

LM-79-08 Test Report

for

GREEN CREATIVE LTD

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

4" new construction Downlight

Model: 10NCDRL4DIM/930/EXT

Laboratory: Leading Testing Laboratories

NVLAP CODE: 200960-0

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Report No.: HZ18030026b

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

Review by:



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Mar. 20, 2018



Manager: Jim Zhang
Mar. 20, 2018

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: 10NCDRL4DIM/930/EXT

Luminous Efficacy (Lumens /Watt)	Total Luminous Flux (Lumens)	Power (Watts)	Power Factor
76.1	735.7	9.67	0.9682
CCT (K)	CRI	Stabilization Time (Light & Power)	
2968	92.3	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	: Mar. 15, 2018
Date of Test	: Mar. 16, 2018
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	: 4" new construction Downlight
Model	: 10NCDRL4DIM/930/EXT
Electrical Ratings	: 120V, 60Hz
Product Description	: 3000K
Manufacturer	: GREEN CREATIVE LTD
Address	: 756 North Zhongshan Rd., Unit B301 Zhabei District, Shanghai

TEST RESULTS

Test ambient temperature was 25.1 °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 2.47 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)	0.083
Power Factor	0.9682
Test Power (W)	9.67
THD A%	16.18
Luminous Efficacy (lm/W)	76.1
Total Luminous Flux (lm)	735.7
Color Rendering Index (CRI)	92.3
R9	64
Correlated Color Temperature (CCT) (K)	2968
Chromaticity (Chroma x, Chroma y)	(0.4355, 0.3973)
Chromaticity (Chroma u, Chroma v)	(0.2526, 0.3457)
Chromaticity (Chroma u', Chroma v')	(0.2526, 0.5185)
Duv	0.0025
Average Beam Angle (°)	113.6
Center Beam Candle Power (cd)	254
Spacing Criteria	1.25 (0°-180°)/ 1.26 (90°-270°)
Zonal Lumens in the 0°-60°Zone	78.13%
Zonal Lumens in the 60°-90°Zone	21.76%
Zonal Lumens in the 90°-120°Zone	0.03%
Zonal Lumens in the 120°-180°Zone	0.09%

Special Rendering Indices	Color
R1	96
R2	98
R3	94
R4	92
R5	95
R6	94
R7	88
R8	81
R9	64
R10	98
R11	94
R12	81
R13	98
R14	98
Rf	88
Rg	96

