



LM-79-08 Test Report

for

GREEN CREATIVE LTD

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

2x2' Troffer

Model: 25TROF22DIM/835/277V

Laboratory: Leading Testing Laboratories

NVLAP CODE: 200960-0

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Report No.: HZ17010017j

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/835/277V

Luminous Efficacy (Lumens /Watt)	Total Luminous Flux (Lumens)	Power (Watts)	Power Factor
133.4	3260.1	24.43	0.9928
CCT (K)	CRI	Stabilization Time (Light & Power)	
3368	83.8	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. 12, 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	: 2x2' Troffer
Model	: 25TROF22DIM/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 24.6°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)	0.205	0.092
Power Factor	0.9928	0.9398
Test Power (W)	24.43	24.02
THD A%	9.45	10.58
Luminous Efficacy (lm/W)	133.4	135.8
Total Luminous Flux (lm)	3260.1	3261.6
Color Rendering Index (CRI)	83.8	
R9	15	
Correlated Color Temperature (CCT) (K)	3368	
Chromaticity (Chroma x, Chroma y)	(0.4152, 0.4001)	
Chromaticity (Chroma u, Chroma v)	(0.2383, 0.3444)	
Chromaticity (Chroma u', Chroma v')	(0.2383, 0.5166)	
Duv	0.0020	
Average Beam Angle (°)	118.2	
Center Beam Candle Power (cd)	1075	
Spacing Criteria	1.21 (0°-180°)/ 1.31 (90°-270°)	
Zonal Lumens in the 0°-60°Zone	75.43%	
Zonal Lumens in the 60°-90°Zone	24.46%	
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	90
R3	96
R4	82
R5	82
R6	87
R7	86
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

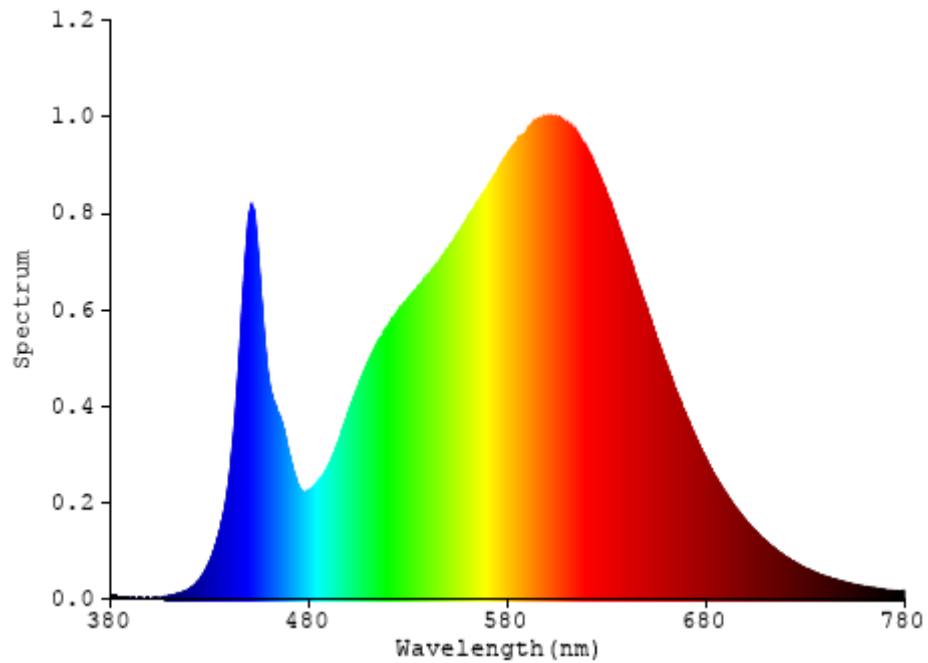


Chart 1: Spectral Power Distribution

Zonal Lumen Tabulation

$\gamma(^{\circ})$	Lumens	% Total
0- 10	101.728	3.12%
10- 20	291.405	8.94%
20- 30	442.083	13.56%
30- 40	535.056	16.41%
40- 50	561.934	17.24%
50- 60	526.76	16.16%
60- 70	435.785	13.37%
70- 80	284.77	8.74%
80- 90	76.692	2.35%
90-100	0.278	0.01%
100-110	0.397	0.01%
110-120	0.523	0.02%
120-130	0.606	0.02%
130-140	0.655	0.02%
140-150	0.585	0.02%
150-160	0.43	0.01%
160-170	0.278	0.01%
170-180	0.091	0.00%
Total	3260.1	100%

