



LM-79-08 Test Report

for

ABOVE ALL LIGHTING INC.

1501 Industrial Way N. Toms River, NJ 08755

Troffer

Model: TR22D32ACT

Laboratory: Leading Testing Laboratories

NVLAP CODE: 200960-0

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Report No.: HZ16120066a

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

Reviewed by:

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Jan. 20, 2017

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Jan. 20, 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: **TR22D32ACT**

Luminous Efficacy (Lumens /Watt)	Total Luminous Flux (Lumens)	Power (Watts)	Power Factor
128.4	3855.9	30.04	0.9964
CCT (K)	CRI	Stabilization Time (Light & Power)	
5084	83.5	60	

Table 1: Executive Data Summary

Test specifications:

Date of Receipt	: Dec. 30, 2016
Date of Test	: Jan. 18, 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 Photo



Figure 1- Overview of the sample

Equipment Under Test (EUT)

Name	: Troffer
Model	: TR22D32ACT
Electrical Ratings	: 120~277Vac, 50/60Hz
Product Description	: 5000K, Frosted Lens Manufacturer of light source: LG Innotek Co., Ltd Model of light source: LGIT 5630HE Package
Manufacturer	: ABOVE ALL LIGHTING (SHANGHAI) Co., Ltd.
Address	: Room 1012, North Minch Fortune 108 Plaza, # 1839 Qixin road, Shanghai

TEST RESULTS

Test ambient temperature was 24.8°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 85 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)	0.251	0.119
Power Factor	0.9964	0.9331
Test Power (W)	30.04	30.80
THD A%	7.08	8.57
Luminous Efficacy (lm/W)	128.4	125.2
Total Luminous Flux (lm)	3855.9	3856.7
Color Rendering Index (CRI)	83.5	
R9	9	
Correlated Color Temperature (CCT) (K)	5084	
Chromaticity (Chroma x, Chroma y)	(0.3428, 0.3495)	
Chromaticity (Chroma u, Chroma v)	(0.2107, 0.3222)	
Chromaticity (Chroma u', Chroma v')	(0.2107, 0.4833)	
Duv	0.0001	
Average Beam Angle (°)	112.5	
Center Beam Candle Power (cd)	1329	
Spacing Criteria	1.22 (0°-180°)/ 1.28 (90°-270°)	
Zonal Lumens in the 0°-60°Zone	77.12%	
Zonal Lumens in the 60°-90°Zone	22.74%	
Zonal Lumens in the 90°-120°Zone	0.05%	
Zonal Lumens in the 120°-180°Zone	0.08%	

Special Color Rendering Indices	
R1	82
R2	87
R3	92
R4	85
R5	84
R6	84
R7	86
R8	68
R9	9
R10	71
R11	86
R12	72
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

