



LM-79-08 Test Report

for

GREEN CREATIVE LTD

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

LED LAMP

Model: 14A19/827/3WAY

Laboratory: Leading Testing Laboratories

NVLAP CODE: 200960-0

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Report No.: HZ18040044a

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

Review by:

Engineer: April Zou
Apr. 27, 2018

Approved by:



Manager: Jim Zhang
Apr. 27, 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: 14A19/827/3WAY

Luminous Efficacy (Lumens /Watt)	Total Luminous Flux (Lumens)	Power (Watts)	Power Factor
110.7	1555.0	14.05	0.9695
CCT (K)	CRI	Stabilization Time (Light & Power)	
2808	80.7	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 : Apr. 23, 2018

Date of Test : Apr. 25, 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



Figure 1- Overview of the sample

Equipment Under Test (EUT)

Name	: LED LAMP
Model	: 14A19/827/3WAY
Electrical Ratings	: 120V, 60Hz, 14W
Product Description	: E26 base, 2700K
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)	0.121
Power Factor	0.9695
Test Power (W)	14.05
THD A%	22.12
Luminous Efficacy (lm/W)	110.7
Total Luminous Flux (lm)	1555.0
Color Rendering Index (CRI)	80.7
R9	2.7
Correlated Color Temperature (CCT)(K)	2808
Chromaticity Chroma x	0.4485
Chromaticity Chroma y	0.4037
Chromaticity Chroma u	0.2583
Chromaticity Chroma v	0.3486
Duv	0.0016
Chromaticity Chroma u'	0.2583
Chromaticity Chroma v'	0.5230

Special Color Rendering Indices	
R1	79.3
R2	91.5
R3	94.5
R4	76.5
R5	79.3
R6	89.6
R7	80
R8	55
R9	2.7
R10	80.2
R11	74.3
R12	73.1
R13	82.3
R14	97.8
Rf	81
Rg	95

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 24.5°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)	0.121
Power Factor	0.9693
Test Power (W)	14.11
Luminous Efficacy (lm/W)	111.9
Total Luminous Flux (lm)	1578.9
Beam Angle (°)	217.2
Center Beam Candle Power (cd)	201
Spacing Criteria	1.51 (0°-180°)/ 1.47 (90°-270°)
Zonal Lumens in the 0°-60°Zone	37.79%
Zonal Lumens in the 60°-90°Zone	30.65%
Zonal Lumens in the 90°-120°Zone	21.36%
Zonal Lumens in the 120°-180°Zone	10.21%

