



## LM-79-08 Test Report

for

### GREEN CREATIVE LTD

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

**2x4' Troffer**

**Model: 30TROF24DIM/830/277V**

**Laboratory: Leading Testing Laboratories**

**NVLAP CODE: 200960-0**

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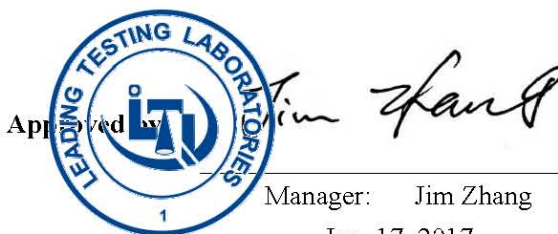
Report No.: HZ17010017a

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

Review by:

*April Zou*

Engineer: April Zou  
Jan. 17, 2017



Approved by

Manager: Jim Zhang  
Jan. 17, 2017

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: 30TROF24DIM/830/277V

Luminous Efficacy (Lumens /Watt)	Total Luminous Flux (Lumens)	Power (Watts)	Power Factor
134.3	3899.9	29.04	0.9945
CCT (K)	CRI	Stabilization Time (Light & Power)	
2972	83.9	60	

Table 1: Executive Data Summary

Note: The above results are recorded/ derived from measurements made using an Integrating Sphere.

### Test specifications:

<b>Date of Receipt</b>	: Jan. 10, 2017
<b>Date of Test</b>	: Jan. 14, 2017
<b>Test item</b>	: Total Luminous Flux, Luminous Distribution Intensity, Luminous Efficacy, Correlated Color Temperature, Color Rendering Index, Chromaticity Coordinate, Electrical parameters
<b>Reference Standard</b>	: IESNA LM-79-2008 Approved Method for the Electrical and Photometric Measurements of Solid-State Lighting Products

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### Sample Photos



Overview of the sample

#### Equipment Under Test (EUT)

<b>Name</b>	: 2x4' Troffer
<b>Model</b>	: 30TROF24DIM/830/277V
<b>Electrical Ratings</b>	: 120-277V, 60Hz
<b>Product Description</b>	: 3000K, Frosted Lens, CRI80
<b>Manufacturer</b>	: GREEN CREATIVE LTD
<b>Address</b>	: 756 North Zhongshan Rd., Unit B301 Zhabei District, Shanghai

## TEST RESULTS

Test ambient temperature was 24.7°C.

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 95 minutes.

The photometric distance of Goniophotometer is 30 m.

Luminous data was taken at 0.5° vertical intervals and 10.0° horizontal intervals.

Parameter	Result	
Test Voltage (V)	120.0	277.0
Voltage frequency (Hz)	60	60
Test Current (A)	0.243	0.108
Power Factor	0.9945	0.9539
Test Power (W)	29.04	28.53
THD A%	8.65	10.03
Luminous Efficacy (lm/W)	134.3	136.8
Total Luminous Flux (lm)	3899.9	3902.5
Color Rendering Index (CRI)	83.9	
R9	14	
Correlated Color Temperature (CCT) (K)	2972	
Chromaticity (Chroma x, Chroma y)	(0.4400, 0.4069)	
Chromaticity (Chroma u, Chroma v)	(0.2513, 0.3487)	
Chromaticity (Chroma u', Chroma v')	(0.2513, 0.5230)	
Duv	0.0007	
Average Beam Angle (°)	122.0	
Center Beam Candle Power (cd)	1235	
Spacing Criteria	1.24 (0°-180°)/ 1.30 (90°-270°)	
Zonal Lumens in the 0°-60°Zone	74.44%	
Zonal Lumens in the 60°-90°Zone	25.47%	
Zonal Lumens in the 90°-120°Zone	0.03%	
Zonal Lumens in the 120°-180°Zone	0.06%	

Special Color Rendering Indices	
R1	82
R2	91
R3	97
R4	82
R5	82
R6	89
R7	85
R8	62
R9	14
R10	79
R11	82
R12	70
R13	84
R14	99

Table 2: Test data per Goniophotometer Method

Note: According to CIE 1976 (u',v') diagram,  $u' = u = 4x/(-2x+12y+3)$ ,  $v' = 3v/2 = 9y/(-2x+12y+3)$ .

