LM-79-08 Test Report

for

GREEN CREATIVE LTD

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

LED Lamp

Model: 19.5PAR30HO/930NF25/277V/R

Laboratory: Leading Testing Laboratories

NVLAP CODE: 200960-0

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Report No.: HZ18120026c

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. 24, 2018

Approved by: Jim Zhang

Manager: Jim Zhang
Dec. 24, 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: 19.5PAR30HO/930NF25/277V/R

Luminous Efficacy (Lumens /Watt)	Total Luminous Flux (Lumens)	Power (Watts)	Power Factor
107.5	2062.0	19.18	0.9940

CCT (K)	CRI	Stabilization Time (Light & Power)
3029	92.0	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. 18, 2018
Date of Test	: Dec. 20, 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	: 19.5PAR30HO/930NF25/277V/R
Electrical Ratings	: 120-277V, 50/60Hz, 19.5W
Product Description	: 3000K
Manufacturer	: GREEN CREATIVE LTD
Address	: 756 North Zhongshan Rd., Unit B301 Zhabei District, Shanghai

TEST RESULTS

Test ambient temperature was 25.0℃.

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)	0.161	0.076
Power Factor	0.9940	0.9170
Test Power (W)	19.18	19.38
THD A%	5.72	26.11
Luminous Efficacy (lm/W)	107.5	108.2
Total Luminous Flux (lm)	2062.0	2097.0
Color Rendering Index (CRI)	92.0	
R9	58.6	
Correlated Color Temperature (CCT)(K)	3029	
Chromaticity Chroma x	0.4383	
Chromaticity Chroma y	0.4107	
Chromaticity Chroma u	0.2486	
Chromaticity Chroma v	0.3495	
Duv	0.0024	
Chromaticity Chroma u ’	0.2486	
Chromaticity Chroma v’	0.5242	

Special Color Rendering Indices	
R1	91.7
R2	94.3
R3	96.1
R4	93.1
R5	91.2
R6	93.1
R7	93.8
R8	82.8
R9	58.6
R10	86.1
R11	93.7
R12	80.4
R13	92.1
R14	97.2
Rf	92
Rg	99

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℃.

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)	0.162
Power Factor	0.9938
Test Power (W)	19.32
Luminous Efficacy (lm/W)	109.0
Total Luminous Flux (lm)	2105.1
Beam Angle (°)	35.0
Center Beam Candle Power (cd)	4326
Spacing Criteria	0.58 (0 °-180 °)/ 0.60 (90 °-270 °)
Zonal Lumens in the 0 °-60 °Zone	96.31%
Zonal Lumens in the 60 °-90 °Zone	3.56%
Zonal Lumens in the 90 °-120 °Zone	0.00%
Zonal Lumens in the 120 °-180 °Zone	0.13%

