

LM-79-08 Test Report

for

GREEN CREATIVE LTD

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

LED lamp

Model: 17T8/4F/850/DEB

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

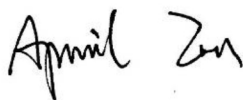
Tel: +86 571 86376106

www.ledtestlab.com

Report No.: HZ18100024r

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

Review by:



Engineer: April Zou
Nov. 02, 2018

Approved by:



Manager: Jim Zhang
Nov. 02, 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: 17T8/4F/850/DEB

Luminous Efficacy (Lumens /Watt)	Total Luminous Flux (Lumens)	Power (Watts)	Power Factor
136.4	2301.0	16.87	0.9766
CCT (K)	CRI	Stabilization Time (Light & Power)	
5044	84.0	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 : Oct. 30, 2018

Date of Test : Oct. 31, 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	: 17T8/4F/850/DEB
Electrical Ratings	: 120-277V, 50/60Hz, 17W
Product Description	: 5000K
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 light down. 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	277.0
Voltage frequency (Hz)	60	60
Test Current (A)	0.144	0.067
Power Factor	0.9766	0.9209
Test Power (W)	16.87	17.06
THD A%	20.50	27.17
Luminous Efficacy (lm/W)	136.4	135.5
Total Luminous Flux (lm)	2301.0	2311.0
Color Rendering Index (CRI)	84.0	
R9	8.5	
Correlated Color Temperature (CCT)(K)	5044	
Chromaticity Chroma x	0.3442	
Chromaticity Chroma y	0.3560	
Chromaticity Chroma u	0.2091	
Chromaticity Chroma v	0.3245	
Duv	0.0018	
Chromaticity Chroma u'	0.2091	
Chromaticity Chroma v'	0.4867	

Special Color Rendering Indices	
R1	82
R2	89.2
R3	94.1
R4	83.8
R5	83.2
R6	85.2
R7	86.9
R8	67.4
R9	8.5
R10	74.6
R11	83.5
R12	67.8
R13	83.9
R14	97
Rf	83
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 25.1°C.

The photometric distance is 30m.

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)	0.144
Power Factor	0.9767
Test Power (W)	16.92
Luminous Efficacy (lm/W)	134.2
Total Luminous Flux (lm)	2270.4
Beam Angle (°)	153.1
Center Beam Candle Power (cd)	408
Spacing Criteria	1.26 (0°-180°)/ 1.39 (90°-270°)
Zonal Lumens in the 0°-60°Zone	45.03%
Zonal Lumens in the 60°-90°Zone	26.46%
Zonal Lumens in the 90°-120°Zone	16.58%
Zonal Lumens in the 120°-180°Zone	11.93%

