



LM-79-08 Test Report

for

GREEN CREATIVE LTD

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

2x4' Troffer

Model: 30TROF24DIM/840/277V

Laboratory: Leading Testing Laboratories

NVLAP CODE: 200960-0

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

Tel: +86 571 86376106

www.ledtestlab.com

Report No.: HZ17010017c

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

Review by:

Engineer: April Zou
Jan. 17, 2017

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/840/277V**

Luminous Efficacy (Lumens /Watt)	Total Luminous Flux (Lumens)	Power (Watts)	Power Factor
139.2	4070.2	29.24	0.9945
CCT (K)	CRI	Stabilization Time (Light & Power)	
3812	83.1	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

TABLE OF CONTENT

LM-79-08 Test Report.....	1
Test Summary.....	2
Sample Photos.....	4
TEST RESULTS	5
Spectral Power Distribution	6
Zonal Lumen Tabulation.....	7
Luminous Intensity Distribution Plots.....	9
Luminous Intensity Data	10
EQUIPMENT LIST	12
TEST METHODS	12
Seasoning of SSL Product.....	12
Goniophotometer Method	12
Photometric and Electrical Measurements.....	12
Color Characteristics Measurements.....	13
Color Spatial Uniformity	13

Sample Photos



Overview of the sample

Equipment Under Test (EUT)

Name	: 2x4' Troffer
Model	: 30TROF24DIM/840/277V
Electrical Ratings	: 120-277V, 60Hz
Product Description	: 4000K, 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)	0.245	0.109
Power Factor	0.9945	0.9545
Test Power (W)	29.24	28.71
THD A%	8.55	9.85
Luminous Efficacy (lm/W)	139.2	139.9
Total Luminous Flux (lm)	4070.2	4016.5
Color Rendering Index (CRI)	83.1	
R9	14	
Correlated Color Temperature (CCT) (K)	3812	
Chromaticity (Chroma x, Chroma y)	(0.3918, 0.3907)	
Chromaticity (Chroma u, Chroma v)	(0.2270, 0.3395)	
Chromaticity (Chroma u', Chroma v')	(0.2270, 0.5093)	
Duv	0.0033	
Average Beam Angle (°)	122.2	
Center Beam Candle Power (cd)	1285	
Spacing Criteria	1.25 (0°-180°)/ 1.31 (90°-270°)	
Zonal Lumens in the 0°-60°Zone	74.35%	
Zonal Lumens in the 60°-90°Zone	25.56%	
Zonal Lumens in the 90°-120°Zone	0.03%	
Zonal Lumens in the 120°-180°Zone	0.06%	

Special Color Rendering Indices	
R1	81
R2	88
R3	94
R4	83
R5	81
R6	83
R7	88
R8	67
R9	14
R10	71
R11	82
R12	60
R13	83
R14	96