$\gamma(^{\circ})$	Lumens	% Total
0- 60	2458.966	75.43%
60- 90	797.247	24.46%
0-90	3256.213	99.88%
90- 180	3.843	0.12%
0- 180	3260.1	100%

Table 3: Zonal Lumen Data

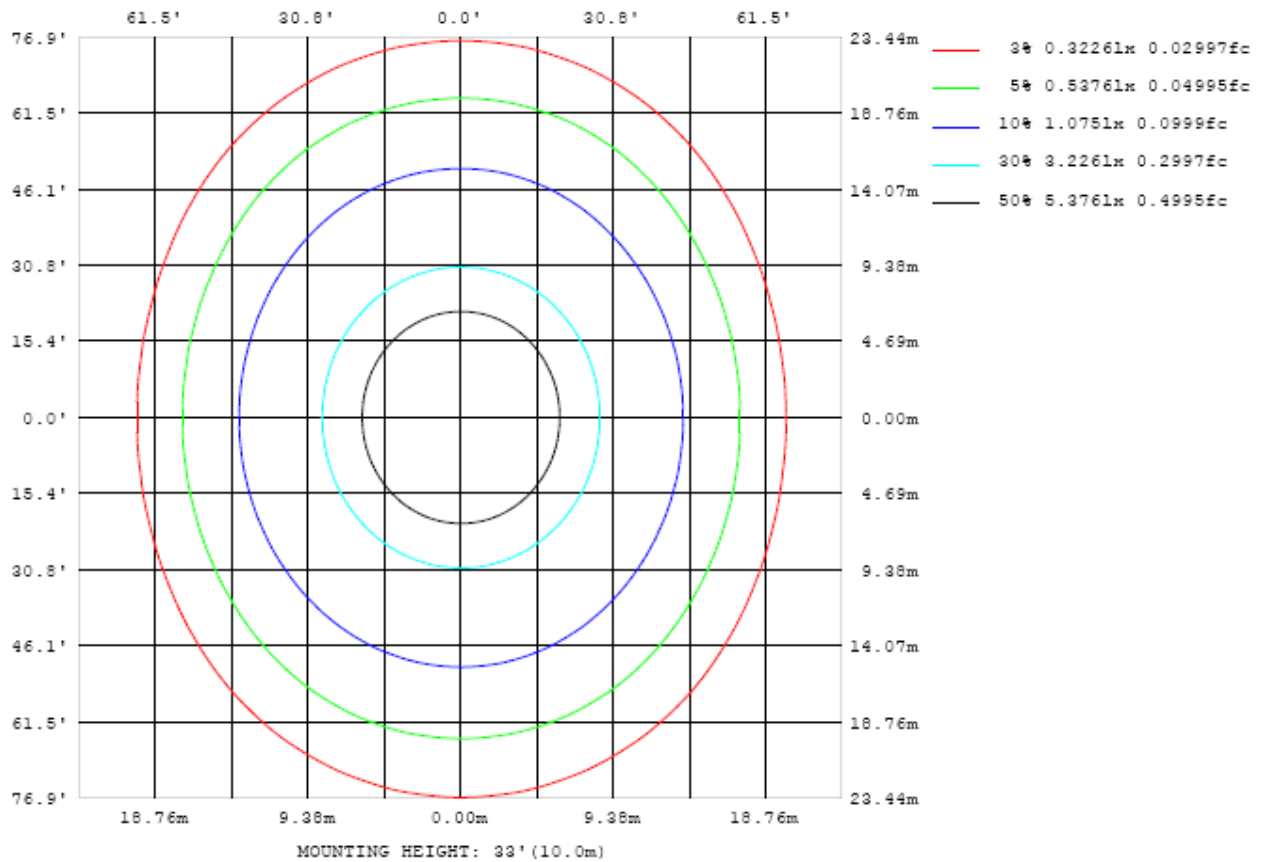


Chart 2: Illuminance Plot (Footcandles)

