

LM-79-08 Test Report

for

GREEN CREATIVE LTD

Room 1206-07 New Victory House
93-103 Wing Lok Street, Central Hongkong, Hongkong

Vertically Mounted Lamps

Model: 17PLV/827/DIR

Laboratory: Leading Testing Laboratories

NVLAP CODE: 200960-0

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Hangzhou, Zhejiang Province, China 311100

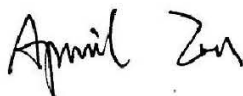
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Report No.: HZ18070009c

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

Review by:



Engineer: April Zou
Jul. 12, 2018

Approved by:



Manager: Jim Zhang
Jul. 12, 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: 17PLV/827/DIR

Luminous Efficacy (Lumens /Watt)	Total Luminous Flux (Lumens)	Power (Watts)	Power Factor
92.7	1937.0	20.90	0.9965
CCT (K)	CRI	Stabilization Time (Light & Power)	
2695	81.9	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 : May 09, 2018

Date of Test : May 11, 2018

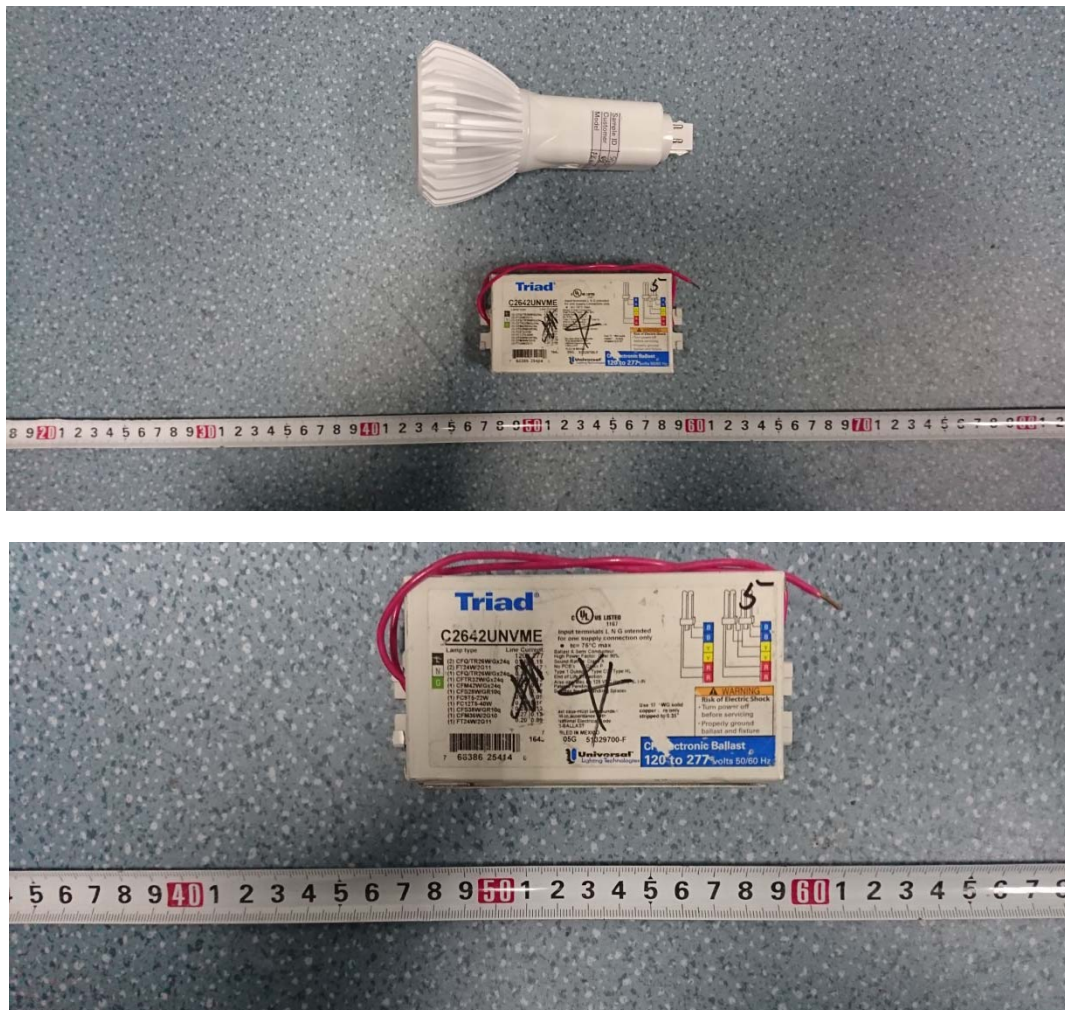
Test item : Total Luminous Flux, Luminous Distribution Intensity, Luminous Efficacy, Correlated Color Temperature, Color Rendering Index, Chromaticity Coordinate, Electrical parameters

