



LM-79-08 Test Report

for

ABOVE ALL LIGHTING INC.

1501 Industrial Way N. Toms River, NJ 08755

Troffer

Model: TR24D32ACT

Laboratory: Leading Testing Laboratories

NVLAP CODE: 200960-0

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Report No.: HZ16120066b

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: **TR24D32ACT**

Luminous Efficacy (Lumens /Watt)	Total Luminous Flux (Lumens)	Power (Watts)	Power Factor
130.1	3915.4	30.09	0.9961
CCT (K)	CRI	Stabilization Time (Light & Power)	
5112	83.7	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	: TR24D32ACT
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 24.7°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 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)	0.252	0.120
Power Factor	0.9961	0.9297
Test Power (W)	30.09	30.85
THD A%	7.04	7.29
Luminous Efficacy (lm/W)	130.1	126.9
Total Luminous Flux (lm)	3915.4	3915.8
Color Rendering Index (CRI)	83.7	
R9	10	
Correlated Color Temperature (CCT) (K)	5112	
Chromaticity (Chroma x, Chroma y)	(0.3420, 0.3482)	
Chromaticity (Chroma u, Chroma v)	(0.2106, 0.3217)	
Chromaticity (Chroma u', Chroma v')	(0.2106, 0.4826)	
Duv	0.0004	
Average Beam Angle (°)	116.2	
Center Beam Candle Power (cd)	1288	
Spacing Criteria	1.26 (0°-180°)/ 1.26 (90°-270°)	
Zonal Lumens in the 0°-60°Zone	75.73%	
Zonal Lumens in the 60°-90°Zone	24.15%	
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	69
R9	10
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

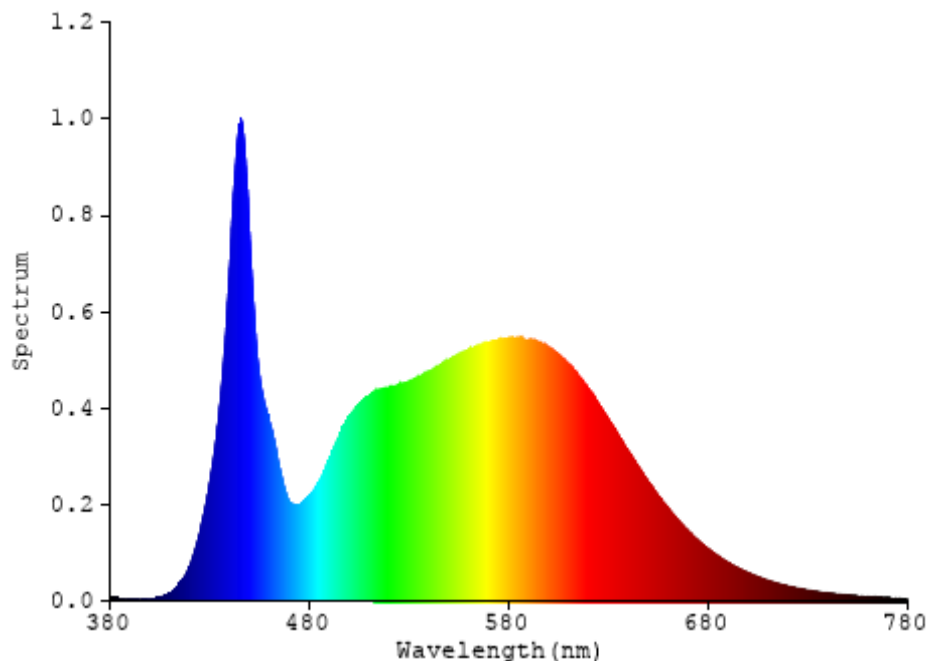


Chart 1: Spectral Power Distribution

Zonal Lumen Tabulation

$\gamma(^{\circ})$	Lumens	% Total
0- 10	121.985	3.12%
10- 20	350.627	8.96%
20- 30	534.965	13.66%
30- 40	650.335	16.61%
40- 50	680.927	17.39%
50- 60	626.212	15.99%
60- 70	508.952	13.00%
70- 80	346.48	8.85%
80- 90	90.016	2.30%
90-100	0.509	0.01%
100-110	0.637	0.02%
110-120	0.801	0.02%
120-130	0.801	0.02%
130-140	0.753	0.02%
140-150	0.628	0.02%
150-160	0.432	0.01%
160-170	0.25	0.01%
170-180	0.088	0.00%
Total	3915.4	100%

