

LM-79-08 TEST REPORT

for

GREEN CREATIVE LTD

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

LED Tube

Model: 17PLL/840/GL/BYP

Laboratory: Leading Testing Laboratories

NVLAP CODE: 200960-0

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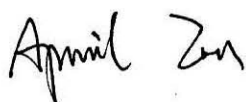
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Report No.: HZ19050020h

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

Review by:



Engineer: April Zou
May 23, 2019

Approved by:



Manager: Jim Zhang
May 23, 2019

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: 17PLL/840/GL/BYP

Luminous Efficacy (Lumens /Watt)	Total Luminous Flux (Lumens)	Power (Watts)	Power Factor
141.5	2269.0	16.03	0.9809
CCT (K)	CRI	Stabilization Time (Light & Power)	
4097	81.7	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	: May 16, 2019
Date of Test	: May 20, 2019
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

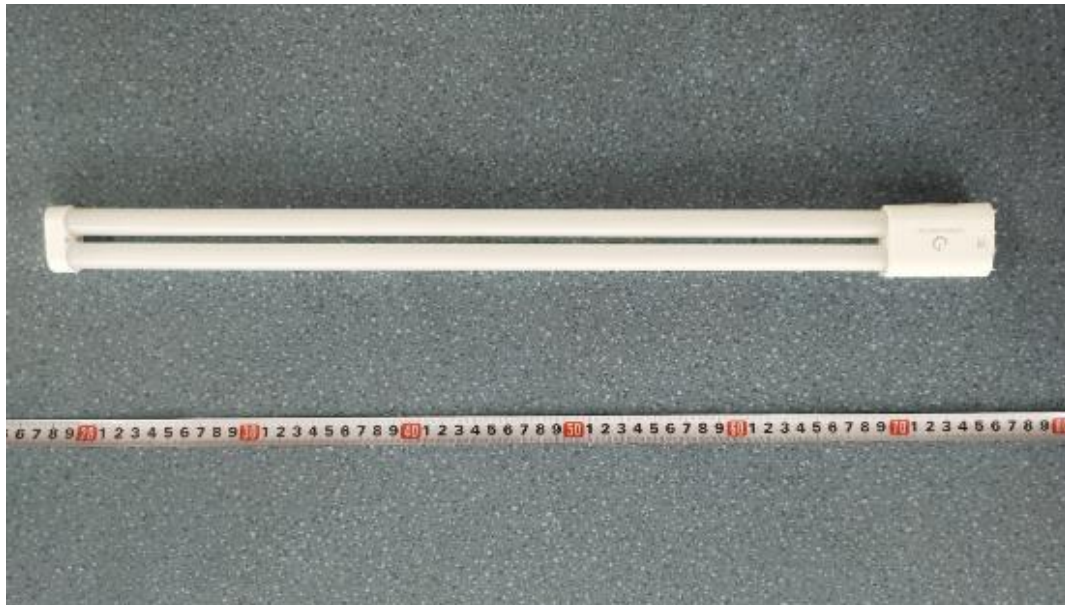


Figure 1- Overview of the sample

Equipment Under Test(EUT)

Name	: LED Tube
Model	: 17PLL/840/GL/BYP
Electrical Ratings	: 120-277V, 60Hz, 17W
Product Description	: 4000K
Manufacturer	: GREEN CREATIVE LTD
Address	: 756 North Zhongshan Rd., Unit B301 Zhabei District, Shanghai

TEST RESULTS

Test ambient temperature was 26.0°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 65 minutes.

Sphere-Spectroradiometer Method

Parameter	Result	
Test Voltage (V)	120.0	277.0
Voltage frequency (Hz)	60	60
Test Current (A)	0.136	0.063
Power Factor	0.9809	0.9141
Test Power (W)	16.03	15.87
THD A%	18.17	23.78
Luminous Efficacy (lm/W)	141.5	142.4
Total Luminous Flux (lm)	2269.0	2260.0
Color Rendering Index (CRI)	81.7	
R9	1.4	
Correlated Color Temperature (CCT)(K)	4097	
Chromaticity Chroma x	0.3775	
Chromaticity Chroma y	0.3795	
Chromaticity Chroma u	0.2221	
Chromaticity Chroma v	0.3349	
Duv	0.0016	
Chromaticity Chroma u'	0.2221	
Chromaticity Chroma v'	0.5024	

Special Color Rendering Indices	
R1	79.4
R2	88
R3	94.5
R4	80.4
R5	79.6
R6	83.4
R7	85.8
R8	62.5
R9	1.4
R10	71.6
R11	79.1
R12	59.2
R13	81.5
R14	97.1

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 24.7°C.