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

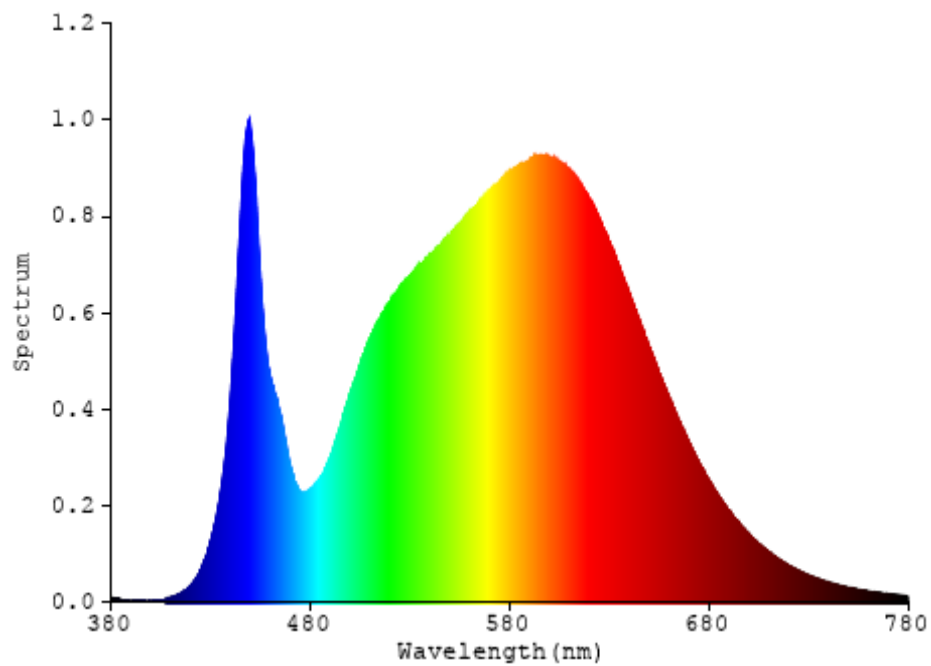


Chart 1: Spectral Power Distribution

Zonal Lumen Tabulation

$\gamma(^{\circ})$	Lumens	% Total
0- 10	121.718	2.99%
10- 20	350.231	8.60%
20- 30	535.829	13.16%
30- 40	656.04	16.12%
40- 50	698.426	17.16%
50- 60	664.059	16.32%
60- 70	557.195	13.69%
70- 80	372.26	9.15%
80- 90	110.819	2.72%
90-100	0.306	0.01%
100-110	0.406	0.01%
110-120	0.504	0.01%
120-130	0.559	0.01%
130-140	0.6	0.01%
140-150	0.535	0.01%
150-160	0.383	0.01%
160-170	0.254	0.01%
170-180	0.091	0.00%
Total	4070.2	100%

$\gamma(^{\circ})$	Lumens	% Total
0- 60	3026.303	74.35%
60- 90	1040.274	25.56%
0-90	4066.577	99.91%
90- 180	3.638	0.09%
0- 180	4070.2	100%