Table 3: Test data per Goniophotometer Method

Spectral Power Distribution - Sphere Spectroradiometer Method

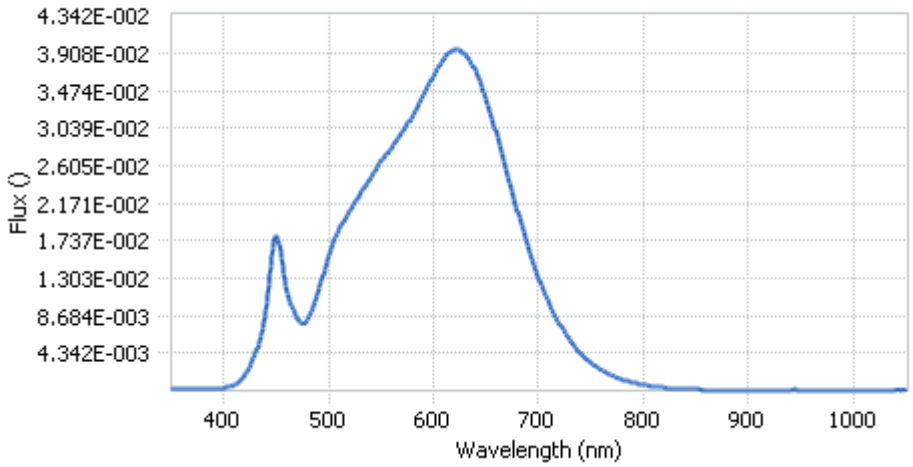
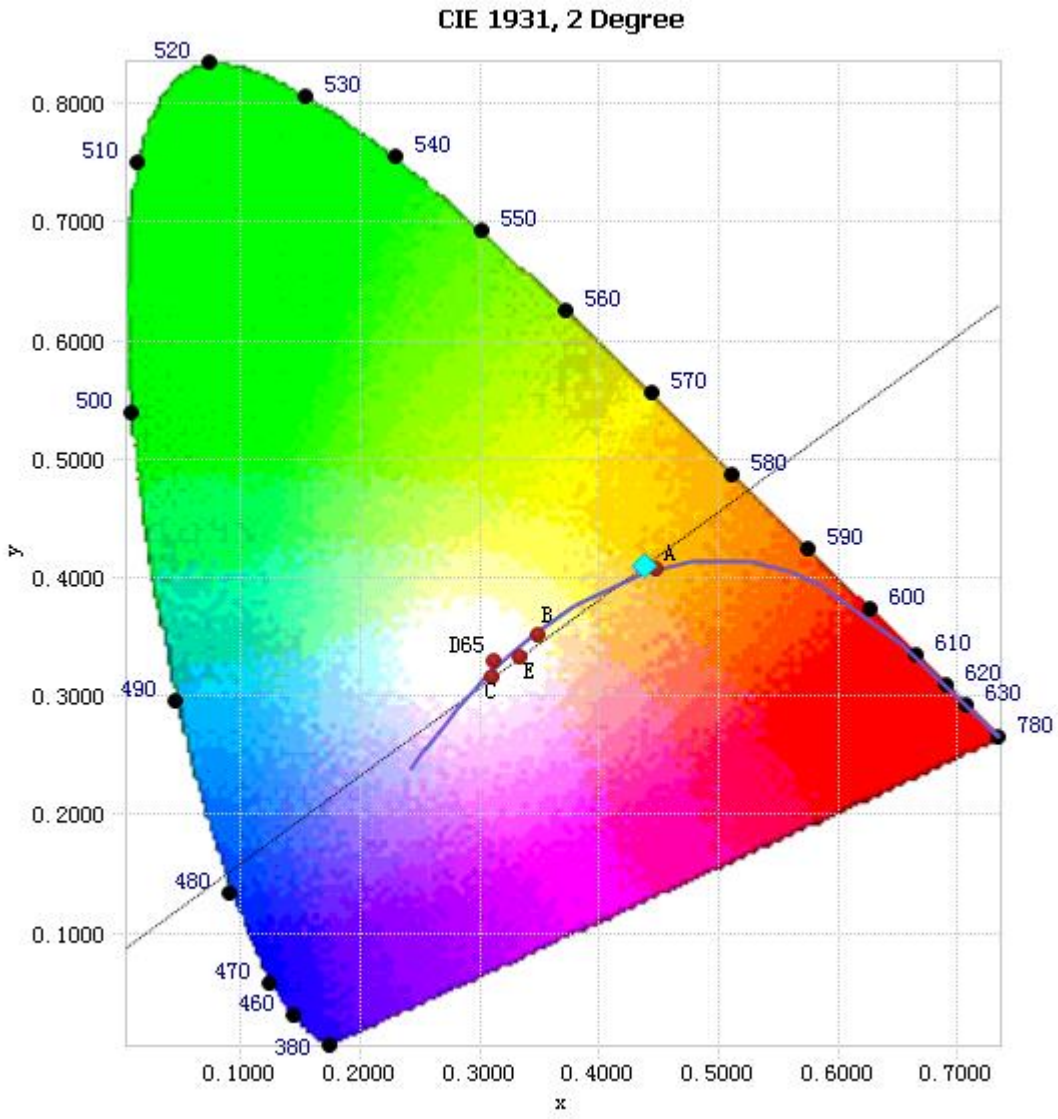


