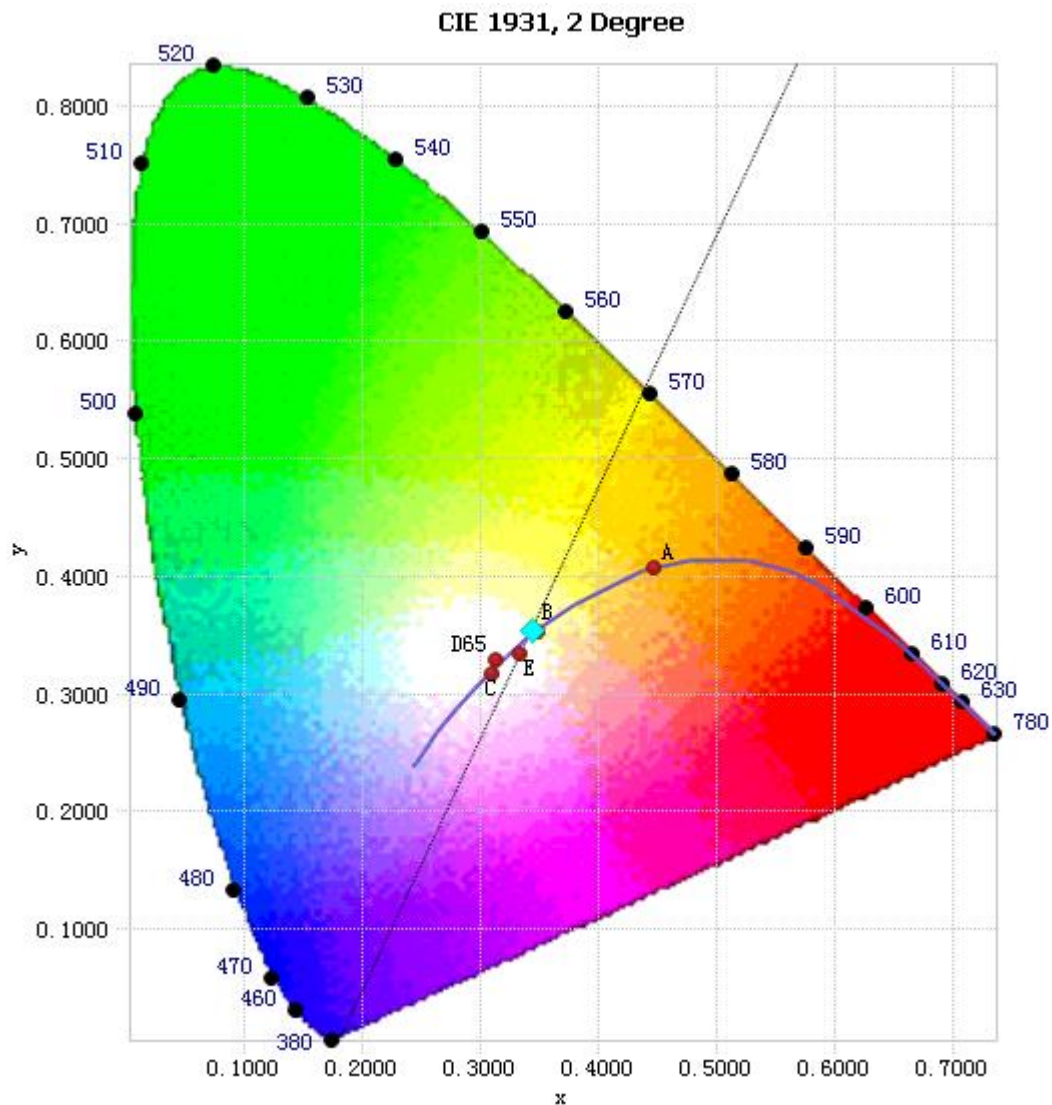


Chart 1: Spectral Power Distribution

Spectral Distribution over Visible Wavelength							
WL(nm)	Radiant(Watts)	WL(nm)	Radiant(Watts)	WL(nm)	Radiant(Watts)	WL(nm)	Radiant(Watts)
380	7.39E-04	485	2.51E-02	590	5.51E-02	695	7.33E-03
385	7.03E-04	490	2.67E-02	595	5.43E-02	700	6.35E-03
390	8.05E-04	495	2.97E-02	600	5.30E-02	705	5.43E-03
395	9.15E-04	500	3.33E-02	605	5.12E-02	710	4.65E-03
400	1.05E-03	505	3.71E-02	610	4.91E-02	715	4.02E-03
405	1.33E-03	510	4.01E-02	615	4.65E-02	720	3.47E-03
410	1.97E-03	515	4.26E-02	620	4.36E-02	725	2.99E-03
415	3.10E-03	520	4.46E-02	625	4.07E-02	730	2.56E-03
420	5.20E-03	525	4.59E-02	630	3.75E-02	735	2.18E-03
425	8.75E-03	530	4.73E-02	635	3.42E-02	740	1.88E-03
430	1.44E-02	535	4.82E-02	640	3.10E-02	745	1.61E-03
435	2.29E-02	540	4.92E-02	645	2.79E-02	750	1.40E-03
440	3.64E-02	545	5.03E-02	650	2.49E-02	755	1.20E-03
445	5.78E-02	550	5.10E-02	655	2.22E-02	760	1.04E-03
450	7.97E-02	555	5.20E-02	660	1.96E-02	765	9.06E-04
455	7.97E-02	560	5.27E-02	665	1.72E-02	770	7.77E-04
460	6.11E-02	565	5.38E-02	670	1.50E-02	775	6.77E-04
465	4.64E-02	570	5.47E-02	675	1.31E-02	780	5.95E-04
470	3.72E-02	575	5.52E-02	680	1.14E-02		
475	2.94E-02	580	5.56E-02	685	9.87E-03		
480	2.52E-02	585	5.58E-02	690	8.54E-03		

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

Chromaticity Diagram - Sphere Spectroradiometer Method



Tristimulus values(x, y): (0.3433, 0.3547)

