NVLAP LAB CODE 200960-0

LM-79-08 Test Report

for

Elec-Tech International Co., Ltd

No.1 Jinfeng Rd.,Tangjiawan Town,
Xiangzhou District, Zhuhai City,
Guangdong province, China

Model: 52301121, 523011XX "XX" could be 21-30

Laboratory: Leading Testing Laboratories Co., LTD

NVLAP CODE: 200960-0

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Report No.: HZ12060009b/R3

This report is replaced the old report No. HZ12060009b/R2 dated July 13, 2013.

Mar. 13, 2013

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

Tested by: April Zou

Engineer: April Zou
Mar. 13, 2013

Approved by: Jim Zhang

Manager: Jim Zhang
Mar. 13, 2013

Note: This report does not imply product certification, approval, or endorsement by NVLAP, NIST, or any agency of the Federal Government.

U.S. Department of Energy

Lighting Facts™ Uniform LM-79 Reporting Template

Laboratory Information:

Name of test Laboratory	Leading Testing Laboratories
Date of test Report	Mar. 13, 2013
Test Report Number	HZ12060009b/R3
Laboratory Contact Name	Jim Zhang

Product Information:

Organization Name	Elec-Tech International Co., Ltd.	
Brand Name	ETI, AEG	
Model Number	52301121, 523011XX “XX” could be 21-30	
SKU (if available)	N/A	
Type of Luminaire (for integral lamps, list base type and lamp type)	Decorative lamp, E12 base	
Luminaire Aperture (downlights)	N/A	in.
Luminaire Length	4.00	in.
Luminaire Width	1.50	in.
Number of Units (modular products)	N/A	

Electrical Measurements:	**Integrating sphere output**	**Goniophotometer output**	
Input Wattage	2.58	2.54	W
Input Current	0.038	0.040	A
Input Voltage ac	120	120	V
Power Factor	0.5715	0.5291	
Off-state Power	0.00	0.00	W

Photometric Characteristics

Total Initial Lumen Output	115.2	116.9	lm
Initial Luminaire Efficacy	44.7	46.0	lm/W
Correlated Color Temperature/ CCT	2911	K	
Color Rendering Index / CRI	83.3		
R9 Value	18.8		
Duv	0.0005		

Luminous Intensity Distribution

Center Beam Candlepower (if application)	8.14	cd
Beam Angle (if application)	243.7	°
Zonal Lumens in the 0° -60° Zone	31.08%	
Zonal Lumens in the 60° -90° Zone	33.70%	
Zonal Lumens in the 90° -120° Zone	25.50%	
Zonal Lumens in the 120° -180° Zone	9.75%	

Test Summary

Sample Tested: **52301121**

Luminous Efficacy (Lumens /Watt)	Total Luminous Flux (Lumens)	Power (Watts)	Power Factor
44.7	115.2	2.58	0.5715

CCT (K)	CRI	Stabilization Time (Light & Power)
2911	83.3	50

Table 1: Executive Data Summary

Note: The above results are recorded/ derived from measurements made using an Integrating Sphere.

Test specifications:	
Date of Receipt	: June 26, 2012
Date of Test	: June 27, 2012 to June 28, 2012
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

Model discrepancy: Model 523011XX is identical with Model 52301121. “XX” could be 21-30, indicate for different packages, different costumer No. and different painting color of metal enclosure. Model 52301121 is chosen to represent for both models in this report.

TABLE OF CONTENT

Sample Photos

Figure 1- Overview of the sample model: 52301121

Equipment Under Test (EUT)	
Name	: LED CANDLE LAMP
Model	: 52301121
Electrical Ratings	: 120 V ac, 60Hz, 2.5W
Product Description	: E12 base, Non dimmable, 3000K Quantity of light source: 1 pc
Manufacturer	: Elec-Tech International Co.,Ltd
Address	: No.18-1, Keji 6th Road, Gangwan Avenue, Tangjiawan Town, Xiangzhou District, Zhuhai City, Guangdong Province, P.R.China
Manufacturer (Alternative)	: Wuhu 3E Lighting Co., Ltd
Address	: No11.wei Rd.East Zone of wuhu Economice and Technological Development Area

