



LM-79-08 Test Report

for

GREEN CREATIVE LTD

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

2x2' Troffer

Model: 25TROF22DIM/850/277V

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.: HZ170100171

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. 18, 2017



Approved by

Manager: Jim Zhang
Jan. 18, 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: **25TROF22DIM/850/277V**

Luminous Efficacy (Lumens /Watt)	Total Luminous Flux (Lumens)	Power (Watts)	Power Factor
135.5	3342.6	24.67	0.9929
CCT (K)	CRI	Stabilization Time (Light & Power)	
4879	83.9	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	: Jan. 10, 2017
Date of Test	: Jan. 13, 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	: 2x2' Troffer
Model	: 25TROF22DIM/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 24.7°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)	0.207	0.093
Power Factor	0.9929	0.9408
Test Power (W)	24.67	24.24
THD A%	9.30	11.52
Luminous Efficacy (lm/W)	135.5	137.9
Total Luminous Flux (lm)	3342.6	3343.4
Color Rendering Index (CRI)	83.9	
R9	17	
Correlated Color Temperature (CCT) (K)	4879	
Chromaticity (Chroma x, Chroma y)	(0.3492, 0.3601)	
Chromaticity (Chroma u, Chroma v)	(0.2109, 0.3263)	
Chromaticity (Chroma u', Chroma v')	(0.2109, 0.4894)	
Duv	0.0026	
Average Beam Angle (°)	118.9	
Center Beam Candle Power (cd)	1100	
Spacing Criteria	1.21 (0°-180°)/ 1.31 (90°-270°)	
Zonal Lumens in the 0°-60°Zone	75.45%	
Zonal Lumens in the 60°-90°Zone	24.44%	
Zonal Lumens in the 90°-120°Zone	0.04%	
Zonal Lumens in the 120°-180°Zone	0.08%	

Special Color Rendering Indices	
R1	82
R2	88
R3	92
R4	83
R5	82
R6	83
R7	89
R8	71
R9	17
R10	72
R11	82
R12	56
R13	84
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

