



LM-79-08 Test Report

for

GREEN CREATIVE LTD

756 North Zhongshan Rd., Unit B301 Zhabei District, Shanghai

LED Panel

Model: 38PAN24DIM/850/277V

Laboratory: Leading Testing Laboratories

NVLAP CODE: 200960-0

3rd Floor, Bld. 2, NO. 96 Longchuanwu Rd Qianjiang Economy Dev. Zone, Yuhang Dist,
Hangzhou, Zhejiang Province, China 311100

Tel: +86 571 86376106

www.ledtestlab.com

Report No.: HZ17010030d

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

Review by:

Engineer: April Zou
Feb. 04, 2017

Manager: Jim Zhang
Feb. 04, 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: 38PAN24DIM/850/277V

Luminous Efficacy (Lumens /Watt)	Total Luminous Flux (Lumens)	Power (Watts)	Power Factor
117.6	4463.0	37.95	0.9944
CCT (K)	CRI	Stabilization Time (Light & Power)	
4885	83.6	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	: Jan. 17, 2017
Date of Test	: Jan. 19, 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

TABLE OF CONTENT

LM-79-08 Test Report.....	1
Test Summary.....	2
Sample Photos.....	4
TEST RESULTS	5
Spectral Power Distribution	6
Zonal Lumen Tabulation.....	7
Luminous Intensity Distribution Plots.....	9
Luminous Intensity Data	10
EQUIPMENT LIST	12
TEST METHODS	12
Seasoning of SSL Product.....	12
Goniophotometer Method	12
Photometric and Electrical Measurements.....	12
Color Characteristics Measurements.....	13
Color Spatial Uniformity	13

Sample Photos



Overview of the sample

Equipment Under Test (EUT)

Name	: LED Panel
Model	: 38PAN24DIM/850/277V
Electrical Ratings	: 120-277V, 60Hz
Product Description	: 5000K, CRI80
Manufacturer	: GREEN CREATIVE LTD
Address	: 756 North Zhongshan Rd., Unit B301 Zhabei District, 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 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	277.0
Voltage frequency (Hz)	60	60
Test Current (A)	0.318	0.149
Power Factor	0.9944	0.9167
Test Power (W)	37.95	37.80
THD A%	8.77	15.81
Luminous Efficacy (lm/W)	117.6	118.1
Total Luminous Flux (lm)	4463.0	4463.6
Color Rendering Index (CRI)	83.6	
R9	13.5	
Correlated Color Temperature (CCT) (K)	4885	
Chromaticity (Chroma x, Chroma y)	(0.3493, 0.3618)	
Chromaticity (Chroma u, Chroma v)	(0.2103, 0.3268)	
Chromaticity (Chroma u', Chroma v')	(0.2103, 0.4902)	
Duv	0.0034	
Average Beam Angle (°)	96.0	
Center Beam Candle Power (cd)	1836	
Spacing Criteria	1.33 (0°-180°)/ 1.32 (90°-270°)	
Zonal Lumens in the 0°-60°Zone	86.59%	
Zonal Lumens in the 60°-90°Zone	13.36%	
Zonal Lumens in the 90°-120°Zone	0.01%	
Zonal Lumens in the 120°-180°Zone	0.04%	

Special Color Rendering Indices	
R1	81.2
R2	88.4
R3	93.9
R4	83.5
R5	82.6
R6	84.6
R7	87.0
R8	68.1
R9	13.5
R10	72.9
R11	84.4
R12	52.1
R13	82.6
R14	96.8