The photometric distance is 30 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)	0.137
Power Factor	0.9764
Power (W)	16.06
Luminous Efficacy (lm/W)	139.1
Total Luminous Flux (lm)	2233.6
Beam Angle (°)	102.6 (0°-180°) / 115.9 (90°-270°)
Center Beam Candle Power (cd)	657
Maximum Beam Candle Power (cd)	659.0 (At: C=300.0, Gamma=1.5)
Spacing Criteria	1.22 (0°-180°) / 1.35 (90°-270°)
Zonal Lumens in the 0 °-60 °Zone	66.48%
Zonal Lumens in the 60 °-90 °Zone	21.22%
Zonal Lumens in the 90 °-120 °Zone	6.93%
Zonal Lumens in the 120 °-180 °Zone	5.37%

Table 3: Test data per Goniophotometer Method

Spectral Power Distribution - Sphere Spectroradiometer Method

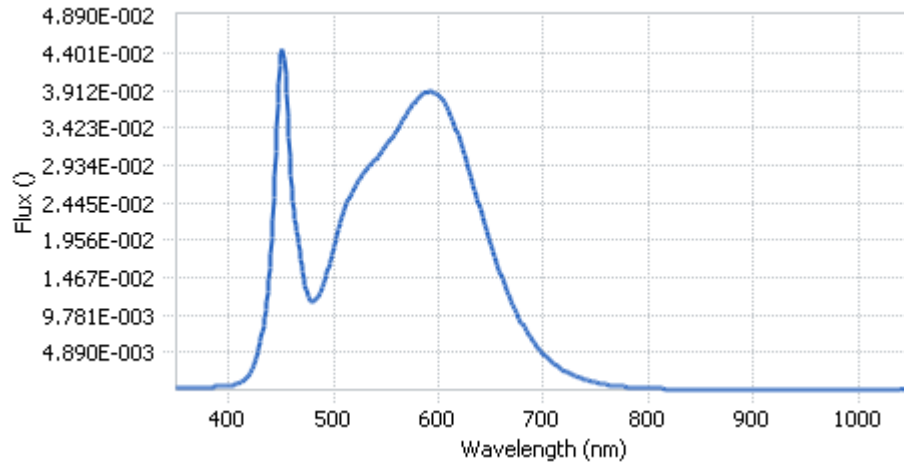
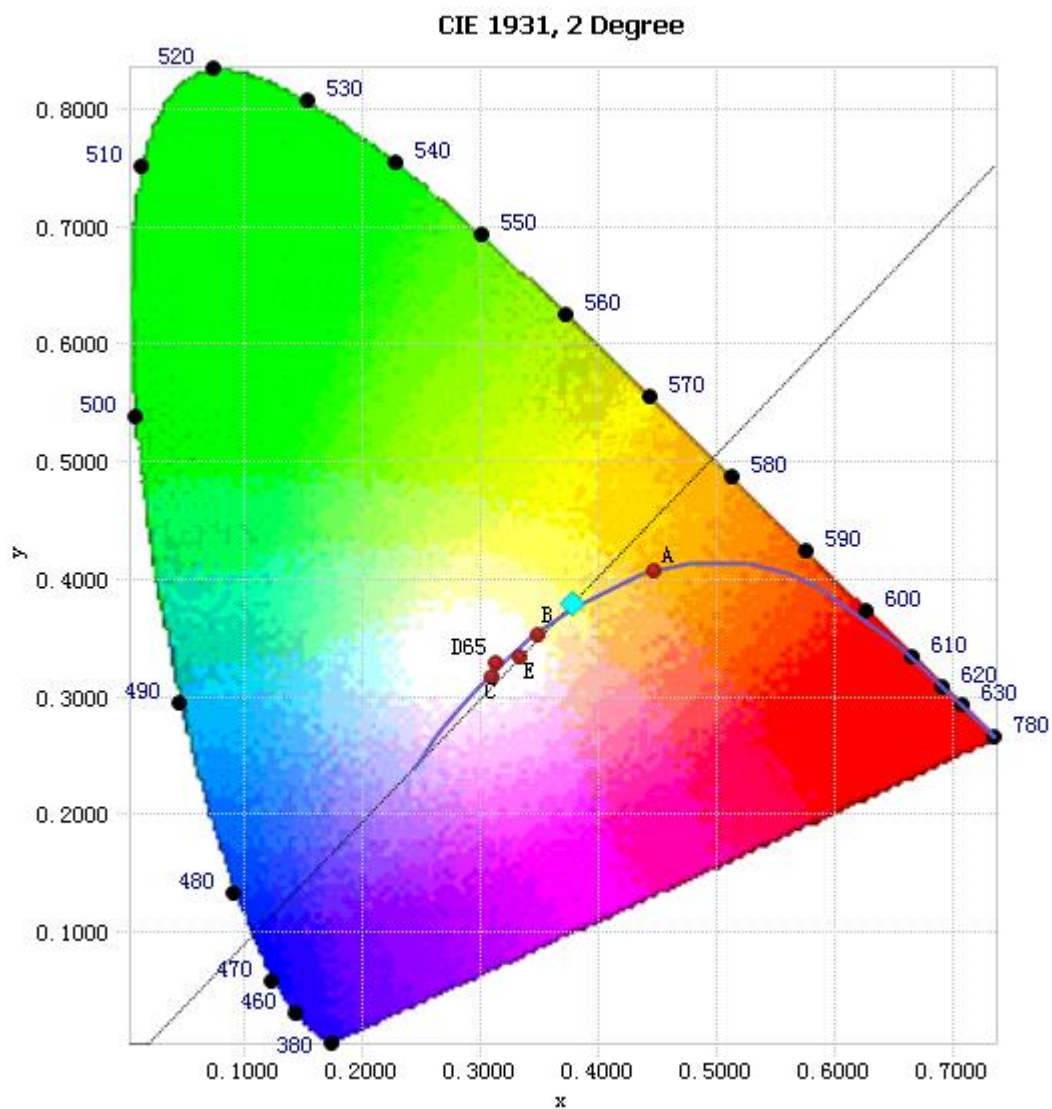