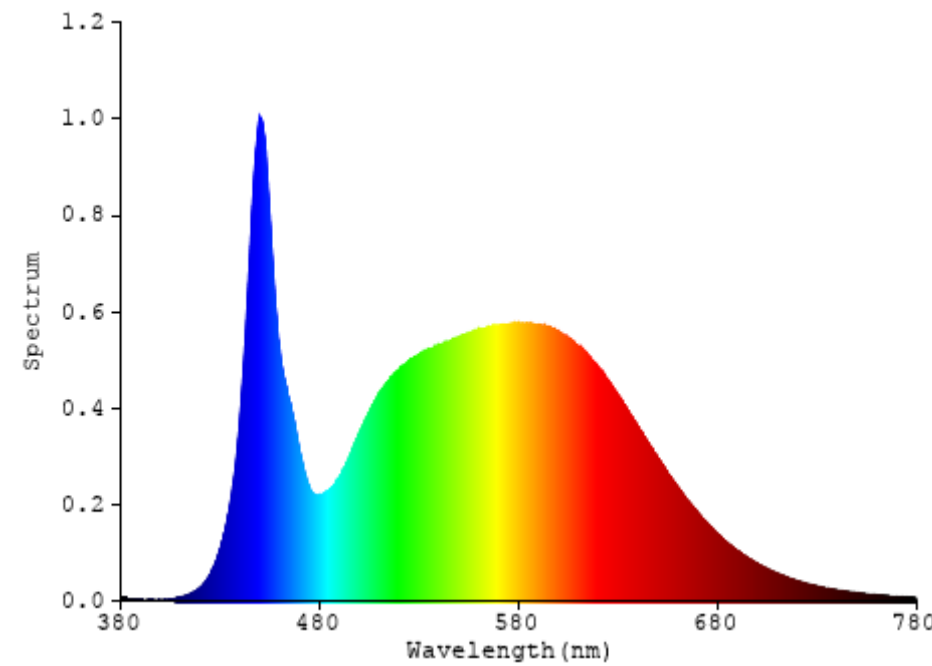


Chart 1: Spectral Power Distribution

Zonal Lumen Tabulation

$\gamma(^{\circ})$	Lumens	% Total
0- 10	104.102	3.11%
10- 20	298.379	8.93%
20- 30	453.035	13.55%
30- 40	548.771	16.42%
40- 50	576.71	17.25%
50- 60	540.853	16.18%
60- 70	447.535	13.39%
70- 80	291.804	8.73%
80- 90	77.436	2.32%
90-100	0.272	0.01%
100-110	0.411	0.01%
110-120	0.547	0.02%