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

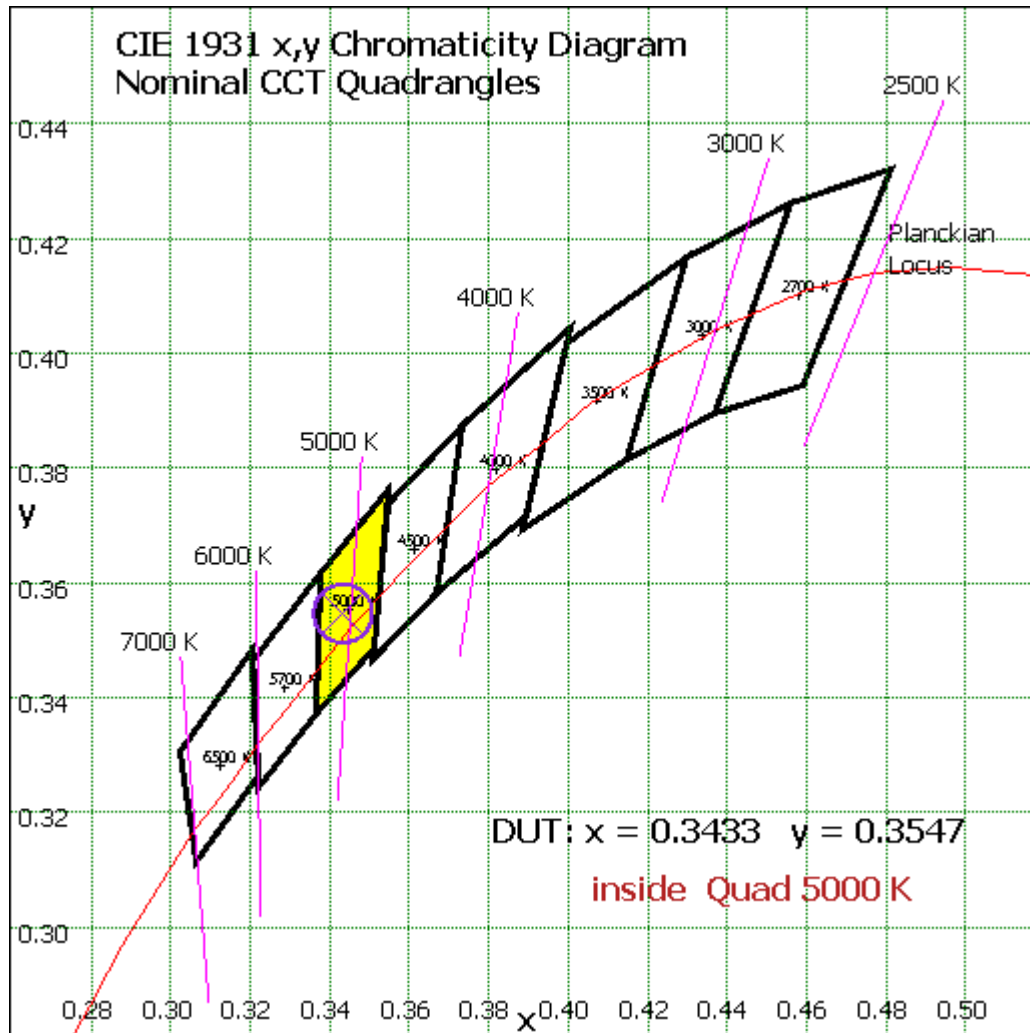


Chart 3: Plot of Lamp x/y coordinates on CIE 1931 Chromaticity Diagram

Zonal Lumen Tabulation- Goniophotometer Method

$\gamma(^{\circ})$	Lumens	% Total
0- 10	30.157	0.85%
10- 20	90.81	2.57%
20- 30	151.988	4.30%
30- 40	212.422	6.00%
40- 50	268.457	7.59%
50- 60	314.609	8.89%
60- 70	346.044	9.78%
70- 80	359.912	10.17%
80- 90	355.427	10.04%
90-100	333.913	9.44%
100-110	298.307	8.43%
110-120	252.777	7.14%
120-130	201.066	5.68%
130-140	147.37	4.16%
140-150	96.669	2.73%
150-160	53.392	1.51%
160-170	21.828	0.62%
170-180	3.319	0.09%
Total	3538.5	100%

$\gamma(^{\circ})$	Lumens	% Total
0- 60	1068.443	30.20%
60- 90	1061.383	30.00%
0-90	2129.826	60.19%
90- 180	1408.641	39.81%
0- 180	3538.5	100%

