



LM-79-08 Test Report

for

ABOVE ALL LIGHTING INC.

1501 Industrial Way N. Toms River, NJ 08755.

Troffer Retrofit kit

Model: TRK24D32ACT

Laboratory: Leading Testing Laboratories

NVLAP CODE: 200960-0

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Report No.: HZ16120031a

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

Reviewed by:

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Dec. 28, 2016

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Manager: Jim Zhang
Dec. 28, 2016

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: **TRK24D32ACT**

Luminous Efficacy (Lumens /Watt)	Total Luminous Flux (Lumens)	Power (Watts)	Power Factor
130.6	4086.3	31.28	0.9952
CCT (K)	CRI	Stabilization Time (Light & Power)	
5087	83.6	60	

Table 1: Executive Data Summary

Test specifications:

Date of Receipt	: Dec. 19, 2016
Date of Test	: Dec. 19, 2016
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 in Lithonia 2GT8 Lensed 2x4

Equipment Under Test (EUT)

Name	: Troffer Retrofit kit
Model	: TRK24D32ACT
Electrical Ratings	: 120~277Vac, 50/60Hz, 32W
Product Description	: 5000K, Aluminum frame, Frosted Lens, SPCC with powder paint Manufacturer of light source: LG Innotek Co., Ltd Model of light source: LGIT 5630HE Package
Manufacturer	: ABOVE ALL LIGHTING INC.
Address	: Room 1012, North Minch Fortune 108 Plaza,# 1839 Qixin road, Shanghai

TEST RESULTS

Test ambient temperature was 24.9°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)	0.262	0.123
Power Factor	0.9952	0.9404
Test Power (W)	31.28	31.92
THD A%	8.33	8.03
Luminous Efficacy (lm/W)	130.6	127.7
Total Luminous Flux (lm)	4086.3	4077.5
Color Rendering Index (CRI)	83.6	
R9	10	
Correlated Color Temperature (CCT) (K)	5087	
Chromaticity (Chroma x, Chroma y)	(0.3426, 0.3489)	
Chromaticity (Chroma u, Chroma v)	(0.2108, 0.3220)	
Chromaticity (Chroma u', Chroma v')	(0.2108, 0.5141)	
Duv	0.0003	
Average Beam Angle (°)	116.6	
Center Beam Candle Power (cd)	1348	
Spacing Criteria	1.25 (0°-180°)/ 1.29 (90°-270°)	
Zonal Lumens in the 0°-60°Zone	75.99%	
Zonal Lumens in the 60°-90°Zone	23.84%	
Zonal Lumens in the 90°-120°Zone	0.07%	
Zonal Lumens in the 120°-180°Zone	0.10%	

Special Color Rendering Indices	
R1	82
R2	87
R3	92
R4	85
R5	84
R6	84
R7	86
R8	68
R9	10
R10	71
R11	86
R12	72
R13	83
R14	95