Table 3: Zonal Lumen Data

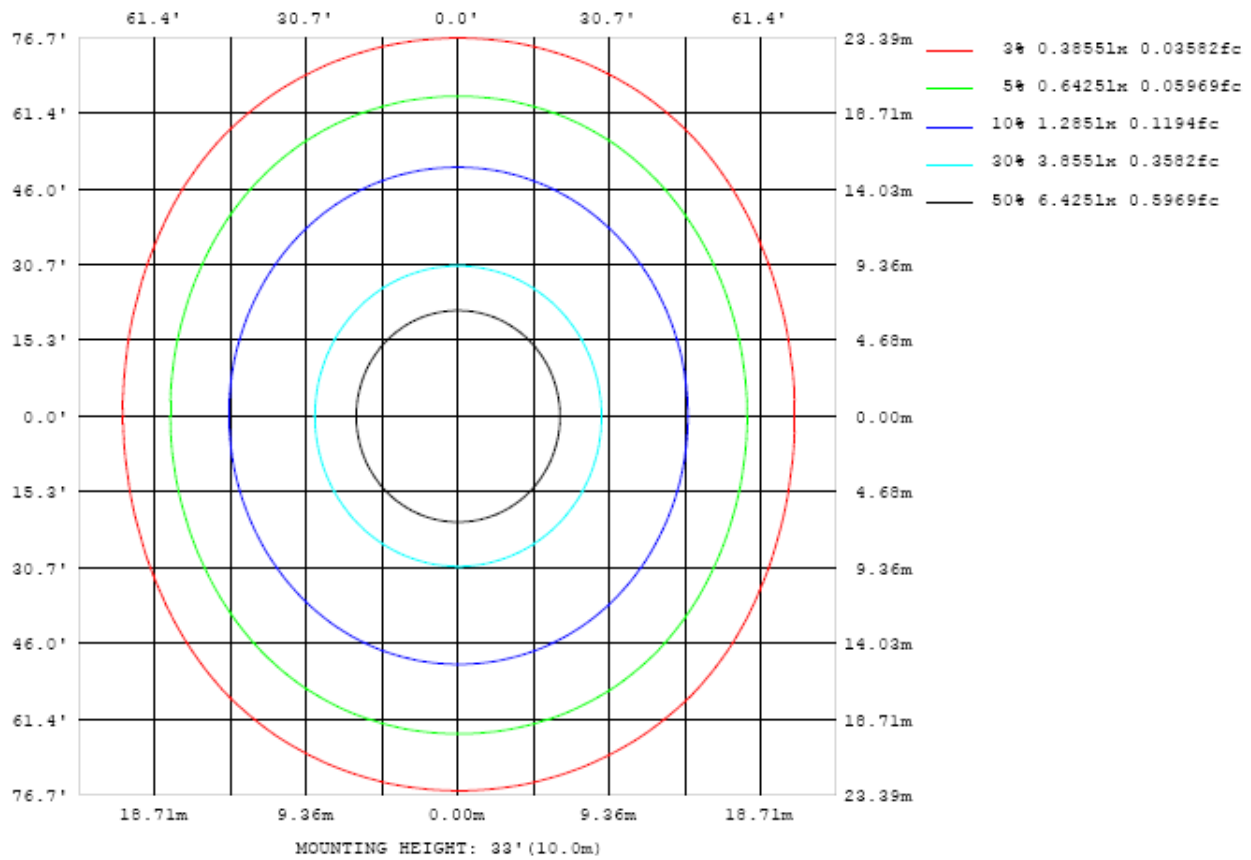


Chart 2: Illuminance Plot (Footcandles)

