



LM-79-08 Test Report

for

GREEN CREATIVE LTD

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

LED Panel

Model: 38PAN24DIM/830/277V

Laboratory: Leading Testing Laboratories

NVLAP CODE: 200960-0

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Report No.: HZ17010030c

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

Review by:

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Feb. 04, 2017

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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/830/277V

Luminous Efficacy (Lumens /Watt)	Total Luminous Flux (Lumens)	Power (Watts)	Power Factor
110.7	4197.1	37.90	0.9907
CCT (K)	CRI	Stabilization Time (Light & Power)	
2889	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

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Sample Photos



Overview of the sample

Equipment Under Test (EUT)

Name	: LED Panel
Model	: 38PAN24DIM/830/277V
Electrical Ratings	: 120-277V, 60Hz
Product Description	: 3000K, 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)	0.319	0.149
Power Factor	0.9907	0.9151
Test Power (W)	37.90	37.78
THD A%	12.11	17.11
Luminous Efficacy (lm/W)	110.7	111.1
Total Luminous Flux (lm)	4197.1	4198.0
Color Rendering Index (CRI)	83.6	
R9	11	
Correlated Color Temperature (CCT) (K)	2889	
Chromaticity (Chroma x, Chroma y)	(0.4463, 0.4091)	
Chromaticity (Chroma u, Chroma v)	(0.2544, 0.3498)	
Chromaticity (Chroma u', Chroma v')	(0.2544, 0.5247)	
Duv	0.0008	
Average Beam Angle (°)	95.9	
Center Beam Candle Power (cd)	1728	
Spacing Criteria	1.33 (0°-180°)/ 1.32 (90°-270°)	
Zonal Lumens in the 0°-60°Zone	86.56%	
Zonal Lumens in the 60°-90°Zone	13.38%	
Zonal Lumens in the 90°-120°Zone	0.01%	
Zonal Lumens in the 120°-180°Zone	0.04%	

Special Color Rendering Indices	
R1	82
R2	92
R3	96
R4	82
R5	83
R6	91
R7	83
R8	60
R9	11
R10	82
R11	82
R12	74
R13	84
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

