

LM-79-08 TEST REPORT

for

GREEN CREATIVE LTD

Room 3603, Level 36, Tower 1, Enterprise Square Five, 38 Wang Chiu Road, Kowloon Bay, KL,
Hong Kong

LED Lamp

Model: 34HID/850/277V/EX39/SD

Laboratory: Leading Testing Laboratories

NVLAP CODE: 200960-0

3rd Floor, Bld. 2, NO. 96 Longchuanwu Rd Qianjiang Economy Dev. Zone, YuhangDist,
Hangzhou, Zhejiang Province, China 311100

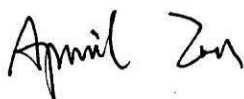
Tel: +86571 86376106

www.ledtestlab.com

Report No.: HZ21120007ae

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

Review by:



Engineer: April Zou

Dec. 16, 2021

Approved by:



Manager: Jim Zhang

Dec. 16, 2021

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: 34HID/850/277V/EX39/SD

Luminous Efficacy (Lumens /Watt)	Total Luminous Flux (Lumens)	Power (Watts)	Power Factor
160.0	5285.3	33.04	0.9919
CCT (K)	CRI	Stabilization Time (Light & Power)	
4847	82.4	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	: Dec. 03, 2021
Date of Test	: Dec. 08, 2021
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

TABLE OF CONTENT

LM-79-08 TEST REPORT	1
TEST SUMMARY	2
SAMPLE PHOTO	4
TEST RESULTS	5
Sphere-Spectroradiometer Method.....	5
Goniophotometer Method	6
Spectral Power Distribution - Sphere Spectroradiometer Method	7
Chromaticity Diagram - Sphere Spectroradiometer Method.....	8
Nominal CCT Quadrangles – Sphere Spectroradiometer Method	9
Color Rendition Report – Sphere Spectroradiometer Method	10
Zonal Lumen Tabulation- Goniophotometer Method	12
Illuminance Plots- Goniophotometer Method	13
Luminous Intensity Distribution Plots- Goniophotometer Method.....	14
Luminous Intensity Data- Goniophotometer Method	15
EQUIPMENT LIST	17
TEST METHODS	17
Seasoning of SSL Product.....	17
Sphere-Spectroradiometer Method- Photometric and Electrical Measurements.....	17
Goniophotometer Method	18
Photometric and Electrical Measurements	18
Color Characteristics Measurements.....	18
Color Spatial Uniformity	18

SAMPLE PHOTO



Figure 1- Overview of the sample

Equipment Under Test(EUT)

Name	: LED Lamp
Model	: 34HID/850/277V/EX39/SD
Electrical Ratings	: 120-277V, 50/60Hz, 34W
Product Description	: 5000K
Manufacturer	: GREEN CREATIVE LTD
Address	: Room 3603, Level 36, Tower 1, Enterprise Square Five, 38 Wang Chiu Road, Kowloon Bay, KL, Hong Kong

TEST RESULTS

Test ambient temperature was 26.0 °C.

Base orientation was horizontal. 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)	0.278	0.121
Power Factor	0.9919	0.9697
Test Power (W)	33.04	32.51
THD A%	11.05	11.12
Luminous Efficacy (lm/W)	160.0	159.8
Total Luminous Flux (lm)	5285.3	5195.8
Color Rendering Index (CRI)	82.4	
R9	6.9	
Correlated Color Temperature (CCT)(K)	4847	
Chromaticity Chroma x	0.3502	
Chromaticity Chroma y	0.3614	
Chromaticity Chroma u	0.2111	
Chromaticity Chroma v	0.3267	
Duv	0.0029	
Chromaticity Chroma u'	0.2111	
Chromaticity Chroma v'	0.4901	

Special Color Rendering Indices	
R1	80.2
R2	86.8
R3	92
R4	82.5
R5	80.8
R6	81.8
R7	87.6
R8	67.4
R9	6.9
R10	69
R11	81.6
R12	59.1
R13	81.7
R14	95.8