Chart 1: Spectral Power Distribution

Spectral Distribution over Visible Wavelength							
WL(nm)	Radiant(Watts)	WL(nm)	Radiant(Watts)	WL(nm)	Radiant(Watts)	WL(nm)	Radiant(Watts)
380	2.83E-04	485	9.68E-03	590	3.41E-02	695	1.48E-02
385	2.76E-04	490	1.15E-02	595	3.54E-02	700	1.31E-02
390	2.96E-04	495	1.35E-02	600	3.66E-02	705	1.15E-02
395	3.27E-04	500	1.56E-02	605	3.76E-02	710	1.02E-02
400	3.54E-04	505	1.74E-02	610	3.84E-02	715	8.88E-03
405	4.58E-04	510	1.87E-02	615	3.91E-02	720	7.80E-03
410	7.08E-04	515	1.99E-02	620	3.95E-02	725	6.79E-03
415	1.14E-03	520	2.09E-02	625	3.94E-02	730	5.87E-03
420	1.84E-03	525	2.18E-02	630	3.90E-02	735	5.06E-03
425	2.93E-03	530	2.27E-02	635	3.81E-02	740	4.35E-03
430	4.34E-03	535	2.37E-02	640	3.70E-02	745	3.73E-03
435	6.26E-03	540	2.47E-02	645	3.55E-02	750	3.25E-03
440	9.42E-03	545	2.57E-02	650	3.37E-02	755	2.79E-03
445	1.45E-02	550	2.66E-02	655	3.18E-02	760	2.41E-03
450	1.80E-02	555	2.74E-02	660	2.97E-02	765	2.07E-03
455	1.53E-02	560	2.82E-02	665	2.75E-02	770	1.78E-03
460	1.15E-02	565	2.91E-02	670	2.52E-02	775	1.52E-03
465	9.85E-03	570	3.00E-02	675	2.30E-02	780	1.30E-03
470	8.51E-03	575	3.08E-02	680	2.08E-02		
475	7.77E-03	580	3.19E-02	685	1.87E-02		
480	8.31E-03	585	3.30E-02	690	1.67E-02		

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

Chromaticity Diagram - Sphere Spectroradiometer Method



Tristimulus values(x, y): (0.4383, 0.4107)