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

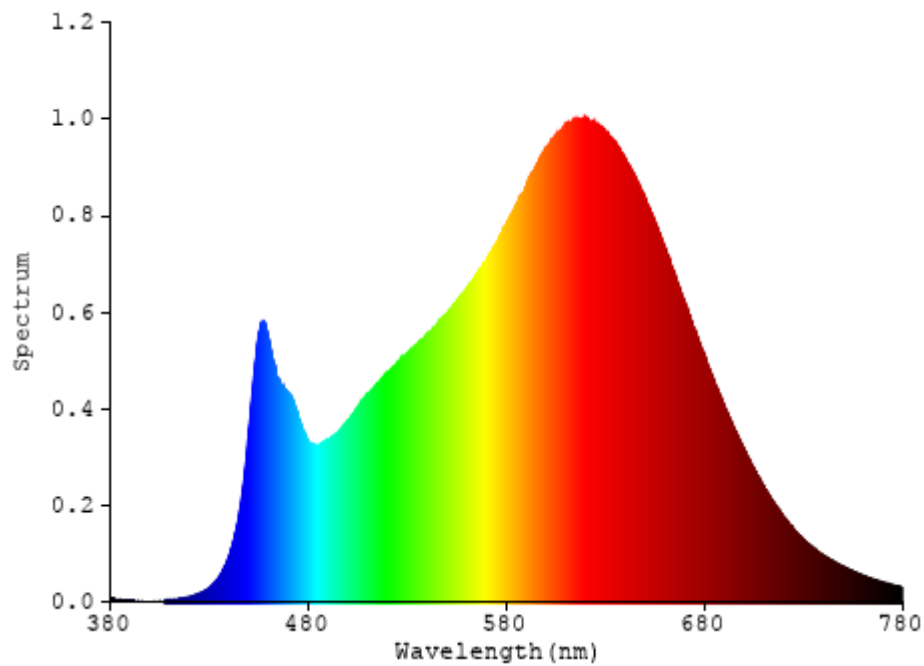


Chart 1: Spectral Power Distribution

Zonal Lumen Tabulation

$\gamma(^{\circ})$	Lumens	% Total
0- 10	24.069	3.27%
10- 20	68.921	9.37%
20- 30	104.446	14.20%
30- 40	126.035	17.13%
40- 50	131.272	17.84%
50- 60	120.031	16.32%
60- 70	93.187	12.67%
70- 80	54.276	7.38%
80- 90	12.595	1.71%
90-100	0.042	0.01%
100-110	0.066	0.01%
110-120	0.097	0.01%
120-130	0.124	0.02%
130-140	0.149	0.02%
140-150	0.153	0.02%
150-160	0.125	0.02%
160-170	0.082	0.01%
170-180	0.028	0.00%
Total	735.7	100%

$\gamma(^{\circ})$	Lumens	% Total
0- 60	574.774	78.13%
60- 90	160.058	21.76%
0-90	734.832	99.88%
90- 180	0.866	0.12%
0- 180	735.7	100%

Table 3: Zonal Lumen Data

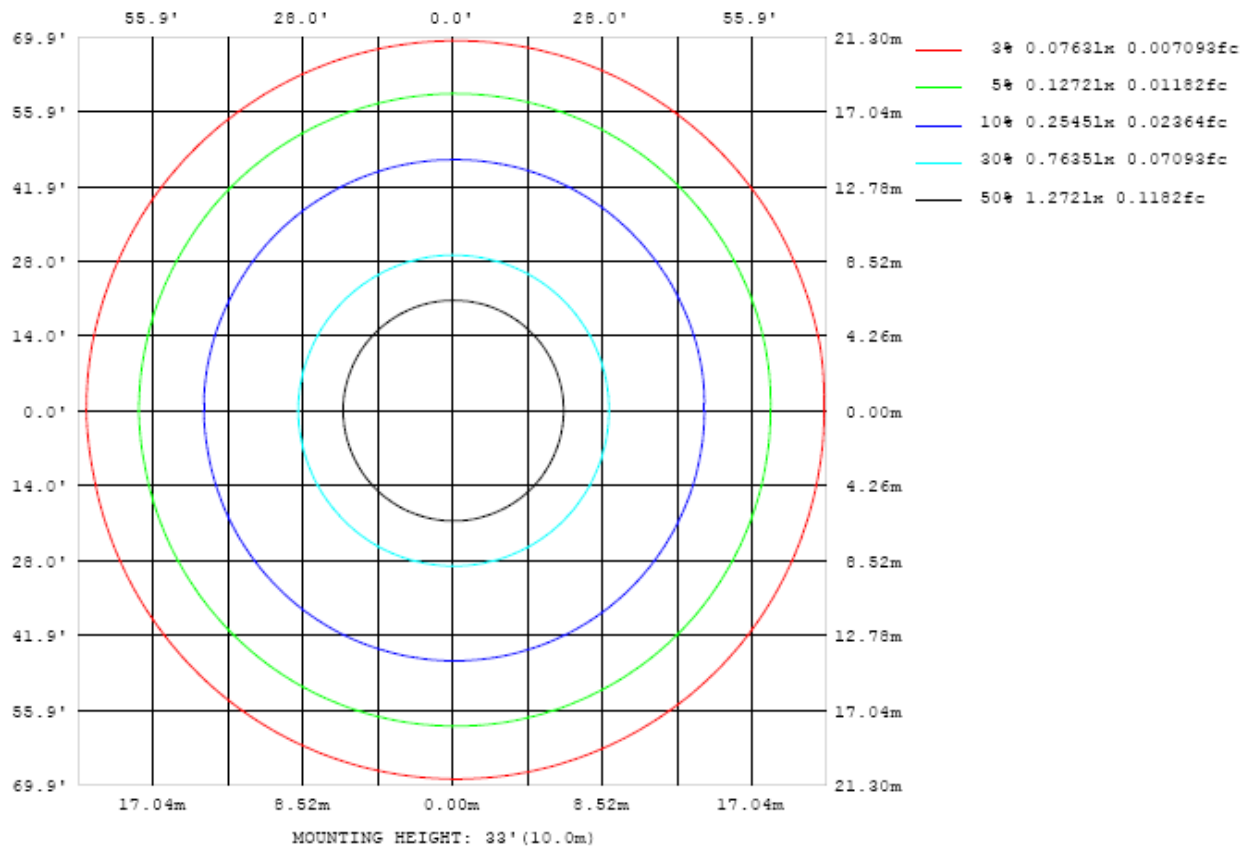


Chart 2: Illuminance Plot (Footcandles)