Table 3: Test data per Goniophotometer Method

Spectral Power Distribution - Sphere Spectroradiometer Method

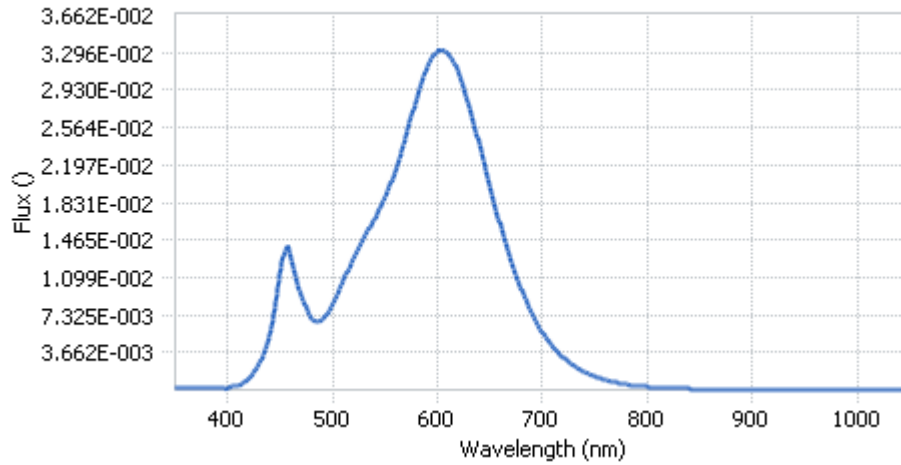
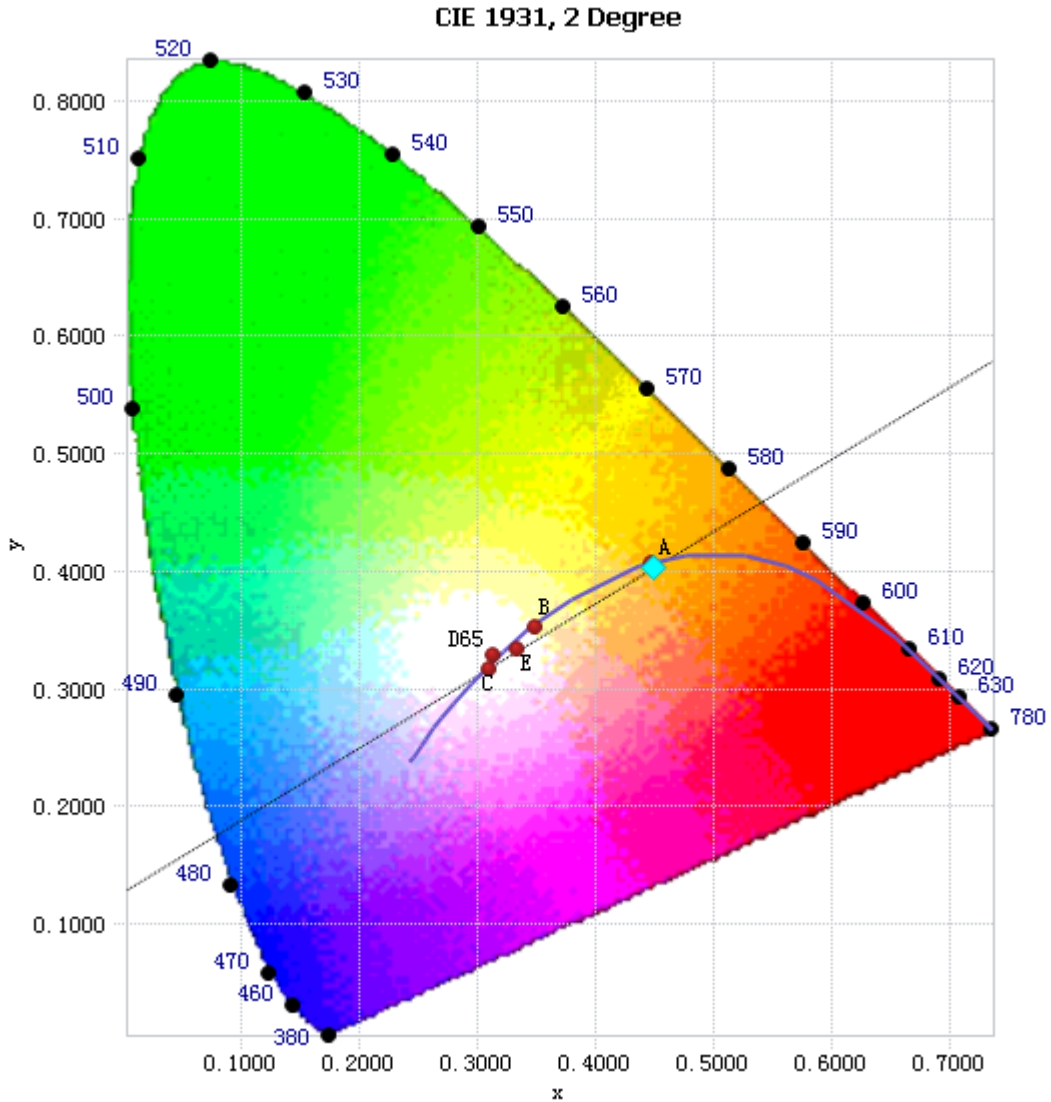