Luminous Intensity Distribution Plots

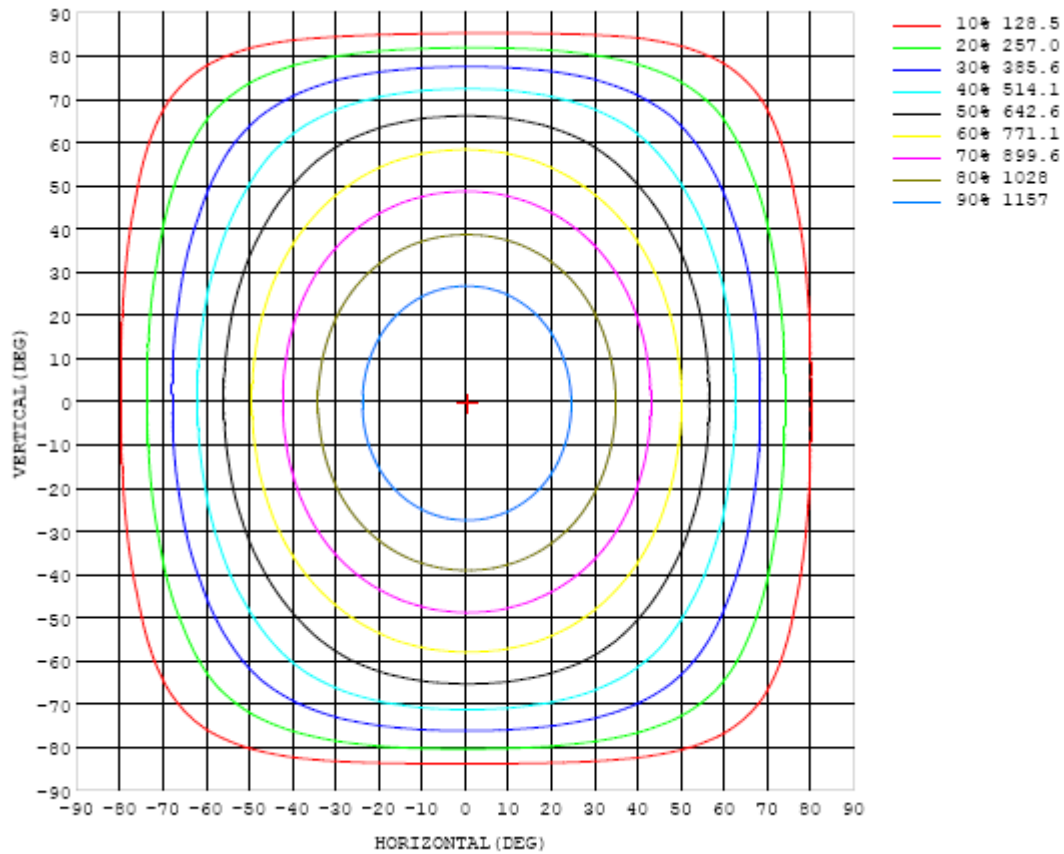


Chart 3: Isocandela Plot

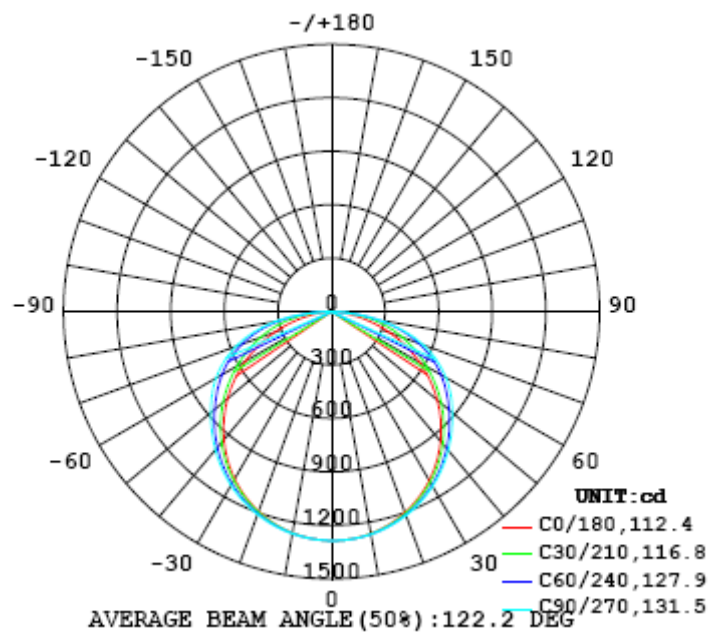


Chart 4: Polar Candela Distribution

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	1285	1285	1285	1285	1285	1285	1285	1285	1285	1285	1285	1285	1285	1285	1285	1285	1285	1285	1285
5	1280	1281	1281	1281	1281	1281	1282	1282	1282	1282	1281	1281	1281	1280	1280	1280	1279	1279	1279
10	1265	1265	1266	1266	1267	1268	1269	1269	1269	1269	1268	1268	1267	1266	1265	1264	1263	1262	1261
15	1238	1239	1240	1241	1243	1245	1246	1247	1248	1248	1247	1246	1244	1242	1239	1237	1235	1234	1233
20	1200	1202	1203	1206	1209	1212	1214	1216	1218	1217	1216	1215	1212	1208	1204	1201	1197	1195	1194
25	1152	1154	1156	1160	1165	1170	1174	1177	1179	1179	1177	1174	1170	1165	1159	1154	1149	1146	1144
30	1094	1096	1100	1105	1112	1119	1124	1128	1131	1132	1130	1126	1120	1113	1105	1097	1091	1086	1084
35	1026	1028	1033	1041	1050	1059	1067	1073	1077	1077	1075	1069	1062	1052	1042	1031	1023	1017	1015
40	949	952	958	968	980	992	1002	1010	1015	1016	1013	1006	996	984	971	958	947	940	938
45	864	868	876	888	904	919	932	943	950	951	947	939	925	910	892	876	863	855	852
50	772	775	786	802	821	841	859	873	882	884	879	868	851	830	808	788	772	762	760
55	673	677	690	710	735	761	785	803	813	815	810	796	775	748	721	696	676	664	662
60	569	574	589	615	647	680	707	726	737	739	734	720	697	666	631	599	575	560	558
65	460	466	486	519	558	594	620	638	647	649	645	632	611	581	541	501	470	452	449
70	348	356	382	422	463	495	519	535	542	544	541	530	511	483	447	403	365	342	338
75	236	247	279	322	356	382	402	413	417	419	417	410	397	373	342	305	261	233	228
80	130	144	180	210	234	252	263	268	269	270	270	268	260	246	225	198	163	131	124
85	45.1	57.1	76.5	90.8	99.2	98.9	90.9	82.6	76.2	74.9	77.2	84.0	91.6	98.0	95.4	83.2	67.0	47.7	40.5
