



LM-79-08 Test Report

for

GREEN CREATIVE LTD

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

LED Panel

Model: 30PAN22DIM/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.: HZ17010030b

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

Review by:

April Zou

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: 30PAN22DIM/850/277V

Luminous Efficacy (Lumens /Watt)	Total Luminous Flux (Lumens)	Power (Watts)	Power Factor
121.3	3770.3	31.09	0.9960
CCT (K)	CRI	Stabilization Time (Light & Power)	
4799	83.1	60	

Table 1: Executive Data Summary

Note: The above results are recorded/ derived from measurements made using an Integrating Sphere.

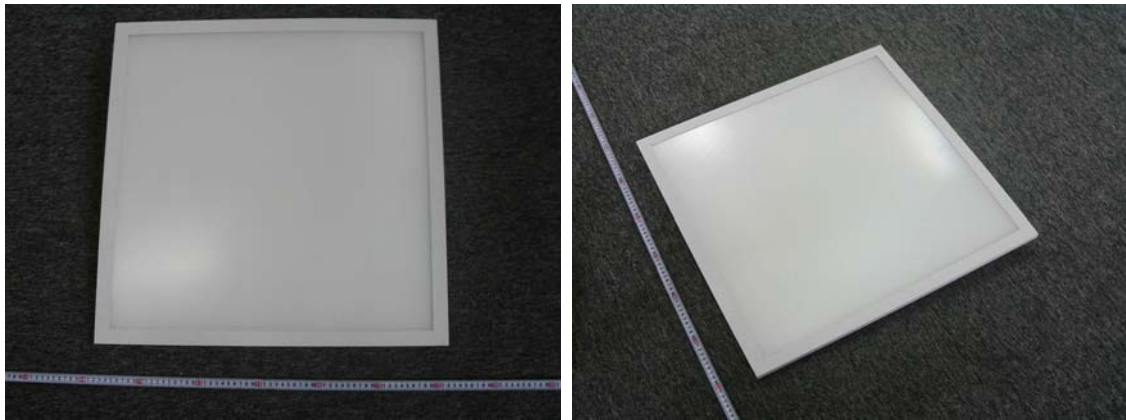
Test specifications:

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	: 30PAN22DIM/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)	0.260	0.118
Power Factor	0.9960	0.9429
Test Power (W)	31.09	30.78
THD A%	8.20	15.06
Luminous Efficacy (lm/W)	121.3	122.7
Total Luminous Flux (lm)	3770.3	3775.7
Color Rendering Index (CRI)	83.1	
R9	10	
Correlated Color Temperature (CCT) (K)	4799	
Chromaticity (Chroma x, Chroma y)	(0.3522, 0.3657)	
Chromaticity (Chroma u, Chroma v)	(0.2107, 0.3283)	
Chromaticity (Chroma u', Chroma v')	(0.2107, 0.4924)	
Duv	0.0042	
Average Beam Angle (°)	92.3	
Center Beam Candle Power (cd)	1613	
Spacing Criteria	1.27 (0°-180°)/ 1.28 (90°-270°)	
Zonal Lumens in the 0°-60°Zone	87.29%	
Zonal Lumens in the 60°-90°Zone	12.65%	
Zonal Lumens in the 90°-120°Zone	0.01%	
Zonal Lumens in the 120°-180°Zone	0.05%	

Special Color Rendering Indices	
R1	81
R2	88
R3	94
R4	82
R5	81
R6	83
R7	88
R8	68
R9	10
R10	72
R11	81
R12	56
R13	83
R14	97