120-130	0.639	0.02%
130-140	0.68	0.02%
140-150	0.598	0.02%
150-160	0.426	0.01%
160-170	0.272	0.01%
170-180	0.088	0.00%
Total	3342.6	100%

$\gamma(^{\circ})$	Lumens	% Total
0- 60	2521.85	75.45%
60- 90	816.775	24.44%
0-90	3338.625	99.88%
90- 180	3.933	0.12%
0- 180	3342.6	100%

Table 3: Zonal Lumen Data

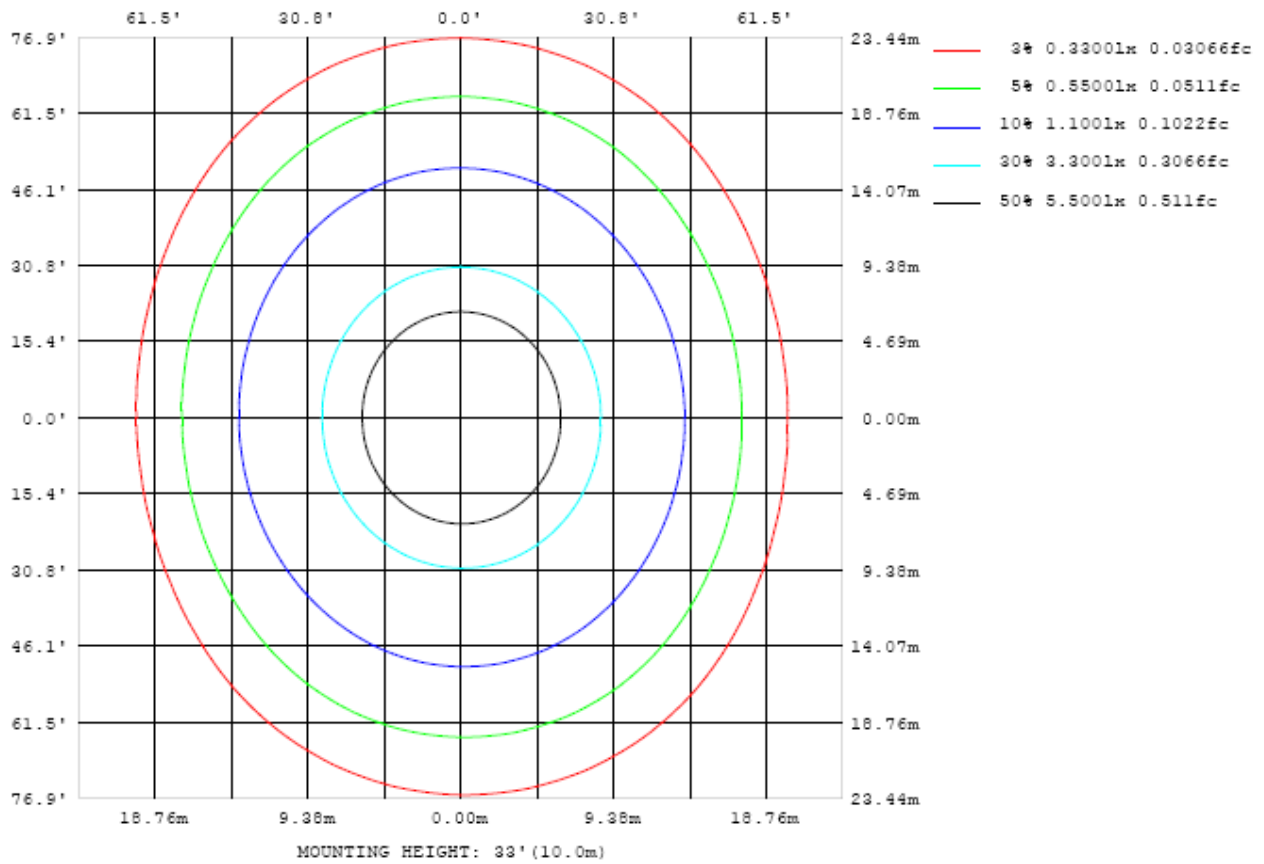


Chart 2: Illuminance Plot (Footcandles)