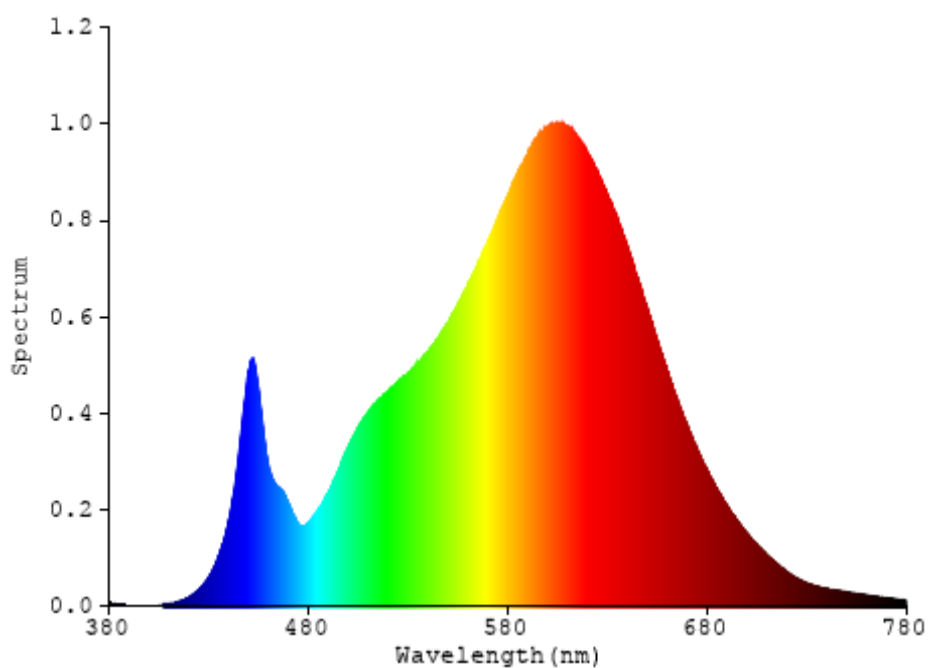


Chart 1: Spectral Power Distribution

Zonal Lumen Tabulation

$\gamma(^{\circ})$	Lumens	% Total
0- 10	164.787	3.93%
10- 20	486.416	11.59%
20- 30	768.459	18.31%
30- 40	910.95	21.70%
40- 50	779.508	18.57%
50- 60	523.029	12.46%
60- 70	315.17	7.51%
70- 80	183.738	4.38%
80- 90	62.752	1.50%
90-100	0.165	0.00%
100-110	0.171	0.00%
110-120	0.235	0.01%