Photometric Testing Photos

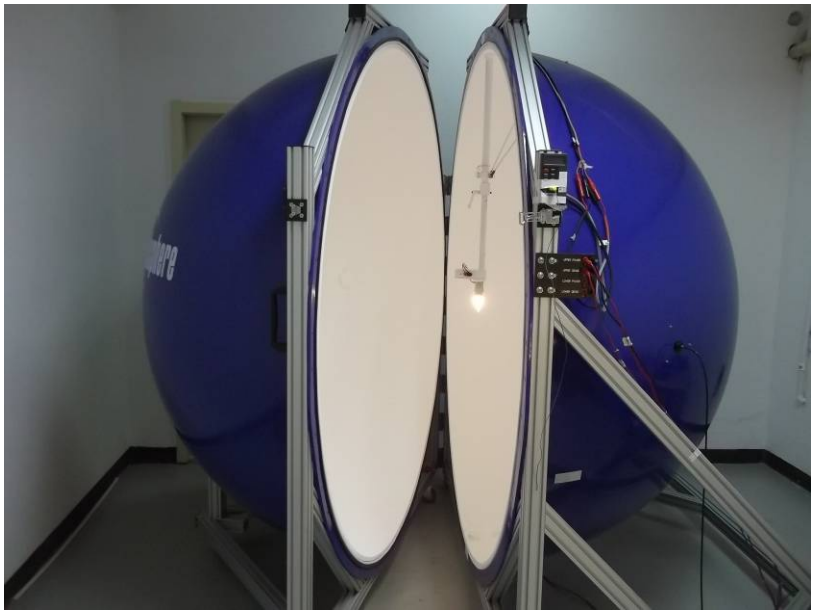


Figure 2: Testing in Integrating Sphere

Figure 3: Testing in Goniophotometer

TEST RESULTS

Test ambient temperature was 24.6℃.

Base orientation was Base up. Test was conducted without a dimmer in the circuit.

The stabilization time of the sample was 55 minutes, and the total operating time including stabilization was 85 minutes.

Sphere-Spectroradiometer Method

Parameter	Result
Test Voltage (V)	120.0
Voltage frequency (Hz)	60
Test Current (A)	0.038
Power Factor	0.5715
Test Power (W)	2.58
Luminous Efficacy (lm/W)	44.7
Total Luminous Flux (lm)	115.2
Color Rendering Index (CRI)	83.3
R9	18.8
Correlated Color Temperature (CCT) (K)	2911
Chromaticity (Chroma x, Chroma y)	(0.4446, 0.4088)
Chromaticity (Chroma u, Chroma v)	(0.2535, 0.3496)
Chromaticity (Chroma u', Chroma v')	(0.2535, 0.5244)
Duv	0.0005

Special Color Rendering Indices	
R1	81.5
R2	92.2
R3	96
R4	78.7
R5	81.1
R6	89.9
R7	83.9
R8	62.8
R9	18.8
R10	81.7
R11	76
R12	71.4
R13	84
R14	98.4

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

The photometric distance is 2.475m.

Luminous data was taken at 1.0°vertical intervals and 10°horizontal intervals.

Parameter	Result
Test Voltage (V)	120.0
Voltage frequency (Hz)	60
Test Current (A)	0.040
Power Factor	0.5291
Test Power (W)	2.54
Luminous Efficacy (lm/W)	46.0
Total Luminous Flux (lm)	116.9
Beam Angle (°)	243.7
Center Beam Candle Power (cd)	8.14