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

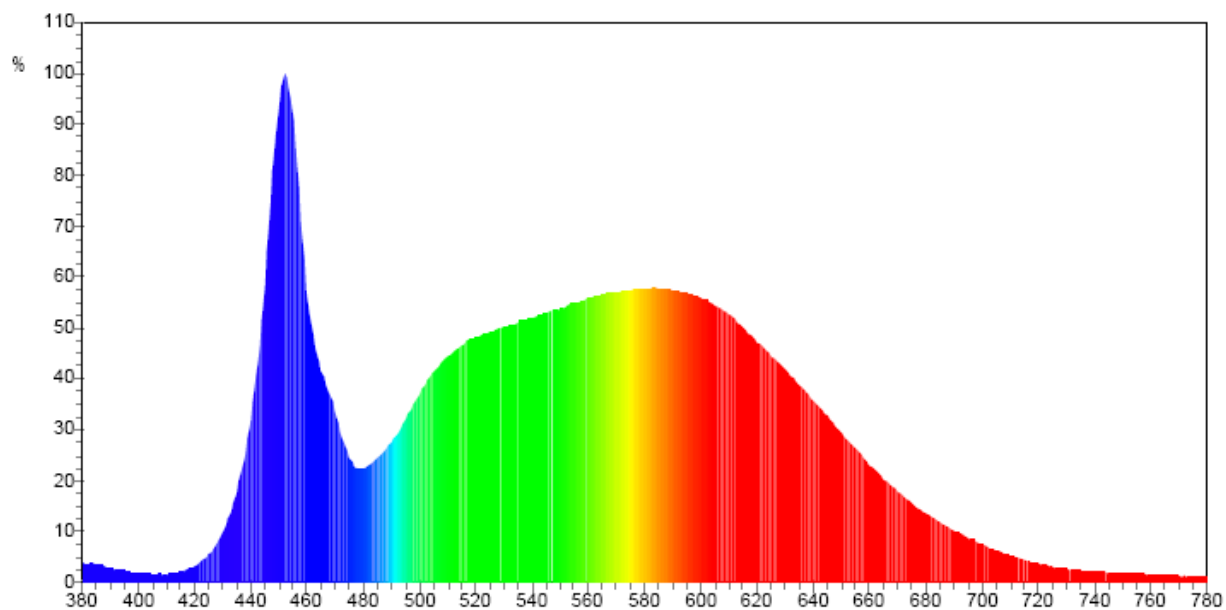


Chart 1: Spectral Power Distribution

Zonal Lumen Tabulation

$\gamma(^{\circ})$	Lumens	% Total
0- 10	175.131	3.92%
10- 20	517.036	11.58%
20- 30	817.041	18.31%
30- 40	968.753	21.71%
40- 50	828.775	18.57%
50- 60	557.54	12.49%
60- 70	335.84	7.53%
70- 80	194.942	4.37%
80- 90	65.54	1.47%
90-100	0.162	0.00%
100-110	0.183	0.00%
110-120	0.253	0.01%
120-130	0.329	0.01%
130-140	0.412	0.01%
140-150	0.411	0.01%
150-160	0.325	0.01%
160-170	0.224	0.01%
170-180	0.086	0.00%
Total	4463.0	100%

$\gamma(^{\circ})$	Lumens	% Total
0- 60	3864.276	86.59%
60- 90	596.322	13.36%
0-90	4460.598	99.95%
90- 180	2.385	0.05%
0- 180	4463.0	100%

