

LM-79-08 TEST REPORT

for

GREEN CREATIVE LTD

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

LED Lamp

Model: 19.5PAR38HO/927NF25/277V

Laboratory: Leading Testing Laboratories

NVLAP CODE: 200960-0

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

Tel: +86571 86376106

www.ledtestlab.com

Report No.: HZ19060039a

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

Review by:



Engineer: April Zou
Sep. 02, 2019

Approved by:



Manager: Jim Zhang
Sep. 02, 2019

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: **19.5PAR38HO/927NF25/277V**

Luminous Efficacy (Lumens /Watt)	Total Luminous Flux (Lumens)	Power (Watts)	Power Factor
103.2	1969.2	19.09	0.9908
CCT (K)	CRI	Stabilization Time (Light & Power)	
2728	93.0	60	

Table 1: Executive Data Summary

Test specifications:

Date of Receipt	: Jun. 20, 2019
Date of Test	: Jun. 21, 2019
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 PHOTO



Figure 1- Overview of the sample

Equipment Under Test(EUT)

Name	: LED Lamp
Model	: 19.5PAR38HO/927NF25/277V
Electrical Ratings	: 120-277V, 60Hz, 19.5W
Product Description	: 2700K
Manufacturer	: GREEN CREATIVE LTD
Address	: 756 North Zhongshan Rd., Unit B301 Zhabei District, Shanghai

TEST RESULTS

Test ambient temperature was 25.0 °C.

Test orientation was base up. Test was conducted without a dimmer in the circuit.

The stabilization time of the sample was 70 minutes, and the total operating time including stabilization was 90 minutes.

The photometric distance is 2.47 m.

Luminous data was taken at 0.5 ° vertical intervals and 10 ° horizontal intervals.

Parameter	Result		Special Color Rendering Indices	
Test Voltage (V)	120.0	277.0	R1	93.2
Voltage frequency (Hz)	60	60	R2	96.3
Test Current (A)	0.161	0.085	R3	98.1
Power Factor	0.9908	0.8662	R4	93.4
Test Power (W)	19.09	20.29	R5	93.1
THD A%	12.21	26.04	R6	96.1
Luminous Efficacy (lm/W)	103.2	101.6	R7	92
Total Luminous Flux (lm)	1969.2	2062.2	R8	82.1
Color Rendering Index (CRI)	93.0		R9	60.9
R9	60.9		R10	90.9
Correlated Color Temperature (CCT) (K)	2728		R11	94.8
Chromaticity (Chroma x, Chroma y)	(0.4563, 0.4080)		R12	87.3
Chromaticity (Chroma u, Chroma v)	(0.2614, 0.3505)		R13	94
Chromaticity (Chroma u', Chroma v')	(0.2614, 0.5258)		R14	98.3
Duv	-0.0007			
Average Beam Angle (°)	21.4			
Center Beam Candle Power (cd)	8760			
Spacing Criteria	0.34 (0°-180°)/ 0.35 (90°-270°)			
Zonal Lumens in the 0°-60° Zone	95.99%			
Zonal Lumens in the 60°-90° Zone	3.86%			
Zonal Lumens in the 90°-120° Zone	0.02%			
Zonal Lumens in the 120°-180° Zone	0.13%			