Chart 1: Spectral Power Distribution

Spectral Distribution over Visible Wavelength							
WL(nm)	Radiant(Watts)	WL(nm)	Radiant(Watts)	WL(nm)	Radiant(Watts)	WL(nm)	Radiant(Watts)
380	2.17E-04	485	6.65E-03	590	3.15E-02	695	6.47E-03
385	2.11E-04	490	6.87E-03	595	3.25E-02	700	5.63E-03
390	2.27E-04	495	7.49E-03	600	3.31E-02	705	4.88E-03
395	2.52E-04	500	8.35E-03	605	3.32E-02	710	4.20E-03
400	2.46E-04	505	9.45E-03	610	3.29E-02	715	3.64E-03
405	3.32E-04	510	1.07E-02	615	3.21E-02	720	3.14E-03
410	4.70E-04	515	1.18E-02	620	3.09E-02	725	2.73E-03
415	7.26E-04	520	1.30E-02	625	2.95E-02	730	2.35E-03
420	1.11E-03	525	1.40E-02	630	2.78E-02	735	2.03E-03
425	1.75E-03	530	1.49E-02	635	2.59E-02	740	1.73E-03
430	2.65E-03	535	1.58E-02	640	2.39E-02	745	1.50E-03
435	3.84E-03	540	1.68E-02	645	2.18E-02	750	1.30E-03
440	5.51E-03	545	1.78E-02	650	1.98E-02	755	1.12E-03
445	8.04E-03	550	1.88E-02	655	1.79E-02	760	9.72E-04
450	1.13E-02	555	2.01E-02	660	1.60E-02	765	8.33E-04
455	1.38E-02	560	2.15E-02	665	1.42E-02	770	7.22E-04
460	1.30E-02	565	2.31E-02	670	1.26E-02	775	6.26E-04
465	1.09E-02	570	2.50E-02	675	1.11E-02	780	5.42E-04
470	9.34E-03	575	2.67E-02	680	9.77E-03		
475	7.98E-03	580	2.85E-02	685	8.58E-03		
480	6.96E-03	585	3.02E-02	690	7.46E-03		

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

Chromaticity Diagram - Sphere Spectroradiometer Method



Tristimulus values(x, y): (0.4485, 0.4037)