Table 3: Zonal Lumen Data

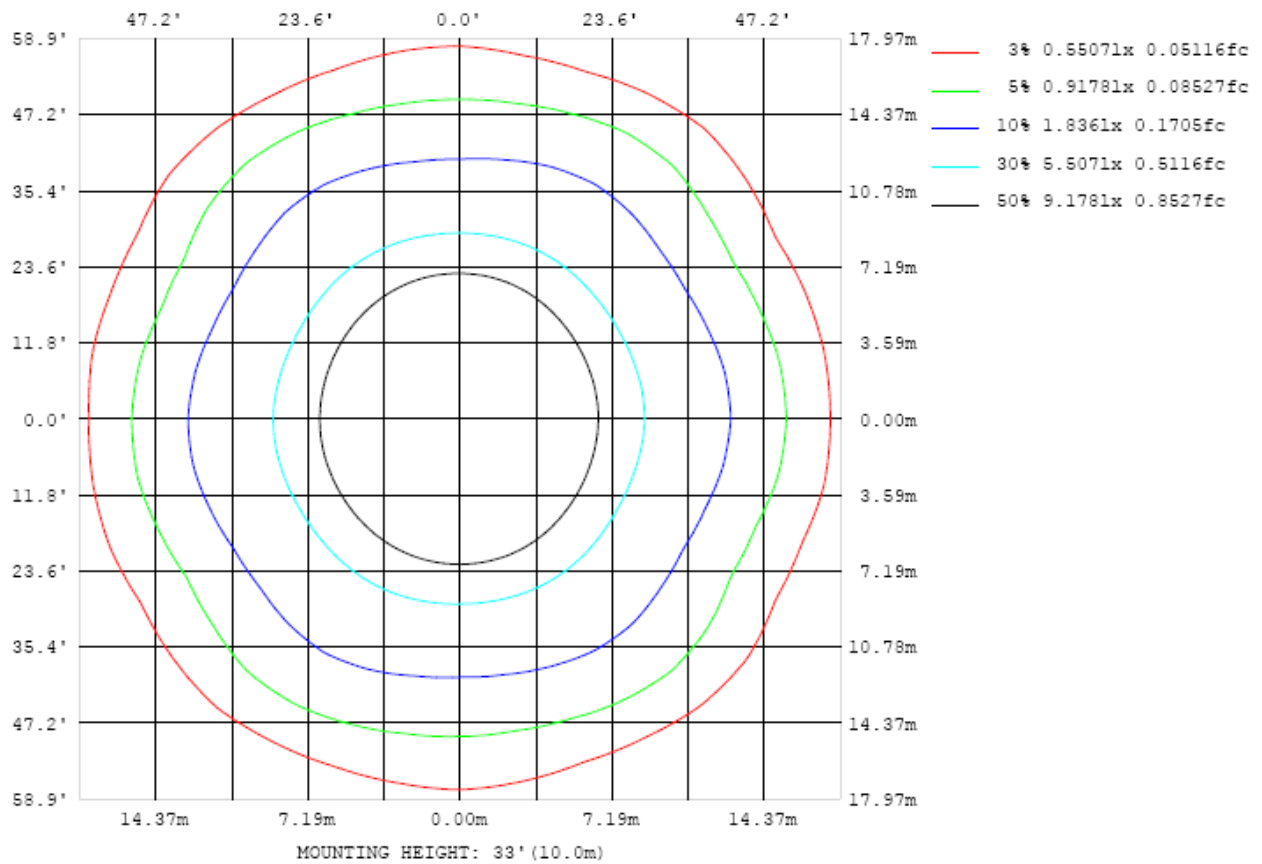


Chart 2: Illuminance Plot (Footcandles)

