LM-79-08 Test Report

for

GREEN CREATIVE LTD

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

LED Lamp

Model: 25HID/830/277V/EX39/R

Laboratory: Leading Testing Laboratories

NVLAP CODE: 200960-0

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Report No.: HZ18120009c

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

Review by: April Zou

Engineer: April Zou
Dec. 13, 2018

Approved by: Jim Zhang

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/830/277V/EX39/R**

Luminous Efficacy (Lumens /Watt)	Total Luminous Flux (Lumens)	Power (Watts)	Power Factor
138.9	3379.0	24.33	0.9958

CCT (K)	CRI	Stabilization Time (Light & Power)
3041	82.2	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	: 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/830/277V/EX39/R
Electrical Ratings	: 120-277V, 50/60Hz, 25W
Product Description	: 3000K
Manufacturer	: GREEN CREATIVE LTD
Address	: 756 North Zhongshan Rd., Unit B301 Zhabei District, Shanghai

TEST RESULTS

Test ambient temperature was 26.0℃.

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)	0.204	0.092
Power Factor	0.9958	0.9346
Test Power (W)	24.33	23.84
THD A%	6.76	12.42
Luminous Efficacy (lm/W)	138.9	141.7
Total Luminous Flux (lm)	3379.0	3378.0
Color Rendering Index (CRI)	82.2	
R9	6.8	
Correlated Color Temperature (CCT)(K)	3041	
Chromaticity Chroma x	0.4321	
Chromaticity Chroma y	0.3991	
Chromaticity Chroma u	0.2496	
Chromaticity Chroma v	0.3458	
Duv	0.0014	
Chromaticity Chroma u ’	0.2496	
Chromaticity Chroma v’	0.5187	

Special Color Rendering Indices	
R1	81.1
R2	92.5
R3	94.2
R4	78.6
R5	81.3
R6	90.7
R7	81.2
R8	57.9
R9	6.8
R10	82.7
R11	77.3
R12	72.2
R13	84
R14	97.6
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 24.8℃.

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)	0.208
Power Factor	0.9952
Test Power (W)	24.78
Luminous Efficacy (lm/W)	139.5
Total Luminous Flux (lm)	3456.3
Beam Angle (°)	288.3
Center Beam Candle Power (cd)	305
Spacing Criteria	1.64 (0 °-180 °)/ 1.69 (90 °-270 °)
Zonal Lumens in the 0 °-60 °Zone	30.12%
Zonal Lumens in the 60 °-90 °Zone	30.10%
Zonal Lumens in the 90 °-120 °Zone	25.04%
Zonal Lumens in the 120 °-180 °Zone	14.75%

