

LM-79-08 Test Report

for

GREEN CREATIVE LTD

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

LED lamp

Model: 8.5PLV/840/HYBM

Laboratory: Leading Testing Laboratories

NVLAP CODE: 200960-0

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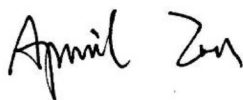
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Report No.: HZ18100024i

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

Review by:



Engineer: April Zou
Nov. 02, 2018

Approved by:



Manager: Jim Zhang
Nov. 02, 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: **8.5PLV/840/HYBM**

Luminous Efficacy (Lumens /Watt)	Total Luminous Flux (Lumens)	Power (Watts)	Power Factor
129.6	1107.0	8.54	0.9744
CCT (K)	CRI	Stabilization Time (Light & Power)	
3981	83.3	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 : Oct. 30, 2018

Date of Test : Oct. 31, 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	: 8.5PLV/840/HYBM
Electrical Ratings	: 120-277V, 50/60Hz, 8.5W
Product Description	: 4000K
Manufacturer	: GREEN CREATIVE LTD
Address	: 756 North Zhongshan Rd., Unit B301 Zhabei District, Shanghai

TEST RESULTS

Test ambient temperature was 25.3°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 70 minutes.

Sphere-Spectroradiometer Method

Parameter	Result	
Test Voltage (V)	120.0	277.0
Voltage frequency (Hz)	60	60
Test Current (A)	0.073	0.035
Power Factor	0.9744	0.8965
Test Power (W)	8.54	8.63
THD A%	19.48	28.58
Luminous Efficacy (lm/W)	129.6	128.2
Total Luminous Flux (lm)	1107.0	1106.0
Color Rendering Index (CRI)	83.3	
R9	8.4	
Correlated Color Temperature (CCT)(K)	3981	
Chromaticity Chroma x	0.3824	
Chromaticity Chroma y	0.3816	
Chromaticity Chroma u	0.2244	
Chromaticity Chroma v	0.3360	
Duv	0.0017	
Chromaticity Chroma u'	0.2244	
Chromaticity Chroma v'	0.5040	

Special Color Rendering Indices	
R1	81.3
R2	90.2
R3	96
R4	81.2
R5	81.4
R6	86.4
R7	85.9
R8	64
R9	8.4
R10	76.6
R11	80
R12	63.6
R13	83.7
R14	98.1
Rf	83
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 24.9°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)	0.073
Power Factor	0.9748
Test Power (W)	8.51
Luminous Efficacy (lm/W)	132.6
Total Luminous Flux (lm)	1128.2
Beam Angle (°)	91.6
Center Beam Candle Power (cd)	493
Spacing Criteria	1.14 (0°-180°)/ 1.15 (90°-270°)
Zonal Lumens in the 0°-60°Zone	81.80%
Zonal Lumens in the 60°-90°Zone	17.08%
Zonal Lumens in the 90°-120°Zone	1.03%
Zonal Lumens in the 120°-180°Zone	0.09%