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

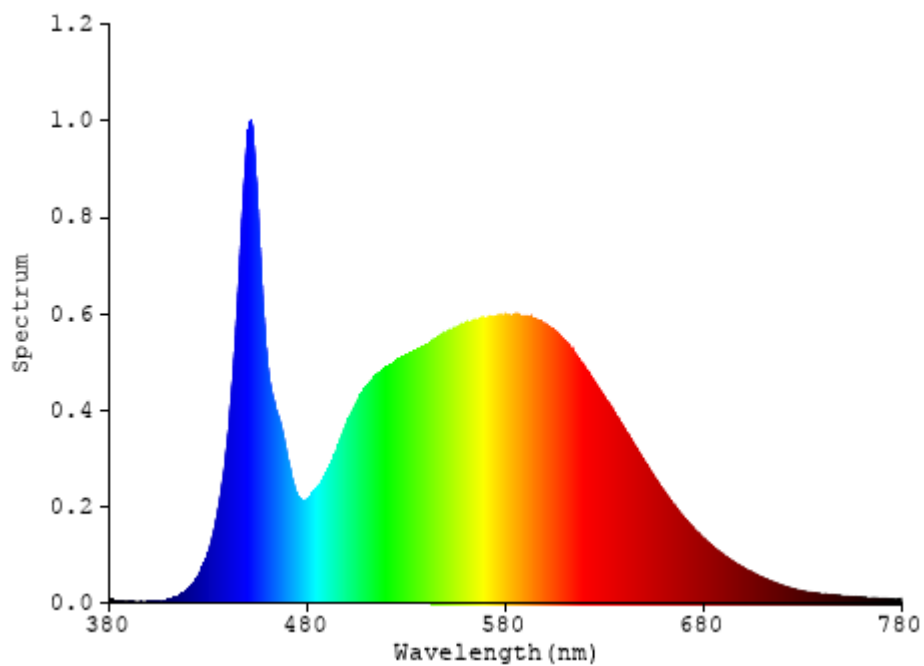


Chart 1: Spectral Power Distribution

Zonal Lumen Tabulation

$\gamma(^{\circ})$	Lumens	% Total
0- 10	154.026	4.09%
10- 20	456.712	12.11%
20- 30	724.021	19.20%
30- 40	851.746	22.59%
40- 50	666.815	17.69%
50- 60	437.747	11.61%
60- 70	264.574	7.02%
70- 80	160.022	4.24%
80- 90	52.194	1.38%
90-100	0.173	0.00%
100-110	0.151	0.00%
110-120	0.224	0.01%
120-130	0.32	0.01%
130-140	0.423	0.01%
140-150	0.441	0.01%
150-160	0.357	0.01%
160-170	0.24	0.01%
170-180	0.09	0.00%
Total	3770.3	100%

$\gamma(^{\circ})$	Lumens	% Total
0- 60	3291.067	87.29%
60- 90	476.79	12.65%
0-90	3767.857	99.94%
90- 180	2.419	0.06%
0- 180	3770.3	100%