Reference Standard : IESNA LM-79-2008 Approved Method for the Electrical and Photometric Measurements of Solid-State Lighting Products

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Sample Photo



Sample view

Equipment Under Test (EUT)

Name	: Vertically Mounted Lamps
Model	: 17PLV/827/DIR
Electrical Ratings	: 120-277VAC, 60Hz
Product Description	: G24Q base, 2700K LED Tubes supplied by a high frequency fluorescent lamp ballast: C2642UNVME
Manufacturer	: WING (SHANGHAI) INTERNATIONAL TRADE CO., LTD
Address	: NO.118, LANE 6045, HUTAI ROAD, BAOSHAN DISTRICT, SHANGHAI

TEST RESULTS

Test ambient temperature was 24.9°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 65 minutes.

Sphere-Spectroradiometer Method

Parameter	Result	
Test Voltage (V)	120.0	277.0
Voltage frequency (Hz)	60	60
Test Current (A)	0.175	0.078
Power Factor	0.9965	0.9754
Test Power (W)	20.90	21.10
THD A%	7.45	6.99
Luminous Efficacy (lm/W)	92.7	94.1
Total Luminous Flux (lm)	1937.0	1986.0
Color Rendering Index (CRI)	81.9	
R9	4.2	
Correlated Color Temperature (CCT)(K)	2695	
Chromaticity Chroma x	0.4591	
Chromaticity Chroma y	0.4089	
Chromaticity Chroma u	0.2628	
Chromaticity Chroma v	0.3511	
Duv	0.0009	
Chromaticity Chroma u'	0.2628	
Chromaticity Chroma v'	0.5266	

Special Color Rendering Indices	
R1	80.7
R2	92.1
R3	94.2
R4	79.7
R5	81.3
R6	91.8
R7	80.3
R8	55.3
R9	4.2
R10	82.9
R11	79.9
R12	78.3
R13	83.5
R14	97.5

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 25.1°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)	0.176
Power Factor	0.9949
Test Power (W)	21.01
Luminous Efficacy (lm/W)	94.0
Total Luminous Flux (lm)	1975.7
Beam Angle (°)	97.0 (0°-180°)/ 96.5 (90°-270°)
Center Beam Candle Power (cd)	824
Maximum Beam Candle Power (cd)	824.6 (At: C=290.0, Gamma=1.5)
Spacing Criteria	1.19 (0°-180°)/ 1.20 (90°-270°)
Zonal Lumens in the 0°-60°Zone	83.12%
Zonal Lumens in the 60°-90°Zone	16.63%
Zonal Lumens in the 90°-120°Zone	0.17%
Zonal Lumens in the 120°-180°Zone	0.09%