Table 3: Test data per Goniophotometer Method

Spectral Power Distribution - Sphere Spectroradiometer Method

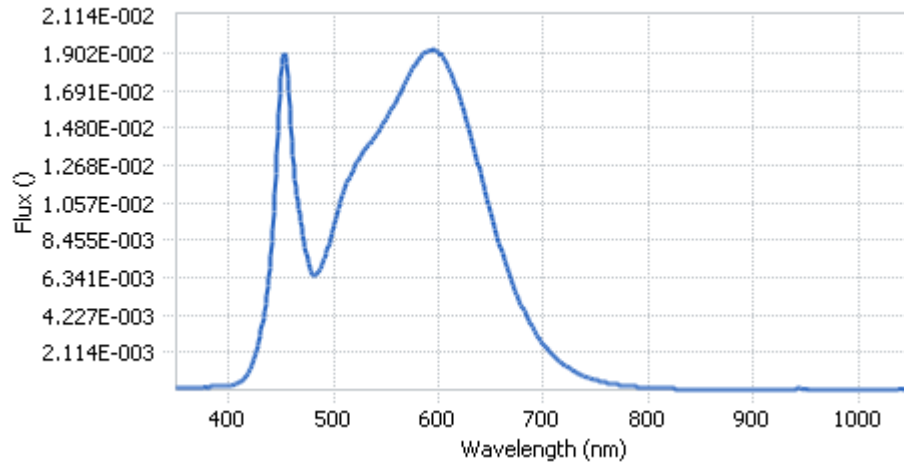
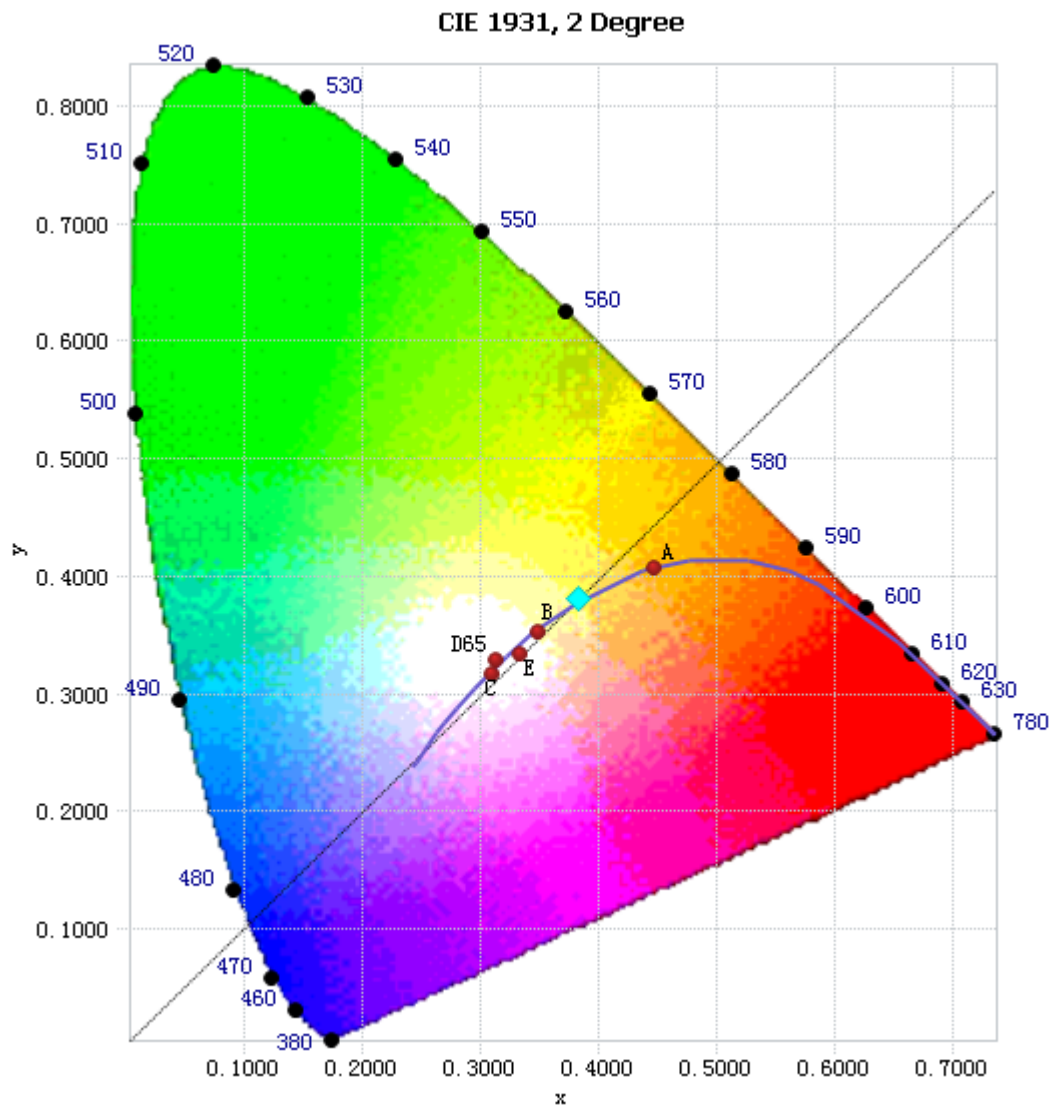


