



LM-79-08 Test Report

for

ELEC-TECH INTERNATIONAL CO LTD

No.1 Jinfeng Road, Tangjiawan Town, Xiangzhou District, Zhuhai City, Guangdong Province, P.R. China 519085

LED Cabinet Light

Model: 535041##(##=11-30)

Laboratory: Leading Testing Laboratories

NVLAP CODE: 200960-0

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Report No.: HZ17070067h/R1

This report is replaced the old report No. HZ17070067h dated Jul. 25, 2017

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

Review by:

Engineer: April Zou

Jul. 25, 2017

Approved by:

Manager: Jim Zhang

Jul. 25, 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: 535041##(##=11-30)

Luminous Efficacy (Lumens /Watt)	Total Luminous Flux (Lumens)	Power (Watts)	Power Factor
63.2	776.8	12.30	0.9808
CCT (K)	CRI	Stabilization Time (Light & Power)	
2979	93.0	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	: Jul. 23, 2017
Date of Test	: Jul. 25, 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	: LED Cabinet Light
Model	: 535041##(##=11-30)
Electrical Ratings	: 120V, 60Hz
Product Description	: 3000K, Dimmable
Manufacturer	: ELEC-TECH INTERNATIONAL CO LTD
Address	: No.1 Jinfeng Road, Tangjiawan Town, Xiangzhou District, ZhuhaiCity, Guangdong Province, P.R. China 519085

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 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
Voltage frequency (Hz)	60
Test Current (A)	0.105
Power Factor	0.9808
Test Power (W)	12.30
THD A%	16.68
Luminous Efficacy (lm/W)	63.2
Total Luminous Flux (lm)	776.8
Color Rendering Index (CRI)	93.0
R9	61
Correlated Color Temperature (CCT) (K)	2979
Chromaticity (Chroma x, Chroma y)	(0.4355, 0.3987)
Chromaticity (Chroma u, Chroma v)	(0.2520, 0.3460)
Chromaticity (Chroma u', Chroma v')	(0.2520, 0.5190)
Duv	0.0020
Average Beam Angle (°)	112.0
Center Beam Candle Power (cd)	229
Spacing Criteria	1.24 (0°-180°) 1.04 (90°-270°)
Zonal Lumens in the 0°-60°Zone	65.88%
Zonal Lumens in the 60°-90°Zone	21.77%
Zonal Lumens in the 90°-120°Zone	5.26%
Zonal Lumens in the 120°-180°Zone	7.08%

Special Rendering Indices	Color
R1	94
R2	99
R3	97
R4	92
R5	94
R6	96
R7	90
R8	81
R9	61
R10	97
R11	94
R12	83
R13	96
R14	99

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

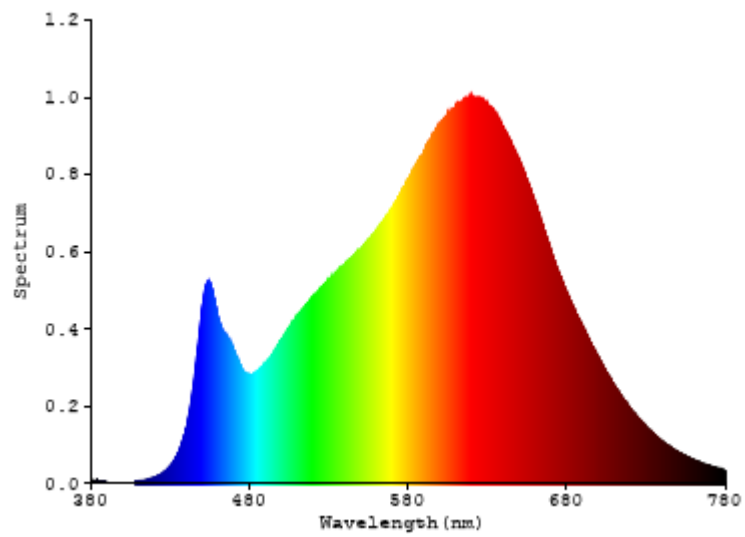


Chart 1: Spectral Power Distribution

Zonal Lumen Tabulation

$\gamma(^{\circ})$	Lumens	% Total
0- 10	21.68	2.79%
10- 20	61.996	7.98%
20- 30	93.455	12.03%
30- 40	112.133	14.44%
40- 50	116.268	14.97%
50- 60	106.221	13.67%
60- 70	84.527	10.88%
70- 80	55.727	7.17%
80- 90	28.891	3.72%
90-100	15.442	1.99%
100-110	12.911	1.66%
110-120	12.52	1.61%
120-130	12.939	1.67%
130-140	13.026	1.68%
140-150	12.004	1.55%
150-160	9.702	1.25%
160-170	5.849	0.75%
170-180	1.507	0.19%
Total	776.8	100%

