

LM-79-08 TEST REPORT

for

GREEN CREATIVE LTD

Room 3603, Level 36, Tower 1, Enterprise Square Five, 38 Wang Chiu Road, Kowloon Bay, KL,
Hong Kong

LED Lamp

Model: 10FA19DIM/930

Laboratory: Leading Testing Laboratories

NVLAP CODE: 200960-0

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Report No.: HZ21120007as

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

Review by:



Engineer: April Zou

Feb. 17, 2022

Approved by:



Manager: Jim Zhang

Feb. 17, 2022

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: 10FA19DIM/930

Luminous Efficacy (Lumens /Watt)	Total Luminous Flux (Lumens)	Power (Watts)	Power Factor
145.6	1313.0	9.02	0.9771
CCT (K)	CRI	Stabilization Time (Light & Power)	
3062	91.9	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	: Dec. 03, 2021
Date of Test	: Feb. 15, 2022
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 ANSI/IES TM-30-18 IES Method for Evaluating Light Source Color Rendition

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SAMPLE PHOTO



Figure 1- Overview of the sample

Equipment Under Test(EUT)

Name	: LED Lamp
Model	: 10FA19DIM/930
Electrical Ratings	: 120V, 60Hz, 10W
Product Description	: 3000K
Manufacturer	: GREEN CREATIVE LTD
Address	: Room 3603, Level 36, Tower 1, Enterprise Square Five, 38 Wang Chiu Road, Kowloon Bay, KL, Hong Kong

TEST RESULTS

Test ambient temperature was 26.0 °C.

Base orientation was horizontal. 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 65 minutes.

Sphere-Spectroradiometer Method

Parameter	Result
Test Voltage (V)	120.0
Voltage frequency (Hz)	60
Test Current (A)	0.077
Power Factor	0.9771
Test Power (W)	9.02
THD A%	16.24
Luminous Efficacy (lm/W)	145.6
Total Luminous Flux (lm)	1313.0
Color Rendering Index (CRI)	91.9
R9	53.9
Correlated Color Temperature (CCT)(K)	3062
Chromaticity Chroma x	0.4318
Chromaticity Chroma y	0.4012
Chromaticity Chroma u	0.2485
Chromaticity Chroma v	0.3463
Duv	-0.0004
Chromaticity Chroma u'	0.2485
Chromaticity Chroma v'	0.5195

Special Color Rendering Indices	
R1	92.8
R2	98.3
R3	96.9
R4	90.5
R5	92.4
R6	96.5
R7	89.1
R8	78.4
R9	53.9
R10	94.8
R11	91.6
R12	80
R13	94.7
R14	99.3

Table 2: Test data per Sphere-Spectroradiometer Method

Note: According to CIE 1976 (u', v') diagram, $u' = u = 4x/(-2x+12y+3)$, $v' = 3v/2 = 9y/(-2x+12y+3)$.

Goniophotometer Method

Test ambient temperature was 25.1 °C.

The photometric distance is 2.47 m.

Luminous data was taken at 0.5 vertical intervals and 10 horizontal intervals.

Parameter	Result
Test Voltage (V)	120.0
Voltage frequency (Hz)	60
Test Current (A)	0.077
Power Factor	0.9782
Power (W)	9.03
Luminous Efficacy (lm/W)	147.7
Total Luminous Flux (lm)	1333.5
Beam Angle (°)	314.8 (0°-180°) / 309.1(90°-270°)
Center Beam Candle Power (cd)	50.0
Maximum Beam Candle Power (cd)	147.2 (At: C=157.5, Gamma=87.0)
Spacing Criteria	2.67 (0°-180°) / 2.73 (90°-270°)
Zonal Lumens in the 0°-60° Zone	23.71%
Zonal Lumens in the 60°-90° Zone	31.50%
Zonal Lumens in the 90°-120° Zone	29.41%
Zonal Lumens in the 120°-180° Zone	15.38%