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 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)	0.279
Power Factor	0.9923
Power (W)	33.22
Luminous Efficacy (lm/W)	162.7
Total Luminous Flux (lm)	5403.7
Beam Angle (°)	224.6 (0°-180°) / 224.3 (90°-270°)
Center Beam Candle Power (cd)	660
Maximum Beam Candle Power (cd)	671.8 (At: C=10.0, Gamma=22.5)
Spacing Criteria	1.48 (0°-180°) / 1.49 (90°-270°)
Zonal Lumens in the 0 °-60 °Zone	36.92%
Zonal Lumens in the 60 °-90 °Zone	30.74%
Zonal Lumens in the 90 °-120 °Zone	21.80%
Zonal Lumens in the 120 °-180 °Zone	10.54%

Table 3: Test data per Goniophotometer Method

Spectral Power Distribution - Sphere Spectroradiometer Method

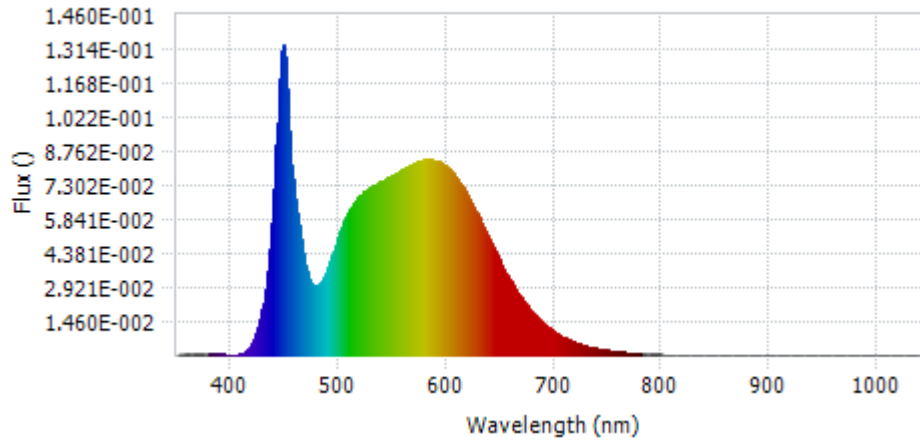
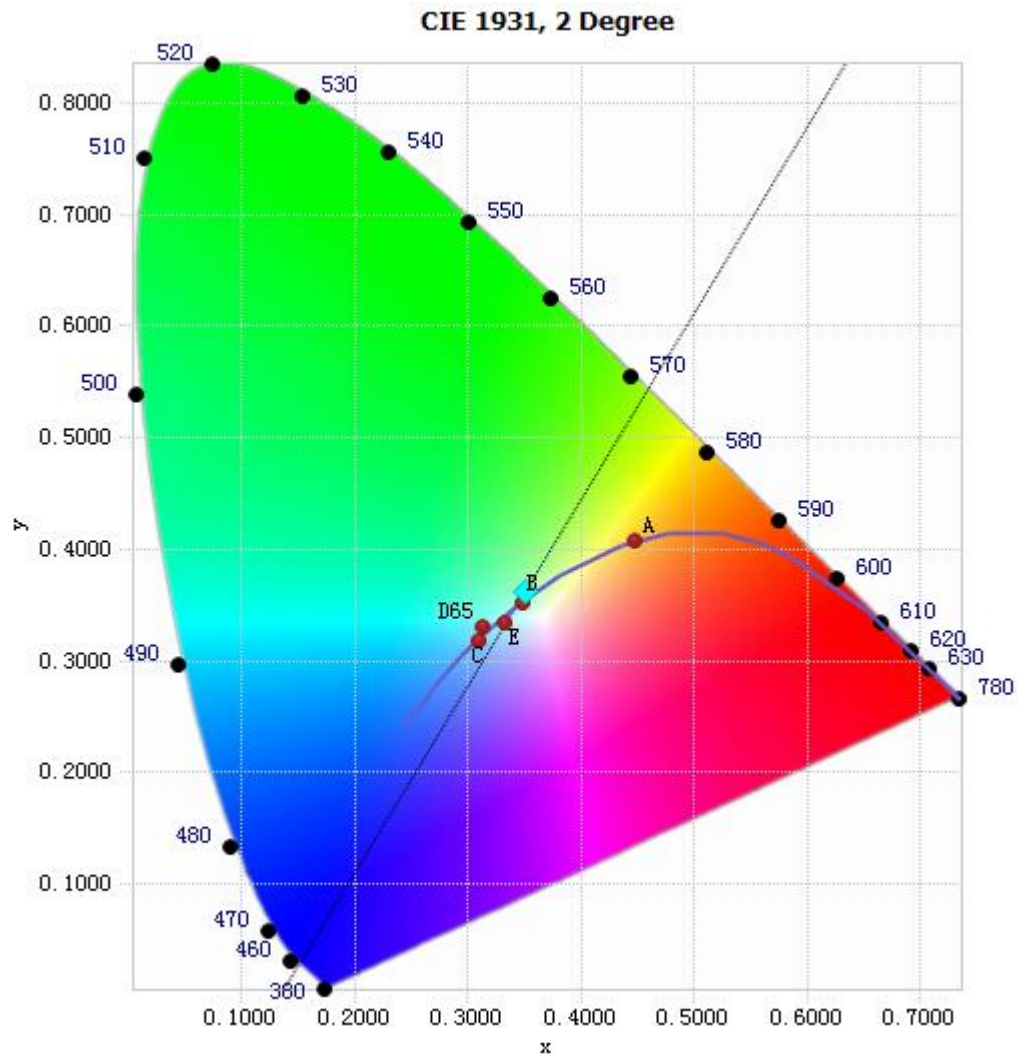


