



LM-79-08 Test Report

for

GREEN CREATIVE LTD

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

LED LAMP

Model: 13PAR30DIM/930FL40

Laboratory: Leading Testing Laboratories

NVLAP CODE: 200960-0

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Report No.: HZ17020041j

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

Review by:

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Mar. 07, 2017

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Jim Zhang

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Mar. 07, 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: 13PAR30DIM/930FL40

Luminous Efficacy (Lumens /Watt)	Total Luminous Flux (Lumens)	Power (Watts)	Power Factor
85.5	1089.0	12.74	0.9511
CCT (K)	CRI	Stabilization Time (Light & Power)	
3029	92.9	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 : Feb. 27, 2017

Date of Test : Mar. 02, 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
Goniophotometer Method	6
Spectral Power Distribution - Sphere Spectroradiometer Method	7
Chromaticity Diagram - Sphere Spectroradiometer Method.....	8
Nominal CCT Quadrangles – Sphere Spectroradiometer Method	9
Zonal Lumen Tabulation- Goniophotometer Method	10
Luminous Intensity Distribution Plots- Goniophotometer Method.....	12
Luminous Intensity Data- Goniophotometer Method.....	13
EQUIPMENT LIST	14
TEST METHODS	14
Seasoning of SSL Product.....	14
Sphere-Spectroradiometer Method- Photometric and Electrical Measurements.....	14
Goniophotometer Method	15
Photometric and Electrical Measurements.....	15
Color Characteristics Measurements.....	15
Color Spatial Uniformity	15

Sample Photos



Figure 1- Overview of the sample

Equipment Under Test (EUT)

Name	: LED LAMP
Model	: 13PAR30DIM/930FL40
Electrical Ratings	: 120Vac, 60Hz, 13W
Product Description	: E26 base, 3000K
Manufacturer	: GREEN CREATIVE LTD
Address	: 756 North Zhongshan Rd., Unit B301 Zhabei District, Shanghai

TEST RESULTS

Test ambient temperature was 25.0°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 70 minutes.

Sphere-Spectroradiometer Method

Parameter	Result
Test Voltage (V)	120.0
Voltage frequency (Hz)	60
Test Current (A)	0.112
Power Factor	0.9511
Test Power (W)	12.74
THD A%	26.84
Luminous Efficacy (lm/W)	85.5
Total Luminous Flux (lm)	1089.0
Color Rendering Index (CRI)	92.9
R9	64.6
Correlated Color Temperature (CCT)(K)	3029
Chromaticity Chroma x	0.4336
Chromaticity Chroma y	0.4008
Chromaticity Chroma u	0.2498
Chromaticity Chroma v	0.3464
Duv	0.0009
Chromaticity Chroma u'	0.2498
Chromaticity Chroma v'	0.5196

Special Color Rendering Indices	
R1	93.3
R2	96.2
R3	96.8
R4	92.5
R5	92.4
R6	94.4
R7	93.1
R8	84.4
R9	64.6
R10	89.4
R11	92.3
R12	79
R13	94.1
R14	97.5
Rf	90
Rg	99

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 24.6°C.

The photometric distance is 2.47m.

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)	0.113
Power Factor	0.9500
Test Power (W)	12.87
Luminous Efficacy (lm/W)	85.6
Total Luminous Flux (lm)	1101.3
Beam Angle (°)	33.9
Center Beam Candle Power (cd)	2564
Spacing Criteria	0.52 (0°-180°)/ 0.56(90°-270°)
Zonal Lumens in the 0°-60°Zone	95.43%
Zonal Lumens in the 60°-90°Zone	4.47%
Zonal Lumens in the 90°-120°Zone	0.01%
Zonal Lumens in the 120°-180°Zone	0.09%