Table 3: Test data per Goniophotometer Method

Spectral Power Distribution - Sphere Spectroradiometer Method

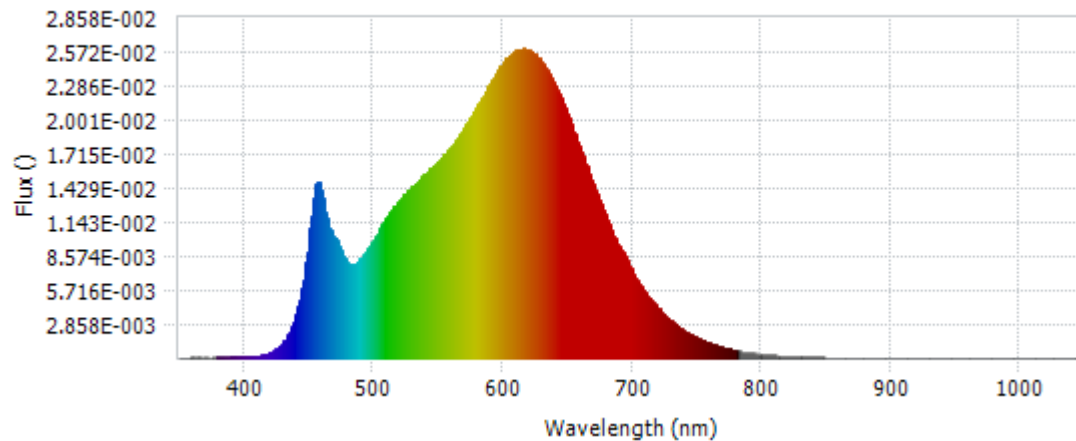
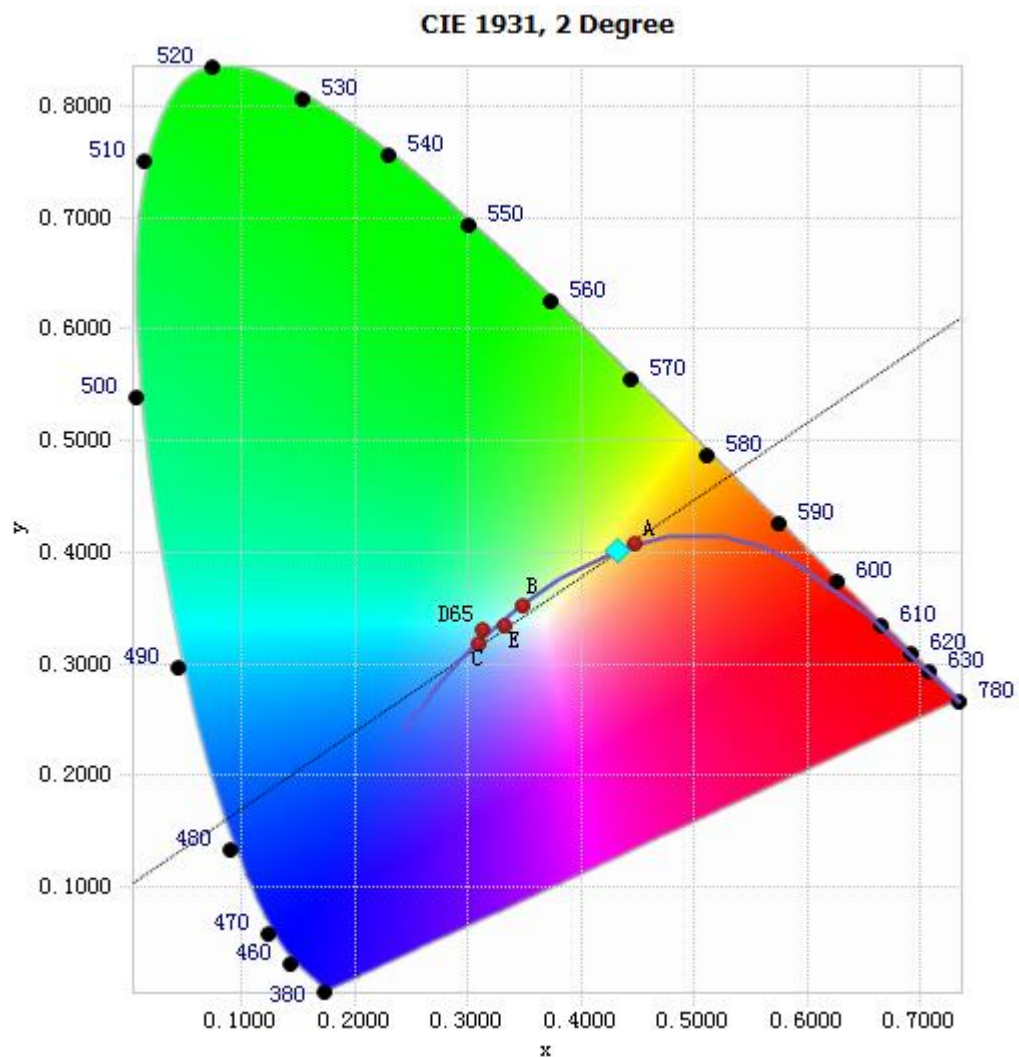