Luminous Intensity Distribution Plots

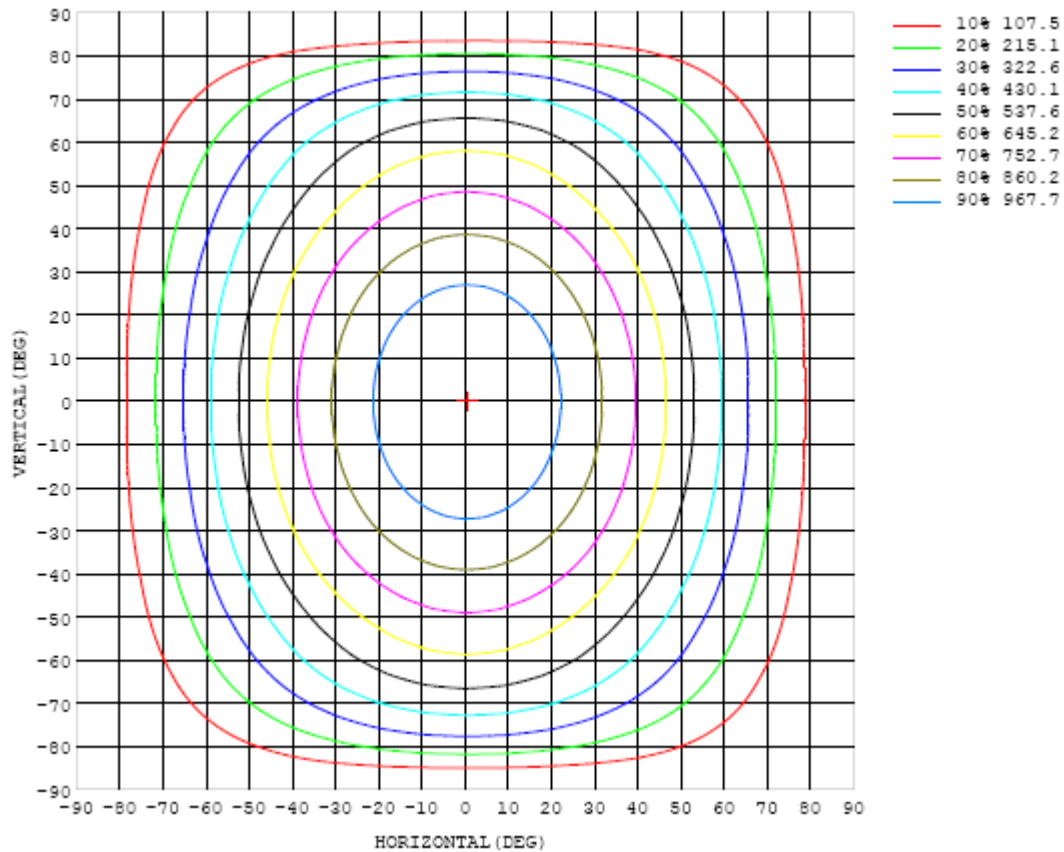


Chart 3: Isocandela Plot

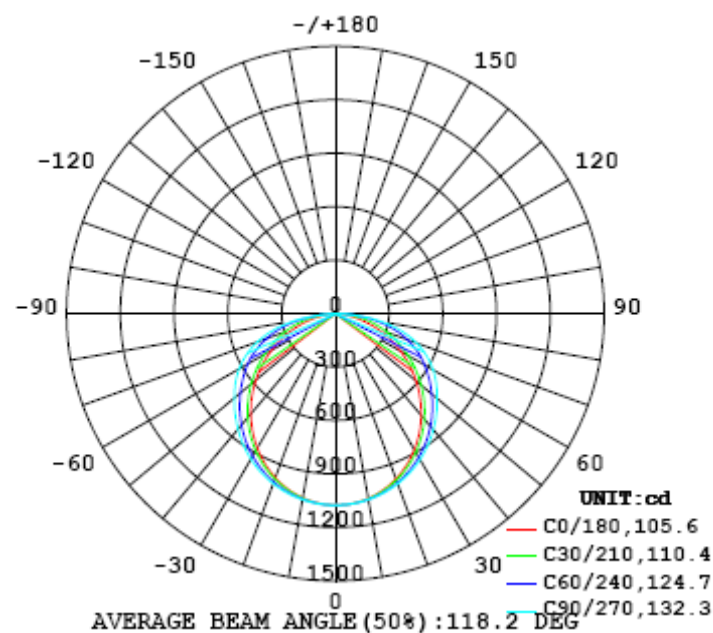


Chart 4: Polar Candela Distribution

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	1075	1075	1075	1075	1075	1075	1075	1075	1075	1075	1075	1075	1075	1075	1075	1075	1075	1075	1075
5	1070	1070	1071	1071	1071	1071	1071	1072	1071	1071	1071	1071	1070	1070	1069	1069	1069	1069	1068
10	1054	1054	1055	1056	1057	1058	1059	1060	1060	1060	1060	1059	1057	1056	1054	1052	1051	1050	1050
15	1026	1026	1028	1030	1033	1036	1039	1041	1042	1042	1041	1039	1036	1032	1029	1025	1023	1021	1020
20	987	988	991	995	1000	1006	1010	1014	1016	1017	1015	1012	1007	1001	995	989	984	981	980
25	939	940	944	951	959	967	974	980	984	985	982	977	970	961	952	943	936	932	930
30	882	884	890	898	909	920	931	939	944	945	943	936	926	914	902	889	880	874	872
35	817	819	827	839	853	867	881	892	899	901	897	888	876	861	844	829	817	809	806
40	745	749	758	773	790	808	825	839	848	851	846	835	820	801	781	763	748	738	735
45	668	673	684	701	722	744	765	782	794	797	792	779	759	736	713	691	674	663	659
50	588	593	606	625	650	677	702	723	738	742	736	720	696	669	641	616	596	583	579