Chart 1: Spectral Power Distribution

Spectral Distribution over Visible Wavelength							
WL(nm)	Radiant(Watts)	WL(nm)	Radiant(Watts)	WL(nm)	Radiant(Watts)	WL(nm)	Radiant(Watts)
380	5.59E-04	485	3.25E-02	590	8.35E-02	695	1.18E-02
385	4.91E-04	490	3.77E-02	595	8.24E-02	700	1.01E-02
390	4.88E-04	495	4.48E-02	600	8.08E-02	705	8.61E-03
395	4.05E-04	500	5.18E-02	605	7.85E-02	710	7.37E-03
400	3.31E-04	505	5.77E-02	610	7.55E-02	715	6.31E-03
405	3.99E-04	510	6.24E-02	615	7.21E-02	720	5.49E-03
410	8.48E-04	515	6.61E-02	620	6.80E-02	725	4.69E-03
415	2.41E-03	520	6.87E-02	625	6.37E-02	730	3.97E-03
420	5.78E-03	525	7.05E-02	630	5.91E-02	735	3.40E-03
425	1.19E-02	530	7.21E-02	635	5.42E-02	740	2.90E-03
430	2.26E-02	535	7.34E-02	640	4.95E-02	745	2.47E-03
435	4.05E-02	540	7.47E-02	645	4.46E-02	750	2.13E-03
440	7.17E-02	545	7.62E-02	650	4.00E-02	755	1.81E-03
445	1.19E-01	550	7.72E-02	655	3.55E-02	760	1.54E-03
450	1.28E-01	555	7.86E-02	660	3.14E-02	765	1.32E-03
455	8.88E-02	560	7.99E-02	665	2.77E-02	770	1.14E-03
460	6.45E-02	565	8.10E-02	670	2.42E-02	775	9.94E-04
465	5.02E-02	570	8.22E-02	675	2.11E-02	780	8.50E-04
470	3.61E-02	575	8.32E-02	680	1.83E-02		
475	3.01E-02	580	8.37E-02	685	1.59E-02		
480	3.01E-02	585	8.40E-02	690	1.37E-02		

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

Chromaticity Diagram - Sphere Spectroradiometer Method



Tristimulus values(x, y): (0.3502, 0.3614)