Luminous Intensity Distribution Plots

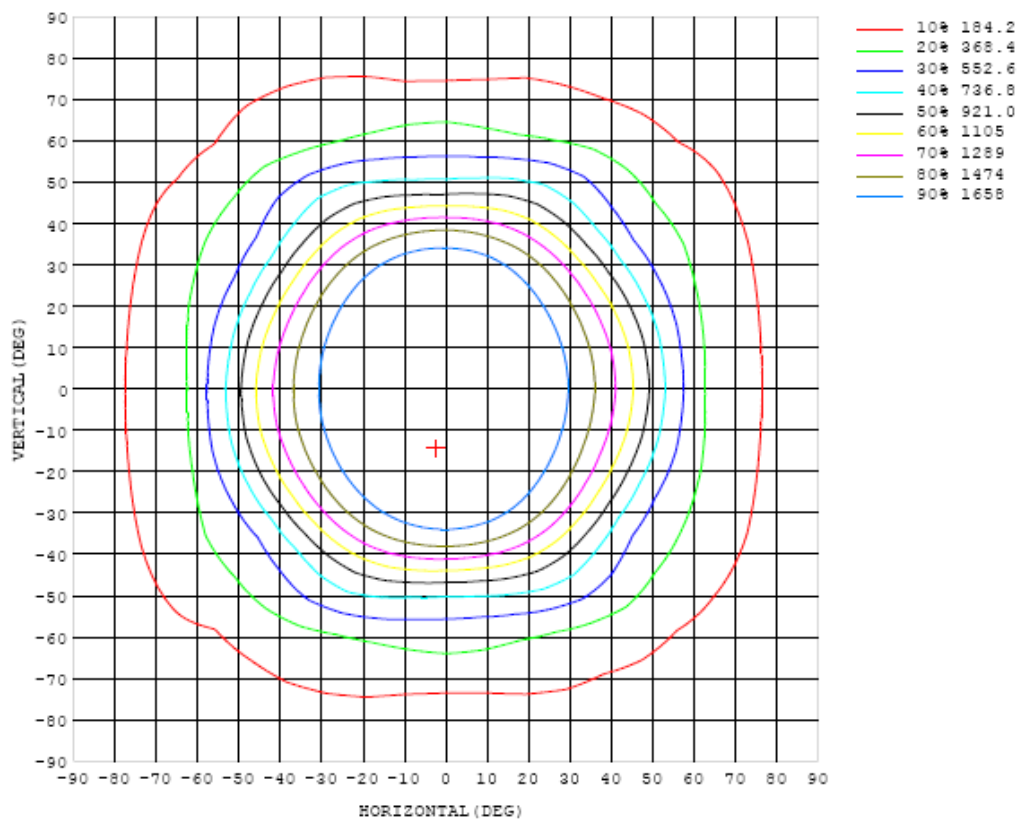


Chart 3: Isocandela Plot

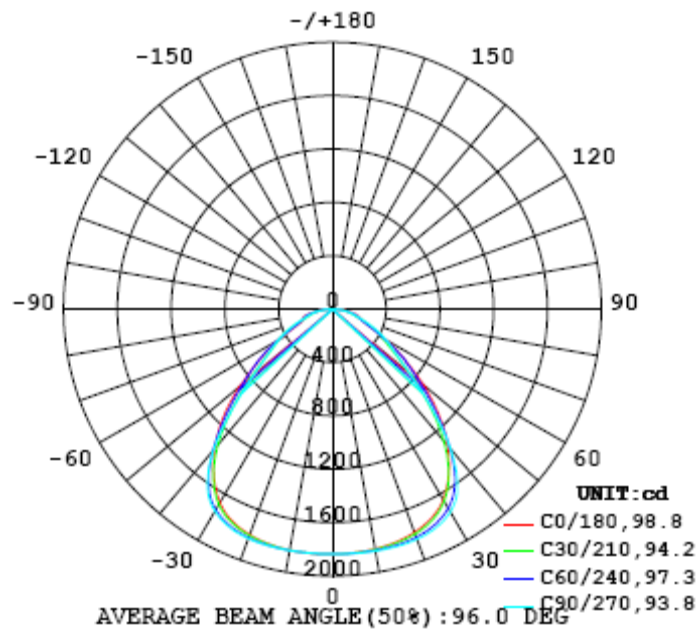


Chart 4: Polar Candela Distribution

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	1836	1836	1836	1836	1836	1836	1836	1836	1836	1836	1836	1836	1836	1836	1836	1836	1836	1836	1836
5	1832	1833	1833	1834	1834	1835	1836	1836	1837	1838	1838	1838	1838	1838	1838	1837	1837	1837	1837
10	1824	1825	1826	1828	1831	1833	1835	1838	1839	1840	1841	1840	1839	1838	1837	1836	1835	1834	1834
15	1809	1810	1813	1817	1822	1827	1832	1837	1840	1841	1842	1840	1837	1834	1831	1828	1825	1824	1822
20	1781	1783	1787	1793	1801	1810	1819	1827	1832	1835	1835	1832	1827	1820	1814	1808	1804	1802	1799
25	1733	1734	1740	1748	1760	1773	1787	1799	1807	1811	1811	1807	1797	1786	1776	1768	1762	1759	1757
30	1648	1647	1650	1661	1678	1700	1722	1739	1749	1754	1753	1746	1732	1714	1698	1687	1680	1677	1675
35	1507	1501	1497	1508	1531	1561	1589	1608	1617	1621	1620	1612	1597	1577	1556	1541	1537	1539	1537
40	1330	1312	1290	1286	1308	1339	1360	1366	1363	1364	1373	1381	1376	1356	1335	1327	1339	1357	1361
45	1119	1092	1046	1020	1036	1070	1089	1073	1043	1036	1063	1097	1102	1079	1054	1059	1099	1141	1151
50	880	844	782	752	786	835	842	804	762	750	777	831	858	828	782	780	832	887	898
55	652	624	563	550	612	659	652	596	571	570	586	632	672	659	598	567	607	656	665
60	459	457	429	429	475	481	450	432	445	458	453	455	476	495	472	448	466	471	464
65	306	334	336	328	342	317	299	312	337	347	332	314	307	337	349	343	359	318	297
70	231	258	249	229	235	219	221	236	243	243	238	235	223	235	238	230	266	252	237
75	197	197	173	160	171	175	184	182	169	165	174	189	190	186	171	162	195	216	220
80	141	134	118	116	117	124	124	117	114	115	119	122	130	123	121	126	125	133	140
85	77.9	70.5	58.7	52.6	52.2	53.4	51.9	49.1	46.7	46.6	48.5	51.4	54.4	53.9	53.0	55.5	58.9	70.2	74.8
