

LM-79-08 Test Report

for

GREEN CREATIVE LTD

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

4" new construction Downlight

Model: 10NCDRL4DIM/940/EXT

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.: HZ18030026c

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

Review by:



Engineer: April Zou
Mar. 20, 2018



Approved by

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/940/EXT

Luminous Efficacy (Lumens /Watt)	Total Luminous Flux (Lumens)	Power (Watts)	Power Factor
82.9	827.5	9.98	0.9715
CCT (K)	CRI	Stabilization Time (Light & Power)	
4024	93.8	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/940/EXT
Electrical Ratings	: 120V, 60Hz
Product Description	: 4000K
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)	0.086
Power Factor	0.9715
Test Power (W)	9.98
THD A%	15.73
Luminous Efficacy (lm/W)	82.9
Total Luminous Flux (lm)	827.5
Color Rendering Index (CRI)	93.8
R9	68
Correlated Color Temperature (CCT) (K)	4024
Chromaticity (Chroma x, Chroma y)	(0.3791, 0.3751)
Chromaticity (Chroma u, Chroma v)	(0.2249, 0.3338)
Chromaticity (Chroma u', Chroma v')	(0.2249, 0.5007)
Duv	0.0004
Average Beam Angle (°)	113.3
Center Beam Candle Power (cd)	287
Spacing Criteria	1.25 (0°-180°)/ 1.26 (90°-270°)
Zonal Lumens in the 0°-60°Zone	78.25%
Zonal Lumens in the 60°-90°Zone	21.63%
Zonal Lumens in the 90°-120°Zone	0.03%
Zonal Lumens in the 120°-180°Zone	0.09%

Special Rendering Indices	Color
R1	94
R2	97
R3	97
R4	93
R5	93
R6	94
R7	94
R8	87
R9	68
R10	91
R11	94
R12	74
R13	95
R14	98
Rf	90
Rg	98

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

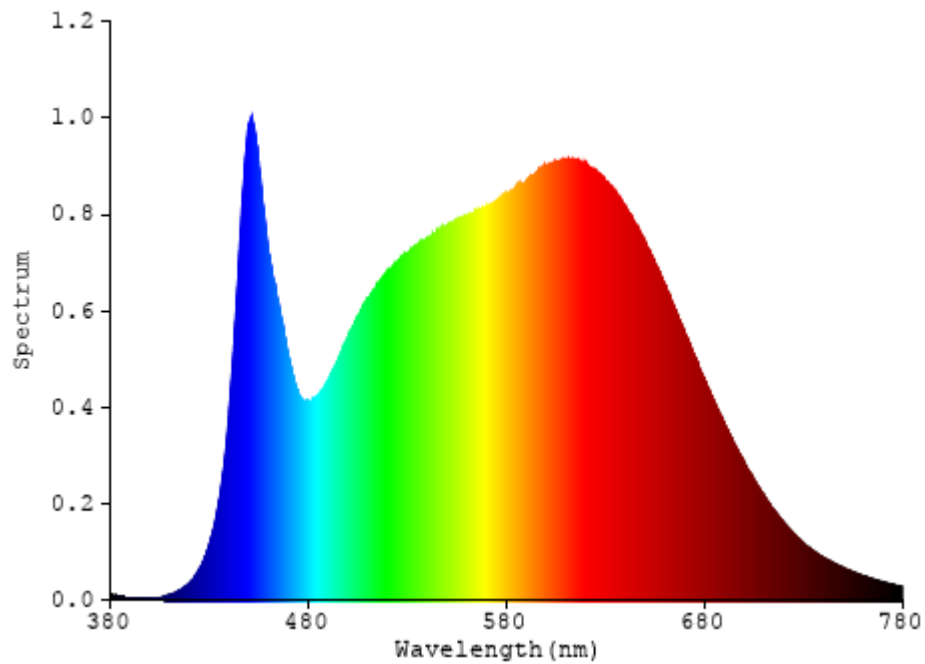


Chart 1: Spectral Power Distribution

Zonal Lumen Tabulation

$\gamma(^{\circ})$	Lumens	% Total
0- 10	27.189	3.29%
10- 20	77.825	9.41%
20- 30	117.858	14.24%
30- 40	142.073	17.17%
40- 50	147.758	17.86%
50- 60	134.794	16.29%
60- 70	104.491	12.63%
70- 80	60.533	7.32%
80- 90	13.94	1.68%
90-100	0.05	0.01%
100-110	0.076	0.01%
110-120	0.11	0.01%
120-130	0.142	0.02%
130-140	0.169	0.02%
140-150	0.173	0.02%
150-160	0.142	0.02%
160-170	0.093	0.01%
170-180	0.032	0.00%
Total	827.4	100%

$\gamma(^{\circ})$	Lumens	% Total
0- 60	647.497	78.25%
60- 90	178.964	21.63%
0-90	826.461	99.88%
90- 180	0.987	0.12%
0- 180	827.4	100%

Table 3: Zonal Lumen Data

Note: The Flux in this table might be a little different from the total flux in Table 2 due to rounding.