Table 3: Test data per Goniophotometer Method

Spectral Power Distribution - Sphere Spectroradiometer Method

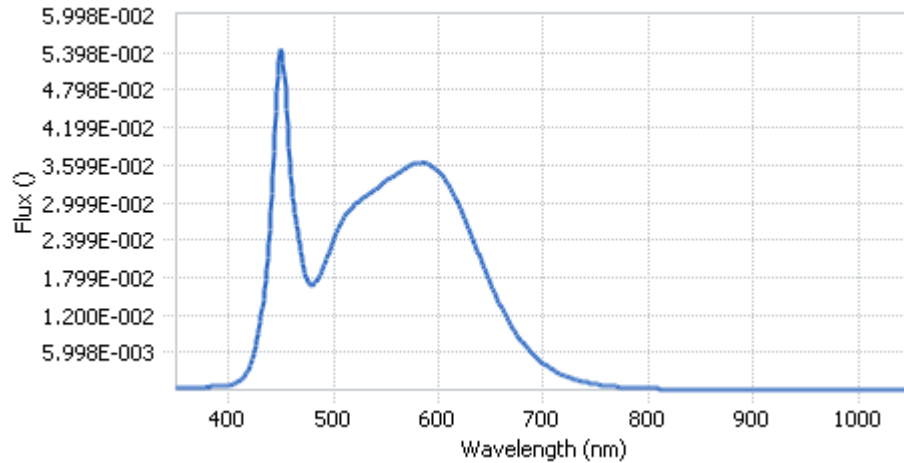
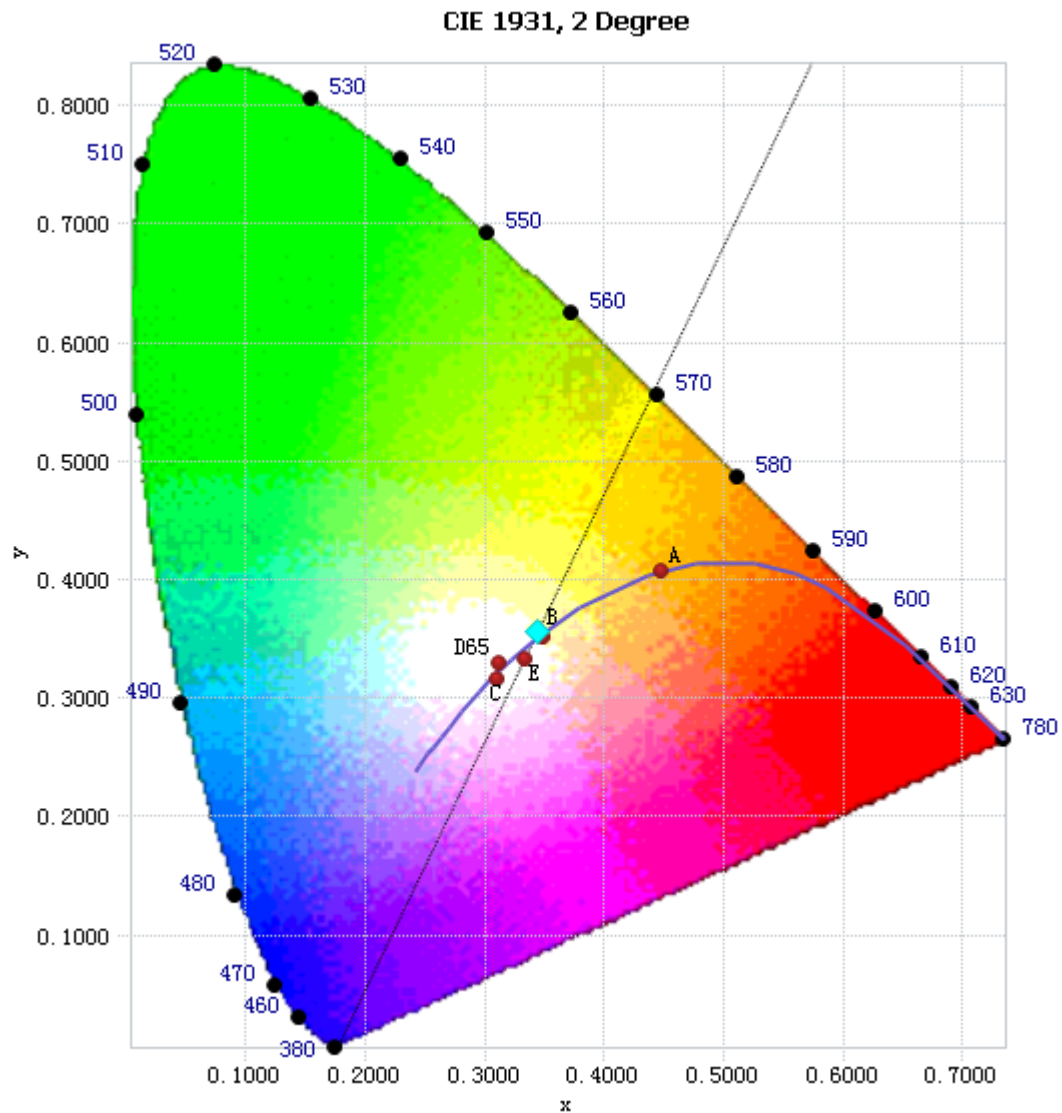