$\gamma(^{\circ})$	Lumens	% Total
0- 60	511.753	65.88%
60- 90	169.145	21.77%
0-90	680.898	87.65%
90- 180	95.9	12.35%
0- 180	776.8	100%

Table 3: Zonal Lumen Data

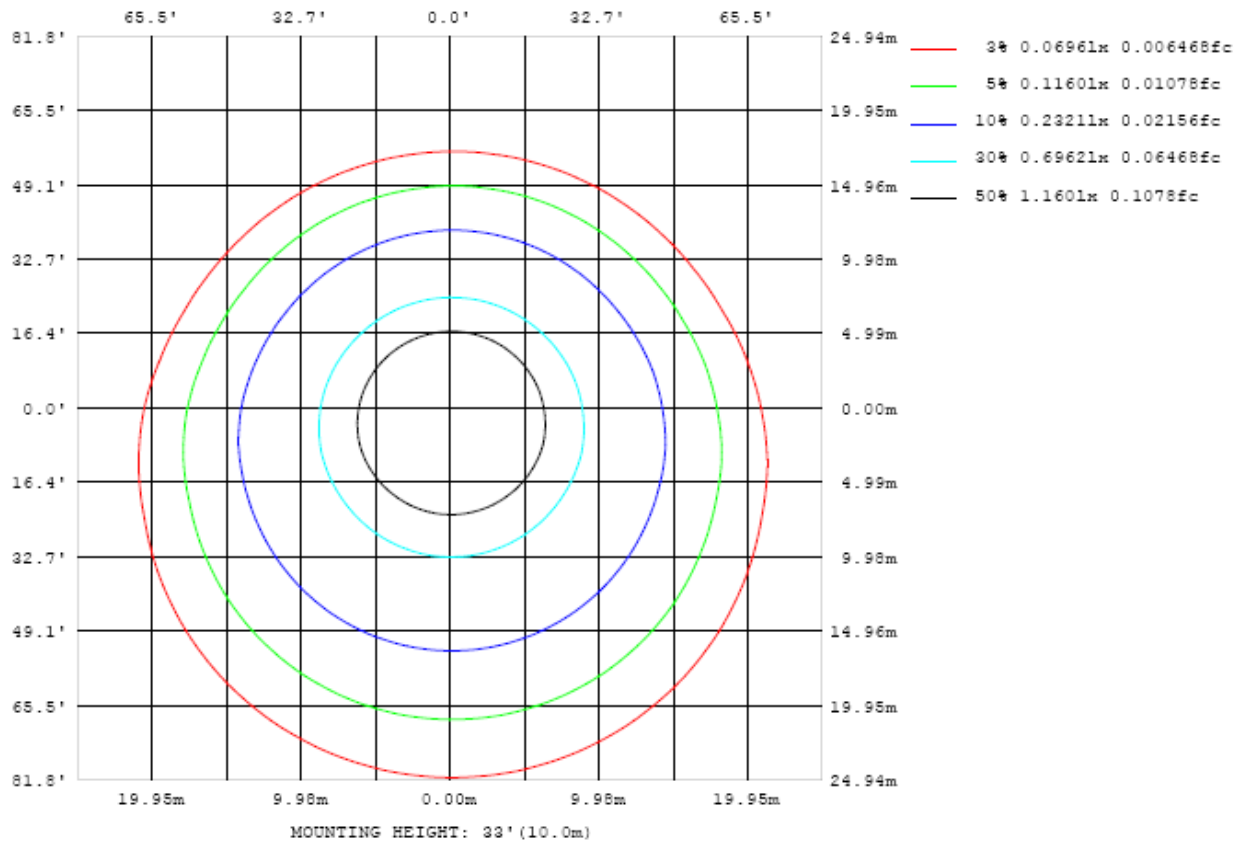


Chart 2: Illuminance Plot (Footcandles)