55	505	510	525	547	575	607	639	664	682	687	680	660	633	600	568	538	515	501	497
60	420	426	442	467	500	538	575	604	623	629	621	600	568	531	492	459	433	417	412
65	333	340	359	387	426	468	506	536	555	562	554	532	500	460	418	379	350	333	327
70	248	255	276	308	350	391	427	457	476	482	474	453	421	383	341	300	268	249	243
75	165	173	195	230	268	304	337	363	380	385	378	359	330	296	259	222	188	168	161
80	89.2	97.0	118	148	178	205	229	248	260	263	257	244	222	197	169	140	112	92.6	87.1
85	30.2	34.7	46.4	62.8	79.4	90.8	97.9	103	106	106	105	102	96.6	87.3	72.8	57.1	41.8	31.8	28.7
90	0.13	0.18	1.60	1.97	2.00	1.52	0.90	2.29	0.47	0.44	0.47	2.25	0.82	1.44	1.92	1.75	1.76	0.11	0.09
95	0.14	0.16	0.16	0.18	0.19	0.20	0.21	0.27	0.31	0.34	0.27	0.23	0.19	0.18	0.16	0.16	0.14	0.14	0.20
100	0.20	0.20	0.19	0.21	0.22	0.25	0.28	0.31	0.34	0.35	0.30	0.28	0.26	0.22	0.19	0.18	0.18	0.19	0.29
105	0.28	0.25	0.27	0.28	0.31	0.33	0.35	0.36	0.39	0.36	0.36	0.34	0.32	0.30	0.26	0.24	0.23	0.28	0.41
110	0.39	0.35	0.36	0.36	0.38	0.41	0.43	0.45	0.45	0.43	0.44	0.44	0.41	0.37	0.34	0.32	0.30	0.36	0.52
115	0.49	0.48	0.45	0.44	0.44	0.48	0.50	0.52	0.51	0.50	0.51	0.52	0.50	0.45	0.41	0.39	0.35	0.42	0.56
120	0.61	0.55	0.39	0.52	0.51	0.52	0.53	0.54	0.55	0.54	0.55	0.54	0.54	0.51	0.47	0.47	0.36	0.43	0.65