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

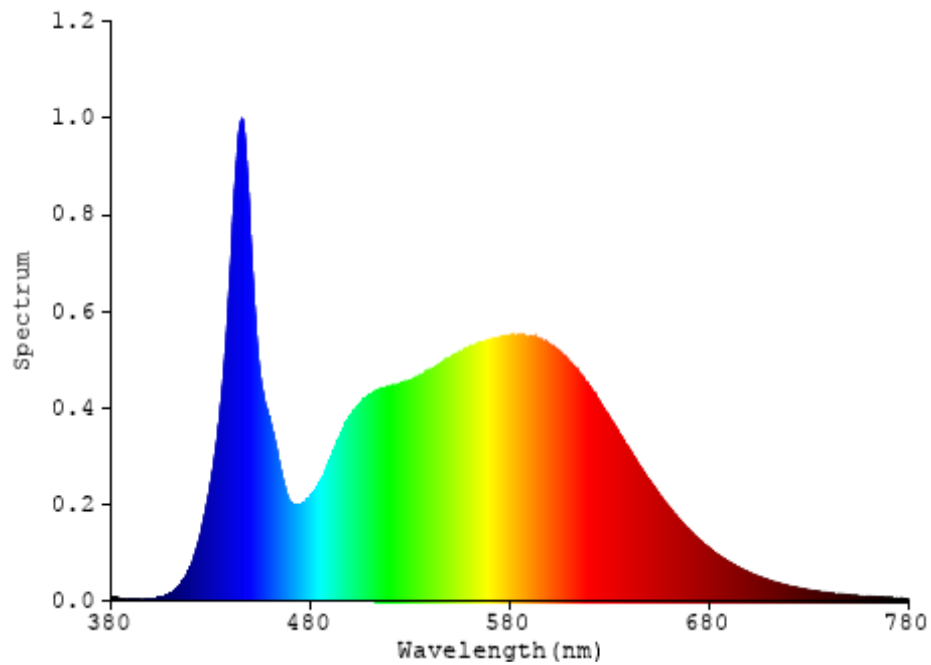


Chart 1: Spectral Power Distribution

Zonal Lumen Tabulation

$\gamma(^{\circ})$	Lumens	% Total
0- 10	127.686	3.12%
10- 20	367.058	8.98%
20- 30	559.969	13.70%
30- 40	680.668	16.66%
40- 50	712.96	17.45%
50- 60	657.063	16.08%
60- 70	531.85	13.02%
70- 80	349.233	8.55%
80- 90	92.951	2.27%
90-100	0.835	0.02%
100-110	0.993	0.02%
110-120	1.153	0.03%
120-130	1.1	0.03%
130-140	0.988	0.02%
140-150	0.818	0.02%
150-160	0.572	0.01%
160-170	0.319	0.01%
170-180	0.113	0.00%
Total	4086.3	100%

$\gamma(^{\circ})$	Lumens	% Total
0- 60	3105.404	75.99%
60- 90	974.034	23.84%
0-90	4079.438	99.83%
90- 180	6.891	0.17%
0- 180	4086.3	100%