Chart 1: Spectral Power Distribution

Spectral Distribution over Visible Wavelength							
WL(nm)	Radiant(Watts)	WL(nm)	Radiant(Watts)	WL(nm)	Radiant(Watts)	WL(nm)	Radiant(Watts)
380	5.10E-04	485	1.79E-02	590	3.61E-02	695	4.87E-03
385	4.98E-04	490	1.95E-02	595	3.58E-02	700	4.20E-03
390	5.60E-04	495	2.18E-02	600	3.50E-02	705	3.62E-03
395	6.23E-04	500	2.42E-02	605	3.40E-02	710	3.08E-03
400	7.33E-04	505	2.61E-02	610	3.26E-02	715	2.65E-03
405	9.32E-04	510	2.76E-02	615	3.11E-02	720	2.27E-03
410	1.40E-03	515	2.88E-02	620	2.92E-02	725	1.95E-03
415	2.26E-03	520	2.97E-02	625	2.72E-02	730	1.68E-03
420	3.74E-03	525	3.02E-02	630	2.52E-02	735	1.43E-03
425	6.43E-03	530	3.09E-02	635	2.30E-02	740	1.22E-03
430	1.09E-02	535	3.16E-02	640	2.10E-02	745	1.05E-03
435	1.76E-02	540	3.22E-02	645	1.88E-02	750	9.08E-04
440	2.85E-02	545	3.29E-02	650	1.68E-02	755	7.78E-04
445	4.47E-02	550	3.35E-02	655	1.49E-02	760	6.75E-04
450	5.45E-02	555	3.41E-02	660	1.32E-02	765	5.83E-04
455	4.50E-02	560	3.45E-02	665	1.16E-02	770	5.08E-04
460	3.23E-02	565	3.50E-02	670	1.01E-02	775	4.30E-04
465	2.64E-02	570	3.56E-02	675	8.75E-03	780	3.72E-04
470	2.11E-02	575	3.59E-02	680	7.63E-03		
475	1.73E-02	580	3.63E-02	685	6.59E-03		
480	1.68E-02	585	3.64E-02	690	5.69E-03		

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

Chromaticity Diagram - Sphere Spectroradiometer Method



Tristimulus values(x, y): (0.3442, 0.3560)