Luminous Intensity Distribution Plots

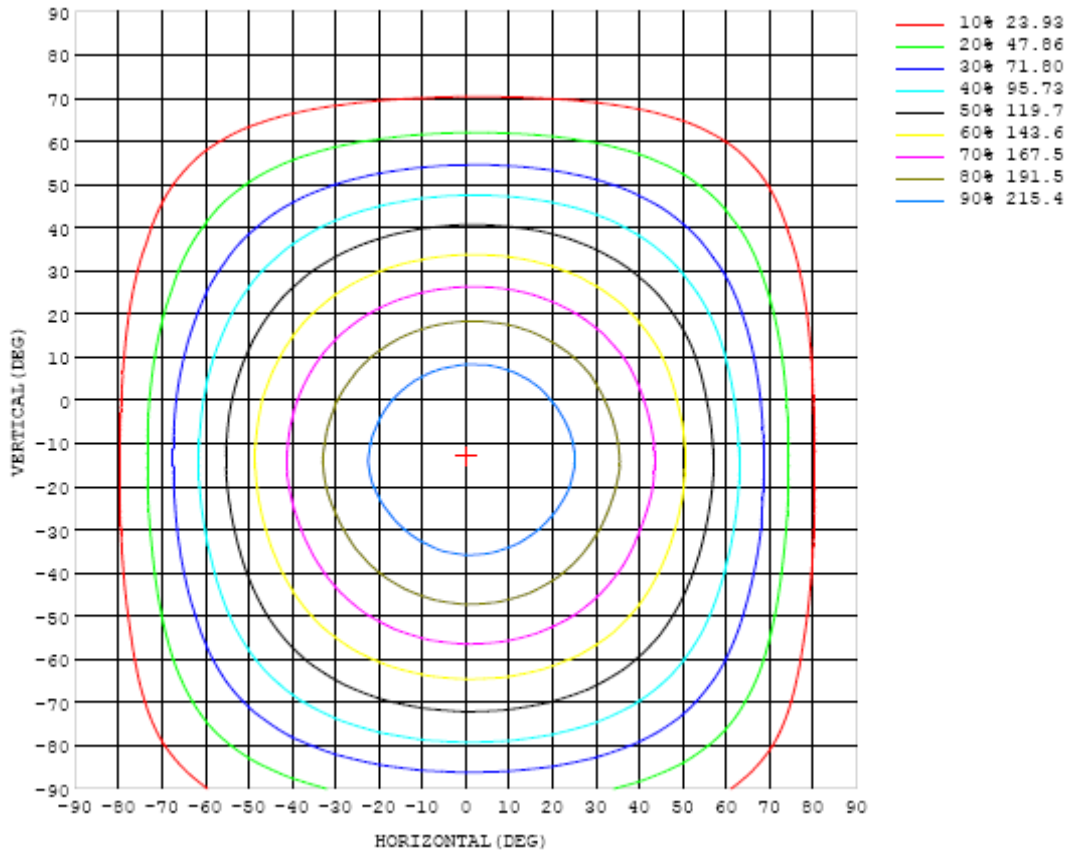


Chart 3: Isocandela Plot

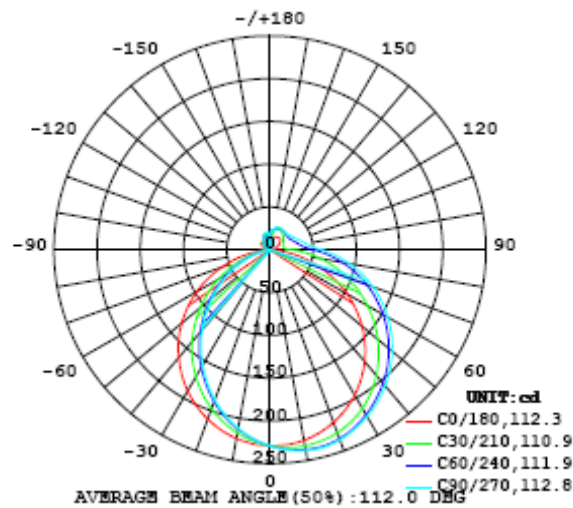


Chart 4: Polar Candela Distribution

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	229	229	229	229	229	229	229	229	229	229	229	229	229	229	229	229	229	229	229
5	229	230	231	232	233	234	234	235	235	235	235	234	234	233	232	231	230	229	228
10	226	228	231	233	234	236	237	238	238	238	238	237	236	234	233	231	228	226	224
15	221	225	228	231	234	236	238	238	239	239	238	237	236	234	231	228	225	222	218
20	215	219	224	228	231	233	235	236	237	236	236	235	233	230	227	224	220	215	211
25	206	212	218	222	226	228	230	231	231	231	231	229	227	225	221	217	212	207	201
30	196	203	209	214	218	220	222	224	225	225	224	222	219	216	213	209	203	197	191
35	184	192	199	204	208	211	214	216	217	217	216	213	210	207	202	198	192	185	178
40	170	179	187	191	196	200	203	206	207	208	206	204	200	196	190	185	180	172	164
45	156	165	173	178	183	188	192	195	197	197	196	193	189	183	177	171	165	158	150
50	139	149	157	163	170	175	180	183	185	185	183	180	176	170	163	157	150	142	133
55	121	132	140	147	154	161	166	169	171	172	170	167	162	156	149	141	133	126	116
60	103	114	122	130	139	145	151	155	157	158	156	153	148	141	133	124	115	108	97.7
65	83.4	94.4	103	113	122	130	135	140	142	142	141	137	132	126	117	108	97.2	88.6	78.6
70	63.6	73.8	84.2	95.2	105	113	119	124	126	127	125	122	116	109	101	90.5	79.2	68.8	59.3
75	43.5	53.6	65.9	77.2	87.3	95.7	102	107	110	110	109	105	99.7	92.4	83.6	73.2	61.8	49.6	40.0
80	24.3	34.6	47.9	59.8	69.7	78.2	85.0	89.7	92.6	93.2	91.8	88.2	82.7	75.5	66.5	56.5	44.6	31.6	21.9
85	8.30	18.4	30.8	41.9	52.1	60.8	67.7	72.4	75.3	76.1	74.6	71.1	65.9	58.6	49.6	39.5	28.4	16.6	7.01
90	0.20	5.61	14.6	25.1	35.1	43.8	50.7	55.8	58.8	59.6	58.3	54.8	49.4	42.2	33.4	23.5	13.2	4.72	0.09