Chart 1: Spectral Power Distribution

Spectral Distribution over Visible Wavelength							
WL(nm)	Radiant(Watts)	WL(nm)	Radiant(Watts)	WL(nm)	Radiant(Watts)	WL(nm)	Radiant(Watts)
380	3.89E-04	485	1.21E-02	590	3.90E-02	695	5.44E-03
385	3.88E-04	490	1.36E-02	595	3.88E-02	700	4.69E-03
390	4.27E-04	495	1.59E-02	600	3.84E-02	705	4.03E-03
395	4.81E-04	500	1.87E-02	605	3.76E-02	710	3.44E-03
400	5.50E-04	505	2.12E-02	610	3.63E-02	715	2.94E-03
405	6.64E-04	510	2.34E-02	615	3.46E-02	720	2.50E-03
410	9.17E-04	515	2.53E-02	620	3.27E-02	725	2.14E-03
415	1.36E-03	520	2.65E-02	625	3.05E-02	730	1.84E-03
420	2.18E-03	525	2.76E-02	630	2.82E-02	735	1.57E-03
425	3.67E-03	530	2.85E-02	635	2.58E-02	740	1.34E-03
430	6.21E-03	535	2.93E-02	640	2.35E-02	745	1.15E-03
435	1.06E-02	540	3.01E-02	645	2.11E-02	750	9.80E-04
440	1.79E-02	545	3.09E-02	650	1.89E-02	755	8.46E-04
445	3.11E-02	550	3.19E-02	655	1.68E-02	760	7.26E-04
450	4.40E-02	555	3.28E-02	660	1.48E-02	765	6.23E-04
455	3.86E-02	560	3.38E-02	665	1.30E-02	770	5.44E-04
460	2.61E-02	565	3.50E-02	670	1.13E-02	775	4.67E-04
465	2.08E-02	570	3.61E-02	675	9.86E-03	780	3.98E-04
470	1.62E-02	575	3.72E-02	680	8.54E-03		
475	1.23E-02	580	3.80E-02	685	7.39E-03		
480	1.15E-02	585	3.87E-02	690	6.37E-03		

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

Chromaticity Diagram - Sphere Spectroradiometer Method



Tristimulus values(x, y): (0.3775, 0.3795)