120-130	0.308	0.01%
130-140	0.385	0.01%
140-150	0.384	0.01%
150-160	0.304	0.01%
160-170	0.209	0.00%
170-180	0.08	0.00%
Total	4197.1	100%

$\gamma(^{\circ})$	Lumens	% Total
0- 60	3633.149	86.56%
60- 90	561.66	13.38%
0-90	4194.809	99.95%
90- 180	2.241	0.05%
0- 180	4197.1	100%

Table 3: Zonal Lumen Data

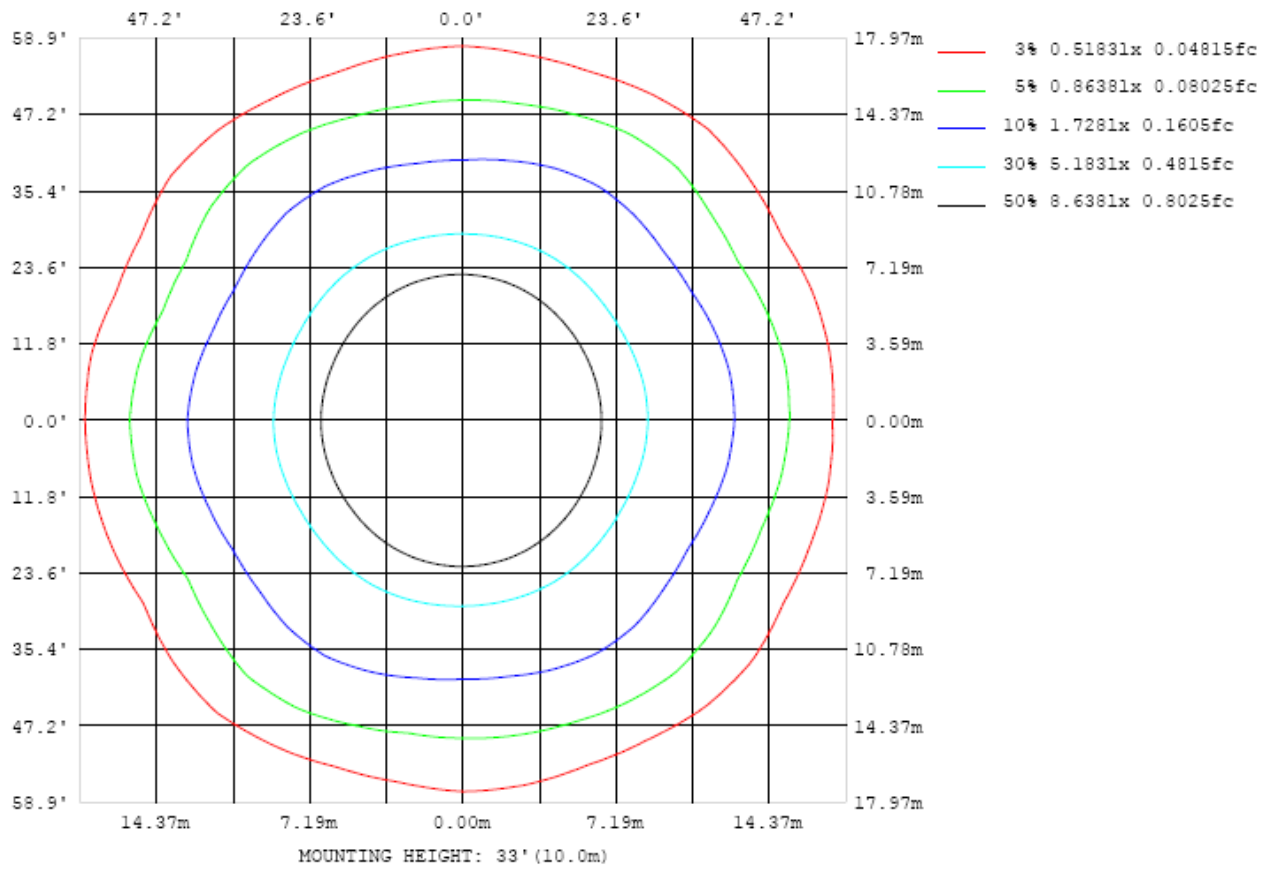


Chart 2: Illuminance Plot (Footcandles)