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

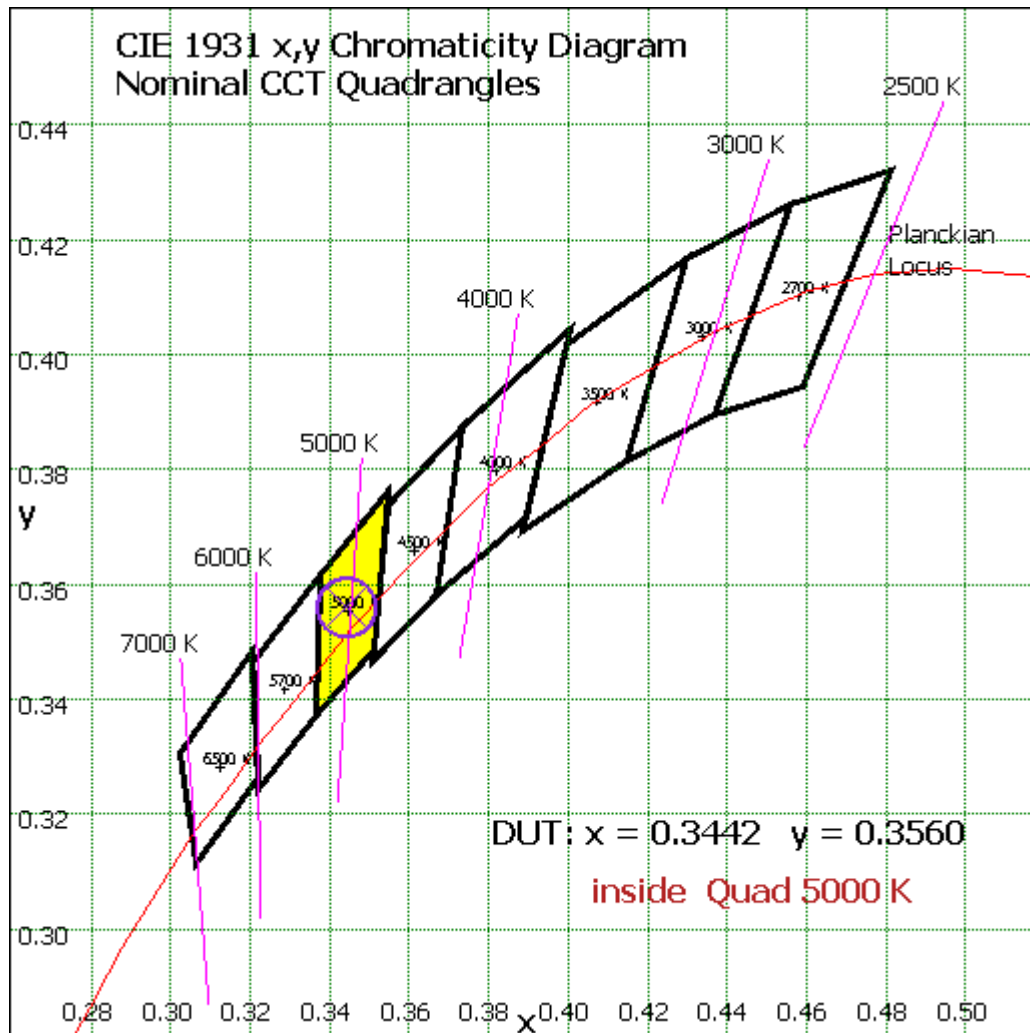


Chart 3: Plot of Lamp x/y coordinates on CIE 1931 Chromaticity Diagram

Zonal Lumen Tabulation- Goniophotometer Method

$\gamma(^{\circ})$	Lumens	% Total
0- 10	38.736	1.71%
10- 20	111.995	4.93%
20- 30	173.283	7.63%
30- 40	216.776	9.55%
40- 50	239.584	10.55%
50- 60	242.022	10.66%
60- 70	227.37	10.01%
70- 80	201.306	8.87%
80- 90	171.998	7.58%
90-100	147.039	6.48%
100-110	124.807	5.50%
110-120	104.573	4.61%
120-130	86.247	3.80%
130-140	69.334	3.05%
140-150	53.105	2.34%
150-160	36.845	1.62%
160-170	19.785	0.87%
170-180	5.631	0.25%
Total	2270.4	100%

$\gamma(^{\circ})$	Lumens	% Total
0- 60	1022.396	45.03%
60- 90	600.674	26.46%
0-90	1623.07	71.49%
90- 180	647.366	28.51%
0- 180	2270.4	100%