Table 3: Test data per Goniophotometer Method

Spectral Power Distribution - Sphere Spectroradiometer Method

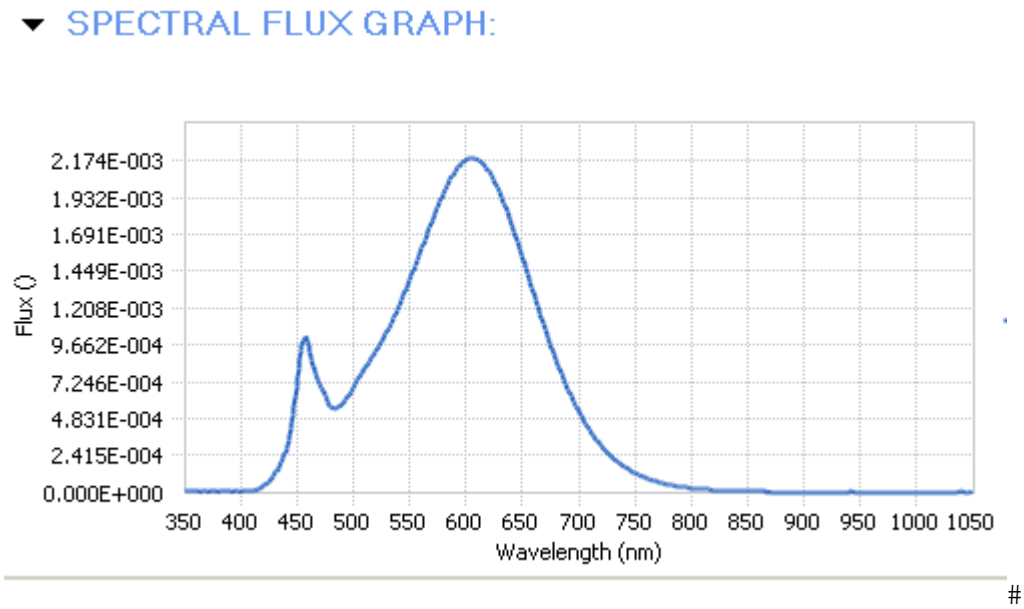
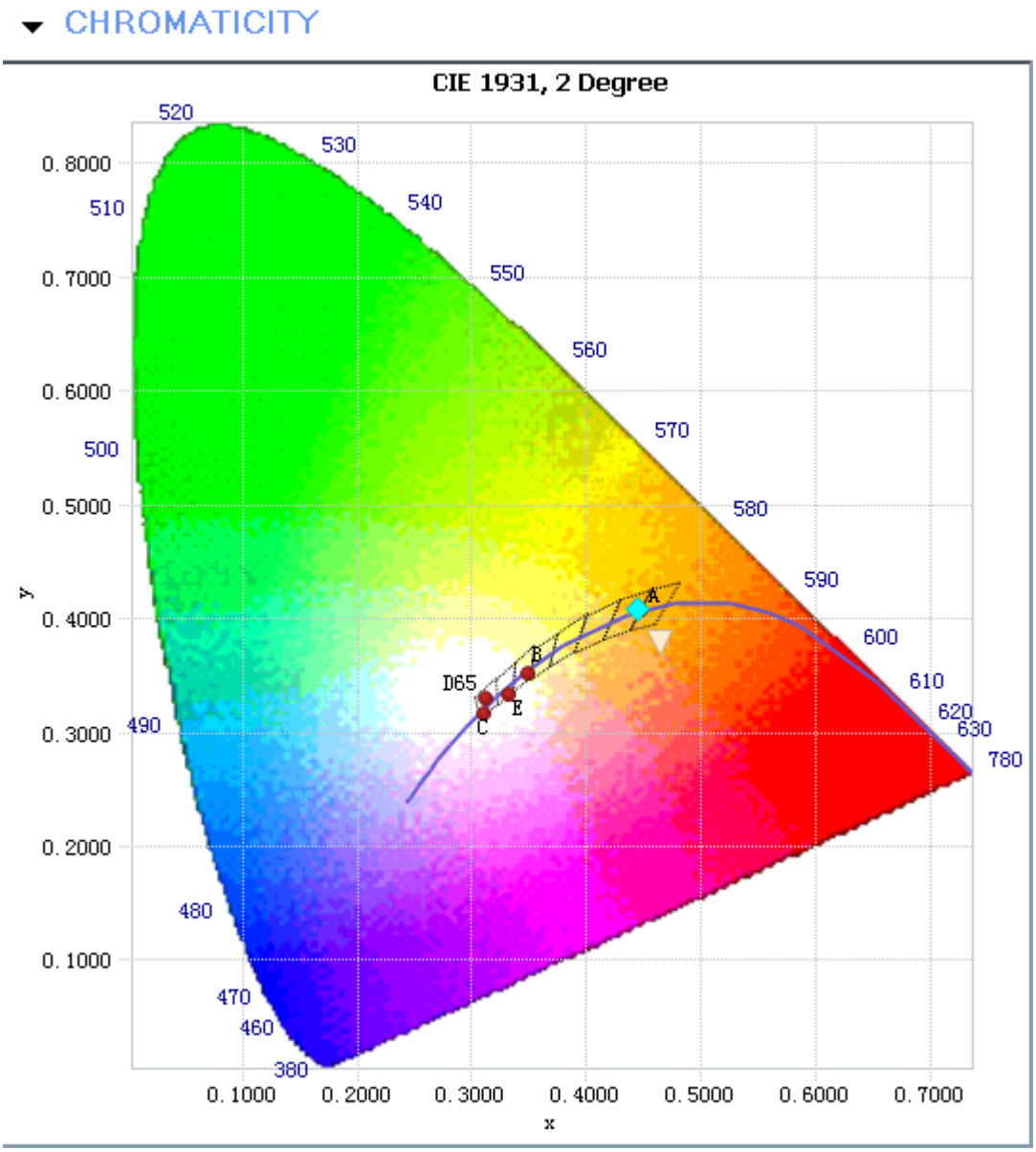