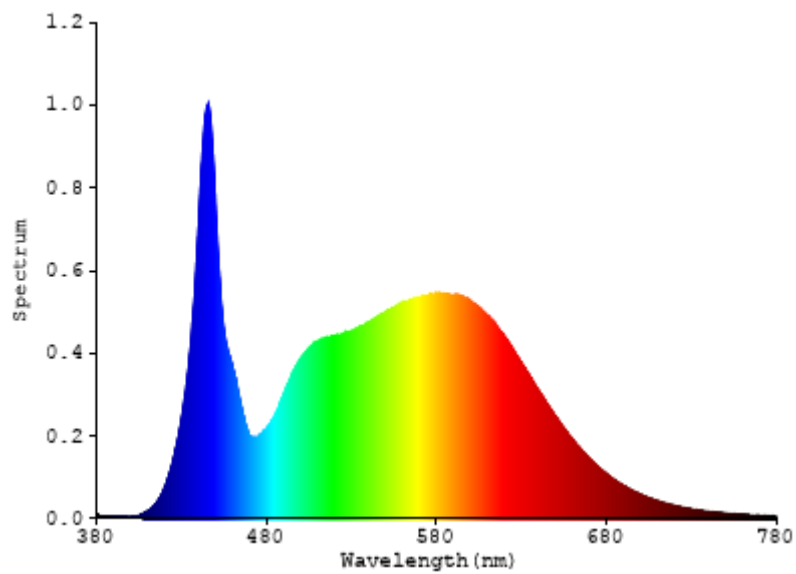


Chart 1: Spectral Power Distribution

Zonal Lumen Tabulation

$\gamma(^{\circ})$	Lumens	% Total
0- 10	125.737	3.26%
10- 20	360.284	9.34%
20- 30	545.639	14.15%
30- 40	655.581	17.00%
40- 50	675.909	17.53%
50- 60	610.677	15.84%
60- 70	484.316	12.56%
70- 80	317.111	8.22%
80- 90	75.457	1.96%
90-100	0.468	0.01%
100-110	0.687	0.02%
110-120	0.826	0.02%
120-130	0.836	0.02%
130-140	0.806	0.02%
140-150	0.691	0.02%
150-160	0.503	0.01%
160-170	0.298	0.01%
170-180	0.104	0.00%
Total	3855.9	100%

$\gamma(^{\circ})$	Lumens	% Total
0- 60	2973.827	77.12%
60- 90	876.884	22.74%
0-90	3850.711	99.86%
90- 180	5.219	0.14%
0- 180	3855.9	100%

