



LM-79-08 Test Report

for

GREEN CREATIVE LTD

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

2x4' Troffer

Model: 30TROF24DIM/850/277V

Laboratory: Leading Testing Laboratories

NVLAP CODE: 200960-0

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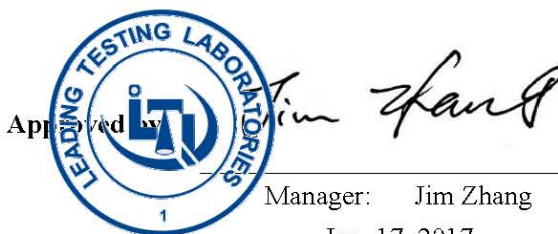
Report No.: HZ17010017d

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/850/277V**

Luminous Efficacy (Lumens /Watt)	Total Luminous Flux (Lumens)	Power (Watts)	Power Factor
140.3	4084.4	29.11	0.9945
CCT (K)	CRI	Stabilization Time (Light & Power)	
4793	84.6	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	: Jan. 10, 2017
Date of Test	: Jan. 14, 2017
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



Overview of the sample

Equipment Under Test (EUT)

Name	: 2x4' Troffer
Model	: 30TROF24DIM/850/277V
Electrical Ratings	: 120-277V, 60Hz
Product Description	: 5000K, Frosted Lens, CRI80
Manufacturer	: GREEN CREATIVE LTD
Address	: 756 North Zhongshan Rd., Unit B301 Zhabei District, Shanghai

TEST RESULTS

Test ambient temperature was 24.6°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)	0.244	0.108
Power Factor	0.9945	0.9540
Test Power (W)	29.11	28.60
THD A%	8.63	9.78
Luminous Efficacy (lm/W)	140.3	143.0
Total Luminous Flux (lm)	4084.4	4089.6
Color Rendering Index (CRI)	84.6	
R9	19	
Correlated Color Temperature (CCT) (K)	4793	
Chromaticity (Chroma x, Chroma y)	(0.3521, 0.3907)	
Chromaticity (Chroma u, Chroma v)	(0.2113, 0.3278)	
Chromaticity (Chroma u', Chroma v')	(0.2113, 0.4917)	
Duv	0.0035	
Average Beam Angle (°)	122.4	
Center Beam Candle Power (cd)	1288	
Spacing Criteria	1.25 (0°-180°)/ 1.31 (90°-270°)	
Zonal Lumens in the 0°-60°Zone	74.32%	
Zonal Lumens in the 60°-90°Zone	25.59%	
Zonal Lumens in the 90°-120°Zone	0.03%	
Zonal Lumens in the 120°-180°Zone	0.06%	

Special Color Rendering Indices	
R1	83
R2	91
R3	95
R4	82
R5	82
R6	86
R7	88
R8	70
R9	19
R10	77
R11	80
R12	55
R13	86
R14	98