95	1.23	4.10	10.2	18.0	26.0	33.4	39.6	44.2	47.0	47.8	46.7	43.6	38.8	32.5	25.2	17.4	9.87	4.14	1.04
100	3.21	5.29	10.2	16.5	23.4	29.8	35.1	39.1	41.5	42.2	41.3	38.7	34.5	29.1	22.7	16.0	9.97	5.18	2.18
105	5.45	7.26	11.0	16.0	21.7	27.2	32.0	35.6	37.9	38.4	37.6	35.2	31.5	26.7	21.1	15.6	10.8	7.04	3.85
110	7.63	9.36	12.1	16.2	20.8	25.4	29.5	32.7	34.7	35.3	34.5	32.4	29.1	24.9	20.3	15.8	12.1	8.22	5.80
115	9.72	12.2	13.7	16.7	20.5	24.2	27.6	30.3	32.0	32.5	31.8	30.0	27.2	23.7	20.0	16.5	13.7	9.40	8.33
120	11.7	14.2	14.9	17.8	20.7	23.6	26.3	28.5	29.9	30.3	29.7	28.2	25.9	23.1	20.2	17.6	14.8	11.2	10.6
125	13.7	16.2	17.5	19.1	21.3	23.6	25.5	27.3	28.3	28.6	28.2	26.9	25.1	23.0	20.9	18.9	16.4	12.7	12.2
130	15.4	17.7	19.4	20.1	22.2	24.0	25.4	26.6	27.4	27.6	27.3	26.3	25.0	23.4	21.8	19.9	14.5	14.2	12.8
135	16.9	19.3	21.0	22.1	23.3	24.6	25.7	26.6	27.1	27.2	26.9	26.2	25.3	24.1	22.9	21.1	17.6	16.6	12.6
140	17.5	20.6	22.3	23.3	24.5	25.5	26.2	26.8	27.2	27.3	27.1	26.6	25.8	24.9	23.4	19.1	20.2	17.1	12.4
145	17.4	21.8	23.3	24.4	25.3	26.2	26.8	27.3	27.5	27.6	27.4	27.0	26.4	25.3	23.1	22.3	20.0	17.9	12.1
150	17.1	22.8	24.1	25.2	26.0	26.7	27.3	27.7	27.9	27.9	27.6	27.2	26.7	25.5	23.9	23.4	18.4	19.9	11.7
155	16.6	23.5	24.8	25.7	26.5	27.1	27.5	27.8	28.0	28.0	27.9	27.6	26.8	25.4	24.9	20.5	19.7	21.5	12.0
160	16.1	22.5	24.9	25.6	26.7	27.3	27.6	27.9	28.0	28.0	27.9	27.5	26.4	25.8	23.1	20.6	20.9	21.9	12.7
165	15.5	20.2	23.7	24.6	24.8	25.5	26.0	26.9	27.5	27.4	26.9	25.8	24.0	22.8	20.6	19.0	18.5	15.4	12.2
170	14.7	16.3	17.5	19.5	23.9	23.7	23.5	23.3	23.3	23.3	23.2	23.0	21.9	14.5	14.0	13.6	13.7	11.1	10.6
175	14.4	14.5	14.6	14.7	14.9	16.7	19.4	22.6	24.4	24.3	21.9	11.5	10.7	10.5	10.2	10.7	9.11	9.16	9.60
180	0.07	0.07	0.06	0.06	0.05	0.04	0.03	0.02	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