Table 2: Test data per Goniophotometer Method

Spectral Power Distribution

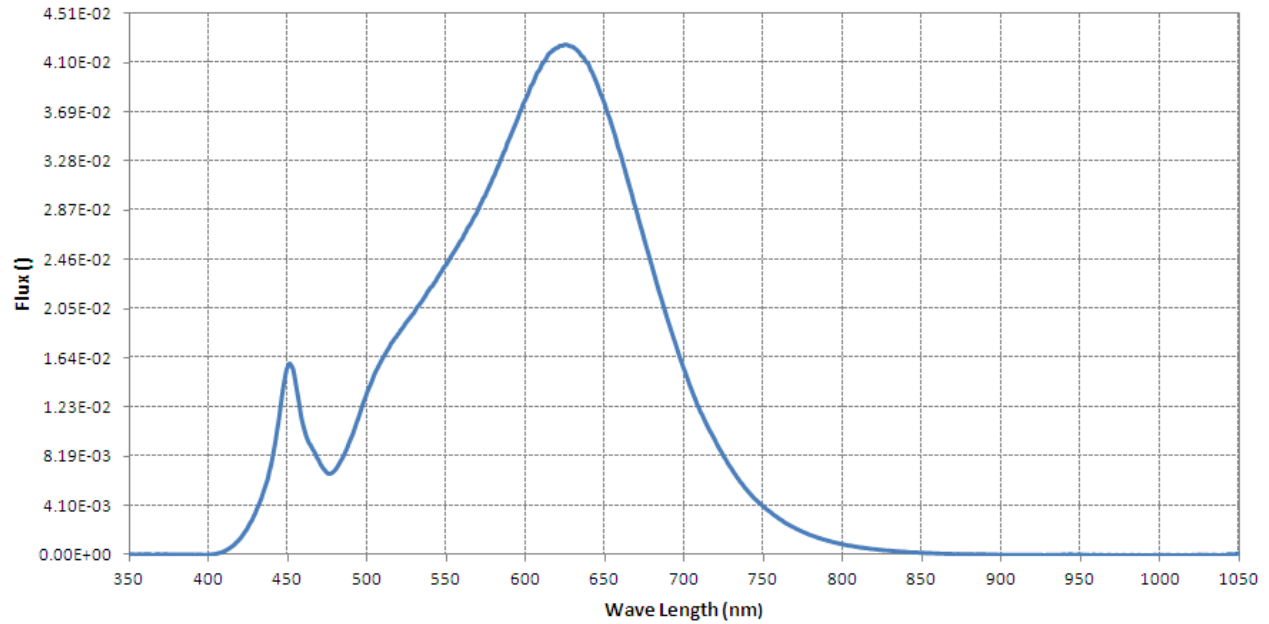


Chart 1: Spectral Power Distribution

Spectral Distribution over Visible Wavelength							
WL(nm)	Radiant(Watts)	WL(nm)	Radiant(Watts)	WL(nm)	Radiant(Watts)	WL(nm)	Radiant(Watts)
380	7.39E-05	485	8.73E-03	590	3.66E-02	695	1.82E-02
385	8.19E-05	490	1.04E-02	595	3.83E-02	700	1.62E-02
390	7.27E-05	495	1.23E-02	600	4.00E-02	705	1.43E-02
395	6.75E-05	500	1.43E-02	605	4.15E-02	710	1.26E-02
400	6.19E-05	505	1.60E-02	610	4.29E-02	715	1.11E-02
405	1.56E-04	510	1.73E-02	615	4.40E-02	720	9.82E-03
410	3.78E-04	515	1.86E-02	620	4.44E-02	725	8.60E-03
415	8.26E-04	520	1.95E-02	625	4.47E-02	730	7.49E-03
420	1.52E-03	525	2.05E-02	630	4.45E-02	735	6.45E-03
425	2.59E-03	530	2.14E-02	635	4.37E-02	740	5.60E-03
430	3.96E-03	535	2.24E-02	640	4.28E-02	745	4.87E-03
435	5.80E-03	540	2.35E-02	645	4.12E-02	750	4.25E-03
440	8.49E-03	545	2.45E-02	650	3.93E-02	755	3.68E-03
445	1.28E-02	550	2.55E-02	655	3.72E-02	760	3.18E-03
450	1.66E-02	555	2.66E-02	660	3.49E-02	765	2.74E-03
455	1.48E-02	560	2.77E-02	665	3.24E-02	770	2.36E-03
460	1.11E-02	565	2.90E-02	670	3.00E-02	775	2.04E-03
465	9.38E-03	570	3.04E-02	675	2.74E-02	780	1.75E-03
470	8.07E-03	575	3.17E-02	680	2.50E-02		
475	7.17E-03	580	3.32E-02	685	2.26E-02		
480	7.53E-03	585	3.49E-02	690	2.03E-02		

Table 3: Spectral Power Distribution Numerical Data per Sphere - Spectroradiometer Method