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

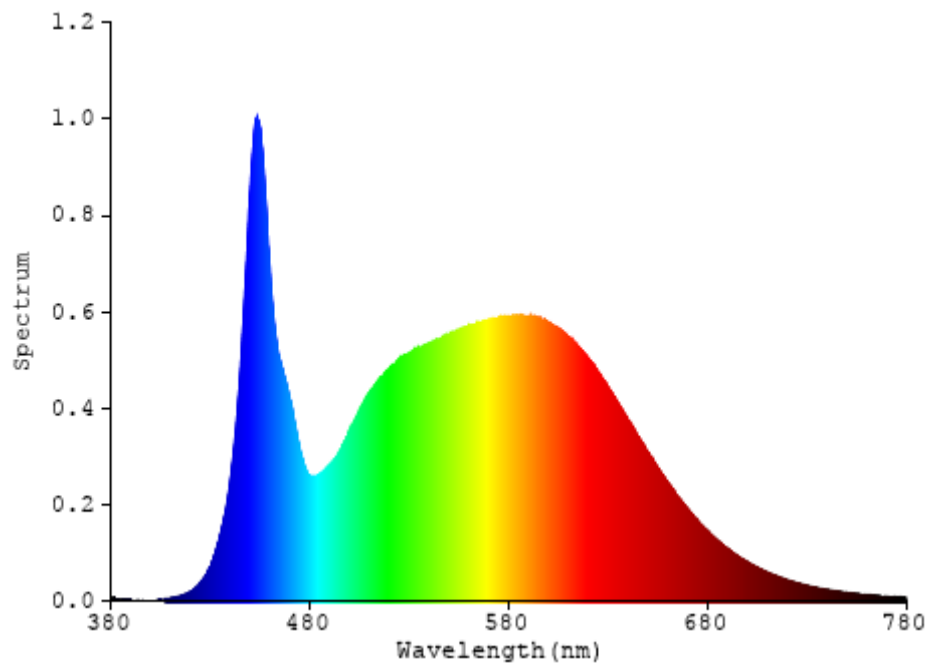


Chart 1: Spectral Power Distribution

Zonal Lumen Tabulation

$\gamma(^{\circ})$	Lumens	% Total
0- 10	121.95	2.99%
10- 20	350.959	8.59%
20- 30	537.128	13.15%
30- 40	657.92	16.11%
40- 50	700.789	17.16%
50- 60	666.675	16.32%
60- 70	559.857	13.71%
70- 80	374.259	9.16%
80- 90	111.235	2.72%
90-100	0.343	0.01%
100-110	0.405	0.01%
110-120	0.499	0.01%
120-130	0.561	0.01%
130-140	0.586	0.01%
140-150	0.529	0.01%
150-160	0.384	0.01%
160-170	0.246	0.01%
170-180	0.087	0.00%
Total	4084.4	100%

$\gamma(^{\circ})$	Lumens	% Total
0- 60	3035.421	74.32%
60- 90	1045.351	25.59%
0-90	4080.772	99.91%
90- 180	3.64	0.09%
0- 180	4084.4	100%