Chart 1: Spectral Power Distribution

Spectral Distribution over Visible Wavelength							
WL(nm)	Radiant(Watts)	WL(nm)	Radiant(Watts)	WL(nm)	Radiant(Watts)	WL(nm)	Radiant(Watts)
380	5.53E-06	485	5.52E-04	590	2.10E-03	695	6.06E-04
385	4.91E-06	490	5.84E-04	595	2.15E-03	700	5.31E-04
390	6.23E-06	495	6.32E-04	600	2.18E-03	705	4.64E-04
395	5.10E-06	500	6.93E-04	605	2.19E-03	710	4.06E-04
400	4.83E-06	505	7.56E-04	610	2.18E-03	715	3.55E-04
405	7.29E-06	510	8.15E-04	615	2.15E-03	720	3.09E-04
410	1.14E-05	515	8.76E-04	620	2.11E-03	725	2.67E-04
415	2.37E-05	520	9.34E-04	625	2.05E-03	730	2.33E-04
420	4.49E-05	525	9.97E-04	630	1.96E-03	735	2.00E-04
425	7.58E-05	530	1.06E-03	635	1.87E-03	740	1.74E-04
430	1.24E-04	535	1.14E-03	640	1.77E-03	745	1.50E-04
435	1.91E-04	540	1.22E-03	645	1.66E-03	750	1.28E-04
440	2.87E-04	545	1.31E-03	650	1.54E-03	755	1.11E-04
445	4.62E-04	550	1.40E-03	655	1.43E-03	760	9.54E-05
450	7.54E-04	555	1.49E-03	660	1.31E-03	765	8.28E-05
455	1.00E-03	560	1.59E-03	665	1.19E-03	770	7.08E-05
460	9.65E-04	565	1.69E-03	670	1.08E-03	775	6.04E-05
465	8.00E-04	570	1.79E-03	675	9.68E-04	780	5.28E-05
470	7.04E-04	575	1.88E-03	680	8.69E-04		
475	6.30E-04	580	1.97E-03	685	7.72E-04		
480	5.59E-04	585	2.04E-03	690	6.86E-04		

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

Chromaticity Diagram - Sphere Spectroradiometer Method



Tristimulus values(x, y) : (0.4446, 0.4088)