Luminous Intensity Distribution Plots

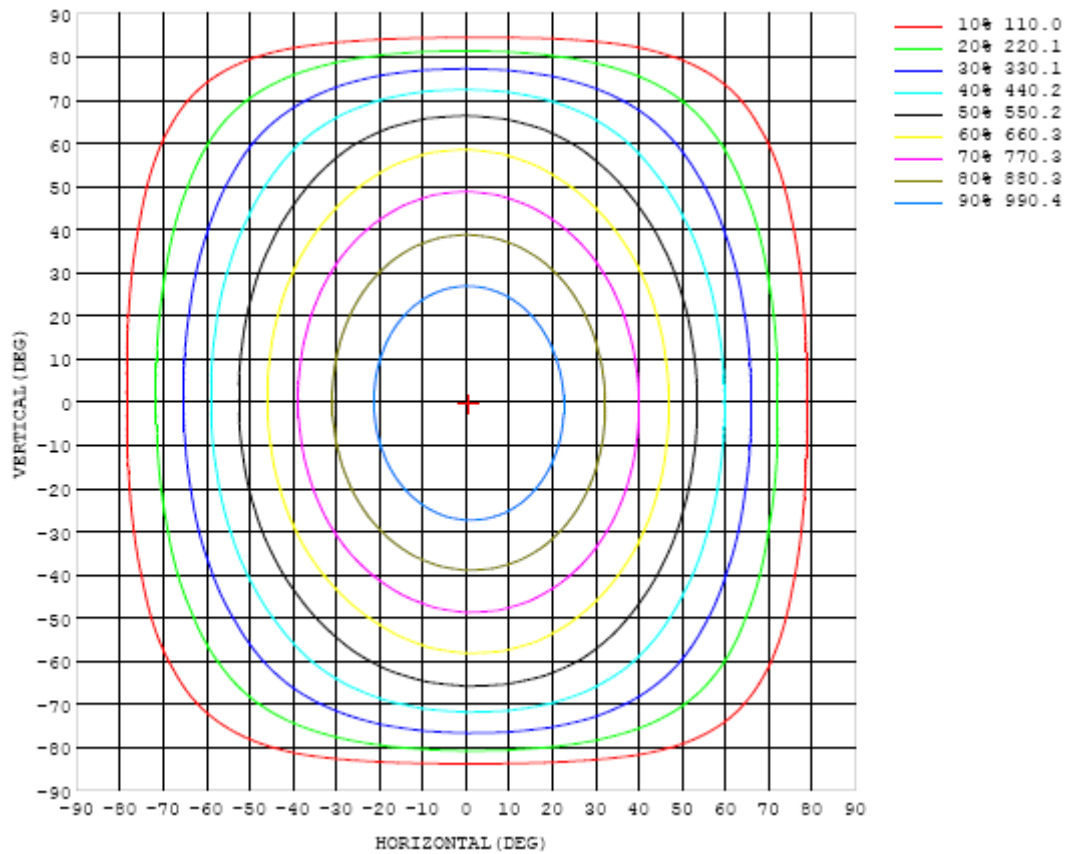


Chart 3: Isocandela Plot

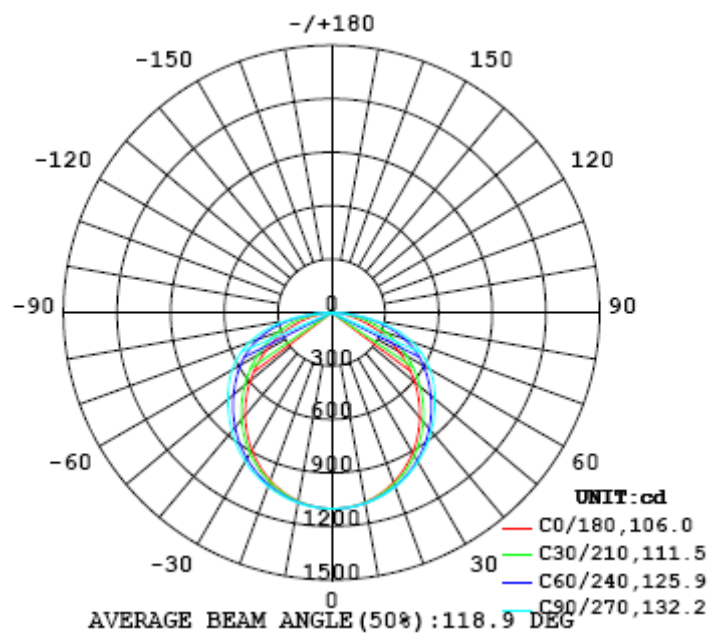


Chart 4: Polar Candela Distribution

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	1100	1100	1100	1100	1100	1100	1100	1100	1100	1100	1100	1100	1100	1100	1100	1100	1100	1100	1100
5	1096	1096	1096	1097	1097	1097	1097	1097	1097	1097	1097	1096	1096	1095	1094	1094	1093	1093	1093
10	1080	1081	1082	1083	1084	1085	1086	1086	1086	1086	1085	1084	1082	1080	1078	1077	1075	1074	1074
15	1052	1054	1056	1058	1061	1064	1066	1067	1068	1067	1066	1063	1060	1056	1052	1049	1046	1044	1044
20	1014	1016	1019	1024	1028	1033	1038	1041	1042	1041	1039	1035	1030	1024	1017	1012	1007	1004	1003
25	965	968	973	979	987	995	1002	1007	1009	1008	1005	999	991	982	973	964	957	953	952
30	908	911	918	927	937	948	958	965	968	968	964	956	945	933	920	909	900	894	892
35	842	846	854	866	880	894	907	917	921	921	916	906	892	876	860	846	834	827	826
40	769	774	784	799	816	834	850	862	868	868	862	850	833	814	794	776	763	755	753
45	690	696	708	726	747	769	789	804	812	813	805	790	769	746	723	702	686	677	675
50	608	614	628	648	673	700	725	744	754	755	747	728	703	675	647	624	606	595	593
55	522	529	544	567	597	629	660	684	697	698	688	666	635	602	570	542	522	511	509
60	434	442	459	485	520	559	595	621	635	636	625	602	568	530	491	460	437	424	423
65	346	353	373	404	444	485	521	547	561	563	552	528	495	455	413	377	351	337	335
70	257	266	287	322	363	401	435	461	475	476	466	444	412	374	334	295	266	251	249
75	171	181	204	239	273	307	337	359	370	371	363	344	316	284	249	214	184	167	165
80	92.8	102	123	150	175	199	219	233	240	241	235	223	205	182	157	131	106	90.8	88.9
85	31.6	36.1	45.3	57.5	67.4	70.2	68.8	67.3	65.3	64.1	64.8	66.0	68.0	66.5	59.6	48.3	36.3	29.8	29.2