Table 3: Test data per Goniophotometer Method

Spectral Power Distribution - Sphere Spectroradiometer Method

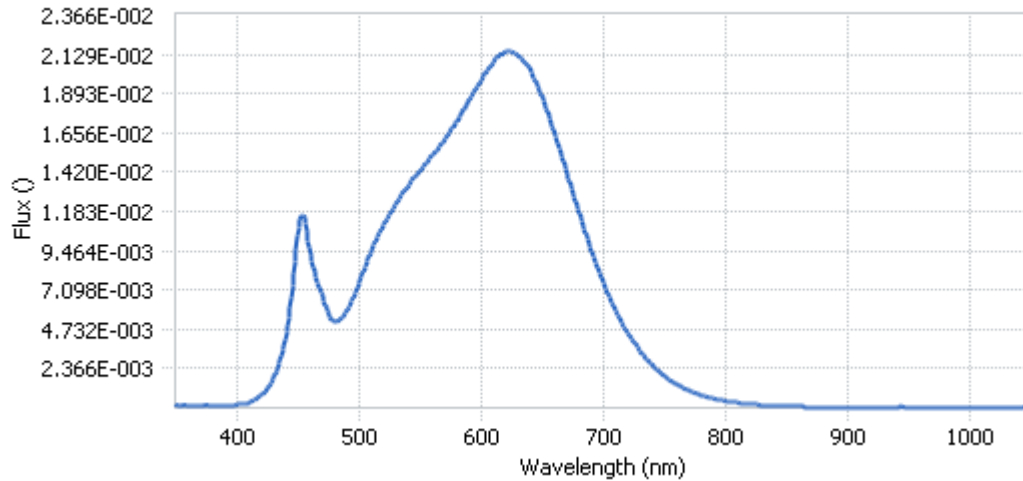


Chart 1: Spectral Power Distribution

Spectral Distribution over Visible Wavelength							
WL(nm)	Radiant(Watts)	WL(nm)	Radiant(Watts)	WL(nm)	Radiant(Watts)	WL(nm)	Radiant(Watts)
380	1.71E-04	485	5.34E-03	590	1.84E-02	695	8.65E-03
385	1.52E-04	490	5.81E-03	595	1.91E-02	700	7.67E-03
390	1.78E-04	495	6.56E-03	600	1.97E-02	705	6.78E-03
395	1.71E-04	500	7.46E-03	605	2.03E-02	710	5.96E-03
400	1.92E-04	505	8.43E-03	610	2.08E-02	715	5.26E-03
405	2.40E-04	510	9.33E-03	615	2.12E-02	720	4.63E-03
410	3.10E-04	515	1.03E-02	620	2.14E-02	725	4.02E-03
415	4.76E-04	520	1.10E-02	625	2.15E-02	730	3.50E-03
420	7.32E-04	525	1.16E-02	630	2.13E-02	735	3.02E-03
425	1.16E-03	530	1.23E-02	635	2.09E-02	740	2.61E-03
430	1.76E-03	535	1.28E-02	640	2.05E-02	745	2.25E-03
435	2.69E-03	540	1.33E-02	645	1.97E-02	750	1.95E-03
440	4.13E-03	545	1.38E-02	650	1.89E-02	755	1.68E-03
445	6.67E-03	550	1.42E-02	655	1.78E-02	760	1.45E-03
450	1.04E-02	555	1.47E-02	660	1.67E-02	765	1.25E-03
455	1.16E-02	560	1.52E-02	665	1.55E-02	770	1.08E-03
460	9.67E-03	565	1.56E-02	670	1.43E-02	775	9.33E-04
465	7.90E-03	570	1.61E-02	675	1.31E-02	780	7.88E-04
470	6.93E-03	575	1.67E-02	680	1.20E-02		
475	5.78E-03	580	1.72E-02	685	1.08E-02		
480	5.22E-03	585	1.78E-02	690	9.70E-03		