Chart 1: Spectral Power Distribution

Spectral Distribution over Visible Wavelength							
WL(nm)	Radiant(Watts)	WL(nm)	Radiant(Watts)	WL(nm)	Radiant(Watts)	WL(nm)	Radiant(Watts)
380	1.80E-04	485	6.63E-03	590	1.91E-02	695	3.00E-03
385	1.85E-04	490	7.21E-03	595	1.92E-02	700	2.58E-03
390	1.96E-04	495	8.11E-03	600	1.90E-02	705	2.21E-03
395	2.24E-04	500	9.25E-03	605	1.87E-02	710	1.91E-03
400	2.51E-04	505	1.03E-02	610	1.82E-02	715	1.63E-03
405	3.11E-04	510	1.12E-02	615	1.74E-02	720	1.40E-03
410	4.28E-04	515	1.20E-02	620	1.65E-02	725	1.21E-03
415	6.82E-04	520	1.27E-02	625	1.55E-02	730	1.04E-03
420	1.13E-03	525	1.31E-02	630	1.44E-02	735	8.89E-04
425	1.89E-03	530	1.36E-02	635	1.33E-02	740	7.56E-04
430	3.09E-03	535	1.39E-02	640	1.22E-02	745	6.43E-04
435	4.84E-03	540	1.44E-02	645	1.10E-02	750	5.57E-04
440	7.63E-03	545	1.48E-02	650	9.91E-03	755	4.79E-04
445	1.22E-02	550	1.53E-02	655	8.85E-03	760	4.15E-04
450	1.77E-02	555	1.58E-02	660	7.86E-03	765	3.58E-04
455	1.84E-02	560	1.64E-02	665	6.94E-03	770	3.06E-04
460	1.40E-02	565	1.69E-02	670	6.09E-03	775	2.65E-04
465	1.10E-02	570	1.75E-02	675	5.32E-03	780	2.26E-04
470	9.13E-03	575	1.81E-02	680	4.64E-03		
475	7.38E-03	580	1.86E-02	685	4.03E-03		
480	6.46E-03	585	1.90E-02	690	3.48E-03		

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

Chromaticity Diagram - Sphere Spectroradiometer Method



Tristimulus values(x, y): (0.3824, 0.3816)