90	2.08	2.43	2.08	0.84	0.21	0.13	0.19	0.22	0.25	0.28	0.24	0.21	0.18	0.12	0.20	0.75	1.69	2.50	0.12
95	0.16	0.17	0.17	0.19	0.20	0.22	0.24	0.25	0.31	0.35	0.31	0.26	0.24	0.22	0.20	0.19	0.19	0.19	0.26
100	0.21	0.20	0.20	0.22	0.23	0.25	0.27	0.28	0.34	0.36	0.33	0.30	0.28	0.27	0.25	0.25	0.24	0.26	0.35
105	0.28	0.25	0.25	0.26	0.27	0.30	0.32	0.33	0.35	0.39	0.37	0.36	0.36	0.35	0.33	0.32	0.32	0.33	0.48
110	0.31	0.31	0.31	0.32	0.32	0.36	0.39	0.40	0.42	0.44	0.44	0.44	0.43	0.42	0.40	0.39	0.38	0.36	0.50
115	0.36	0.36	0.37	0.39	0.36	0.41	0.42	0.45	0.45	0.46	0.47	0.48	0.48	0.46	0.44	0.46	0.44	0.42	0.55
120	0.43	0.36	0.38	0.45	0.42	0.45	0.46	0.45	0.46	0.48	0.48	0.49	0.50	0.51	0.50	0.52	0.51	0.56	0.69
125	0.54	0.55	0.50	0.51	0.47	0.50	0.51	0.49	0.51	0.52	0.54	0.55	0.57	0.57	0.58	0.57	0.47	0.58	0.69
130	0.58	0.54	0.52	0.48	0.52	0.54	0.55	0.55	0.55	0.58	0.59	0.60	0.62	0.64	0.63	0.56	0.65	0.69	0.80
135	0.73	0.67	0.63	0.62	0.51	0.59	0.60	0.59	0.59	0.61	0.63	0.65	0.68	0.67	0.58	0.73	0.73	0.76	0.91
140	0.82	0.66	0.71	0.66	0.62	0.57	0.67	0.67	0.68	0.69	0.70	0.72	0.73	0.64	0.74	0.68	0.72	0.69	0.98
145	0.76	0.62	0.73	0.77	0.71	0.64	0.59	0.59	0.61	0.65	0.61	0.63	0.66	0.73	0.76	0.83	0.80	0.66	0.95
150	0.75	0.68	0.70	0.69	0.63	0.65	0.64	0.66	0.59	0.59	0.59	0.71	0.75	0.79	0.70	0.71	0.75	0.73	1.08
155	0.77	0.72	0.68	0.76	0.78	0.71	0.66	0.66	0.63	0.63	0.65	0.67	0.74	0.81	0.82	0.76	0.61	0.65	0.74
160	0.89	0.77	0.72	0.77	0.84	0.81	0.68	0.64	0.65	0.65	0.68	0.66	0.76	0.82	0.83	0.73	0.72	0.92	0.98
165	0.81	0.79	0.79	0.75	0.72	0.76	0.76	0.70	0.72	0.74	0.77	0.80	0.86	0.84	0.75	0.70	0.81	0.95	0.97
170	0.82	0.82	0.83	0.84	0.81	0.73	0.67	0.64	0.66	0.66	0.63	0.69	0.77	0.76	0.74	0.93	0.96	0.98	0.99
175	0.92	0.79	0.94	0.99	0.98	0.96	1.03	0.95	0.91	0.89	0.90	0.95	0.98	0.99	0.99	1.00	1.03	1.04	1.06
180	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87