Table 3: Zonal Lumen Data

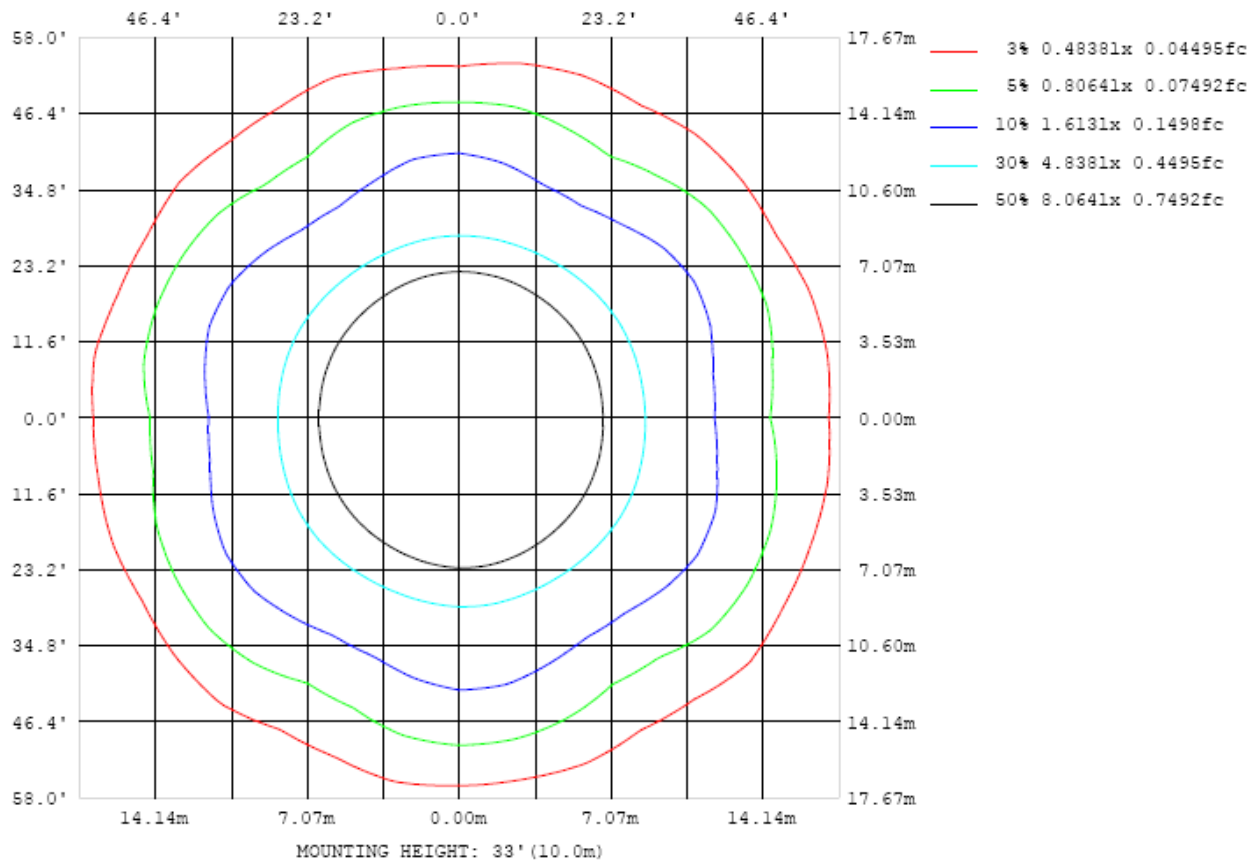


Chart 2: Illuminance Plot (Footcandles)