Chart 1: Spectral Power Distribution

Spectral Distribution over Visible Wavelength							
WL(nm)	Radiant(Watts)	WL(nm)	Radiant(Watts)	WL(nm)	Radiant(Watts)	WL(nm)	Radiant(Watts)
380	9.59E-05	485	7.89E-03	590	2.31E-02	695	8.50E-03
385	8.55E-05	490	8.35E-03	595	2.39E-02	700	7.29E-03
390	9.11E-05	495	9.05E-03	600	2.47E-02	705	6.37E-03
395	8.46E-05	500	9.91E-03	605	2.54E-02	710	5.58E-03
400	1.14E-04	505	1.09E-02	610	2.58E-02	715	4.86E-03
405	1.32E-04	510	1.17E-02	615	2.60E-02	720	4.22E-03
410	1.80E-04	515	1.26E-02	620	2.58E-02	725	3.65E-03
415	2.92E-04	520	1.33E-02	625	2.55E-02	730	3.15E-03
420	4.77E-04	525	1.38E-02	630	2.49E-02	735	2.71E-03
425	7.90E-04	530	1.44E-02	635	2.41E-02	740	2.32E-03
430	1.30E-03	535	1.50E-02	640	2.31E-02	745	2.01E-03
435	2.19E-03	540	1.55E-02	645	2.18E-02	750	1.72E-03
440	3.62E-03	545	1.60E-02	650	2.05E-02	755	1.47E-03
445	5.96E-03	550	1.65E-02	655	1.90E-02	760	1.27E-03
450	9.89E-03	555	1.71E-02	660	1.76E-02	765	1.09E-03
455	1.42E-02	560	1.77E-02	665	1.61E-02	770	9.30E-04
460	1.41E-02	565	1.85E-02	670	1.46E-02	775	7.97E-04
465	1.13E-02	570	1.93E-02	675	1.32E-02	780	6.80E-04
470	1.02E-02	575	2.02E-02	680	1.18E-02		
475	9.09E-03	580	2.11E-02	685	1.06E-02		
480	8.00E-03	585	2.21E-02	690	9.37E-03		

Table 4: Spectral Power Distribution Numerical Data per Sphere - Spectroradiometer Method

Chromaticity Diagram - Sphere Spectroradiometer Method



Tristimulus values(x, y): (0.4318, 0.4012)

Chart 2: Chromaticity Diagram per Sphere - Spectroradiometer Method

Note: The location on the diagram of the tristimulus coordinates are indicated by the blue diamond.