$\gamma(^{\circ})$	Lumens	% Total
0- 60	2965.051	75.73%
60- 90	945.448	24.15%
0-90	3910.499	99.87%
90- 180	4.899	0.13%
0- 180	3915.4	100%

Table 3: Zonal Lumen Data

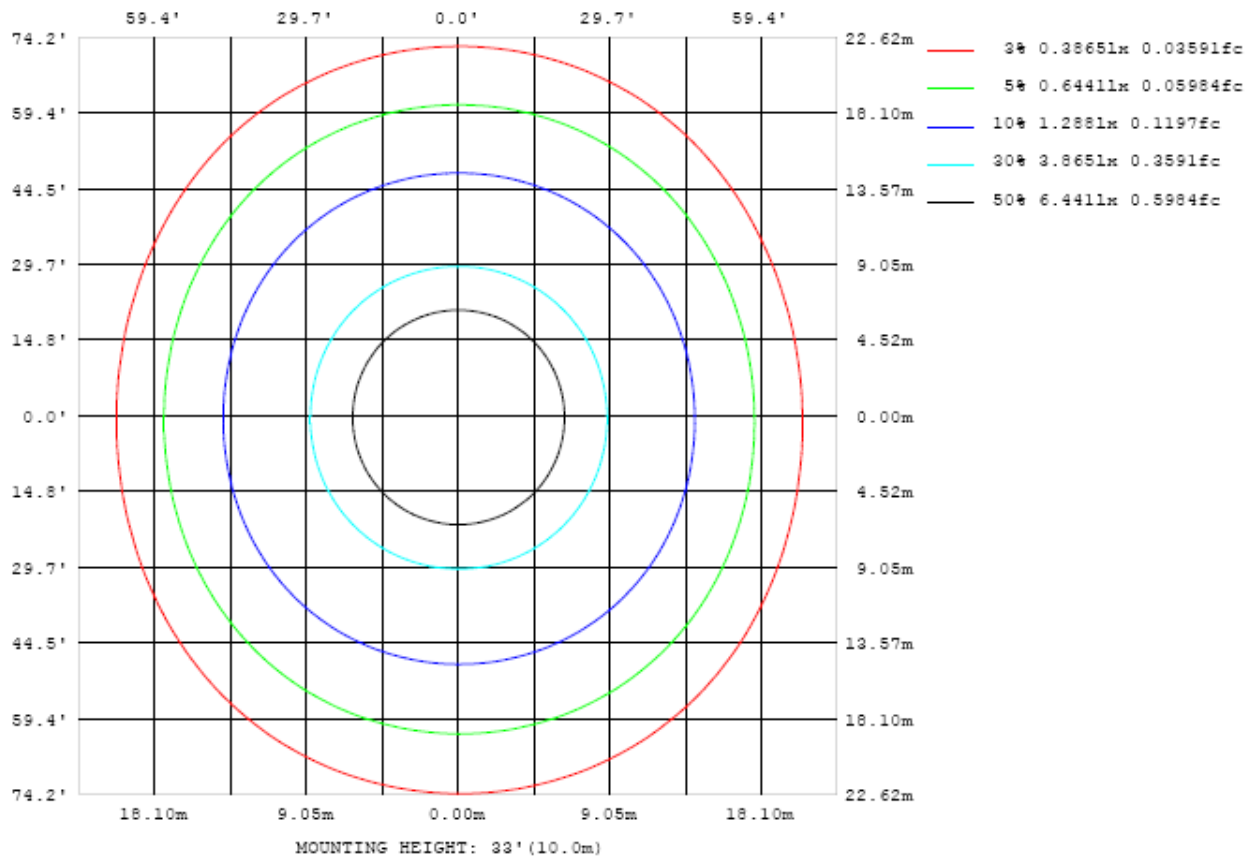


Chart 2: Illuminance Plot (Footcandles)