Table 3: Test data per Goniophotometer Method

Spectral Power Distribution - Sphere Spectroradiometer Method

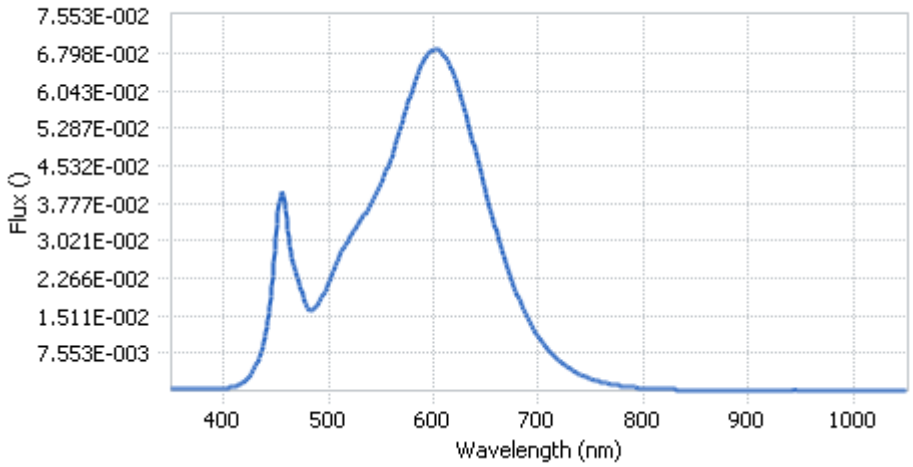
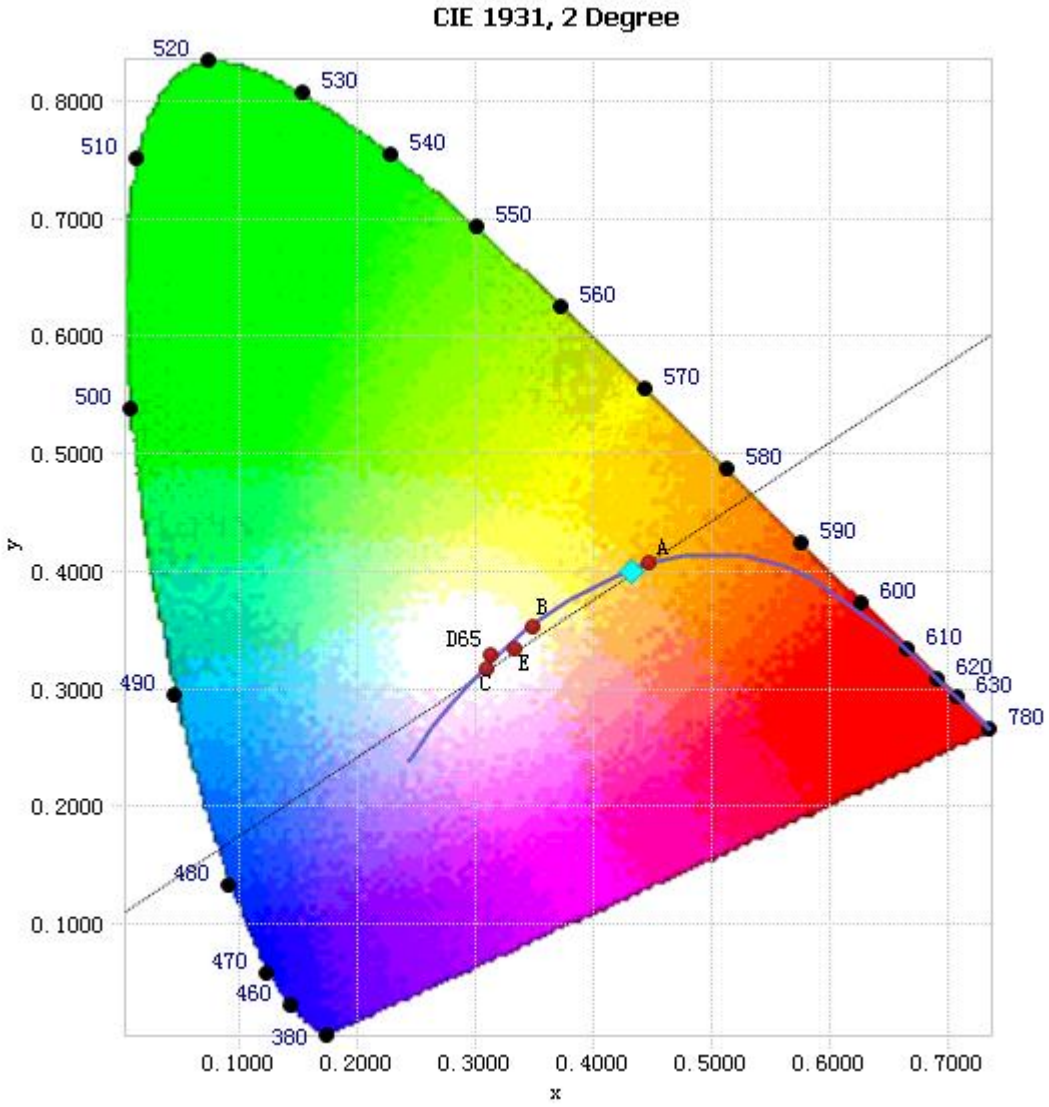