90	3.95	4.73	3.92	2.88	1.37	1.06	0.71	0.32	0.12	0.16	0.17	0.37	0.83	1.12	1.28	2.78	3.39	2.74	0.09
95	0.08	0.08	0.08	0.08	0.08	0.08	0.09	0.08	0.08	0.09	0.09	0.09	0.09	0.09	0.09	0.08	0.08	0.08	0.12
100	0.11	0.10	0.10	0.10	0.10	0.10	0.11	0.11	0.10	0.10	0.11	0.11	0.11	0.11	0.11	0.11	0.10	0.11	0.16
105	0.15	0.14	0.13	0.12	0.12	0.12	0.14	0.14	0.13	0.13	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.22
110	0.17	0.16	0.16	0.15	0.14	0.15	0.17	0.17	0.17	0.17	0.18	0.18	0.18	0.18	0.18	0.17	0.17	0.17	0.25
115	0.21	0.19	0.18	0.18	0.17	0.18	0.19	0.20	0.20	0.20	0.20	0.21	0.21	0.21	0.21	0.21	0.20	0.21	0.28
120	0.26	0.23	0.22	0.22	0.21	0.21	0.22	0.22	0.23	0.23	0.24	0.24	0.24	0.25	0.26	0.26	0.25	0.26	0.34
125	0.32	0.28	0.25	0.26	0.25	0.26	0.26	0.26	0.27	0.28	0.29	0.30	0.30	0.32	0.32	0.32	0.31	0.32	0.43
130	0.39	0.35	0.33	0.31	0.30	0.30	0.32	0.31	0.32	0.34	0.35	0.37	0.37	0.38	0.39	0.39	0.37	0.39	0.50
135	0.47	0.44	0.41	0.39	0.37	0.36	0.38	0.38	0.37	0.41	0.42	0.43	0.44	0.45	0.46	0.46	0.45	0.47	0.58
140	0.54	0.51	0.49	0.47	0.46	0.45	0.46	0.46	0.46	0.48	0.48	0.50	0.51	0.52	0.53	0.52	0.52	0.55	0.64
145	0.61	0.59	0.57	0.54	0.52	0.51	0.50	0.50	0.51	0.53	0.52	0.53	0.54	0.56	0.56	0.56	0.58	0.62	0.71
150	0.67	0.64	0.62	0.57	0.53	0.53	0.50	0.50	0.50	0.50	0.50	0.52	0.55	0.57	0.57	0.58	0.60	0.66	0.77
155	0.73	0.68	0.67	0.64	0.59	0.54	0.51	0.50	0.49	0.48	0.51	0.53	0.57	0.60	0.61	0.64	0.65	0.71	0.81
160	0.81	0.74	0.74	0.70	0.65	0.58	0.52	0.50	0.48	0.47	0.52	0.57	0.63	0.67	0.68	0.70	0.72	0.79	0.88
165	0.87	0.80	0.81	0.79	0.75	0.67	0.60	0.56	0.55	0.56	0.61	0.67	0.73	0.76	0.79	0.81	0.81	0.85	0.89
170	0.91	0.86	0.87	0.86	0.84	0.78	0.71	0.69	0.72	0.70	0.70	0.77	0.84	0.85	0.85	0.87	0.87	0.92	0.93
175	0.91	0.91	0.93	0.95	0.95	0.95	0.91	0.86	0.88	0.80	0.80	0.86	0.86	0.86	0.88	0.91	0.93	0.94	0.96
180	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88