## Spectral Power Distribution

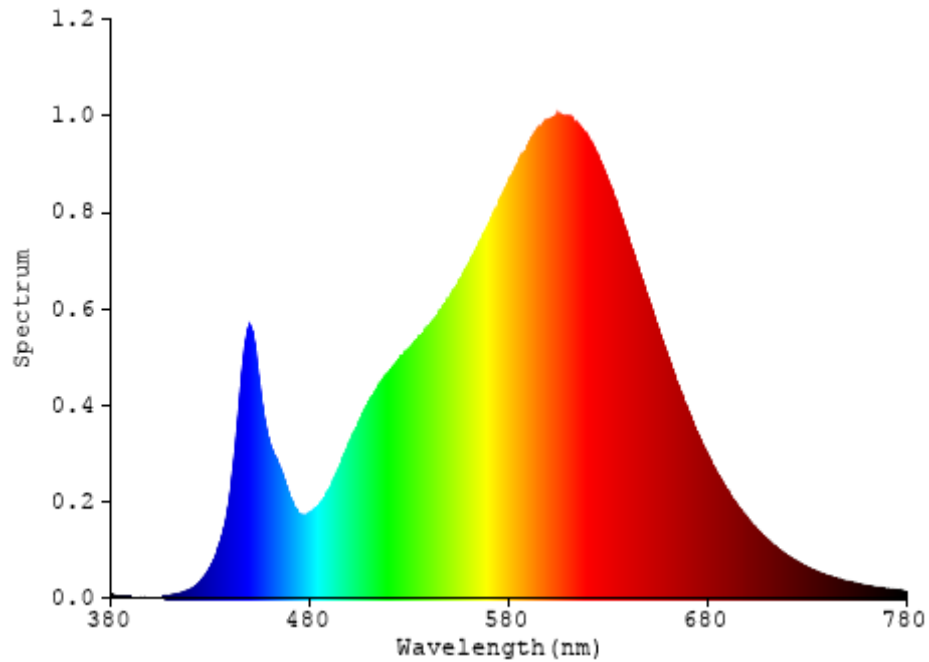


Chart 1: Spectral Power Distribution

## Zonal Lumen Tabulation

$\gamma(^{\circ})$	Lumens	% Total
0- 10	116.941	3.00%
10- 20	336.4	8.63%
20- 30	514.421	13.19%
30- 40	629.456	16.14%
40- 50	669.636	17.17%
50- 60	636.182	16.31%
60- 70	533.216	13.67%
70- 80	355.346	9.11%
80- 90	104.871	2.69%
90-100	0.297	0.01%
100-110	0.392	0.01%
110-120	0.487	0.01%
120-130	0.541	0.01%
130-140	0.564	0.01%
140-150	0.507	0.01%
150-160	0.365	0.01%
160-170	0.237	0.01%
170-180	0.083	0.00%
Total	3899.9	100%

$\gamma(^{\circ})$	Lumens	% Total
0- 60	2903.036	74.44%
60- 90	993.433	25.47%
0-90	3896.469	99.91%
90- 180	3.473	0.09%
0- 180	3899.9	100%