Table 5: Zonal Lumen Data

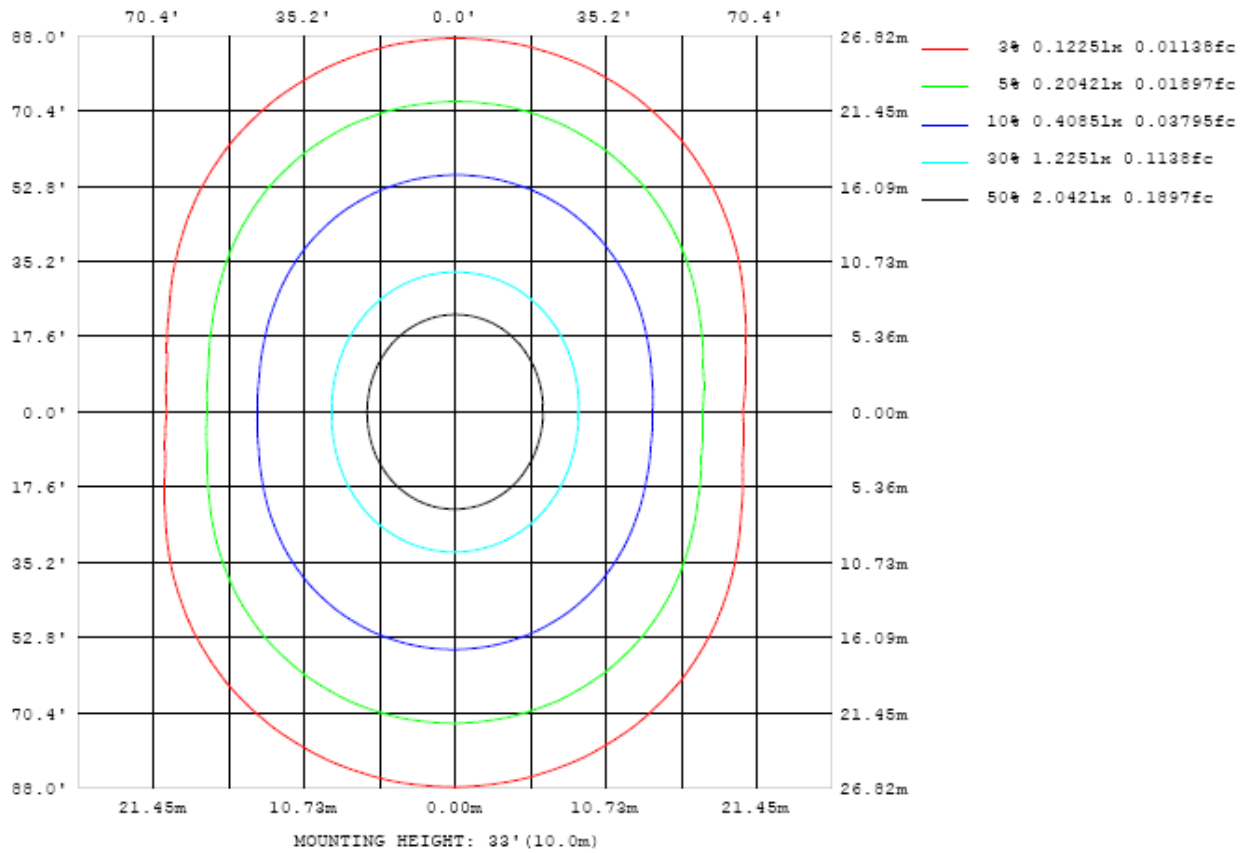


Chart 4: Illuminance Plot (Footcandles)

