



LM-79-08 Test Report

for

GREEN CREATIVE LTD

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

2x4' Troffer

Model: 30TROF24DIM/835/277V

Laboratory: Leading Testing Laboratories

NVLAP CODE: 200960-0

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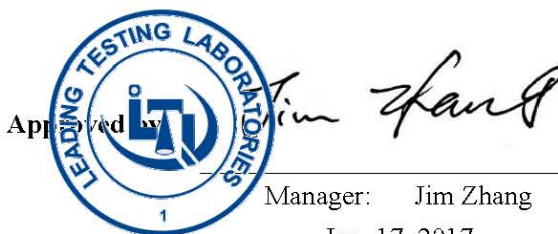
Report No.: HZ17010017b

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/835/277V

Luminous Efficacy (Lumens /Watt)	Total Luminous Flux (Lumens)	Power (Watts)	Power Factor
138.3	4004.0	28.95	0.9945
CCT (K)	CRI	Stabilization Time (Light & Power)	
3359	83.3	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/835/277V
Electrical Ratings	: 120-277V, 60Hz
Product Description	: 3500K, 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)	0.243	0.108
Power Factor	0.9945	0.9536
Test Power (W)	28.95	28.43
THD A%	8.53	10.73
Luminous Efficacy (lm/W)	138.3	140.9
Total Luminous Flux (lm)	4004.0	4007.5
Color Rendering Index (CRI)	83.3	
R9	15	
Correlated Color Temperature (CCT) (K)	3359	
Chromaticity (Chroma x, Chroma y)	(0.4160, 0.4009)	
Chromaticity (Chroma u, Chroma v)	(0.2385, 0.3447)	
Chromaticity (Chroma u', Chroma v')	(0.2385, 0.5170)	
Duv	0.0021	
Average Beam Angle (°)	122.0	
Center Beam Candle Power (cd)	1266	
Spacing Criteria	1.25 (0°-180°)/ 1.30 (90°-270°)	
Zonal Lumens in the 0°-60°Zone	74.40%	
Zonal Lumens in the 60°-90°Zone	25.51%	
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	90
R3	96
R4	83
R5	82
R6	87
R7	87
R8	65
R9	15
R10	76
R11	81
R12	64
R13	84
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