Chart 1: Spectral Power Distribution

Spectral Distribution over Visible Wavelength							
WL(nm)	Radiant(Watts)	WL(nm)	Radiant(Watts)	WL(nm)	Radiant(Watts)	WL(nm)	Radiant(Watts)
380	4.46E-04	485	1.63E-02	590	6.61E-02	695	1.26E-02
385	4.36E-04	490	1.75E-02	595	6.78E-02	700	1.09E-02
390	4.54E-04	495	1.93E-02	600	6.87E-02	705	9.35E-03
395	5.20E-04	500	2.17E-02	605	6.86E-02	710	8.04E-03
400	5.38E-04	505	2.45E-02	610	6.76E-02	715	6.95E-03
405	6.36E-04	510	2.69E-02	615	6.57E-02	720	6.00E-03
410	8.83E-04	515	2.91E-02	620	6.31E-02	725	5.18E-03
415	1.27E-03	520	3.10E-02	625	6.00E-02	730	4.43E-03
420	1.95E-03	525	3.25E-02	630	5.63E-02	735	3.80E-03
425	3.07E-03	530	3.43E-02	635	5.23E-02	740	3.23E-03
430	4.85E-03	535	3.58E-02	640	4.82E-02	745	2.78E-03
435	7.65E-03	540	3.75E-02	645	4.39E-02	750	2.40E-03
440	1.19E-02	545	3.95E-02	650	3.98E-02	755	2.06E-03
445	1.89E-02	550	4.18E-02	655	3.59E-02	760	1.77E-03
450	3.08E-02	555	4.43E-02	660	3.20E-02	765	1.53E-03
455	4.00E-02	560	4.71E-02	665	2.83E-02	770	1.32E-03
460	3.44E-02	565	5.05E-02	670	2.50E-02	775	1.13E-03
465	2.66E-02	570	5.39E-02	675	2.19E-02	780	9.74E-04
470	2.33E-02	575	5.74E-02	680	1.92E-02		
475	1.95E-02	580	6.08E-02	685	1.68E-02		
480	1.66E-02	585	6.40E-02	690	1.46E-02		

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

Chromaticity Diagram - Sphere Spectroradiometer Method



Tristimulus values(x, y): (0.4321, 0.3991)