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

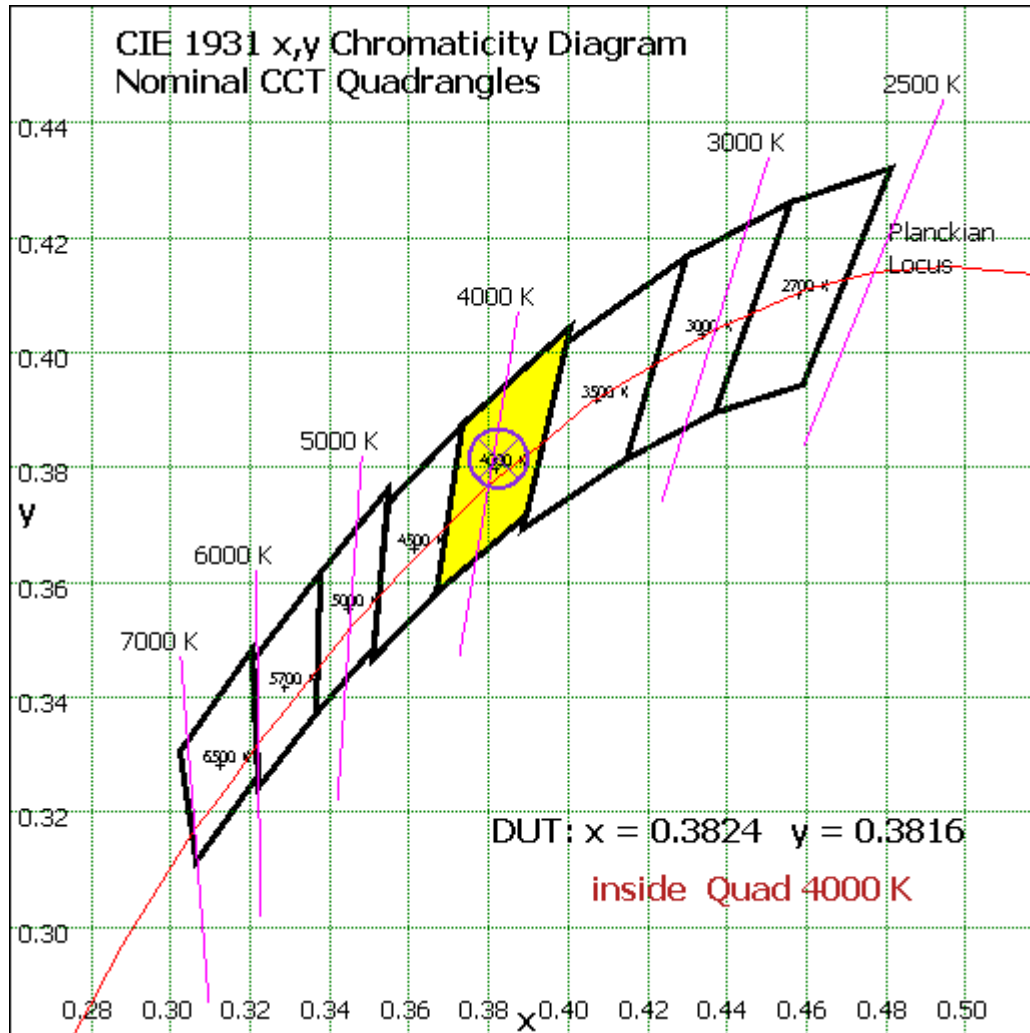


Chart 3: Plot of Lamp x/y coordinates on CIE 1931 Chromaticity Diagram

Zonal Lumen Tabulation- Goniophotometer Method

$\gamma(^{\circ})$	Lumens	% Total
0- 10	46.379	4.11%
10- 20	129.969	11.52%
20- 30	187.594	16.63%
30- 40	209.427	18.56%
40- 50	195.279	17.31%
50- 60	154.291	13.68%
60- 70	103.814	9.20%
70- 80	59.959	5.31%
80- 90	28.939	2.56%
90-100	9.816	0.87%
100-110	1.617	0.14%
110-120	0.158	0.01%
120-130	0.153	0.01%
130-140	0.21	0.02%
140-150	0.238	0.02%
150-160	0.211	0.02%
160-170	0.142	0.01%
170-180	0.05	0.00%
Total	1128.2	100%

$\gamma(^{\circ})$	Lumens	% Total
0- 60	922.939	81.80%
60- 90	192.712	17.08%
0-90	1115.651	98.88%
90- 180	12.595	1.12%
0- 180	1128.2	100%