Table 3: Zonal Lumen Data

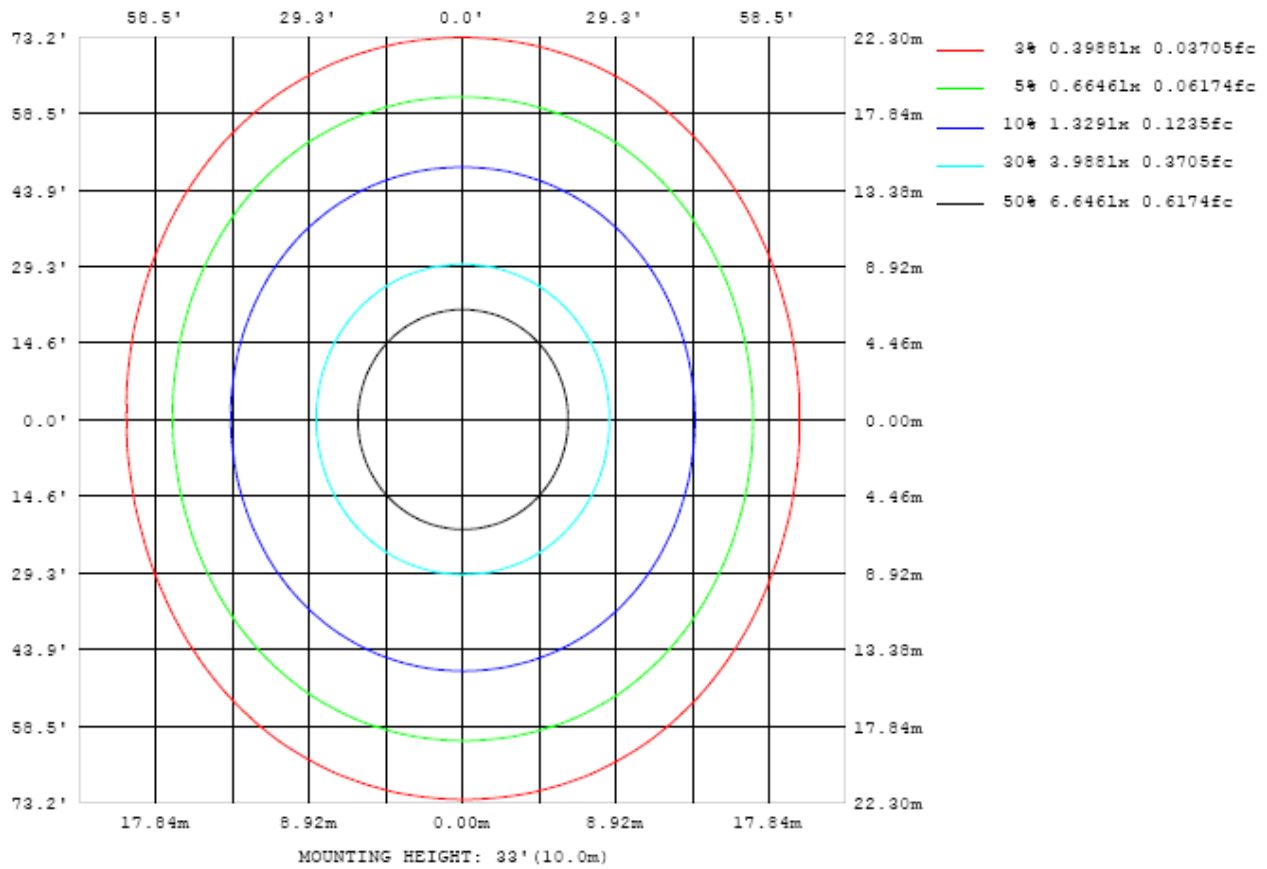


Chart 2: Illuminance Plot (Footcandles)