Luminous Intensity Distribution Plots

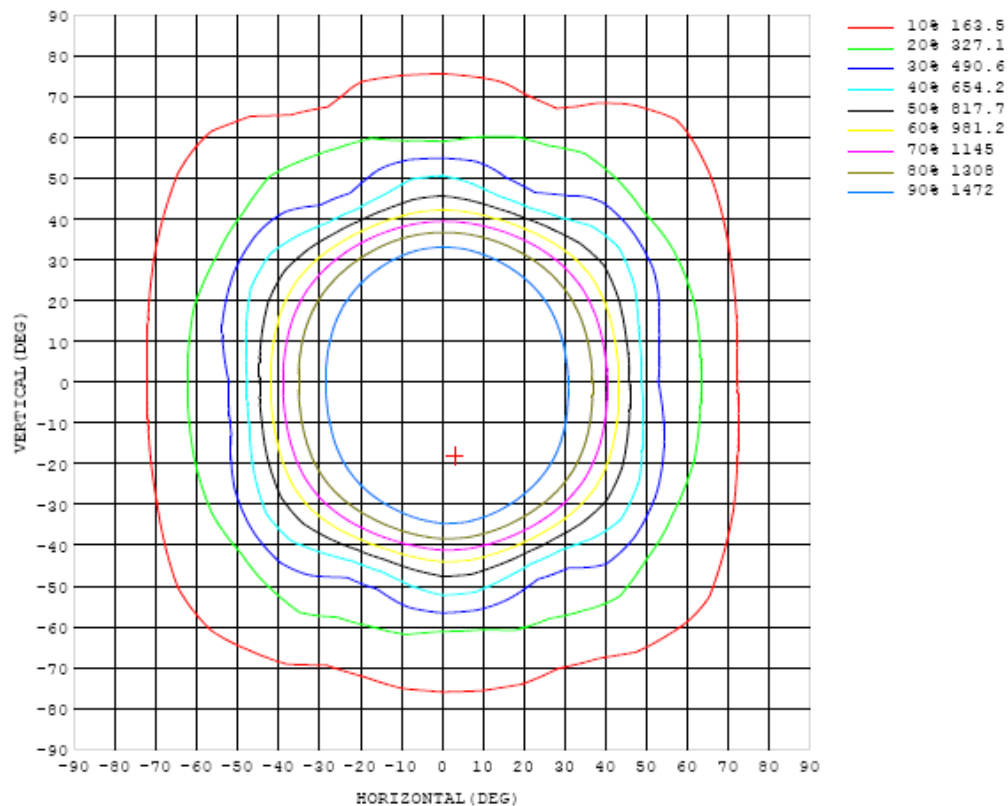


Chart 3: Isocandela Plot

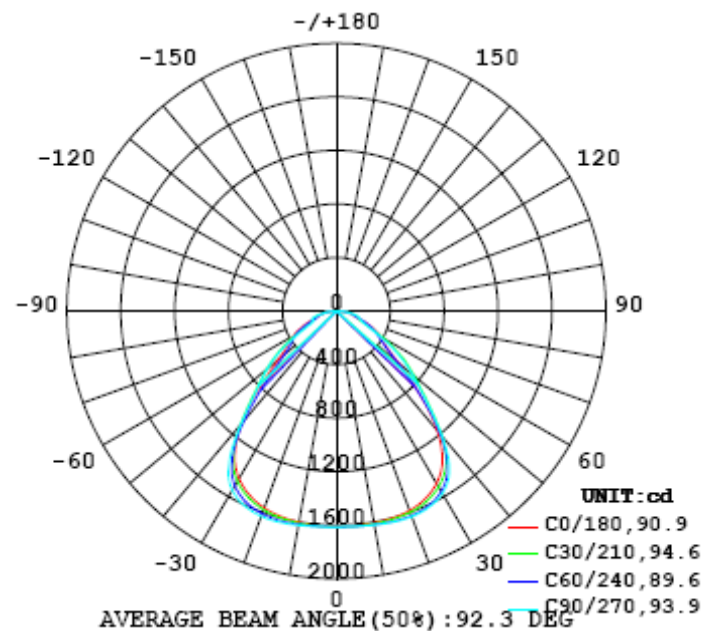


Chart 4: Polar Candela Distribution

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	1613	1613	1613	1613	1613	1613	1613	1613	1613	1613	1613	1613	1613	1613	1613	1613	1613	1613	1613
5	1612	1613	1613	1613	1614	1614	1615	1615	1615	1614	1614	1613	1612	1612	1610	1610	1609	1609	1609
10	1609	1610	1611	1613	1615	1618	1620	1622	1623	1622	1620	1618	1615	1612	1608	1605	1603	1602	1602
15	1602	1603	1606	1611	1616	1621	1627	1630	1632	1631	1628	1623	1616	1609	1602	1596	1592	1589	1589
20	1586	1589	1593	1600	1609	1619	1627	1633	1635	1634	1629	1621	1610	1598	1586	1577	1570	1566	1565
25	1551	1555	1562	1572	1584	1597	1609	1617	1621	1619	1611	1599	1584	1568	1552	1539	1529	1523	1521
30	1486	1492	1504	1516	1529	1542	1556	1569	1576	1573	1560	1542	1524	1507	1490	1475	1460	1449	1446
35	1370	1382	1401	1415	1422	1427	1438	1454	1466	1462	1440	1415	1396	1386	1376	1362	1340	1322	1315
40	1164	1179	1202	1214	1209	1200	1199	1209	1225	1221	1191	1165	1158	1162	1165	1155	1129	1104	1093
45	868	903	944	954	924	879	868	898	935	936	891	840	835	875	912	911	869	819	801
50	598	654	736	753	689	602	584	653	726	734	669	581	563	637	709	717	655	579	559
55	443	503	570	591	541	449	428	488	543	554	510	435	422	490	542	542	504	443	437
60	378	393	394	400	417	368	350	371	363	365	376	350	345	388	381	359	373	366	367
65	295	298	258	250	301	290	279	288	245	238	282	275	269	292	254	232	272	281	280
70	200	217	193	180	210	204	204	225	198	190	218	205	191	211	187	180	207	199	192
75	132	153	166	162	157	142	141	164	171	171	168	149	136	151	157	161	156	137	136
80	107	99.9	109	115	107	109	108	109	117	119	113	106	104	102	111	109	99.0	98.6	103
85	45.7	48.8	53.7	55.0	54.5	51.6	54.2	59.6	63.4	65.3	61.2	53.6	50.0	50.3	53.4	53.1	48.3	44.3	42.8