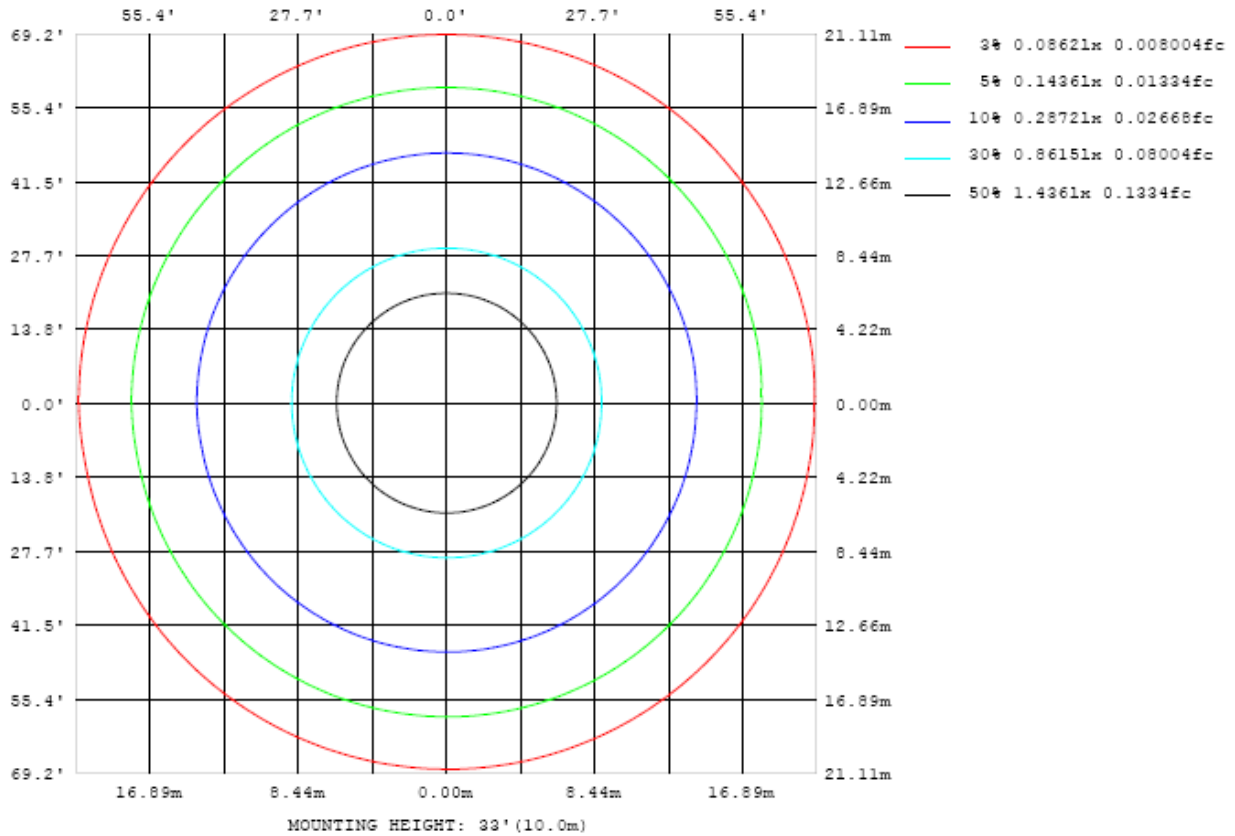


Chart 2: Illuminance Plot (Footcandles)