Chromaticity Diagram

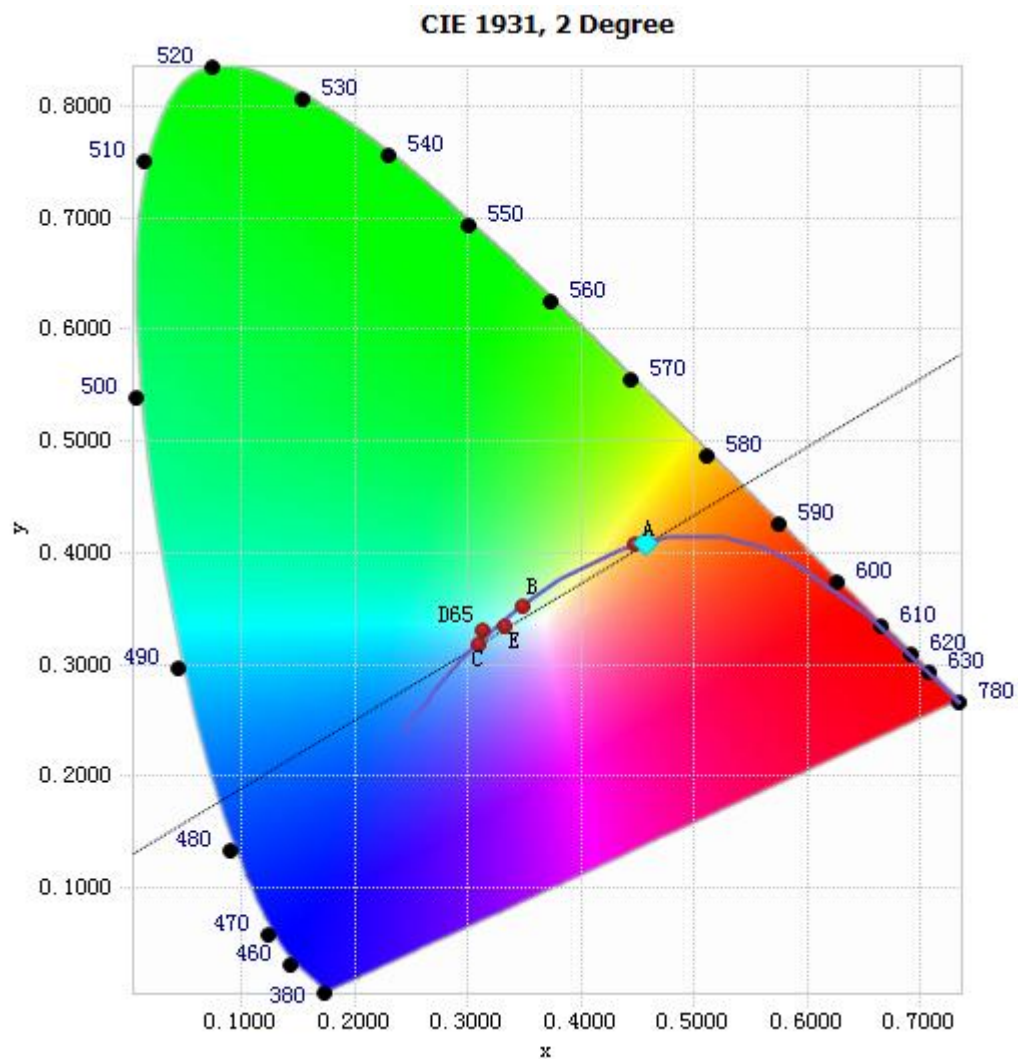


Chart 2: Chromaticity Diagram per Sphere - Spectroradiometer Method

Note: The location on the diagram of the tristimulus coordinates are indicated by the blue diamond.