Nominal CCT Quadrangles – Sphere Spectroradiometer Method

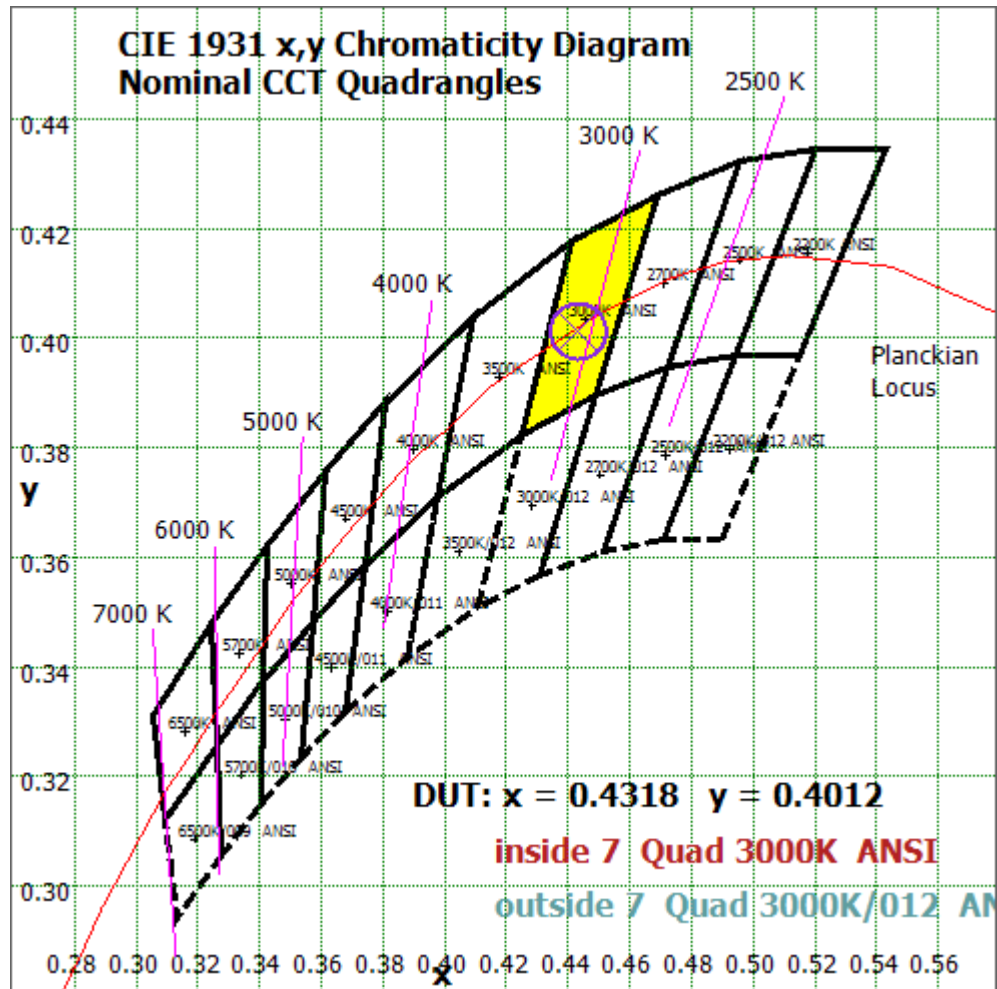


Chart 3: Plot of Lamp x/y coordinates on CIE 1931 Chromaticity Diagram

Color Rendition Report – Sphere Spectroradiometer Method

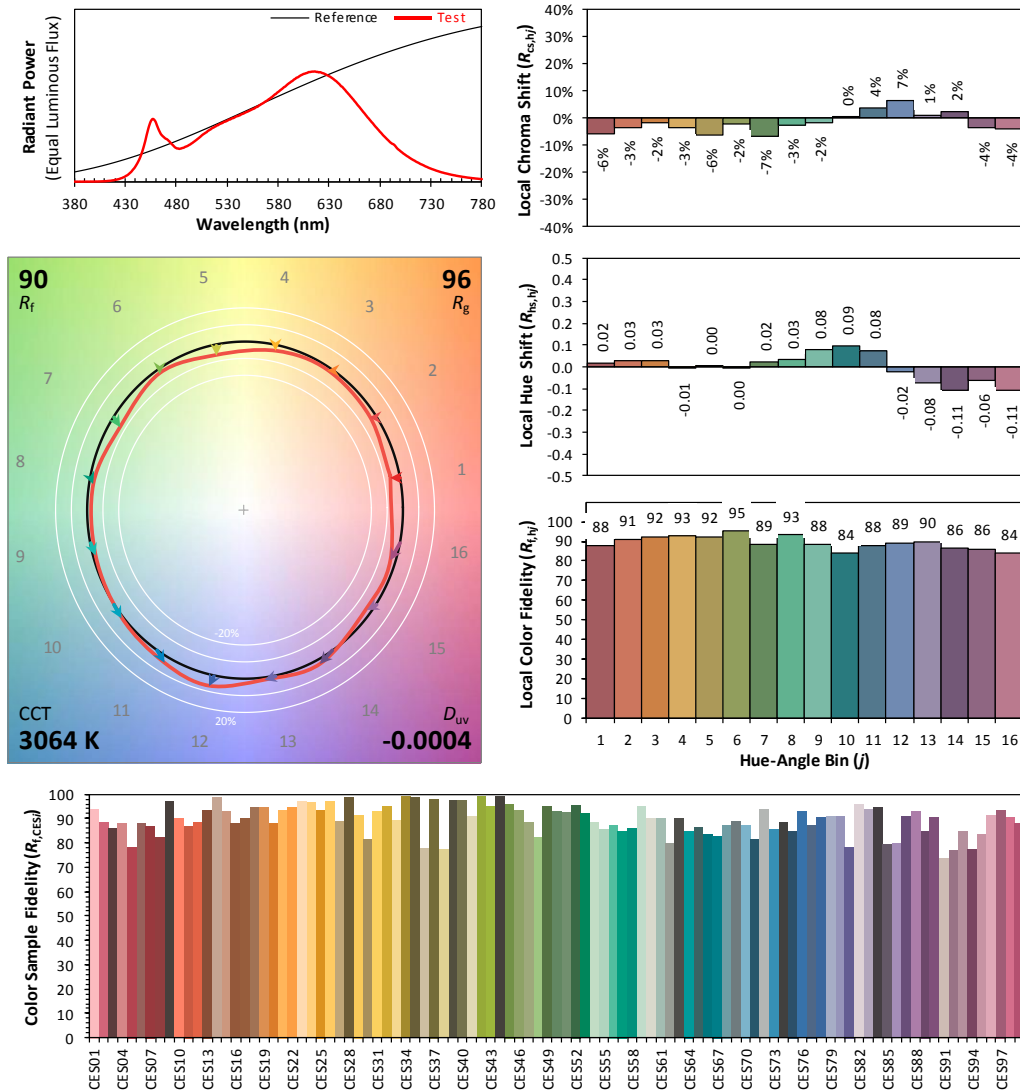
ANSI/IES TM-30-18 Color Rendition Report