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	229	229	229	229	229	229	229	229	229	229	229	229	229	229	229	229	229		
5	226	225	224	223	223	222	222	222	222	222	222	223	224	224	225	227	228		
10	221	220	217	216	214	213	212	212	212	212	213	214	216	217	220	222	224		
15	215	212	209	206	204	202	201	200	200	201	202	204	206	209	212	215	218		
20	206	202	198	194	191	189	187	187	187	187	189	191	194	198	202	206	211		
25	196	191	185	181	177	174	173	172	172	173	174	177	181	185	190	195	201		
30	184	178	172	166	162	159	157	156	156	157	159	162	166	171	177	183	190		
35	170	163	157	151	146	143	140	139	139	140	142	146	150	156	162	169	177		
40	156	148	141	134	129	125	123	122	122	123	125	129	133	139	146	154	163		
45	140	131	123	117	112	108	106	104	104	105	108	111	116	121	129	138	147		
50	123	113	105	99.1	94.1	90.5	88.3	87.1	87.1	88.0	90.1	93.6	98.2	104	111	120	130		
55	105	95.1	87.1	81.3	76.8	73.5	71.3	70.2	70.2	71.1	73.2	76.3	80.4	85.7	92.7	101	112		
60	86.3	76.6	69.5	64.2	59.9	57.1	55.1	54.2	54.0	54.9	56.7	59.5	63.3	68.1	74.2	82.2	92.8		
65	67.2	58.3	52.1	47.6	44.0	41.4	39.7	38.9	38.8	39.5	41.1	43.6	46.8	51.0	56.3	63.3	72.9		
70	48.0	40.9	35.8	32.1	29.3	27.1	25.6	24.9	24.7	25.3	26.7	28.8	31.4	35.0	39.4	45.1	52.9		
75	30.1	24.9	21.2	18.3	16.0	14.2	12.8	12.1	12.0	12.5	13.7	15.4	17.7	20.4	23.8	28.1	33.9		
80	14.8	11.3	8.73	6.61	4.91	3.60	2.71	2.25	2.16	2.45	3.20	4.38	5.98	7.99	10.5	13.5	17.3		
85	3.59	1.93	0.79	0.46	0.36	0.31	0.27	0.23	0.19	0.22	0.27	0.33	0.42	0.65	1.33	2.92	4.80		
90	0.10	0.12	0.14	0.16	0.19	0.20	0.21	0.20	0.19	0.21	0.23	0.24	0.26	0.27	0.25	0.25	0.19		
95	0.15	0.13	0.14	0.15	0.17	0.18	0.20	0.20	0.20	0.21	0.20	0.20	0.20	0.19	0.19	0.19	0.18		
100	1.30	0.41	0.22	0.20	0.21	0.22	0.22	0.22	0.23	0.23	0.22	0.22	0.22	0.24	0.25	0.49	1.49		
105	2.83	1.80	0.78	0.34	0.31	0.30	0.29	0.29	0.30	0.29	0.29	0.30	0.32	0.36	0.90	2.05	3.20		
110	4.57	3.61	2.39	1.31	0.70	0.47	0.42	0.41	0.41	0.41	0.41	0.46	0.73	1.46	2.60	3.99	5.19		
115	6.54	5.37	4.19	3.04	2.07	1.42	1.05	0.87	0.82	0.88	1.08	1.50	2.22	3.24	4.56	5.96	7.22		
120	8.56	7.13	6.04	4.91	3.92	3.13	2.58	2.27	2.19	2.32	2.67	3.28	4.11	5.21	6.52	8.09	9.21		
125	10.4	9.12	7.92	6.81	5.83	5.06	4.50	4.16	4.08	4.24	4.63	5.25	6.12	7.26	8.60	10.2	11.0		
130	11.8	11.1	9.77	8.79	7.86	7.06	6.50	6.19	6.10	6.27	6.66	7.34	8.24	9.32	10.6	12.2	12.8		
135	13.4	11.3	11.7	10.6	9.84	9.13	8.63	8.33	8.26	8.42	8.81	9.45	10.3	11.4	12.7	14.1	14.5		
140	15.0	13.3	12.0	12.6	11.8	11.2	10.7	10.4	10.4	10.5	10.9	11.5	12.4	13.4	14.3	15.7	16.0		
145	15.9	15.7	12.6	14.5	13.7	13.1	12.7	12.5	12.5	12.6	13.0	13.6	14.4	15.4	15.4	17.1	17.3		
150	17.6	17.3	15.2	13.2	15.6	15.1	14.8	14.6	14.6	14.8	15.1	15.7	16.3	15.9	17.3	18.6	18.6		
155	18.7	18.5	17.5	16.3	13.5	15.9	16.8	16.6	16.6	16.8	17.0	16.7	17.2	17.6	19.0	19.9	19.0		
160	14.8	19.6	19.8	19.1	17.9	16.0	18.4	18.5	18.6	18.3	18.1	18.5	18.8	19.5	20.1	20.9	20.0		
165	11.3	14.9	17.5	18.9	20.5	19.1	18.8	20.2	20.2	19.9	19.8	20.3	20.6	20.8	21.1	19.8	17.5		
170	10.9	11.2	12.5	12.7	13.7	15.2	19.6	19.6	19.2	21.6	21.6	21.6	21.9	22.0	18.9	16.6	14.5		
175	9.63	11.2	11.1	11.9	10.6	10.5	10.3	10.2	12.0	14.5	20.1	19.8	17.2	14.4	14.0	14.1	14.3		
180	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.02	0.03	0.04	0.05	0.06	0.06	0.07		