Table 5: Zonal Lumen Data

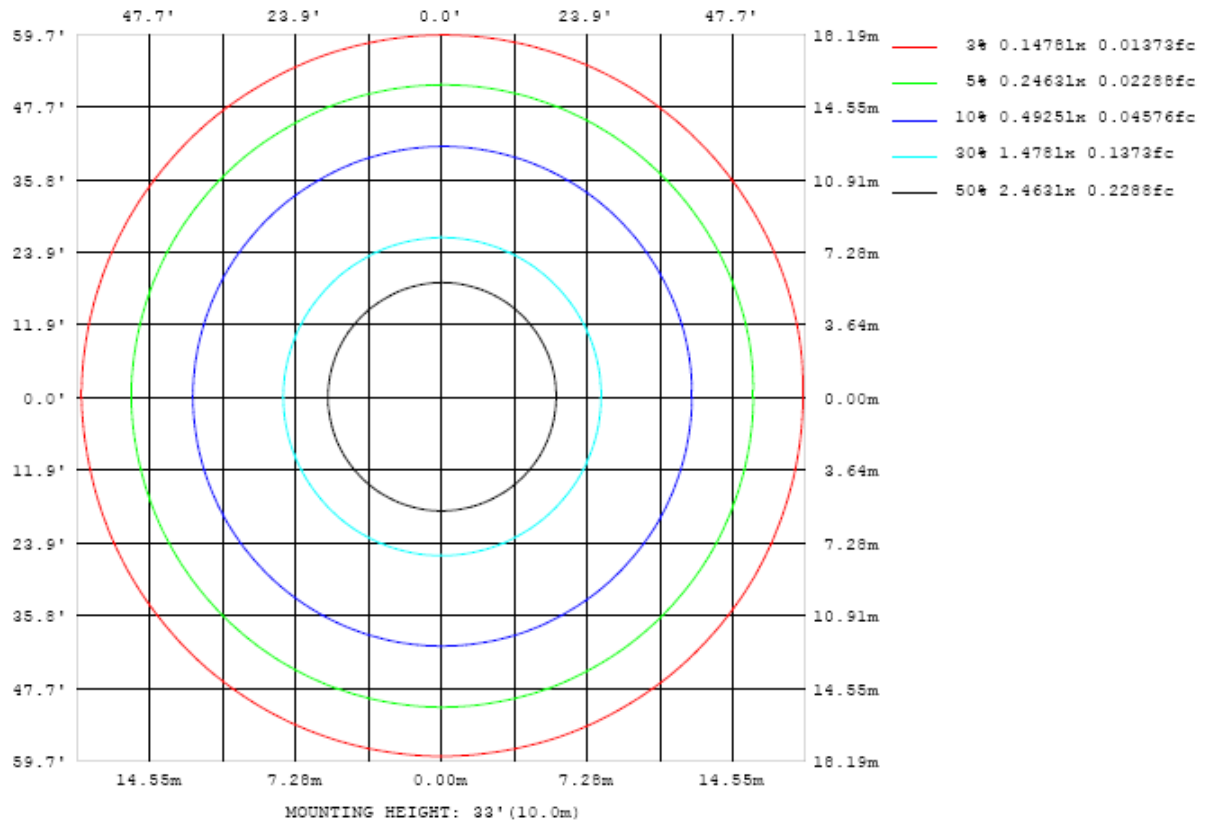


Chart 4: Illuminance Plot (Footcandles)