Luminous Intensity Distribution Plots

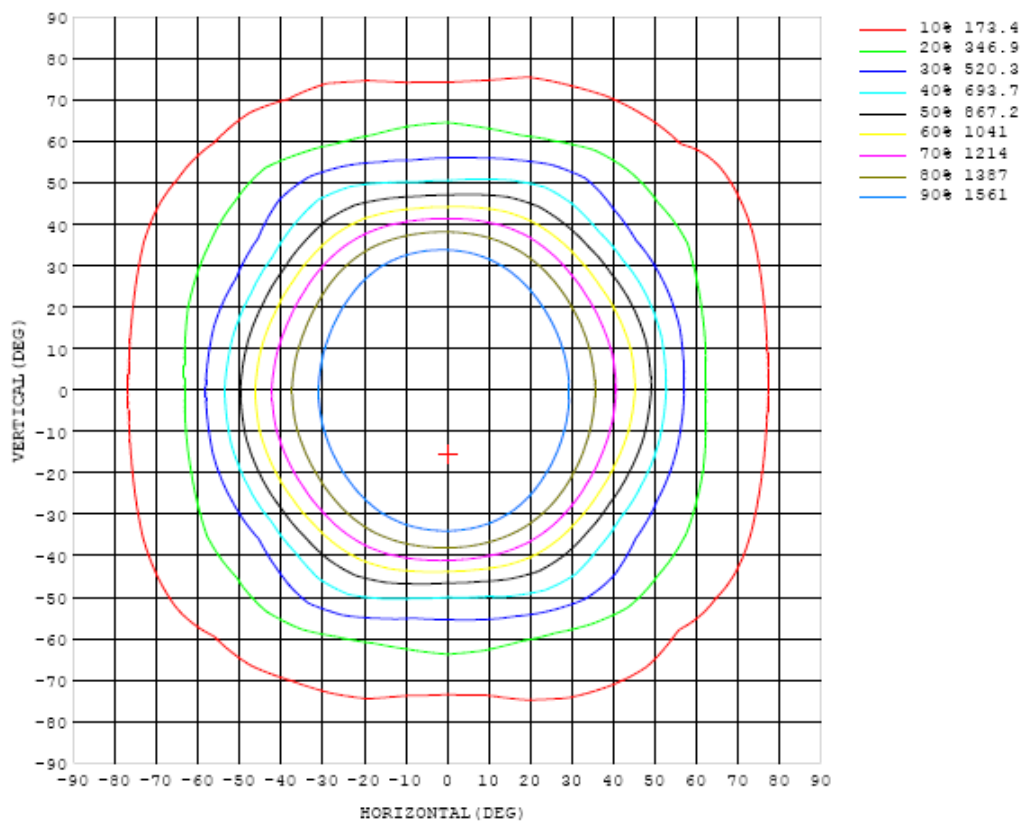


Chart 3: Isocandela Plot

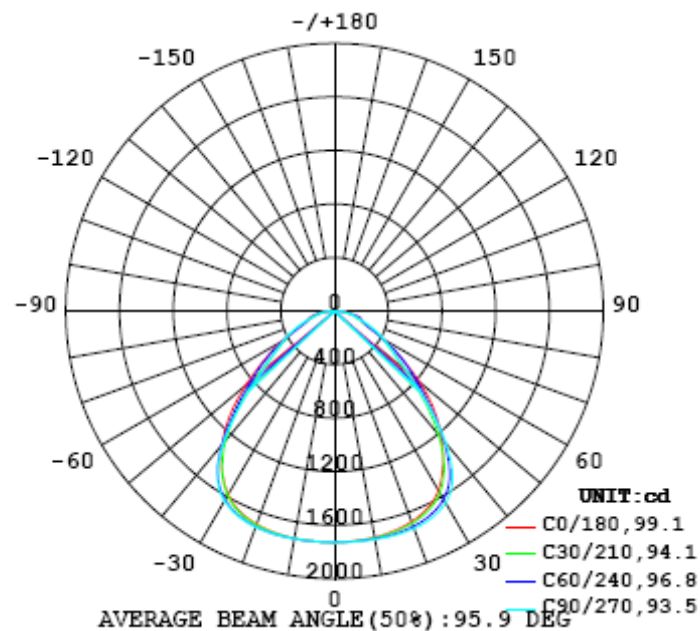


Chart 4: Polar Candela Distribution

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	1728	1728	1728	1728	1728	1728	1728	1728	1728	1728	1728	1728	1728	1728	1728	1728	1728	1728	1728
5	1724	1724	1725	1725	1726	1727	1727	1728	1729	1729	1729	1729	1730	1729	1729	1729	1729	1729	1728
10	1716	1717	1718	1720	1723	1725	1728	1730	1731	1733	1732	1732	1731	1730	1729	1727	1727	1726	1725
15	1701	1703	1706	1710	1714	1720	1725	1729	1732	1734	1733	1732	1730	1727	1723	1720	1718	1716	1715
20	1675	1678	1682	1688	1696	1705	1713	1721	1726	1729	1728	1726	1721	1715	1709	1704	1700	1697	1695
25	1630	1633	1638	1646	1657	1670	1683	1695	1702	1706	1706	1702	1694	1684	1675	1667	1663	1659	1657
30	1547	1550	1556	1566	1582	1602	1622	1638	1648	1652	1652	1646	1634	1617	1602	1592	1587	1585	1582
35	1406	1405	1408	1420	1442	1468	1493	1512	1524	1529	1528	1523	1509	1489	1468	1456	1455	1460	1460
40	1238	1225	1207	1202	1218	1245	1268	1277	1281	1285	1295	1304	1303	1286	1265	1262	1277	1296	1301
45	1048	1020	974	942	949	982	1007	998	971	967	999	1038	1051	1034	1011	1016	1051	1089	1100
50	822	789	734	700	721	768	785	755	710	696	729	786	823	804	760	748	793	844	861
55	597	569	533	528	574	611	601	564	543	531	536	584	646	639	574	534	570	624	641
60	418	422	414	415	447	446	417	407	421	426	411	417	453	479	450	411	430	448	457
65	277	315	325	310	317	294	276	285	310	323	310	297	294	324	335	321	334	311	302
70	222	248	231	207	220	214	217	220	222	227	227	227	209	218	233	229	253	236	224
75	199	189	164	156	172	180	189	181	164	158	163	179	175	169	166	156	178	190	190
80	133	121	117	117	112	116	117	115	114	113	111	114	122	117	113	114	116	130	136
85	70.0	65.3	55.5	52.6	50.9	53.5	54.4	51.0	47.8	46.8	49.0	51.3	53.9	53.5	50.9	52.5	56.9	67.8	73.3