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

Chromaticity Diagram - Sphere Spectroradiometer Method

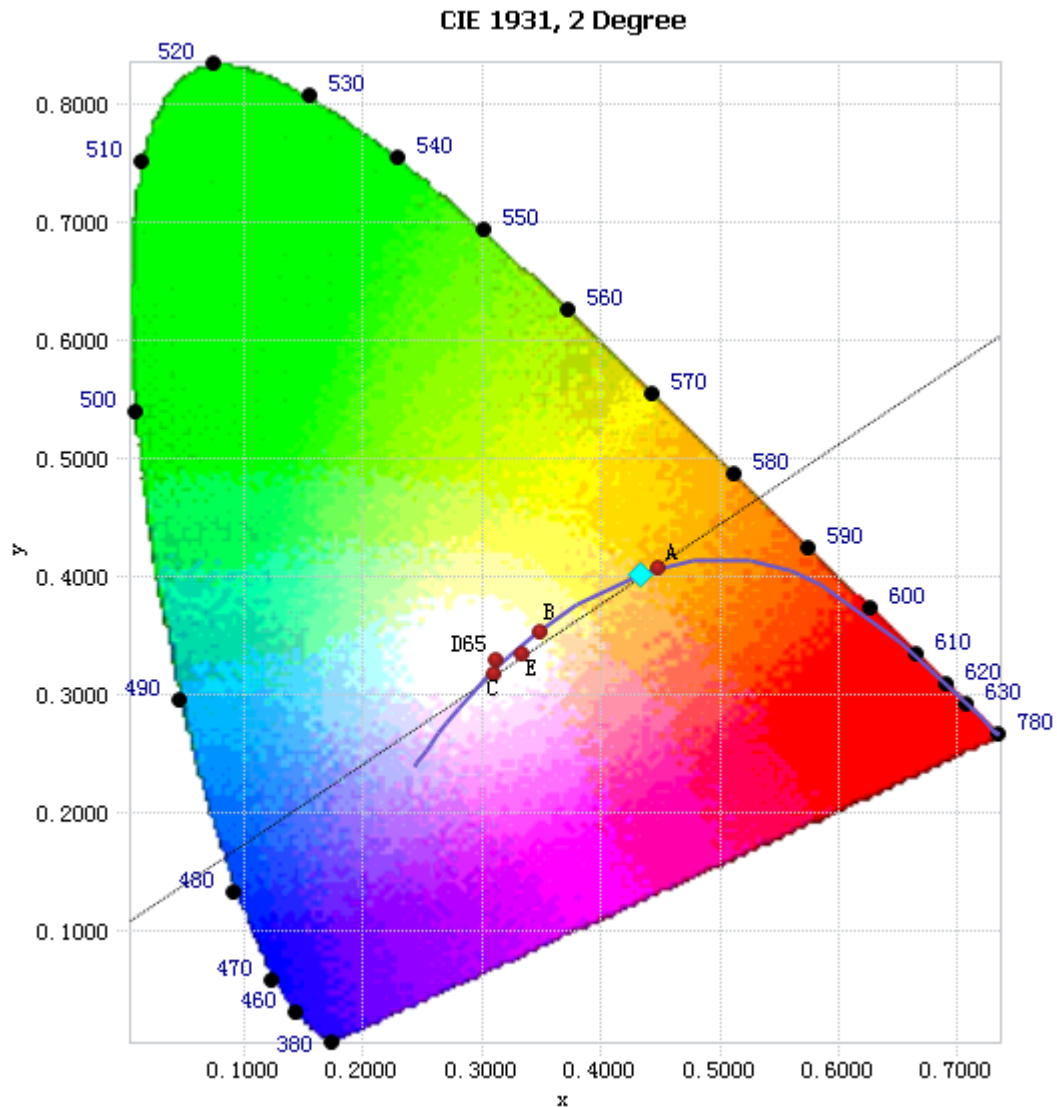


Chart 2: Chromaticity Diagram per Sphere - Spectroradiometer Method

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

Nominal CCT Quadrangles – Sphere Spectroradiometer Method

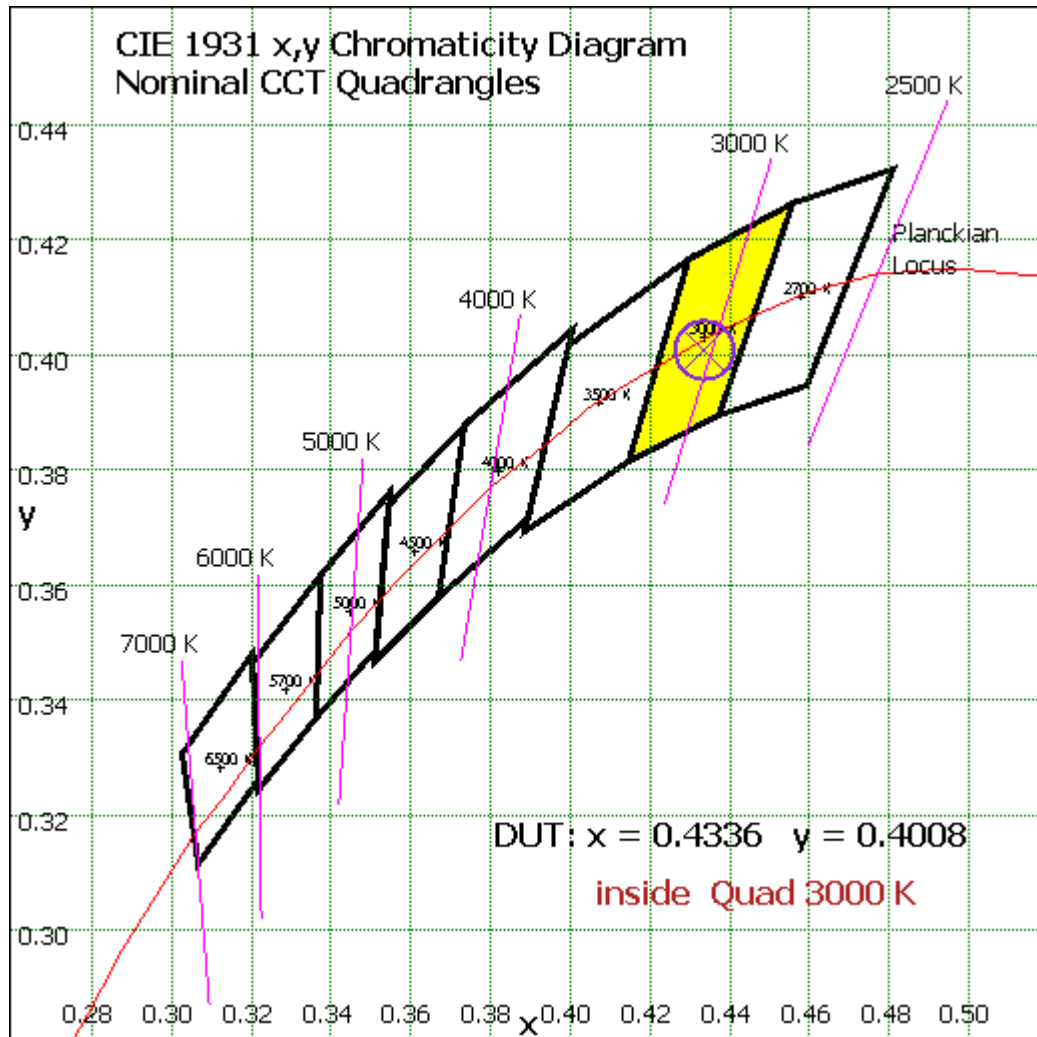