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

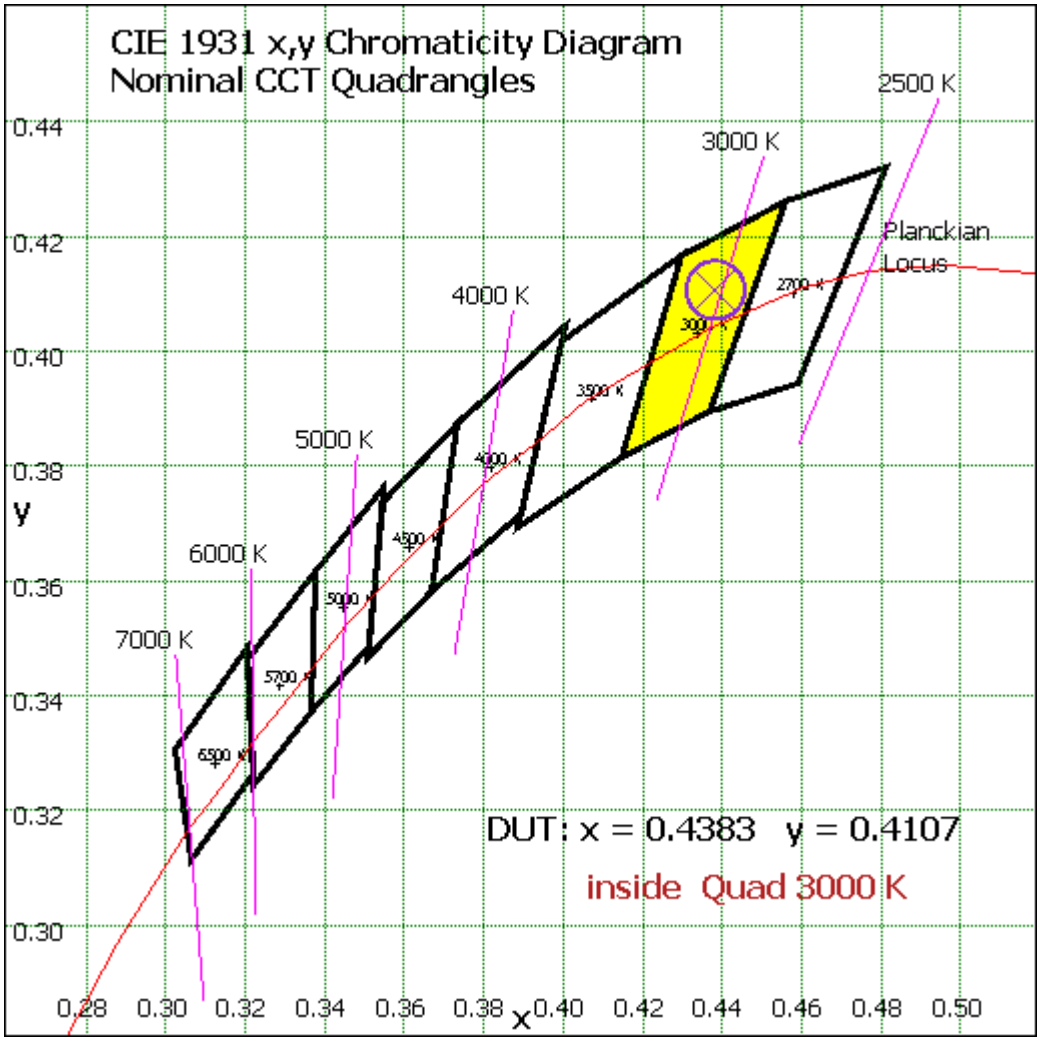


Chart 3: Plot of Lamp x/y coordinates on CIE 1931 Chromaticity Diagram

Zonal Lumen Tabulation- Goniophotometer Method

γ(°)	Lumens	% Total
0- 10	368.578	17.51%
10- 20	713.237	33.88%
20- 30	520.254	24.71%
30- 40	247.537	11.76%
40- 50	109.79	5.22%
50- 60	67.978	3.23%
60- 70	45.067	2.14%
70- 80	24.017	1.14%
80- 90	5.867	0.28%
90-100	0.011	0.00%
100-110	0.022	0.00%
110-120	0.047	0.00%
120-130	0.129	0.01%
130-140	0.362	0.02%
140-150	0.656	0.03%
150-160	0.769	0.04%
160-170	0.592	0.03%
170-180	0.197	0.01%
Total	2105.1	100%

γ(°)	Lumens	% Total
0- 60	2027.374	96.31%
60- 90	74.951	3.56%
0-90	2102.325	99.87%
90- 180	2.785	0.13%
0- 180	2105.1	100%