Luminous Intensity Distribution Plots

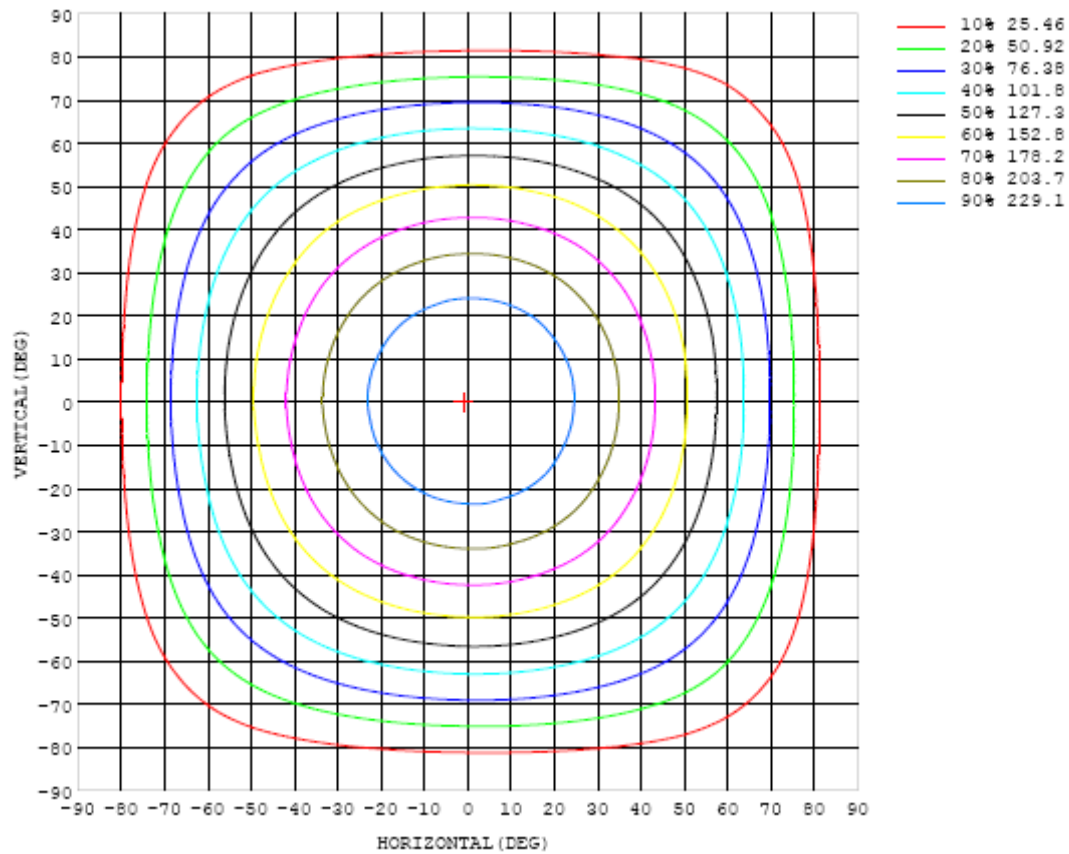


Chart 3: Isocandela Plot

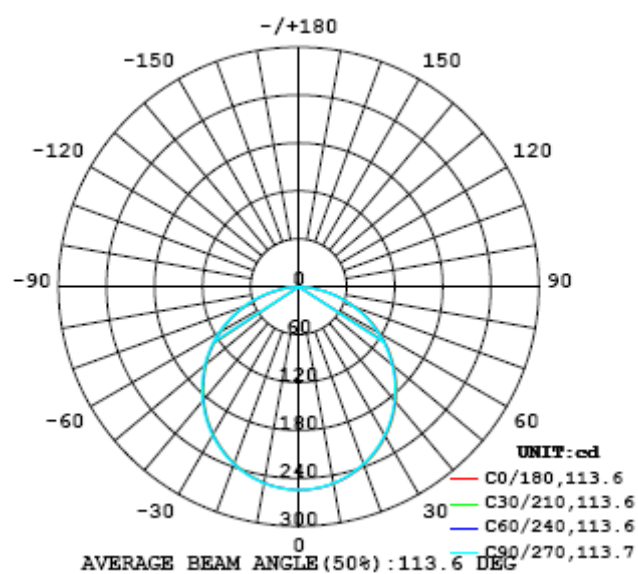


Chart 4: Polar Candela Distribution

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	254	254	254	254	254	254	254	254	254	254	254	254	254	254	254	254	254	254	254
5	254	254	254	253	253	254	253	253	253	253	253	253	253	253	253	253	253	253	253
10	250	250	250	250	250	250	250	250	250	250	249	249	249	249	249	249	249	249	249
15	245	245	245	245	245	245	244	244	244	244	244	243	244	243	243	243	243	243	243
20	238	237	237	237	237	237	237	236	236	236	236	236	235	235	235	235	235	235	235
25	228	228	228	227	228	227	227	227	227	226	226	226	225	225	225	225	225	225	225
30	217	217	216	216	216	216	215	215	215	214	214	214	213	213	213	213	213	213	213
35	203	203	203	203	203	202	202	201	201	201	200	200	200	200	199	199	199	199	200
40	188	188	188	188	188	187	187	186	186	186	185	185	185	184	184	184	184	184	185
45	172	172	172	172	172	171	171	170	170	169	169	169	168	168	168	167	167	167	168
50	155	155	155	154	154	154	153	153	152	152	151	151	151	150	150	150	150	150	151
55	136	136	136	136	136	135	135	134	134	133	133	133	132	132	131	131	131	131	132
60	117	117	116	116	116	116	115	115	114	114	113	113	112	112	111	111	111	111	112
65	96.7	96.5	96.2	96.0	95.9	95.4	94.9	94.4	94.0	93.4	92.8	92.4	91.9	91.5	91.1	90.8	90.6	90.6	92.1
70	75.3	75.4	75.2	74.9	74.7	74.3	73.7	73.3	72.9	72.2	71.6	71.2	70.7	70.3	69.9	69.5	69.4	69.4	70.3
75	52.6	52.6	52.7	53.8	53.9	53.3	52.8	52.3	51.9	51.1	50.8	50.3	49.8	49.4	49.0	48.1	47.1	46.5	47.2
80	30.4	30.6	30.6	31.7	32.6	32.2	31.7	31.2	31.0	30.3	29.8	29.3	28.8	28.4	28.1	26.7	25.1	24.8	25.5
85	11.7	11.8	11.9	12.2	12.2	11.9	11.5	11.1	10.6	10.1	9.66	9.20	8.78	8.35	8.07	7.54	7.33	6.94	7.36
90	0.05	0.06	0.05	0.05	0.04	0.04	0.03	0.03	0.02	0.03	0.03	0.03	0.03	0.03	0.03	0.04	0.04	0.05	0.04