Source: LED

Manufacturer: GREEN CREATIVE LTD

Date: 2022/02/15

Model: 10FA19DIM/930



Notes: This is a recommended method for displaying ANSI/IES TM-30-18 information.

x 0.4318
 y 0.4012
 u' 0.2485
 v' 0.5195

CIE 13.3-1995
(CRI)
 R_a 92
 R_g 54

Colors are for visual orientation purposes only. Created with the ANSI/IES TM-30-18 Calculator Version 2.00.

Chart 4: Full Report Created with the IES TM-30 Calculator

Note: The values in this diagram might be a little different from the values in Table 2 due to rounding.

Zonal Lumen Tabulation- Goniophotometer Method

$\gamma(^{\circ})$	Lumens	% Total
0- 10	5	0.37%
10- 20	17.39	1.30%
20- 30	36.959	2.77%
30- 40	61.437	4.61%
40- 50	86.314	6.47%
50- 60	109.071	8.18%
60- 70	128.508	9.64%
70- 80	142.835	10.71%
80- 90	148.771	11.16%
90-100	145.169	10.89%
100-110	133.079	9.98%
110-120	113.883	8.54%
120-130	89.939	6.74%
130-140	63.449	4.76%
140-150	36.24	2.72%
150-160	13.585	1.02%
160-170	1.878	0.14%
170-180	0.015	0.00%
Total	1333.5	100%

$\gamma(^{\circ})$	Lumens	% Total
0-130	1218.36	91.36%
130-180	115.167	8.64%
0-180	1333.5	100%