Table 5: Zonal Lumen Data

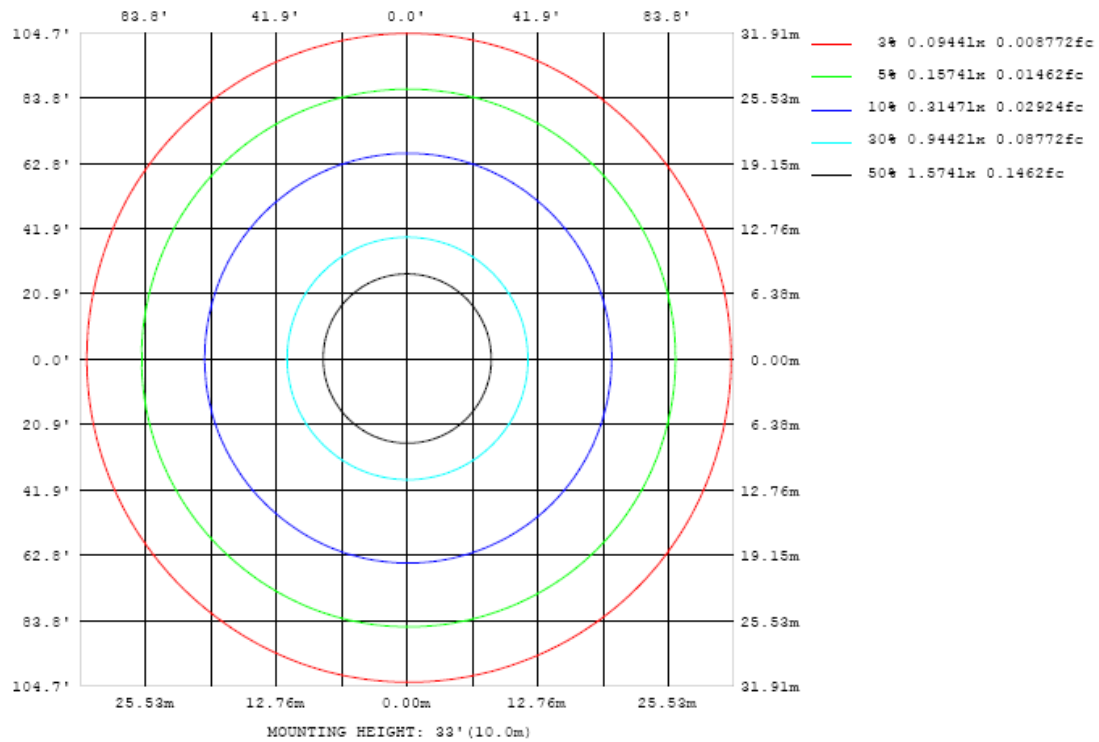


Chart 4: Illuminance Plot (Footcandles)

