



LM-79-08 Test Report

for

GREEN CREATIVE LTD

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

LED Panel

Model: 30PAN22DIM/840/277V

Laboratory: Leading Testing Laboratories

NVLAP CODE: 200960-0

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Report No.: HZ17020029b

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. 24, 2017

Approved by *Jim Zhang*



Manager: Jim Zhang
Feb. 24, 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/840/277V

Luminous Efficacy (Lumens /Watt)	Total Luminous Flux (Lumens)	Power (Watts)	Power Factor
121.5	3811.3	31.38	0.9907
CCT (K)	CRI	Stabilization Time (Light & Power)	
3700	82.6	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	: Feb. 20, 2017
Date of Test	: Feb. 23, 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	: 30PAN22DIM/840/277V
Electrical Ratings	: 120-277V, 60Hz, 30W
Product Description	: 4000K, Frosted Lens, CRI80
Manufacturer	: GREEN CREATIVE LTD
Address	: 756 North Zhongshan Rd., Unit B301 Zhabei District, Shanghai

TEST RESULTS

Test ambient temperature was 24.6°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)	0.264	0.120
Power Factor	0.9907	0.9371
Test Power (W)	31.38	31.06
THD A%	11.33	15.29
Luminous Efficacy (lm/W)	121.5	122.8
Total Luminous Flux (lm)	3811.3	3813.1
Color Rendering Index (CRI)	82.6	
R9	8	
Correlated Color Temperature (CCT) (K)	3700	
Chromaticity (Chroma x, Chroma y)	(0.3961, 0.3896)	
Chromaticity (Chroma u, Chroma v)	(0.2302, 0.3396)	
Chromaticity (Chroma u', Chroma v')	(0.2302, 0.5094)	
Duv	0.0016	
Average Beam Angle (°)	95.2	
Center Beam Candle Power (cd)	1553	
Spacing Criteria	1.32 (0°-180°)/ 1.32 (90°-270°)	
Zonal Lumens in the 0°-60°Zone	86.53%	
Zonal Lumens in the 60°-90°Zone	13.41%	
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	89
R3	95
R4	81
R5	81
R6	85
R7	86
R8	64
R9	8
R10	74
R11	80
R12	61
R13	82
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

