



LM-79-08 Test Report

for

ABOVE ALL LIGHTING INC.

1501 Industrial Way N. Toms River, NJ 08755.

Troffer Retrofit kit

Model: TRK24D25LED50-DL

Laboratory: Leading Testing Laboratories

NVLAP CODE: 200960-0

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Report No.: HZ16100019d

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

Reviewed by:

Engineer: April Zou
Oct. 21, 2016



Approved by:

Manager: Jim Zhang
Oct. 21, 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: **TRK24D25LED50-DL**

Luminous Efficacy (Lumens /Watt)	Total Luminous Flux (Lumens)	Power (Watts)	Power Factor
135.3	3425.1	25.31	0.9886
CCT (K)	CRI	Stabilization Time (Light & Power)	
5023	82.6	60	

Table 1: Executive Data Summary

Test specifications:

Date of Receipt	: Oct. 19, 2016
Date of Test	: Oct. 20, 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	: TRK24D25LED50-DL
Electrical Ratings	: 120~277Vac, 50/60Hz, 25W
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 24.2°C.

Base orientation was Light down. 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)	0.213	0.099
Power Factor	0.9886	0.9343
Test Power (W)	25.31	25.66
THD A%	7.47	11.42
Luminous Efficacy (lm/W)	135.3	133.6
Total Luminous Flux (lm)	3425.1	3427.2
Color Rendering Index (CRI)	82.6	
R9	2	
Correlated Color Temperature (CCT) (K)	5023	
Chromaticity (Chroma x, Chroma y)	(0.3443, 0.3495)	
Chromaticity (Chroma u, Chroma v)	(0.2117, 0.3223)	
Chromaticity (Chroma u', Chroma v')	(0.2117, 0.4835)	
Duv	0.0007	
Average Beam Angle (°)	117.0	
Center Beam Candle Power (cd)	1128	
Spacing Criteria	1.25 (0°-180°)/ 1.28 (90°-270°)	
Zonal Lumens in the 0°-60°Zone	75.82%	
Zonal Lumens in the 60°-90°Zone	24.01%	
Zonal Lumens in the 90°-120°Zone	0.07%	
Zonal Lumens in the 120°-180°Zone	0.10%	

Special Color Rendering Indices	
R1	81
R2	87
R3	92
R4	84
R5	83
R6	84
R7	85
R8	65
R9	2
R10	70
R11	85
R12	71
R13	82
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