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

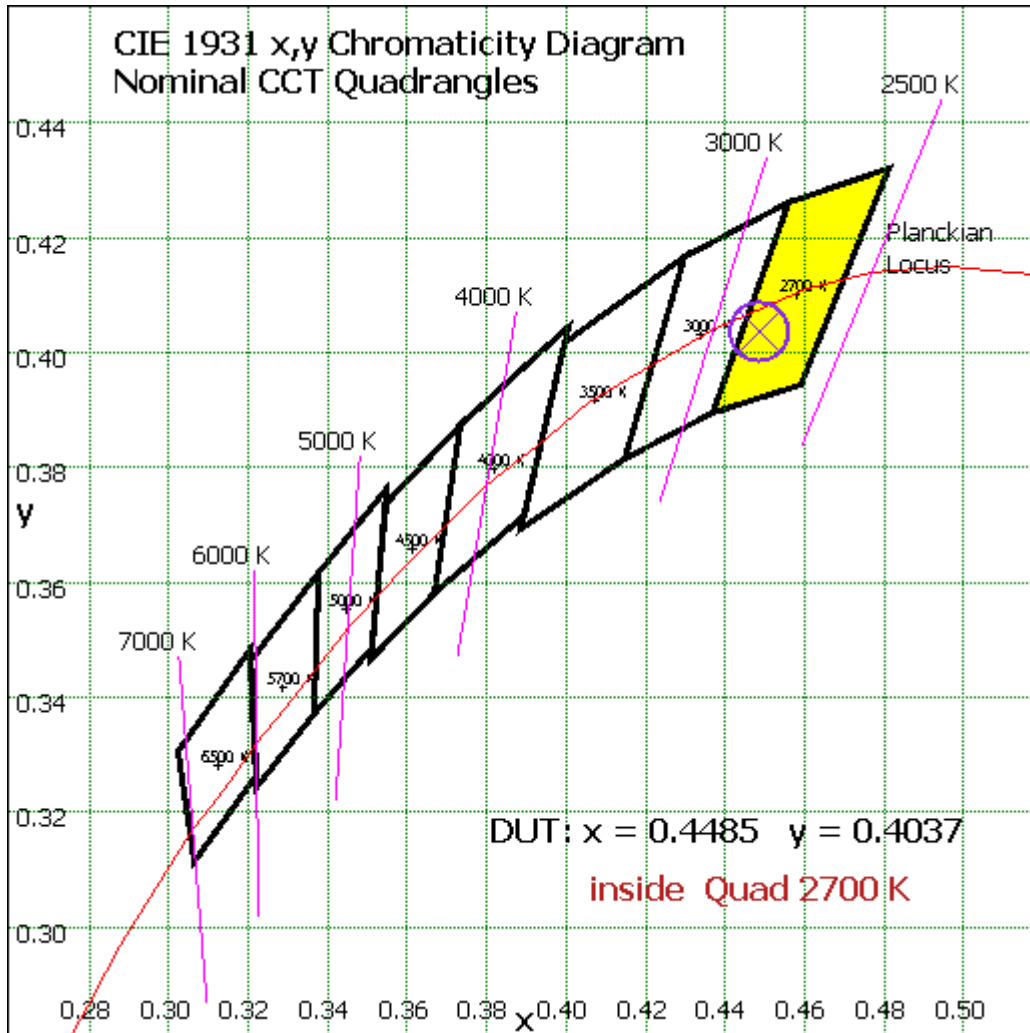


Chart 3: Plot of Lamp x/y coordinates on CIE 1931 Chromaticity Diagram

Zonal Lumen Tabulation- Goniophotometer Method

$\gamma(^{\circ})$	Lumens	% Total
0- 10	19.147	1.21%
10- 20	56.653	3.59%
20- 30	91.64	5.80%
30- 40	122.095	7.73%
40- 50	145.888	9.24%
50- 60	161.176	10.21%
60- 70	167.102	10.58%
70- 80	163.911	10.38%
80- 90	152.84	9.68%
90-100	134.958	8.55%
100-110	112.971	7.16%
110-120	89.311	5.66%
120-130	66.199	4.19%
130-140	45.527	2.88%
140-150	28.264	1.79%
150-160	15.039	0.95%
160-170	5.73	0.36%
170-180	0.406	0.03%
Total	1578.9	100%

$\gamma(^{\circ})$	Lumens	% Total
0- 60	596.599	37.79%
60- 90	483.853	30.65%
0-90	1080.452	68.43%
90- 180	498.405	31.57%
0- 180	1578.9	100%