90	0.20	1.06	0.55	0.15	0.04	0.09	0.40	0.51	0.61	0.52	0.15	0.11	0.04	0.07	0.03	0.12	0.00	0.00	0.10
95	0.17	0.17	0.20	0.26	0.30	0.38	0.46	0.52	0.54	0.35	0.19	0.16	0.14	0.14	0.14	0.13	0.13	0.14	0.20
100	0.25	0.26	0.31	0.35	0.41	0.47	0.50	0.50	0.47	0.32	0.24	0.22	0.23	0.20	0.18	0.17	0.17	0.18	0.25
105	0.35	0.30	0.39	0.44	0.48	0.51	0.53	0.52	0.47	0.35	0.30	0.31	0.31	0.31	0.30	0.29	0.27	0.28	0.35
110	0.39	0.35	0.51	0.54	0.56	0.58	0.59	0.58	0.52	0.44	0.41	0.41	0.38	0.41	0.42	0.42	0.38	0.40	0.46
115	0.52	0.39	0.63	0.65	0.65	0.66	0.65	0.64	0.57	0.52	0.50	0.50	0.51	0.53	0.54	0.57	0.50	0.53	0.57
120	0.59	0.38	0.73	0.76	0.75	0.76	0.74	0.71	0.65	0.61	0.59	0.60	0.60	0.64	0.67	0.69	0.60	0.64	0.51
125	0.70	0.69	0.76	0.87	0.87	0.88	0.87	0.82	0.76	0.68	0.70	0.73	0.72	0.77	0.80	0.80	0.70	0.68	0.71
130	0.54	0.53	0.83	0.98	0.98	0.99	0.98	0.95	0.84	0.84	0.79	0.84	0.83	0.88	0.91	0.90	0.55	0.61	0.74
135	0.75	0.96	0.70	0.92	1.06	1.08	1.01	0.99	0.94	0.89	0.91	0.95	0.92	0.98	0.99	0.87	0.68	0.99	0.99
140	0.92	1.11	0.99	0.94	1.00	1.05	1.05	1.08	0.89	0.88	0.97	1.01	0.93	1.07	0.94	0.67	1.04	1.00	0.99
145	0.96	1.09	0.99	0.77	0.88	0.92	1.10	0.99	0.87	0.90	1.03	0.92	0.92	1.00	0.97	0.62	1.09	1.08	1.05
150	0.84	0.94	0.83	0.82	0.79	0.82	0.76	0.78	0.83	0.95	0.96	0.79	0.83	0.91	0.73	1.14	1.07	0.97	1.05
155	0.81	0.84	0.85	0.81	0.76	0.61	0.58	0.74	0.86	0.89	0.87	0.75	0.66	0.72	1.00	1.15	1.15	1.13	1.11
160	0.99	0.97	0.94	0.85	0.88	0.96	0.85	0.64	0.64	0.60	0.60	0.65	0.77	0.73	0.76	0.90	0.94	1.01	1.11
165	0.99	0.93	1.04	1.15	1.17	1.06	0.96	0.97	0.98	0.94	0.82	0.82	0.80	0.80	0.84	0.92	0.92	0.85	0.87
170	1.04	0.98	1.03	1.06	1.10	1.11	1.05	1.02	1.02	0.97	0.89	0.87	0.78	0.77	0.79	0.87	0.94	1.08	1.17
175	0.92	0.99	1.02	1.03	1.04	1.06	1.05	1.07	1.04	0.96	0.96	0.93	0.89	0.88	0.86	0.82	0.80	0.86	0.86
180	0.76	0.76	0.76	0.76	0.76	0.76	0.76	0.76	0.76	0.76	0.76	0.76	0.76	0.76	0.76	0.76	0.76	0.76	0.76