95	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.04	0.04	0.04	0.04	0.03	0.03	0.03	0.04
100	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.05	0.05	0.05	0.04	0.04	0.04	0.04	0.05	0.06
105	0.06	0.05	0.05	0.05	0.05	0.05	0.05	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.05	0.05	0.06	0.06	0.08
110	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.08	0.08	0.07	0.07	0.07	0.08	0.11
115	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.10	0.09	0.09	0.10	0.10	0.10	0.09	0.10	0.10	0.10	0.13
120	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.12	0.11	0.11	0.11	0.12	0.11	0.11	0.11	0.12	0.12	0.13
125	0.13	0.13	0.13	0.13	0.12	0.13	0.13	0.13	0.13	0.13	0.13	0.13	0.14	0.14	0.14	0.13	0.14	0.14	0.15
130	0.16	0.15	0.15	0.15	0.14	0.15	0.15	0.15	0.15	0.16	0.15	0.15	0.15	0.16	0.16	0.15	0.16	0.16	0.18
135	0.18	0.17	0.17	0.17	0.17	0.17	0.17	0.18	0.18	0.18	0.18	0.18	0.17	0.17	0.18	0.18	0.18	0.18	0.23
140	0.20	0.20	0.20	0.20	0.19	0.18	0.19	0.19	0.20	0.20	0.20	0.20	0.20	0.20	0.19	0.20	0.20	0.20	0.25
145	0.21	0.21	0.21	0.21	0.21	0.20	0.21	0.21	0.22	0.22	0.22	0.22	0.22	0.22	0.21	0.21	0.21	0.21	0.27
150	0.22	0.22	0.22	0.22	0.22	0.21	0.22	0.22	0.22	0.22	0.23	0.23	0.23	0.23	0.22	0.22	0.22	0.22	0.29
155	0.23	0.23	0.23	0.23	0.23	0.23	0.23	0.23	0.23	0.24	0.24	0.24	0.24	0.24	0.23	0.23	0.23	0.23	0.30
160	0.25	0.24	0.24	0.24	0.24	0.24	0.24	0.24	0.24	0.25	0.25	0.26	0.26	0.25	0.25	0.25	0.25	0.25	0.30
165	0.26	0.26	0.27	0.26	0.26	0.25	0.26	0.25	0.26	0.26	0.26	0.27	0.27	0.27	0.26	0.26	0.26	0.26	0.30
170	0.28	0.28	0.29	0.28	0.28	0.28	0.27	0.28	0.28	0.28	0.28	0.28	0.28	0.28	0.28	0.28	0.28	0.28	0.30
175	0.29	0.29	0.29	0.29	0.29	0.29	0.29	0.30	0.30	0.29	0.29	0.29	0.29	0.29	0.29	0.29	0.29	0.29	0.30
180	0.28	0.28	0.28	0.28	0.28	0.28	0.28	0.28	0.28	0.28	0.28	0.28	0.28	0.28	0.28	0.28	0.28	0.28	0.28