Luminous Intensity Distribution Plots- Goniophotometer Method

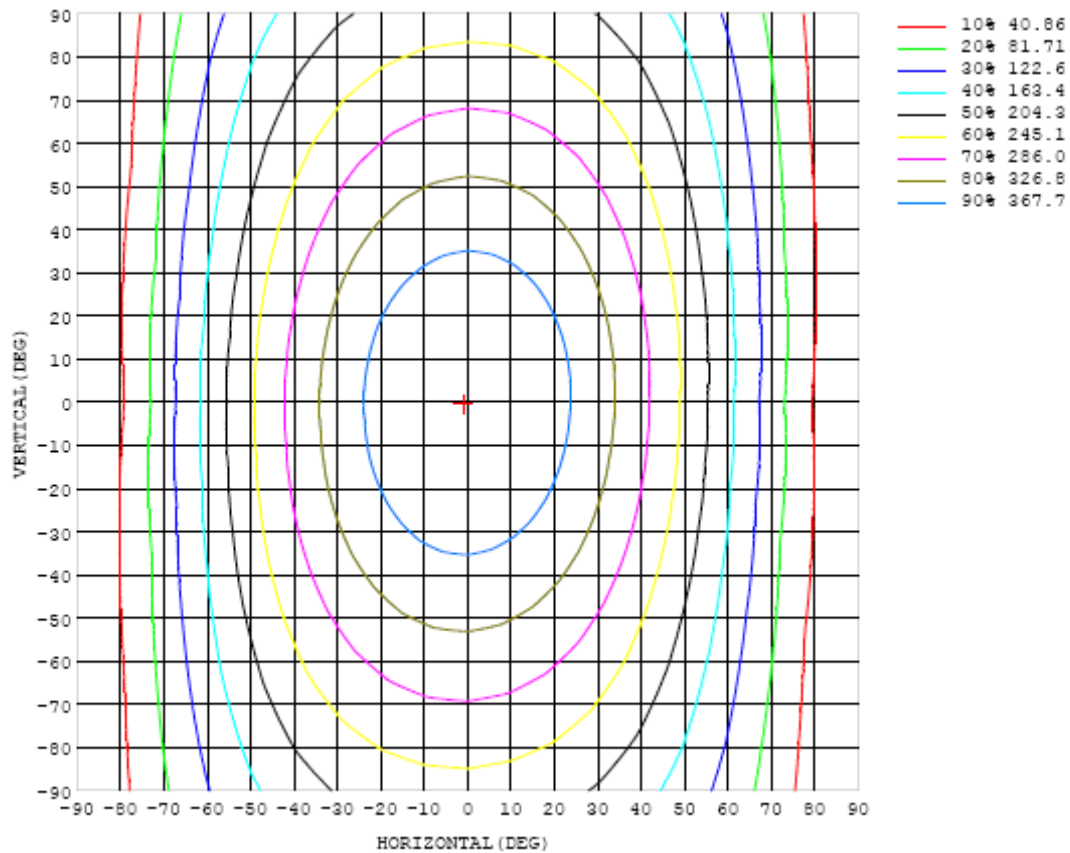


Chart 5: Isocandela Plot

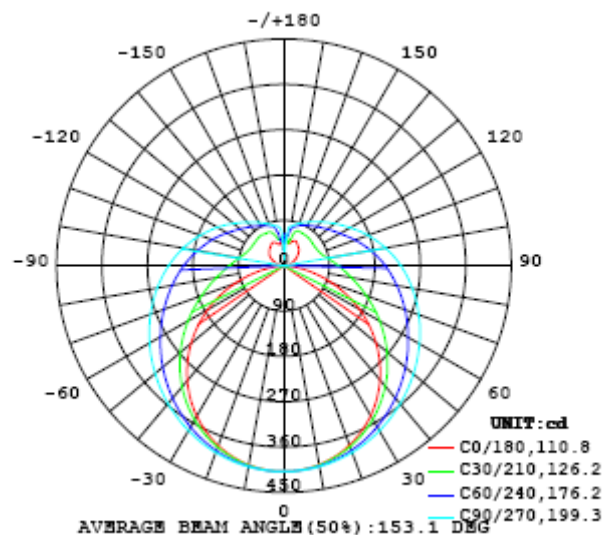


Chart 6: Polar Candela Distribution

Luminous Intensity Data- Goniophotometer Method

Table---1

UNIT: cd

C (DEG) y (DEG)	0	10	20	30	40	50	60	70	80	90	100	110	120	130	140	150	160	170	180
0	408	408	408	408	408	408	408	408	408	408	408	408	408	408	408	408	408	408	408
5	407	407	407	407	407	407	407	407	407	408	408	408	408	407	407	407	407	407	407
10	401	401	401	402	402	403	404	404	405	405	405	405	404	404	403	402	402	401	401
15	392	392	392	394	395	396	398	399	400	400	400	400	399	397	396	395	394	392	392
20	379	379	380	383	385	388	390	392	394	394	394	393	392	389	387	384	382	380	380
25	363	363	365	368	372	377	381	384	386	387	387	385	382	379	375	371	367	365	364
30	344	344	347	352	358	364	369	374	377	378	378	376	372	367	361	355	350	346	345
35	321	322	326	333	341	349	357	362	367	368	368	365	360	353	345	337	330	324	323
40	296	297	303	312	323	333	343	350	356	358	357	353	347	338	327	317	307	300	298
45	268	270	278	290	303	317	329	338	344	346	346	341	333	322	309	296	283	273	270
50	238	241	251	266	283	300	314	325	331	334	333	328	319	306	290	273	257	244	240
55	206	210	224	243	263	283	299	311	319	322	321	315	304	289	271	250	230	214	208
60	172	178	195	219	243	266	284	298	306	310	308	302	290	273	251	227	202	182	174
65	137	145	167	196	224	249	269	284	293	297	296	288	275	257	233	205	175	150	139
70	102	112	140	174	206	233	255	271	280	284	282	275	261	241	215	184	149	118	103
75	68.2	80.8	115	153	189	218	241	257	267	271	269	262	247	226	199	165	125	87.7	68.2
80	37.0	53.4	93.3	136	173	204	227	244	254	258	256	248	234	212	184	148	105	62.0	36.0
85	12.1	32.2	76.2	121	159	190	214	230	241	245	243	235	220	199	170	133	88.8	42.5	11.0