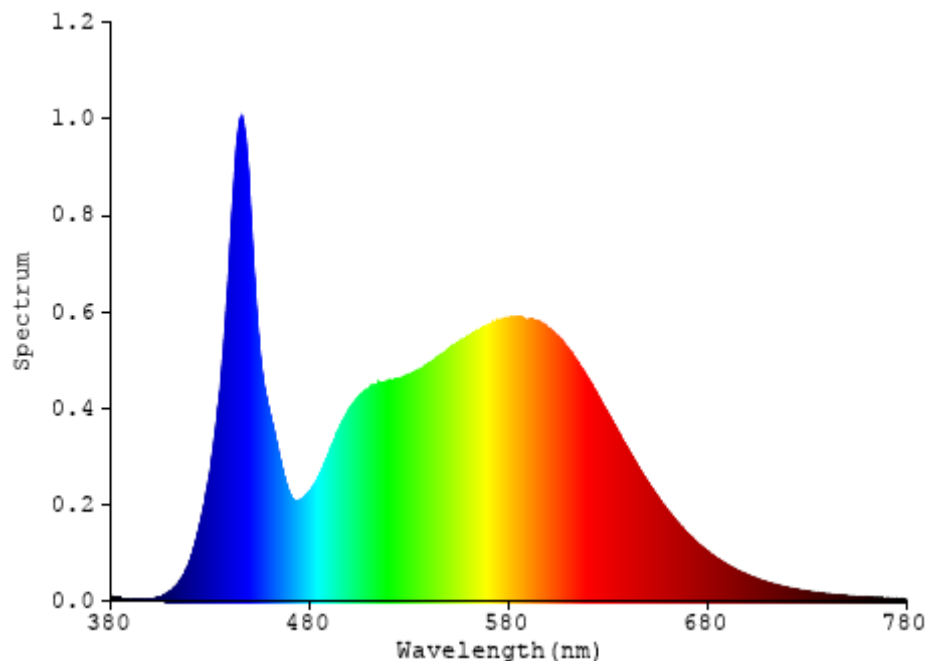


Chart 1: Spectral Power Distribution

Zonal Lumen Tabulation

$\gamma(^{\circ})$	Lumens	% Total
0- 10	106.78	3.12%
10- 20	306.887	8.96%
20- 30	467.987	13.66%
30- 40	568.771	16.61%
40- 50	595.999	17.40%
50- 60	550.541	16.07%
60- 70	449.893	13.14%
70- 80	295.004	8.61%
80- 90	77.358	2.26%
90-100	0.742	0.02%
100-110	0.851	0.02%
110-120	0.973	0.03%
120-130	0.931	0.03%
130-140	0.831	0.02%
140-150	0.687	0.02%
150-160	0.474	0.01%
160-170	0.271	0.01%
170-180	0.093	0.00%
Total	3425.1	100%

$\gamma(^{\circ})$	Lumens	% Total
0- 60	2596.965	75.82%
60- 90	822.255	24.01%
0-90	3419.22	99.83%
90- 180	5.853	0.17%
0- 180	3425.1	100%