Table 5: Luminous Intensity Data

EQUIPMENT LIST

Test Equipment	Model	Equipment No.	Calibration Date	Calibration Due date
Goniophotometer system	GO-R5000	HZTE011-01	Jul. 26, 2016	Jul. 25, 2017
Digital Power Meter	PF2010A	HZTE028-01	Jul. 26, 2016	Jul. 25, 2017
AC Power Supply	DPS1060	HZTE001-06	Dec. 25, 2016	Dec. 24, 2017
DC Power Supply	WY12010	HZTE004-03	Dec. 25, 2016	Dec. 24, 2017
Temperature Meter	TES1310	HZTE017-01	Aug. 08, 2016	Aug. 07, 2017
Standard Source	D908	HZTE012-01	Jul. 28, 2016	Jul. 27, 2017
Standard source	SCL-1400	HZTE012-02	Jul. 28, 2016	Jul. 27, 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 2.3% with a coverage factor $k=2$.

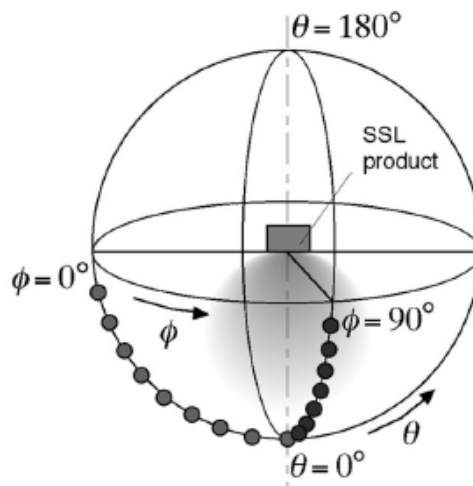
Color Characteristics Measurements

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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