Luminous Intensity Distribution Plots

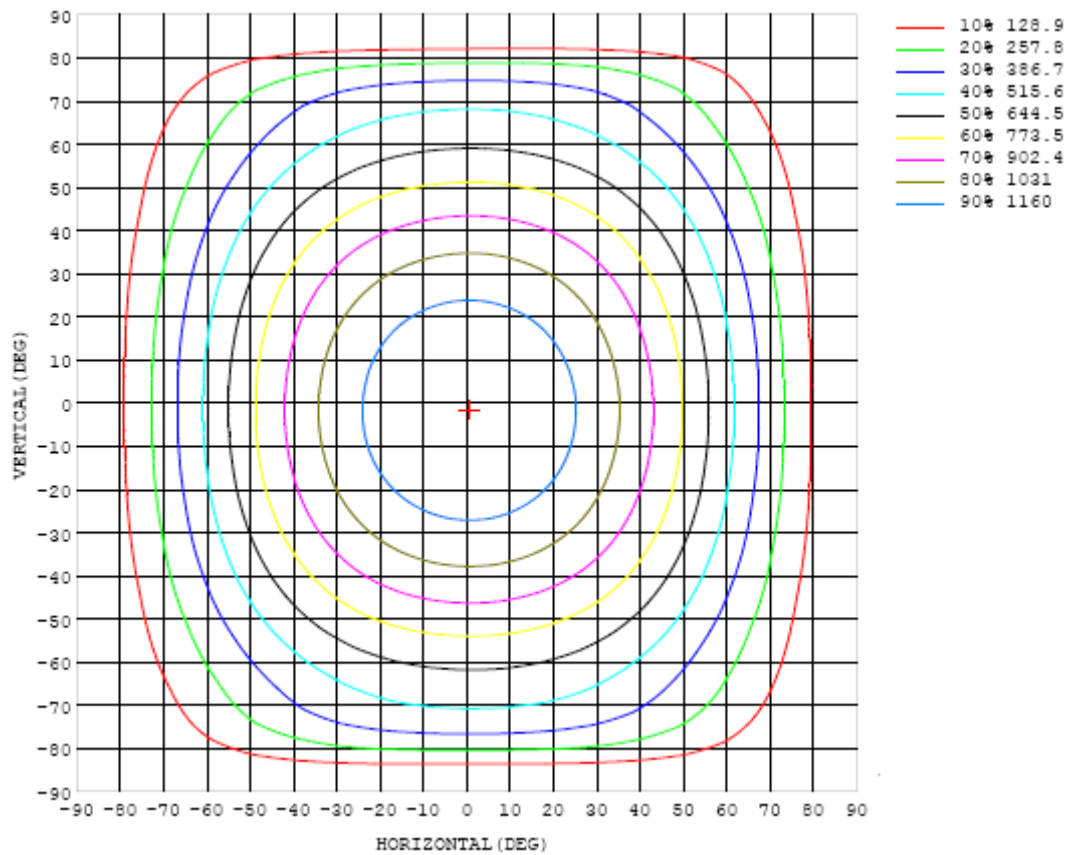


Chart 3: Isocandela Plot

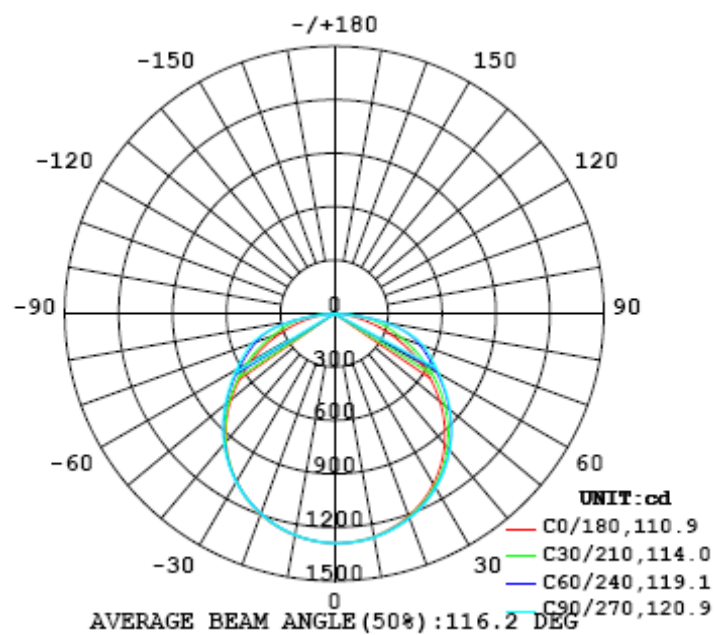


Chart 4: Polar Candela Distribution

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	1288	1288	1288	1288	1288	1288	1288	1288	1288	1288	1288	1288	1288	1288	1288	1288	1288	1288	1288
5	1284	1285	1285	1285	1286	1287	1287	1287	1287	1286	1287	1286	1285	1285	1284	1284	1283	1282	1282
10	1270	1270	1272	1273	1274	1274	1275	1275	1275	1275	1274	1273	1271	1270	1269	1267	1266	1264	1264
15	1244	1245	1247	1249	1251	1252	1253	1253	1254	1253	1252	1251	1250	1247	1245	1244	1241	1239	1237
20	1208	1210	1213	1215	1218	1219	1221	1222	1222	1222	1221	1219	1217	1214	1211	1208	1205	1202	1199
25	1162	1164	1168	1171	1175	1177	1179	1180	1181	1180	1179	1176	1174	1171	1167	1162	1158	1154	1150
30	1104	1107	1112	1117	1122	1125	1127	1129	1130	1129	1128	1125	1122	1117	1112	1106	1100	1095	1091
35	1035	1039	1045	1052	1059	1063	1067	1069	1070	1069	1067	1064	1060	1055	1047	1040	1032	1025	1020
40	955	960	969	978	986	993	997	1000	1001	1000	998	995	990	983	974	964	953	945	939
45	866	872	882	894	905	914	920	923	924	923	922	918	912	903	892	879	865	855	849
50	767	774	787	802	817	828	836	840	842	841	839	835	828	817	803	786	770	757	750