Luminous Intensity Distribution Plots- Goniophotometer Method

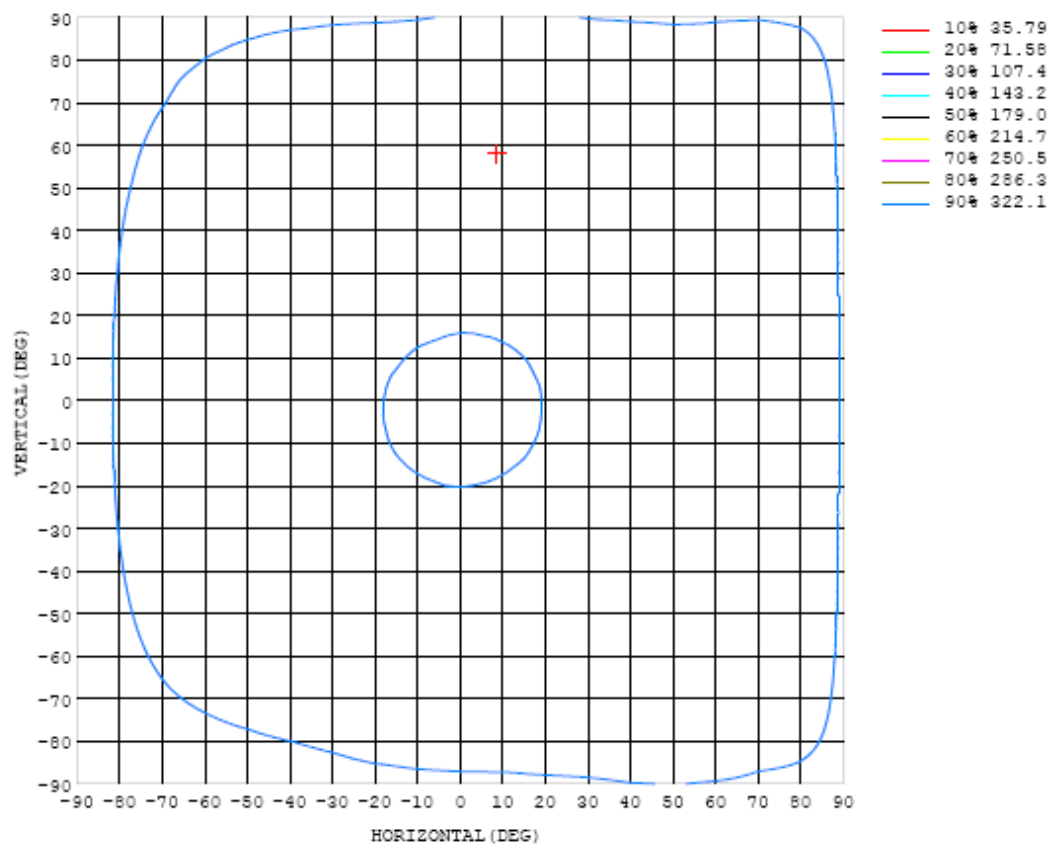


Chart 5: Isocandela Plot

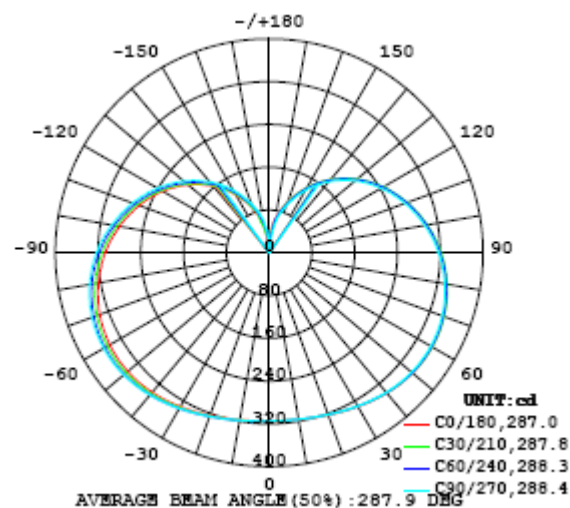


Chart 6: Polar Candela Distribution

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	315	315	315	315	315	315	315	315	315	315	315	315	315	315	315	315	315	315	315
5	315	315	315	315	315	315	315	315	315	315	315	315	315	315	315	315	315	315	315
10	317	316	316	316	316	316	316	316	316	316	316	316	316	316	316	317	317	317	317
15	319	319	319	319	319	319	319	319	318	319	319	319	319	319	319	319	320	320	320
20	323	323	322	322	322	322	322	322	322	322	322	322	322	322	322	323	323	323	324
25	327	327	327	327	326	326	326	326	326	326	326	326	326	326	326	327	327	327	328
30	332	332	331	331	331	331	331	331	331	331	331	331	331	331	331	331	332	332	332
35	337	337	337	337	336	336	336	336	336	336	336	336	336	336	336	336	336	336	337
40	342	342	342	342	341	341	342	341	341	341	340	340	340	340	340	339	340	340	341
45	347	346	346	346	346	346	346	346	345	345	344	344	343	343	343	342	343	343	344
50	350	350	349	350	349	349	349	349	348	347	347	346	346	345	345	344	345	345	346
55	352	352	351	352	351	351	351	350	350	349	348	347	346	345	345	345	345	345	346
60	352	352	352	352	352	352	351	350	350	349	348	347	346	344	344	344	344	344	345
65	351	350	350	351	351	350	350	349	348	347	346	345	343	342	341	341	342	341	342
70	347	347	347	348	348	348	347	346	345	344	343	342	340	338	337	337	338	337	337
75	343	343	343	344	344	344	342	341	340	339	338	337	335	332	332	332	332	332	332
80	336	336	337	338	338	338	337	334	334	334	332	331	328	326	325	325	325	325	324
85	329	329	330	330	331	330	329	328	326	326	325	323	320	318	317	317	317	316	316