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

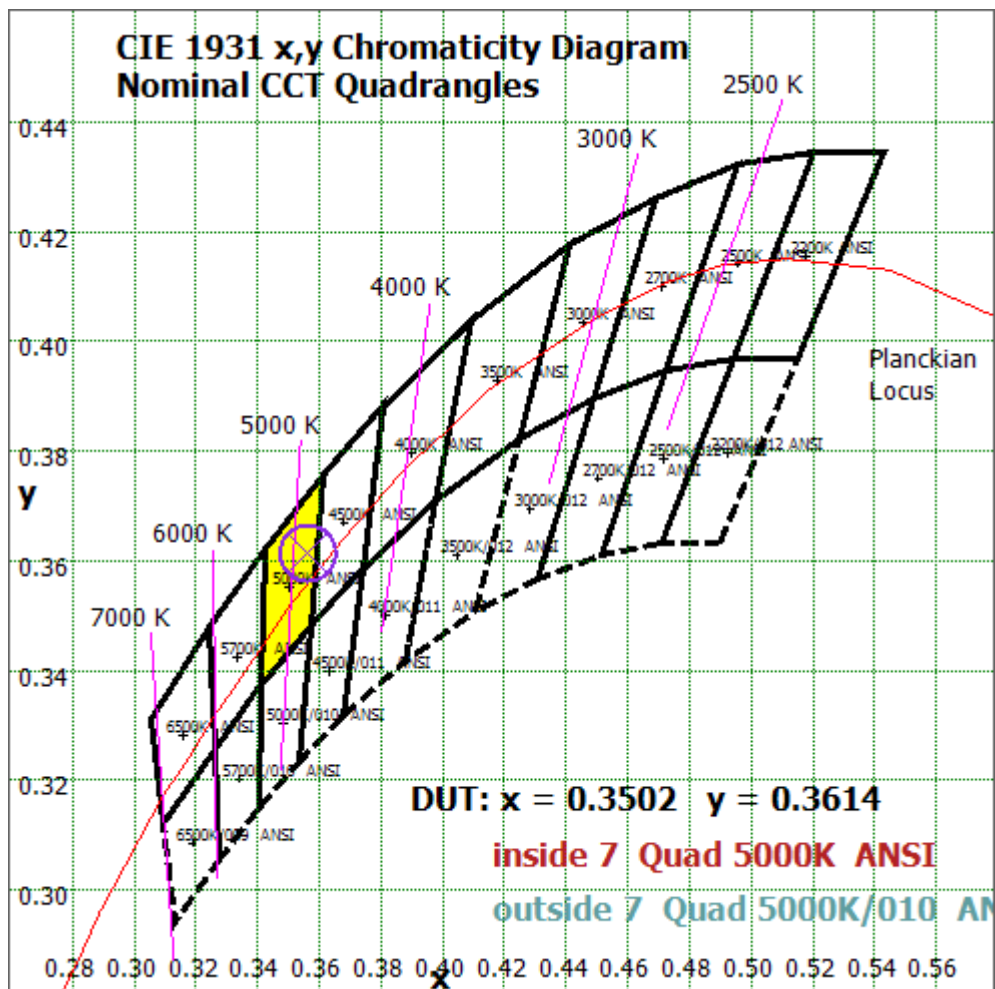


Chart 3: Plot of Lamp x/y coordinates on CIE 1931 Chromaticity Diagram

Color Rendition Report – Sphere Spectroradiometer Method

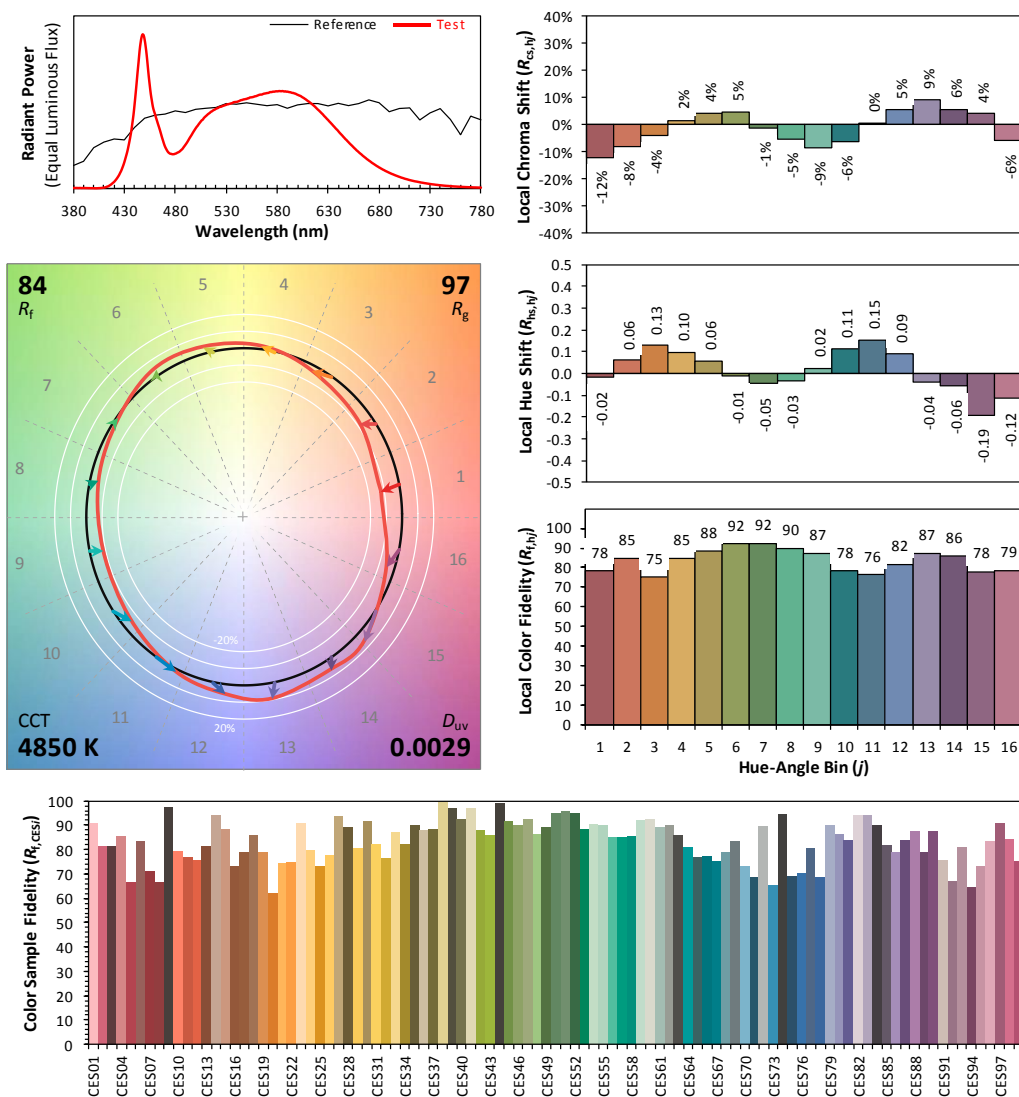
ANSI/IES TM-30-18 Color Rendition Report

Source: LED

Manufacturer: GREEN CREATIVE LTD

Date: 2021/12/08

Model: 34HID/850/277V/EX39/SD



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

x 0.3502
 y 0.3614
 u' 0.2111
 v' 0.4901

CIE 13.3-1995
(CRI)

R_a 82
 R_g 7

Colors are for visual orientation purposes only. Created with the ANSI/IES TM-30-18 Calculator Version 2.00.

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	62.926	1.16%
10- 20	186.487	3.45%
20- 30	303.021	5.61%
30- 40	406.683	7.53%
40- 50	490.057	9.07%
50- 60	545.999	10.10%
60- 70	570.481	10.56%
70- 80	563.2	10.42%
80- 90	527.151	9.76%
90-100	468.39	8.67%
100-110	394.834	7.31%
110-120	314.643	5.82%
120-130	234.86	4.35%
130-140	161.548	2.99%
140-150	99.435	1.84%
150-160	51.49	0.95%
160-170	19.239	0.36%
170-180	3.21	0.06%
Total	5403.7	100%

$\gamma(^{\circ})$	Lumens	% Total
0- 60	1995.17	36.92%
60- 90	1660.83	30.74%
0-90	3656.01	67.66%
90- 180	1747.65	32.34%
0- 180	5403.7	100%