Nominal CCT Quadrangles

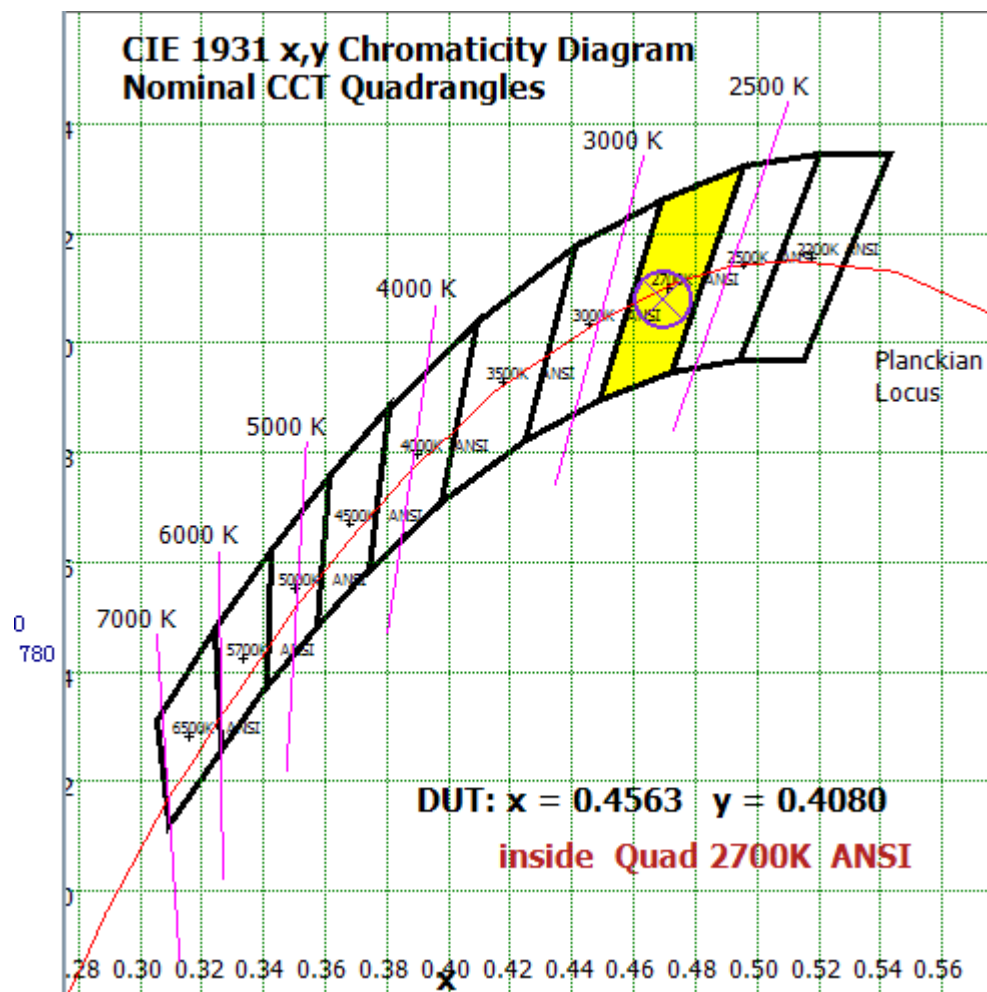


Chart 3: Plot of Lamp x/y coordinates on CIE 1931 Chromaticity Diagram

Color Rendition Report

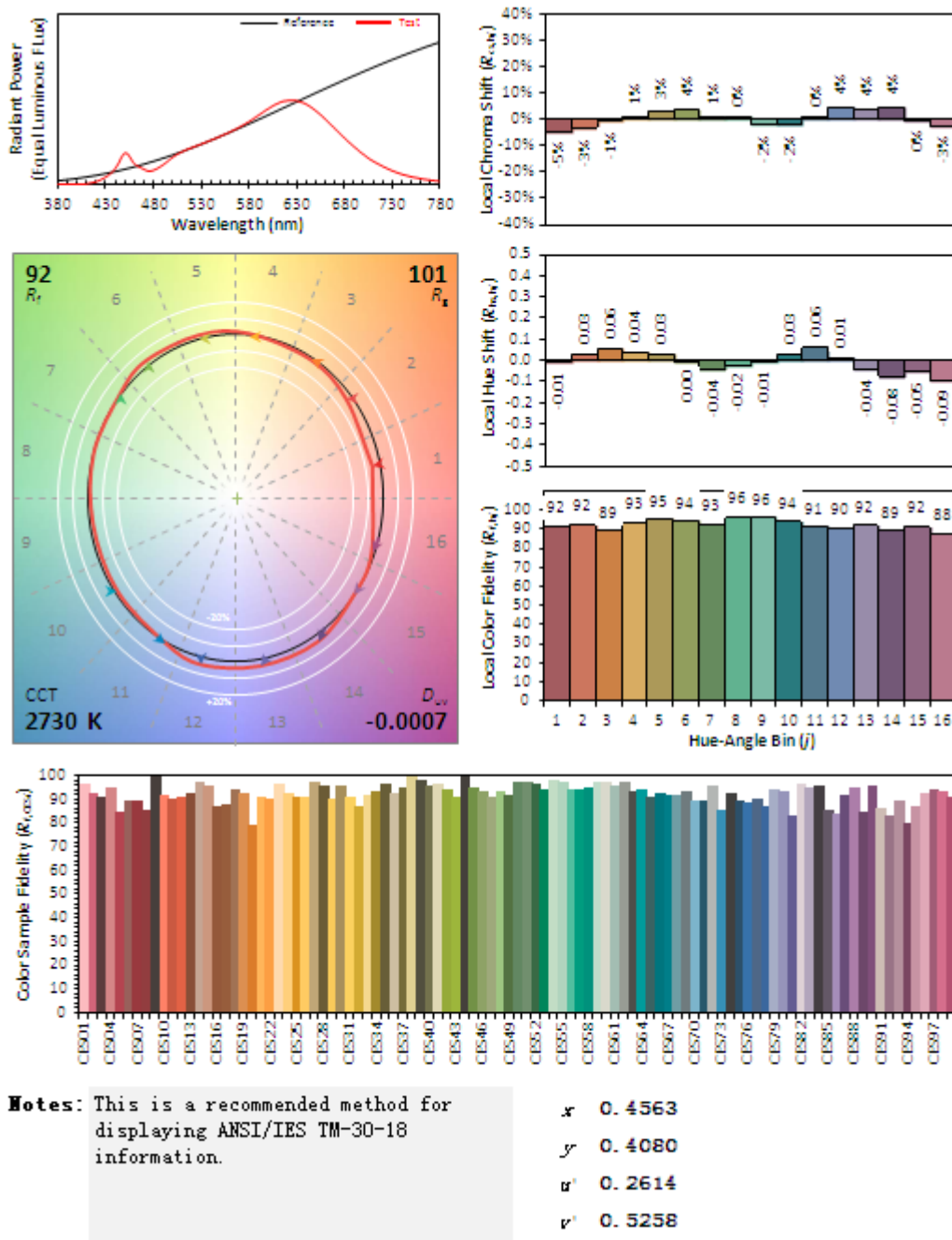


Chart 4: Full Report Created with the IES TM-30 Calculator

Note: The values in this diagram might be a little different from the values in Table 2 due to rounding.