Table 3: Zonal Lumen Data

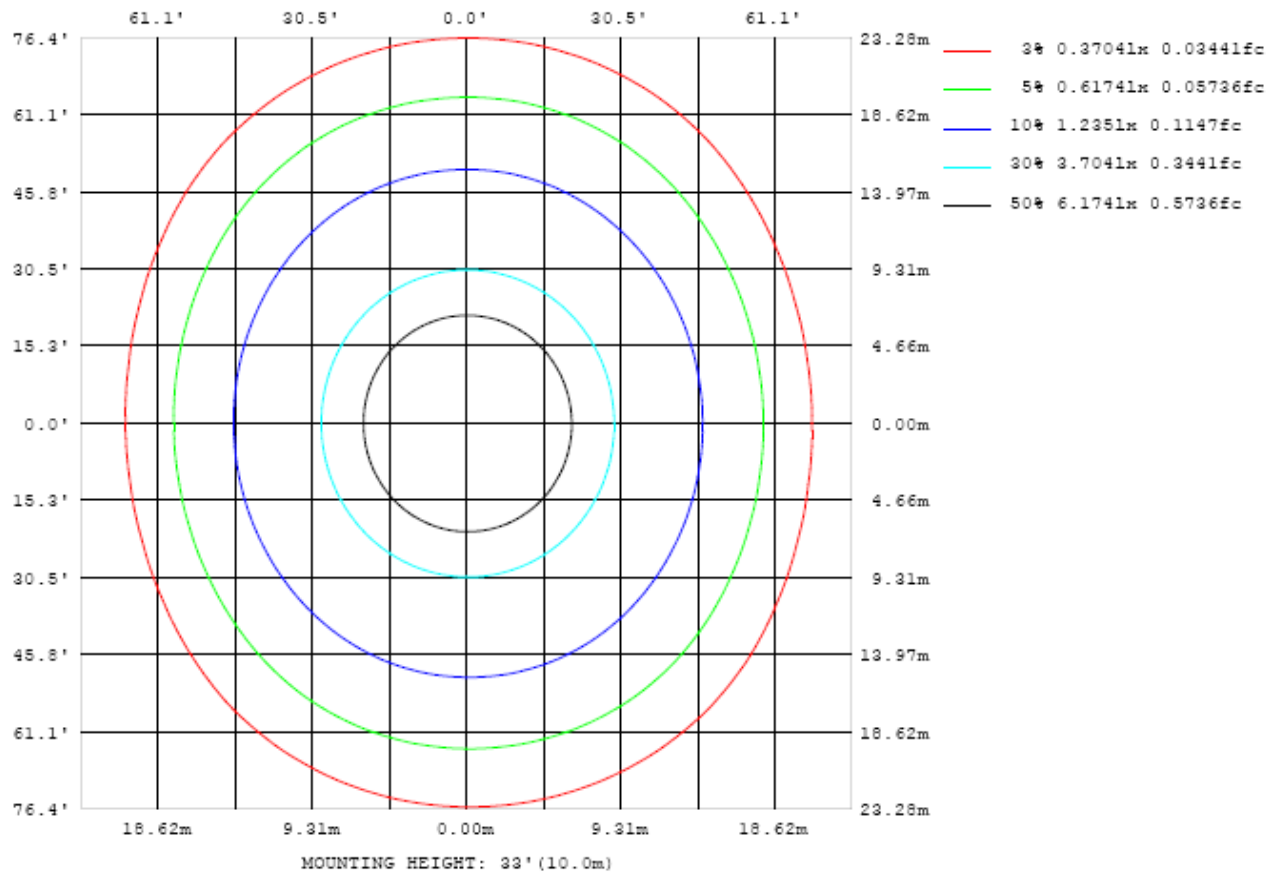


Chart 2: Illuminance Plot (Footcandles)