Luminous Intensity Distribution Plots- Goniophotometer Method

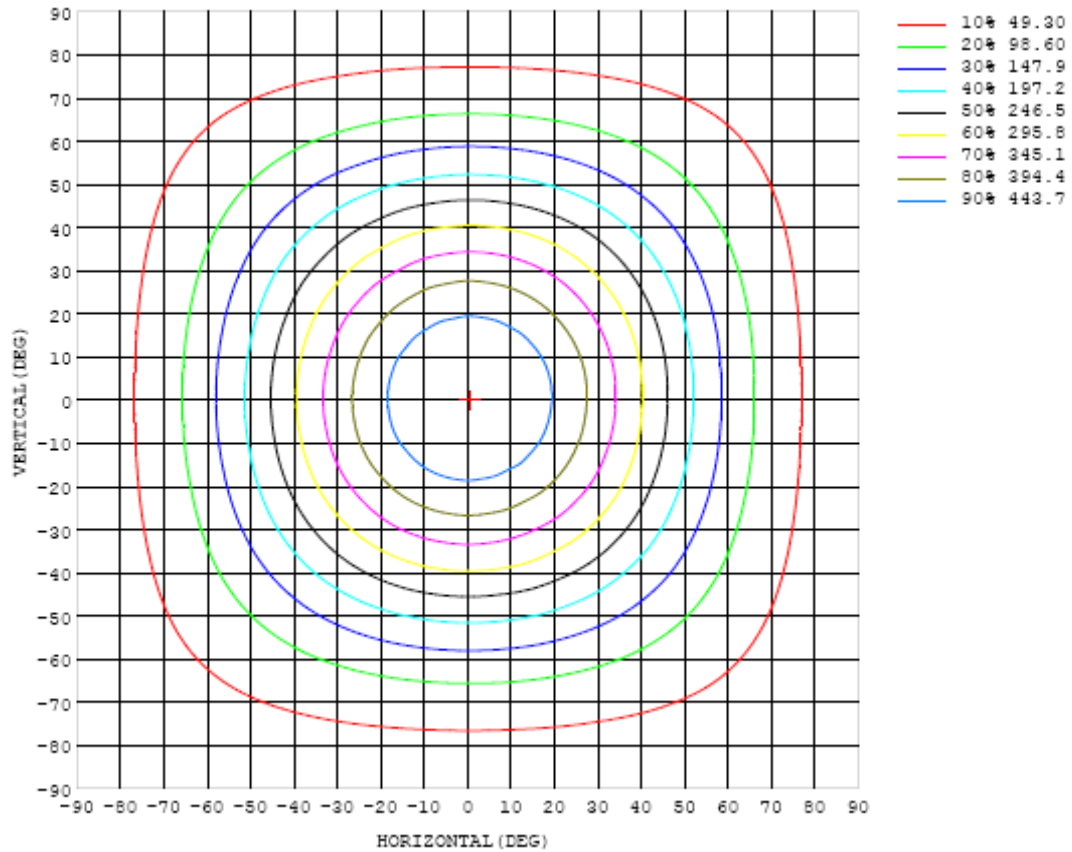


Chart 5: Isocandela Plot

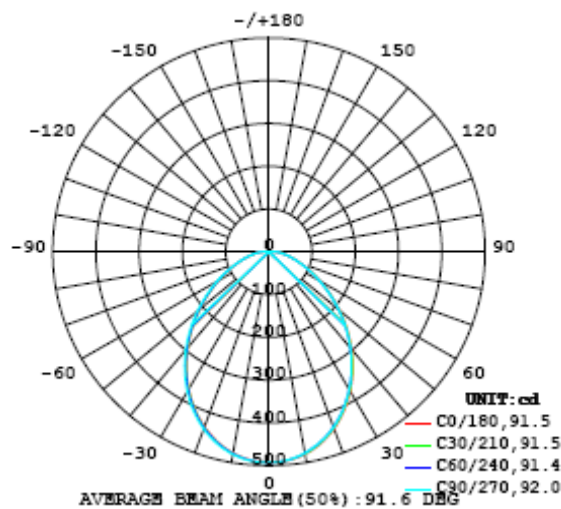


Chart 6: Polar Candela Distribution

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	493	493	493	493	493	493	493	493	493	493	493	493	493	493	493	493	493	493	493
5	490	489	490	489	490	490	489	489	489	489	488	488	489	488	488	488	488	488	489
10	480	480	480	480	479	479	478	478	478	477	478	477	477	477	477	477	477	477	478
15	464	463	463	462	461	462	460	461	460	460	460	459	460	460	459	460	460	460	460
20	441	439	439	438	438	438	436	436	436	436	435	435	435	435	435	435	435	436	436
25	410	410	409	409	408	408	405	406	405	406	405	405	405	405	404	405	405	405	406
30	376	375	375	374	373	373	370	371	370	371	370	370	370	370	369	370	370	370	371
35	338	337	336	336	335	334	333	333	332	333	332	332	331	331	331	331	331	331	332
40	298	297	296	296	294	294	293	294	292	293	292	292	291	291	290	290	291	291	292
45	255	255	254	254	253	253	251	252	251	251	250	250	250	249	249	249	249	249	250
50	214	213	212	212	211	211	210	211	210	210	209	209	208	208	208	207	208	208	209
55	174	173	172	172	171	171	171	171	170	170	170	169	169	169	168	168	168	169	170
60	137	137	136	136	135	135	135	135	134	134	134	133	133	133	133	133	133	133	135
65	105	104	104	104	104	103	103	103	102	102	102	102	102	102	101	101	102	102	103
70	77.5	77.3	77.1	77.0	76.7	76.4	76.0	75.9	75.8	75.4	75.4	75.4	75.3	75.2	75.3	75.4	75.6	75.8	77.0
75	56.3	56.0	55.9	55.9	55.6	55.4	55.0	55.1	54.9	54.8	54.7	54.8	54.8	54.7	54.9	54.9	55.1	55.3	55.9
80	39.3	39.1	38.9	38.9	38.7	38.6	38.3	38.4	38.2	38.3	38.2	38.1	38.2	38.2	38.2	38.2	38.5	38.7	39.2
85	26.0	25.9	25.8	25.7	25.6	25.5	25.4	25.3	25.3	25.3	25.3	25.3	25.2	25.3	25.2	25.3	25.5	25.6	26.0
90	15.9	15.8	15.8	15.7	15.7	15.6	15.5	15.5	15.4	15.4	15.4	15.4	15.4	15.4	15.4	15.4	15.5	15.6	15.9