Table 3: Zonal Lumen Data

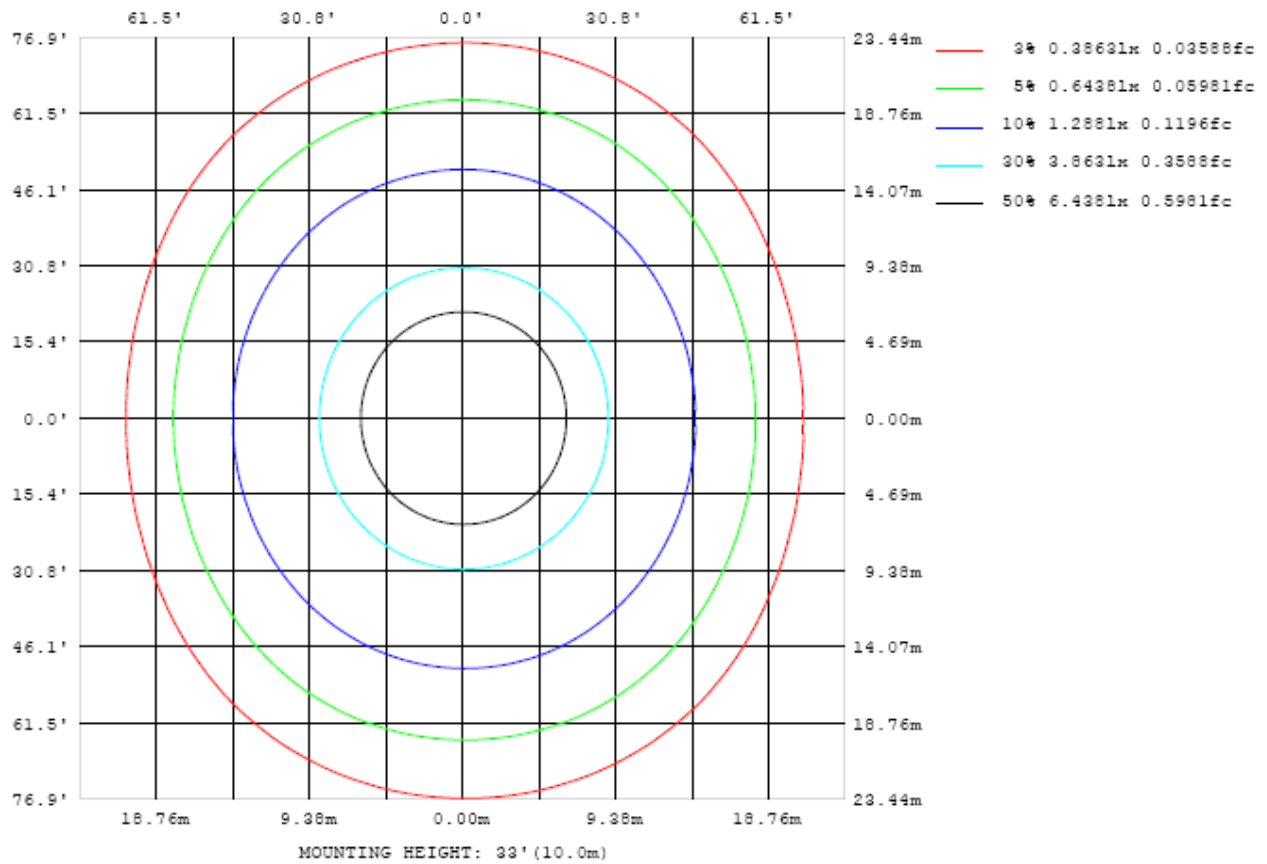


Chart 2: Illuminance Plot (Footcandles)