## Luminous Intensity Distribution Plots

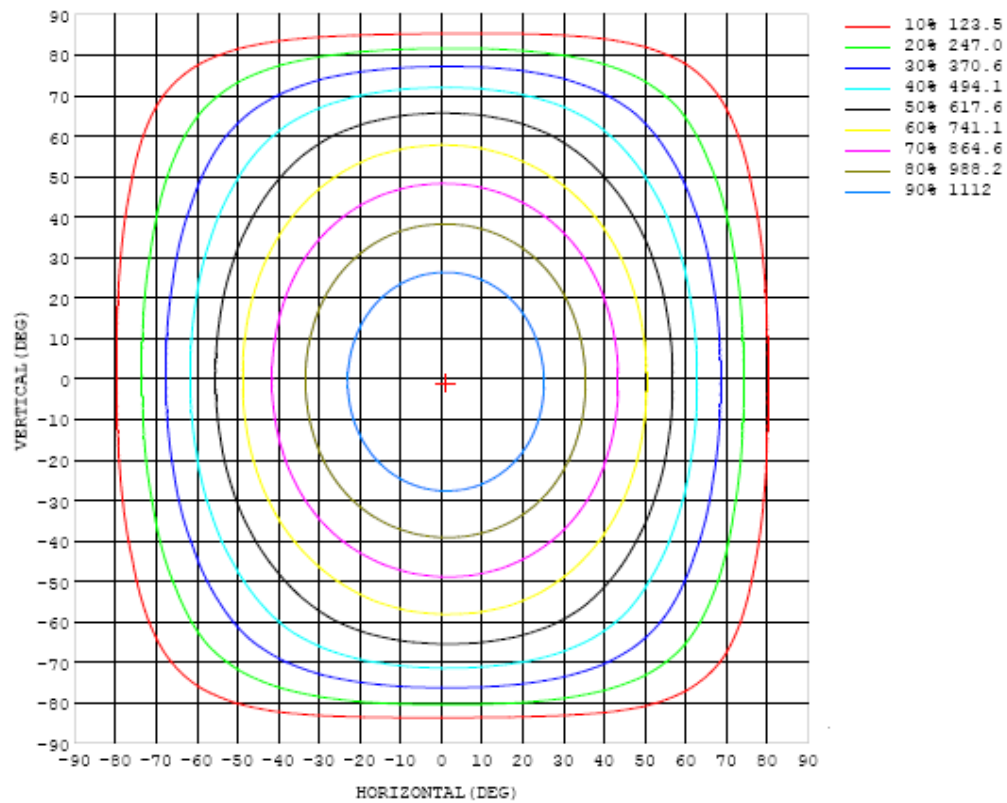


Chart 3: Isocandela Plot

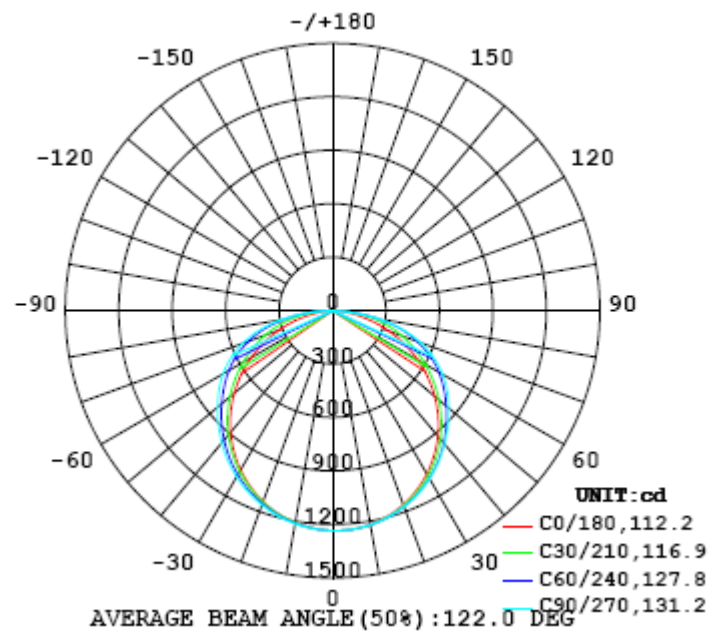


Chart 4: Polar Candela Distribution

## Luminous Intensity Data

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	1235	1235	1235	1235	1235	1235	1235	1235	1235	1235	1235	1235	1235	1235	1235	1235	1235	1235	1235
5	1232	1232	1232	1233	1233	1233	1233	1233	1233	1232	1232	1231	1230	1230	1229	1228	1228	1227	1227
10	1218	1219	1220	1220	1221	1221	1222	1222	1221	1221	1220	1218	1217	1215	1213	1212	1210	1209	1208
15	1194	1195	1196	1198	1199	1200	1201	1202	1201	1200	1199	1197	1194	1191	1188	1185	1183	1181	1179
20	1159	1160	1162	1165	1168	1170	1172	1173	1173	1172	1169	1166	1162	1158	1153	1148	1145	1142	1140
25	1113	1115	1118	1122	1127	1131	1134	1135	1136	1135	1132	1127	1121	1115	1108	1102	1097	1093	1091
30	1058	1061	1065	1071	1077	1082	1087	1089	1090	1089	1085	1080	1072	1064	1055	1047	1040	1035	1033
35	993	996	1002	1009	1018	1025	1032	1036	1038	1036	1032	1025	1016	1005	994	983	974	968	966
40	919	923	930	940	951	961	970	976	979	977	972	964	952	939	925	911	900	893	891
45	838	842	851	863	877	891	903	911	915	914	908	898	884	867	849	833	820	811	809
50	748	753	764	780	798	817	833	845	851	850	843	830	812	790	768	749	733	723	721
55	652	658	672	691	716	740	762	777	785	785	777	761	739	712	684	660	641	629	627
60	551	558	575	600	631	663	689	705	712	712	705	689	665	633	599	568	544	530	528
65	446	454	475	507	547	581	605	620	626	626	620	605	583	552	512	474	445	428	425
70	337	348	374	415	455	485	507	521	527	526	521	508	488	461	424	381	345	324	321
75	229	242	275	318	350	376	394	403	406	405	401	393	378	355	325	289	246	221	216
80	126	142	178	208	232	248	258	262	262	261	260	256	248	234	214	188	154	124	118
85	44.0	57.6	76.0	89.9	96.6	90.2	80.3	72.3	66.0	64.7	67.8	75.2	83.7	91.5	90.9	79.6	64.5	44.9	39.7