90	1.75	2.22	2.25	2.46	3.02	3.03	3.55	4.99	4.32	4.26	4.02	3.56	2.76	2.60	3.58	3.71	2.01	1.47	0.08
95	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.07	0.06	0.06	0.10
100	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.07	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.09	0.09	0.09	0.13
105	0.11	0.11	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.11	0.11	0.11	0.12	0.18
110	0.14	0.14	0.13	0.13	0.13	0.13	0.13	0.13	0.13	0.13	0.13	0.13	0.13	0.13	0.14	0.14	0.14	0.15	0.22
115	0.18	0.17	0.16	0.16	0.16	0.16	0.16	0.16	0.16	0.17	0.17	0.17	0.17	0.17	0.17	0.18	0.18	0.19	0.28
120	0.23	0.22	0.21	0.20	0.19	0.20	0.20	0.19	0.20	0.20	0.21	0.21	0.21	0.21	0.22	0.23	0.23	0.23	0.35
125	0.29	0.27	0.25	0.25	0.24	0.26	0.26	0.24	0.26	0.26	0.27	0.28	0.27	0.27	0.27	0.28	0.29	0.30	0.44
130	0.35	0.34	0.33	0.32	0.31	0.32	0.33	0.32	0.31	0.32	0.33	0.34	0.34	0.34	0.34	0.35	0.36	0.37	0.56
135	0.44	0.41	0.40	0.40	0.38	0.39	0.39	0.39	0.36	0.40	0.40	0.41	0.41	0.41	0.42	0.43	0.44	0.45	0.68
140	0.50	0.49	0.47	0.47	0.46	0.47	0.46	0.46	0.44	0.46	0.47	0.48	0.48	0.49	0.49	0.50	0.51	0.53	0.78
145	0.57	0.56	0.55	0.52	0.52	0.52	0.53	0.52	0.54	0.54	0.54	0.56	0.55	0.55	0.55	0.55	0.57	0.59	0.86
150	0.61	0.61	0.59	0.57	0.55	0.54	0.54	0.56	0.56	0.57	0.57	0.58	0.57	0.58	0.59	0.59	0.61	0.62	0.91
155	0.64	0.66	0.64	0.64	0.59	0.57	0.57	0.57	0.57	0.58	0.59	0.61	0.60	0.62	0.63	0.65	0.66	0.66	0.94
160	0.71	0.72	0.70	0.69	0.66	0.61	0.58	0.59	0.60	0.57	0.62	0.65	0.66	0.68	0.70	0.70	0.70	0.71	0.97
165	0.75	0.77	0.76	0.75	0.73	0.68	0.66	0.65	0.65	0.64	0.69	0.73	0.74	0.76	0.77	0.77	0.76	0.76	0.98
170	0.84	0.84	0.83	0.83	0.81	0.76	0.75	0.73	0.77	0.76	0.75	0.82	0.83	0.84	0.84	0.84	0.85	0.85	1.02
175	0.95	0.97	0.97	0.96	0.97	0.93	0.93	0.92	0.90	0.85	0.91	0.92	0.93	0.94	0.96	0.96	0.95	0.95	1.04
180	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90