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

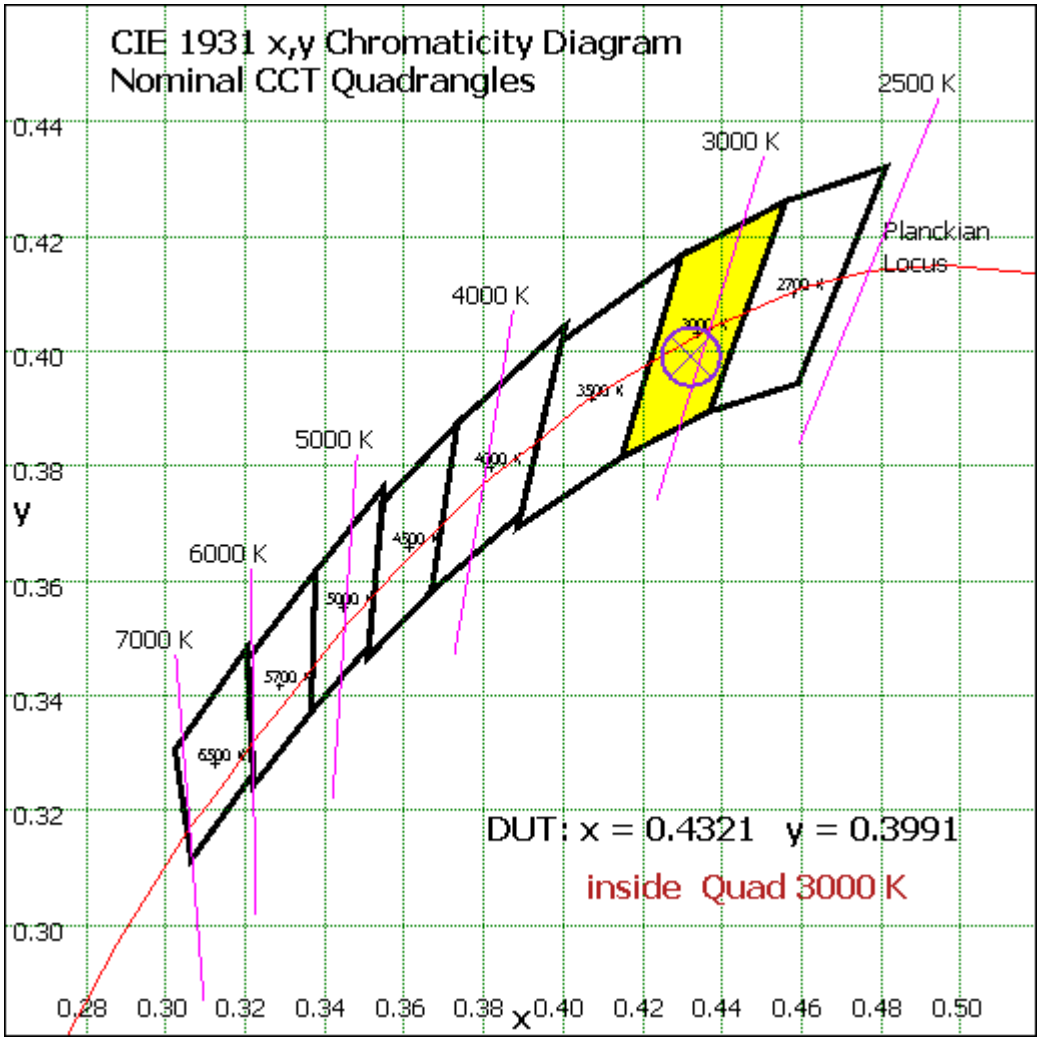


Chart 3: Plot of Lamp x/y coordinates on CIE 1931 Chromaticity Diagram

Zonal Lumen Tabulation- Goniophotometer Method

γ(°)	Lumens	% Total
0- 10	29.185	0.84%
10- 20	87.981	2.55%
20- 30	147.551	4.27%
30- 40	206.734	5.98%
40- 50	261.911	7.58%
50- 60	307.613	8.90%
60- 70	338.943	9.81%
70- 80	352.876	10.21%
80- 90	348.472	10.08%
90-100	327.048	9.46%
100-110	291.655	8.44%
110-120	246.61	7.14%
120-130	195.751	5.66%
130-140	143.267	4.15%
140-150	94.017	2.72%
150-160	52.04	1.51%
160-170	21.445	0.62%
170-180	3.24	0.09%
Total	3456.3	100%

γ(°)	Lumens	% Total
0- 60	1040.975	30.12%
60- 90	1040.291	30.10%
0-90	2081.266	60.22%
90- 180	1375.073	39.78%
0- 180	3456.3	100%