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

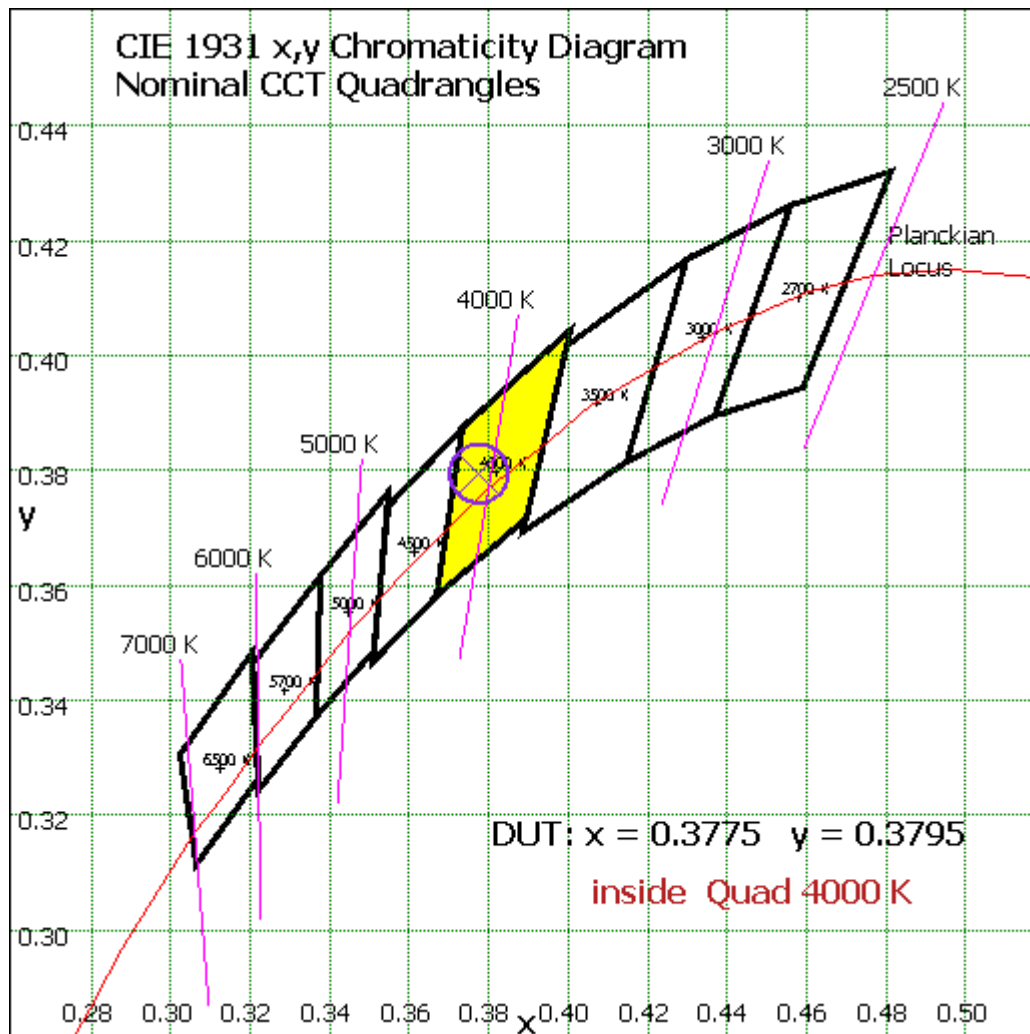
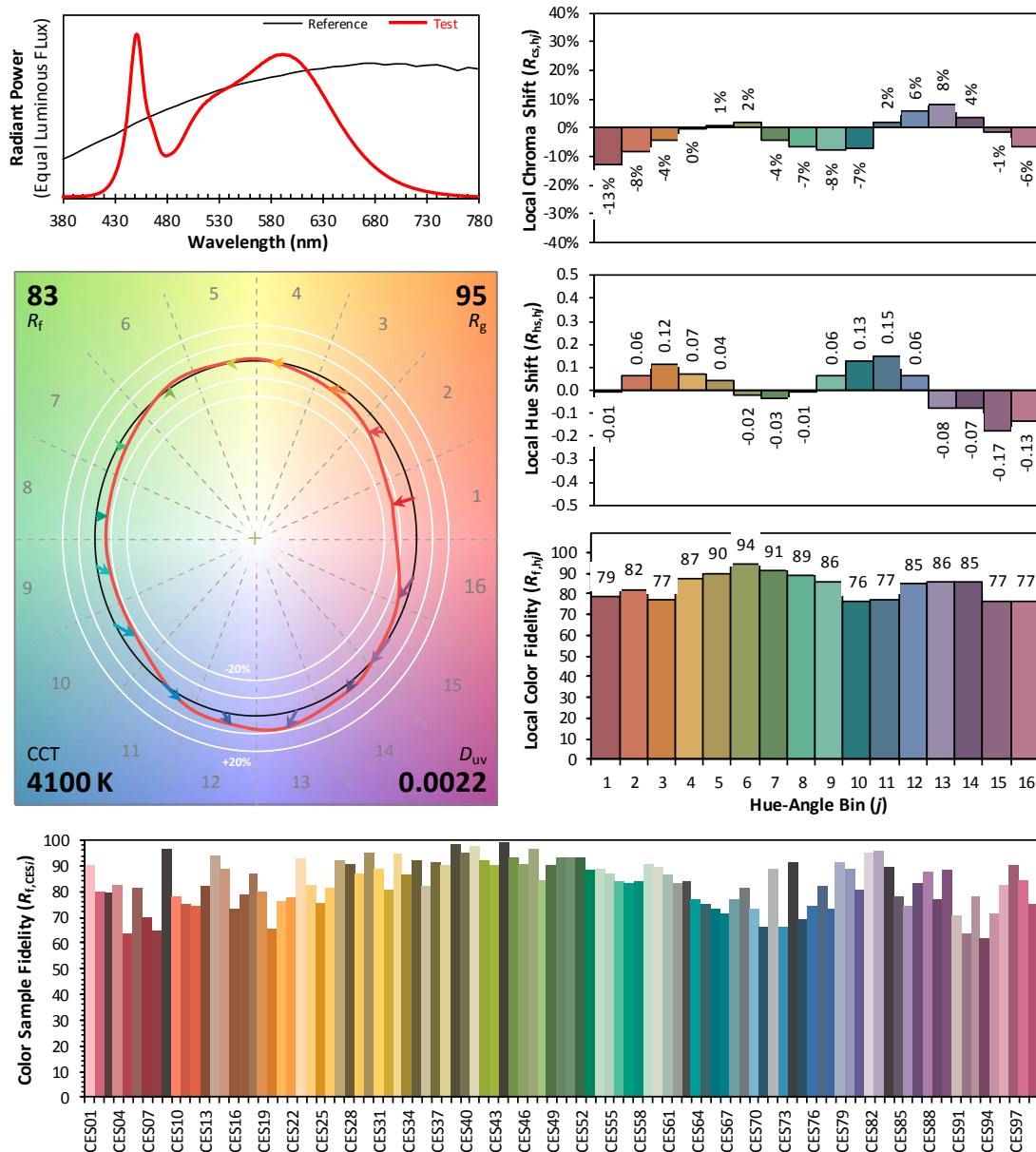