Table 3: Zonal Lumen Data

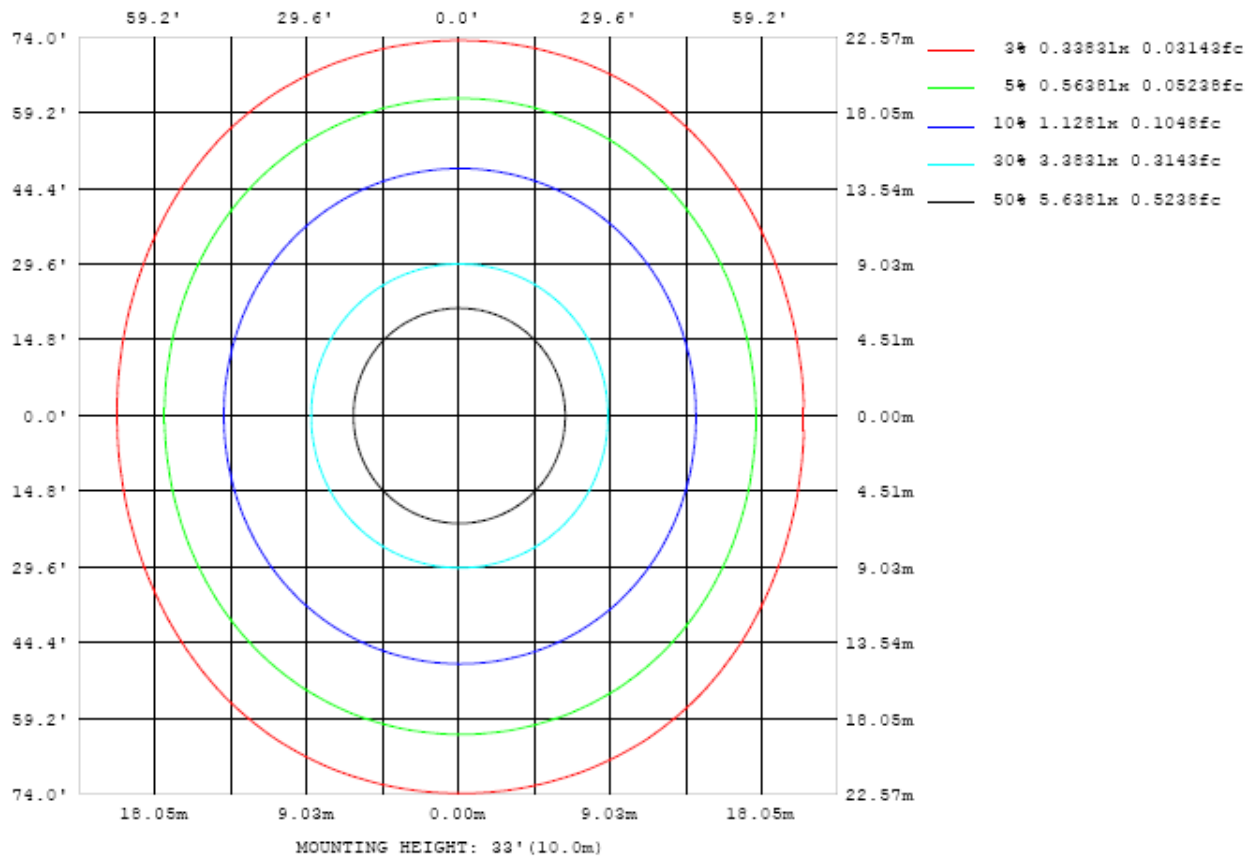


Chart 2: Illuminance Plot (Footcandles)