Table 4: Luminous Intensity Data

Table--2

UNIT: cd

C (DEG) γ (DEG)	190	200	210	220	230	240	250	260	270	280	290	300	310	320	330	340	350		
0	1836	1836	1836	1836	1836	1836	1836	1836	1836	1836	1836	1836	1836	1836	1836	1836	1836		
5	1836	1836	1836	1836	1836	1836	1836	1835	1835	1835	1834	1833	1833	1833	1832	1832	1832		
10	1833	1834	1834	1835	1835	1836	1836	1836	1836	1835	1833	1831	1829	1827	1826	1825	1824		
15	1822	1824	1826	1828	1831	1834	1836	1837	1836	1834	1831	1826	1821	1817	1813	1811	1809		
20	1800	1802	1806	1811	1818	1824	1828	1830	1829	1826	1820	1812	1804	1796	1789	1784	1781		
25	1758	1762	1767	1776	1786	1796	1803	1806	1806	1800	1792	1780	1766	1753	1744	1736	1733		
30	1676	1681	1690	1704	1721	1736	1747	1750	1749	1743	1731	1713	1692	1673	1658	1651	1648		
35	1534	1535	1545	1563	1585	1605	1619	1625	1623	1616	1603	1581	1553	1526	1507	1502	1506		
40	1348	1330	1325	1342	1366	1382	1385	1380	1376	1375	1367	1351	1325	1298	1289	1302	1322		
45	1123	1080	1054	1067	1100	1117	1099	1061	1047	1068	1097	1095	1060	1024	1025	1064	1104		
50	865	810	783	813	860	868	828	777	763	797	847	865	830	780	765	807	861		
55	633	586	582	642	687	672	622	589	582	596	636	675	658	596	562	589	633		
60	472	459	461	503	506	479	461	464	467	450	453	487	504	468	429	444	458		
65	346	360	353	362	331	315	330	349	357	336	316	322	350	351	336	347	325		
70	269	251	233	250	234	239	249	250	255	247	240	228	237	245	240	265	249		
75	209	178	170	192	201	208	198	178	177	184	195	187	180	177	168	189	198		
80	129	130	131	127	137	137	134	131	128	126	132	136	128	124	121	125	138		
85	71.2	61.6	59.2	61.0	66.2	67.8	63.6	61.5	60.6	63.4	65.1	67.8	65.0	60.2	61.4	65.6	76.1		
90	0.07	0.12	0.20	0.22	0.41	0.55	0.91	1.02	1.16	1.40	1.71	1.82	1.71	1.47	1.28	1.28	0.69		
95	0.11	0.11	0.11	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.11	0.11	0.12		
100	0.15	0.15	0.15	0.15	0.16	0.16	0.16	0.16	0.16	0.16	0.16	0.16	0.16	0.15	0.15	0.15	0.16		