Table 3: Zonal Lumen Data

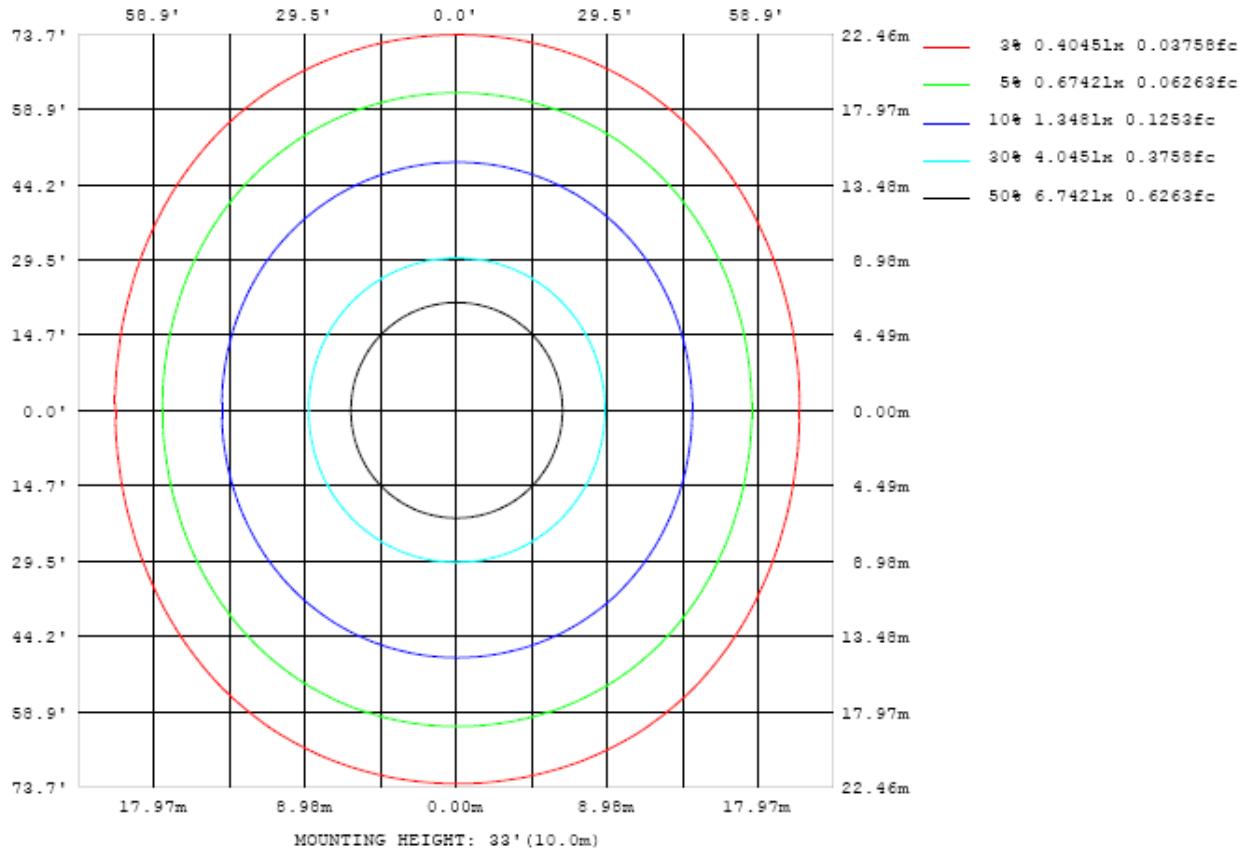


Chart 2: Illuminance Plot (Footcandles)