Chart 3: Plot of Lamp x/y coordinates on CIE 1931 Chromaticity Diagram

Zonal Lumen Tabulation- Goniophotometer Method

$\gamma(^{\circ})$	Lumens	% Total
0- 10	228.956	20.79%
10- 20	433.282	39.34%
20- 30	197.559	17.94%
30- 40	88.7	8.05%
40- 50	59.931	5.44%
50- 60	42.616	3.87%
60- 70	28.696	2.61%
70- 80	16.154	1.47%
80- 90	4.411	0.40%
90-100	0.039	0.00%
100-110	0.007	0.00%
110-120	0.017	0.00%
120-130	0.038	0.00%
130-140	0.124	0.01%
140-150	0.245	0.02%
150-160	0.287	0.03%
160-170	0.212	0.02%
170-180	0.067	0.01%
Total	1101.3	100%

$\gamma(^{\circ})$	Lumens	% Total
0- 60	1051.044	95.43%
60- 90	49.261	4.47%
0-90	1100.305	99.91%
90- 180	1.036	0.09%
0- 180	1101.3	100%

Table 5: Zonal Lumen Data

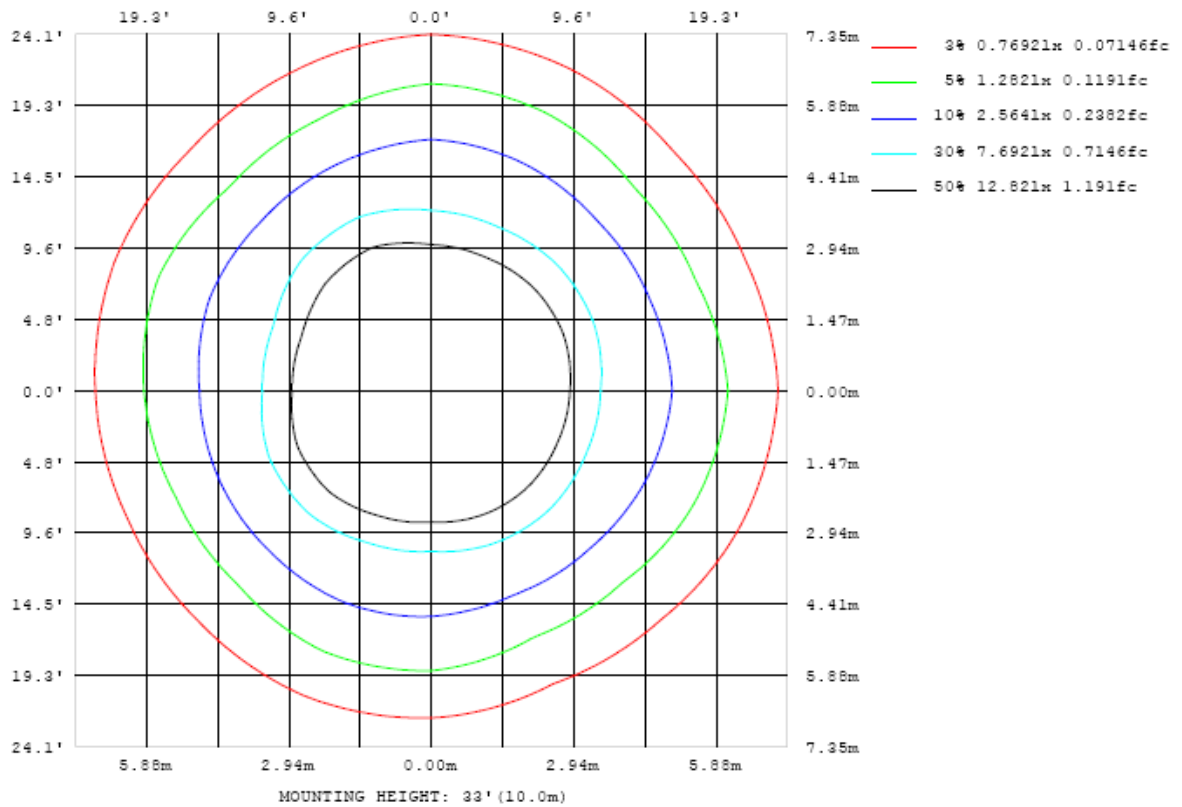


Chart 4: Illuminance Plot (Footcandles)