Zonal Lumen Tabulation- Goniophotometer Method

$\gamma(^{\circ})$	Lumens	% Total
0- 10	632.362	32.11%
10- 20	688.653	34.97%
20- 30	291.1	14.78%
30- 40	131.926	6.70%
40- 50	87.957	4.47%
50- 60	58.113	2.95%
60- 70	41.515	2.11%
70- 80	25.814	1.31%
80- 90	8.741	0.44%
90-100	0.264	0.01%
100-110	0.03	0.00%
110-120	0.047	0.00%
120-130	0.089	0.00%
130-140	0.26	0.01%
140-150	0.626	0.03%
150-160	0.845	0.04%
160-170	0.632	0.03%
170-180	0.193	0.01%
Total	1969.2	100%

$\gamma(^{\circ})$	Lumens	% Total
0- 60	1890.111	95.99%
60- 90	76.07	3.86%
0-90	1966.181	99.85%
90- 180	2.986	0.15%
0- 180	1969.2	100%

Table 4: Zonal Lumen Data

Illuminance Plots- Goniophotometer Method

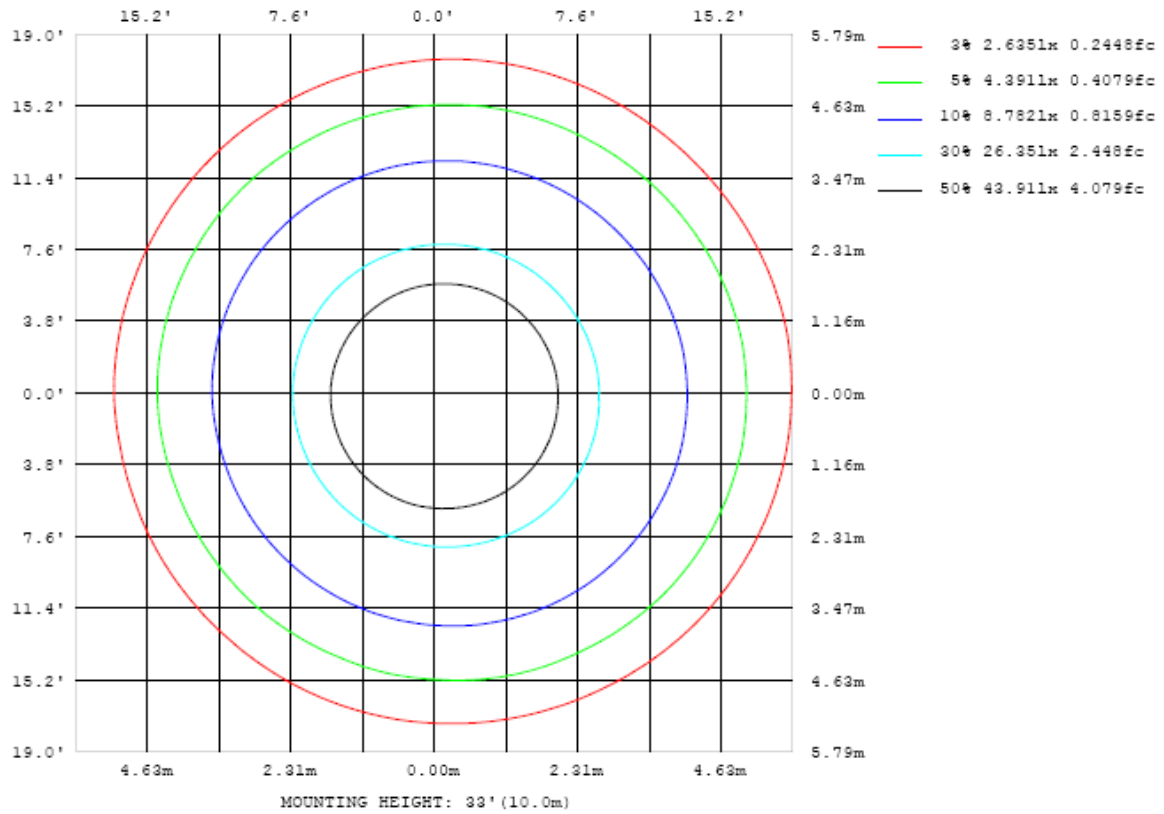


Chart 5: Illuminance Plot (Footcandles)