Table 5: Zonal Lumen

Illuminance Plots- Goniophotometer Method

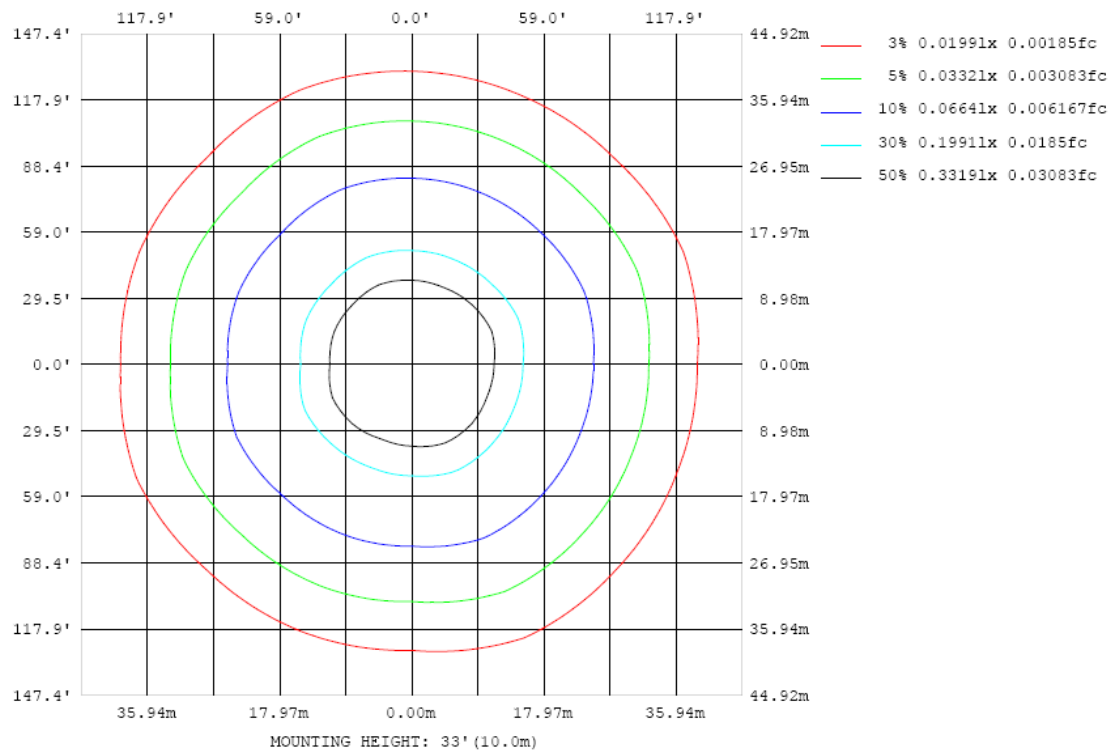


Chart 5: Illuminance Plot (Footcandles)