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	1285	1285	1285	1285	1285	1285	1285	1285	1285	1285	1285	1285	1285	1285	1285	1285	1285		
5	1279	1279	1279	1279	1279	1279	1279	1280	1280	1280	1280	1280	1280	1280	1280	1280	1280		
10	1261	1261	1262	1263	1263	1264	1265	1265	1265	1266	1266	1265	1265	1265	1265	1264	1264		
15	1233	1233	1235	1236	1238	1240	1241	1242	1243	1243	1243	1242	1241	1240	1238	1238	1237		
20	1194	1195	1198	1200	1204	1206	1209	1211	1212	1212	1211	1209	1207	1205	1202	1201	1200		
25	1144	1147	1151	1155	1160	1165	1169	1171	1173	1173	1171	1168	1164	1161	1157	1153	1152		
30	1085	1089	1095	1102	1109	1115	1121	1124	1126	1125	1123	1119	1113	1107	1101	1097	1094		
35	1017	1022	1030	1040	1049	1058	1065	1070	1072	1071	1068	1062	1054	1046	1037	1031	1027		
40	940	947	958	970	983	994	1004	1010	1012	1011	1006	998	988	977	966	956	951		
45	856	865	879	895	911	926	938	946	949	947	940	929	915	901	886	874	867		
50	765	776	794	814	835	854	870	880	883	880	871	856	838	819	801	785	775		
55	668	682	704	729	756	782	802	814	817	814	802	782	759	733	709	690	677		
60	565	584	611	644	679	709	731	743	747	744	731	708	678	645	614	590	575		
65	459	482	517	559	598	627	648	660	665	661	650	628	597	557	518	487	467		
70	351	380	424	469	504	533	553	564	568	566	555	535	506	468	422	382	358		
75	244	280	328	366	399	424	442	451	454	453	445	427	402	368	326	279	248		
80	143	184	220	252	276	295	307	313	316	316	312	300	282	256	223	181	143		
85	57.1	82.5	104	123	134	137	138	138	141	144	147	150	145	131	110	85.2	56.3		
90	0.05	0.20	0.26	0.34	0.40	0.44	0.49	0.56	0.64	0.49	0.34	0.32	0.00	0.07	0.00	0.77	0.55		
95	0.30	0.31	0.33	0.36	0.40	0.43	0.46	0.51	0.58	0.40	0.26	0.24	0.23	0.21	0.20	0.19	0.19		
100	0.36	0.37	0.39	0.41	0.44	0.47	0.50	0.53	0.55	0.39	0.31	0.30	0.28	0.25	0.25	0.24	0.24		
105	0.47	0.47	0.47	0.50	0.52	0.54	0.56	0.57	0.57	0.42	0.39	0.38	0.37	0.34	0.33	0.33	0.31		
110	0.56	0.57	0.56	0.58	0.60	0.63	0.64	0.65	0.60	0.51	0.49	0.48	0.47	0.45	0.42	0.43	0.38		
115	0.61	0.63	0.63	0.64	0.65	0.67	0.68	0.68	0.63	0.56	0.55	0.54	0.54	0.52	0.49	0.51	0.49		
120	0.65	0.71	0.70	0.72	0.70	0.71	0.71	0.71	0.65	0.60	0.60	0.61	0.62	0.61	0.56	0.60	0.50		
125	0.71	0.79	0.79	0.81	0.79	0.78	0.77	0.75	0.72	0.67	0.67	0.68	0.71	0.70	0.64	0.70	0.71		
130	0.85	0.89	0.89	0.92	0.90	0.89	0.88	0.87	0.84	0.77	0.79	0.81	0.83	0.81	0.73	0.65	0.66		
135	0.93	0.71	0.99	1.01	1.02	1.01	1.00	1.01	0.96	0.92	0.92	0.93	0.93	0.92	0.82	0.80	0.82		
140	1.00	0.92	1.04	1.07	1.10	1.11	1.11	1.12	1.05	1.03	1.03	1.03	1.01	0.98	0.69	0.87	0.89		
145	1.00	0.98	0.82	1.13	1.15	1.16	1.17	1.18	1.13	1.10	1.07	1.05	1.01	1.01	0.75	0.83	0.82		
150	1.07	1.01	0.84	0.87	1.16	1.14	1.17	1.15	1.11	1.05	1.03	1.02	1.06	0.78	0.98	1.05	0.96		
155	0.80	0.93	1.02	0.88	0.85	1.08	1.14	1.08	1.03	1.01	1.03	0.85	0.74	0.81	0.88	0.87	0.83		
160	1.00	1.04	1.09	1.18	1.10	0.78	0.77	0.77	0.74	0.74	0.73	0.71	1.00	1.09	1.10	1.06	1.03		
165	0.99	1.01	1.01	1.06	1.11	1.07	1.06	1.10	1.08	1.02	0.98	0.98	1.02	1.09	1.11	1.09	0.98		
170	1.03	1.06	1.07	1.09	1.10	1.10	1.11	1.13	1.12	1.08	1.05	1.01	1.01	1.04	1.06	1.06	1.03		
175	1.08	1.12	1.15	1.15	1.15	1.08	1.02	1.01	1.06	1.08	1.08	1.05	1.01	1.00	1.00	0.94	0.93		
180	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87		

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.

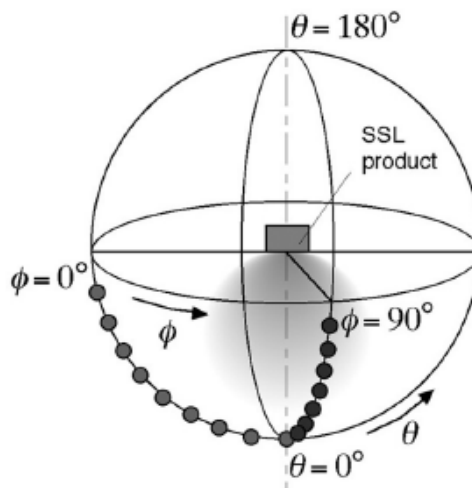
Color Characteristics Measurements

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° 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.