Table 3: Test data per Goniophotometer Method

Spectral Power Distribution - Sphere Spectroradiometer Method

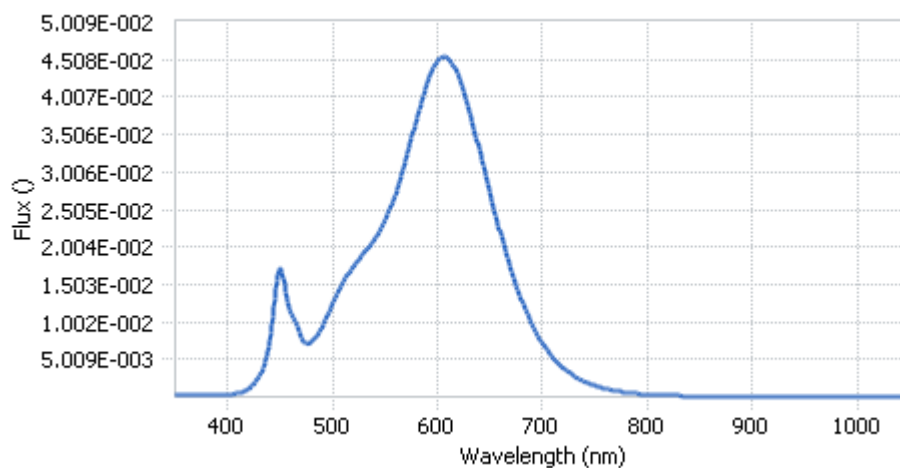
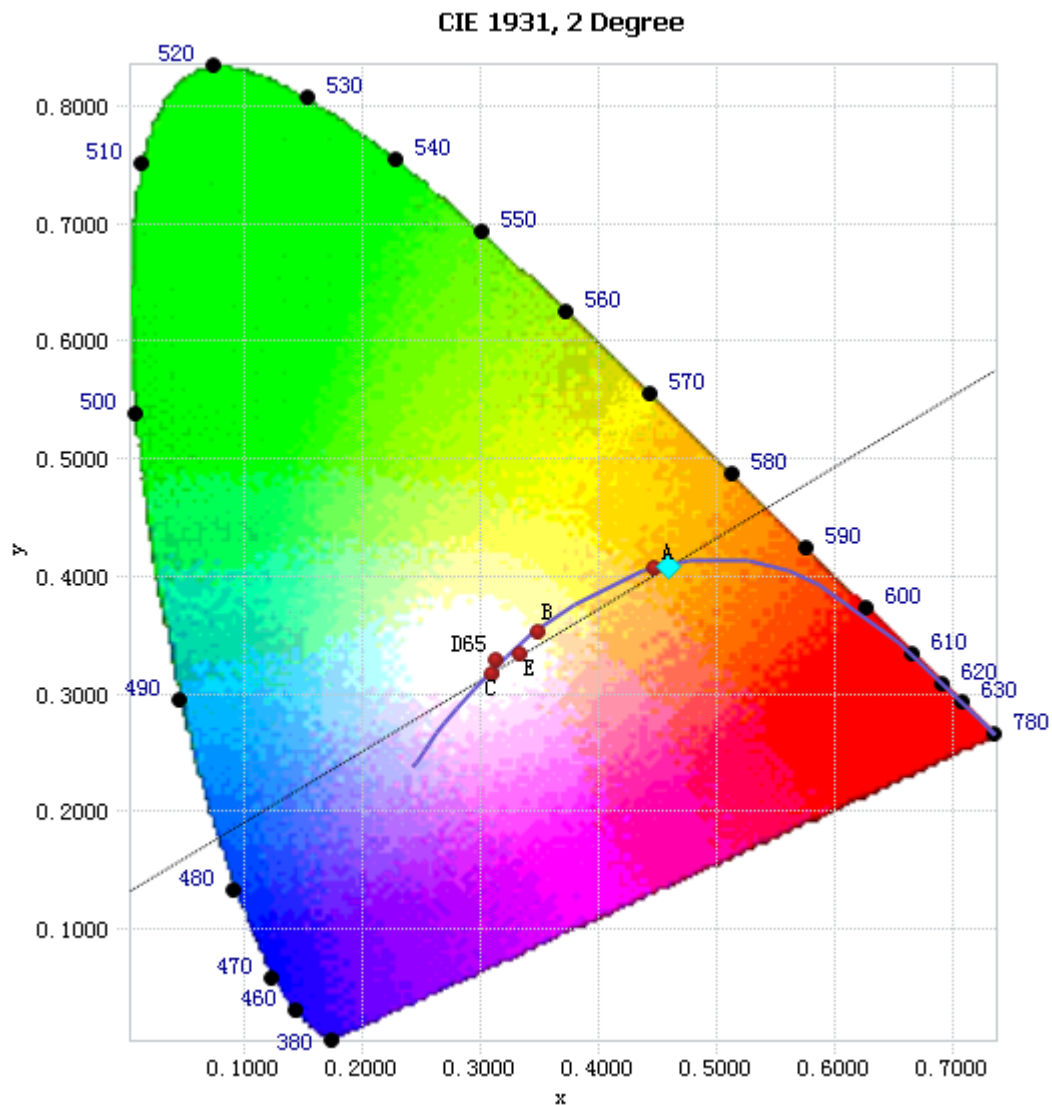


Chart 1: Spectral Power Distribution

Spectral Distribution over Visible Wavelength							
WL(nm)	Radiant(Watts)	WL(nm)	Radiant(Watts)	WL(nm)	Radiant(Watts)	WL(nm)	Radiant(Watts)
380	2.68E-04	485	7.55E-03	590	3.89E-02	695	7.74E-03
385	2.55E-04	490	8.58E-03	595	4.06E-02	700	6.65E-03
390	2.53E-04	495	1.01E-02	600	4.17E-02	705	5.71E-03
395	2.96E-04	500	1.17E-02	605	4.22E-02	710	4.85E-03
400	2.98E-04	505	1.30E-02	610	4.20E-02	715	4.18E-03
405	3.48E-04	510	1.43E-02	615	4.11E-02	720	3.55E-03
410	4.64E-04	515	1.54E-02	620	3.97E-02	725	3.06E-03
415	6.84E-04	520	1.62E-02	625	3.77E-02	730	2.61E-03
420	1.03E-03	525	1.70E-02	630	3.57E-02	735	2.23E-03
425	1.61E-03	530	1.78E-02	635	3.31E-02	740	1.88E-03
430	2.59E-03	535	1.87E-02	640	3.06E-02	745	1.62E-03
435	4.13E-03	540	1.96E-02	645	2.79E-02	750	1.38E-03
440	7.08E-03	545	2.07E-02	650	2.53E-02	755	1.19E-03
445	1.23E-02	550	2.19E-02	655	2.27E-02	760	1.01E-03
450	1.59E-02	555	2.35E-02	660	2.03E-02	765	8.72E-04
455	1.30E-02	560	2.52E-02	665	1.79E-02	770	7.47E-04
460	1.04E-02	565	2.72E-02	670	1.58E-02	775	6.40E-04
465	9.27E-03	570	2.96E-02	675	1.38E-02	780	5.48E-04
470	7.55E-03	575	3.20E-02	680	1.21E-02		
475	6.62E-03	580	3.45E-02	685	1.04E-02		
480	6.86E-03	585	3.68E-02	690	9.01E-03		