90	1.90	2.18	1.71	0.77	0.37	0.29	0.31	0.35	0.40	0.47	0.35	0.14	0.13	0.16	0.21	0.78	1.51	0.92	0.12
95	0.22	0.24	0.26	0.27	0.30	0.32	0.35	0.38	0.42	0.47	0.29	0.19	0.17	0.16	0.15	0.15	0.15	0.16	0.21
100	0.24	0.30	0.30	0.31	0.33	0.36	0.38	0.41	0.42	0.43	0.29	0.23	0.22	0.20	0.19	0.19	0.18	0.18	0.26
105	0.38	0.38	0.38	0.37	0.39	0.41	0.44	0.45	0.45	0.42	0.31	0.30	0.29	0.29	0.26	0.24	0.25	0.23	0.33
110	0.42	0.46	0.47	0.45	0.46	0.47	0.49	0.50	0.50	0.46	0.38	0.37	0.40	0.36	0.35	0.31	0.30	0.28	0.39
115	0.45	0.52	0.55	0.54	0.53	0.53	0.53	0.54	0.53	0.49	0.43	0.44	0.44	0.44	0.43	0.40	0.39	0.36	0.40
120	0.60	0.56	0.62	0.62	0.62	0.61	0.59	0.58	0.56	0.53	0.51	0.50	0.51	0.52	0.52	0.47	0.50	0.43	0.47
125	0.66	0.65	0.68	0.68	0.68	0.68	0.67	0.64	0.64	0.61	0.57	0.58	0.59	0.62	0.62	0.55	0.60	0.58	0.60
130	0.69	0.74	0.77	0.75	0.75	0.75	0.74	0.72	0.71	0.68	0.64	0.67	0.69	0.71	0.71	0.61	0.54	0.67	0.69
135	0.72	0.77	0.55	0.76	0.81	0.81	0.81	0.79	0.77	0.74	0.72	0.74	0.76	0.77	0.76	0.67	0.57	0.59	0.67
140	0.74	0.84	0.70	0.85	0.89	0.89	0.89	0.88	0.87	0.83	0.81	0.83	0.84	0.84	0.77	0.55	0.68	0.69	0.84
145	0.79	0.87	0.90	0.66	0.85	0.91	0.91	0.91	0.91	0.86	0.83	0.85	0.86	0.84	0.76	0.63	0.82	0.59	0.64
150	0.90	0.93	0.89	0.70	0.58	0.84	0.87	0.86	0.84	0.82	0.79	0.81	0.82	0.70	0.63	0.86	0.86	0.83	0.77
155	0.67	0.68	0.73	0.82	0.86	0.62	0.52	0.67	0.78	0.77	0.75	0.61	0.56	0.64	0.86	0.86	0.85	0.81	0.73
160	0.85	0.91	0.97	0.96	0.95	0.91	0.74	0.50	0.49	0.48	0.50	0.55	0.72	0.73	0.81	0.88	0.87	0.83	0.80
165	0.89	0.88	0.91	0.91	0.93	0.85	0.75	0.74	0.80	0.82	0.83	0.88	0.87	0.79	0.74	0.76	0.76	0.78	0.80
170	0.92	0.90	0.91	0.93	0.90	0.86	0.83	0.84	0.89	0.87	0.84	0.84	0.78	0.77	0.77	0.80	0.79	0.80	0.81
175	0.90	0.90	0.94	0.96	0.98	1.00	1.00	0.93	0.95	0.90	0.76	0.78	0.93	0.98	0.97	0.96	0.96	0.94	0.92
180	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	0.75	0.75