95	8.61	8.58	8.57	8.56	8.52	8.48	8.41	8.36	8.28	8.26	8.27	8.28	8.28	8.26	8.25	8.25	8.27	8.29	8.39
100	3.77	3.75	3.78	3.80	3.78	3.77	3.72	3.70	3.64	3.62	3.60	3.59	3.59	3.58	3.55	3.54	3.54	3.55	3.66
105	1.22	1.23	1.25	1.28	1.29	1.29	1.28	1.26	1.23	1.20	1.18	1.17	1.16	1.15	1.14	1.12	1.12	1.13	1.19
110	0.29	0.29	0.31	0.33	0.35	0.36	0.36	0.34	0.33	0.31	0.29	0.28	0.28	0.27	0.27	0.27	0.27	0.27	0.32
115	0.10	0.10	0.11	0.11	0.12	0.12	0.12	0.12	0.11	0.10	0.10	0.11	0.11	0.10	0.10	0.10	0.10	0.10	0.11
120	0.12	0.12	0.13	0.13	0.13	0.13	0.13	0.13	0.13	0.13	0.13	0.13	0.13	0.13	0.13	0.13	0.13	0.13	0.14
125	0.15	0.16	0.16	0.16	0.16	0.16	0.16	0.16	0.16	0.16	0.16	0.16	0.16	0.16	0.16	0.16	0.16	0.16	0.18
130	0.19	0.19	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.24
135	0.24	0.24	0.24	0.24	0.24	0.24	0.24	0.24	0.24	0.24	0.24	0.24	0.24	0.24	0.24	0.24	0.24	0.24	0.30
140	0.28	0.28	0.28	0.28	0.28	0.28	0.28	0.29	0.29	0.28	0.29	0.29	0.29	0.29	0.29	0.29	0.29	0.28	0.38
145	0.32	0.32	0.32	0.32	0.32	0.32	0.32	0.32	0.32	0.32	0.32	0.32	0.32	0.32	0.32	0.32	0.32	0.32	0.44
150	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.36	0.35	0.35	0.36	0.36	0.35	0.35	0.36	0.35	0.35	0.49
155	0.38	0.39	0.39	0.39	0.39	0.39	0.39	0.39	0.39	0.39	0.39	0.39	0.39	0.39	0.39	0.39	0.39	0.39	0.52
160	0.42	0.42	0.42	0.42	0.42	0.42	0.42	0.42	0.42	0.42	0.42	0.42	0.42	0.42	0.42	0.42	0.42	0.42	0.55
165	0.44	0.45	0.45	0.45	0.45	0.45	0.45	0.45	0.45	0.45	0.45	0.45	0.45	0.45	0.45	0.45	0.45	0.45	0.55
170	0.47	0.47	0.47	0.48	0.47	0.47	0.48	0.48	0.48	0.48	0.47	0.48	0.48	0.47	0.47	0.47	0.48	0.47	0.55
175	0.51	0.51	0.51	0.52	0.51	0.51	0.52	0.52	0.52	0.52	0.51	0.52	0.52	0.51	0.51	0.51	0.52	0.51	0.53
180	0.52	0.52	0.52	0.52	0.52	0.52	0.52	0.52	0.52	0.52	0.52	0.52	0.52	0.52	0.52	0.52	0.52	0.52	0.52