Luminous Intensity Distribution Plots

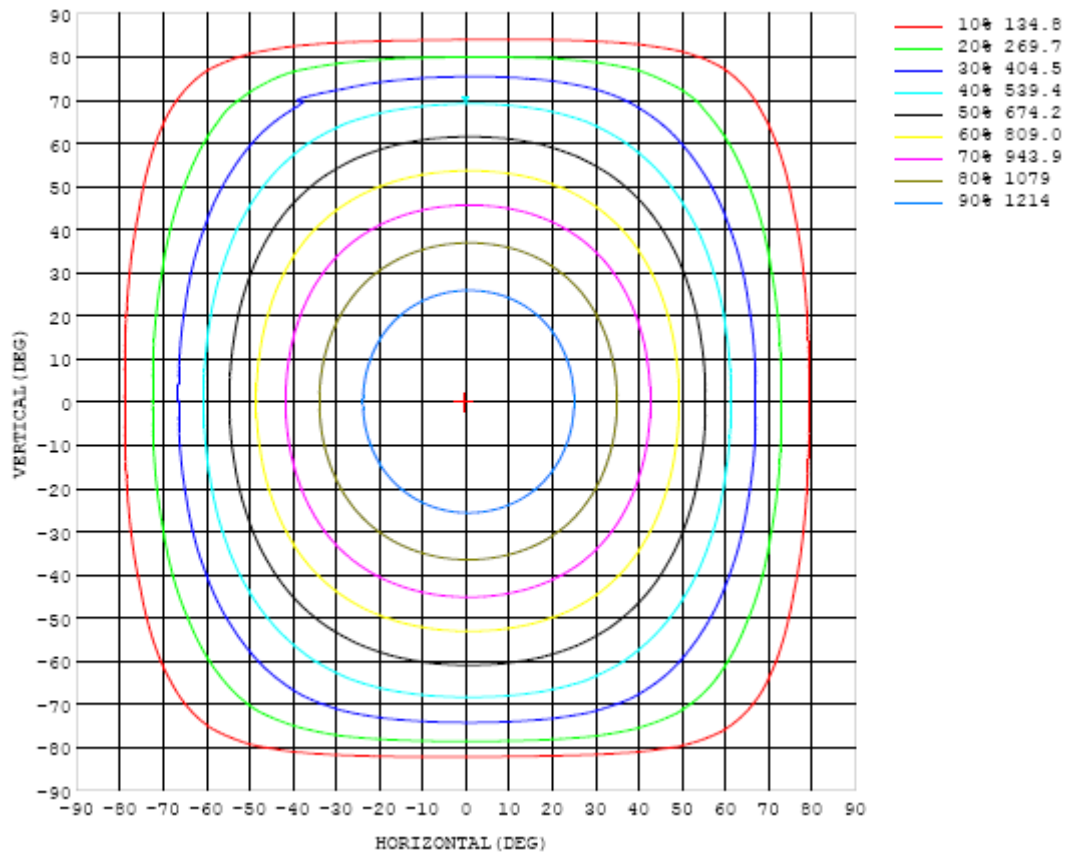


Chart 3: Isocandela Plot

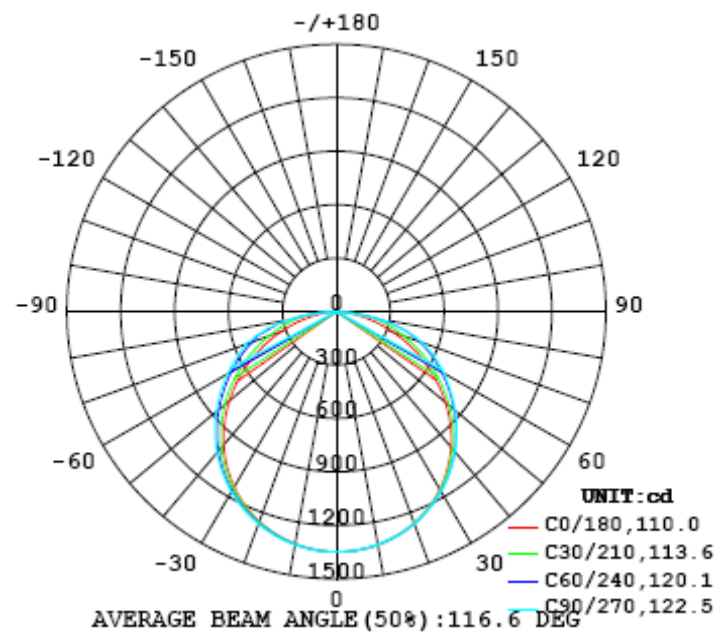


Chart 4: Polar Candela Distribution

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	1348	1348	1348	1348	1348	1348	1348	1348	1348	1348	1348	1348	1348	1348	1348	1348	1348	1348	1348
5	1344	1344	1344	1344	1344	1344	1343	1343	1343	1343	1343	1343	1343	1342	1342	1342	1342	1341	1341
10	1329	1329	1329	1328	1328	1329	1328	1328	1328	1328	1327	1327	1327	1326	1325	1325	1324	1323	1323
15	1302	1302	1301	1301	1302	1302	1302	1302	1302	1302	1301	1300	1299	1298	1297	1295	1294	1294	1294
20	1263	1263	1264	1264	1265	1266	1266	1266	1266	1266	1265	1264	1262	1260	1258	1256	1254	1254	1253
25	1213	1213	1214	1216	1217	1219	1220	1221	1220	1220	1219	1217	1215	1212	1209	1206	1203	1201	1201
30	1151	1151	1153	1156	1159	1162	1164	1165	1165	1164	1163	1160	1157	1154	1150	1145	1140	1138	1137
35	1077	1078	1081	1086	1091	1096	1098	1100	1100	1100	1098	1095	1091	1086	1080	1073	1067	1063	1062
40	992	993	998	1005	1013	1020	1024	1026	1027	1026	1024	1021	1016	1009	1001	991	983	977	976
45	897	899	906	916	926	936	942	945	947	946	944	940	934	925	913	901	890	882	880
50	792	795	805	818	833	846	855	860	862	862	859	854	846	834	819	803	789	779	777
55	682	685	697	715	735	752	765	772	776	776	773	766	755	739	720	699	681	670	668
60	567	572	586	608	634	658	675	685	690	690	687	679	665	644	619	593	571	557	555
65	451	457	474	502	534	565	586	597	602	602	599	591	576	551	519	486	459	443	440
70	336	342	364	399	437	471	493	503	506	506	504	497	483	458	422	383	350	330	326
75	224	232	260	301	341	369	383	385	383	383	382	382	376	358	327	285	246	221	216
80	121	132	165	204	227	240	238	228	219	217	221	228	234	233	217	191	151	122	116
85	41.0	51.6	72.3	84.0	77.2	62.7	53.6	42.1	36.9	36.1	38.5	45.2	54.2	66.7	78.3	77.9	64.3	44.3	38.1