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	1613	1613	1613	1613	1613	1613	1613	1613	1613	1613	1613	1613	1613	1613	1613	1613	1613		
5	1609	1610	1611	1612	1614	1615	1616	1616	1617	1617	1616	1616	1615	1614	1613	1613	1613		
10	1602	1605	1608	1612	1615	1619	1622	1624	1625	1625	1624	1621	1619	1615	1613	1611	1609		
15	1590	1594	1600	1606	1614	1621	1627	1631	1633	1633	1630	1625	1620	1614	1609	1605	1602		
20	1566	1571	1580	1590	1601	1612	1621	1628	1631	1630	1625	1618	1610	1601	1593	1588	1586		
25	1522	1529	1539	1551	1565	1579	1593	1603	1608	1606	1599	1589	1578	1568	1560	1554	1550		
30	1450	1458	1469	1480	1493	1508	1525	1540	1546	1543	1534	1522	1513	1505	1497	1489	1485		
35	1322	1332	1339	1339	1341	1351	1366	1380	1388	1387	1382	1374	1375	1379	1380	1374	1369		
40	1099	1110	1106	1087	1070	1064	1075	1094	1105	1102	1098	1104	1123	1148	1165	1164	1159		
45	830	863	857	808	746	726	766	823	841	810	764	758	810	880	915	903	872		
50	624	684	676	603	517	500	571	655	672	620	537	506	574	678	728	694	617		
55	493	520	509	470	412	406	459	484	481	474	434	406	454	526	552	541	475		
60	379	346	338	363	344	341	352	310	291	336	357	351	376	373	354	387	392		
65	276	226	221	270	258	247	259	215	194	244	263	254	281	251	216	265	296		
70	200	180	181	199	170	165	203	196	188	206	185	161	198	198	177	201	207		
75	147	159	161	147	130	136	159	168	172	160	147	130	146	165	177	162	146		
80	95.4	103	102	91.1	95.3	98.2	88.8	94.0	97.5	91.1	94.5	102	93.7	95.7	106	99.8	105		
85	44.2	47.7	45.6	41.1	37.8	36.8	41.3	42.9	45.5	45.1	40.4	38.6	41.4	47.1	49.3	48.1	44.1		
90	0.07	0.07	0.07	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.07	0.07	0.08	0.08	0.08	0.08	0.09		
95	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10		
100	0.13	0.14	0.14	0.13	0.13	0.13	0.13	0.13	0.14	0.13	0.13	0.13	0.13	0.13	0.13	0.13	0.13		
105	0.18	0.19	0.19	0.18	0.18	0.18	0.18	0.18	0.19	0.18	0.17	0.17	0.18	0.18	0.19	0.18	0.18		
110	0.23	0.24	0.23	0.23	0.23	0.23	0.23	0.24	0.24	0.23	0.22	0.22	0.22	0.23	0.23	0.23	0.22		
115	0.28	0.28	0.28	0.28	0.28	0.28	0.29	0.29	0.28	0.28	0.28	0.27	0.28	0.27	0.27	0.27	0.27		
120	0.35	0.35	0.35	0.35	0.35	0.36	0.36	0.36	0.35	0.35	0.35	0.34	0.34	0.34	0.34	0.34	0.34		
125	0.44	0.43	0.43	0.44	0.45	0.46	0.47	0.46	0.45	0.45	0.45	0.44	0.43	0.42	0.42	0.42	0.43		
130	0.56	0.55	0.55	0.56	0.58	0.59	0.60	0.60	0.59	0.59	0.59	0.57	0.56	0.54	0.53	0.54	0.54		
135	0.68	0.68	0.69	0.70	0.72	0.73	0.74	0.74	0.73	0.73	0.72	0.71	0.69	0.68	0.66	0.66	0.66		
140	0.79	0.79	0.79	0.82	0.84	0.85	0.85	0.85	0.84	0.82	0.82	0.80	0.78	0.78	0.75	0.74	0.75		
145	0.87	0.87	0.87	0.89	0.91	0.92	0.92	0.91	0.90	0.87	0.86	0.86	0.86	0.84	0.82	0.81	0.82		
150	0.92	0.92	0.93	0.94	0.94	0.95	0.96	0.94	0.88	0.89	0.90	0.89	0.90	0.88	0.90	0.90	0.89		
155	0.96	0.96	0.96	0.95	0.94	0.95	0.94	0.92	0.90	0.91	0.88	0.89	0.89	0.92	0.94	0.92	0.92		
160	0.98	0.98	0.99	0.99	0.99	0.98	0.97	0.96	0.91	0.90	0.89	0.89	0.90	0.94	0.97	0.99	0.98		
165	0.98	1.00	1.00	1.02	1.02	1.02	1.02	0.98	0.95	0.91	0.89	0.90	0.90	0.94	0.96	0.99	0.98		
170	1.03	1.04	1.06	1.06	1.07	1.07	1.06	1.02	1.00	0.98	0.96	0.94	0.92	0.96	1.00	1.01	1.00		
175	1.04	1.06	1.07	1.08	1.06	1.06	1.05	1.02	0.99	0.96	1.01	0.99	0.97	0.98	1.02	1.02	1.03		
180	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90		

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 ***

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