Luminous Intensity Distribution Plots- Goniophotometer Method

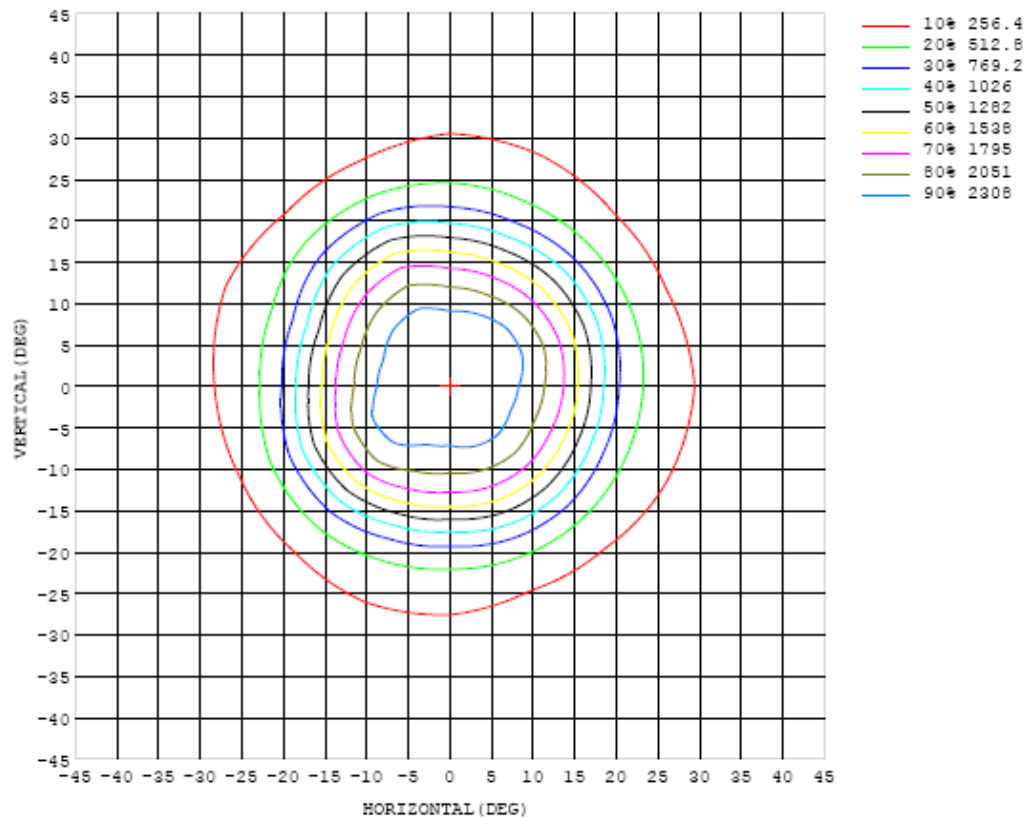


Chart 5: Isocandela Plot

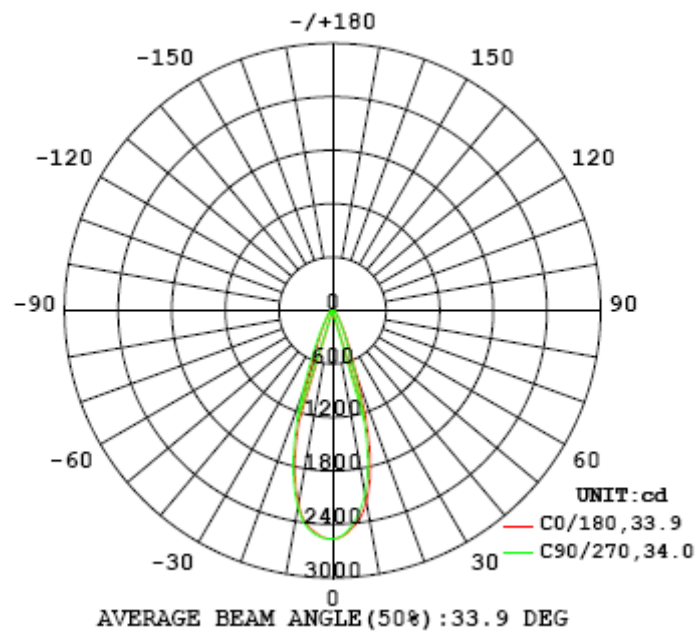


Chart 6: Polar Candela Distribution

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	2564	2564	2564	2564	2564	2564	2564	2564	2564	2564	2564	2564	2564	2564	2564	2564			
5	2452	2456	2477	2467	2429	2430	2471	2500	2483	2471	2484	2501	2503	2514	2517	2491			
10	2176	2136	2165	2133	2091	2143	2281	2313	2203	2204	2280	2318	2237	2250	2288	2263			
15	1600	1549	1548	1513	1458	1546	1709	1719	1604	1635	1783	1853	1699	1679	1697	1679			
20	809	775	780	739	684	738	879	911	797	833	1059	1134	983	927	951	916			
25	416	378	330	311	344	360	357	370	373	415	458	490	487	450	417	411			
30	240	213	178	170	198	203	185	191	215	239	213	232	272	251	214	212			
35	149	138	123	116	125	129	127	128	135	143	141	150	163	155	141	141			
40	104	98.2	90.3	86.5	89.2	92.0	92.8	92.8	95.4	99.2	101	107	111	106	101	101			
45	80.7	77.2	72.1	69.0	70.3	72.2	74.0	73.3	74.7	77.5	78.8	82.9	85.3	82.8	80.2	79.2			
50	65.8	62.1	57.5	55.6	55.3	56.8	58.7	58.1	59.6	61.5	63.9	68.2	68.4	66.5	66.6	65.5			
55	48.2	45.9	43.3	43.4	42.8	43.3	44.1	44.6	45.9	47.3	48.3	51.8	52.1	50.4	49.3	49.0			
60	37.5	35.9	34.3	34.5	33.8	34.1	34.8	35.3	36.2	37.1	37.7	39.8	39.9	39.0	38.6	38.1			
65	29.4	28.3	27.4	27.1	26.7	26.8	27.3	27.9	28.6	29.2	29.7	30.9	31.2	30.9	30.4	30.2			
70	22.4	21.5	20.8	20.4	20.1	20.2	20.5	21.2	21.6	22.1	22.7	23.5	23.8	23.7	23.1	23.1			
75	15.5	14.9	14.3	13.9	13.7	13.8	14.0	14.7	15.0	15.4	16.0	16.6	16.8	16.8	16.3	16.2			
80	9.23	8.71	8.28	7.98	7.85	7.91	8.13	8.62	8.94	9.28	9.71	10.1	10.3	10.3	9.97	9.78			