Luminous Intensity Distribution Plots

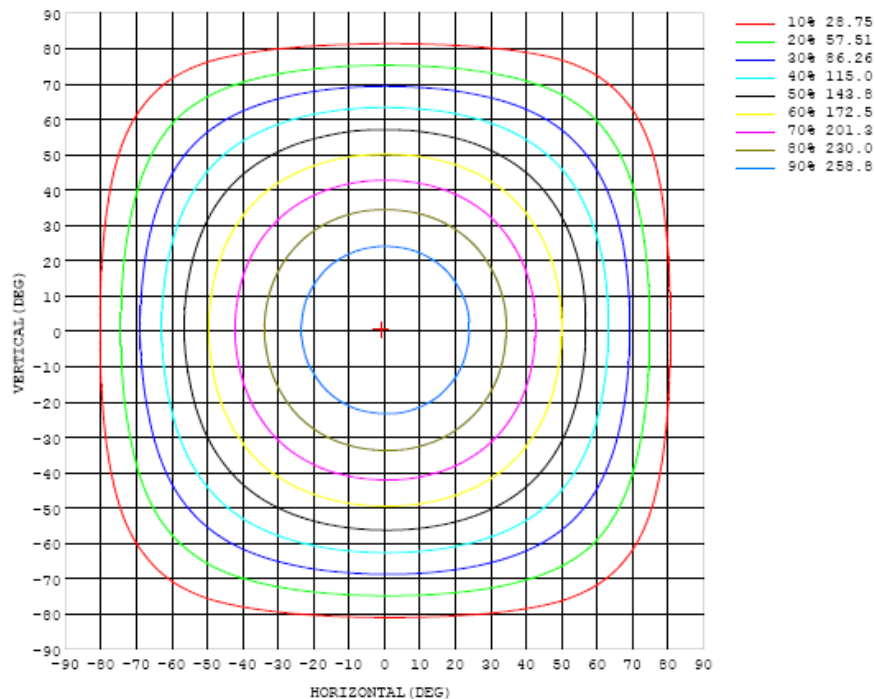


Chart 3: Isocandela Plot

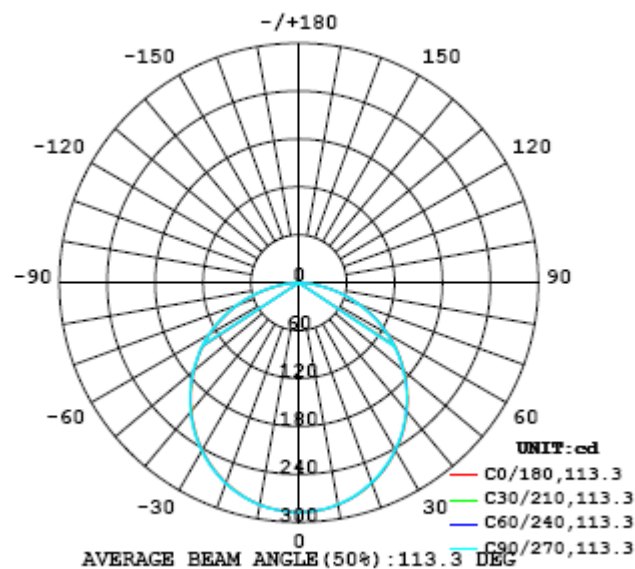


Chart 4: Polar Candela Distribution

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	287	287	287	287	287	287	287	287	287	287	287	287	287	287	287	287	287	287	287
5	286	286	286	286	286	286	286	286	286	286	286	286	286	286	286	286	286	286	286
10	283	282	282	282	282	282	282	282	282	282	282	282	282	282	282	282	282	282	282
15	276	276	276	276	276	276	276	275	275	275	275	275	275	275	275	275	275	275	275
20	267	267	267	267	267	267	267	266	266	266	266	266	266	266	266	266	266	266	266
25	256	256	256	256	256	255	255	255	255	254	255	255	255	255	255	255	254	255	255
30	243	243	243	242	242	242	242	242	242	241	241	241	241	241	241	241	241	241	242
35	228	227	227	227	227	227	227	226	226	226	226	226	226	226	225	226	225	226	226
40	211	210	210	210	210	210	210	209	209	209	208	209	208	208	208	208	208	209	209
45	192	192	192	191	191	191	191	191	190	190	190	190	190	190	190	190	190	190	191
50	172	172	172	172	171	171	171	171	171	170	170	170	170	170	170	170	170	170	171
55	151	151	151	151	150	150	150	150	150	149	149	149	149	149	149	149	149	149	151
60	129	129	129	128	128	128	128	127	127	127	127	127	127	127	127	126	127	127	128
65	106	106	106	105	105	105	105	104	104	104	104	104	104	104	104	103	104	104	105
70	82.1	82.1	82.0	81.7	81.5	81.4	81.0	80.7	80.5	80.1	79.9	79.8	79.8	79.8	79.6	79.6	79.7	79.6	81.2
75	56.6	56.7	57.1	58.1	57.8	57.7	57.5	57.2	56.9	56.6	56.5	56.4	56.3	56.1	56.1	55.0	54.3	54.0	54.9
80	32.0	31.9	32.0	33.5	34.3	34.0	33.9	33.7	33.5	33.2	33.0	32.8	32.7	32.6	32.4	31.0	29.6	29.6	30.5
85	11.1	11.1	11.2	11.5	11.7	11.5	11.4	11.1	10.9	10.7	10.5	10.4	10.3	10.2	10.1	9.76	9.40	9.20	10.0
90	0.04	0.05	0.04	0.04	0.04	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.04	0.04	0.04	0.05	0.05	0.04