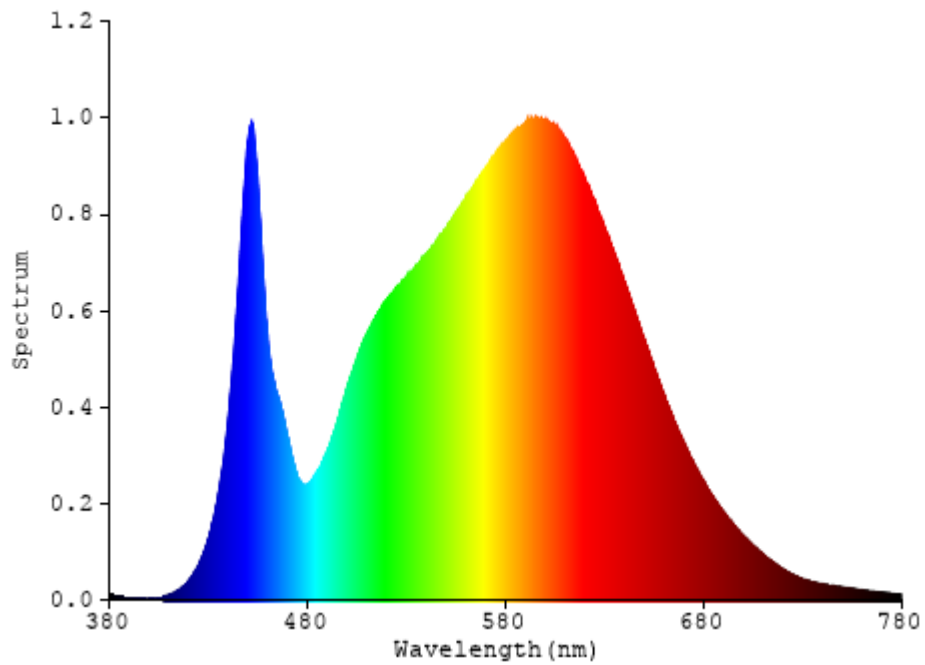


Chart 1: Spectral Power Distribution

Zonal Lumen Tabulation

$\gamma(^{\circ})$	Lumens	% Total
0- 10	148.141	3.89%
10- 20	439.266	11.53%
20- 30	703.045	18.45%
30- 40	853.492	22.39%
40- 50	695.668	18.25%
50- 60	458.394	12.03%
60- 70	286.128	7.51%
70- 80	167.451	4.39%
80- 90	57.356	1.50%
90-100	0.133	0.00%
100-110	0.161	0.00%
110-120	0.234	0.01%
120-130	0.325	0.01%
130-140	0.425	0.01%
140-150	0.442	0.01%
150-160	0.359	0.01%
160-170	0.239	0.01%
170-180	0.09	0.00%
Total	3811.3	100%

$\gamma(^{\circ})$	Lumens	% Total
0- 60	3298.006	86.53%
60- 90	510.935	13.41%
0-90	3808.941	99.94%
90- 180	2.408	0.06%
0- 180	3811.3	100%