85	3.89	3.50	3.15	2.88	2.74	2.76	2.91	3.27	3.56	3.87	4.21	4.66	4.75	4.71	4.52	4.33			
90	0.27	0.17	0.13	0.08	0.12	0.15	0.17	0.13	0.14	0.26	0.45	0.66	0.75	0.76	0.66	0.46			
95	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00			
100	0.00	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00			
105	0.01	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.01	0.01	0.01	0.01			
110	0.02	0.02	0.02	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.00	0.01	0.01	0.01	0.01	0.01			
115	0.02	0.02	0.02	0.01	0.01	0.01	0.02	0.01	0.01	0.01	0.01	0.02	0.02	0.02	0.02	0.02			
120	0.03	0.03	0.03	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.03	0.03	0.03	0.03	0.03			
125	0.05	0.05	0.05	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.05	0.05	0.05	0.05	0.05			
130	0.10	0.10	0.11	0.06	0.06	0.06	0.05	0.05	0.05	0.05	0.05	0.09	0.09	0.10	0.10	0.10			
135	0.21	0.22	0.22	0.12	0.12	0.11	0.11	0.11	0.11	0.10	0.10	0.19	0.19	0.20	0.21	0.21			
140	0.37	0.39	0.38	0.19	0.18	0.18	0.18	0.18	0.18	0.18	0.17	0.33	0.34	0.35	0.35	0.36			
145	0.55	0.58	0.56	0.27	0.27	0.27	0.26	0.26	0.25	0.25	0.23	0.49	0.51	0.52	0.53	0.54			
150	0.74	0.77	0.74	0.33	0.32	0.33	0.33	0.32	0.32	0.31	0.30	0.67	0.70	0.70	0.70	0.72			
155	0.89	0.92	0.88	0.40	0.39	0.40	0.40	0.40	0.39	0.39	0.37	0.81	0.85	0.85	0.86	0.87			
160	0.99	1.02	0.96	0.46	0.45	0.46	0.47	0.47	0.46	0.46	0.43	0.92	0.97	0.98	0.98	0.98			
165	1.03	1.06	0.96	0.49	0.49	0.50	0.51	0.51	0.52	0.52	0.48	0.96	1.03	1.04	1.03	1.03			
170	1.00	1.02	0.89	0.50	0.52	0.53	0.53	0.53	0.53	0.53	0.49	0.88	0.99	1.00	0.99	1.00			
175	0.86	0.86	0.69	0.49	0.50	0.51	0.51	0.52	0.54	0.55	0.55	0.66	0.83	0.85	0.85	0.85			
180	0.68	0.68	0.68	0.68	0.68	0.68	0.68	0.68	0.68	0.68	0.68	0.68	0.68	0.68	0.68	0.68			