Chart 3: Plot of Lamp x/y coordinates on CIE 1931 Chromaticity Diagram

Color Rendition Report – Sphere Spectroradiometer Method



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

x 0.3775

y 0.3795

u' 0.2221

v' 0.5024

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	62.09	2.78%
10- 20	177.668	7.95%
20- 30	269.481	12.07%
30- 40	327.009	14.64%
40- 50	342.066	15.31%
50- 60	306.5	13.72%
60- 70	229.874	10.29%
70- 80	152.919	6.85%
80- 90	91.162	4.08%
90-100	60.159	2.69%
100-110	50.031	2.24%
110-120	44.593	2.00%
120-130	39.798	1.78%
130-140	32.312	1.45%
140-150	23.193	1.04%
150-160	14.835	0.66%
160-170	7.952	0.36%
170-180	1.915	0.09%
Total	2233.6	100%

$\gamma(^{\circ})$	Lumens	% Total
0- 60	1484.814	66.48%
60- 90	473.955	21.22%
0-90	1958.769	87.70%
90- 180	274.788	12.30%
0- 180	2233.6	100%

Table 5: Zonal Lumen

Illuminance Plots- Goniophotometer Method

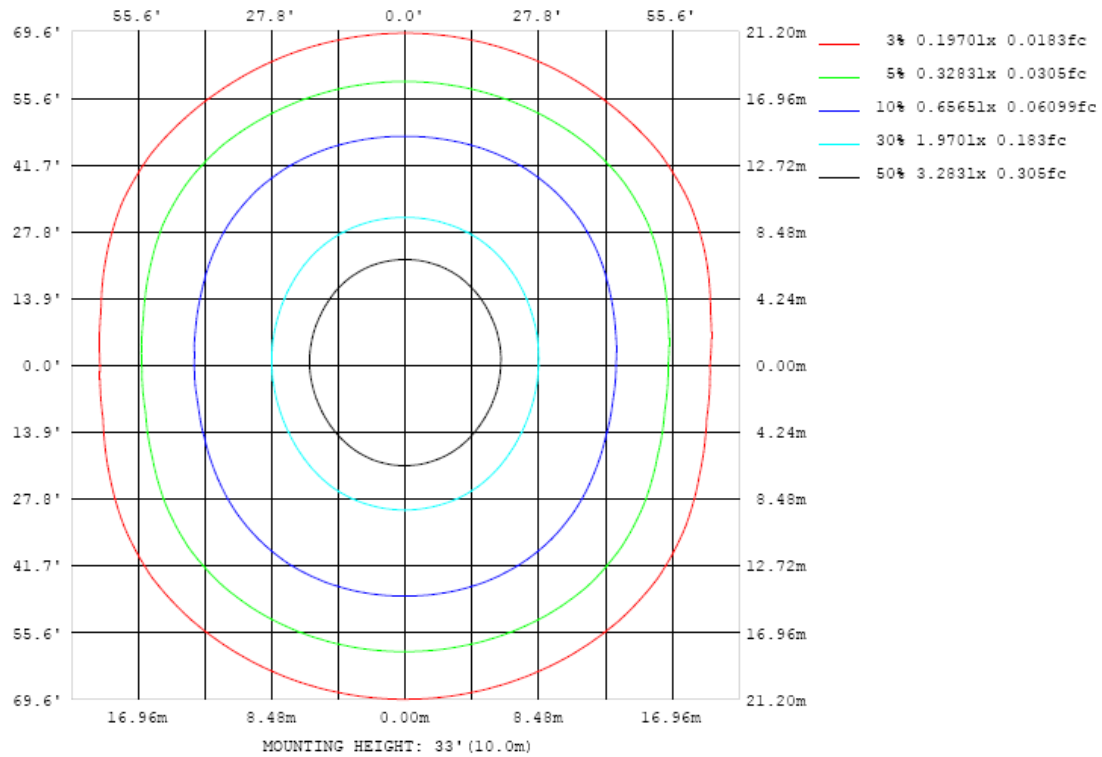


Chart 5: Illuminance Plot (Footcandles)