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

Chromaticity Diagram - Sphere Spectroradiometer Method



Tristimulus values(x, y) : (0.4591, 0.4089)

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

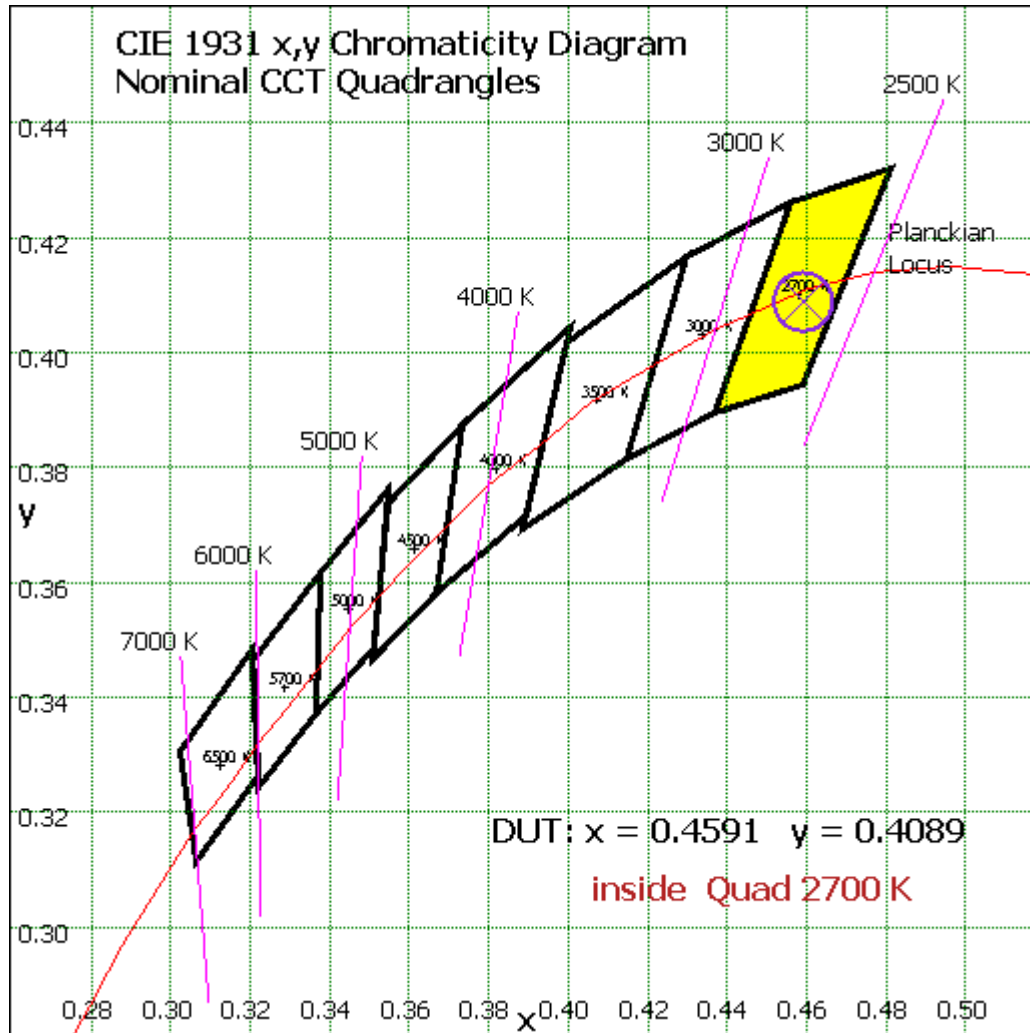


Chart 3: Plot of Lamp x/y coordinates on CIE 1931 Chromaticity Diagram

Zonal Lumen Tabulation- Goniophotometer Method

$\gamma(^{\circ})$	Lumens	% Total
0- 10	77.865	3.94%
10- 20	221.591	11.22%
20- 30	328.534	16.63%
30- 40	375.555	19.01%
40- 50	354.968	17.97%
50- 60	283.651	14.36%
60- 70	191.876	9.71%
70- 80	102.788	5.20%
80- 90	33.831	1.71%
90-100	2.983	0.15%
100-110	0.129	0.01%
110-120	0.194	0.01%
120-130	0.273	0.01%
130-140	0.371	0.02%
140-150	0.412	0.02%
150-160	0.358	0.02%
160-170	0.239	0.01%
170-180	0.082	0.00%
Total	1975.7	100%