Table 5: Zonal Lumen Data

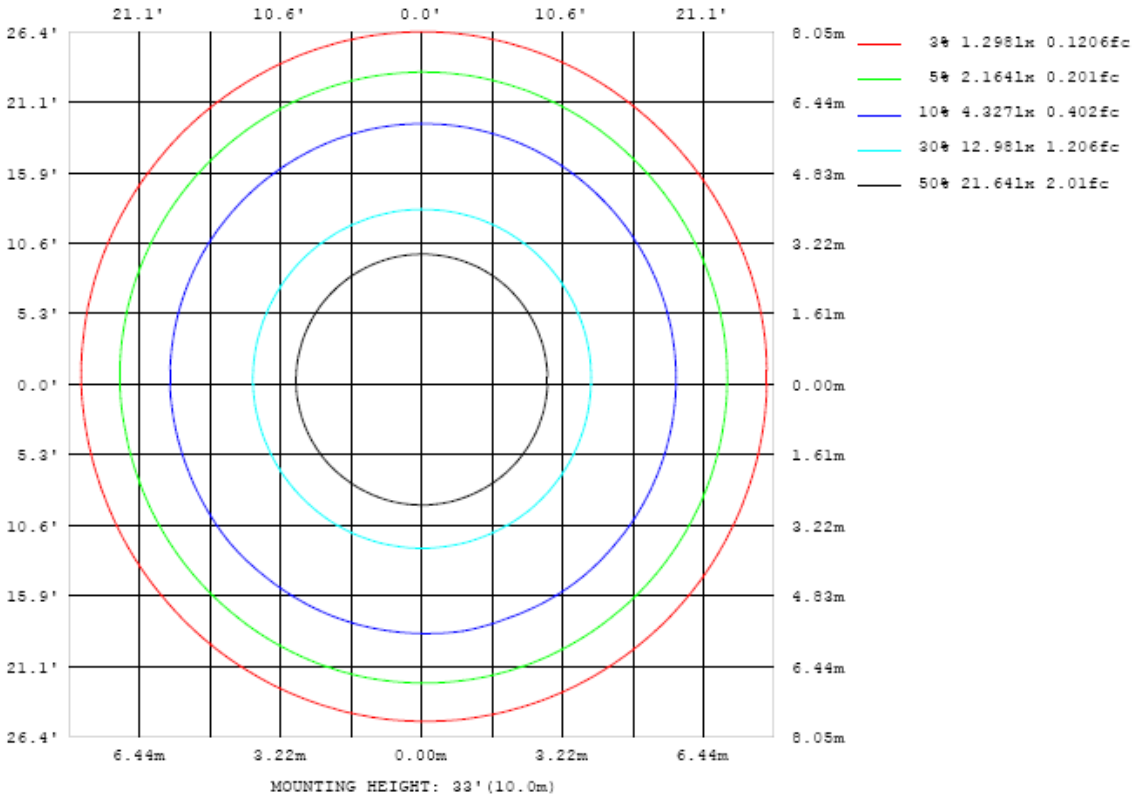


Chart 4: Illuminance Plot (Footcandles)