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	254	254	254	254	254	254	254	254	254	254	254	254	254	254	254	254	254		
5	253	253	253	253	253	253	253	253	253	253	253	254	254	254	254	254	254		
10	249	249	249	250	250	250	250	250	250	250	250	250	251	251	251	250	251		
15	243	243	243	244	244	244	244	245	245	245	245	245	245	245	245	245	245		
20	235	235	236	236	236	236	236	237	237	237	237	238	238	238	238	238	238		
25	225	226	225	226	226	226	227	227	227	228	228	228	228	228	228	229	229		
30	214	213	214	214	214	215	215	215	216	216	216	216	217	217	217	217	217		
35	200	200	200	201	201	201	202	202	203	203	203	204	204	204	204	204	204		
40	185	185	185	185	186	186	186	187	187	188	188	189	189	189	189	189	189		
45	168	168	168	169	169	170	170	171	171	171	172	172	173	173	173	173	173		
50	151	151	151	152	152	152	153	153	154	154	155	155	156	156	156	156	156		
55	133	133	132	133	133	133	134	135	135	136	137	137	137	138	138	138	138		
60	112	113	113	113	114	114	115	116	116	116	117	117	118	118	118	118	119		
65	91.9	92.1	92.6	92.7	93.4	93.9	94.1	94.7	95.1	95.9	96.5	96.7	97.2	97.5	97.9	97.7	98.2		
70	70.4	70.8	71.0	71.5	71.5	72.5	73.0	73.7	74.0	74.7	75.3	75.5	76.1	76.3	76.6	76.6	76.4		
75	47.5	47.9	49.9	50.3	50.7	51.0	51.4	52.2	52.6	53.1	53.6	54.1	54.5	54.7	54.5	54.1	53.3		
80	25.6	26.0	27.6	29.2	29.5	30.0	30.4	31.0	31.5	32.0	32.5	33.1	33.2	33.7	32.6	31.6	31.3		
85	7.41	7.70	8.20	8.79	9.23	9.61	10.0	10.6	11.1	11.6	12.1	12.5	12.9	13.1	13.0	12.6	12.3		
90	0.05	0.04	0.04	0.04	0.03	0.03	0.03	0.03	0.04	0.04	0.05	0.05	0.06	0.07	0.07	0.08	0.09		
95	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.05	0.04		
100	0.06	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05		
105	0.10	0.08	0.07	0.07	0.06	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.06	0.06	0.06	0.06	0.07		
110	0.10	0.10	0.09	0.09	0.08	0.08	0.08	0.09	0.08	0.08	0.09	0.08	0.08	0.08	0.08	0.08	0.08		
115	0.12	0.12	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	0.10	0.10		
120	0.14	0.14	0.13	0.12	0.12	0.12	0.12	0.12	0.12	0.11	0.12	0.12	0.12	0.12	0.12	0.12	0.12		
125	0.15	0.16	0.16	0.15	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14		
130	0.18	0.19	0.19	0.18	0.18	0.18	0.18	0.17	0.17	0.17	0.17	0.17	0.17	0.18	0.17	0.17	0.17		
135	0.22	0.22	0.22	0.22	0.21	0.21	0.21	0.21	0.21	0.21	0.20	0.20	0.21	0.21	0.21	0.21	0.21		
140	0.25	0.25	0.26	0.26	0.25	0.25	0.25	0.24	0.24	0.24	0.24	0.24	0.24	0.24	0.24	0.24	0.24		
145	0.28	0.29	0.29	0.29	0.29	0.28	0.28	0.27	0.27	0.27	0.27	0.27	0.28	0.27	0.27	0.28	0.27		
150	0.30	0.30	0.31	0.31	0.31	0.30	0.30	0.30	0.30	0.29	0.29	0.30	0.30	0.30	0.30	0.30	0.30		
155	0.31	0.31	0.32	0.32	0.32	0.32	0.31	0.31	0.31	0.31	0.31	0.31	0.31	0.31	0.31	0.32	0.31		
160	0.32	0.32	0.32	0.33	0.32	0.32	0.32	0.32	0.32	0.32	0.31	0.31	0.31	0.32	0.31	0.32	0.31		
165	0.32	0.32	0.32	0.33	0.33	0.33	0.33	0.32	0.32	0.32	0.32	0.32	0.32	0.32	0.32	0.32	0.31		
170	0.32	0.32	0.32	0.33	0.33	0.33	0.33	0.33	0.33	0.32	0.32	0.32	0.32	0.32	0.32	0.32	0.31		
175	0.31	0.31	0.31	0.30	0.31	0.31	0.31	0.31	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30		
180	0.28	0.28	0.28	0.28	0.28	0.28	0.28	0.28	0.28	0.28	0.28	0.28	0.28	0.28	0.28	0.28	0.28		