90	4.04	3.61	2.78	2.08	3.05	1.72	1.65	1.51	1.33	0.11	1.48	1.82	2.05	1.98	3.11	3.45	4.03	3.17	0.10
95	0.07	0.07	0.07	0.07	0.07	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.07	0.07	0.11
100	0.10	0.09	0.09	0.09	0.09	0.09	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.14
105	0.13	0.12	0.12	0.11	0.11	0.12	0.13	0.13	0.13	0.13	0.13	0.14	0.14	0.13	0.13	0.13	0.12	0.13	0.20
110	0.15	0.15	0.14	0.14	0.14	0.14	0.16	0.16	0.16	0.16	0.17	0.17	0.17	0.17	0.17	0.16	0.15	0.15	0.23
115	0.19	0.17	0.16	0.16	0.16	0.17	0.18	0.19	0.19	0.19	0.19	0.20	0.20	0.20	0.20	0.19	0.18	0.19	0.26
120	0.24	0.21	0.20	0.20	0.20	0.20	0.21	0.21	0.22	0.22	0.22	0.23	0.23	0.23	0.24	0.24	0.22	0.23	0.32
125	0.29	0.26	0.23	0.24	0.23	0.24	0.25	0.24	0.26	0.26	0.27	0.28	0.28	0.29	0.29	0.29	0.28	0.29	0.40
130	0.36	0.33	0.30	0.29	0.28	0.28	0.29	0.29	0.30	0.32	0.32	0.34	0.34	0.35	0.35	0.35	0.34	0.36	0.47
135	0.43	0.41	0.38	0.36	0.34	0.33	0.35	0.34	0.34	0.37	0.38	0.39	0.41	0.42	0.42	0.43	0.41	0.43	0.55
140	0.50	0.47	0.46	0.44	0.42	0.42	0.42	0.42	0.42	0.44	0.44	0.46	0.47	0.47	0.48	0.48	0.48	0.50	0.59
145	0.56	0.55	0.53	0.50	0.49	0.47	0.46	0.46	0.48	0.49	0.48	0.49	0.50	0.52	0.52	0.52	0.54	0.56	0.66
150	0.61	0.60	0.58	0.54	0.50	0.50	0.47	0.47	0.46	0.47	0.47	0.49	0.51	0.53	0.53	0.54	0.56	0.61	0.72
155	0.66	0.64	0.62	0.60	0.55	0.50	0.48	0.47	0.46	0.45	0.47	0.50	0.53	0.55	0.57	0.59	0.60	0.65	0.75
160	0.73	0.69	0.68	0.64	0.60	0.54	0.48	0.47	0.45	0.44	0.48	0.53	0.58	0.62	0.64	0.65	0.67	0.72	0.82
165	0.78	0.75	0.75	0.72	0.68	0.60	0.55	0.52	0.51	0.52	0.56	0.62	0.67	0.70	0.73	0.75	0.75	0.78	0.83
170	0.84	0.81	0.82	0.80	0.78	0.72	0.65	0.63	0.65	0.64	0.64	0.71	0.77	0.79	0.80	0.81	0.82	0.85	0.87
175	0.85	0.87	0.89	0.89	0.89	0.88	0.83	0.80	0.82	0.74	0.75	0.79	0.81	0.80	0.82	0.84	0.87	0.88	0.89
180	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83