Luminous Intensity Distribution Plots- Goniophotometer Method

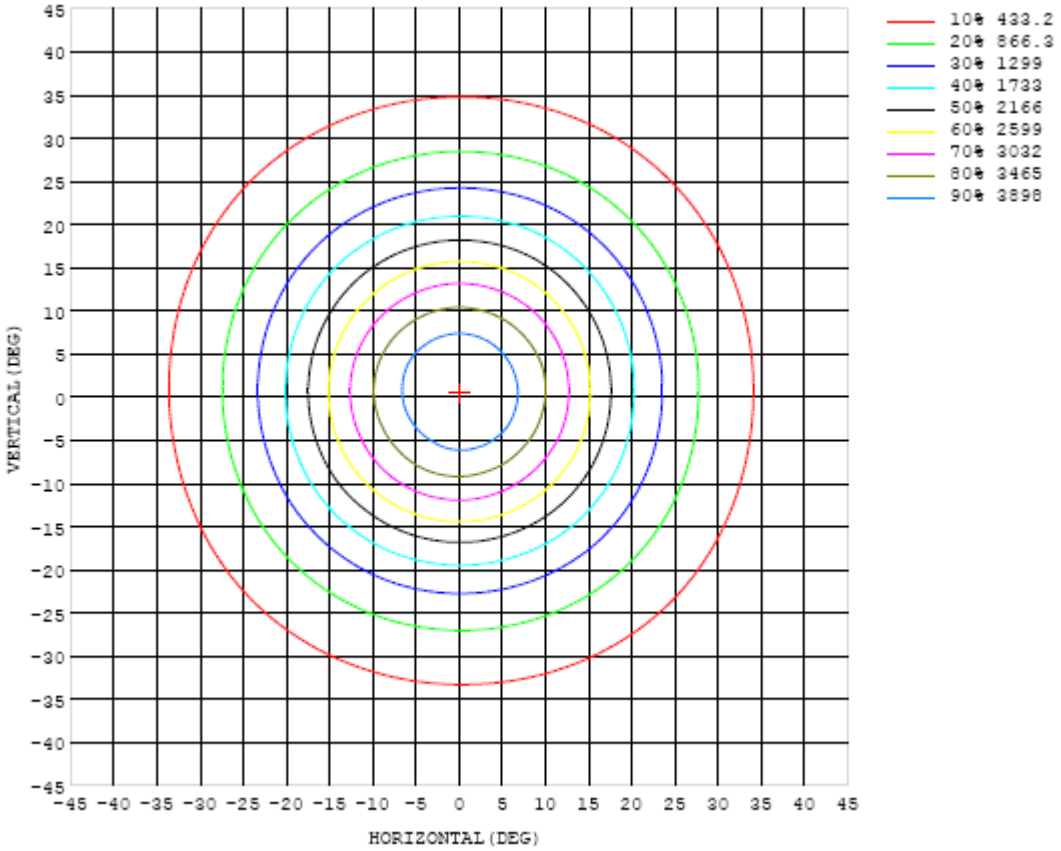


Chart 5: Isocandela Plot

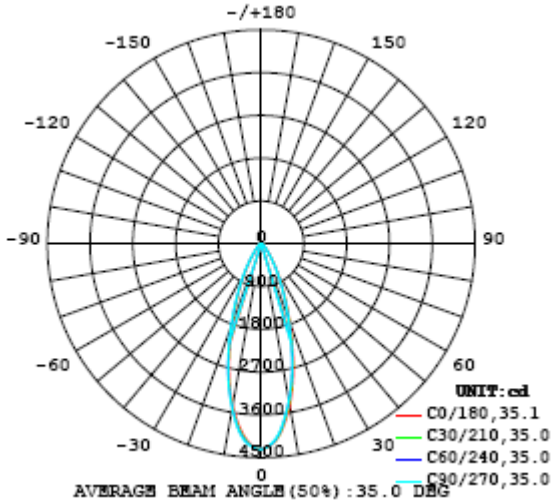


Chart 6: Polar Candela Distribution

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	4326	4326	4326	4326	4326	4326	4326	4326	4326	4326	4326	4326	4326	4326	4326	4326	4326	4326	4326
5	4088	4086	4082	4078	4073	4058	4051	4042	4036	4034	4026	4019	4017	4024	4027	4035	4048	4060	4068
10	3463	3433	3413	3391	3369	3358	3348	3336	3338	3341	3343	3351	3359	3363	3371	3386	3401	3428	3449
15	2629	2606	2588	2567	2544	2526	2510	2500	2495	2495	2495	2498	2506	2518	2541	2561	2580	2601	2624
20	1771	1751	1736	1719	1705	1690	1675	1664	1656	1656	1654	1657	1662	1669	1682	1697	1713	1733	1754
25	1132	1117	1108	1096	1084	1074	1064	1059	1058	1053	1049	1049	1049	1050	1056	1065	1073	1089	1110
30	684	674	666	659	653	652	646	636	645	635	630	628	625	624	633	631	634	644	658
35	390	385	379	373	369	364	362	359	357	354	352	349	347	346	347	350	354	360	371
40	223	220	217	213	210	208	205	203	201	200	197	196	194	194	194	196	199	204	210
45	138	138	137	136	134	132	131	131	130	129	127	126	125	126	127	128	130	132	135
50	98.0	97.6	97.2	96.5	95.7	95.0	94.2	93.8	93.3	92.9	92.0	91.2	90.8	91.1	91.9	92.8	93.6	94.7	96.7
55	75.9	75.4	75.0	74.5	73.8	73.5	72.8	72.4	72.3	72.0	71.2	70.8	70.5	70.7	71.1	72.1	72.4	73.2	74.9
60	59.3	59.0	58.6	58.1	57.7	57.4	57.1	56.9	56.7	56.5	56.1	55.8	55.6	55.9	56.3	56.8	57.2	57.7	58.5
65	45.5	45.3	45.0	44.6	44.4	44.2	44.0	43.8	43.7	43.5	43.2	43.2	43.1	43.4	43.6	44.0	44.4	44.8	45.4
70	33.7	33.5	33.3	32.9	32.7	32.4	32.2	32.1	31.9	31.8	31.6	31.6	31.6	31.8	32.1	32.5	32.8	33.1	33.8
75	22.5	22.3	22.0	21.8	21.6	21.4	21.4	21.2	21.1	21.0	20.9	20.9	20.9	21.0	21.3	21.6	21.9	22.2	22.7