90	1.74	2.79	1.08	1.23	0.56	0.76	0.87	0.99	0.97	0.94	1.05	1.16	1.04	0.83	0.64	1.33	2.28	0.87	0.13
95	0.18	0.24	0.21	0.35	0.56	0.72	0.83	0.91	0.88	0.78	0.92	0.94	0.87	0.75	0.65	0.52	0.43	0.34	0.23
100	0.26	0.31	0.31	0.64	0.75	0.82	0.89	0.94	0.89	0.79	0.92	0.97	0.93	0.85	0.64	0.73	0.59	0.36	0.36
105	0.35	0.44	0.48	0.87	0.97	0.97	1.00	1.02	0.94	0.86	0.97	1.05	1.06	1.02	0.96	0.92	0.65	0.46	0.45
110	0.43	0.58	0.55	0.92	1.08	1.17	1.24	1.25	1.13	1.08	1.17	1.29	1.30	1.26	1.18	1.00	0.70	0.59	0.53
115	0.53	0.62	0.58	0.95	1.11	1.22	1.31	1.34	1.24	1.23	1.28	1.38	1.38	1.30	1.20	1.01	0.72	0.61	0.62
120	0.70	0.66	0.65	0.92	1.13	1.24	1.32	1.30	1.28	1.28	1.32	1.38	1.39	1.32	1.22	0.98	0.72	0.70	0.74
125	0.69	0.68	0.68	0.99	1.06	1.23	1.31	1.32	1.32	1.32	1.36	1.40	1.39	1.31	1.13	1.07	0.71	0.80	0.80
130	0.90	0.86	0.77	1.02	1.11	1.08	1.29	1.34	1.34	1.36	1.38	1.42	1.37	1.19	1.24	1.10	0.84	0.86	0.97
135	0.97	0.96	0.93	0.99	1.10	1.20	1.18	1.18	1.21	1.26	1.25	1.25	1.32	1.32	1.23	1.08	0.82	0.97	1.07
140	0.82	0.84	0.81	1.04	1.14	1.26	1.33	1.36	1.34	1.36	1.39	1.42	1.42	1.33	1.22	1.18	0.80	0.90	1.03
145	1.00	1.00	0.84	1.14	1.17	1.20	1.29	1.31	1.33	1.33	1.35	1.38	1.38	1.29	1.27	1.07	1.06	1.10	1.22
150	1.18	1.04	1.01	0.94	1.17	1.23	1.17	1.18	1.19	1.19	1.21	1.24	1.27	1.36	1.21	0.94	1.12	1.15	1.27
155	1.19	1.09	1.08	0.98	0.95	1.16	1.21	1.17	1.16	1.17	1.23	1.28	1.30	1.16	0.88	1.12	1.10	1.16	1.27
160	1.29	1.17	1.12	1.13	1.05	0.89	0.82	0.92	1.05	1.09	1.08	0.95	0.87	0.91	1.09	1.07	1.06	1.14	1.27
165	1.34	1.21	1.18	1.16	1.15	1.12	1.03	0.85	0.79	0.80	0.84	0.97	1.06	1.05	1.04	1.06	1.12	1.25	1.35
170	1.19	1.13	1.14	1.10	1.07	0.99	0.89	0.84	0.84	0.93	0.99	1.00	1.07	1.12	1.23	1.23	1.26	1.32	1.30
175	1.21	1.19	1.17	1.17	1.17	1.16	1.11	1.03	1.02	0.98	1.00	1.11	1.11	1.12	1.15	1.19	1.27	1.31	1.33
180	1.07	1.07	1.07	1.07	1.07	1.07	1.07	1.07	1.07	1.07	1.07	1.07	1.07	1.07	1.07	1.07	1.07	1.07	1.07