90	320	320	321	321	322	322	320	318	317	316	316	314	311	308	307	307	307	307	307
95	309	310	310	312	312	312	310	308	307	307	305	304	300	298	297	297	297	296	297
100	299	299	299	300	301	300	299	298	297	295	294	292	289	287	285	285	285	285	284
105	286	286	287	288	289	288	287	285	284	283	282	280	277	275	273	273	273	272	272
110	273	273	274	275	276	275	274	272	271	270	269	267	264	262	260	260	260	259	259
115	260	259	260	261	262	261	260	258	257	256	255	253	251	248	247	246	246	245	245
120	245	245	245	247	247	246	245	244	243	241	240	239	236	233	232	231	231	230	231
125	230	230	230	231	231	231	230	228	227	226	225	223	220	218	216	215	215	214	214
130	213	213	214	215	215	215	213	212	211	209	208	206	204	201	200	199	198	198	198
135	196	196	196	197	197	197	196	194	193	191	190	189	186	183	182	181	181	181	181
140	178	178	179	179	179	179	177	176	175	173	172	170	167	165	164	163	163	162	162
145	160	160	159	160	160	159	158	157	155	154	152	150	148	146	144	144	144	144	145
150	140	140	140	140	140	139	138	137	135	134	132	130	128	126	125	124	124	124	125
155	121	120	120	120	120	119	118	117	115	113	112	110	108	106	105	104	104	105	106
160	101	100	100	99.9	99.7	98.8	97.8	96.5	94.9	93.4	91.8	90.4	88.6	87.1	85.9	85.2	85.1	85.9	87.1
165	82.2	81.4	80.7	79.6	80.1	79.9	78.9	77.7	76.4	73.8	69.0	72.3	70.3	69.5	67.6	65.5	65.5	66.1	67.7
170	64.3	62.9	62.3	58.0	55.5	59.3	60.3	56.4	53.3	43.1	37.4	38.1	44.5	40.1	35.4	34.5	37.3	39.1	40.7
175	43.2	39.2	37.0	33.8	31.3	30.6	29.6	27.7	23.5	17.2	10.2	10.9	12.9	13.1	9.93	9.60	12.6	13.6	11.9
180	0.37	0.37	0.37	0.37	0.37	0.37	0.37	0.37	0.37	0.37	0.37	0.37	0.37	0.37	0.37	0.37	0.37	0.37	0.37