Table 3: Zonal Lumen Data

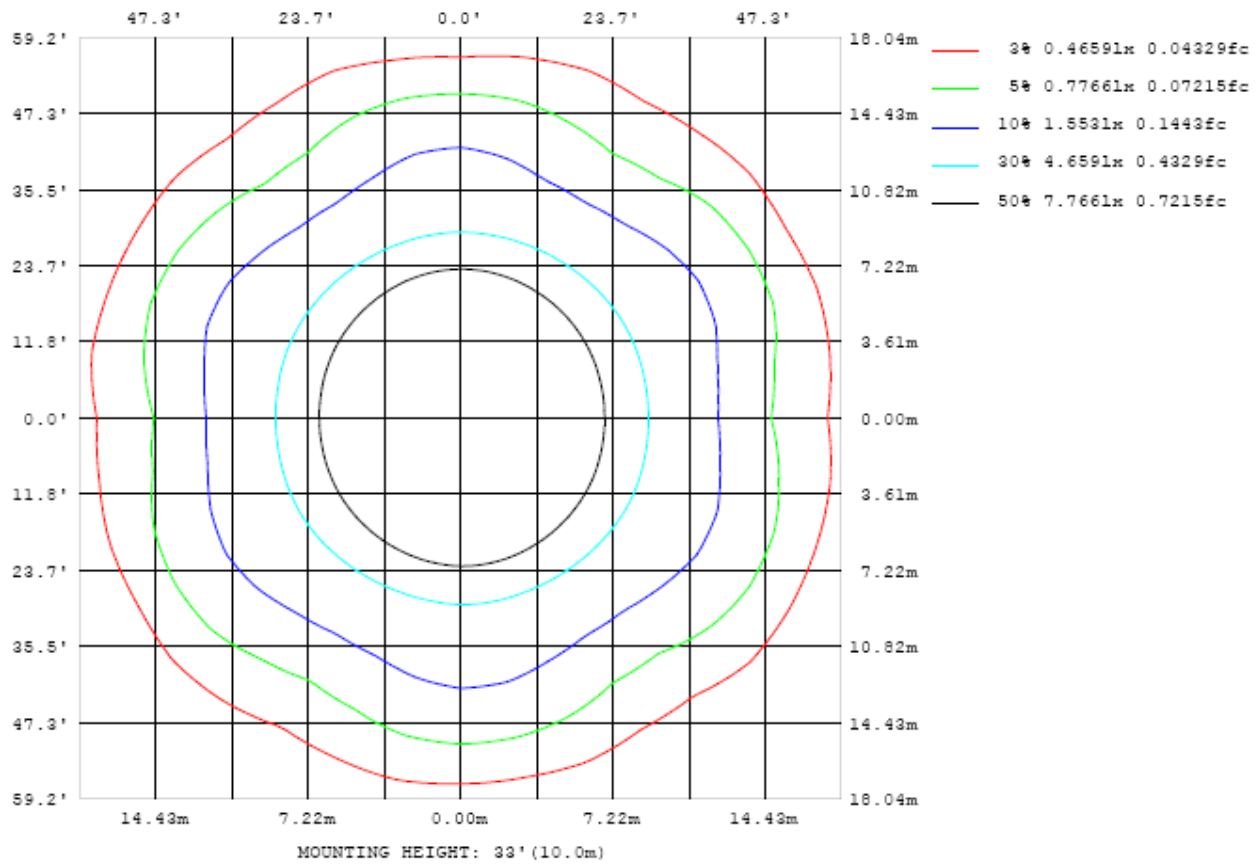


Chart 2: Illuminance Plot (Footcandles)