Luminous Intensity Distribution Plots

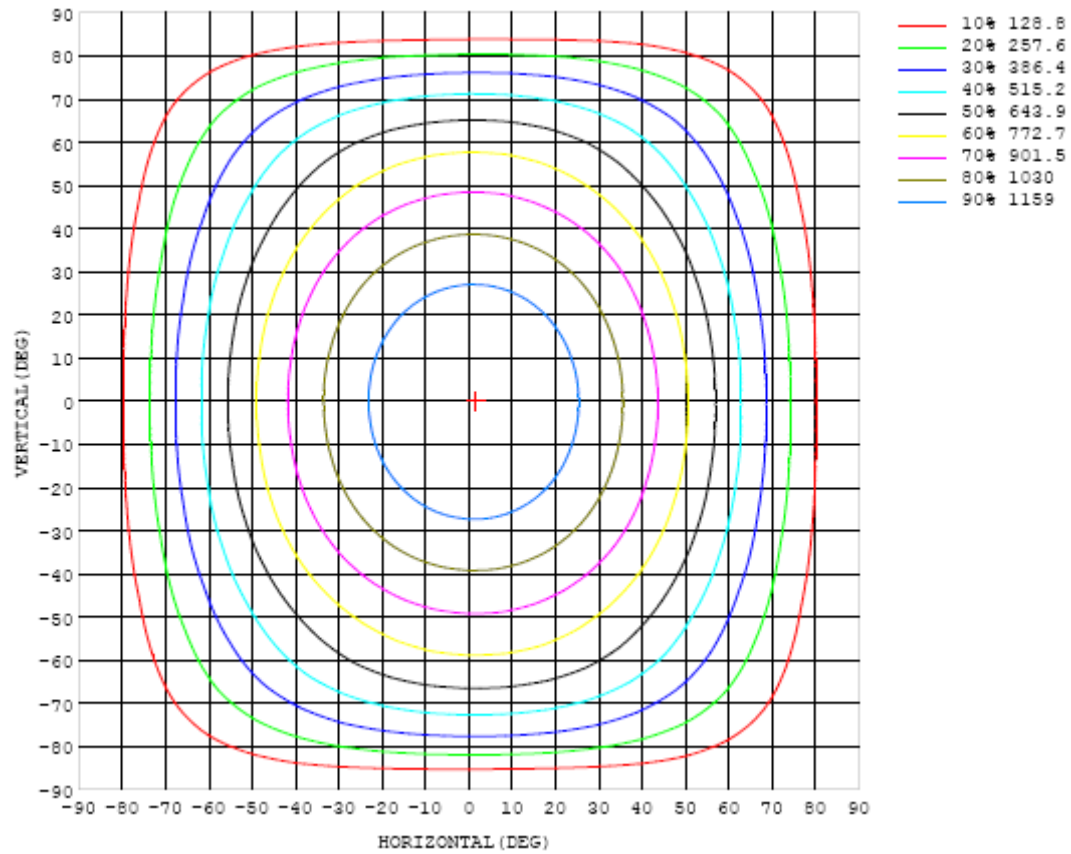


Chart 3: Isocandela Plot

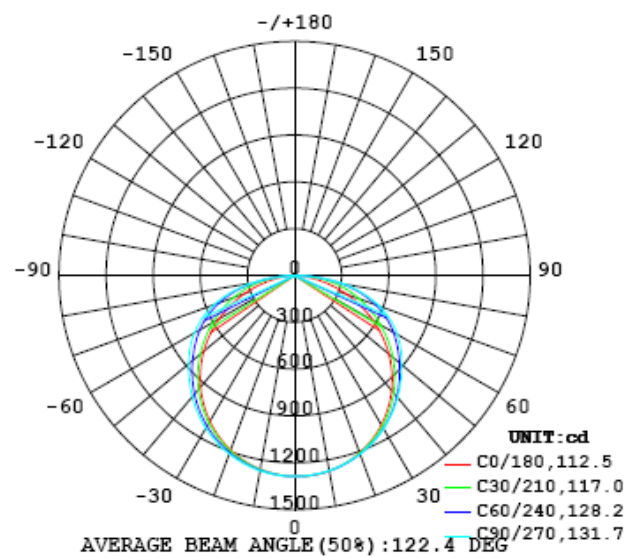


Chart 4: Polar Candela Distribution

Luminous Intensity Data

Table--1

UNIT: cd

C (DEG) γ (DEG)	0	10	20	30	40	50	60	70	80	90	100	110	120	130	140	150	160	170	180
0	1288	1288	1288	1288	1288	1288	1288	1288	1288	1288	1288	1288	1288	1288	1288	1288	1288	1288	1288
5	1285	1285	1284	1284	1284	1284	1284	1284	1283	1283	1282	1282	1281	1281	1280	1280	1280	1279	1279
10	1271	1271	1271	1271	1271	1271	1271	1271	1270	1270	1269	1267	1266	1264	1263	1262	1261	1260	1261
15	1246	1246	1246	1247	1248	1249	1249	1249	1249	1248	1246	1244	1242	1239	1236	1234	1232	1231	1231
20	1210	1210	1211	1213	1215	1217	1218	1219	1219	1218	1215	1212	1209	1204	1200	1196	1193	1191	1190
25	1162	1163	1165	1169	1173	1176	1179	1180	1181	1180	1176	1172	1167	1161	1154	1148	1144	1140	1139
30	1105	1106	1110	1115	1121	1126	1131	1134	1135	1133	1130	1124	1117	1109	1100	1092	1085	1080	1079
35	1038	1040	1045	1052	1061	1068	1075	1079	1081	1080	1076	1069	1060	1049	1037	1027	1017	1011	1010
40	961	964	971	981	993	1003	1012	1019	1022	1021	1016	1007	996	982	967	954	942	934	932
45	876	880	890	903	917	931	944	953	958	957	951	941	926	909	891	874	859	850	847
50	783	788	800	817	836	855	873	885	892	892	885	872	854	831	809	788	770	758	755
55	683	690	705	726	751	777	800	817	826	826	818	803	780	752	723	697	676	661	657
60	577	586	604	631	664	698	726	746	755	756	748	732	706	672	636	603	576	559	553
65	467	478	501	535	577	616	644	663	672	672	665	650	626	591	549	508	474	453	446
70	353	366	396	439	485	522	549	566	574	575	569	555	532	500	460	412	371	345	337
75	239	255	291	341	380	413	437	453	459	459	454	443	423	396	360	318	269	237	227
80	131	149	192	231	263	287	304	314	317	317	315	308	295	274	248	214	173	136	124
85	45.0	61.1	87.5	111	129	142	145	143	140	140	142	145	144	137	122	102	78.6	52.6	41.3