Table 4: Luminous Intensity Data

Table--2

UNIT: cd

C (DEG) γ (DEG)	190	200	210	220	230	240	250	260	270	280	290	300	310	320	330	340	350		
0	1235	1235	1235	1235	1235	1235	1235	1235	1235	1235	1235	1235	1235	1235	1235	1235	1235		
5	1227	1227	1227	1227	1227	1227	1228	1228	1229	1229	1229	1230	1230	1231	1231	1231	1232		
10	1208	1208	1209	1209	1210	1211	1212	1213	1214	1215	1216	1216	1216	1217	1217	1217	1218		
15	1179	1180	1181	1183	1185	1187	1189	1190	1192	1193	1193	1193	1193	1193	1193	1193	1193		
20	1140	1141	1144	1147	1150	1154	1157	1159	1162	1162	1163	1162	1161	1160	1159	1158	1158		
25	1091	1093	1097	1102	1107	1113	1117	1121	1123	1124	1124	1122	1120	1117	1115	1113	1113		
30	1034	1037	1043	1050	1057	1064	1071	1075	1078	1079	1077	1074	1071	1066	1062	1059	1057		
35	967	972	980	990	1000	1009	1017	1022	1025	1026	1024	1019	1013	1007	1000	995	993		
40	893	900	910	923	935	947	958	965	968	968	965	958	950	940	931	923	920		
45	812	821	834	850	866	882	895	903	906	906	901	891	879	866	854	844	838		
50	725	737	753	773	793	813	829	839	843	842	834	820	805	787	771	758	750		
55	633	647	667	692	719	743	762	774	779	776	765	748	727	703	682	665	655		
60	536	553	580	611	644	672	693	706	711	708	696	675	647	617	590	568	555		
65	435	458	491	529	565	593	614	625	630	627	617	597	567	530	495	467	451		
70	333	361	402	443	476	502	521	533	537	535	525	506	479	443	400	365	344		
75	232	267	309	344	374	397	414	423	427	427	419	402	378	347	306	264	237		
80	138	175	207	235	257	274	285	291	295	296	292	282	264	239	208	168	136		
85	56.4	78.5	97.2	113	124	130	132	132	135	139	143	143	135	121	102	77.6	51.5		
90	0.05	0.00	0.19	0.00	0.26	0.16	0.38	0.44	0.46	0.43	0.29	0.18	0.00	1.49	0.11	1.39	0.44		
95	0.20	0.21	0.23	0.25	0.28	0.30	0.32	0.39	0.43	0.38	0.32	0.30	0.28	0.25	0.23	0.22	0.21		
100	0.24	0.26	0.27	0.29	0.32	0.34	0.35	0.43	0.46	0.42	0.36	0.35	0.33	0.30	0.30	0.29	0.29		
105	0.30	0.32	0.34	0.36	0.39	0.41	0.42	0.45	0.49	0.45	0.43	0.42	0.41	0.39	0.39	0.38	0.39		
110	0.34	0.39	0.41	0.42	0.47	0.49	0.50	0.52	0.54	0.54	0.52	0.51	0.49	0.48	0.46	0.45	0.44		
115	0.41	0.43	0.45	0.45	0.50	0.53	0.54	0.56	0.57	0.58	0.57	0.56	0.55	0.51	0.51	0.48	0.47		
120	0.43	0.49	0.48	0.49	0.53	0.54	0.56	0.58	0.58	0.60	0.59	0.58	0.57	0.55	0.56	0.54	0.60		
125	0.57	0.50	0.55	0.54	0.57	0.58	0.58	0.59	0.61	0.61	0.62	0.62	0.63	0.61	0.60	0.65	0.66		
130	0.66	0.64	0.57	0.63	0.65	0.65	0.65	0.67	0.69	0.68	0.69	0.69	0.70	0.68	0.61	0.71	0.65		
135	0.65	0.62	0.64	0.72	0.73	0.73	0.73	0.76	0.77	0.76	0.77	0.78	0.78	0.65	0.73	0.75	0.62		
140	0.78	0.65	0.72	0.70	0.78	0.82	0.82	0.84	0.84	0.84	0.85	0.85	0.73	0.81	0.83	0.81	0.65		
145	0.67	0.77	0.83	0.81	0.76	0.77	0.85	0.88	0.88	0.88	0.78	0.76	0.78	0.88	0.87	0.84	0.67		
150	0.75	0.87	0.85	0.87	0.86	0.83	0.79	0.79	0.78	0.74	0.77	0.87	0.85	0.79	0.86	0.91	0.91		
155	0.79	0.91	0.89	0.81	0.87	0.82	0.82	0.82	0.81	0.78	0.83	0.88	0.91	0.91	0.87	0.77	0.76		
160	0.79	0.83	0.94	0.91	0.83	0.81	0.83	0.84	0.83	0.79	0.79	0.84	0.93	0.99	1.02	0.86	0.87		
165	0.82	0.81	0.77	0.84	0.88	0.86	0.90	0.90	0.88	0.85	0.78	0.78	0.84	0.95	0.88	0.76	0.85		
170	0.84	0.87	0.86	0.85	0.84	0.85	0.91	0.95	0.94	0.91	0.89	0.86	0.77	0.72	0.74	0.80	0.94		
175	0.87	0.93	0.98	0.91	0.91	0.87	0.80	0.77	0.77	0.78	0.79	0.78	0.78	0.82	0.94	0.96	0.92		
180	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		