Table 5: Zonal Lumen Data

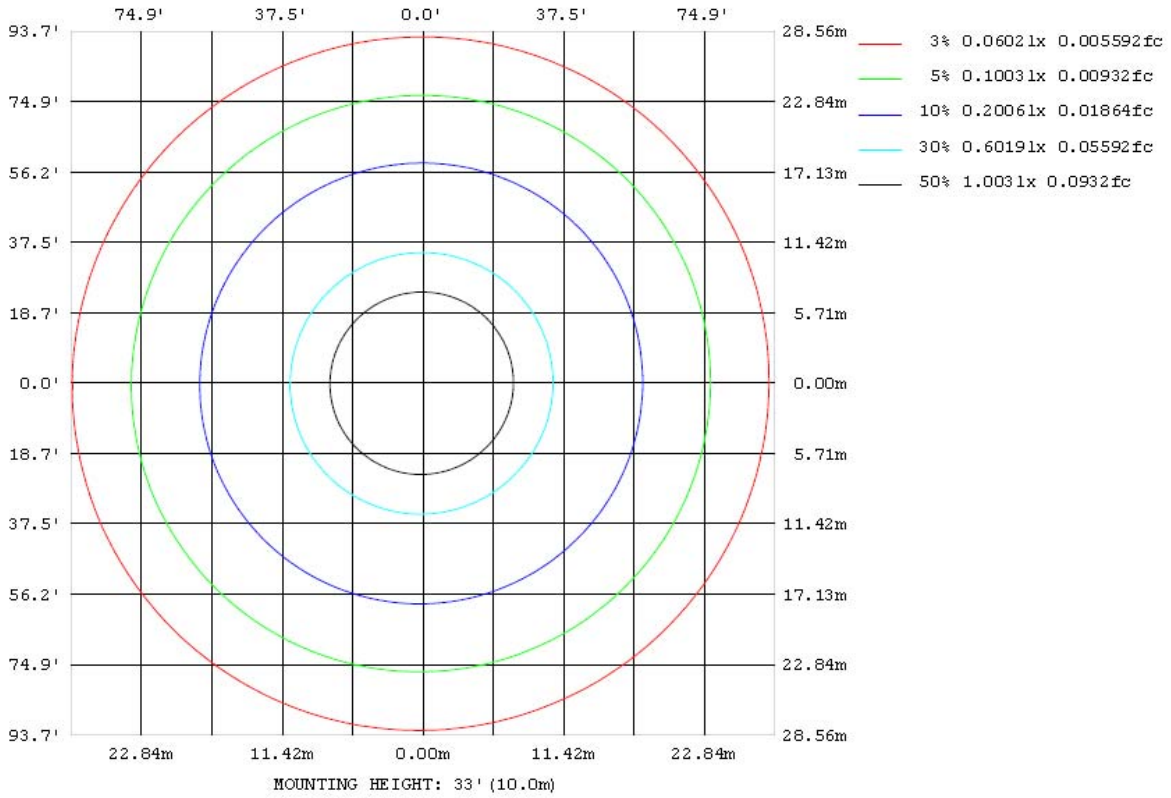


Chart 4: Illuminance Plot (Footcandles)