55	662	670	686	704	723	738	748	754	756	756	754	748	739	726	708	688	668	653	646
60	552	561	579	602	626	646	660	669	673	673	669	662	651	633	610	585	562	545	537
65	440	450	471	499	530	557	578	590	597	597	593	583	567	543	513	482	454	435	427
70	328	339	364	399	439	476	505	520	527	528	524	514	492	460	421	381	348	325	317
75	219	232	262	308	358	398	421	430	431	431	429	426	414	384	338	288	246	220	211
80	118	134	172	223	261	280	288	284	278	275	277	284	282	271	249	205	155	122	113
85	39.0	54.3	85.1	107	114	106	94.8	85.0	78.0	76.0	78.7	86.7	96.5	106	110	98.5	73.4	45.5	35.7
90	1.69	3.80	2.28	2.46	1.13	0.97	1.26	1.45	1.45	1.47	1.48	1.43	1.08	0.88	1.28	2.56	0.14	1.74	0.10
95	0.14	0.23	0.40	0.53	0.64	0.73	0.98	1.13	1.09	1.07	1.09	1.09	0.79	0.67	0.60	0.50	0.37	0.19	0.18
100	0.21	0.29	0.52	0.63	0.71	0.78	0.94	1.06	0.96	0.95	0.98	1.04	0.85	0.75	0.69	0.61	0.49	0.23	0.26
105	0.30	0.33	0.58	0.74	0.86	1.04	1.16	1.16	1.03	1.01	1.06	1.17	1.14	1.02	0.85	0.73	0.58	0.28	0.37
110	0.38	0.42	0.63	0.99	1.18	1.29	1.34	1.30	1.18	1.16	1.22	1.33	1.34	1.33	1.18	0.96	0.61	0.36	0.44
115	0.46	0.52	0.68	1.12	1.30	1.41	1.46	1.43	1.35	1.32	1.38	1.45	1.48	1.44	1.30	1.11	0.66	0.44	0.49
120	0.55	0.49	0.70	1.10	1.30	1.43	1.49	1.50	1.45	1.43	1.48	1.51	1.52	1.45	1.33	1.10	0.67	0.50	0.59