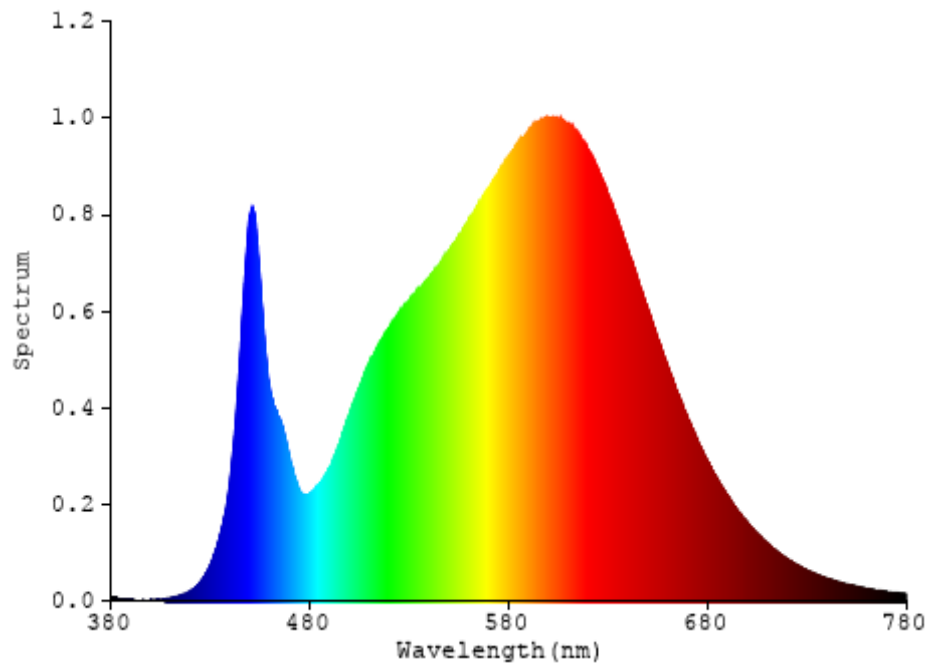


Chart 1: Spectral Power Distribution

Zonal Lumen Tabulation

$\gamma(^{\circ})$	Lumens	% Total
0- 10	119.938	3.00%
10- 20	345.053	8.62%
20- 30	527.752	13.18%
30- 40	645.904	16.13%
40- 50	687.295	17.17%
50- 60	653.094	16.31%
60- 70	547.674	13.68%
70- 80	365.64	9.13%
80- 90	108.069	2.70%
90-100	0.309	0.01%
100-110	0.401	0.01%
110-120	0.495	0.01%
120-130	0.548	0.01%
130-140	0.586	0.01%
140-150	0.52	0.01%
150-160	0.372	0.01%
160-170	0.246	0.01%
170-180	0.088	0.00%
Total	4004.0	100%

$\gamma(^{\circ})$	Lumens	% Total
0- 60	2979.036	74.40%
60- 90	1021.383	25.51%
0-90	4000.419	99.91%
90- 180	3.565	0.09%
0- 180	4004.0	100%