Table 5: Zonal Lumen

Illuminance Plots- Goniophotometer Method

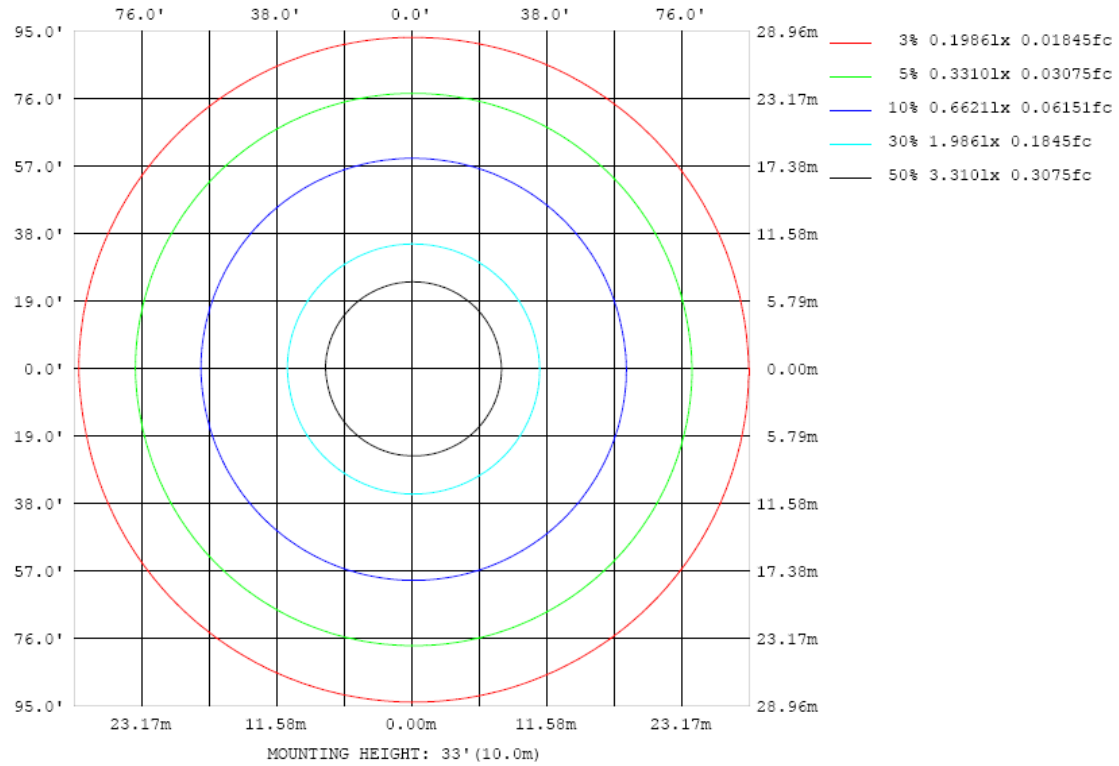


Chart 5: Illuminance Plot (Footcandles)