Table 5: Luminous Intensity Data

EQUIPMENT LIST

Test Equipment	Model	Equipment No.	Calibration Date	Calibration Due date
Goniophotometer system	GO-R5000	HZTE011-01	Aug. 23, 2017	Aug. 22, 2018
Digital Power Meter	PF2010A	HZTE028-01	Aug. 10, 2017	Aug. 09, 2018
AC Power Supply	DPS1060	HZTE001-06	Aug. 10, 2017	Aug. 09, 2018
DC Power Supply	WY12010	HZTE004-03	Aug. 10, 2017	Aug. 09, 2018
Standard Source	D908	HZTE012-01	Aug. 20, 2017	Aug. 19, 2018
Standard source	SCL-1400	HZTE012-02	Aug. 20, 2017	Aug. 19, 2018
Temperature and humidity recorder	JR900	HZTE018-01	Aug. 16, 2017	Aug. 15, 2018
Temperature recorder	JM624U	HZTE018-08	Aug. 17, 2017	Aug. 16, 2018

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.

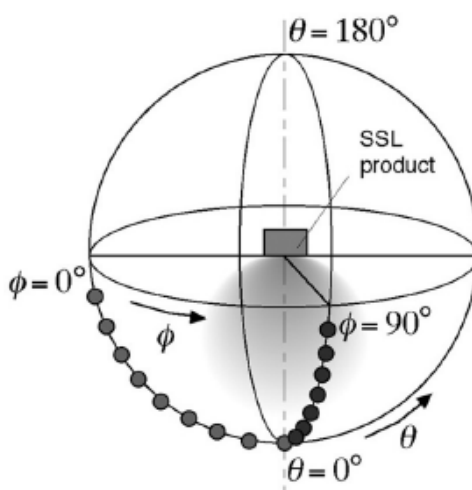
Color Characteristics Measurements

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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