Luminous Intensity Distribution Plots- Goniophotometer Method

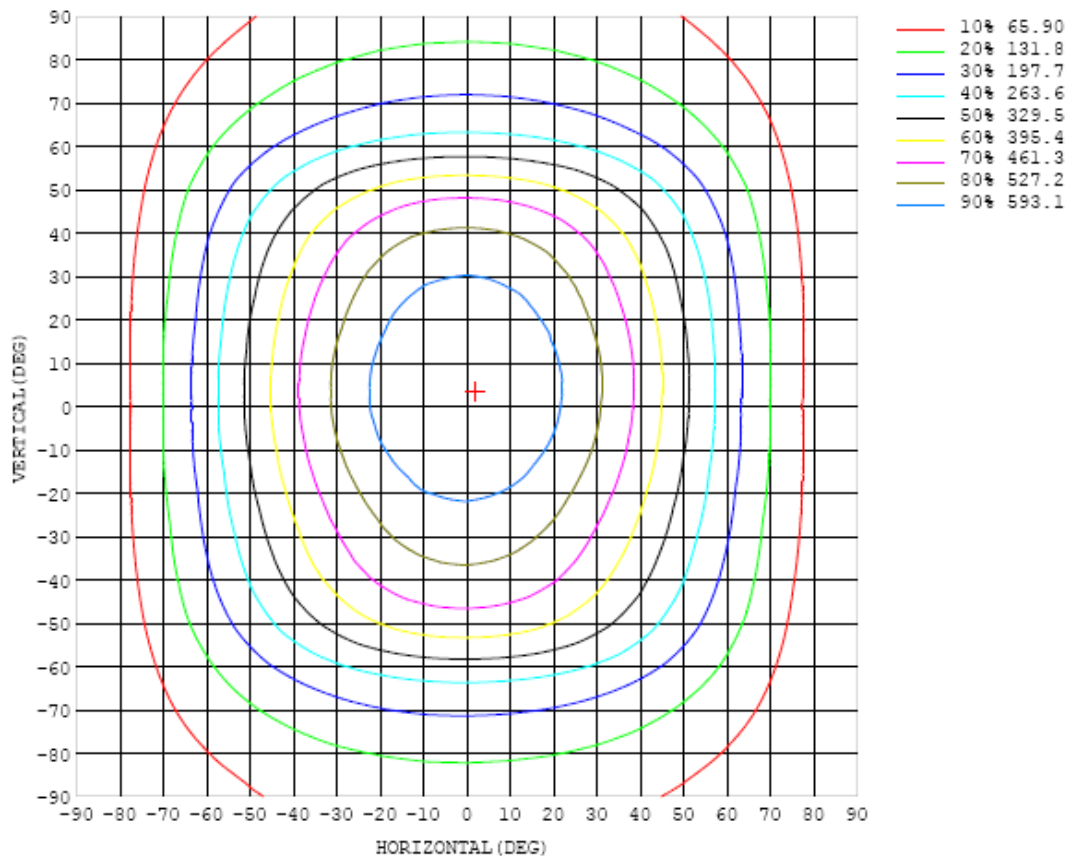


Chart 6: Isocandela Plot

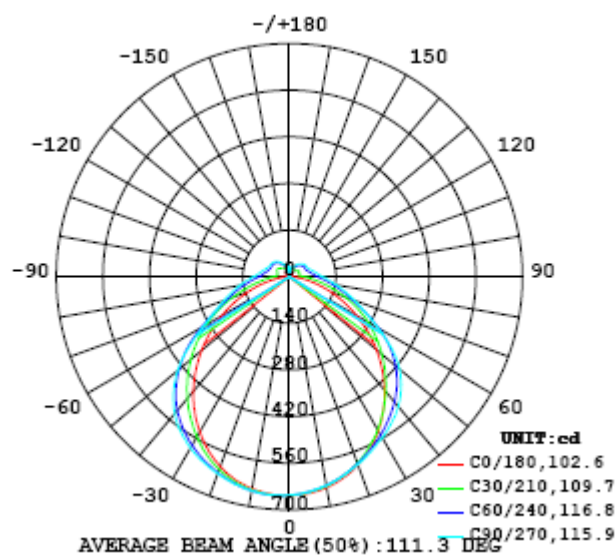


Chart 7: Polar Candela Distribution

Luminous Intensity Data- Goniophotometer Method

Table--1

UNIT: cd

C (DEG) y (DEG)	0	10	20	30	40	50	60	70	80	90	100	110	120	130	140	150	160	170	180
0	657	657	657	657	657	657	657	657	657	657	657	657	657	657	657	657	657	657	657
5	653	652	650	650	649	650	649	649	648	648	649	649	651	648	651	653	652	655	655
10	642	642	640	638	637	638	636	636	635	637	636	636	637	638	639	640	643	646	647
15	625	624	622	620	619	619	619	619	619	620	620	621	621	621	621	623	625	628	631
20	602	600	598	596	595	597	597	599	599	601	599	600	601	598	599	599	601	604	607
25	571	569	567	565	567	570	573	576	578	581	579	579	578	573	570	569	570	572	576
30	533	531	530	530	534	542	548	554	556	559	558	556	553	544	540	535	533	535	539
35	491	488	488	492	500	511	520	528	532	536	534	531	525	514	504	495	492	491	497
40	445	441	443	450	462	477	491	501	505	509	507	504	495	481	467	454	446	445	449
45	394	391	396	406	423	442	456	467	472	475	474	470	461	445	428	410	399	394	398
50	341	339	347	363	383	402	416	426	430	432	432	427	420	405	389	366	351	342	345
55	287	286	298	318	340	357	368	374	375	374	377	376	371	360	344	322	301	290	289
60	232	234	249	272	292	306	310	310	308	307	308	310	310	307	296	276	253	237	235
65	180	184	203	226	242	248	250	250	250	251	251	251	249	248	243	228	208	186	182
70	130	137	159	178	189	196	201	205	207	208	208	205	201	196	189	179	163	140	132
75	85.4	95.2	117	132	144	154	163	169	172	174	173	169	164	155	145	133	119	98.9	86.7
80	46.9	59.9	77.5	93.2	108	121	131	138	142	144	143	138	132	122	110	95.2	79.4	62.9	47.4
85	17.0	28.9	46.3	63.6	79.2	93.5	104	112	117	119	117	113	106	95.0	81.3	65.5	48.5	30.9	17.8