Luminous Intensity Distribution Plots- Goniophotometer Method

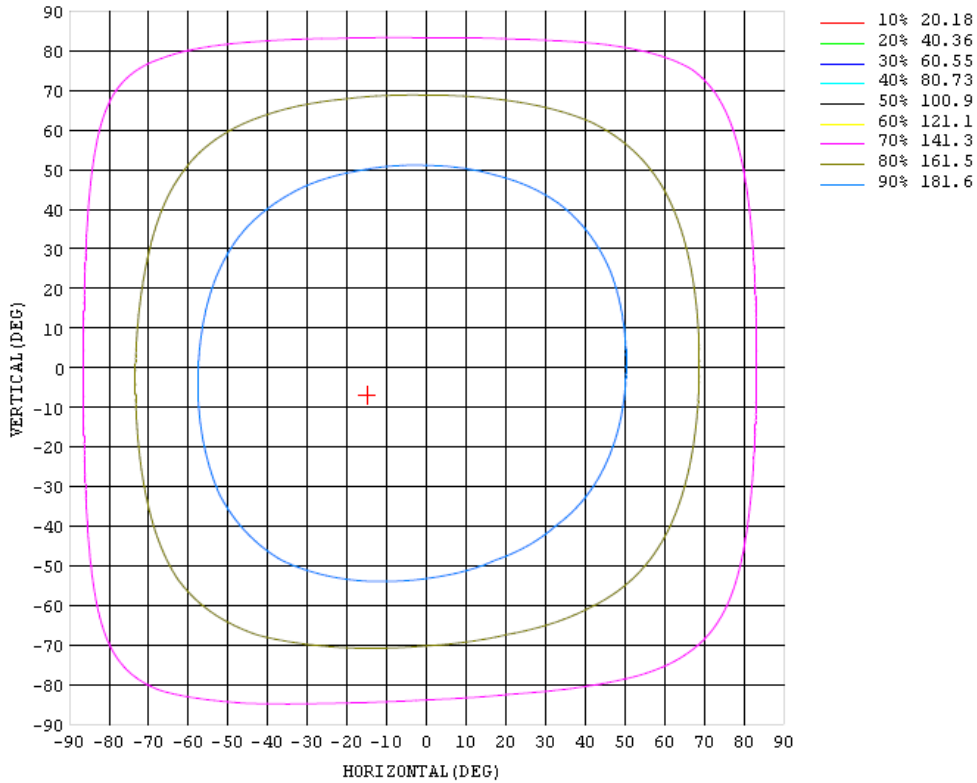


Chart 5: Isocandela Plot

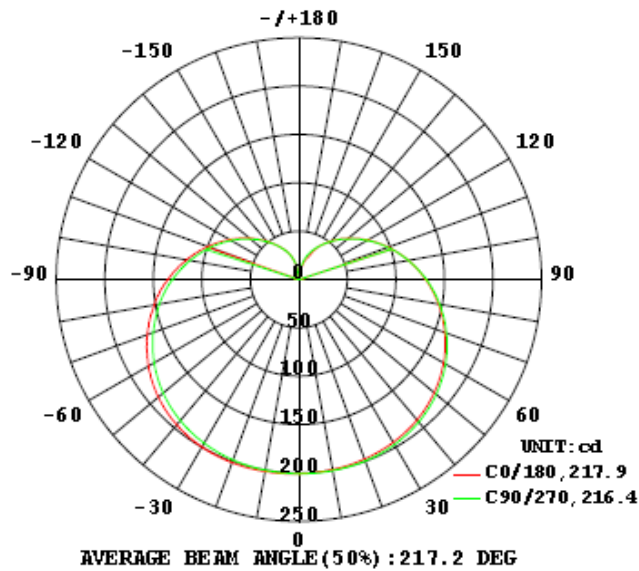


Chart 6: Polar Candela Distribution

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	201	201	201	201	201	201	201	201	201	201	201	201	201	201	201	201			
5	200	200	200	200	201	201	201	201	201	201	201	201	201	200	200	200			
10	200	200	200	200	201	201	202	202	201	201	201	200	200	200	200	199			
15	199	199	199	199	200	201	202	202	202	201	200	200	199	199	199	199			
20	198	198	198	198	200	201	202	202	202	201	200	199	198	198	198	198			
25	196	196	196	197	198	200	201	201	201	200	199	198	197	197	197	196			
30	194	194	194	195	197	199	200	200	200	199	197	196	195	195	195	195			
35	192	192	192	193	195	197	198	199	198	197	195	194	193	193	193	192			
40	189	189	189	190	192	194	196	197	196	194	192	191	190	190	190	190			
45	186	186	186	187	189	191	193	194	193	191	189	188	187	186	187	186			
50	182	182	181	182	185	187	189	190	189	187	185	183	183	182	183	182			
55	177	177	177	178	180	182	185	185	184	182	180	178	178	178	178	178			
60	172	172	171	172	174	177	179	180	179	177	175	173	172	172	172	173			
65	166	166	166	166	168	171	173	174	173	171	169	167	166	166	167	167			
70	160	159	159	160	162	164	167	167	166	164	162	160	160	160	161	161			
75	153	153	152	153	155	157	159	160	159	157	155	153	153	153	154	154			
80	146	145	145	146	147	149	151	152	152	149	148	147	146	147	147	148			
85	138	138	138	138	139	141	143	144	144	142	140	139	138	139	140	140			
90	131	130	130	130	131	133	135	136	135	133	132	131	130	131	132	132			
95	123	122	122	122	123	124	126	127	127	125	124	123	122	123	124	124			
100	115	114	113	114	115	116	117	118	118	116	115	114	114	114	115	115			
105	106	106	105	105	106	108	109	109	108	108	106	106	106	106	107	107			
110	98.1	97.5	96.9	96.8	97.4	98.6	99.7	100	99.9	98.8	97.7	97.1	97.2	97.8	98.6	99.0			
115	89.9	89.4	88.8	88.7	89.3	90.0	91.0	91.3	91.3	90.1	89.2	88.8	89.0	89.6	90.3	90.5			
120	81.8	81.4	80.7	80.6	81.1	81.8	82.5	82.7	82.7	81.7	80.9	80.6	80.9	81.4	82.3	82.4			
125	73.9	73.5	72.9	72.8	73.2	73.6	74.2	74.4	74.5	73.6	72.8	72.7	73.0	73.5	74.3	74.5			
130	66.3	65.9	65.4	65.2	65.5	65.8	66.3	66.5	66.4	65.7	65.1	65.1	65.4	65.9	66.4	66.9			
135	59.2	59.0	58.5	58.3	58.5	58.9	59.1	59.2	58.8	58.3	57.8	57.7	58.1	58.5	58.4	59.0			
140	51.9	52.0	51.6	51.4	51.5	51.6	51.9	52.0	51.7	51.3	50.9	50.9	51.2	51.6	49.9	48.6			
145	45.2	45.5	45.2	45.0	45.0	45.1	45.3	45.4	45.1	44.8	44.4	44.4	44.7	45.1	42.9	41.6			
150	38.3	39.4	39.2	39.0	39.1	39.0	39.2	39.2	39.1	38.9	38.6	38.6	38.7	38.9	36.9	34.8			
155	29.5	33.8	33.7	33.6	33.5	33.5	33.5	33.6	33.5	33.5	33.1	33.2	33.3	32.8	27.4	20.5			
160	23.4	28.0	27.9	27.9	27.6	27.8	27.8	27.7	27.7	27.9	27.4	27.6	27.6	26.0	19.4	14.0			
165	17.4	21.3	21.2	21.4	20.9	21.2	21.2	21.2	21.2	21.5	20.7	21.3	21.2	18.5	13.3	12.2			
170	9.46	12.8	12.8	12.8	12.4	12.4	12.5	12.2	12.4	13.0	12.6	12.3	12.4	9.83	7.64	6.28			
175	0.28	0.27	0.27	0.26	0.26	0.26	0.26	0.26	0.27	0.26	0.27	0.27	0.29	0.29	0.29	0.28			
180	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25			