Table 3: Zonal Lumen Data

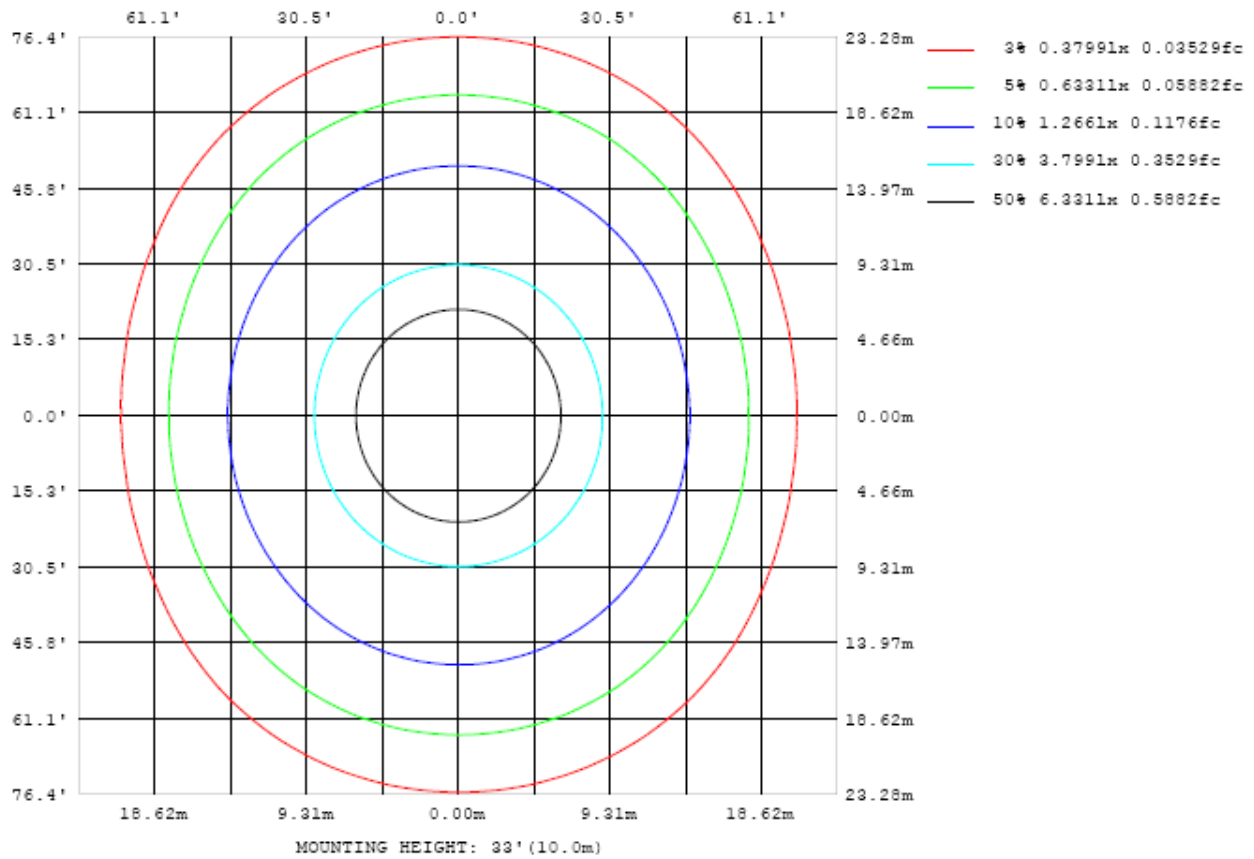


Chart 2: Illuminance Plot (Footcandles)