Luminous Intensity Distribution Plots

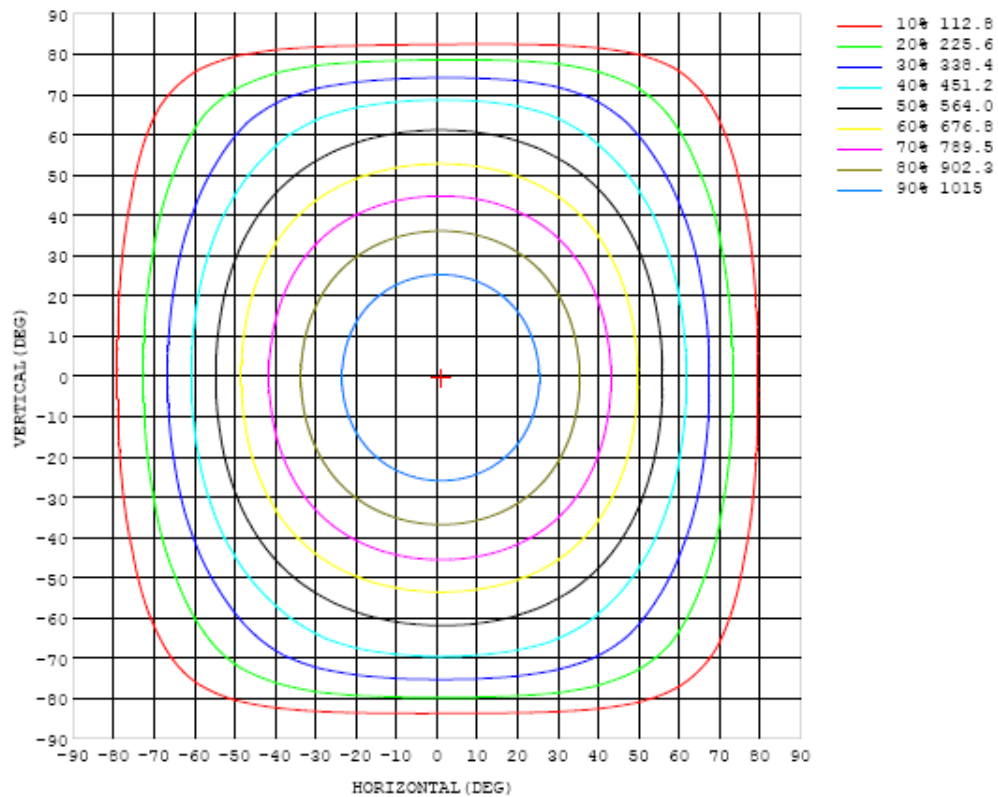


Chart 3: Isocandela Plot

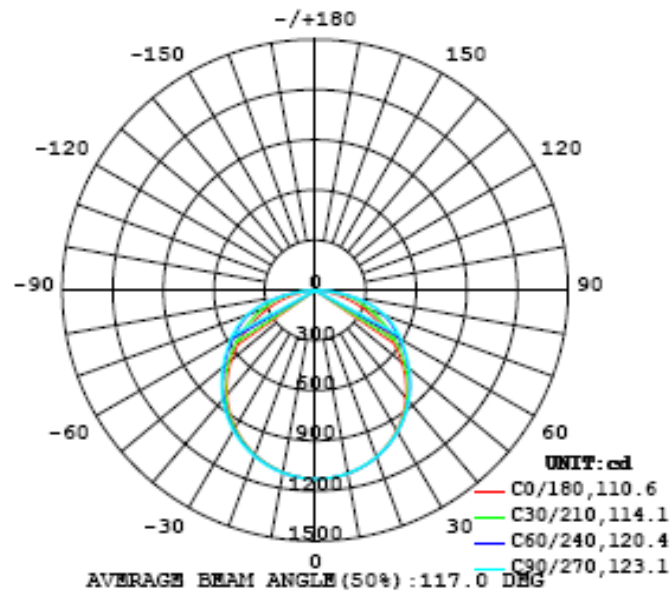


Chart 4: Polar Candela Distribution

Luminous Intensity Data

Table--1

UNIT: cd

C (DEG) y (DEG)	0	10	20	30	40	50	60	70	80	90	100	110	120	130	140	150	160	170	180
0	1128	1128	1128	1128	1128	1128	1128	1128	1128	1128	1128	1128	1128	1128	1128	1128	1128	1128	1128
5	1125	1125	1125	1125	1125	1125	1125	1124	1124	1124	1123	1123	1123	1122	1122	1122	1122	1121	1121
10	1113	1113	1113	1113	1113	1113	1113	1112	1112	1111	1111	1110	1109	1108	1108	1107	1106	1106	1105
15	1091	1091	1092	1092	1092	1092	1092	1091	1091	1090	1089	1088	1087	1085	1084	1083	1081	1081	1080
20	1059	1060	1061	1061	1062	1062	1062	1062	1062	1061	1059	1057	1056	1053	1051	1049	1047	1046	1045
25	1018	1019	1020	1022	1023	1024	1025	1025	1024	1023	1021	1019	1016	1013	1010	1007	1004	1002	1001
30	967	969	971	973	976	977	978	979	978	977	975	972	969	965	960	956	952	949	947
35	907	909	912	916	919	922	924	925	925	923	921	918	914	908	902	896	891	887	885
40	837	839	844	850	856	860	863	864	864	863	860	857	852	845	837	829	821	816	814
45	758	761	768	777	785	791	795	798	798	797	794	790	784	775	765	754	744	738	735
50	672	676	685	696	708	717	723	727	728	727	724	719	711	700	687	673	661	653	650
55	580	585	596	611	626	640	649	654	657	656	653	646	636	622	606	588	573	563	559
60	484	490	503	522	543	562	576	585	589	589	585	576	563	544	522	500	481	469	466
65	386	393	409	434	462	488	507	518	522	522	518	510	494	470	441	412	388	374	370
70	287	296	317	349	385	416	434	442	444	444	441	435	422	398	363	326	296	279	275
75	192	202	229	269	306	330	343	346	346	345	344	341	334	316	287	246	209	187	183
80	104	116	148	184	208	224	229	225	220	218	219	223	224	214	195	168	130	104	97.9
85	34.3	46.4	67.2	84.0	92.8	93.6	86.9	78.9	73.8	72.3	74.8	80.7	87.5	90.1	87.2	76.2	58.4	37.5	31.9