Luminous Intensity Distribution Plots

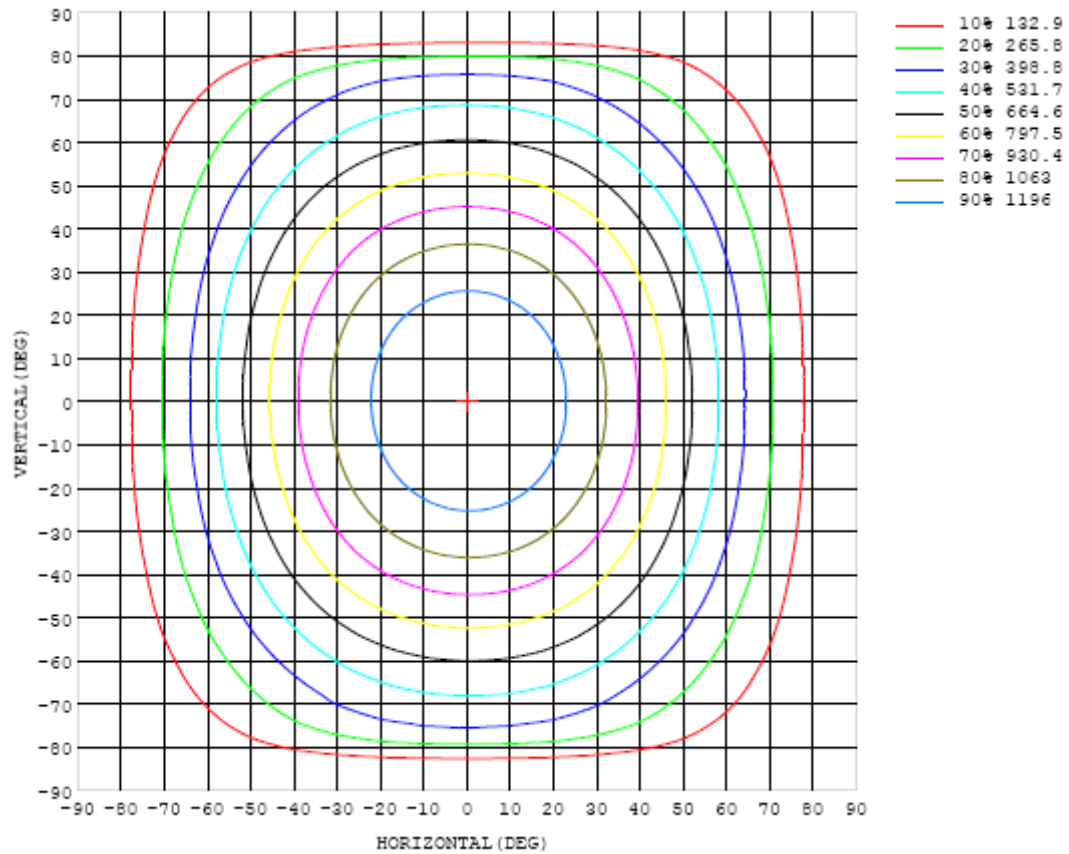


Chart 3: Isocandela Plot

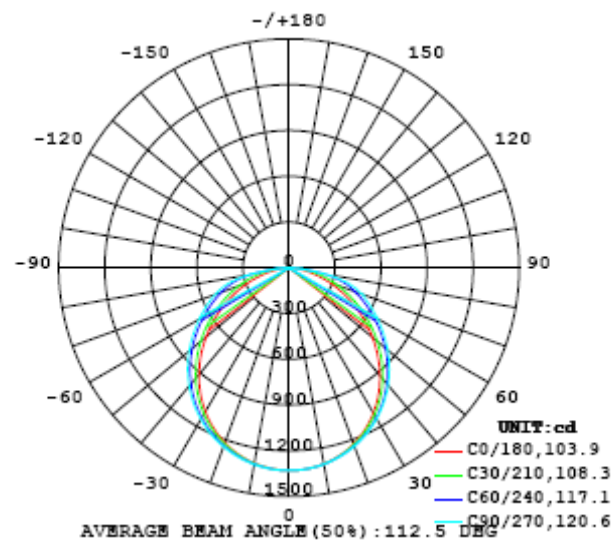


Chart 4: Polar Candela Distribution

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	1329	1329	1329	1329	1329	1329	1329	1329	1329	1329	1329	1329	1329	1329	1329	1329	1329	1329	1329
5	1324	1323	1323	1324	1324	1324	1324	1324	1324	1323	1323	1323	1323	1323	1322	1321	1321	1321	1321
10	1306	1306	1306	1306	1307	1307	1307	1308	1308	1307	1307	1306	1305	1304	1303	1302	1301	1301	1301
15	1274	1274	1275	1276	1278	1279	1280	1281	1281	1282	1281	1279	1277	1274	1272	1270	1269	1267	1267
20	1229	1230	1232	1234	1238	1241	1243	1244	1245	1245	1244	1241	1238	1234	1230	1226	1223	1221	1221
25	1171	1172	1175	1180	1185	1191	1195	1197	1199	1199	1197	1193	1189	1183	1176	1170	1165	1162	1161
30	1099	1101	1106	1114	1122	1130	1137	1141	1143	1143	1140	1136	1129	1121	1111	1102	1095	1090	1089
35	1015	1018	1026	1036	1048	1059	1069	1075	1078	1078	1075	1069	1060	1049	1037	1024	1013	1007	1006
40	921	925	935	949	965	980	992	1001	1004	1005	1002	994	983	969	953	936	923	914	912
45	818	823	835	853	874	893	909	919	924	925	921	912	899	881	861	841	824	813	811
50	710	715	730	751	776	800	819	832	838	839	835	825	810	788	764	739	720	707	705
55	600	605	621	645	674	703	727	743	750	752	747	736	717	692	663	635	612	598	596
60	491	496	513	539	571	605	634	653	663	665	660	647	625	595	561	529	504	490	487
65	383	389	407	435	472	510	544	568	579	581	576	562	536	501	462	426	399	383	380
70	280	286	305	337	377	419	457	485	509	511	511	480	450	411	368	328	297	280	277
75	183	189	210	245	286	330	366	392	402	405	401	389	363	325	278	236	203	183	180
80	96.4	103	124	155	189	216	234	241	239	236	239	240	232	213	185	147	117	97.8	94.6
85	30.5	33.6	43.5	57.1	63.6	63.5	59.0	52.7	48.5	48.3	48.6	53.0	58.7	63.2	62.7	53.0	38.9	30.7	29.5