Luminous Intensity Distribution Plots

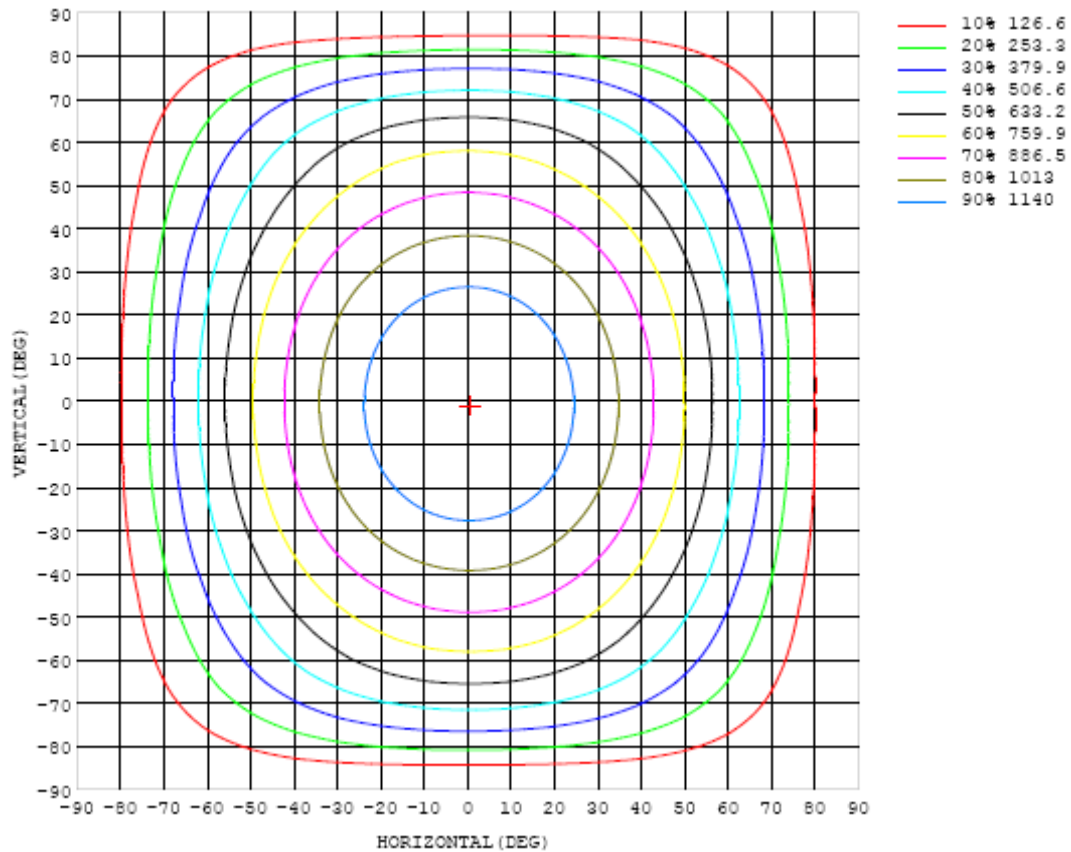


Chart 3: Isocandela Plot

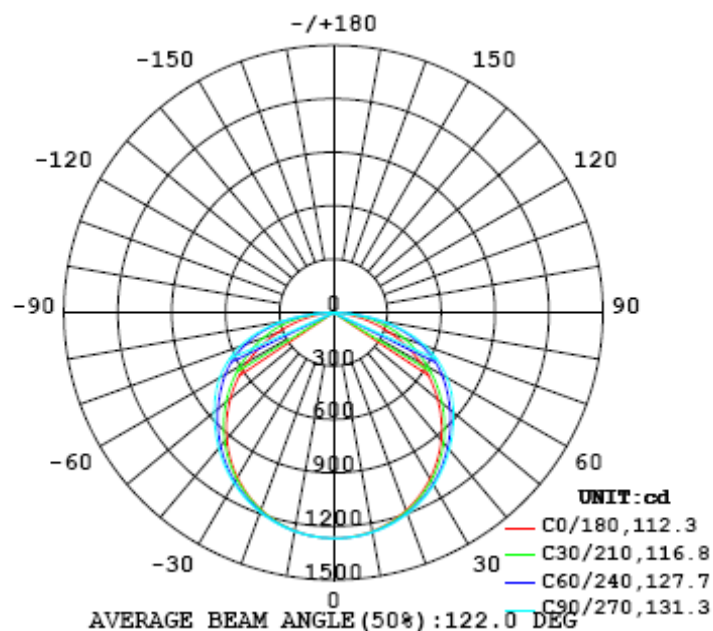


Chart 4: Polar Candela Distribution

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	1266	1266	1266	1266	1266	1266	1266	1266	1266	1266	1266	1266	1266	1266	1266	1266	1266	1266	1266
5	1261	1262	1262	1262	1263	1263	1263	1263	1263	1263	1263	1263	1263	1262	1262	1261	1261	1261	1260
10	1246	1246	1247	1248	1249	1250	1251	1251	1252	1251	1251	1251	1250	1249	1247	1246	1245	1244	1243
15	1219	1220	1221	1223	1225	1227	1229	1230	1231	1231	1230	1229	1227	1225	1222	1220	1218	1217	1215
20	1182	1183	1185	1188	1191	1195	1197	1200	1201	1201	1200	1198	1196	1192	1188	1184	1181	1178	1177
25	1134	1136	1139	1143	1148	1153	1157	1161	1163	1163	1162	1159	1155	1149	1144	1138	1133	1130	1128
30	1076	1078	1083	1089	1096	1103	1109	1114	1117	1117	1115	1112	1106	1098	1090	1083	1076	1071	1069
35	1009	1011	1017	1025	1035	1044	1053	1059	1063	1063	1061	1056	1049	1039	1028	1018	1009	1003	1001
40	933	936	943	954	966	978	989	997	1002	1003	1000	994	984	971	958	945	934	927	924
45	849	853	862	875	891	906	920	931	937	939	935	927	914	898	881	865	852	843	840
50	758	762	773	790	809	829	847	862	870	872	868	857	840	820	798	778	763	752	749
55	661	666	679	699	724	750	773	791	802	804	799	785	765	739	712	687	668	655	652
60	558	564	580	606	637	670	697	717	727	729	724	711	688	657	623	592	568	553	550
65	451	458	479	511	550	586	612	631	640	642	638	625	604	573	534	495	465	447	443
70	341	350	376	416	457	490	514	531	539	542	538	526	507	479	442	398	361	338	334
75	231	243	275	318	353	381	401	413	419	420	418	411	396	371	340	302	259	231	225
80	127	142	178	210	235	254	267	274	277	278	277	274	264	248	227	198	162	130	123
85	44.5	57.2	77.8	93.9	106	110	106	100	95.4	94.0	96.7	102	107	109	101	86.6	69.0	48.0	40.2