95	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.03	0.04	0.04	0.04	0.04	0.04	0.04	0.03	0.03	0.04	0.04
100	0.05	0.05	0.05	0.04	0.04	0.04	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.04	0.04	0.05	0.05	0.06
105	0.07	0.07	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.07	0.07	0.06	0.06	0.06	0.06	0.06	0.07	0.08
110	0.08	0.08	0.08	0.08	0.07	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.09	0.10
115	0.11	0.11	0.10	0.10	0.10	0.10	0.10	0.10	0.11	0.10	0.10	0.11	0.11	0.10	0.10	0.10	0.11	0.11	0.13
120	0.13	0.13	0.12	0.12	0.12	0.12	0.12	0.13	0.13	0.13	0.12	0.13	0.13	0.13	0.12	0.12	0.13	0.13	0.15
125	0.15	0.15	0.15	0.14	0.14	0.14	0.15	0.15	0.15	0.15	0.15	0.14	0.15	0.15	0.15	0.14	0.15	0.15	0.17
130	0.18	0.17	0.17	0.17	0.16	0.16	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.20
135	0.20	0.20	0.20	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.20	0.20	0.24
140	0.22	0.22	0.22	0.22	0.21	0.21	0.22	0.21	0.22	0.22	0.22	0.22	0.22	0.22	0.21	0.21	0.22	0.22	0.27
145	0.24	0.24	0.24	0.23	0.23	0.23	0.23	0.23	0.23	0.24	0.23	0.24	0.24	0.24	0.23	0.23	0.23	0.23	0.30
150	0.25	0.25	0.25	0.24	0.24	0.24	0.25	0.24	0.24	0.25	0.25	0.25	0.25	0.24	0.24	0.24	0.24	0.24	0.32
155	0.26	0.26	0.26	0.26	0.26	0.25	0.26	0.26	0.26	0.26	0.26	0.26	0.27	0.26	0.26	0.26	0.26	0.26	0.33
160	0.28	0.28	0.28	0.28	0.27	0.27	0.28	0.28	0.28	0.28	0.28	0.28	0.28	0.28	0.27	0.27	0.27	0.27	0.33
165	0.30	0.30	0.31	0.30	0.29	0.29	0.29	0.29	0.29	0.29	0.30	0.30	0.30	0.30	0.29	0.29	0.29	0.29	0.34
170	0.32	0.32	0.33	0.33	0.33	0.32	0.31	0.32	0.32	0.32	0.32	0.32	0.32	0.32	0.32	0.31	0.31	0.31	0.34
175	0.34	0.33	0.33	0.33	0.33	0.33	0.33	0.34	0.34	0.33	0.33	0.33	0.33	0.33	0.33	0.33	0.33	0.33	0.34
180	0.32	0.32	0.32	0.32	0.32	0.32	0.32	0.32	0.32	0.32	0.32	0.32	0.32	0.32	0.32	0.32	0.32	0.32	0.32