Luminous Intensity Distribution Plots- Goniophotometer Method

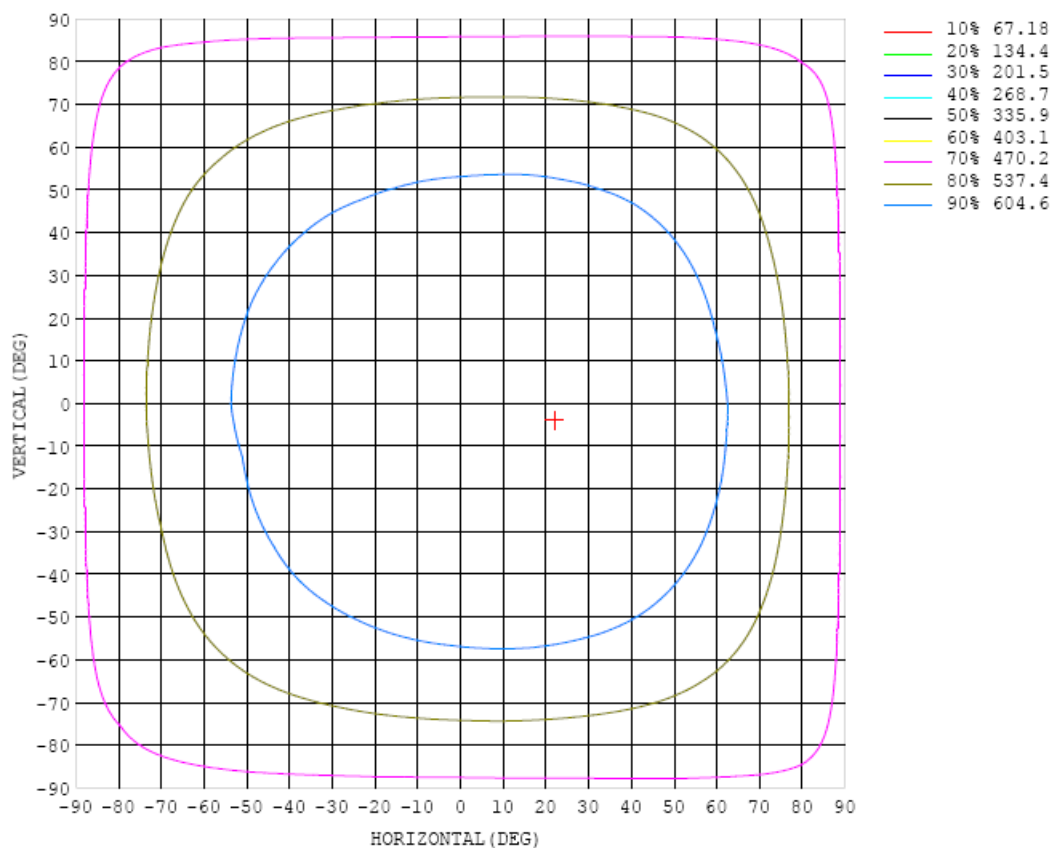


Chart 6: Isocandela Plot

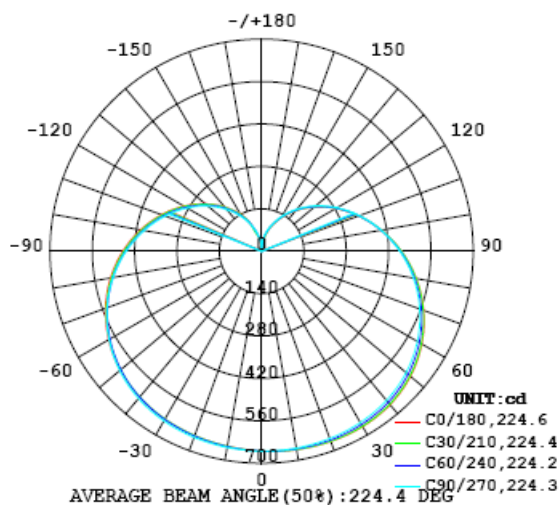


Chart 7: Polar Candela Distribution

Luminous Intensity Data- Goniophotometer Method

Table--1 UNIT: cd

C (DEG) γ (DEG)	0	10	20	30	40	50	60	70	80	90	100	110	120	130	140	150	160	170	180
0	660	660	660	660	660	660	660	660	660	660	660	660	660	660	660	660	660	660	660
5	662	662	662	661	662	662	661	661	661	660	659	659	658	658	658	657	657	657	657
10	665	665	665	664	664	663	662	662	661	660	659	658	657	656	655	655	654	654	654
15	666	667	666	666	665	664	663	662	660	659	657	656	655	654	653	652	651	651	651
20	668	668	668	667	666	665	663	662	660	658	656	655	653	651	651	649	649	648	648
25	669	669	668	667	666	665	662	660	658	656	654	652	650	649	647	646	645	644	644
30	668	668	667	667	665	663	660	658	656	653	651	649	647	645	644	642	642	641	640
35	665	666	665	664	662	660	657	655	652	649	647	644	642	641	639	638	637	636	635
40	661	661	660	659	657	654	651	649	646	643	641	638	636	635	633	631	631	630	629
45	653	653	652	651	649	647	643	641	638	634	632	630	628	627	625	624	623	622	621
50	642	642	641	640	638	636	632	630	627	624	622	620	618	616	615	614	613	612	611
55	628	629	628	626	624	622	619	616	613	611	609	607	605	604	603	601	600	600	599
60	611	612	611	610	607	605	602	600	597	595	593	591	590	589	588	587	586	585	585
65	592	592	591	591	588	586	583	581	579	577	575	574	572	572	571	570	570	569	568
70	570	570	569	569	567	564	562	560	558	556	555	554	553	553	552	551	551	550	550
75	545	546	545	545	543	541	539	537	536	534	533	532	532	531	531	531	530	530	530
80	519	519	519	518	517	515	513	512	511	510	509	509	509	509	508	508	508	507	507
85	491	492	491	491	490	488	487	486	485	484	484	484	484	484	484	484	484	484	484
90	462	463	462	462	461	460	459	458	458	457	458	458	458	459	459	459	459	459	459
95	432	433	433	432	432	431	430	430	430	429	430	431	431	432	432	433	433	433	433
100	402	403	402	402	402	401	401	401	401	401	402	403	404	405	405	406	406	406	407
105	372	372	372	372	372	372	371	372	372	373	374	375	376	377	378	379	379	379	380
110	342	342	343	343	342	342	342	343	344	344	346	347	348	349	350	351	352	352	353
115	312	313	313	313	313	313	313	314	315	316	317	319	320	322	323	324	324	325	325
120	283	284	284	284	284	285	285	286	287	288	290	291	293	294	295	296	297	297	298
125	255	255	256	256	256	257	257	258	259	261	262	263	265	267	268	269	270	270	271
130	227	228	228	229	229	229	230	231	232	233	235	237	238	240	241	242	243	243	244
135	201	201	202	202	202	203	203	205	206	207	209	210	212	213	214	215	217	217	217
140	175	176	176	177	177	177	178	179	181	182	183	185	186	187	189	190	191	191	191
145	150	151	151	152	152	153	154	155	156	157	158	160	161	162	163	164	165	166	166
150	127	128	128	128	128	129	130	131	132	133	134	135	137	138	139	140	141	141	142
155	105	105	105	106	106	107	108	108	109	110	112	112	114	115	115	116	117	117	115
160	83.9	84.4	84.7	85.0	85.3	86.1	86.7	87.5	88.4	89.2	90.2	91.1	91.8	92.5	93.0	93.5	94.2	94.7	82.6
165	62.5	56.4	63.9	61.9	64.0	64.1	67.4	68.6	69.3	70.0	70.8	71.5	71.8	71.3	71.6	73.0	73.3	71.9	60.8
170	43.6	34.3	36.5	37.2	38.0	45.5	47.5	51.2	52.9	53.8	54.5	54.7	53.8	52.9	53.3	54.9	55.1	51.0	44.9
175	27.5	26.4	19.5	16.7	22.1	27.1	27.6	28.7	31.6	33.4	36.8	38.5	37.2	35.8	35.5	35.4	34.5	33.2	25.0
180	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	0.00	0.00	0.87