90	2.07	2.72	2.68	1.65	0.56	0.16	0.17	0.21	0.26	0.28	0.24	0.21	0.17	1.04	0.59	1.55	2.05	1.44	0.12
95	0.16	0.17	0.16	0.19	0.20	0.21	0.23	0.25	0.31	0.35	0.31	0.26	0.24	0.22	0.21	0.19	0.19	0.19	0.27
100	0.21	0.20	0.20	0.21	0.22	0.25	0.26	0.28	0.34	0.37	0.34	0.30	0.28	0.26	0.25	0.24	0.24	0.25	0.35
105	0.27	0.24	0.24	0.26	0.26	0.29	0.31	0.32	0.34	0.38	0.36	0.36	0.35	0.34	0.32	0.32	0.31	0.33	0.47
110	0.32	0.30	0.30	0.32	0.31	0.35	0.38	0.39	0.41	0.43	0.43	0.43	0.42	0.41	0.39	0.39	0.38	0.35	0.49
115	0.34	0.35	0.37	0.38	0.35	0.40	0.42	0.44	0.45	0.46	0.47	0.48	0.47	0.45	0.43	0.45	0.43	0.41	0.54
120	0.42	0.36	0.38	0.44	0.41	0.44	0.44	0.44	0.46	0.47	0.48	0.49	0.49	0.50	0.49	0.51	0.50	0.54	0.68
125	0.56	0.53	0.48	0.49	0.46	0.49	0.49	0.48	0.49	0.51	0.52	0.54	0.55	0.56	0.56	0.56	0.47	0.57	0.69
130	0.55	0.52	0.50	0.46	0.50	0.53	0.53	0.53	0.54	0.56	0.57	0.59	0.61	0.62	0.61	0.54	0.63	0.67	0.78
135	0.70	0.67	0.61	0.59	0.49	0.57	0.58	0.57	0.57	0.60	0.61	0.63	0.66	0.66	0.66	0.71	0.71	0.73	0.89
140	0.79	0.63	0.68	0.64	0.57	0.54	0.65	0.65	0.65	0.67	0.68	0.69	0.72	0.61	0.70	0.68	0.72	0.65	0.96
145	0.72	0.58	0.70	0.73	0.69	0.60	0.57	0.57	0.64	0.68	0.63	0.61	0.63	0.69	0.74	0.80	0.78	0.61	0.92
150	0.70	0.65	0.67	0.66	0.60	0.63	0.62	0.63	0.56	0.56	0.55	0.68	0.74	0.77	0.70	0.72	0.75	0.67	1.04
155	0.74	0.68	0.65	0.72	0.74	0.69	0.65	0.64	0.62	0.62	0.64	0.66	0.73	0.78	0.81	0.76	0.61	0.63	0.72
160	0.83	0.76	0.71	0.78	0.82	0.76	0.64	0.61	0.63	0.62	0.65	0.62	0.70	0.79	0.80	0.75	0.67	0.88	0.96
165	0.76	0.77	0.75	0.71	0.70	0.75	0.71	0.66	0.67	0.71	0.73	0.75	0.81	0.82	0.74	0.67	0.75	0.93	0.95
170	0.78	0.79	0.80	0.80	0.74	0.69	0.62	0.59	0.61	0.62	0.60	0.64	0.72	0.73	0.70	0.83	0.94	0.96	0.98
175	0.80	0.83	0.90	0.90	0.88	0.90	0.98	0.82	0.88	0.80	0.82	0.90	0.96	0.98	0.99	0.98	1.00	1.02	1.03
180	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84