Luminous Intensity Distribution Plots- Goniophotometer Method

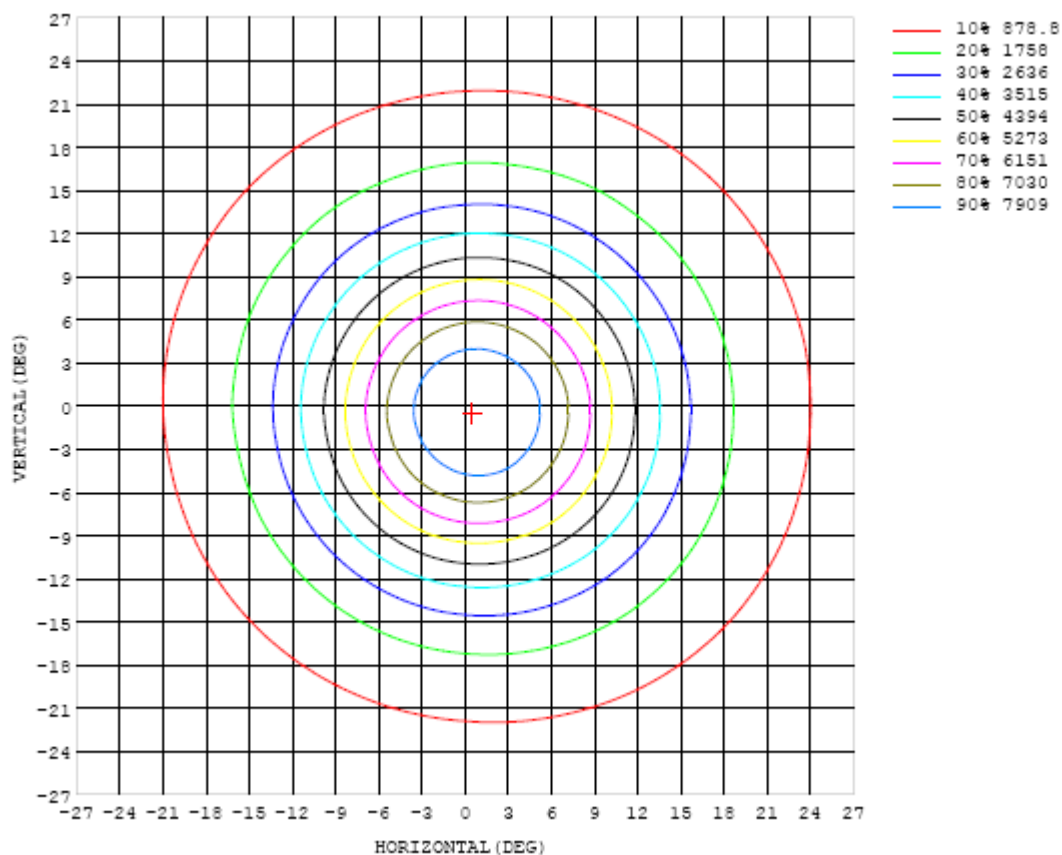


Chart 6: Isocandela Plot

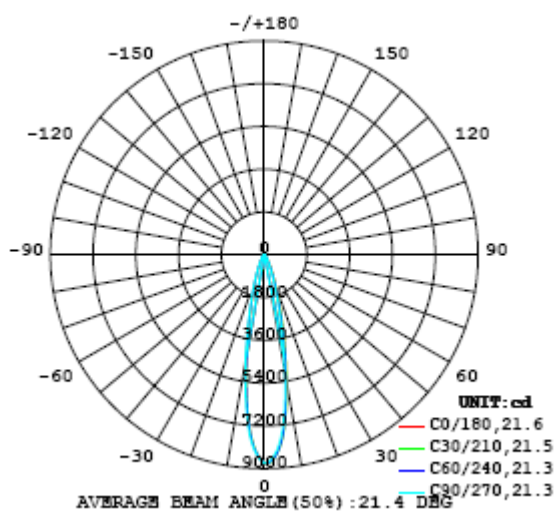


Chart 7: Polar Candela Distribution

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	8760	8760	8760	8760	8760	8760	8760	8760	8760	8760	8760	8760	8760	8760	8760	8760	8760	8760	8760
5	7983	7996	8011	8018	8012	8011	7976	7931	7878	7807	7738	7662	7594	7520	7449	7387	7326	7303	7266
10	5389	5417	5432	5413	5381	5332	5250	5147	5044	4942	4850	4753	4657	4565	4483	4412	4342	4307	4292
15	2891	2911	2920	2895	2854	2788	2703	2616	2530	2445	2364	2294	2230	2173	2129	2096	2069	2059	2071
20	1471	1474	1466	1443	1410	1367	1316	1261	1207	1157	1113	1077	1046	1024	1008	1001	996	1000	1015
25	774	770	758	739	718	685	652	629	601	569	550	530	517	514	502	498	497	498	510
30	404	401	393	382	368	352	336	322	312	303	297	290	283	277	273	272	270	271	275
35	235	233	229	223	216	209	203	198	195	192	190	187	184	181	179	178	178	179	181
40	166	166	166	165	163	161	158	156	154	152	151	149	146	142	140	138	138	139	142
45	120	120	120	120	119	117	116	116	114	114	115	114	113	110	107	105	104	104	106
50	88.8	88.8	88.5	88.1	87.3	86.4	85.7	84.9	83.4	82.5	83.2	83.9	83.9	82.1	79.7	78.3	78.2	77.9	79.0
55	67.0	67.0	67.1	66.9	66.5	66.1	65.4	64.5	63.7	63.4	64.0	64.5	64.4	63.6	61.9	60.7	60.8	61.2	61.6
60	53.3	53.4	53.3	53.2	53.0	52.9	52.5	51.8	50.9	50.5	50.5	50.8	50.8	50.5	49.5	48.8	48.8	48.8	49.2
65	43.6	43.6	43.7	43.9	44.1	43.6	43.1	42.7	42.0	41.5	41.4	41.1	41.0	41.1	40.9	40.4	40.4	40.2	40.2
70	34.5	34.4	34.4	34.5	34.4	34.2	33.9	33.4	32.9	32.6	32.4	32.1	31.9	31.7	31.4	31.2	31.1	31.1	31.5
75	26.1	25.9	25.8	25.8	25.7	25.5	25.4	25.1	24.7	24.4	24.2	23.8	23.7	23.4	23.2	23.2	23.0	23.0	23.4
80	17.4	17.2	17.1	17.1	17.1	16.9	16.7	16.4	16.1	15.9	15.6	15.4	15.3	15.2	15.1	15.0	14.8	14.7	14.9