80	12.8	12.6	12.4	12.2	12.1	12.0	11.9	11.8	11.8	11.7	11.7	11.7	11.7	11.8	12.0	12.2	12.4	12.7	13.0
85	4.59	4.42	4.26	4.15	4.05	3.99	3.93	3.90	3.86	3.83	3.77	3.77	3.82	3.89	4.01	4.39	4.36	4.61	5.05
90	0.01	0.01	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	0.01	0.00	0.01	0.03
95	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
100	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
105	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02
110	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03
115	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.05
120	0.06	0.06	0.06	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.08
125	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.15
130	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.20	0.20	0.20	0.20	0.20	0.19	0.20	0.19	0.30
135	0.33	0.33	0.34	0.34	0.34	0.34	0.34	0.34	0.34	0.34	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.34	0.55
140	0.52	0.52	0.52	0.53	0.53	0.53	0.53	0.54	0.54	0.54	0.54	0.55	0.55	0.55	0.55	0.55	0.55	0.53	0.86
145	0.73	0.74	0.74	0.75	0.76	0.76	0.77	0.77	0.78	0.78	0.78	0.78	0.79	0.79	0.79	0.78	0.78	0.75	1.21
150	0.97	0.97	0.98	0.98	0.99	1.00	1.00	1.01	1.02	1.02	1.02	1.03	1.03	1.03	1.03	1.03	1.03	0.98	1.53
155	1.23	1.23	1.24	1.24	1.25	1.25	1.26	1.27	1.27	1.28	1.28	1.29	1.29	1.30	1.30	1.30	1.30	1.25	1.78
160	1.49	1.49	1.49	1.50	1.51	1.51	1.52	1.53	1.54	1.54	1.55	1.56	1.56	1.57	1.57	1.58	1.58	1.53	1.94
165	1.68	1.68	1.69	1.69	1.70	1.70	1.71	1.72	1.73	1.74	1.74	1.75	1.76	1.77	1.78	1.78	1.79	1.76	1.97
170	1.77	1.78	1.79	1.79	1.80	1.81	1.82	1.83	1.84	1.85	1.86	1.87	1.88	1.88	1.89	1.89	1.89	1.89	1.87
175	1.83	1.82	1.82	1.82	1.82	1.82	1.83	1.84	1.85	1.86	1.87	1.88	1.89	1.89	1.90	1.91	1.93	1.94	1.95
180	2.11	2.11	2.11	2.11	2.11	2.11	2.11	2.11	2.11	2.11	2.11	2.11	2.11	2.11	2.11	2.11	2.11	2.11	2.11