Table 5: Zonal Lumen Data

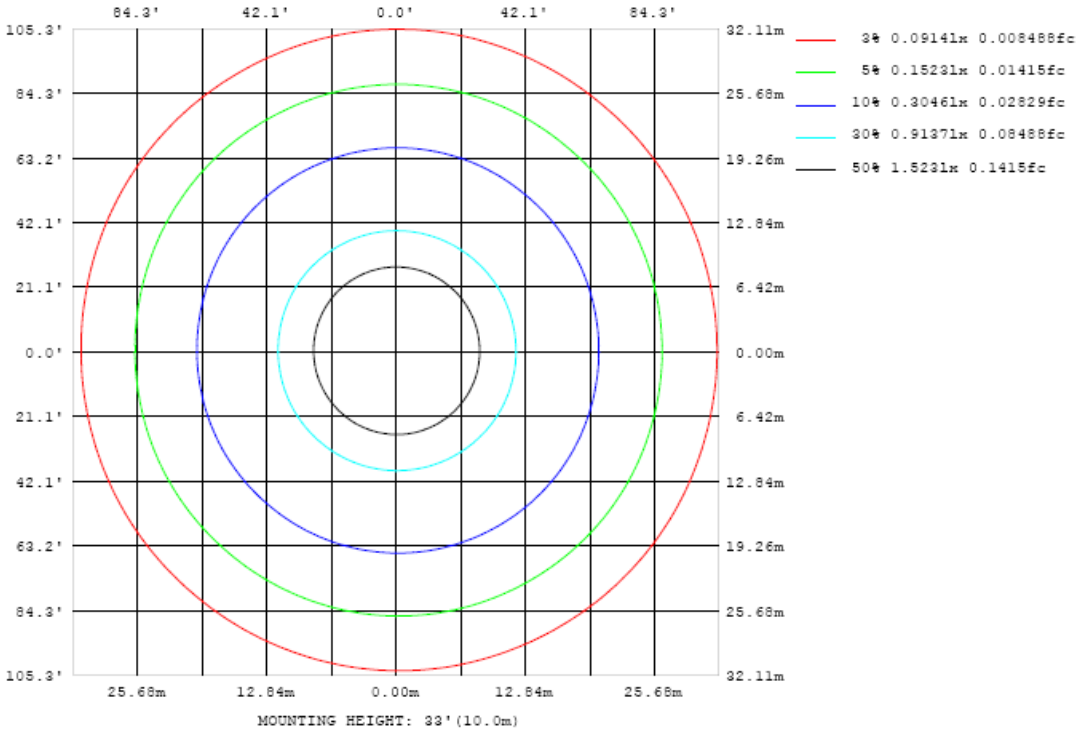


Chart 4: Illuminance Plot (Footcandles)