$\gamma(^{\circ})$	Lumens	% Total
0- 60	1642.164	83.12%
60- 90	328.495	16.63%
0-90	1970.659	99.74%
90- 180	5.041	0.26%
0- 180	1975.7	100%

Table 4: Zonal Lumen Data

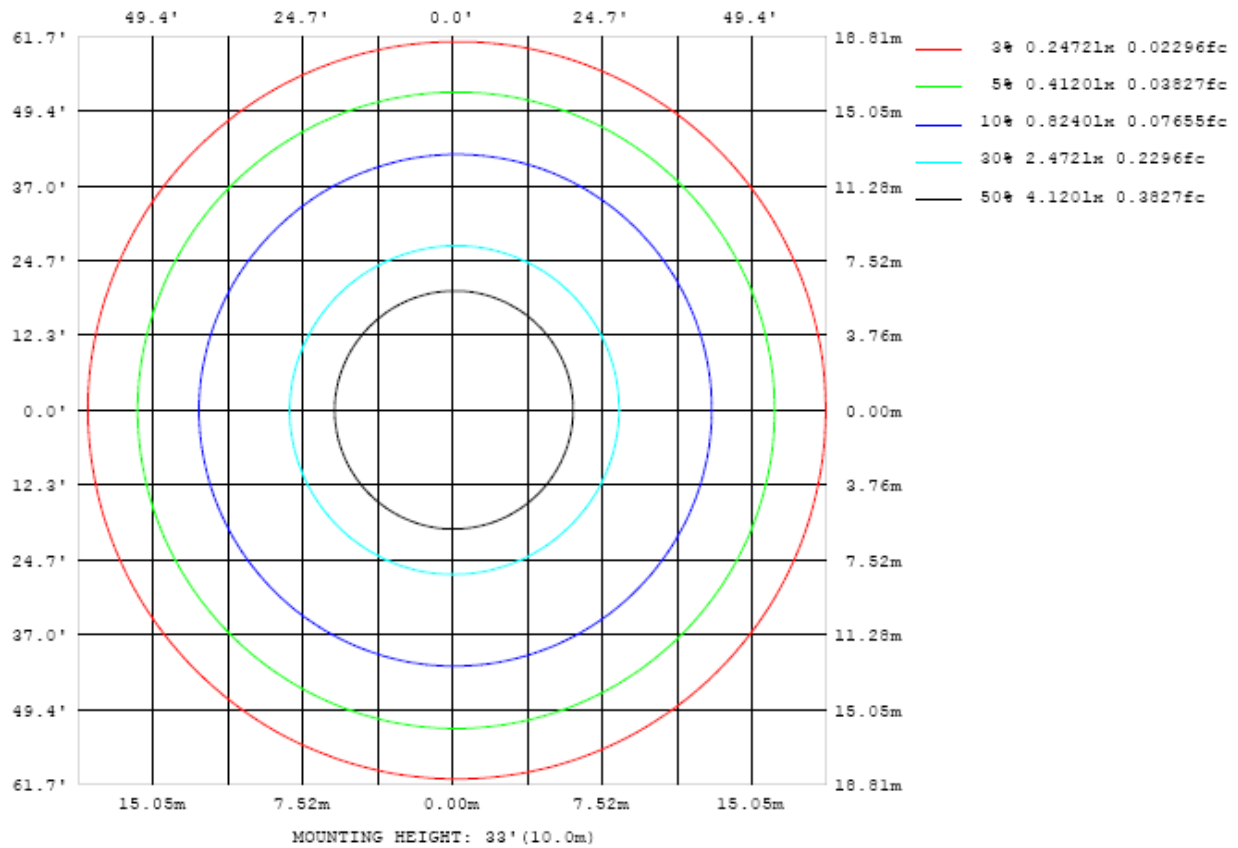


Chart 4: Illuminance Plot (Footcandles)