85	8.97	8.84	8.79	8.84	8.85	8.76	8.57	8.31	8.12	7.91	7.71	7.50	7.37	7.27	7.15	7.01	6.74	6.70	6.72
90	2.26	2.28	2.29	2.32	2.32	2.27	2.17	2.05	1.91	1.79	1.66	1.54	1.44	1.35	1.25	1.16	1.06	0.98	1.02
95	0.01	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	0.03	0.03	0.02	0.02
100	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	0.03	0.03	0.03	0.02	0.02
105	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03
110	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04
115	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05
120	0.05	0.05	0.05	0.05	0.05	0.05	0.06	0.06	0.05	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.07
125	0.07	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.09	0.09	0.09	0.09	0.09	0.12
130	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.13	0.13	0.13	0.14	0.14	0.14	0.15	0.15	0.22
135	0.21	0.21	0.21	0.21	0.21	0.22	0.22	0.22	0.23	0.23	0.24	0.24	0.25	0.25	0.26	0.27	0.27	0.27	0.46
140	0.38	0.38	0.38	0.38	0.39	0.39	0.39	0.40	0.41	0.41	0.42	0.43	0.44	0.45	0.46	0.48	0.49	0.48	0.85
145	0.63	0.63	0.63	0.63	0.63	0.64	0.64	0.65	0.66	0.67	0.68	0.70	0.71	0.72	0.74	0.75	0.76	0.74	1.39
150	0.92	0.92	0.92	0.92	0.92	0.93	0.93	0.94	0.95	0.96	0.98	0.99	1.00	1.02	1.03	1.05	1.06	1.03	1.96
155	1.22	1.21	1.21	1.21	1.21	1.21	1.22	1.23	1.24	1.25	1.26	1.27	1.29	1.30	1.31	1.33	1.34	1.30	2.40
160	1.44	1.44	1.44	1.43	1.43	1.44	1.44	1.45	1.46	1.47	1.48	1.49	1.50	1.51	1.53	1.54	1.55	1.49	2.61
165	1.62	1.61	1.61	1.60	1.60	1.60	1.61	1.61	1.62	1.63	1.64	1.65	1.66	1.67	1.69	1.70	1.71	1.65	2.56
170	1.72	1.72	1.72	1.72	1.72	1.72	1.73	1.73	1.74	1.75	1.76	1.76	1.77	1.77	1.78	1.79	1.79	1.74	2.26
175	1.70	1.70	1.70	1.70	1.70	1.70	1.70	1.71	1.71	1.72	1.72	1.72	1.73	1.73	1.73	1.74	1.75	1.75	1.79
180	1.70	1.70	1.70	1.70	1.70	1.70	1.70	1.70	1.70	1.70	1.70	1.70	1.70	1.70	1.70	1.70	1.70	1.70	1.70