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

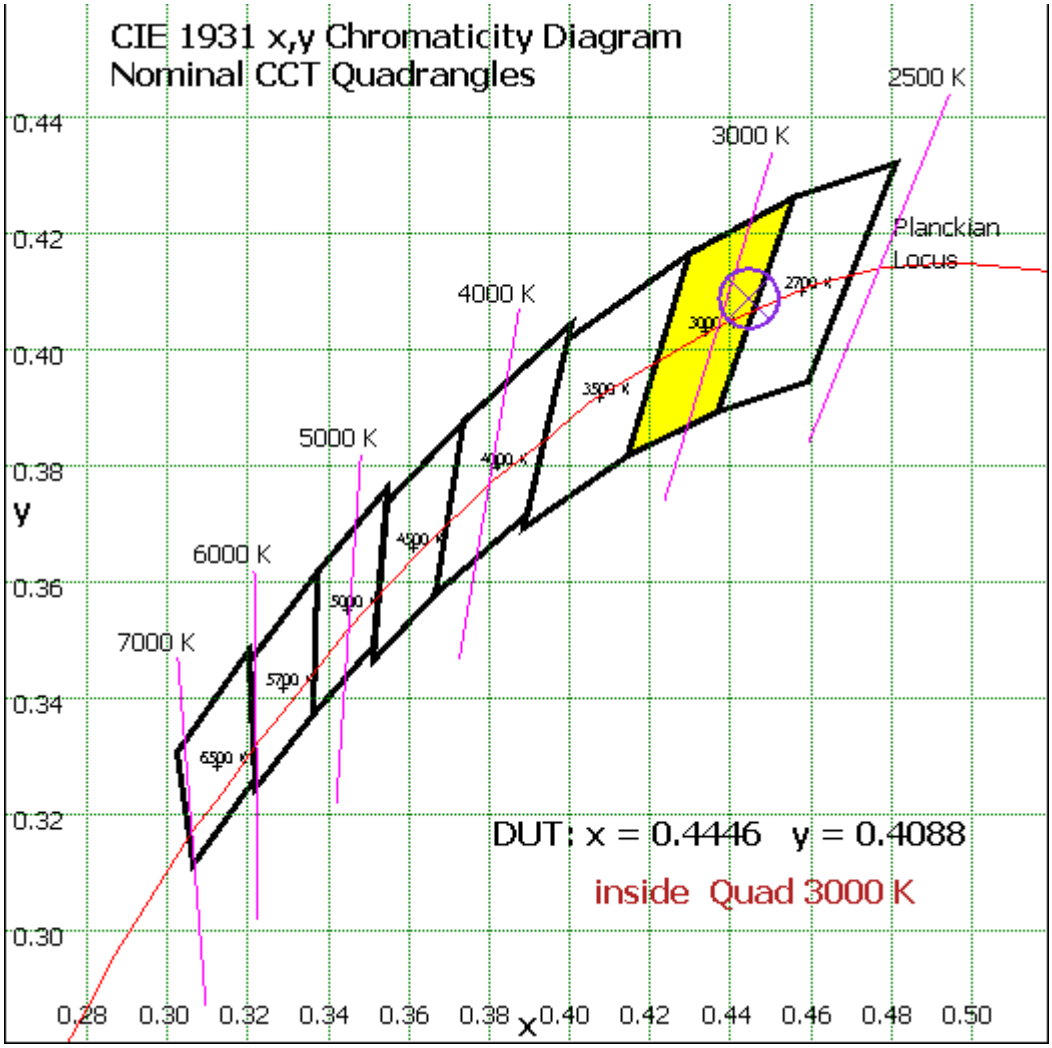


Chart 3: Plot of Lamp x/y coordinates on CIE 1931 Chromaticity Diagram

Zonal Lumen Tabulation- Goniophotometer Method

γ(°)	Lumens	% Total
0- 10	0.7884	0.67%
10- 20	2.53	2.16%
20- 30	4.698	4.02%
30- 40	7.157	6.12%
40- 50	9.57	8.19%
50- 60	11.59	9.91%
60- 70	12.93	11.06%
70- 80	13.42	11.48%
80- 90	13.04	11.15%
90-100	11.86	10.15%
100-110	10.06	8.61%
110-120	7.884	6.74%
120-130	5.594	4.79%
130-140	3.452	2.95%
140-150	1.714	1.47%
150-160	0.5722	0.49%
160-170	0.0582	0.05%
170-180	0.0021	0.00%
Total	116.9	100%

γ(°)	Lumens	% Total
0- 60	36.3334	31.08%
60- 90	39.39	33.70%
0-90	75.7234	64.78%
90- 180	41.1965	35.24%
0- 180	116.9	100%