Luminous Intensity Distribution Plots- Goniophotometer Method

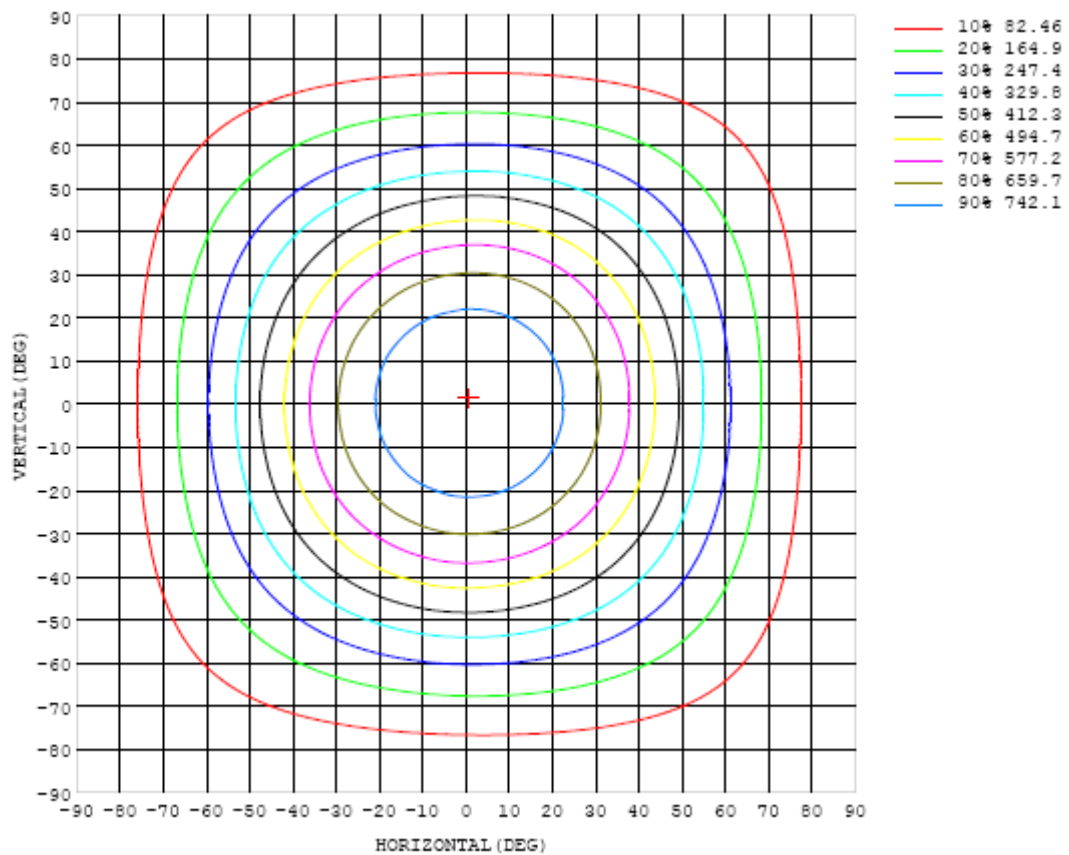


Chart 5: Isocandela Plot

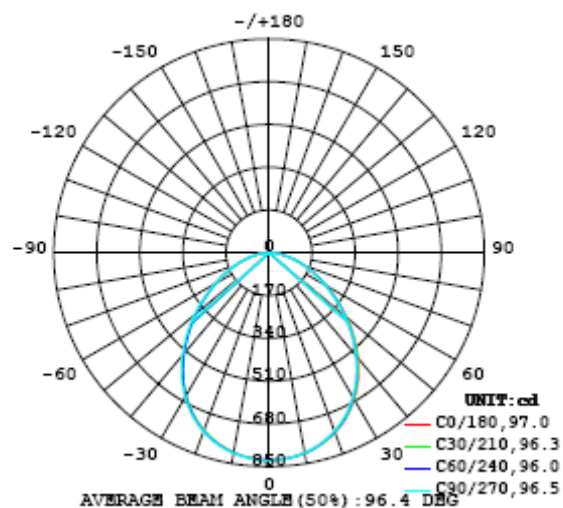


Chart 6: Polar Candela Distribution

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	824	824	824	824	824	824	824	824	824	824	824	824	824	824	824	824	824	824	824
5	820	821	821	821	820	820	820	820	819	820	820	819	819	818	818	819	818	819	819
10	809	810	809	809	808	807	807	807	807	805	806	805	805	805	804	805	804	804	805
15	790	790	789	788	788	787	786	786	784	785	784	783	782	781	782	782	781	782	783
20	761	761	760	759	758	757	756	755	753	753	753	751	750	750	749	749	749	749	750
25	722	721	720	719	718	717	716	715	713	713	711	710	709	708	708	708	708	707	708
30	673	672	670	669	668	666	665	663	661	661	660	658	657	657	656	656	655	654	655
35	614	613	611	609	607	605	604	603	601	600	599	597	597	594	594	594	594	593	594
40	547	546	543	541	539	536	535	533	533	531	532	530	528	526	525	525	524	524	525
45	476	474	471	469	466	464	462	461	460	460	459	457	455	453	451	452	451	451	452
50	402	401	399	396	394	391	390	389	388	387	386	384	382	380	378	378	378	378	379
55	329	329	328	326	324	322	321	319	318	316	315	313	311	309	308	308	307	307	307
60	262	262	261	260	259	257	256	255	252	251	249	247	246	244	243	242	242	242	243
65	201	202	201	201	200	199	198	196	194	192	191	189	188	186	185	185	184	184	185
70	148	148	148	148	148	147	146	144	142	141	139	138	136	135	134	134	133	133	134
75	102	102	102	102	102	101	99.5	98.3	96.9	95.5	94.3	92.9	92.0	91.3	90.4	89.7	89.5	89.2	90.4
80	63.8	63.6	63.6	63.2	62.9	61.9	60.8	60.0	58.9	58.2	57.2	56.3	55.5	54.9	54.4	53.8	53.5	53.2	53.6
85	33.2	33.1	32.8	32.3	31.8	31.2	30.6	29.9	29.3	28.7	28.2	27.7	27.2	26.8	26.5	26.2	26.0	25.8	25.9