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	1100	1100	1100	1100	1100	1100	1100	1100	1100	1100	1100	1100	1100	1100	1100	1100	1100		
5	1093	1093	1093	1094	1094	1094	1095	1096	1096	1096	1096	1096	1096	1096	1096	1096	1096		
10	1074	1075	1076	1077	1079	1080	1082	1083	1084	1084	1084	1083	1083	1082	1081	1080	1080		
15	1044	1046	1049	1052	1055	1059	1061	1064	1065	1065	1064	1062	1060	1057	1055	1054	1053		
20	1004	1007	1012	1017	1023	1029	1034	1037	1038	1038	1036	1033	1029	1024	1019	1016	1014		
25	954	959	966	975	983	992	999	1003	1005	1004	1001	996	989	981	974	969	966		
30	895	902	912	924	936	947	957	963	965	964	959	951	941	930	921	913	909		
35	830	838	851	866	882	896	908	916	919	917	910	899	886	872	859	849	843		
40	757	768	784	802	822	840	855	865	868	865	856	842	825	808	791	779	771		
45	681	693	711	734	757	779	798	810	813	809	798	780	759	737	717	702	693		
50	600	615	636	662	689	716	739	753	758	752	737	715	690	663	640	621	611		
55	517	533	557	587	621	653	680	697	702	695	676	649	618	586	559	538	526		
60	431	449	477	513	552	589	619	638	643	635	614	583	546	508	476	453	439		
65	345	366	397	438	481	519	549	567	572	564	544	512	472	430	393	366	350		
70	259	283	318	360	400	437	466	484	489	481	461	430	392	350	310	276	262		
75	177	201	237	274	309	341	368	383	387	381	364	335	302	266	228	196	177		
80	99.5	122	150	179	204	228	246	257	260	256	243	224	200	173	144	116	98.2		
85	34.1	44.6	59.2	72.5	80.2	84.9	89.0	91.0	92.8	95.0	95.3	93.1	87.0	73.4	57.8	42.9	33.9		
90	0.10	0.12	0.18	0.19	0.23	0.27	0.32	0.38	0.39	0.35	0.29	0.25	0.22	0.21	0.19	0.17	0.17		
95	0.20	0.20	0.23	0.24	0.26	0.27	0.34	0.38	0.40	0.34	0.29	0.25	0.24	0.22	0.21	0.19	0.18		
100	0.25	0.24	0.27	0.28	0.32	0.36	0.39	0.42	0.44	0.39	0.36	0.33	0.29	0.27	0.26	0.25	0.26		
105	0.33	0.34	0.37	0.40	0.42	0.44	0.47	0.48	0.46	0.47	0.45	0.42	0.40	0.39	0.37	0.32	0.36		
110	0.43	0.44	0.46	0.49	0.51	0.53	0.56	0.56	0.54	0.56	0.54	0.51	0.50	0.47	0.45	0.38	0.41		
115	0.53	0.52	0.53	0.54	0.56	0.60	0.61	0.60	0.60	0.62	0.62	0.58	0.55	0.52	0.53	0.39	0.53		
120	0.63	0.59	0.60	0.61	0.61	0.62	0.63	0.63	0.63	0.65	0.64	0.62	0.61	0.60	0.61	0.41	0.57		
125	0.63	0.52	0.69	0.67	0.67	0.67	0.67	0.66	0.66	0.69	0.71	0.68	0.68	0.68	0.66	0.65	0.68		
130	0.67	0.66	0.66	0.77	0.75	0.76	0.75	0.74	0.75	0.78	0.80	0.79	0.79	0.78	0.61	0.60	0.65		
135	1.00	0.93	0.68	0.86	0.86	0.84	0.83	0.83	0.83	0.87	0.90	0.90	0.90	0.77	0.84	0.97	0.65		
140	1.05	1.01	0.89	0.81	0.89	0.94	0.93	0.91	0.90	0.93	0.98	1.00	0.85	0.89	1.08	1.11	0.90		
145	0.92	1.08	1.01	0.97	0.87	0.87	0.95	0.97	0.97	0.95	0.88	0.92	0.79	0.94	1.08	1.17	0.99		
150	0.83	1.20	1.16	1.13	0.92	0.81	0.87	0.85	0.84	0.83	0.83	0.92	1.06	1.08	0.99	1.02	1.02		
155	1.00	1.24	1.16	1.04	0.93	0.91	0.93	0.93	0.94	0.96	0.97	0.97	0.97	0.92	1.06	0.87	0.90		
160	1.14	0.98	1.03	0.95	1.06	0.96	0.93	1.04	1.06	1.08	1.06	1.06	1.10	1.08	1.11	0.89	1.02		
165	0.91	0.97	1.02	1.18	1.19	0.96	0.83	0.95	1.06	1.00	0.99	0.96	1.06	1.22	1.06	1.00	1.08		
170	1.21	1.21	1.04	0.95	0.94	0.92	0.87	0.85	0.87	0.92	0.94	0.93	0.85	0.84	0.88	0.87	0.96		
175	0.89	0.92	0.96	0.93	0.91	0.90	0.88	0.87	0.87	0.86	0.87	0.86	0.84	0.85	0.88	0.85	0.87		
180	0.76	0.76	0.76	0.76	0.76	0.76	0.76	0.76	0.76	0.76	0.76	0.76	0.76	0.76	0.76	0.76	0.76		

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' Trofkits) 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.

Prepared by: Leading Testing Laboratories
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

Page 13 of 13