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	287	287	287	287	287	287	287	287	287	287	287	287	287	287	287	287	287		
5	286	286	286	286	286	286	286	286	286	286	286	286	286	287	286	286	286		
10	282	282	282	282	282	283	283	283	282	283	283	283	283	283	283	283	283		
15	276	276	276	276	276	276	276	276	276	276	276	277	277	277	276	276	276		
20	267	267	267	267	267	267	267	268	268	268	268	268	268	268	268	268	268		
25	256	256	256	256	256	256	257	257	257	257	257	257	257	257	257	257	257		
30	242	242	243	243	243	243	243	243	243	244	244	244	244	244	244	244	244		
35	227	227	227	227	228	228	228	228	228	228	229	229	229	229	228	228	228		
40	210	210	210	210	211	211	211	211	212	211	212	212	212	212	212	212	211		
45	191	192	192	192	192	192	193	193	193	193	193	193	193	193	193	193	193		
50	171	172	172	172	172	173	173	173	173	173	174	174	174	173	173	173	173		
55	151	151	152	152	152	152	152	152	153	153	153	153	153	153	153	153	153		
60	129	129	129	130	130	130	130	131	130	131	131	131	131	131	131	131	131		
65	106	106	106	106	107	107	107	107	107	107	108	108	108	108	108	107	107		
70	81.7	81.9	82.2	82.4	82.5	82.4	82.9	83.0	83.3	83.2	83.6	83.6	84.0	83.6	83.7	83.8	83.9		
75	55.3	56.1	57.7	58.0	58.6	58.5	58.6	58.9	59.2	58.9	59.5	59.4	59.6	59.6	59.0	58.5	57.7		
80	30.9	31.3	33.1	34.6	34.7	34.7	34.8	35.2	35.3	35.5	35.6	35.8	35.8	36.1	34.6	33.4	33.1		
85	10.3	10.7	11.3	11.9	12.0	12.3	12.4	12.6	12.8	12.9	13.0	13.1	13.2	13.1	12.8	12.3	11.9		
90	0.05	0.05	0.05	0.04	0.05	0.05	0.05	0.04	0.05	0.05	0.05	0.06	0.06	0.06	0.06	0.06	0.07		
95	0.04	0.04	0.04	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.06	0.05	0.05		
100	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.07	0.07	0.07	0.06	0.06	0.06	0.06	0.06		
105	0.08	0.09	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.09	0.09	0.08	0.08	0.08	0.08	0.08	0.08		
110	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		
115	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12		
120	0.15	0.14	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	0.14		
125	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.16	0.17	0.17	0.17	0.17	0.16	0.16		
130	0.20	0.21	0.21	0.21	0.21	0.21	0.21	0.21	0.21	0.20	0.20	0.20	0.20	0.21	0.21	0.20	0.20		
135	0.24	0.24	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.24	0.24	0.24	0.25	0.24	0.24	0.24		
140	0.28	0.28	0.29	0.30	0.29	0.29	0.29	0.29	0.29	0.29	0.28	0.28	0.28	0.28	0.28	0.28	0.28		
145	0.31	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	0.32	0.31		
150	0.34	0.34	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.34	0.34	0.35	0.35	0.34		
155	0.35	0.35	0.36	0.36	0.36	0.36	0.36	0.36	0.36	0.36	0.36	0.36	0.36	0.36	0.36	0.36	0.35		
160	0.35	0.36	0.36	0.37	0.37	0.37	0.36	0.36	0.36	0.36	0.36	0.36	0.36	0.36	0.36	0.37	0.35		
165	0.35	0.36	0.36	0.37	0.37	0.37	0.37	0.37	0.36	0.36	0.36	0.36	0.37	0.37	0.37	0.37	0.35		
170	0.36	0.36	0.36	0.37	0.37	0.37	0.37	0.37	0.36	0.37	0.37	0.37	0.37	0.37	0.36	0.37	0.35		
175	0.34	0.34	0.34	0.34	0.35	0.35	0.35	0.35	0.34	0.35	0.35	0.34	0.34	0.34	0.34	0.34	0.34		
180	0.32	0.32	0.32	0.32	0.32	0.32	0.32	0.32	0.32	0.32	0.32	0.32	0.32	0.32	0.32	0.32	0.32		

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.

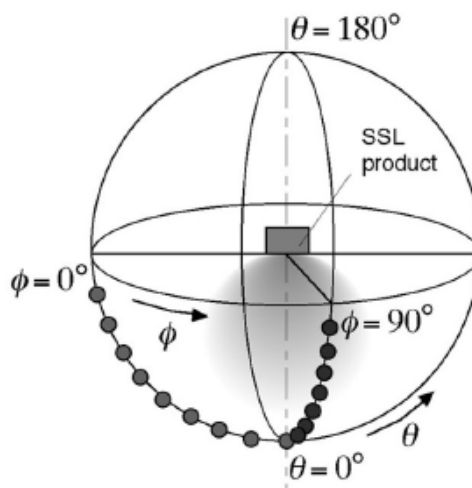
Color Characteristics Measurements

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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