90	0.20	1.77	0.20	2.59	1.14	0.91	1.02	0.97	0.93	0.89	0.89	0.87	0.83	0.59	1.12	2.35	2.13	1.40	0.11
95	0.17	0.25	0.28	0.52	0.66	0.68	0.72	0.75	0.70	0.63	0.68	0.66	0.64	0.61	0.42	0.40	0.21	0.25	0.20
100	0.27	0.34	0.39	0.66	0.71	0.72	0.74	0.76	0.70	0.63	0.70	0.70	0.69	0.66	0.63	0.42	0.30	0.27	0.29
105	0.36	0.46	0.47	0.83	0.84	0.81	0.82	0.81	0.74	0.68	0.75	0.79	0.78	0.79	0.79	0.67	0.35	0.33	0.37
110	0.45	0.52	0.50	0.89	0.97	1.00	1.00	0.96	0.84	0.80	0.87	0.95	0.97	0.95	0.90	0.78	0.41	0.39	0.43
115	0.54	0.55	0.50	0.91	1.03	1.07	1.10	1.07	0.97	0.95	0.99	1.08	1.06	1.02	0.93	0.76	0.47	0.41	0.47
120	0.66	0.60	0.55	0.88	1.03	1.10	1.13	1.08	1.01	1.00	1.02	1.09	1.08	1.02	0.92	0.74	0.52	0.52	0.60
125	0.68	0.66	0.60	0.94	0.98	1.10	1.11	1.08	1.05	1.04	1.05	1.08	1.07	1.01	0.86	0.83	0.53	0.55	0.63
130	0.80	0.82	0.66	0.96	1.00	0.98	1.09	1.10	1.07	1.07	1.07	1.09	1.07	0.91	0.95	0.87	0.62	0.62	0.76
135	0.79	0.80	0.72	0.92	1.03	1.05	0.99	1.00	1.04	1.08	1.05	0.98	0.98	1.01	0.97	0.87	0.60	0.72	0.86
140	0.79	0.82	0.67	0.99	1.03	1.10	1.13	1.12	1.08	1.07	1.09	1.11	1.10	1.04	0.94	0.90	0.68	0.77	0.81
145	0.93	0.89	0.81	1.00	1.03	1.03	1.12	1.13	1.12	1.13	1.12	1.12	1.10	1.00	0.99	0.82	0.86	0.87	0.94
150	1.05	0.99	0.97	0.81	0.98	1.04	1.01	1.01	1.03	1.04	1.02	1.00	1.00	1.03	0.96	0.78	0.82	0.86	0.93
155	1.01	0.99	0.97	0.96	0.77	1.02	0.95	0.98	0.96	0.94	0.97	1.01	0.99	0.99	0.77	0.90	0.73	0.71	0.97
160	1.02	1.01	0.99	1.00	1.00	0.75	0.61	0.80	0.94	0.93	0.95	0.83	0.75	0.84	0.95	0.87	0.85	0.80	0.92
165	1.11	1.06	1.02	1.01	0.88	0.76	0.80	0.75	0.71	0.72	0.75	0.78	1.00	0.97	0.91	0.89	0.91	0.92	1.05
170	0.87	0.87	0.82	0.85	0.89	0.91	0.90	0.84	0.86	0.88	0.91	0.91	0.88	0.87	0.96	0.98	0.96	0.97	1.02
175	1.10	1.09	1.07	1.06	1.03	0.96	0.92	0.91	0.90	0.88	0.90	0.81	0.89	0.90	0.91	0.93	0.95	0.97	1.02
180	0.96	0.96	0.96	0.97	0.98	1.01	0.99	0.92	0.88	1.01	0.71	0.87	0.93	0.97	1.04	1.06	1.04	1.03	1.09