125	0.60	0.55	0.69	1.10	1.27	1.43	1.51	1.53	1.51	1.49	1.53	1.55	1.55	1.46	1.31	1.13	0.76	0.70	0.65
130	0.65	0.74	0.78	1.08	1.25	1.39	1.51	1.56	1.53	1.54	1.56	1.55	1.55	1.43	1.30	1.12	0.82	0.77	0.75
135	0.81	0.92	0.75	1.11	1.25	1.37	1.48	1.51	1.50	1.52	1.51	1.52	1.51	1.42	1.28	1.15	0.62	0.95	0.85
140	0.72	0.74	0.60	1.16	1.22	1.36	1.47	1.48	1.49	1.51	1.49	1.49	1.49	1.38	1.24	1.20	0.66	0.81	0.86
145	0.87	0.92	0.84	1.16	1.23	1.29	1.38	1.44	1.48	1.46	1.47	1.44	1.41	1.31	1.28	1.09	0.88	0.95	0.97
150	0.89	0.94	0.98	0.59	1.20	1.26	1.27	1.29	1.32	1.31	1.32	1.30	1.29	1.26	1.25	0.68	0.99	0.89	0.97
155	0.84	0.91	1.04	1.04	0.64	1.20	1.21	1.23	1.24	1.22	1.24	1.22	1.21	1.22	0.66	1.00	0.99	0.84	1.01
160	0.96	0.98	1.04	1.12	1.04	0.62	0.59	0.91	1.19	1.16	1.17	0.94	0.62	0.65	0.91	0.99	0.97	0.89	0.97
165	0.97	1.01	1.04	1.06	1.07	1.00	0.93	0.62	0.60	0.58	0.56	0.62	0.97	1.04	1.02	0.98	0.96	0.92	1.01
170	0.89	0.96	0.92	0.92	0.90	0.90	0.89	0.90	0.89	0.94	0.98	0.99	1.06	1.03	1.01	1.05	1.03	1.03	1.01
175	1.02	1.01	1.01	0.99	0.97	0.93	0.88	0.89	0.94	0.93	0.94	0.93	1.00	0.91	0.90	0.95	0.92	0.94	0.97
180	0.73	0.73	0.73	0.73	0.73	0.73	0.73	0.73	0.73	0.72	0.72	0.72	0.72	0.72	0.72	0.72	0.71	0.71	0.71