105	0.20	0.20	0.20	0.20	0.21	0.22	0.22	0.21	0.21	0.21	0.22	0.22	0.21	0.21	0.20	0.21	0.22		
110	0.24	0.24	0.25	0.26	0.27	0.28	0.29	0.28	0.28	0.28	0.29	0.28	0.27	0.26	0.26	0.25	0.26		
115	0.27	0.28	0.29	0.30	0.31	0.33	0.34	0.34	0.34	0.34	0.34	0.33	0.32	0.30	0.30	0.29	0.29		
120	0.33	0.34	0.34	0.35	0.36	0.38	0.39	0.40	0.40	0.40	0.40	0.38	0.37	0.36	0.36	0.35	0.35		
125	0.41	0.41	0.43	0.42	0.44	0.45	0.46	0.47	0.48	0.48	0.47	0.46	0.45	0.44	0.44	0.43	0.43		
130	0.49	0.51	0.53	0.53	0.54	0.56	0.58	0.60	0.60	0.59	0.59	0.57	0.56	0.54	0.53	0.51	0.50		
135	0.57	0.59	0.61	0.64	0.66	0.68	0.69	0.72	0.73	0.72	0.71	0.70	0.67	0.65	0.63	0.60	0.58		
140	0.63	0.66	0.69	0.71	0.74	0.77	0.81	0.84	0.84	0.83	0.81	0.79	0.74	0.71	0.68	0.65	0.63		
145	0.70	0.72	0.74	0.77	0.79	0.81	0.85	0.88	0.89	0.87	0.83	0.79	0.77	0.75	0.72	0.68	0.69		
150	0.77	0.76	0.78	0.82	0.83	0.83	0.85	0.86	0.86	0.80	0.79	0.80	0.79	0.76	0.76	0.75	0.77		
155	0.80	0.80	0.82	0.83	0.83	0.83	0.84	0.81	0.79	0.79	0.80	0.79	0.79	0.79	0.81	0.81	0.83		
160	0.87	0.86	0.85	0.87	0.86	0.83	0.83	0.81	0.79	0.81	0.81	0.80	0.81	0.84	0.87	0.90	0.91		
165	0.90	0.90	0.91	0.91	0.91	0.88	0.87	0.85	0.82	0.79	0.79	0.79	0.81	0.84	0.86	0.89	0.91		
170	0.96	0.98	1.00	1.01	1.00	0.97	0.95	0.92	0.90	0.87	0.84	0.83	0.85	0.87	0.90	0.93	0.93		
175	0.99	1.00	1.00	1.01	1.02	1.01	0.98	0.95	0.93	0.95	0.97	0.94	0.88	0.85	0.88	0.92	0.93		
180	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88		

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 Panels) 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 $k=2$.

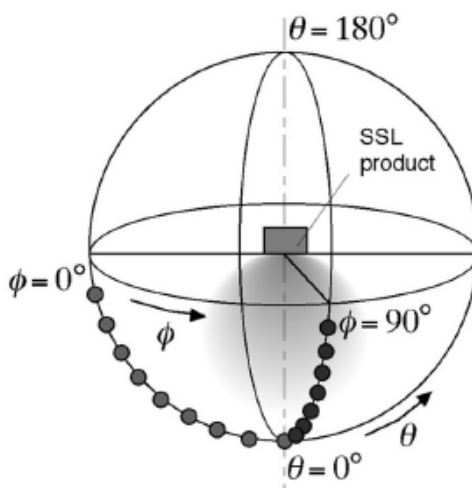
Color Characteristics Measurements

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.

Prepared by: Leading Testing Laboratories
3rd Floor, Bld. 2, NO. 96 Longchuanwu Rd Qianjiang Economy Dev. Zone, Yuhang Dist,
Hangzhou, Zhejiang Province, China 311100
Tel: +86 571 86376106 www.ledtestlab.com

Page 13 of 13