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	1728	1728	1728	1728	1728	1728	1728	1728	1728	1728	1728	1728	1728	1728	1728	1728	1728		
5	1727	1727	1727	1727	1728	1727	1727	1727	1727	1726	1726	1725	1725	1725	1724	1724	1724		
10	1725	1725	1725	1726	1727	1727	1728	1727	1727	1726	1724	1723	1721	1719	1717	1716	1716		
15	1715	1716	1718	1720	1723	1725	1726	1727	1726	1723	1720	1716	1711	1707	1704	1702	1701		
20	1695	1698	1701	1705	1710	1714	1717	1718	1717	1713	1707	1700	1692	1685	1679	1675	1674		
25	1657	1660	1665	1671	1679	1687	1692	1693	1692	1686	1678	1667	1654	1643	1635	1630	1629		
30	1582	1583	1590	1601	1616	1629	1637	1640	1638	1631	1619	1601	1581	1563	1552	1547	1545		
35	1455	1452	1458	1476	1497	1515	1524	1525	1520	1510	1493	1471	1445	1419	1403	1400	1402		
40	1286	1264	1260	1276	1296	1306	1302	1294	1288	1285	1281	1266	1237	1208	1198	1211	1231		
45	1073	1029	1005	1015	1038	1045	1022	989	982	1005	1027	1019	988	961	963	1000	1040		
50	825	766	741	773	812	810	762	716	711	744	786	798	764	724	726	772	816		
55	605	546	543	601	640	619	570	540	542	557	590	623	609	556	533	564	598		
60	450	416	422	466	468	438	420	427	437	425	425	453	469	437	410	428	431		
65	331	326	324	337	307	293	305	326	335	316	297	300	326	326	318	333	301		
70	253	240	228	232	211	216	230	236	238	231	224	214	224	225	223	252	236		
75	190	167	159	170	170	180	177	166	164	172	185	177	174	165	159	185	198		
80	129	117	114	118	127	128	121	120	118	121	127	131	123	120	119	121	132		
85	67.4	58.0	54.9	57.0	61.7	60.9	58.3	56.9	57.6	60.3	62.4	64.9	62.0	59.4	60.9	61.8	69.4		
90	0.21	0.07	0.09	0.15	0.14	0.20	0.30	0.43	0.59	0.93	1.44	1.74	1.55	1.35	1.31	1.22	0.87		
95	0.11	0.11	0.11	0.11	0.11	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.11	0.11	0.11	0.11	0.11		
100	0.14	0.14	0.14	0.14	0.15	0.15	0.15	0.15	0.15	0.15	0.16	0.15	0.15	0.14	0.14	0.14	0.14		
105	0.19	0.18	0.19	0.19	0.20	0.21	0.21	0.20	0.20	0.20	0.21	0.21	0.20	0.20	0.19	0.19	0.20		
110	0.23	0.22	0.23	0.24	0.25	0.26	0.27	0.26	0.26	0.26	0.27	0.27	0.25	0.24	0.24	0.23	0.24		
115	0.25	0.26	0.26	0.27	0.29	0.30	0.31	0.31	0.31	0.31	0.32	0.31	0.29	0.28	0.28	0.27	0.27		
120	0.31	0.31	0.31	0.33	0.33	0.35	0.36	0.37	0.37	0.37	0.37	0.36	0.35	0.34	0.34	0.33	0.33		
125	0.39	0.39	0.40	0.40	0.41	0.42	0.43	0.44	0.45	0.45	0.45	0.44	0.43	0.41	0.41	0.41	0.40		
130	0.46	0.48	0.49	0.50	0.51	0.54	0.55	0.57	0.57	0.57	0.57	0.54	0.52	0.51	0.50	0.48	0.47		
135	0.54	0.55	0.57	0.60	0.62	0.65	0.66	0.69	0.70	0.69	0.68	0.66	0.63	0.62	0.59	0.56	0.54		
140	0.59	0.62	0.64	0.67	0.70	0.72	0.76	0.79	0.80	0.79	0.77	0.74	0.70	0.66	0.64	0.61	0.59		
145	0.66	0.68	0.69	0.73	0.75	0.77	0.80	0.82	0.83	0.82	0.77	0.74	0.72	0.70	0.67	0.65	0.65		
150	0.72	0.72	0.72	0.76	0.78	0.78	0.80	0.81	0.80	0.74	0.73	0.74	0.74	0.71	0.71	0.71	0.73		
155	0.75	0.75	0.77	0.78	0.78	0.77	0.78	0.75	0.74	0.74	0.74	0.74	0.74	0.74	0.77	0.76	0.77		
160	0.82	0.81	0.80	0.82	0.82	0.78	0.78	0.77	0.74	0.76	0.75	0.75	0.76	0.80	0.82	0.84	0.85		
165	0.84	0.85	0.86	0.86	0.87	0.84	0.83	0.81	0.78	0.75	0.76	0.76	0.77	0.79	0.81	0.84	0.85		
170	0.89	0.92	0.94	0.95	0.95	0.93	0.90	0.88	0.86	0.84	0.80	0.79	0.80	0.82	0.85	0.87	0.87		
175	0.92	0.93	0.94	0.94	0.96	0.95	0.93	0.90	0.88	0.90	0.91	0.88	0.82	0.81	0.85	0.87	0.86		
180	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83		

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.

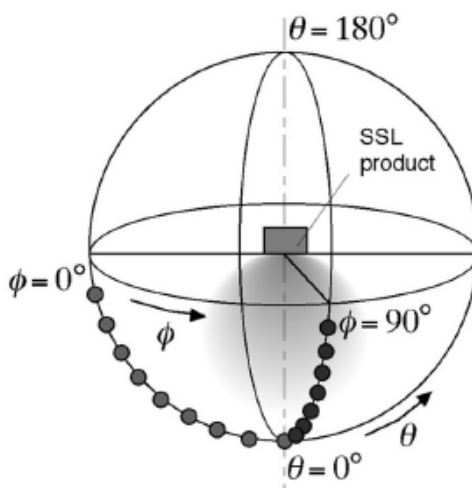
Color Characteristics Measurements

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.

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