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	1288	1288	1288	1288	1288	1288	1288	1288	1288	1288	1288	1288	1288	1288	1288	1288	1288		
5	1281	1281	1280	1280	1280	1280	1280	1280	1280	1280	1281	1281	1281	1282	1282	1283	1284		
10	1263	1263	1261	1261	1261	1261	1261	1262	1262	1262	1262	1263	1264	1265	1266	1267	1268		
15	1235	1235	1233	1233	1232	1232	1232	1233	1233	1234	1235	1236	1237	1237	1239	1240	1243		
20	1197	1196	1195	1195	1194	1194	1195	1195	1196	1197	1197	1198	1200	1201	1202	1204	1206		
25	1148	1147	1146	1147	1146	1147	1147	1148	1148	1150	1150	1151	1153	1154	1155	1156	1159		
30	1088	1088	1088	1089	1089	1090	1090	1092	1093	1094	1094	1095	1097	1097	1098	1099	1101		
35	1018	1018	1020	1021	1023	1025	1025	1027	1028	1030	1030	1031	1031	1031	1031	1030	1031		
40	937	939	942	946	950	952	953	955	956	957	958	958	958	956	954	952	952		
45	847	851	857	863	868	872	874	875	877	879	879	879	877	873	869	865	863		
50	750	756	764	773	781	787	790	793	794	795	795	794	790	784	776	769	766		
55	646	654	666	679	691	699	705	708	711	711	710	706	700	689	677	666	661		
60	539	549	565	584	601	614	622	628	630	630	627	620	608	591	575	560	552		
65	430	443	465	491	516	535	548	555	558	557	551	539	520	496	471	451	441		
70	322	340	369	404	439	465	479	486	488	487	481	466	440	406	372	345	330		
75	218	243	281	326	360	377	381	380	381	384	386	381	361	323	280	243	223		
80	123	156	198	221	231	232	222	213	213	219	233	244	241	228	196	152	125		
85	46.7	68.3	76.8	69.5	55.5	48.6	40.8	36.7	36.4	39.4	47.4	55.2	71.6	86.0	86.6	69.1	45.3		
90	0.11	0.11	0.13	0.14	0.15	0.16	0.17	0.17	0.17	0.17	0.16	0.15	0.15	0.13	0.12	0.11	0.11		
95	0.16	0.16	0.18	0.19	0.21	0.22	0.23	0.23	0.22	0.22	0.22	0.21	0.19	0.18	0.16	0.15	0.16		
100	0.27	0.28	0.24	0.23	0.25	0.25	0.26	0.27	0.26	0.26	0.26	0.25	0.24	0.23	0.25	0.27	0.26		
105	0.35	0.37	0.37	0.39	0.37	0.34	0.33	0.37	0.38	0.33	0.34	0.35	0.38	0.39	0.37	0.37	0.34		
110	0.36	0.44	0.44	0.45	0.48	0.51	0.51	0.52	0.51	0.51	0.51	0.51	0.48	0.45	0.46	0.47	0.39		
115	0.37	0.45	0.53	0.48	0.50	0.53	0.54	0.56	0.55	0.55	0.55	0.53	0.50	0.51	0.56	0.47	0.44		
120	0.50	0.50	0.51	0.54	0.52	0.53	0.55	0.55	0.56	0.56	0.56	0.54	0.53	0.53	0.51	0.51	0.54		
125	0.59	0.51	0.58	0.51	0.60	0.58	0.59	0.58	0.60	0.59	0.61	0.60	0.61	0.54	0.57	0.52	0.59		
130	0.64	0.56	0.66	0.67	0.59	0.59	0.67	0.69	0.70	0.69	0.71	0.59	0.66	0.65	0.63	0.58	0.56		
135	0.73	0.68	0.68	0.74	0.73	0.76	0.67	0.68	0.69	0.69	0.73	0.76	0.74	0.75	0.69	0.75	0.68		
140	0.71	0.80	0.69	0.71	0.81	0.84	0.83	0.86	0.85	0.86	0.83	0.83	0.79	0.73	0.67	0.76	0.73		
145	0.77	0.86	0.77	0.82	0.80	0.85	0.87	0.87	0.87	0.88	0.84	0.80	0.78	0.74	0.80	0.85	0.88		
150	0.92	0.82	0.90	0.81	0.83	0.83	0.82	0.81	0.77	0.74	0.77	0.80	0.79	0.78	0.79	0.68	0.90		
155	0.99	0.76	0.90	0.87	0.84	0.78	0.77	0.80	0.77	0.77	0.75	0.79	0.82	0.93	0.91	0.74	0.91		
160	0.97	0.94	0.76	0.83	0.86	0.85	0.81	0.78	0.76	0.78	0.78	0.84	0.89	0.94	0.82	0.97	1.07		
165	0.99	0.93	0.89	0.78	0.76	0.86	0.86	0.88	0.84	0.83	0.86	0.88	0.79	0.79	0.85	0.96	0.96		
170	1.00	1.02	1.04	1.02	1.00	0.90	0.80	0.81	0.77	0.77	0.76	0.76	0.80	0.90	0.97	0.93	0.90		
175	0.97	0.94	0.95	0.96	0.95	0.95	0.94	0.88	0.82	0.80	0.86	0.84	0.85	0.90	0.95	0.94	0.97		
180	0.71	0.71	0.72	0.72	0.72	0.72	0.72	0.72	0.72	0.73	0.73	0.73	0.73	0.73	0.73	0.73	0.73		

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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