Luminous Intensity Distribution Plots

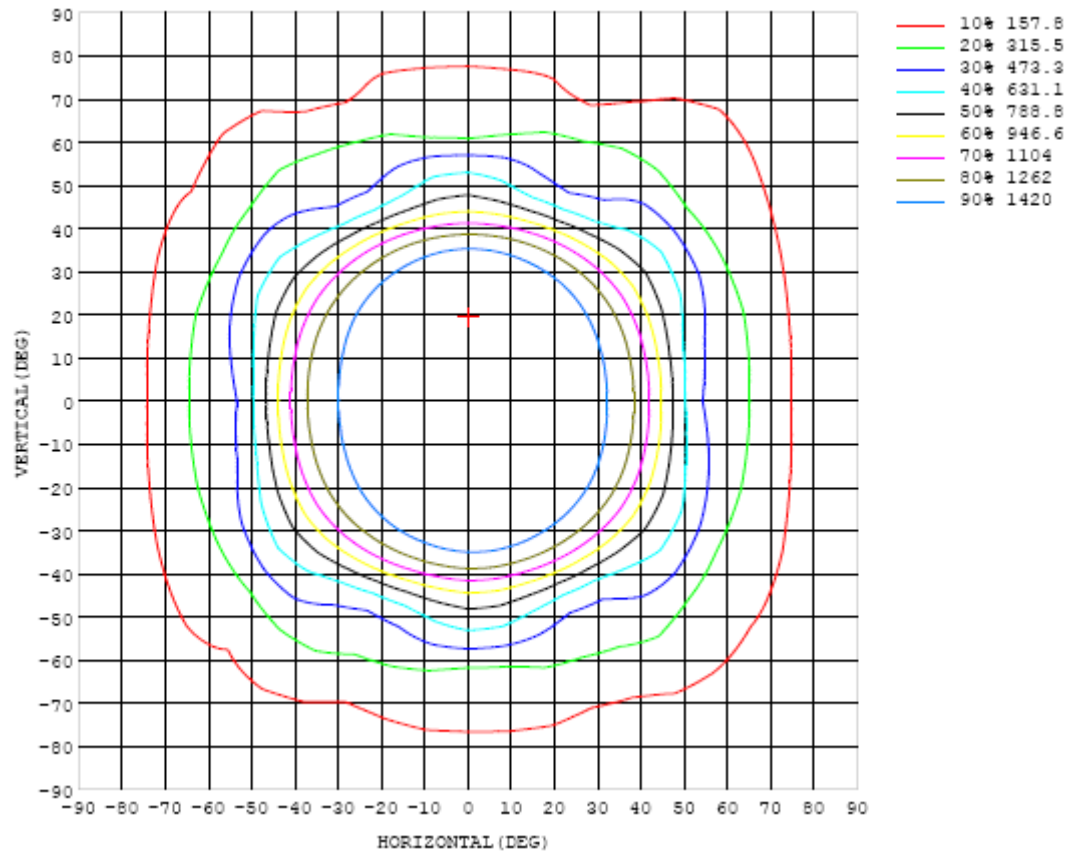


Chart 3: Isocandela Plot

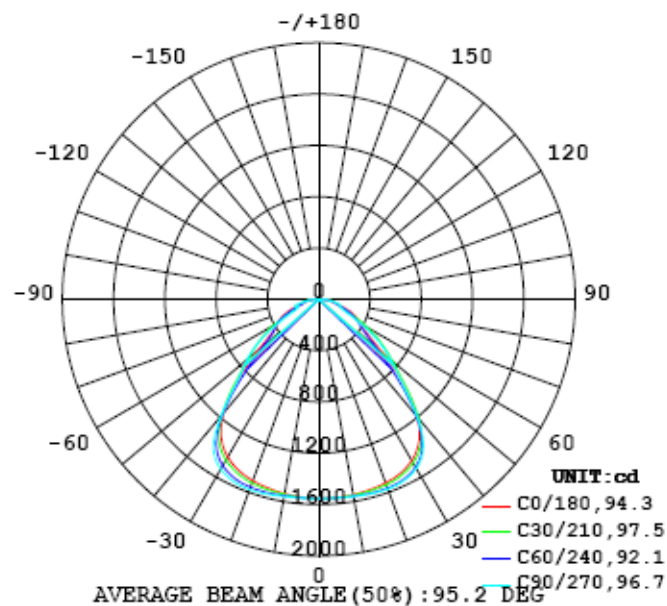


Chart 4: Polar Candela Distribution

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	1553	1553	1553	1553	1553	1553	1553	1553	1553	1553	1553	1553	1553	1553	1553	1553	1553	1553	1553
5	1552	1552	1553	1553	1553	1554	1555	1555	1555	1555	1554	1553	1552	1551	1550	1549	1548	1548	1548
10	1546	1547	1548	1551	1554	1556	1559	1560	1561	1561	1559	1557	1553	1549	1545	1542	1540	1538	1538
15	1537	1538	1542	1547	1553	1559	1565	1569	1571	1570	1567	1562	1555	1547	1540	1533	1528	1525	1524
20	1524	1526	1531	1539	1548	1558	1566	1572	1575	1574	1570	1563	1552	1540	1528	1517	1510	1506	1505
25	1499	1502	1508	1517	1530	1542	1554	1561	1565	1563	1557	1548	1534	1518	1502	1489	1479	1474	1474
30	1452	1455	1462	1472	1485	1498	1510	1519	1524	1522	1514	1502	1486	1468	1452	1438	1427	1421	1420
35	1363	1368	1378	1385	1389	1395	1402	1413	1421	1418	1405	1389	1376	1364	1356	1347	1336	1327	1326
40	1195	1202	1213	1213	1200	1188	1182	1184	1194	1193	1174	1159	1157	1162	1170	1173	1164	1153	1153
45	929	946	966	960	922	877	860	875	909	918	880	843	842	873	917	938	923	894	886
50	640	690	753	750	675	592	579	641	713	729	673	590	563	612	695	735	701	632	611
55	454	523	598	599	526	438	429	491	548	564	524	450	417	465	545	578	545	463	436
60	377	409	431	439	423	364	355	376	371	374	380	361	346	385	416	408	402	376	367
65	318	314	284	288	321	291	283	288	244	232	276	284	272	303	295	258	282	305	311
70	238	236	196	194	228	209	206	228	194	180	218	215	191	218	204	175	207	230	230
75	155	167	158	160	160	136	139	170	172	170	172	153	125	146	154	148	158	157	148
80	107	114	126	124	112	106	105	108	116	118	114	105	99.6	104	116	121	116	102	101
85	55.1	51.3	54.4	58.4	51.7	47.7	47.4	54.9	62.2	63.1	60.7	50.6	46.4	48.2	57.4	55.4	51.0	52.0	52.8