Table 6: 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
Temperature recorder	JM624U	HZTE018-08	Aug. 17, 2017	Aug. 16, 2018
Temperature and humidity recorder	JR900	HZTE018-01	Aug. 16, 2017	Aug. 15, 2018
Standard source	D908	HZTE012-01	Aug. 20, 2017	Aug. 19, 2018
Integrate Sphere system	2M	HZTE015-01	Aug. 23, 2017	Aug. 22, 2018
Digital Power Meter	WT210	HZTE008-01	Aug. 10, 2017	Aug. 09, 2018
AC Power Supply	PCR 500L	HZTE001-07	Aug. 10, 2017	Aug. 09, 2018
DC Power Supply	IT6154	HZTE004-04	Aug. 10, 2017	Aug. 09, 2018
Standard source	SCL-1400	HZTE012-02	Aug. 20, 2017	Aug. 19, 2018
Temperature and humidity recorder	JR900	HZTE018-02	Aug. 16, 2017	Aug. 15, 2018
Temperature Meter	TES1310	HZTE017-01	Aug. 17, 2017	Aug. 16, 2018

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 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 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

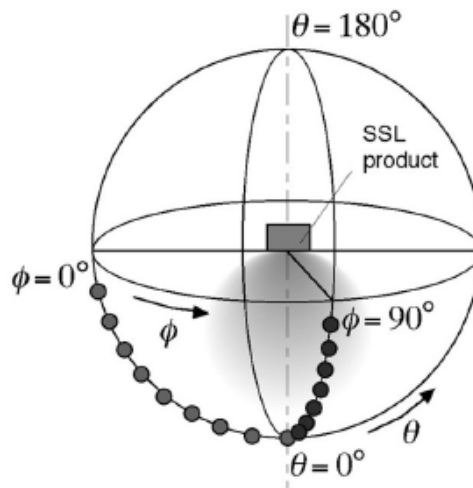
The color characteristics of SSL products include chromaticity coordinates, correlated color temperature, and color rendering index. These characteristics of SSL products may be spatially non-uniform, and thus, in order that they can be specified accurately, the color quantities shall be measured as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