90	1.00	20.8	64.6	108	146	177	201	217	227	232	230	222	207	186	157	120	77.0	31.6	0.73
95	2.36	16.5	55.9	97.3	134	164	188	204	214	218	216	208	194	173	145	109	68.4	26.5	2.43
100	5.59	18.2	50.1	87.8	123	152	175	190	200	204	202	195	181	161	134	100	62.4	26.9	6.25
105	10.3	22.3	48.4	80.6	113	140	162	177	186	190	189	181	168	149	123	92.4	59.7	29.6	11.5
110	15.8	27.1	48.8	76.0	104	130	150	164	173	177	175	168	156	138	114	87.1	59.2	34.1	17.6
115	21.4	32.1	50.6	73.7	97.7	120	138	152	160	164	162	156	144	128	107	83.7	60.2	38.8	23.6
120	26.8	37.0	53.5	72.4	93.2	112	128	140	148	151	150	144	134	120	102	81.7	61.8	43.4	29.7
125	32.3	41.5	56.4	72.0	89.5	106	120	131	137	140	139	134	125	113	97.3	80.4	63.8	47.4	34.7
130	37.3	45.7	58.8	72.4	86.8	101	113	122	128	130	129	125	117	107	93.8	79.7	65.7	50.1	38.4
135	41.6	49.6	61.5	73.2	85.0	96.6	107	114	119	122	121	117	110	102	90.9	79.2	67.5	52.8	41.5
140	45.6	53.7	64.0	73.8	83.7	93.0	101	108	112	114	113	110	104	97.2	88.4	78.9	69.0	53.7	43.9
145	48.7	56.4	66.0	74.1	82.5	90.1	96.6	102	105	107	106	104	99.1	93.5	86.7	78.4	68.6	54.9	46.7
150	51.7	57.1	67.8	74.2	81.1	87.3	92.5	96.5	98.9	100	99.9	98.0	94.6	90.2	85.0	78.4	70.8	55.6	49.8
155	54.0	53.2	66.8	74.6	79.4	84.6	88.7	91.7	93.8	94.8	94.5	93.2	90.7	87.6	81.1	72.2	68.1	52.8	51.0
160	51.9	46.1	60.4	73.8	77.8	81.4	84.9	87.4	88.9	89.8	89.8	88.8	87.2	81.4	70.8	65.0	57.9	47.1	48.7
165	46.8	43.7	47.7	57.4	75.7	77.9	80.3	82.4	83.6	84.5	84.6	83.2	74.2	62.5	57.7	53.6	46.5	43.1	44.6
170	45.7	43.5	46.0	46.0	53.2	64.3	72.1	76.1	79.0	79.9	76.8	58.2	52.6	55.1	51.0	48.4	43.2	43.9	43.8
175	53.3	52.7	55.3	57.8	59.0	58.8	59.8	60.7	56.0	48.9	37.6	54.7	56.9	57.6	55.8	55.9	55.1	53.9	52.3
180	31.9	31.9	31.9	31.9	31.9	31.9	31.9	31.9	31.9	31.9	31.9	31.9	31.9	31.9	31.9	31.9	31.9	31.9	31.9