125	0.63	0.57	0.53	0.60	0.57	0.59	0.59	0.58	0.59	0.58	0.60	0.62	0.61	0.59	0.59	0.55	0.46	0.44	0.62
130	0.46	0.56	0.45	0.53	0.65	0.64	0.65	0.65	0.62	0.61	0.63	0.68	0.68	0.66	0.67	0.54	0.62	0.55	0.65
135	0.78	0.83	0.84	0.67	0.55	0.69	0.69	0.69	0.65	0.65	0.67	0.73	0.72	0.74	0.58	0.64	0.70	0.69	0.83
140	0.88	0.66	0.88	0.77	0.59	0.61	0.76	0.73	0.71	0.69	0.71	0.77	0.81	0.66	0.58	0.76	0.74	0.54	0.83
145	0.92	0.71	0.93	0.79	0.58	0.61	0.64	0.64	0.77	0.75	0.73	0.72	0.72	0.65	0.77	0.87	0.76	0.73	0.88
150	0.73	0.63	0.65	0.70	0.84	0.75	0.70	0.60	0.62	0.61	0.62	0.63	0.57	0.71	1.00	0.98	0.96	0.55	0.89
155	0.75	0.72	0.70	0.92	0.86	0.83	0.82	0.73	0.72	0.66	0.68	0.62	0.77	0.80	0.95	1.02	0.81	0.81	1.05
160	0.98	0.75	0.74	0.95	0.90	0.90	0.85	0.85	0.85	0.75	0.74	0.60	0.80	0.90	0.79	0.86	0.82	1.03	1.02
165	1.00	1.04	0.80	0.79	0.85	0.97	0.89	0.86	0.85	0.79	0.72	0.59	0.68	1.00	1.05	0.72	0.68	0.80	0.91
170	1.06	1.05	0.87	0.79	0.80	0.74	0.69	0.68	0.72	0.68	0.64	0.66	0.65	0.67	0.69	0.71	1.02	1.05	1.09
175	1.11	1.11	1.05	0.96	0.87	0.83	0.80	0.82	0.79	0.74	0.72	0.73	0.76	0.77	0.79	0.80	0.78	0.76	0.82
180	0.79	0.79	0.80	0.79	0.78	0.76	0.73	0.71	0.72	0.80	0.72	0.72	0.74	0.75	0.77	0.77	0.77	0.77	0.80