90	0.28	9.58	25.4	42.5	58.9	72.8	84.0	91.8	96.5	98.4	97.4	93.0	85.6	74.9	62.1	45.4	28.2	11.9	0.32
95	1.29	6.01	19.5	35.1	50.3	64.1	74.4	82.0	86.6	88.4	87.5	83.4	76.5	66.5	53.5	38.1	22.2	8.60	1.84
100	3.10	7.07	18.0	31.0	44.1	56.3	66.6	72.7	77.1	79.0	78.5	74.9	68.5	59.6	47.8	34.6	21.5	11.3	3.70
105	4.83	10.5	19.9	30.1	41.4	51.7	60.4	66.2	70.1	71.7	71.2	68.1	63.0	54.8	44.8	33.9	24.0	14.3	5.68
110	6.37	10.6	20.7	31.4	40.5	49.0	56.2	61.5	64.8	66.2	65.7	63.2	58.5	51.8	44.0	35.6	26.6	14.2	7.74
115	8.03	12.9	20.8	31.5	41.2	48.5	54.1	58.1	60.9	62.0	61.7	59.6	56.1	51.1	44.9	37.2	27.5	14.4	9.94
120	9.55	14.6	19.8	33.1	40.9	48.6	53.7	57.1	59.1	60.1	60.0	58.4	55.8	51.5	45.3	37.9	23.1	17.1	11.9
125	11.2	16.5	19.0	30.8	40.1	47.5	53.1	56.5	58.6	59.5	59.5	57.8	55.2	50.7	44.8	34.4	21.8	19.2	13.7
130	12.7	18.0	21.1	27.7	38.6	45.3	50.7	54.7	56.9	57.9	57.7	56.2	53.1	48.7	42.2	30.6	23.4	20.6	15.1
135	13.9	18.4	22.8	25.7	35.3	43.4	48.1	51.0	53.5	54.7	54.4	52.8	50.3	45.2	36.3	28.7	24.5	22.1	16.5
140	14.7	20.3	23.8	26.4	30.5	39.6	45.2	48.4	49.8	50.6	50.6	49.1	45.2	39.3	34.3	28.9	25.8	23.4	17.8
145	15.6	20.3	24.3	26.9	30.1	34.4	40.0	43.4	45.5	46.4	45.8	43.2	39.8	36.4	32.3	29.2	26.2	24.1	18.9
150	16.1	21.3	25.3	27.0	29.4	32.3	35.1	37.6	40.0	41.0	40.5	38.8	36.6	33.9	31.6	28.9	26.5	24.7	19.5
155	16.4	20.6	24.9	26.8	28.7	30.8	32.5	34.5	36.0	36.6	36.3	35.2	34.0	32.2	30.1	28.7	27.0	25.2	19.2
160	16.0	21.0	26.3	27.0	28.1	29.5	30.7	32.0	32.9	33.4	33.0	32.5	31.8	30.6	29.4	28.3	26.5	24.3	19.1
165	15.2	16.9	23.2	27.1	27.5	28.8	29.6	30.2	30.8	30.9	30.8	30.5	29.9	29.5	28.7	26.6	25.9	22.2	18.2
170	14.2	13.9	15.0	18.0	25.3	28.1	27.7	28.4	29.0	29.2	29.2	28.8	28.1	25.2	22.9	20.5	19.2	17.8	17.1
175	13.5	13.3	13.2	13.3	13.2	14.5	18.8	22.8	25.9	27.5	22.9	17.1	16.5	16.3	16.2	16.3	16.4	16.4	16.5
180	6.99	6.99	6.99	7.00	7.00	7.01	7.02	7.02	7.03	7.04	7.04	7.04	7.04	7.04	7.04	7.05	7.05	7.05	7.05