Luminous Intensity Distribution Plots- Goniophotometer Method

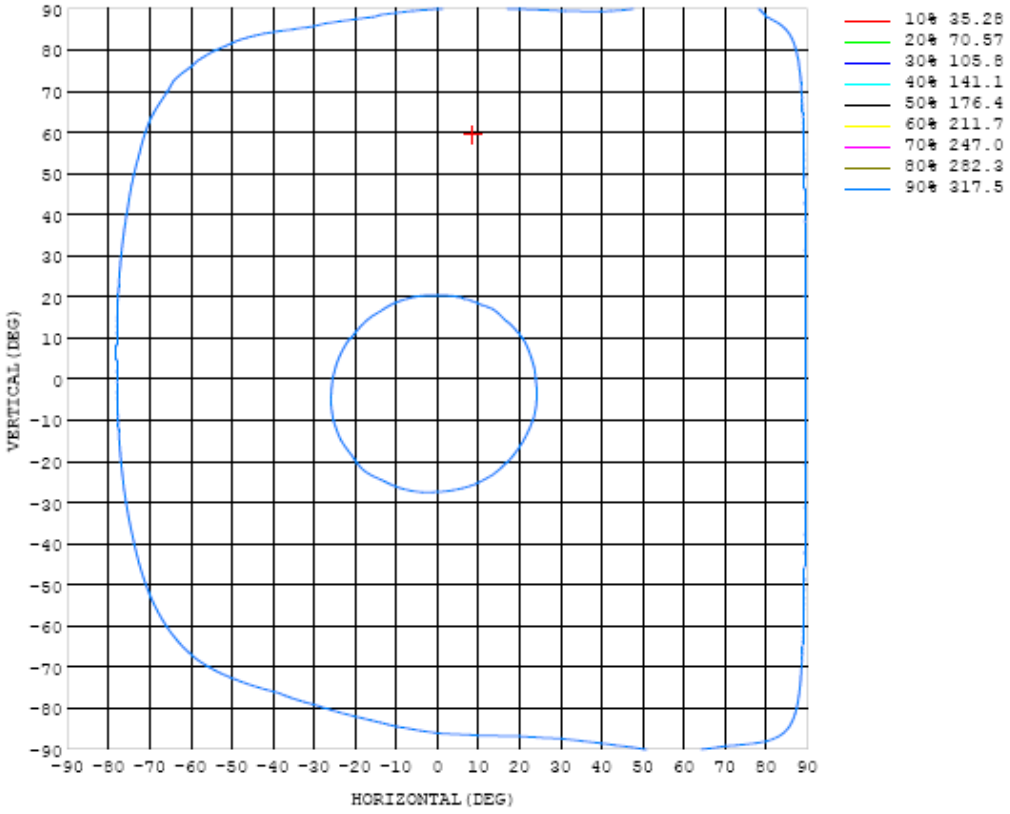


Chart 5: Isocandela Plot

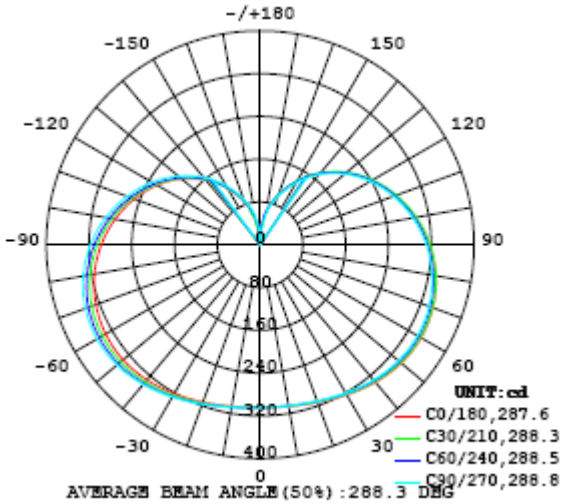


Chart 6: Polar Candela Distribution

Luminous Intensity Data- Goniophotometer Method

Table--1 UNIT: cd

γ (DEG) \ C (DEG)	0	10	20	30	40	50	60	70	80	90	100	110	120	130	140	150	160	170	180
0	305	305	305	305	305	305	305	305	305	305	305	305	305	305	305	305	305	305	305
5	305	305	305	305	305	305	304	304	304	304	304	304	305	304	305	305	305	305	305
10	307	307	306	306	306	306	306	306	306	305	305	305	306	306	306	306	306	306	307
15	310	309	309	309	309	308	308	308	308	308	308	307	308	308	308	308	309	309	309
20	314	313	313	313	312	312	312	311	311	311	311	311	311	311	311	312	312	312	313
25	319	318	317	317	317	316	316	316	316	315	315	315	315	315	315	315	316	316	317
30	324	323	323	323	322	321	321	320	320	320	320	320	320	319	319	319	320	321	322
35	330	329	328	328	328	327	326	326	326	325	325	324	324	323	324	324	324	325	326
40	335	335	334	334	333	332	332	331	331	330	329	329	328	328	328	328	328	329	330
45	340	340	339	339	338	337	336	335	335	334	333	332	332	331	331	331	331	332	333
50	344	344	343	343	342	341	340	339	338	337	336	335	334	333	333	333	333	333	335
55	347	346	345	345	344	343	342	341	340	339	338	336	335	334	334	334	333	334	335
60	348	347	346	346	345	344	343	342	341	340	338	336	335	334	333	333	333	333	334
65	347	346	345	345	345	343	342	341	340	339	337	335	333	331	331	331	331	330	331
70	344	343	343	343	342	341	339	338	337	336	334	332	330	328	327	327	327	326	327
75	339	339	339	339	339	337	335	334	333	332	330	327	325	323	322	322	322	321	322
80	333	333	333	334	333	331	329	328	327	326	324	321	319	317	316	316	315	314	315