90	1.96	2.96	3.75	2.91	1.29	2.23	1.37	0.98	0.96	1.01	0.94	1.04	1.63	4.28	1.47	3.12	3.56	3.64	0.12
95	0.21	0.25	0.26	0.28	0.30	0.33	0.35	0.38	0.42	0.49	0.32	0.19	0.17	0.17	0.15	0.15	0.15	0.15	0.21
100	0.29	0.30	0.30	0.32	0.33	0.36	0.39	0.41	0.43	0.45	0.31	0.23	0.22	0.21	0.19	0.19	0.18	0.18	0.27
105	0.38	0.39	0.38	0.37	0.38	0.41	0.43	0.44	0.45	0.45	0.31	0.28	0.29	0.28	0.26	0.25	0.25	0.22	0.36
110	0.44	0.48	0.48	0.45	0.45	0.47	0.49	0.50	0.50	0.47	0.39	0.37	0.37	0.36	0.35	0.33	0.33	0.28	0.39
115	0.47	0.53	0.57	0.54	0.54	0.54	0.54	0.56	0.56	0.51	0.45	0.44	0.44	0.45	0.43	0.38	0.41	0.35	0.41
120	0.62	0.57	0.65	0.63	0.62	0.60	0.59	0.58	0.58	0.54	0.48	0.48	0.50	0.52	0.51	0.48	0.51	0.43	0.50
125	0.68	0.68	0.72	0.70	0.71	0.69	0.67	0.65	0.64	0.61	0.54	0.56	0.59	0.62	0.64	0.57	0.62	0.59	0.65
130	0.75	0.79	0.81	0.75	0.78	0.76	0.75	0.73	0.71	0.69	0.62	0.65	0.69	0.71	0.73	0.64	0.54	0.69	0.72
135	0.80	0.83	0.87	0.81	0.84	0.82	0.83	0.80	0.79	0.77	0.71	0.73	0.77	0.79	0.75	0.55	0.60	0.60	0.69
140	0.83	0.87	0.87	0.91	0.92	0.91	0.92	0.89	0.88	0.85	0.83	0.84	0.82	0.79	0.78	0.64	0.72	0.71	0.87
145	0.88	0.91	0.91	0.95	0.95	0.97	0.96	0.95	0.96	0.91	0.89	0.89	0.90	0.88	0.88	0.61	0.88	0.61	0.67
150	0.90	0.98	0.92	0.79	0.62	0.95	0.92	0.94	0.93	0.88	0.86	0.86	0.87	0.88	0.61	0.87	0.90	0.88	0.82
155	0.66	0.75	0.74	0.82	0.85	0.59	0.63	0.89	0.85	0.82	0.82	0.83	0.63	0.60	0.83	0.91	0.89	0.88	0.78
160	0.83	1.00	1.03	1.02	1.00	0.95	0.54	0.51	0.51	0.50	0.52	0.53	0.59	0.78	0.86	0.91	0.92	0.93	0.84
165	0.89	0.95	0.99	1.04	1.02	0.84	0.77	0.78	0.84	0.84	0.86	0.90	0.91	0.89	0.76	0.80	0.77	0.78	0.83
170	0.95	0.97	0.99	0.98	0.93	0.88	0.83	0.90	0.91	0.90	0.89	0.90	0.89	0.89	0.80	0.80	0.83	0.81	0.85
175	0.97	0.99	1.01	1.04	1.09	1.06	1.00	0.96	1.02	0.97	0.93	0.77	0.83	0.84	1.00	0.95	1.02	0.91	0.99
180	1.03	1.03	1.03	1.03	1.03	1.02	0.99	0.94	0.94	0.72	0.70	0.81	0.92	0.97	0.98	0.98	0.98	0.98	1.03