Table 6: Luminous Intensity Data

Table--2

UNIT: cd

C (DEG) γ (DEG)	190	200	210	220	230	240	250	260	270	280	290	300	310	320	330	340	350		
0	408	408	408	408	408	408	408	408	408	408	408	408	408	408	408	408	408		
5	407	407	407	407	407	408	408	408	408	408	408	407	407	407	407	407	407		
10	402	402	402	403	404	404	405	405	405	405	405	404	403	403	402	402	401		
15	393	393	394	396	397	399	400	401	401	400	400	399	397	396	394	393	392		
20	380	382	384	386	389	391	393	394	395	394	393	391	389	386	384	381	380		
25	365	367	370	374	378	381	384	386	387	386	385	382	378	374	370	367	364		
30	346	349	353	359	365	370	374	377	378	377	375	371	366	360	354	349	345		
35	324	328	335	342	350	357	363	366	368	367	364	359	352	344	336	329	324		
40	299	305	314	324	334	343	350	355	357	356	352	345	336	326	316	306	299		
45	272	280	291	304	317	328	337	343	345	344	339	331	320	307	294	282	273		
50	243	253	268	284	300	313	324	330	333	331	326	316	304	288	271	256	244		
55	212	225	244	264	282	298	310	317	320	318	312	302	287	268	248	228	213		
60	179	196	219	243	265	282	296	304	307	305	299	287	270	249	225	201	182		
65	147	168	196	224	248	267	282	291	294	292	285	272	253	230	202	174	151		
70	113	141	173	205	232	253	268	277	281	279	271	258	238	212	181	148	119		
75	81.2	115	154	188	216	238	254	264	268	266	258	244	223	195	161	124	88.2		
80	53.2	93.4	136	172	202	225	241	251	255	252	244	230	208	180	145	103	61.5		
85	32.2	76.5	121	158	188	211	228	238	241	239	231	216	195	165	130	86.1	41.0		
90	21.4	64.6	108	146	175	198	215	224	228	226	218	203	182	153	117	73.8	29.3		
95	18.0	57.0	98.3	135	164	186	202	212	215	213	205	191	170	142	107	65.5	24.5		
100	19.4	52.2	90.0	125	153	174	189	199	203	200	193	178	158	131	97.5	59.5	24.1		
105	23.1	50.2	83.5	115	142	162	177	186	190	187	180	166	147	121	90.1	56.0	26.7		
110	28.9	50.6	78.7	107	132	151	165	173	177	175	167	155	137	113	84.2	55.0	30.9		
115	34.5	52.6	76.0	100	122	140	154	161	164	162	156	144	127	105	80.2	55.5	36.3		
120	40.4	55.2	74.5	95.3	114	130	142	150	153	151	145	133	118	98.7	77.7	56.6	41.5		
125	46.7	58.4	74.2	91.4	108	121	132	139	141	139	134	124	110	94.0	76.4	59.1	46.6		
130	52.5	61.3	74.3	88.5	102	114	123	128	130	129	124	116	104	90.5	75.2	61.9	51.2		
135	56.6	63.5	74.9	86.3	97.4	107	115	119	121	120	116	108	99.1	87.5	75.4	64.5	55.4		
140	59.2	65.7	75.7	84.6	93.4	101	107	111	113	112	108	102	94.6	85.1	75.8	67.0	58.9		
145	63.9	68.5	75.4	83.3	90.0	96.2	101	105	106	105	102	96.8	90.7	83.6	76.1	69.1	62.6		
150	68.3	69.7	73.1	82.1	87.2	91.9	95.5	98.0	98.7	98.0	95.9	92.4	87.8	82.2	76.2	71.0	66.4		
155	67.4	69.8	73.4	79.6	84.3	88.0	90.8	92.7	93.3	92.8	91.2	88.6	85.2	80.6	76.4	72.6	67.7		
160	59.7	66.0	70.1	74.5	81.4	83.6	86.1	87.7	88.3	87.9	86.8	84.7	82.2	79.5	77.1	74.0	65.9		
165	53.4	57.2	60.6	64.7	72.9	81.4	81.6	82.5	82.9	82.8	82.4	81.6	80.5	79.1	77.0	75.0	67.4		
170	46.4	52.4	55.8	52.1	55.8	65.1	74.8	80.4	80.2	80.2	80.0	79.5	78.6	75.9	72.0	70.5	60.3		
175	51.7	53.8	54.3	55.2	52.9	46.9	47.3	57.8	73.1	75.1	74.9	74.5	72.2	69.4	65.5	59.7	55.1		
180	31.9	31.9	31.9	31.9	31.9	31.9	31.9	31.9	31.9	31.9	31.9	31.9	31.9	31.9	31.9	31.9	31.9		

Table 7: Luminous Intensity Data

EQUIPMENT LIST

Test Equipment	Model	Equipment No.	Calibration Date	Calibration Due date
Goniophotometer system	GO-R5000	HZTE011-01	Aug. 14, 2018	Aug. 13, 2019
Digital Power Meter	PF2010A	HZTE028-01	Sep. 12, 2018	Sep. 11, 2019
AC Power Supply	DPS1060	HZTE001-06	Aug. 09, 2018	Aug. 08, 2019
DC Power Supply	WY12010	HZTE004-03	Aug. 09, 2018	Aug. 08, 2019
Temperature recorder	JM624U	HZTE018-08	Aug. 09, 2018	Aug. 08, 2019
Temperature and humidity recorder	JR900	HZTE018-01	Aug. 09, 2018	Aug. 08, 2019
Standard source	D908	HZTE012-01	Aug. 14, 2018	Aug. 13, 2019
Integrate Sphere system	2M	HZTE015-01	Aug. 16, 2018	Aug. 15, 2019
Digital Power Meter	WT210	HZTE008-01	Aug. 02, 2018	Aug. 01, 2019
AC Power Supply	PCR 500L	HZTE001-07	Aug. 09, 2018	Aug. 08, 2019
DC Power Supply	IT6154	HZTE004-04	Aug. 09, 2018	Aug. 08, 2019
Standard source	SCL-1400	HZTE012-02	Aug. 16, 2018	Aug. 15, 2019
Temperature and humidity recorder	JR900	HZTE018-02	Aug. 09, 2018	Aug. 08, 2019
Temperature Meter	TES1310	HZTE017-01	Aug. 09, 2018	Aug. 08, 2019

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 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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