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	4326	4326	4326	4326	4326	4326	4326	4326	4326	4326	4326	4326	4326	4326	4326	4326	4326		
5	4078	4091	4103	4113	4121	4132	4142	4150	4152	4149	4145	4140	4131	4114	4100	4091	4090		
10	3467	3482	3493	3502	3509	3512	3518	3526	3527	3525	3520	3518	3514	3509	3506	3503	3486		
15	2640	2657	2671	2688	2700	2706	2713	2723	2726	2727	2724	2723	2716	2704	2686	2671	2652		
20	1770	1788	1807	1826	1844	1855	1866	1875	1879	1882	1883	1877	1864	1848	1831	1812	1792		
25	1122	1138	1152	1165	1178	1189	1200	1209	1214	1215	1214	1210	1200	1188	1176	1161	1147		
30	668	679	689	698	707	716	727	736	741	742	739	733	725	719	709	701	693		
35	377	383	389	395	402	408	415	421	423	424	422	418	411	405	402	400	397		
40	215	218	222	226	230	233	237	240	242	242	240	237	233	230	229	228	227		
45	137	139	140	142	143	145	147	148	148	147	146	144	143	142	142	141	140		
50	97.8	98.8	99.5	99.9	101	102	103	104	104	103	102	101	101	100	99.8	99.5	99.1		
55	75.5	76.2	76.7	76.9	77.6	78.1	78.9	79.4	79.6	79.3	79.1	78.5	78.0	77.7	77.6	77.3	76.9		
60	58.8	59.1	59.4	59.6	60.2	60.6	61.2	61.6	61.7	61.4	61.2	60.8	60.5	60.1	60.0	60.0	59.7		
65	45.7	45.9	46.0	46.3	46.5	46.8	47.1	47.3	47.4	47.4	47.3	47.2	46.9	46.5	46.3	46.0	45.9		
70	34.0	34.3	34.4	34.5	34.8	35.0	35.2	35.4	35.4	35.4	35.3	35.1	34.9	34.6	34.5	34.2	34.0		
75	23.0	23.2	23.3	23.5	23.7	23.9	24.0	24.2	24.3	24.2	24.1	23.9	23.7	23.5	23.4	23.2	23.0		
80	13.2	13.4	13.5	13.6	13.8	13.9	14.0	14.1	14.2	14.2	14.2	14.1	13.9	13.7	13.6	13.3	13.1		
85	5.21	5.35	5.44	5.53	5.62	5.70	5.77	5.80	5.85	5.87	5.84	5.79	5.68	5.53	5.37	5.15	4.95		
90	0.07	0.12	0.15	0.18	0.22	0.25	0.28	0.31	0.33	0.33	0.32	0.31	0.28	0.23	0.15	0.08	0.04		
95	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01		
100	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01		
105	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02		
110	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03		
115	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05		
120	0.09	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08		
125	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	0.15		
130	0.32	0.32	0.32	0.32	0.32	0.32	0.32	0.33	0.32	0.32	0.32	0.32	0.32	0.32	0.31	0.32	0.30		
135	0.60	0.60	0.59	0.59	0.59	0.59	0.59	0.59	0.59	0.59	0.59	0.59	0.59	0.59	0.59	0.60	0.56		
140	0.97	0.95	0.95	0.95	0.95	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.95	0.95	0.97	0.89		
145	1.40	1.37	1.36	1.36	1.35	1.35	1.35	1.35	1.35	1.35	1.35	1.36	1.36	1.36	1.37	1.41	1.26		
150	1.83	1.78	1.77	1.77	1.76	1.76	1.75	1.76	1.76	1.76	1.76	1.77	1.77	1.78	1.79	1.84	1.61		
155	2.18	2.13	2.12	2.11	2.11	2.11	2.10	2.11	2.11	2.11	2.12	2.13	2.13	2.14	2.15	2.22	1.88		
160	2.45	2.41	2.41	2.40	2.41	2.41	2.41	2.41	2.41	2.42	2.42	2.43	2.43	2.44	2.44	2.51	2.04		
165	2.58	2.56	2.56	2.56	2.57	2.57	2.57	2.58	2.59	2.59	2.60	2.60	2.60	2.61	2.61	2.66	2.01		
170	2.41	2.51	2.49	2.48	2.48	2.48	2.49	2.50	2.51	2.52	2.53	2.54	2.55	2.56	2.58	2.52	1.76		
175	1.95	2.11	2.17	2.16	2.16	2.18	2.19	2.20	2.22	2.24	2.25	2.26	2.27	2.29	2.19	1.85	1.84		
180	2.11	2.11	2.11	2.11	2.11	2.11	2.11	2.11	2.11	2.11	2.11	2.11	2.11	2.11	2.11	2.11	2.11		

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 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 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 expended uncertainty is 2.3% with a coverage factor k=2.

Color Characteristics Measurements

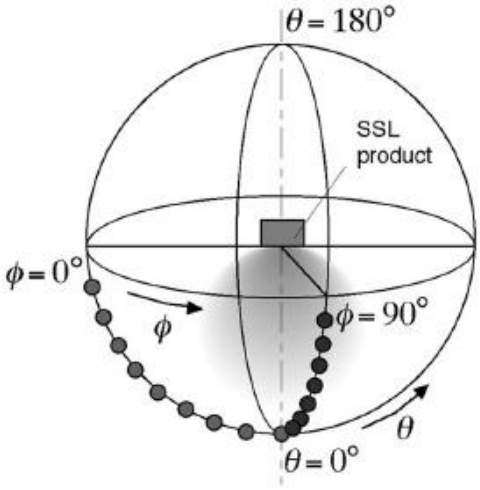
The color characteristics of SSL products include chromaticity coordinates, correlated color temperature, and color rendering index. These characteristics of SSL products may be spatially non-uniform, and thus, in order that they can be specified accurately, the color quantities shall be measured as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