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	1266	1266	1266	1266	1266	1266	1266	1266	1266	1266	1266	1266	1266	1266	1266	1266	1266		
5	1260	1260	1260	1260	1260	1260	1260	1260	1260	1261	1260	1261	1261	1261	1261	1261	1261		
10	1243	1243	1243	1244	1244	1245	1245	1246	1246	1246	1246	1246	1245	1245	1245	1245	1245		
15	1215	1215	1216	1218	1219	1221	1222	1223	1223	1223	1223	1222	1221	1220	1219	1218	1218		
20	1177	1178	1180	1182	1185	1188	1190	1191	1192	1192	1191	1189	1187	1185	1183	1181	1181		
25	1128	1130	1133	1137	1142	1146	1150	1152	1153	1153	1151	1148	1144	1140	1137	1134	1133		
30	1069	1073	1078	1084	1091	1097	1102	1105	1106	1106	1103	1099	1093	1088	1082	1078	1076		
35	1002	1007	1014	1023	1032	1040	1047	1051	1053	1052	1048	1042	1034	1026	1018	1012	1009		
40	926	933	943	954	966	978	986	991	994	992	987	979	969	958	947	939	934		
45	843	852	864	880	895	910	921	928	931	928	921	910	897	882	869	858	851		
50	753	764	780	800	820	839	854	863	867	863	854	839	821	802	784	769	761		
55	657	671	692	717	743	768	787	798	802	798	785	766	742	717	694	676	664		
60	556	574	601	633	667	696	717	729	732	728	715	693	663	630	600	577	563		
65	452	474	508	549	587	615	634	645	648	645	633	613	583	544	506	476	458		
70	346	374	416	459	494	520	538	549	552	549	539	520	492	456	411	373	350		
75	240	275	321	357	387	411	427	434	436	436	429	412	388	357	317	271	242		
80	140	180	213	242	264	280	291	296	298	298	295	285	268	245	214	175	140		
85	55.5	78.4	97.2	112	119	118	116	114	116	121	126	131	132	121	103	80.6	54.1		
90	0.05	0.00	0.28	0.33	0.35	0.39	0.43	0.49	0.56	0.39	0.24	0.22	0.25	0.00	0.00	0.49	0.39		
95	0.30	0.31	0.33	0.36	0.40	0.42	0.46	0.50	0.57	0.41	0.27	0.24	0.24	0.21	0.20	0.19	0.19		
100	0.36	0.36	0.38	0.41	0.44	0.47	0.50	0.52	0.54	0.40	0.32	0.30	0.28	0.26	0.25	0.25	0.24		
105	0.46	0.46	0.46	0.49	0.52	0.54	0.56	0.57	0.56	0.42	0.39	0.38	0.36	0.35	0.34	0.34	0.31		
110	0.55	0.56	0.55	0.57	0.59	0.62	0.64	0.64	0.59	0.50	0.48	0.47	0.46	0.44	0.41	0.43	0.37		
115	0.60	0.62	0.62	0.63	0.64	0.65	0.67	0.67	0.62	0.55	0.54	0.54	0.53	0.51	0.48	0.50	0.48		
120	0.64	0.69	0.69	0.71	0.69	0.69	0.70	0.69	0.65	0.60	0.59	0.60	0.61	0.60	0.55	0.59	0.49		
125	0.68	0.78	0.77	0.79	0.78	0.77	0.76	0.74	0.72	0.66	0.67	0.68	0.70	0.69	0.63	0.68	0.68		
130	0.83	0.87	0.87	0.90	0.89	0.88	0.87	0.87	0.84	0.78	0.79	0.80	0.81	0.79	0.72	0.63	0.63		
135	0.91	0.69	0.97	0.99	1.00	1.00	0.99	1.00	0.95	0.91	0.91	0.92	0.91	0.89	0.80	0.80	0.81		
140	0.97	0.89	1.01	1.06	1.08	1.09	1.09	1.10	1.04	1.02	1.01	1.01	0.98	0.96	0.65	0.85	0.85		
145	0.96	0.99	0.78	1.10	1.13	1.14	1.14	1.16	1.11	1.08	1.04	1.03	0.99	0.97	0.71	0.82	0.80		
150	1.04	1.00	0.84	0.84	1.14	1.12	1.15	1.14	1.09	1.02	1.00	1.00	1.01	0.73	0.97	1.01	0.92		
155	0.79	0.91	1.02	0.94	0.80	0.93	1.11	1.04	1.01	0.98	1.00	0.76	0.72	0.81	0.86	0.83	0.81		
160	0.98	0.99	1.06	1.15	1.10	0.76	0.74	0.74	0.72	0.71	0.70	0.70	1.00	1.07	1.09	1.06	1.01		
165	0.96	1.00	1.00	1.03	1.08	1.05	1.03	1.07	1.05	0.99	0.95	0.95	0.98	1.06	1.07	1.07	0.93		
170	1.00	1.04	1.05	1.06	1.06	1.06	1.11	1.09	1.05	1.01	0.97	0.98	1.01	1.03	1.06	0.95			
175	1.06	1.08	1.12	1.13	1.13	1.10	1.03	0.98	1.03	1.05	1.06	1.03	0.99	0.98	0.93	0.90	0.95		
180	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84		

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 ***

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