Luminous Intensity Distribution Plots- Goniophotometer Method

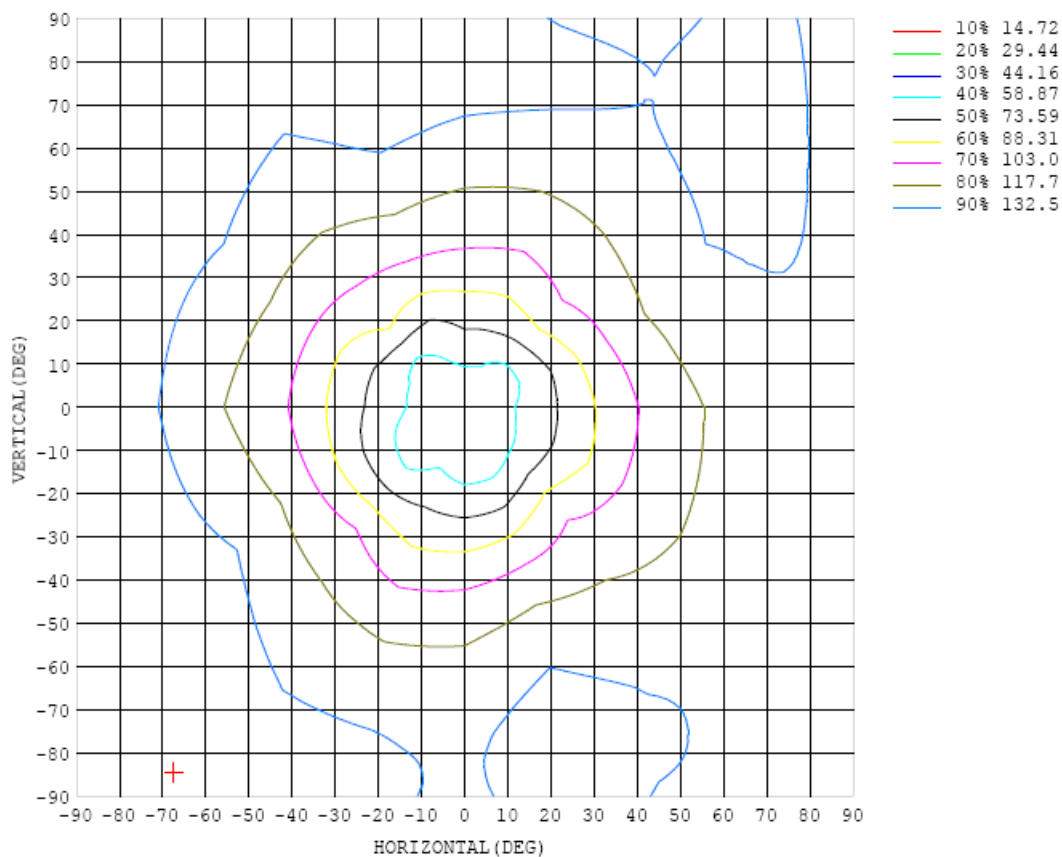


Chart 6: Isocandela Plot

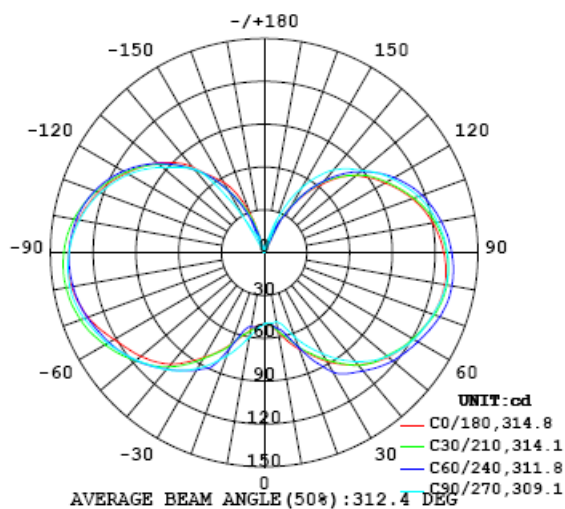


Chart 7: Polar Candela Distribution

Luminous Intensity Data- Goniophotometer Method

Table--1

UNIT: cd

C (DEG) γ (DEG)	0	22.5	45	67.5	90	112.5	135	157.5	180	202.5	225	247.5	270	292.5	315	337.5			
0	50.0	50.0	50.0	50.0	50.0	50.0	50.0	50.0	50.0	50.0	50.0	50.0	50.0	50.0	50.0	50.0			
5	51.4	51.1	50.4	49.8	49.4	49.4	49.8	50.6	51.4	52.2	52.4	53.0	53.4	53.8	52.6	51.1			
10	56.3	55.7	53.9	51.4	49.2	51.7	51.7	53.2	55.0	55.8	52.6	57.3	59.9	58.7	54.0	53.5			
15	64.2	61.5	59.6	54.3	53.5	58.7	53.7	56.2	60.7	60.0	57.2	62.7	68.4	65.4	61.5	60.9			
20	71.8	70.0	70.5	63.8	62.9	66.0	59.9	62.6	68.3	68.8	71.4	70.3	77.0	76.5	75.0	70.5			
25	79.2	78.1	84.1	74.1	72.5	74.0	71.6	72.5	76.6	77.2	88.4	81.3	85.5	84.8	89.1	81.1			
30	87.8	86.5	96.5	85.3	81.7	81.8	85.6	83.5	84.7	85.8	94.9	92.8	93.6	92.1	99.4	92.0			
35	95.5	94.8	103	95.9	91.0	89.4	99.2	95.1	93.4	95.5	101	102	101	99.2	105	102			
40	103	103	108	105	99.5	97.2	107	106	102	104	107	109	107	105	110	109			
45	109	109	113	114	107	105	112	115	108	112	112	116	112	110	115	116			
50	114	112	118	120	113	111	117	122	113	118	117	121	117	115	118	122			
55	117	117	121	126	118	116	121	128	117	124	122	127	122	121	122	127			
60	121	120	125	131	121	121	125	133	122	129	126	132	127	124	125	131			
65	124	124	128	135	124	126	128	138	127	134	129	136	131	128	128	133			
70	126	127	131	138	126	130	131	141	132	137	132	139	134	132	131	136			
75	128	129	133	141	128	132	134	144	135	140	135	142	137	134	132	139			
80	129	130	134	143	130	134	136	146	137	141	136	143	138	134	132	140			
85	128	130	133	143	130	136	136	147	138	142	137	143	138	133	131	139			
90	126	128	132	141	129	137	136	147	137	141	137	141	137	132	129	137			
95	124	126	129	139	127	135	134	146	135	139	136	139	135	129	126	134			
100	120	122	126	135	124	133	131	143	132	136	134	135	132	125	123	130			
105	116	117	122	130	120	129	128	139	128	131	131	130	128	120	119	125			
110	111	112	118	125	115	124	124	134	124	126	127	124	123	115	114	119			
115	105	106	112	118	110	118	119	128	118	120	121	118	117	109	108	111			
120	97.9	99.2	105	111	104	112	113	120	112	113	114	111	110	102	102	103			
125	91.4	92.7	97.4	102	97.3	104	106	112	105	105	106	103	102	93.8	93.8	93.0			
130	84.3	84.5	88.4	91.6	89.6	96.4	98.2	102	97.7	96.5	97.3	93.0	93.2	84.5	84.4	83.0			
135	74.6	75.3	78.1	79.9	83.2	86.8	88.9	90.9	89.2	86.7	86.8	82.6	84.4	76.2	74.0	71.9			
140	62.4	65.0	65.9	67.0	75.6	76.7	79.1	79.1	78.3	75.6	75.9	70.9	76.8	63.8	62.0	60.8			
145	50.1	51.8	52.3	56.5	65.0	65.9	67.1	66.0	66.0	63.7	64.0	56.1	55.0	46.1	45.9	47.3			
150	36.5	36.9	35.3	44.0	52.2	53.6	53.1	50.9	56.8	50.0	50.0	39.8	26.2	30.4	27.6	28.9			
155	21.9	22.4	21.0	26.9	37.6	38.4	36.6	35.7	45.2	37.9	34.9	25.3	14.0	16.5	16.0	18.7			
160	8.02	12.1	13.9	16.8	22.0	21.7	21.1	22.3	28.5	25.1	19.7	14.4	10.6	10.4	9.09	9.90			
165	0.88	0.97	1.85	3.35	5.57	7.03	6.33	7.44	6.79	7.38	4.98	1.52	3.11	1.55	0.73	0.97			
170	0.17	0.18	0.20	0.25	0.26	0.31	0.37	0.42	0.44	0.40	0.31	0.22	0.22	0.19	0.15	0.16			
175	0.12	0.10	0.10	0.10	0.10	0.10	0.10	0.11	0.10	0.12	0.12	0.12	0.12	0.12	0.12	0.12			
180	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09			