90	12.3	12.2	11.9	11.7	11.3	10.9	10.6	10.3	10.0	9.76	9.50	9.21	8.97	8.73	8.55	8.38	8.29	8.25	8.38
95	1.99	1.99	1.96	1.91	1.83	1.74	1.63	1.54	1.42	1.31	1.19	1.08	0.98	0.89	0.83	0.79	0.78	0.80	0.92
100	0.07	0.07	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	0.08	0.08	0.08	0.10
105	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.14
110	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.15	0.15	0.15	0.15	0.15	0.15	0.17
115	0.18	0.18	0.18	0.18	0.18	0.18	0.18	0.18	0.18	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.21
120	0.22	0.22	0.22	0.22	0.23	0.23	0.23	0.23	0.23	0.23	0.23	0.24	0.24	0.24	0.24	0.24	0.24	0.24	0.26
125	0.28	0.28	0.28	0.28	0.28	0.28	0.28	0.28	0.29	0.29	0.29	0.29	0.29	0.29	0.29	0.29	0.30	0.29	0.32
130	0.35	0.34	0.34	0.34	0.34	0.34	0.34	0.35	0.35	0.35	0.35	0.35	0.36	0.36	0.36	0.36	0.36	0.36	0.41
135	0.42	0.42	0.42	0.42	0.42	0.42	0.42	0.42	0.42	0.43	0.43	0.43	0.43	0.43	0.43	0.43	0.43	0.43	0.53
140	0.49	0.49	0.49	0.49	0.49	0.49	0.49	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.51	0.51	0.51	0.50	0.64
145	0.56	0.56	0.56	0.56	0.56	0.56	0.56	0.56	0.56	0.57	0.57	0.57	0.57	0.57	0.57	0.57	0.57	0.56	0.74
150	0.61	0.61	0.61	0.61	0.61	0.61	0.61	0.61	0.61	0.61	0.61	0.62	0.62	0.62	0.62	0.62	0.62	0.61	0.81
155	0.66	0.66	0.66	0.66	0.66	0.66	0.66	0.66	0.66	0.66	0.66	0.66	0.67	0.67	0.66	0.67	0.67	0.65	0.85
160	0.71	0.71	0.71	0.71	0.72	0.72	0.72	0.72	0.72	0.72	0.72	0.72	0.72	0.72	0.72	0.72	0.72	0.70	0.88
165	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.74	0.87
170	0.79	0.79	0.79	0.79	0.79	0.79	0.79	0.79	0.79	0.79	0.79	0.79	0.79	0.79	0.79	0.79	0.79	0.78	0.85
175	0.85	0.85	0.84	0.84	0.84	0.84	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.84	0.84	0.84	0.85	0.85
180	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88