90	0.11	0.05	0.61	0.40	0.48	0.57	0.66	1.29	1.46	1.39	1.50	1.45	0.75	0.62	0.50	0.42	0.02	0.03	0.10
95	0.13	0.23	0.36	0.51	0.64	0.74	0.75	0.88	0.91	0.99	1.05	0.97	0.83	0.76	0.63	0.50	0.37	0.19	0.19
100	0.22	0.32	0.41	0.55	0.70	0.94	1.07	0.94	0.93	0.96	1.12	1.08	1.14	0.92	0.70	0.55	0.42	0.28	0.30
105	0.30	0.37	0.64	0.93	1.20	1.34	1.09	1.03	1.03	1.05	1.26	1.23	1.28	1.40	1.21	0.84	0.53	0.34	0.39
110	0.39	0.41	0.82	1.07	1.29	1.26	1.19	1.19	1.20	1.23	1.39	1.43	1.40	1.46	1.37	1.12	0.83	0.53	0.48
115	0.40	0.45	0.80	1.03	1.15	1.23	1.26	1.31	1.35	1.38	1.47	1.54	1.51	1.45	1.32	1.13	0.87	0.53	0.50
120	0.56	0.43	0.84	1.02	1.16	1.27	1.33	1.37	1.44	1.48	1.51	1.59	1.56	1.48	1.35	1.15	0.92	0.57	0.65
125	0.49	0.51	0.88	1.06	1.18	1.34	1.41	1.46	1.53	1.57	1.57	1.61	1.58	1.52	1.38	1.20	0.96	0.77	0.72
130	0.74	0.82	0.98	1.09	1.21	1.34	1.44	1.52	1.56	1.60	1.59	1.61	1.57	1.50	1.39	1.23	1.04	0.87	0.89
135	0.80	0.86	0.74	1.11	1.24	1.35	1.44	1.51	1.54	1.58	1.57	1.55	1.54	1.48	1.37	1.22	0.71	0.96	1.00
140	0.84	0.94	0.71	1.15	1.25	1.36	1.47	1.52	1.55	1.57	1.57	1.55	1.51	1.45	1.37	1.21	0.73	0.99	1.04
145	0.86	0.85	0.88	0.91	1.23	1.31	1.40	1.46	1.52	1.54	1.53	1.49	1.44	1.41	1.31	0.89	0.91	0.83	0.96
150	1.03	1.04	1.10	0.79	1.17	1.28	1.30	1.37	1.40	1.41	1.43	1.40	1.37	1.35	1.23	0.80	1.07	0.98	1.22
155	1.08	1.07	1.11	1.15	0.81	0.93	1.23	1.30	1.33	1.31	1.35	1.33	1.29	1.04	0.85	1.15	1.11	1.11	1.18
160	1.13	1.11	1.14	1.15	1.16	0.81	0.72	0.76	0.87	0.97	0.93	0.82	0.81	0.88	1.19	1.17	1.14	1.16	1.30
165	1.08	1.03	1.06	1.08	1.07	1.02	0.99	0.97	0.82	0.79	0.90	1.14	1.21	1.23	1.23	1.22	1.16	1.18	1.30
170	1.11	1.07	1.08	1.09	1.10	1.11	1.10	1.01	0.98	1.03	1.13	1.21	1.23	1.25	1.17	1.07	1.05	1.14	1.22
175	1.12	1.09	1.10	1.10	1.11	1.18	1.11	1.10	1.10	1.09	1.15	1.17	1.12	1.13	1.12	1.10	1.10	1.19	1.20
180	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01