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	1348	1348	1348	1348	1348	1348	1348	1348	1348	1348	1348	1348	1348	1348	1348	1348	1348		
5	1342	1341	1342	1342	1342	1343	1343	1343	1343	1344	1344	1344	1344	1344	1344	1344	1344		
10	1323	1324	1324	1325	1326	1326	1327	1328	1328	1329	1329	1329	1329	1329	1329	1329	1329		
15	1294	1295	1296	1297	1299	1300	1301	1302	1303	1304	1304	1304	1304	1303	1303	1303	1302		
20	1253	1255	1257	1259	1261	1263	1265	1266	1268	1269	1269	1269	1268	1267	1266	1265	1264		
25	1202	1204	1207	1210	1214	1217	1219	1222	1223	1224	1224	1223	1222	1220	1218	1216	1214		
30	1138	1142	1147	1151	1156	1161	1164	1167	1169	1170	1170	1169	1166	1163	1159	1155	1153		
35	1064	1069	1076	1083	1090	1095	1100	1104	1106	1107	1106	1104	1101	1096	1090	1084	1079		
40	979	986	996	1005	1015	1022	1028	1032	1034	1035	1035	1032	1026	1019	1010	1002	995		
45	885	894	907	920	932	941	948	953	955	957	955	951	944	934	921	910	901		
50	783	795	810	828	843	854	863	869	872	872	871	865	854	841	824	809	797		
55	675	689	709	731	749	765	776	783	786	786	783	774	761	742	720	702	688		
60	563	580	605	631	656	676	689	697	701	701	695	684	665	640	614	591	574		
65	449	470	500	534	564	588	603	611	615	614	608	595	570	539	507	479	459		
70	336	362	398	439	474	498	512	531	540	528	518	504	478	442	402	368	345		
75	229	260	303	346	398	399	408	412	414	416	415	404	389	347	303	262	234		
80	131	168	218	240	262	271	271	269	269	273	279	279	271	245	210	166	133		
85	52.3	77.7	98.2	109	110	107	102	99.2	101	106	113	119	121	118	104	79.7	51.3		
90	0.11	0.27	0.74	0.98	1.15	1.38	1.47	1.38	1.41	1.45	1.51	1.33	1.12	0.94	0.00	0.51	0.27		
95	0.41	0.44	0.73	0.82	0.89	1.00	1.07	0.99	0.94	1.13	1.19	1.10	0.98	0.90	0.52	0.58	0.34		
100	0.53	0.60	0.93	0.98	1.00	1.06	1.09	1.02	0.95	1.16	1.21	1.15	1.08	1.02	0.66	0.75	0.48		
105	0.60	0.71	1.17	1.23	1.22	1.24	1.23	1.13	1.07	1.25	1.33	1.31	1.27	1.23	0.82	0.84	0.60		
110	0.66	0.79	1.27	1.43	1.47	1.49	1.45	1.32	1.27	1.41	1.53	1.52	1.48	1.38	0.92	0.90	0.67		
115	0.69	0.82	1.28	1.47	1.56	1.63	1.61	1.50	1.46	1.54	1.66	1.64	1.55	1.41	0.95	0.95	0.70		
120	0.66	0.86	1.25	1.46	1.58	1.66	1.64	1.59	1.55	1.61	1.67	1.68	1.58	1.44	0.98	1.03	0.83		
125	0.73	0.93	1.28	1.42	1.59	1.65	1.66	1.63	1.62	1.65	1.67	1.67	1.58	1.41	1.03	1.03	0.82		
130	0.95	0.98	1.30	1.45	1.52	1.67	1.71	1.70	1.70	1.71	1.71	1.67	1.51	1.45	1.12	0.90	0.97		
135	1.04	0.98	1.36	1.48	1.59	1.60	1.67	1.72	1.73	1.71	1.66	1.65	1.57	1.47	1.15	0.95	1.07		
140	0.93	0.92	1.39	1.49	1.61	1.72	1.75	1.74	1.72	1.76	1.78	1.72	1.61	1.47	1.17	0.96	0.91		
145	1.08	1.06	1.30	1.48	1.61	1.69	1.72	1.72	1.72	1.73	1.72	1.69	1.56	1.52	0.99	1.10	1.09		
150	1.16	1.11	1.10	1.55	1.56	1.59	1.65	1.64	1.64	1.62	1.61	1.57	1.58	1.13	1.16	1.24	1.26		
155	1.14	1.19	1.29	1.09	1.46	1.57	1.56	1.54	1.53	1.52	1.55	1.58	1.18	1.02	1.27	1.29	1.29		
160	1.24	1.26	1.36	1.32	1.02	1.05	1.19	1.35	1.36	1.30	1.11	1.00	1.08	1.33	1.37	1.32	1.37		
165	1.33	1.29	1.25	1.26	1.36	1.35	1.14	0.97	1.00	1.02	1.12	1.19	1.22	1.24	1.29	1.30	1.34		
170	1.38	1.35	1.40	1.39	1.32	1.27	1.25	1.23	1.21	1.12	1.09	1.12	1.16	1.14	1.14	1.16	1.19		
175	1.34	1.34	1.32	1.31	1.37	1.34	1.30	1.25	1.22	1.21	1.18	1.14	1.11	1.13	1.17	1.21	1.23		

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 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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