Table 6: Luminous Intensity Data

EQUIPMENT LIST

Test Equipment	Model	Equipment No.	Calibration Date	Calibration Due date
Goniophotometer system	GO-R5000	HZTE011-01	Aug. 05, 2021	Aug. 04, 2022
Digital Power Meter	PF2010A	HZTE028-01	Aug. 05, 2021	Aug. 04, 2022
AC Power Supply	DPS1060	HZTE001-06	Aug. 05, 2021	Aug. 04, 2022
DC Power Supply	WY12010	HZTE004-03	Aug. 05, 2021	Aug. 04, 2022
Temperature recorder	JM624U	HZTE018-08	Aug. 05, 2021	Aug. 04, 2022
Temperature and humidity recorder	JR900	HZTE018-01	Aug. 05, 2021	Aug. 04, 2022
Standard source	D908	HZTE012-01	Aug. 05, 2021	Aug. 04, 2022
Integrate Sphere system	3M	HZTE015-04	Aug. 05, 2021	Aug. 04, 2022
Digital Power Meter	WT210	HZTE008-01	Aug. 05, 2021	Aug. 04, 2022
AC Power Supply	PCR 500L	HZTE001-07	Aug. 05, 2021	Aug. 04, 2022
DC Power Supply	IT6154	HZTE004-04	Aug. 05, 2021	Aug. 04, 2022
Standard source	SCL-1400	HZTE012-02	Aug. 05, 2021	Aug. 04, 2022
Temperature and humidity recorder	JR900	HZTE018-02	Aug. 05, 2021	Aug. 04, 2022
Temperature Meter	TES1310	HZTE017-01	Aug. 05, 2021	Aug. 04, 2022

Table 7: 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.

Sphere-Spectroradiometer Method- Photometric and Electrical Measurements

A Labsphere Model CDS 2100 Spectroradiometer and Two Meter Sphere was used to measure correlated color temperature, chromaticity coordinates, and the color rendering index for each SSL unit. The coating reflectance of each sphere is 98%. The measure geometry is 4π . Self-absorption correction is conducted in testing. Bandwidth of spectroradiometer is 350nm-1050nm.

Ambient temperature was measured at a position inside the sphere. 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 Yokogawa Power Analyzer.

The standard reference of the integrated sphere system is halogen incandescent lamp, the intensity distribution type is omni-directional, and is traceable to the National Institute of Standards and Technology.

The uncertainty of integrating sphere system reported in this document is expanded uncertainty is 2.1% with a coverage factor $k=2$.

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

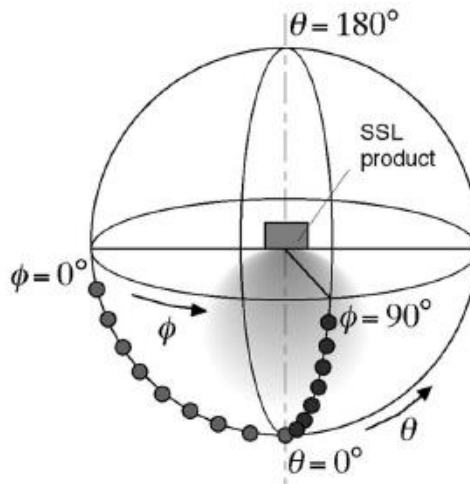
The color characteristics of SSL products include chromaticity coordinates, correlated color temperature, and color rendering index. These characteristics of SSL products may be spatially non-uniform, and thus, in order that they can be specified accurately, the color quantities shall be measured as 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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