90	0.11	0.06	0.06	0.08	0.09	0.05	0.02	0.04	0.04	0.02	0.00	0.00	0.04	0.09	0.14	0.12	0.16	0.14	2.22
95	0.11	0.11	0.11	0.11	0.10	0.11	0.11	0.11	0.11	0.11	0.10	0.10	0.11	0.11	0.11	0.12	0.11	0.11	0.07
100	0.14	0.14	0.14	0.14	0.14	0.13	0.13	0.13	0.14	0.14	0.14	0.13	0.14	0.14	0.14	0.15	0.15	0.15	0.10
105	0.19	0.19	0.19	0.19	0.18	0.18	0.18	0.18	0.19	0.19	0.18	0.18	0.18	0.18	0.19	0.20	0.20	0.20	0.13
110	0.24	0.24	0.24	0.24	0.23	0.23	0.23	0.23	0.24	0.24	0.24	0.23	0.23	0.23	0.24	0.24	0.24	0.24	0.16
115	0.29	0.28	0.28	0.28	0.28	0.28	0.28	0.28	0.29	0.29	0.28	0.28	0.28	0.29	0.29	0.29	0.29	0.29	0.20
120	0.36	0.35	0.34	0.34	0.34	0.35	0.35	0.35	0.35	0.35	0.34	0.35	0.35	0.35	0.35	0.35	0.35	0.36	0.26
125	0.45	0.43	0.42	0.42	0.42	0.43	0.44	0.44	0.44	0.44	0.43	0.44	0.44	0.43	0.43	0.42	0.43	0.44	0.32
130	0.56	0.55	0.53	0.53	0.54	0.55	0.56	0.57	0.57	0.57	0.56	0.57	0.56	0.55	0.54	0.54	0.54	0.56	0.39
135	0.67	0.65	0.65	0.66	0.67	0.69	0.70	0.70	0.71	0.71	0.70	0.70	0.69	0.68	0.68	0.67	0.67	0.68	0.48
140	0.76	0.76	0.75	0.76	0.78	0.80	0.82	0.82	0.82	0.81	0.81	0.79	0.80	0.78	0.78	0.76	0.76	0.77	0.55
145	0.84	0.83	0.83	0.83	0.85	0.88	0.89	0.90	0.89	0.89	0.87	0.86	0.86	0.87	0.85	0.84	0.84	0.86	0.62
150	0.89	0.88	0.89	0.89	0.90	0.91	0.92	0.93	0.92	0.89	0.87	0.90	0.90	0.89	0.89	0.92	0.92	0.94	0.67
155	0.93	0.93	0.94	0.94	0.92	0.91	0.92	0.92	0.89	0.89	0.90	0.89	0.89	0.89	0.92	0.95	0.95	0.96	0.72
160	0.98	0.97	0.96	0.96	0.96	0.95	0.94	0.94	0.93	0.89	0.89	0.88	0.88	0.90	0.94	0.98	1.00	1.01	0.79
165	0.96	0.96	0.97	0.97	0.98	0.98	0.98	0.97	0.94	0.92	0.88	0.88	0.89	0.90	0.92	0.95	0.99	1.01	0.84
170	1.00	1.00	1.02	1.02	1.03	1.03	1.03	1.02	0.98	0.97	0.96	0.93	0.93	0.92	0.94	0.97	1.00	1.02	0.93
175	1.02	1.03	1.04	1.04	1.03	1.03	1.03	1.02	1.00	0.98	0.95	0.99	0.99	0.96	0.95	0.98	1.02	1.02	1.03
180	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92