85	325	325	326	326	326	324	322	321	320	319	317	313	311	309	309	308	307	307	307
90	317	317	317	318	318	316	314	312	312	311	308	306	302	300	300	299	298	298	297
95	306	306	307	307	307	305	304	302	302	301	299	295	292	290	290	290	288	288	287
100	295	295	296	297	297	295	293	292	291	290	288	285	281	280	279	278	277	276	276
105	283	283	284	284	284	282	281	280	279	278	276	273	270	268	267	266	265	263	264
110	269	270	271	271	271	270	268	267	266	265	263	260	257	255	254	254	252	251	251
115	255	256	257	258	257	256	255	254	253	252	250	247	244	242	241	240	238	238	237
120	241	241	242	243	243	242	240	239	239	238	235	233	230	228	227	226	225	224	223
125	225	226	227	228	227	226	225	224	223	222	220	217	215	213	211	211	210	208	208
130	209	209	210	211	211	210	209	208	207	206	204	201	199	197	196	195	194	192	192
135	191	192	193	194	194	193	192	191	190	189	187	185	183	180	179	179	177	176	175
140	173	174	175	176	176	176	174	173	173	171	170	168	165	163	162	161	160	159	158
145	155	156	157	158	157	157	156	155	154	153	151	149	147	145	144	143	142	141	141
150	136	137	138	138	139	138	137	136	135	134	132	130	128	126	125	124	123	122	122
155	117	118	118	119	119	118	118	117	116	115	113	111	109	108	106	106	105	104	104
160	97.9	98.4	99.0	99.5	99.4	98.9	98.2	97.4	96.4	95.5	94.1	92.6	91.0	89.3	88.2	87.2	86.7	86.4	86.5
165	79.6	79.9	80.2	80.0	80.9	80.7	80.2	79.4	78.5	77.3	73.9	75.2	74.0	72.6	71.3	69.5	69.5	68.0	68.2
170	61.4	61.5	60.3	55.7	60.1	63.4	63.2	60.1	60.3	54.2	43.2	43.5	54.5	51.0	47.3	39.3	39.5	40.1	38.9
175	39.2	39.3	37.6	35.3	33.5	34.1	33.4	31.5	25.6	19.8	15.9	16.5	16.9	12.2	10.4	8.09	10.2	11.7	14.6
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