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	1075	1075	1075	1075	1075	1075	1075	1075	1075	1075	1075	1075	1075	1075	1075	1075	1075		
5	1069	1069	1069	1070	1070	1071	1071	1071	1072	1072	1072	1072	1071	1071	1071	1071	1070		
10	1050	1051	1052	1054	1056	1057	1059	1060	1060	1060	1060	1059	1058	1057	1056	1055	1054		
15	1021	1023	1025	1029	1032	1036	1039	1041	1042	1042	1041	1039	1036	1033	1030	1028	1027		
20	981	984	989	994	1000	1006	1011	1014	1016	1015	1014	1010	1005	1000	995	991	989		
25	932	936	943	951	960	969	976	981	983	982	979	973	966	958	950	945	941		
30	874	880	889	900	912	924	934	940	943	942	937	929	919	908	898	889	884		
35	809	816	828	842	858	873	885	894	897	895	889	878	865	851	837	826	819		
40	738	747	761	779	798	816	832	842	846	844	835	822	805	787	770	757	748		
45	662	673	689	710	733	755	774	787	792	789	778	761	740	718	698	682	672		
50	583	594	614	638	665	692	716	732	737	733	719	697	671	645	621	603	592		
55	501	514	536	564	597	629	657	675	682	676	659	633	602	570	542	522	509		
60	417	432	457	490	528	565	594	613	620	615	597	568	531	494	462	438	425		
65	333	349	378	416	456	492	522	541	548	542	525	496	459	419	382	355	339		
70	249	268	300	338	374	409	437	456	463	458	441	413	379	341	303	272	253		
75	168	188	219	252	283	313	337	352	358	355	341	317	288	256	223	191	172		
80	93.3	111	135	158	180	199	215	226	231	229	221	206	187	163	139	113	95.4		
85	30.7	37.2	47.2	54.5	56.0	54.8	54.5	54.7	55.8	58.1	61.7	65.0	66.7	63.3	52.2	40.2	32.2		
90	0.09	0.10	0.11	0.12	0.15	0.41	0.53	0.63	0.62	0.20	0.16	0.15	0.14	0.12	0.10	0.10	0.10		
95	0.22	0.25	0.29	0.33	0.40	0.49	0.54	0.57	0.46	0.26	0.23	0.20	0.19	0.18	0.16	0.16	0.17		
100	0.29	0.35	0.40	0.45	0.51	0.53	0.55	0.52	0.40	0.31	0.30	0.29	0.27	0.25	0.24	0.24	0.24		
105	0.37	0.45	0.48	0.52	0.57	0.59	0.57	0.55	0.44	0.40	0.38	0.38	0.37	0.38	0.37	0.35	0.34		
110	0.42	0.57	0.59	0.61	0.62	0.61	0.64	0.60	0.52	0.49	0.49	0.45	0.49	0.49	0.50	0.46	0.47		
115	0.48	0.63	0.66	0.67	0.64	0.69	0.68	0.63	0.57	0.56	0.57	0.56	0.59	0.61	0.63	0.58	0.59		
120	0.45	0.75	0.78	0.73	0.77	0.76	0.74	0.69	0.64	0.66	0.65	0.65	0.70	0.73	0.76	0.69	0.70		
125	0.66	0.72	0.82	0.87	0.86	0.86	0.84	0.79	0.75	0.76	0.76	0.77	0.82	0.85	0.87	0.78	0.75		
130	0.70	0.72	0.98	1.00	1.02	1.01	0.97	0.93	0.91	0.89	0.91	0.91	0.97	0.98	0.98	0.62	0.65		
135	0.97	0.68	1.02	1.17	1.15	1.14	1.11	1.07	1.04	1.02	1.04	1.07	1.10	1.13	1.02	0.98	1.03		
140	0.92	1.09	0.99	1.10	1.26	1.26	1.26	1.19	1.14	1.14	1.14	1.20	1.21	1.11	0.81	1.20	1.16		
145	1.08	0.98	0.92	1.16	1.19	1.36	1.36	1.25	1.22	1.20	1.22	1.27	1.18	1.08	0.75	1.23	1.22		
150	0.95	1.21	1.26	1.01	1.22	1.22	1.20	1.24	1.22	1.18	1.17	1.18	1.13	0.88	0.92	0.94	0.94		
155	1.08	1.26	1.29	1.19	1.00	0.99	1.18	1.15	1.14	1.16	1.14	0.80	0.80	1.27	1.29	1.18	1.10		
160	1.05	1.16	1.09	0.91	1.02	1.16	0.79	0.79	0.81	0.82	0.80	1.04	1.25	1.24	1.27	1.28	1.28		
165	0.93	1.03	1.05	1.10	1.04	1.09	1.19	1.18	1.22	1.22	1.21	1.22	1.26	1.29	1.32	1.35	1.28		
170	1.08	1.09	0.97	0.92	0.93	1.04	1.22	1.27	1.26	1.25	1.25	1.23	1.23	1.28	1.32	1.29	1.21		
175	0.82	0.83	0.85	0.99	0.99	1.08	1.20	1.20	1.24	1.23	1.26	1.25	1.23	1.24	1.22	1.16	1.04		
180	0.80	0.79	0.79	0.79	0.79	0.77	0.74	0.72	0.72	0.75	0.71	0.72	0.73	0.74	0.75	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 ***

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