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	315	315	315	315	315	315	315	315	315	315	315	315	315	315	315	315	315		
5	316	316	316	316	316	316	316	316	316	316	316	316	316	315	315	315	315		
10	317	318	318	318	318	318	319	318	318	318	318	318	317	317	317	317	317		
15	320	321	321	321	321	322	322	322	322	321	321	321	321	320	320	320	319		
20	324	324	325	325	326	326	326	326	326	326	325	325	325	324	324	323	323		
25	328	329	330	330	330	331	331	331	331	331	330	330	329	329	328	328	327		
30	333	334	334	335	335	336	336	336	336	336	336	335	334	334	333	333	332		
35	338	338	339	340	341	342	342	342	342	342	341	341	340	339	338	338	337		
40	341	343	344	345	346	347	347	347	347	347	347	346	345	344	343	343	342		
45	345	346	347	348	350	351	352	352	352	352	352	350	349	349	348	348	347		
50	346	348	349	351	352	354	355	355	355	355	355	354	353	352	351	351	350		
55	347	348	351	352	354	355	356	357	357	357	357	356	355	353	353	353	352		
60	346	347	350	351	353	355	356	357	358	357	357	356	355	354	353	353	352		
65	342	345	347	350	351	353	354	355	356	356	356	355	353	352	352	352	351		
70	339	340	344	346	348	350	351	352	353	353	353	351	350	349	349	349	348		
75	333	335	338	341	342	344	345	347	348	349	348	346	345	344	344	344	344		
80	325	327	331	334	336	337	338	339	341	342	342	340	338	337	337	338	337		
85	317	319	322	324	327	328	329	331	333	334	333	331	330	329	330	330	330		
90	307	309	313	315	317	318	319	321	323	324	324	322	321	320	321	322	321		
95	297	299	302	304	306	308	308	310	311	313	312	311	310	310	311	312	311		
100	285	287	290	292	294	295	296	297	300	300	301	299	299	298	299	300	299		
105	273	274	277	279	281	282	283	284	287	287	287	287	286	285	286	288	288		
110	259	261	264	265	267	268	268	270	272	273	273	273	272	273	273	274	274		
115	245	246	249	251	251	253	254	256	257	258	259	257	258	258	260	260	260		
120	230	232	234	235	236	237	238	240	242	243	243	243	243	244	245	246	246		
125	215	216	218	219	220	221	222	224	226	227	227	227	227	228	229	230	230		
130	198	199	201	202	203	204	205	207	209	210	211	211	211	212	213	214	214		
135	181	182	184	185	186	186	188	189	191	193	193	193	194	195	196	197	197		
140	163	164	165	166	167	169	170	171	173	174	175	176	177	177	178	179	179		
145	145	146	147	148	149	151	152	153	155	156	157	158	159	159	160	161	161		
150	126	126	128	129	130	131	133	134	136	138	138	139	140	141	142	142	142		
155	106	107	108	109	111	112	113	115	116	118	119	120	121	121	122	123	122		
160	87.1	87.6	89.7	90.4	91.4	93.2	94.5	96.0	97.4	98.7	99.9	101	102	102	103	103	103		
165	68.3	64.9	58.0	66.5	72.7	73.6	77.1	78.1	79.4	80.6	81.7	82.6	83.3	83.6	83.8	83.7	83.4		
170	41.9	36.0	35.7	46.6	53.8	53.6	55.7	60.7	61.7	56.7	61.8	64.9	65.9	66.2	66.1	65.7	65.3		
175	16.1	23.4	26.2	20.5	20.7	25.9	30.5	33.3	36.6	40.2	42.4	44.4	45.8	45.7	45.4	44.9	44.5		
180	0.37	0.37	0.37	0.37	0.37	0.37	0.37	0.37	0.37	0.37	0.37	0.37	0.37	0.37	0.37	0.37	0.37		