γ (DEG) \ C (DEG)	190	200	210	220	230	240	250	260	270	280	290	300	310	320	330	340	350		
0	305	305	305	305	305	305	305	305	305	305	305	305	305	305	305	305	305		
5	305	305	306	306	306	306	306	306	306	306	306	306	305	306	306	305	305		
10	307	307	308	308	308	308	308	309	309	309	309	308	308	308	308	307	307		
15	310	310	311	311	312	312	312	312	312	312	312	312	311	311	311	311	310		
20	314	314	315	315	316	316	317	317	317	317	317	317	316	316	315	315	314		
25	318	319	320	320	321	322	322	323	323	323	322	322	321	321	320	320	319		
30	323	324	325	326	327	328	328	329	329	329	328	328	328	327	326	325	325		
35	327	329	330	331	333	333	334	335	335	335	335	334	333	333	332	331	330		
40	331	333	335	336	338	339	340	341	341	341	341	340	339	339	338	337	336		
45	334	336	338	340	342	343	344	345	346	346	346	345	344	343	343	342	341		
50	336	338	341	343	345	346	348	349	350	350	349	349	348	348	346	346	345		
55	337	339	342	344	346	348	350	351	352	352	352	351	350	350	349	348	347		
60	335	338	341	344	346	347	349	351	352	353	352	352	350	350	350	349	348		
65	333	336	339	342	344	346	348	350	351	352	351	350	349	349	349	348	347		
70	329	332	335	338	340	342	344	346	348	348	348	347	346	346	346	346	344		
75	323	327	330	333	335	336	339	341	343	343	343	342	341	342	342	341	340		
80	316	319	323	326	327	329	332	335	336	336	336	335	335	335	336	335	334		
85	308	311	314	317	319	320	323	326	327	328	328	326	326	327	327	327	326		
90	299	301	305	307	309	310	312	315	317	318	317	317	316	318	318	318	317		
95	288	290	294	296	298	298	301	304	306	307	306	305	306	307	308	308	307		
100	277	279	282	284	285	287	288	291	294	294	294	294	293	295	295	295	295		
105	264	267	269	271	273	273	274	278	279	280	281	280	281	282	282	283	282		
110	251	253	255	257	258	259	261	263	265	266	266	266	267	268	269	269	269		
115	238	239	241	242	243	244	246	248	250	251	251	251	252	254	255	255	255		
120	223	224	225	227	227	228	230	232	234	235	235	236	237	238	240	240	240		
125	208	209	210	211	212	212	214	216	217	219	219	220	221	223	224	224	225		
130	192	193	194	194	195	196	197	199	200	201	202	203	204	206	207	208	208		
135	175	176	176	177	178	178	179	181	183	184	185	186	187	189	190	191	191		
140	158	158	159	159	160	160	162	163	165	166	167	168	169	171	172	173	173		
145	141	141	141	142	142	143	144	146	147	148	149	150	152	153	154	155	156		
150	122	122	123	123	123	124	125	127	128	129	130	132	133	135	136	136	137		
155	104	104	104	104	105	106	106	108	109	110	111	113	114	115	116	117	117		
160	85.9	84.7	86.3	86.5	85.5	87.5	88.5	89.7	90.7	91.7	93.0	94.1	95.2	96.3	97.0	97.5	97.9		
165	68.4	66.9	61.4	55.5	67.7	68.8	71.9	72.8	73.6	74.6	75.7	76.8	77.7	78.3	78.7	79.1	79.8		
170	39.1	38.3	29.5	38.1	49.7	49.2	49.0	51.9	53.3	52.0	57.0	60.0	60.7	61.0	61.2	61.6	61.3		
175	11.2	13.5	18.6	20.3	15.5	16.9	21.8	24.8	29.9	33.9	37.0	39.6	40.3	41.2	41.8	41.7	41.5		
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. 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.

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The uncertainty of integrating sphere system reported in this document is expended 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 expended uncertainty is 2.3% with a coverage factor k=2.

Color Characteristics Measurements

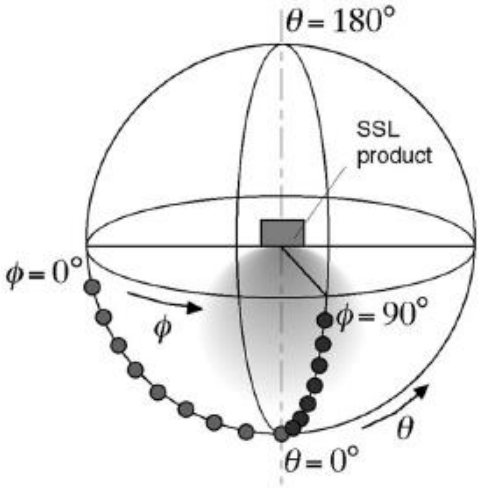
The color characteristics of SSL products include chromaticity coordinates, correlated color temperature, and color rendering index. These characteristics of SSL products may be spatially non-uniform, and thus, in order that they can be specified accurately, the color quantities shall be measured as 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°/180° and C=90°/270°) 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, Δu'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 ***