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	824	824	824	824	824	824	824	824	824	824	824	824	824	824	824	824	824		
5	819	819	818	819	819	820	820	820	821	821	821	821	821	821	822	821	822		
10	805	805	806	806	807	807	808	808	809	811	809	810	810	810	811	811	810		
15	783	784	784	784	784	786	787	787	788	790	790	790	790	790	791	791	790		
20	751	751	751	752	752	754	755	756	758	759	760	761	761	762	762	763	762		
25	708	708	709	709	709	712	713	714	717	719	719	720	722	723	723	723	723		
30	655	655	655	655	656	658	659	662	664	667	670	671	672	673	674	675	673		
35	593	591	591	590	590	593	596	599	602	606	609	611	613	614	614	615	615		
40	523	522	521	520	521	523	525	529	534	538	541	543	545	546	547	549	548		
45	451	449	448	447	447	449	453	457	460	465	468	470	472	474	475	476	476		
50	377	376	375	375	375	377	380	383	387	390	392	395	398	399	400	402	402		
55	307	306	306	306	307	309	311	313	316	319	321	324	325	327	328	329	330		
60	242	242	243	244	245	246	248	249	251	253	255	257	258	259	260	262	262		
65	185	185	186	187	188	190	191	192	192	194	195	197	198	199	200	201	202		
70	135	135	136	137	138	139	140	141	142	143	144	145	146	147	148	149	149		
75	90.3	90.7	91.4	92.1	93.1	94.2	95.0	95.7	96.7	97.7	98.6	99.7	101	102	102	103	103		
80	53.6	53.8	54.2	54.7	55.4	56.3	57.1	57.9	58.8	59.8	60.6	61.6	62.4	63.2	63.6	64.0	64.1		
85	25.9	26.0	26.1	26.4	26.8	27.4	28.1	28.8	29.6	30.3	31.1	31.8	32.4	33.0	33.3	33.6	33.5		
90	8.39	8.41	8.48	8.63	8.83	9.12	9.50	9.91	10.4	10.8	11.2	11.6	12.0	12.3	12.5	12.8	12.5		
95	0.99	1.05	1.10	1.16	1.22	1.30	1.40	1.49	1.59	1.68	1.75	1.80	1.86	1.91	1.95	2.01	2.03		
100	0.10	0.11	0.13	0.13	0.14	0.15	0.14	0.13	0.13	0.11	0.10	0.09	0.09	0.09	0.09	0.09	0.09		
105	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.13	0.13	0.13	0.13	0.13	0.13	0.13	0.13		
110	0.18	0.18	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.16	0.16	0.16	0.16		
115	0.21	0.21	0.21	0.21	0.21	0.21	0.21	0.21	0.21	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20		
120	0.26	0.26	0.26	0.26	0.26	0.26	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.24	0.24		
125	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	0.31	0.31	0.31	0.31		
130	0.42	0.42	0.42	0.42	0.42	0.43	0.42	0.42	0.42	0.42	0.42	0.42	0.42	0.41	0.41	0.41	0.40		
135	0.54	0.54	0.54	0.55	0.55	0.55	0.55	0.55	0.55	0.55	0.54	0.54	0.54	0.54	0.53	0.53	0.52		
140	0.66	0.66	0.66	0.66	0.67	0.66	0.66	0.66	0.66	0.66	0.66	0.66	0.66	0.65	0.65	0.65	0.63		
145	0.77	0.77	0.77	0.77	0.77	0.77	0.77	0.77	0.77	0.77	0.76	0.76	0.76	0.76	0.75	0.76	0.73		
150	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.81		
155	0.91	0.90	0.90	0.90	0.90	0.90	0.90	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.86		
160	0.95	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.93	0.93	0.93	0.93	0.93	0.94	0.89		
165	0.96	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.95	0.89		
170	0.93	0.93	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.93	0.87		
175	0.89	0.90	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.86		
180	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88		

Table 7: Luminous Intensity Data

EQUIPMENT LIST

Test Equipment	Model	Equipment No.	Calibration Date	Calibration Due date
Goniophotometer system	GO-R5000	HZTE011-01	Aug. 23, 2017	Aug. 22, 2018
Digital Power Meter	PF2010A	HZTE028-01	Aug. 10, 2017	Aug. 09, 2018
AC Power Supply	DPS1060	HZTE001-06	Aug. 10, 2017	Aug. 09, 2018
DC Power Supply	WY12010	HZTE004-03	Aug. 10, 2017	Aug. 09, 2018
Temperature recorder	JM624U	HZTE018-08	Aug. 17, 2017	Aug. 16, 2018
Temperature and humidity recorder	JR900	HZTE018-01	Aug. 16, 2017	Aug. 15, 2018
Standard source	D908	HZTE012-01	Aug. 20, 2017	Aug. 19, 2018
Integrate Sphere system	2M	HZTE015-01	Aug. 23, 2017	Aug. 22, 2018
Digital Power Meter	WT210	HZTE008-01	Aug. 10, 2017	Aug. 09, 2018
AC Power Supply	PCR 500L	HZTE001-07	Aug. 10, 2017	Aug. 09, 2018
DC Power Supply	IT6154	HZTE004-04	Aug. 10, 2017	Aug. 09, 2018
Standard source	SCL-1400	HZTE012-02	Aug. 20, 2017	Aug. 19, 2018
Temperature and humidity recorder	JR900	HZTE018-02	Aug. 16, 2017	Aug. 15, 2018
Temperature Meter	TES1310	HZTE017-01	Aug. 17, 2017	Aug. 16, 2018

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 TYPE B 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 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 TYPE B 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

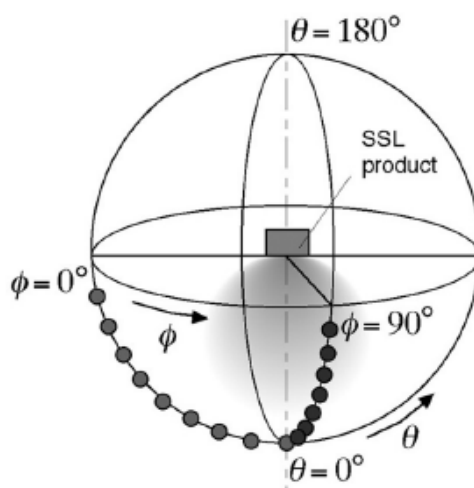
The color characteristics of SSL products include chromaticity coordinates, correlated color temperature, and color rendering index. These characteristics of SSL products may be spatially non-uniform, and thus, in order that they can be specified accurately, the color quantities shall be measured as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