Table 7: Luminous Intensity Data

EQUIPMENT LIST

Test Equipment	Model	Equipment No.	Calibration Date	Calibration Due date
Goniophotometer system	GO-R5000	HZTE011-01	Aug. 14, 2018	Aug. 13, 2019
Digital Power Meter	PF2010A	HZTE028-01	Sep. 12, 2018	Sep. 11, 2019
AC Power Supply	DPS1060	HZTE001-06	Aug. 09, 2018	Aug. 08, 2019
DC Power Supply	WY12010	HZTE004-03	Aug. 09, 2018	Aug. 08, 2019
Temperature recorder	JM624U	HZTE018-08	Aug. 09, 2018	Aug. 08, 2019
Temperature and humidity recorder	JR900	HZTE018-01	Aug. 09, 2018	Aug. 08, 2019
Standard source	D908	HZTE012-01	Aug. 14, 2018	Aug. 13, 2019
Integrate Sphere system	3M	HZTE015-04	Aug. 16, 2018	Aug. 15, 2019
Digital Power Meter	WT210	HZTE008-01	Aug. 02, 2018	Aug. 01, 2019
AC Power Supply	PCR 500L	HZTE001-07	Aug. 09, 2018	Aug. 08, 2019
DC Power Supply	IT6154	HZTE004-04	Aug. 09, 2018	Aug. 08, 2019
Standard source	SCL-1400	HZTE012-02	Aug. 16, 2018	Aug. 15, 2019
Temperature and humidity recorder	JR900	HZTE018-02	Aug. 09, 2018	Aug. 08, 2019
Temperature Meter	TES1310	HZTE017-01	Aug. 09, 2018	Aug. 08, 2019

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 Tubes) 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

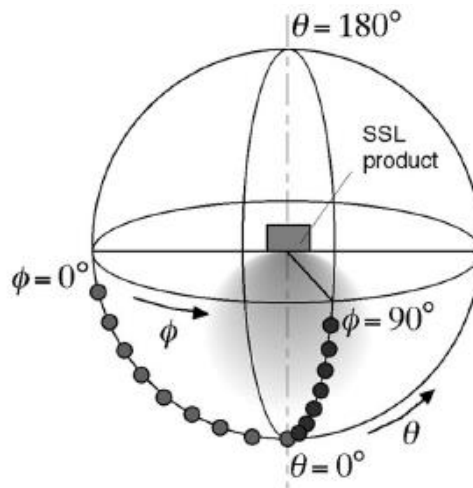
The color characteristics of SSL products include chromaticity coordinates, correlated color temperature, and color rendering index. These characteristics of SSL products may be spatially non-uniform, and thus, in order that they can be specified accurately, the color quantities shall be measured as 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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