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	1329	1329	1329	1329	1329	1329	1329	1329	1329	1329	1329	1329	1329	1329	1329	1329	1329		
5	1321	1322	1322	1322	1323	1323	1323	1324	1324	1324	1324	1324	1324	1324	1324	1324	1324		
10	1302	1302	1303	1304	1305	1306	1308	1309	1309	1309	1309	1308	1308	1307	1307	1306	1306		
15	1268	1270	1272	1274	1277	1279	1281	1283	1284	1284	1283	1282	1280	1279	1277	1276	1274		
20	1222	1225	1229	1233	1238	1241	1244	1247	1248	1248	1247	1245	1242	1239	1235	1232	1229		
25	1163	1168	1174	1180	1188	1193	1198	1201	1203	1202	1200	1197	1192	1186	1180	1175	1172		
30	1092	1099	1107	1117	1127	1136	1142	1146	1148	1147	1144	1139	1131	1123	1114	1106	1101		
35	1010	1018	1031	1044	1057	1069	1077	1082	1084	1083	1079	1072	1061	1049	1036	1025	1017		
40	918	929	945	963	980	993	1004	1010	1012	1010	1005	996	982	966	949	934	924		
45	818	832	851	873	894	911	924	931	933	931	925	913	895	875	853	834	822		
50	712	729	752	778	803	824	838	846	849	846	838	824	802	777	751	729	715		
55	604	623	649	679	709	733	750	759	762	758	749	731	706	676	646	621	606		
60	496	516	545	580	614	642	663	673	676	672	660	639	609	574	541	514	497		
65	390	411	443	482	521	555	577	589	593	588	574	549	513	474	438	408	390		
70	287	311	347	388	432	469	495	508	510	506	491	461	422	379	339	307	288		
75	191	217	255	298	341	380	405	416	418	415	402	372	332	289	246	212	191		
80	105	130	163	201	230	251	261	261	261	265	266	252	227	194	157	125	105		
85	34.1	45.1	61.1	70.6	71.2	67.8	65.7	62.9	62.6	66.7	71.7	77.6	80.9	77.2	62.2	44.9	34.1		
90	0.10	0.11	0.12	0.14	0.17	0.19	0.20	0.21	0.23	0.24	0.23	0.22	0.18	0.15	0.17	0.14	0.15		
95	0.16	0.16	0.17	0.18	0.20	0.20	0.21	0.21	0.21	0.21	0.21	0.20	0.19	0.18	0.17	0.15	0.16		
100	0.28	0.24	0.23	0.23	0.24	0.25	0.27	0.27	0.27	0.27	0.26	0.25	0.24	0.23	0.25	0.25	0.28		
105	0.37	0.35	0.35	0.36	0.35	0.33	0.35	0.46	0.38	0.33	0.33	0.34	0.39	0.41	0.39	0.37	0.38		
110	0.43	0.43	0.43	0.45	0.48	0.51	0.54	0.55	0.54	0.54	0.53	0.53	0.51	0.48	0.46	0.43	0.44		
115	0.46	0.45	0.50	0.51	0.53	0.56	0.59	0.61	0.62	0.62	0.60	0.57	0.55	0.52	0.51	0.45	0.45		
120	0.55	0.49	0.49	0.58	0.57	0.59	0.62	0.63	0.64	0.64	0.62	0.60	0.58	0.59	0.51	0.53	0.57		
125	0.65	0.58	0.60	0.54	0.65	0.65	0.66	0.66	0.68	0.67	0.67	0.65	0.66	0.54	0.59	0.58	0.57		
130	0.80	0.74	0.73	0.72	0.63	0.73	0.77	0.77	0.77	0.77	0.78	0.66	0.64	0.68	0.71	0.75	0.70		
135	0.86	0.87	0.75	0.80	0.82	0.83	0.74	0.76	0.76	0.75	0.74	0.83	0.80	0.81	0.80	0.83	0.73		
140	0.82	0.94	0.87	0.85	0.92	0.94	0.96	0.96	0.93	0.92	0.92	0.93	0.91	0.83	0.89	0.94	0.86		
145	0.88	1.01	1.02	1.00	0.95	1.01	1.01	1.00	0.97	0.94	0.94	0.95	0.92	0.98	1.00	0.97	0.98		
150	1.13	1.04	1.06	1.09	1.05	1.03	0.98	0.95	0.93	0.88	0.91	0.94	1.00	1.04	1.11	0.96	1.15		
155	1.11	0.99	1.11	1.12	1.08	1.06	1.05	0.99	0.97	0.97	0.95	0.95	1.02	1.10	1.12	0.98	1.17		
160	1.19	1.10	1.01	1.15	1.14	1.10	1.08	1.06	1.00	1.00	0.97	0.97	1.00	1.05	0.98	1.09	1.21		
165	1.23	1.17	1.10	0.98	1.03	1.10	1.05	1.04	1.01	0.95	0.96	0.93	0.94	0.90	0.93	1.08	1.17		
170	1.21	1.21	1.19	1.16	1.08	1.00	0.97	0.95	0.91	0.89	0.86	0.85	0.85	0.93	1.04	1.10	1.12		
175	1.21	1.21	1.20	1.16	1.14	1.11	1.06	1.04	1.04	0.99	0.99	0.92	0.87	0.91	0.98	1.06	1.10		
180	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01		

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 LED lamps) 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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