Table 5: 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	8760	8760	8760	8760	8760	8760	8760	8760	8760	8760	8760	8760	8760	8760	8760	8760	8760		
5	7240	7225	7228	7241	7257	7287	7338	7393	7453	7526	7594	7660	7728	7793	7854	7910	7951		
10	4261	4244	4248	4261	4291	4335	4396	4474	4557	4651	4757	4866	4974	5077	5172	5260	5339		
15	2070	2073	2086	2105	2127	2160	2195	2234	2281	2343	2411	2482	2560	2638	2719	2796	2857		
20	1018	1025	1030	1040	1051	1067	1086	1112	1139	1171	1202	1243	1285	1329	1377	1425	1464		
25	512	515	519	526	533	539	551	563	580	599	617	638	665	693	721	748	770		
30	274	274	276	280	283	289	296	305	315	326	335	344	354	367	383	396	407		
35	182	184	187	189	190	192	194	197	201	206	210	212	215	220	226	232	236		
40	142	143	144	146	146	146	147	148	151	152	153	155	156	158	162	165	167		
45	107	107	108	109	109	109	110	111	112	113	114	116	117	119	120	121			
50	78.6	78.2	78.7	79.9	80.6	81.2	81.9	82.4	83.2	83.9	84.6	85.5	86.4	87.4	88.3	88.9	89.5		
55	61.3	60.7	60.8	61.8	62.5	62.9	63.1	63.5	63.5	63.6	64.1	64.9	65.5	66.1	66.7	67.1	67.3		
60	49.1	49.1	49.3	49.9	50.5	50.6	50.5	50.4	50.7	50.9	51.3	51.7	52.1	52.6	53.0	53.4	53.5		
65	40.5	40.5	40.6	40.9	41.2	41.3	41.2	41.2	41.8	42.0	42.1	42.1	42.6	42.9	43.4	43.5	43.6		
70	31.6	31.7	31.8	32.1	32.4	32.5	32.5	32.5	32.6	32.9	33.2	33.5	33.9	34.2	34.5	34.8	34.8		
75	23.3	23.3	23.3	23.4	23.7	23.9	24.0	23.9	24.1	24.5	24.8	25.1	25.4	25.7	26.1	26.3	26.4		
80	14.7	14.5	14.5	14.6	14.7	14.9	15.0	15.1	15.4	15.9	16.2	16.4	16.6	16.9	17.3	17.6	17.7		
85	6.61	6.46	6.40	6.41	6.48	6.59	6.73	6.94	7.24	7.52	7.75	7.94	8.15	8.40	8.68	8.93	9.10		
90	0.97	0.93	0.92	0.94	0.99	1.05	1.13	1.23	1.34	1.46	1.58	1.68	1.82	1.94	2.07	2.20	2.32		
95	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.01	0.01	0.02	0.01	0.01	0.01	0.01	0.01		
100	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		
105	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		
110	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		
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	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.06	0.06	0.06	0.06	0.06		
125	0.12	0.12	0.12	0.12	0.11	0.11	0.11	0.11	0.11	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.09		
130	0.23	0.23	0.23	0.22	0.22	0.21	0.21	0.20	0.20	0.19	0.19	0.18	0.18	0.18	0.18	0.17	0.17		
135	0.47	0.47	0.47	0.46	0.45	0.44	0.43	0.42	0.40	0.39	0.38	0.37	0.36	0.36	0.35	0.35	0.34		
140	0.89	0.88	0.88	0.87	0.85	0.84	0.82	0.80	0.78	0.76	0.74	0.72	0.71	0.70	0.69	0.69	0.66		
145	1.48	1.46	1.45	1.44	1.43	1.40	1.38	1.36	1.33	1.31	1.28	1.26	1.24	1.22	1.21	1.21	1.16		
150	2.12	2.09	2.07	2.06	2.05	2.02	2.00	1.98	1.95	1.93	1.90	1.88	1.86	1.84	1.83	1.84	1.74		
155	2.63	2.59	2.58	2.57	2.56	2.54	2.52	2.50	2.49	2.47	2.45	2.43	2.42	2.41	2.40	2.42	2.27		
160	2.93	2.88	2.87	2.87	2.86	2.85	2.84	2.84	2.84	2.83	2.82	2.82	2.81	2.81	2.80	2.85	2.62		
165	2.95	2.90	2.89	2.89	2.89	2.89	2.89	2.90	2.90	2.91	2.92	2.92	2.93	2.94	2.94	3.00	2.69		
170	2.70	2.65	2.64	2.63	2.64	2.64	2.65	2.66	2.68	2.70	2.72	2.74	2.76	2.77	2.79	2.87	2.46		
175	2.09	2.09	2.07	2.06	2.05	2.05	2.06	2.09	2.11	2.14	2.18	2.21	2.25	2.28	2.31	2.35	1.78		
180	1.70	1.70	1.70	1.70	1.70	1.70	1.70	1.70	1.70	1.70	1.70	1.70	1.70	1.70	1.70	1.70			

Table 6: Luminous Intensity Data

EQUIPMENT LIST

Test Equipment	Model	Equipment No.	Calibration Date	Calibration Due date
Goniophotometer system	GO-R5000	HZTE011-01	Aug. 02, 2019	Aug. 01, 2020
Digital Power Meter	PF2010A	HZTE028-01	Aug. 02, 2019	Aug. 01, 2020
AC Power Supply	DPS1060	HZTE001-06	Aug. 02, 2019	Aug. 01, 2020
DC Power Supply	WY12010	HZTE004-03	Aug. 02, 2019	Aug. 01, 2020
Standard Source	D908	HZTE012-01	Aug. 02, 2019	Aug. 01, 2020
Standard source	SCL-1400	HZTE012-02	Aug. 02, 2019	Aug. 01, 2020
Temperature and humidity recorder	JR900	HZTE018-01	Aug. 02, 2019	Aug. 01, 2020
Temperature recorder	JM624U	HZTE018-08	Aug. 02, 2019	Aug. 01, 2020

Table 7: 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.

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.

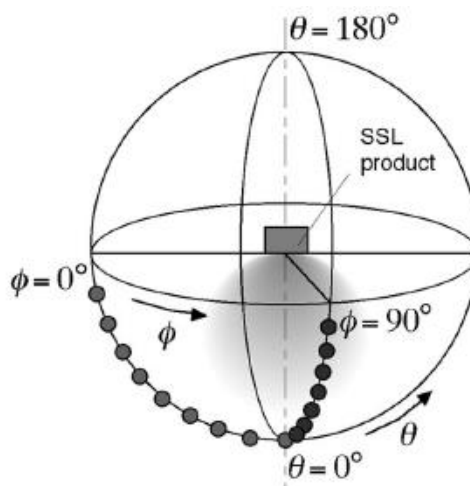
Color Characteristics Measurements

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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