Table 5: Zonal Lumen Data

Illuminance Plots- Goniophotometer Method

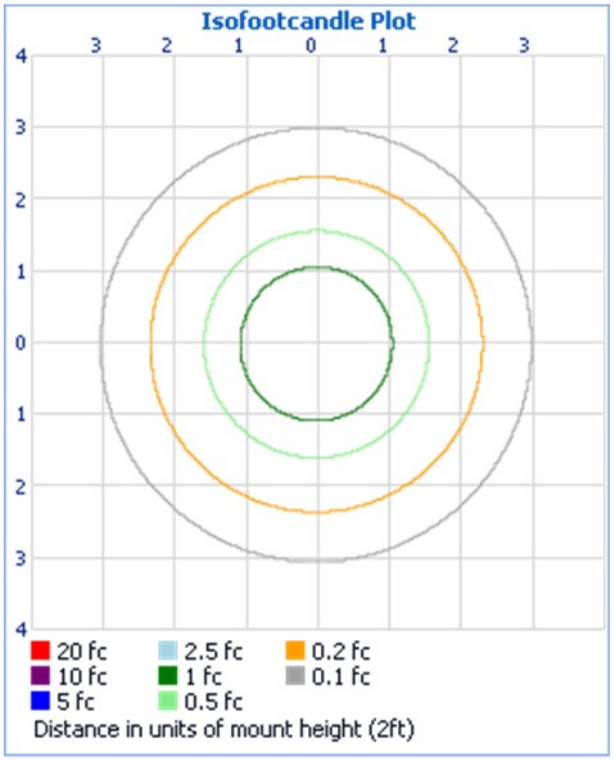


Chart 4: Illuminance Plot (Footcandles)