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	1553	1553	1553	1553	1553	1553	1553	1553	1553	1553	1553	1553	1553	1553	1553	1553	1553		
5	1548	1549	1550	1550	1551	1553	1553	1554	1555	1555	1555	1554	1554	1553	1552	1552	1552		
10	1539	1541	1544	1547	1551	1555	1558	1560	1561	1561	1560	1558	1555	1552	1550	1548	1547		
15	1526	1531	1537	1544	1552	1559	1565	1570	1572	1571	1568	1564	1559	1552	1546	1541	1538		
20	1508	1514	1524	1536	1548	1560	1569	1574	1578	1577	1573	1566	1557	1546	1536	1530	1526		
25	1477	1484	1497	1512	1528	1543	1555	1564	1568	1567	1562	1552	1540	1526	1514	1505	1501		
30	1424	1433	1447	1463	1480	1497	1512	1523	1528	1527	1520	1508	1496	1482	1468	1459	1454		
35	1332	1343	1356	1366	1377	1392	1409	1424	1432	1429	1419	1408	1401	1393	1385	1375	1367		
40	1158	1169	1172	1167	1164	1165	1169	1177	1183	1182	1182	1187	1193	1202	1211	1207	1200		
45	903	927	923	888	845	828	846	882	896	875	848	848	882	932	961	956	936		
50	654	722	717	645	565	552	617	702	729	674	589	557	604	699	761	735	666		
55	507	575	564	495	427	429	492	550	559	529	468	424	456	549	602	584	492		
60	405	413	409	401	367	370	389	365	348	375	389	373	392	425	425	433	404		
65	311	269	270	308	292	283	285	234	206	257	292	287	314	307	266	295	324		
70	225	183	185	222	195	187	221	195	174	213	211	180	216	220	184	208	238		
75	156	151	158	157	123	129	178	192	194	190	163	121	147	176	175	168	163		
80	108	124	122	108	103	111	106	108	111	103	110	114	110	116	134	125	112		
85	50.5	54.9	55.5	49.8	47.7	47.5	50.8	56.2	57.7	57.6	49.3	47.6	48.9	53.4	54.8	54.9	51.1		
90	2.17	2.58	2.28	1.90	1.52	2.71	1.76	1.67	1.76	1.83	0.08	1.25	1.44	1.77	1.95	1.90	3.01		
95	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07		
100	0.09	0.09	0.09	0.09	0.09	0.09	0.08	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.10		
105	0.12	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.12	0.11	0.12	0.12	0.12	0.12	0.12	0.13		
110	0.15	0.15	0.14	0.14	0.14	0.15	0.14	0.14	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.16	0.16		
115	0.19	0.18	0.18	0.17	0.18	0.18	0.18	0.18	0.18	0.19	0.19	0.19	0.19	0.18	0.19	0.19	0.20		
120	0.24	0.23	0.22	0.22	0.22	0.22	0.21	0.21	0.22	0.23	0.23	0.23	0.23	0.23	0.24	0.24	0.25		
125	0.30	0.28	0.28	0.27	0.29	0.29	0.26	0.27	0.28	0.29	0.30	0.29	0.29	0.29	0.29	0.30	0.31		
130	0.36	0.35	0.35	0.33	0.34	0.35	0.34	0.33	0.34	0.35	0.36	0.35	0.35	0.35	0.36	0.37	0.39		
135	0.44	0.43	0.42	0.40	0.41	0.42	0.41	0.38	0.41	0.42	0.43	0.42	0.43	0.43	0.44	0.45	0.47		
140	0.51	0.50	0.50	0.48	0.49	0.49	0.48	0.47	0.49	0.49	0.50	0.50	0.50	0.50	0.51	0.52	0.55		
145	0.59	0.57	0.54	0.53	0.53	0.54	0.54	0.56	0.56	0.56	0.56	0.55	0.55	0.55	0.55	0.57	0.61		
150	0.63	0.62	0.60	0.57	0.55	0.55	0.56	0.56	0.57	0.58	0.58	0.58	0.59	0.59	0.60	0.61	0.65		
155	0.67	0.66	0.66	0.62	0.58	0.58	0.58	0.58	0.58	0.60	0.61	0.61	0.63	0.64	0.66	0.66	0.70		
160	0.73	0.72	0.70	0.67	0.63	0.59	0.59	0.60	0.57	0.63	0.65	0.66	0.69	0.70	0.70	0.70	0.76		
165	0.78	0.78	0.76	0.75	0.70	0.67	0.66	0.66	0.66	0.71	0.74	0.75	0.76	0.77	0.77	0.75	0.81		
170	0.84	0.83	0.83	0.82	0.77	0.74	0.73	0.76	0.76	0.75	0.81	0.82	0.83	0.83	0.84	0.84	0.91		
175	0.94	0.96	0.96	0.96	0.95	0.92	0.92	0.91	0.85	0.90	0.93	0.94	0.95	0.96	0.97	0.97	1.01		
180	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92		

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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Page 13 of 13