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	1128	1128	1128	1128	1128	1128	1128	1128	1128	1128	1128	1128	1128	1128	1128	1128	1128		
5	1121	1121	1121	1121	1122	1122	1122	1123	1123	1123	1123	1124	1124	1124	1124	1125	1125		
10	1105	1105	1106	1106	1107	1107	1108	1109	1109	1110	1110	1111	1111	1112	1112	1112	1112		
15	1080	1080	1081	1082	1083	1084	1085	1086	1087	1088	1088	1089	1089	1090	1090	1090	1090		
20	1045	1046	1047	1049	1050	1052	1054	1055	1056	1057	1058	1059	1059	1059	1059	1059	1059		
25	1001	1003	1005	1007	1010	1012	1014	1016	1017	1018	1019	1020	1020	1019	1019	1018	1018		
30	948	951	954	957	960	964	966	968	970	971	972	972	972	971	969	968	967		
35	886	890	894	899	904	908	911	913	915	917	918	917	916	914	911	908	907		
40	816	821	827	834	840	845	849	852	854	855	856	855	853	849	845	840	837		
45	737	744	753	762	770	776	781	784	787	788	788	786	782	777	770	764	759		
50	653	662	673	684	695	703	709	713	716	717	716	713	707	699	689	680	674		
55	563	574	588	604	618	629	638	643	646	646	644	638	628	616	603	590	582		
60	470	483	501	522	542	558	569	576	579	579	574	565	550	532	513	497	487		
65	376	391	415	444	471	491	502	508	510	510	506	495	475	448	422	401	389		
70	282	302	333	369	398	414	421	425	427	428	427	420	401	370	335	307	291		
75	192	218	256	288	308	317	318	319	320	322	325	325	314	290	253	217	197		
80	110	141	170	187	197	196	190	184	184	189	198	206	206	192	170	135	110		
85	42.5	59.1	68.3	66.3	55.3	48.7	42.0	41.8	41.7	41.4	48.4	55.8	68.8	77.6	73.9	59.8	39.9		
90	0.23	0.35	0.76	0.97	1.13	1.26	1.30	1.23	1.17	1.25	1.27	1.21	1.09	0.94	0.67	0.27	0.17		
95	0.35	0.40	0.70	0.81	0.89	0.95	1.00	0.98	0.91	0.98	0.96	0.93	0.89	0.80	0.66	0.47	0.30		
100	0.43	0.54	0.84	0.90	0.95	1.00	1.03	0.98	0.92	1.01	1.01	0.98	0.95	0.91	0.83	0.69	0.43		
105	0.48	0.61	1.00	1.08	1.10	1.13	1.13	1.06	1.01	1.10	1.13	1.13	1.13	1.13	1.00	0.79	0.50		
110	0.53	0.65	1.06	1.18	1.26	1.31	1.31	1.21	1.18	1.25	1.33	1.34	1.32	1.24	1.04	0.83	0.56		
115	0.56	0.63	1.08	1.22	1.32	1.40	1.39	1.32	1.30	1.35	1.44	1.43	1.39	1.27	1.02	0.85	0.61		
120	0.54	0.69	1.06	1.22	1.35	1.42	1.41	1.38	1.38	1.42	1.46	1.46	1.40	1.27	1.00	0.87	0.75		
125	0.58	0.76	1.07	1.18	1.36	1.42	1.44	1.42	1.43	1.45	1.46	1.44	1.37	1.21	1.04	0.91	0.77		
130	0.81	0.80	1.08	1.23	1.31	1.45	1.47	1.48	1.48	1.49	1.49	1.43	1.30	1.26	1.08	0.89	0.89		
135	0.95	0.90	1.15	1.25	1.38	1.42	1.43	1.46	1.47	1.46	1.42	1.41	1.33	1.23	1.14	0.81	0.88		
140	0.80	0.70	1.16	1.25	1.37	1.46	1.49	1.50	1.50	1.49	1.48	1.42	1.31	1.25	1.17	0.83	0.75		
145	0.96	0.78	1.22	1.29	1.36	1.41	1.45	1.47	1.50	1.44	1.41	1.34	1.29	1.26	0.84	1.12	0.92		
150	0.94	1.04	0.84	1.26	1.33	1.33	1.40	1.39	1.38	1.35	1.30	1.25	1.29	1.04	0.86	1.13	1.07		
155	0.92	0.99	1.15	0.83	1.29	1.32	1.31	1.30	1.30	1.30	1.24	1.31	0.98	0.89	1.24	1.10	1.11		
160	0.97	1.06	1.07	1.17	0.90	0.88	0.91	1.22	1.31	1.22	0.89	0.80	0.91	1.29	1.21	1.13	1.16		
165	1.03	0.99	1.08	1.10	1.12	1.17	1.06	0.83	0.87	0.88	0.93	1.15	1.02	1.09	1.18	1.18	1.18		
170	0.99	1.03	1.06	1.13	1.09	1.08	1.07	1.12	1.10	1.02	1.01	0.97	0.97	0.98	0.95	0.91	0.92		
175	1.02	1.02	1.01	1.01	1.02	1.03	1.04	0.96	0.95	0.93	0.94	0.98	0.98	1.03	1.10	1.08	1.09		
180	1.09	1.08	1.08	1.07	1.06	1.04	1.04	1.01	0.92	0.86	0.85	0.92	0.95	0.96	0.96	0.97	0.97		

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 ***

This report is considered invalidated without the Special Seal for Inspection of the LTL. This report shall not be altered, increased or deleted. The results shown in this test report refer only to the sample(s) tested. Without written approval of LTL, this test report shall not be copied except in full and published as advertisement.

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