Table 4: 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	1288	1288	1288	1288	1288	1288	1288	1288	1288	1288	1288	1288	1288	1288	1288	1288	1288		
5	1280	1280	1280	1281	1281	1282	1282	1283	1283	1284	1284	1284	1284	1284	1285	1285	1285		
10	1261	1261	1262	1264	1265	1266	1268	1269	1270	1271	1271	1271	1271	1271	1271	1271	1271		
15	1231	1232	1234	1237	1239	1242	1244	1246	1248	1249	1249	1249	1248	1248	1247	1246	1246		
20	1191	1193	1196	1200	1204	1208	1211	1215	1217	1218	1218	1217	1216	1214	1212	1210	1210		
25	1141	1144	1148	1154	1160	1166	1171	1175	1178	1179	1178	1176	1174	1170	1167	1164	1163		
30	1081	1085	1091	1099	1107	1115	1122	1127	1130	1131	1130	1127	1123	1117	1112	1108	1106		
35	1012	1017	1025	1036	1047	1057	1065	1071	1075	1076	1074	1069	1063	1056	1048	1042	1039		
40	934	941	952	965	979	992	1002	1010	1014	1014	1011	1004	995	985	975	967	962		
45	850	858	871	888	905	922	935	944	949	948	943	933	921	908	894	884	878		
50	758	769	785	805	827	848	865	876	881	880	872	859	842	824	806	793	785		
55	661	674	695	720	748	774	794	807	813	811	801	783	760	735	713	695	685		
60	559	574	601	634	668	697	719	731	737	735	725	705	677	644	615	593	580		
65	453	473	506	546	583	611	630	642	648	646	637	619	590	553	516	487	471		
70	345	372	412	453	485	511	528	539	544	543	535	519	493	459	416	379	358		
75	239	271	313	347	374	395	407	414	419	420	416	404	383	354	316	273	246		
80	138	174	203	227	244	257	264	268	271	274	273	267	255	235	208	172	140		
85	54.0	72.0	85.5	93.8	93.3	86.9	81.6	78.3	78.8	83.9	92.5	102	109	105	92.1	74.9	51.8		
90	0.12	0.15	0.17	0.19	0.23	0.26	0.28	0.31	0.34	0.30	0.27	0.25	0.22	0.20	0.18	0.15	0.13		
95	0.21	0.22	0.25	0.27	0.29	0.31	0.33	0.39	0.43	0.39	0.34	0.31	0.29	0.27	0.24	0.23	0.23		
100	0.25	0.27	0.29	0.31	0.34	0.36	0.37	0.44	0.46	0.42	0.38	0.37	0.35	0.32	0.32	0.30	0.31		
105	0.32	0.34	0.36	0.38	0.41	0.44	0.45	0.47	0.50	0.48	0.46	0.45	0.44	0.42	0.42	0.40	0.42		
110	0.38	0.40	0.43	0.44	0.48	0.51	0.53	0.55	0.56	0.56	0.55	0.53	0.52	0.50	0.49	0.47	0.45		
115	0.43	0.45	0.47	0.47	0.51	0.54	0.56	0.58	0.58	0.59	0.60	0.58	0.56	0.53	0.54	0.50	0.48		
120	0.45	0.45	0.52	0.51	0.54	0.56	0.56	0.58	0.60	0.61	0.60	0.60	0.60	0.59	0.60	0.56	0.61		
125	0.60	0.56	0.59	0.57	0.61	0.61	0.61	0.62	0.63	0.64	0.66	0.66	0.66	0.64	0.65	0.66	0.71		
130	0.70	0.68	0.60	0.66	0.69	0.70	0.70	0.72	0.74	0.73	0.75	0.74	0.75	0.70	0.64	0.76	0.78		
135	0.68	0.66	0.67	0.67	0.78	0.79	0.79	0.81	0.82	0.82	0.83	0.84	0.82	0.67	0.79	0.76	0.64		
140	0.86	0.64	0.77	0.73	0.74	0.86	0.87	0.89	0.90	0.90	0.89	0.90	0.74	0.88	0.84	0.87	0.67		
145	0.69	0.77	0.87	0.87	0.82	0.78	0.79	0.88	0.91	0.85	0.78	0.79	0.82	0.90	0.91	0.89	0.66		
150	0.75	0.91	0.88	0.92	0.91	0.87	0.83	0.80	0.78	0.73	0.88	0.91	0.93	0.81	0.91	0.97	0.81		
155	0.80	0.91	0.96	0.93	0.92	0.81	0.85	0.86	0.86	0.83	0.86	0.90	0.94	1.00	0.91	0.77	0.78		
160	0.85	0.79	0.98	0.93	0.91	0.85	0.86	0.89	0.86	0.88	0.81	0.86	0.98	1.04	1.06	0.82	0.99		
165	0.84	0.87	0.82	0.83	0.90	0.95	0.96	0.96	0.95	0.90	0.86	0.85	0.89	1.00	0.80	0.79	0.97		
170	0.85	0.89	0.91	0.87	0.89	0.86	0.84	0.92	0.98	0.95	0.90	0.78	0.75	0.76	0.79	0.97	0.97		
175	0.99	1.02	1.00	1.00	1.09	0.98	0.93	0.84	0.83	0.86	0.89	0.91	0.97	1.03	1.03	0.97	0.95		
180	1.03	1.03	1.03	1.02	1.02	1.01	0.99	0.95	0.93	0.77	0.72	0.84	0.93	0.95	0.96	0.97	0.97		

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 expanded 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° 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 ***

This report is considered invalidated without the Special Seal for Inspection of the LTL. This report shall not be altered, increased or deleted. The results shown in this test report refer only to the sample(s) tested. Without written approval of LTL, this test report shall not be copied except in full and published as advertisement.

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