Luminous Intensity Distribution Plots- Goniophotometer Method

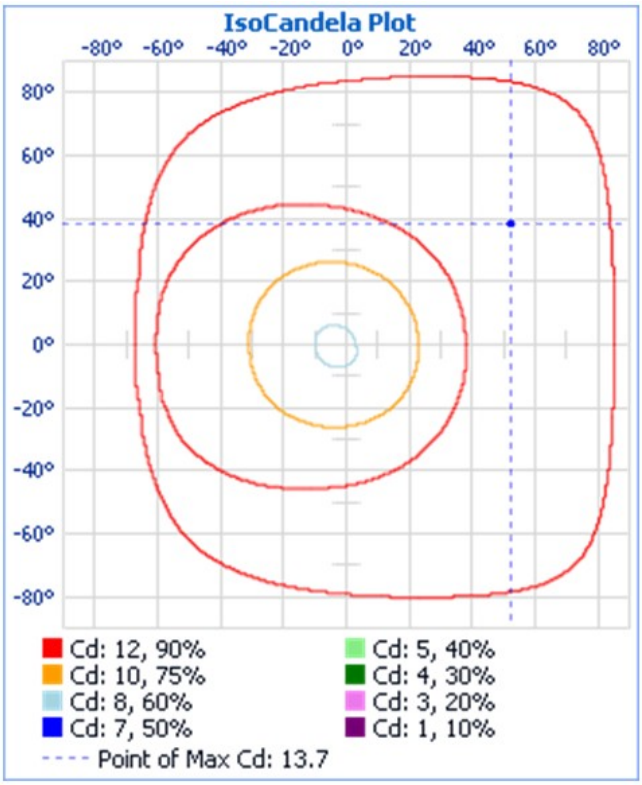


Chart 5: Isocandela Plot

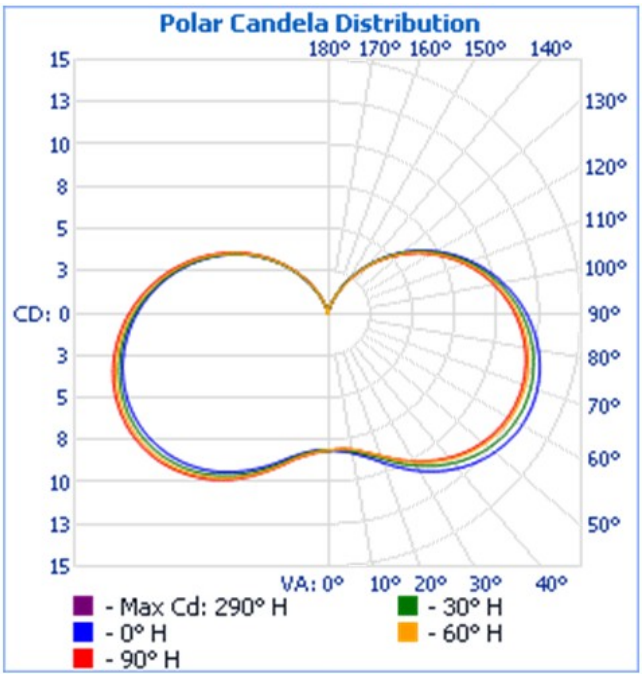


Chart 6: Polar Candela Distribution

Luminous Intensity Data- Goniophotometer Method

	0	10	20	30	40	50	60	70	80	90	100	110	120	130	140	150	160	170	180	190	200	210	220	230	240	250	260	270	280	290	300	310	320	330	340	350	360
0	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8
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Table 6: Luminous Intensity Data

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Table 7: Luminous Intensity Data-Continuous

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138	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	
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147	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	3	3	3	2	
148	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	
149	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	
150	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	

Table 8: Luminous Intensity Data-Continuous

151	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
152	2	2	2	2	2	2	2	2	2	2	2	2	2	1	1	1	1	1	1	1	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
153	2	2	2	2	2	2	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	2	2	2	2	2	2	2
154	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
155	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
156	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
157	1	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
158	1	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
159	1	0	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
160	0	0	0	1	1	1	1	1	1	1	1	1	1	1	1	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0

161	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1	1	1	1	1	0
162	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	1	0	0
163	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
164	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
165	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
166	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
167	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
168	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
169	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
170	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
171	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
172	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
173	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
174	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
175	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
176	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
177	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
178	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
179	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
180	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Table 9: Luminous Intensity Data-Continuous

EQUIPMENT LIST

Test Equipment	Model	Equipment No.	Calibration Date	Calibration Due date
Goniophotometer system	GO-R5000	HZTE011-01	Sep. 10, 2011	Sep. 09, 2012
Digital Power Meter	PF2010A	HZTE028	Sep. 20, 2011	Sep. 19, 2012
AC Power Supply	DPS1060	HZTE001-6	Sep. 21, 2011	Sep. 20, 2012
DC Power Supply	WY12010	HZTE004-03	Sep. 21, 2011	Sep. 20, 2012
Temperature Meter	TES1310	HZTE017-01	Sep. 20, 2011	Sep. 19, 2012
Standard source	SCL-1400	HZTE012-02	Sep. 20, 2011	Sep. 19, 2012
Integrate Sphere system	2M	HZTE015	Sep. 20, 2011	Sep. 19, 2012
Digital Power Meter	WT210	HZTE008	Sep. 20, 2011	Sep. 19, 2012
AC Power Supply	APS6005	HZTE001-01	Sep. 21, 2011	Sep. 20, 2012
DC Power Supply	GPR--6030D	HZTE004-01	Sep. 20, 2011	Sep. 19, 2012
Temperature and humidity recorder	JR900	HZTE018-01	Sep. 21, 2011	Sep. 20, 2012
Standard source	D908	HZTE012-01	Sep. 20, 2011	Sep. 19, 2012

Table 10: 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 expended uncertainty is 1.39% 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 expended uncertainty is 1.8% with a coverage factor k=2.

Color Characteristics Measurements

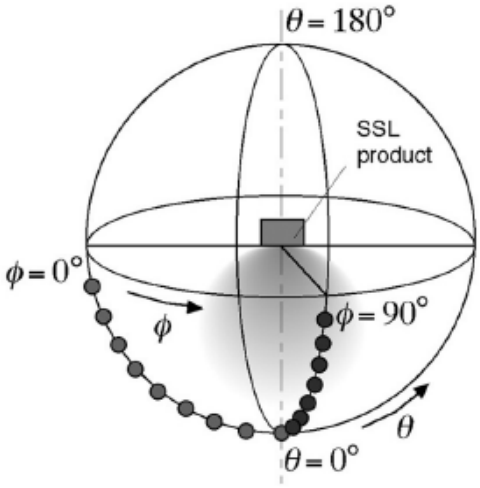
The color characteristics of SSL products include chromaticity coordinates, correlated color temperature, and color rendering index. These characteristics of SSL products may be spatially non-uniform, and thus, in order that they can be specified accurately, the color quantities shall be measured as 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°/180° and C=90°/270°) 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, Δu'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 ***