Table 6: 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
Integrate Sphere system	2M	HZTE015-01	Jul. 27, 2016	Jul. 26, 2017
Digital Power Meter	WT210	HZTE008-01	Jul. 27, 2016	Jul. 26, 2017
AC Power Supply	PCR 500L	HZTE001-07	Jul. 27, 2016	Jul. 26, 2017
DC Power Supply	6154	HZTE004-04	Jul. 27, 2016	Jul. 26, 2017
Temperature and humidity recorder	JR900	HZTE018-01	Jul. 27, 2016	Jul. 26, 2017
Standard source	SCL-1400	HZTE012-02	Jul. 27, 2016	Jul. 26, 2017

Table 8: 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 FA19 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 1.06% 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 FA19 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 1.94% with a coverage factor $k=2$.

Color Characteristics Measurements

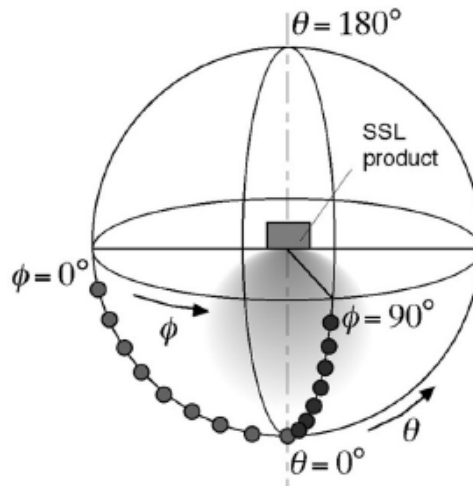
The color characteristics of SSL products include chromaticity coordinates, correlated color temperature, and color rendering index. These characteristics of SSL products may be spatially non-uniform, and thus, in order that they can be specified accurately, the color quantities shall be measured as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