Table 6: Luminous Intensity Data

Table--2

UNIT: cd

C (DEG) y (DEG)	190	200	210	220	230	240	250	260	270	280	290	300	310	320	330	340	350		
0	657	657	657	657	657	657	657	657	657	657	657	657	657	657	657	657	657		
5	655	656	657	657	658	658	658	658	658	659	657	658	656	657	654	656	656		
10	647	649	650	651	652	653	653	653	653	654	653	652	650	651	649	648	645		
15	633	635	637	638	641	642	643	643	644	643	641	641	638	637	633	632	631		
20	610	613	616	619	625	626	628	628	630	629	626	625	622	617	612	612	608		
25	579	584	589	595	603	607	611	612	614	612	610	605	599	594	586	582	577		
30	542	549	555	565	577	584	591	592	594	592	587	583	574	564	554	547	540		
35	500	508	518	531	546	557	565	568	569	567	563	556	543	530	518	508	499		
40	455	464	477	493	511	523	533	536	536	535	531	523	509	493	477	463	453		
45	404	416	433	452	471	483	491	493	493	492	488	483	471	453	434	416	403		
50	351	366	386	408	424	432	439	440	439	439	437	433	423	409	387	366	351		
55	297	314	338	357	371	375	375	371	368	370	373	375	370	358	340	317	297		
60	243	264	287	302	309	306	302	300	299	299	302	305	309	304	289	265	244		
65	191	214	234	244	245	245	247	247	247	247	246	246	245	244	236	217	193		
70	143	167	181	187	194	200	205	209	209	209	205	201	194	189	183	169	145		
75	100	121	133	144	156	165	173	178	179	178	173	166	157	146	135	123	103		
80	62.7	79.9	95.5	111	125	136	145	150	152	150	145	137	126	112	97.5	82.1	65.2		
85	30.4	48.4	66.6	83.6	99.1	111	121	126	128	126	121	113	100	85.3	68.7	50.7	32.6		
90	11.1	28.4	46.7	63.8	79.1	91.2	100.0	105	107	105	100.0	91.7	79.9	65.0	48.0	29.9	12.5		
95	8.09	23.0	39.7	55.8	70.1	81.4	89.6	94.2	95.7	94.2	89.5	81.6	70.5	56.5	40.5	23.9	8.28		
100	11.8	22.6	36.8	50.9	63.5	73.7	81.0	85.2	86.5	85.1	80.8	73.8	63.8	51.2	36.9	22.3	10.8		
105	14.5	25.5	36.9	48.7	59.6	68.4	74.6	78.3	79.4	78.1	74.4	68.3	59.3	48.4	36.1	24.3	14.2		
110	15.9	29.1	39.3	48.6	57.4	64.7	69.9	73.0	73.9	72.8	69.5	64.3	56.7	47.6	37.4	27.4	15.5		
115	17.0	31.1	41.6	50.2	57.4	62.7	66.7	69.0	69.8	68.7	66.0	61.9	56.0	48.4	39.4	29.9	16.3		
120	19.5	30.5	43.2	51.2	57.8	62.8	65.9	67.4	67.8	67.1	65.1	61.8	56.3	49.2	41.0	29.3	17.6		
125	20.6	29.6	42.3	51.5	57.7	62.4	65.2	66.8	67.2	66.4	64.4	61.3	56.2	49.6	41.0	28.5	19.2		
130	22.1	29.0	39.7	50.3	56.8	61.2	64.0	65.5	65.9	65.1	63.2	60.3	55.5	49.2	38.5	28.5	20.0		
135	23.8	27.6	36.9	46.1	54.4	59.2	61.8	63.4	63.7	63.1	61.2	58.3	53.7	45.4	36.2	27.4	22.4		
140	25.2	27.6	35.5	42.0	49.2	55.1	58.9	60.6	61.0	60.2	58.3	54.6	48.5	41.4	34.7	25.7	23.6		
145	26.2	26.7	32.6	39.1	44.4	48.9	52.4	54.6	55.2	54.3	51.9	48.4	43.6	38.7	32.6	25.6	24.5		
150	26.4	27.6	30.9	35.6	40.3	43.8	46.3	47.8	48.2	47.8	46.0	43.5	40.1	35.8	30.0	26.6	24.9		
155	25.3	28.5	28.6	31.4	36.0	39.4	41.3	42.5	42.8	42.5	41.3	39.6	37.0	32.6	29.3	27.8	23.7		
160	23.4	28.1	29.6	29.9	31.6	32.2	37.3	38.0	38.4	38.2	37.5	36.4	33.8	31.7	29.7	28.3	24.1		
165	19.1	26.2	28.8	29.8	30.3	30.8	30.8	34.2	34.9	34.9	34.6	34.1	32.3	30.9	29.7	27.4	21.7		
170	17.2	18.1	20.7	22.5	24.4	27.3	30.5	28.8	28.0	31.3	31.8	31.7	30.5	29.6	26.0	17.8	15.9		
175	16.5	16.6	16.6	16.6	16.6	16.8	17.1	18.1	23.6	28.3	25.5	23.2	19.1	15.0	13.7	13.7	13.7		
180	7.05	7.05	7.05	7.04	7.04	7.04	7.04	7.04	7.04	7.03	7.02	7.02	7.01	7.00	7.00	6.99	6.99		

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	3M	HZTE015-04	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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