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	493	493	493	493	493	493	493	493	493	493	493	493	493	493	493	493	493		
5	489	489	490	489	490	489	490	489	490	490	490	490	490	490	490	490	490		
10	478	478	479	478	479	479	481	480	481	480	481	481	481	481	481	481	481		
15	460	460	461	461	462	462	463	463	465	464	464	464	465	465	465	465	465		
20	436	436	437	437	438	438	440	440	441	441	441	441	442	441	442	441	441		
25	406	406	407	407	408	408	410	410	412	412	412	412	412	412	413	412	412		
30	371	371	372	372	373	373	376	376	378	378	378	379	378	378	378	378	377		
35	332	333	334	334	335	335	338	339	341	340	341	341	340	340	340	340	340		
40	292	292	293	293	295	295	298	298	300	300	300	301	300	300	300	300	299		
45	250	250	251	251	253	253	256	257	258	258	259	259	259	258	258	258	257		
50	208	209	210	210	212	212	214	215	216	217	217	217	216	216	216	216	215		
55	170	170	170	171	172	172	174	175	176	176	176	176	176	176	176	176	175		
60	135	135	136	136	136	137	138	139	140	140	140	140	140	139	139	139	139		
65	103	104	104	104	105	105	106	106	107	107	107	107	107	107	107	107	106		
70	77.2	77.3	77.7	77.9	78.0	78.1	78.9	79.0	79.3	79.4	79.5	79.5	79.6	79.4	79.3	79.3	78.9		
75	56.1	56.2	56.4	56.6	56.9	56.8	57.3	57.5	57.6	57.6	57.6	57.6	57.5	57.4	57.4	57.3	57.0		
80	39.2	39.4	39.7	39.8	40.0	39.9	40.2	40.3	40.4	40.3	40.4	40.3	40.3	40.2	40.1	40.0	39.8		
85	26.1	26.3	26.4	26.5	26.6	26.6	26.8	26.9	26.9	26.9	26.9	26.8	26.8	26.7	26.7	26.5	26.4		
90	15.9	16.1	16.2	16.3	16.4	16.4	16.5	16.5	16.5	16.5	16.6	16.5	16.5	16.4	16.4	16.4	16.3		
95	8.44	8.52	8.57	8.64	8.68	8.75	8.79	8.82	8.83	8.83	8.84	8.84	8.80	8.82	8.81	8.79	8.73		
100	3.68	3.74	3.77	3.81	3.84	3.86	3.89	3.91	3.91	3.89	3.91	3.93	3.93	3.93	3.93	3.91	3.90		
105	1.22	1.26	1.29	1.31	1.32	1.32	1.32	1.31	1.30	1.28	1.29	1.29	1.30	1.30	1.30	1.29	1.29		
110	0.34	0.37	0.40	0.42	0.42	0.41	0.38	0.35	0.34	0.33	0.33	0.35	0.36	0.36	0.35	0.34	0.33		
115	0.12	0.13	0.14	0.15	0.15	0.14	0.13	0.12	0.11	0.11	0.11	0.12	0.13	0.13	0.13	0.12	0.11		
120	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14		
125	0.18	0.18	0.18	0.18	0.18	0.18	0.18	0.18	0.18	0.18	0.18	0.18	0.18	0.18	0.18	0.18	0.18		
130	0.24	0.24	0.24	0.24	0.24	0.24	0.24	0.24	0.24	0.23	0.23	0.24	0.24	0.24	0.23	0.24	0.24		
135	0.31	0.31	0.31	0.31	0.31	0.30	0.31	0.31	0.31	0.30	0.30	0.30	0.30	0.30	0.31	0.30	0.30		
140	0.38	0.38	0.38	0.38	0.38	0.38	0.38	0.38	0.38	0.37	0.38	0.37	0.37	0.38	0.38	0.38	0.38		
145	0.44	0.44	0.44	0.44	0.44	0.44	0.44	0.44	0.44	0.44	0.44	0.44	0.44	0.44	0.44	0.44	0.44		
150	0.49	0.49	0.49	0.49	0.49	0.49	0.49	0.49	0.49	0.49	0.49	0.49	0.49	0.49	0.49	0.49	0.49		
155	0.53	0.53	0.53	0.53	0.53	0.53	0.53	0.53	0.53	0.53	0.53	0.53	0.53	0.53	0.53	0.53	0.53		
160	0.55	0.55	0.55	0.55	0.55	0.55	0.55	0.55	0.55	0.55	0.55	0.55	0.55	0.55	0.55	0.55	0.55		
165	0.56	0.56	0.56	0.56	0.56	0.56	0.56	0.56	0.56	0.56	0.56	0.56	0.56	0.56	0.56	0.56	0.56		
170	0.55	0.55	0.56	0.55	0.55	0.55	0.56	0.56	0.56	0.55	0.56	0.56	0.56	0.55	0.56	0.56	0.56		
175	0.54	0.54	0.54	0.54	0.54	0.54	0.54	0.54	0.54	0.54	0.54	0.54	0.54	0.54	0.54	0.54	0.54		
180	0.52	0.52	0.52	0.52	0.52	0.52	0.52	0.52	0.52	0.52	0.52	0.52	0.52	0.52	0.52	0.52	0.52		

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	2M	HZTE015-01	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 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

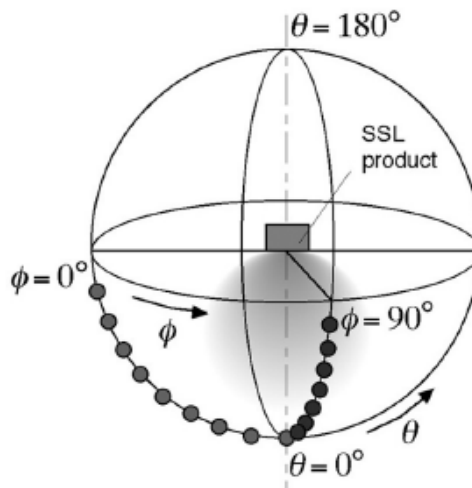
The color characteristics of SSL products include chromaticity coordinates, correlated color temperature, and color rendering index. These characteristics of SSL products may be spatially non-uniform, and thus, in order that they can be specified accurately, the color quantities shall be measured as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