Table 5: Luminous Intensity Data

## EQUIPMENT LIST

Test Equipment	Model	Equipment No.	Calibration Date	Calibration Due date
Goniophotometer system	GO-R5000	HZTE011-01	Jul. 27, 2016	Jul. 26, 2017
Digital Power Meter	PF2010A	HZTE028-01	Jul. 27, 2016	Jul. 26, 2017
AC Power Supply	PCR 500L	HZTE001-08	Jul. 27, 2016	Jul. 26, 2017
DC Power Supply	WY12010	HZTE004-03	Jul. 27, 2016	Jul. 26, 2017
Temperature Meter	TES1310	HZTE017-01	Jul. 27, 2016	Jul. 26, 2017
Standard source	D908	HZTE012-01	Jul. 27, 2016	Jul. 26, 2017
Standard source	SCL-1400	HZTE012-02	Jul. 27, 2016	Jul. 26, 2017

Table 6: 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 2x4' Troffers) 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 1.94% with a coverage factor k=2.

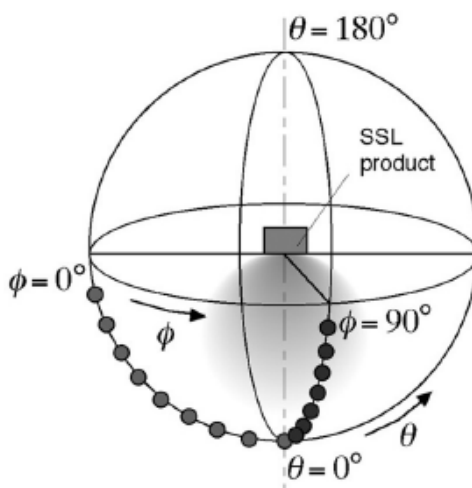
## Color Characteristics Measurements

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  $10^\circ$  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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