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	660	660	660	660	660	660	660	660	660	660	660	660	660	660	660	660	660		
5	657	657	657	657	658	658	658	658	658	659	660	660	660	661	661	662	662		
10	654	653	654	654	655	655	656	657	658	658	660	660	661	662	663	664	664		
15	650	650	651	651	652	652	654	655	656	657	659	661	662	664	664	666	666		
20	647	647	648	648	649	649	651	652	654	656	658	660	662	664	665	666	668		
25	644	643	644	644	645	646	647	649	651	653	656	658	661	663	665	667	668		
30	640	639	640	640	641	641	643	645	647	649	652	655	658	661	664	666	667		
35	635	635	635	634	635	636	638	640	641	645	648	651	654	658	661	663	665		
40	628	628	628	627	628	629	630	632	634	637	641	644	648	652	655	658	660		
45	620	620	619	619	620	620	621	623	625	628	632	635	639	643	647	650	652		
50	610	610	609	608	609	608	610	611	613	616	620	624	628	632	636	639	641		
55	598	597	596	595	595	595	596	597	599	602	605	609	614	618	622	625	627		
60	583	583	582	580	580	579	580	581	583	586	589	593	597	601	605	608	611		
65	567	566	565	563	563	562	563	563	565	567	570	574	577	582	586	589	591		
70	549	547	546	544	544	543	543	543	544	546	549	553	556	560	564	567	569		
75	528	527	526	524	523	522	522	522	523	524	527	530	533	536	540	542	545		
80	506	505	504	502	501	499	499	499	499	500	502	505	508	511	514	516	518		
85	483	482	480	478	477	475	475	474	474	475	477	479	481	484	487	489	490		
90	458	457	456	454	452	450	449	449	449	449	450	452	454	456	458	460	461		
95	433	431	430	428	427	424	423	422	422	422	423	424	426	427	429	430	432		
100	406	405	404	402	400	398	396	396	395	395	395	396	397	398	399	401	402		
105	379	378	377	375	373	371	369	369	367	367	367	367	368	369	370	371	372		
110	352	351	350	348	346	344	343	341	340	339	339	339	339	340	340	341	342		
115	325	324	323	321	319	317	316	314	313	312	311	311	311	311	311	312	312		
120	297	297	296	294	292	290	288	287	285	284	284	283	282	283	283	283	283		
125	270	269	269	267	265	263	261	260	258	257	256	256	255	255	255	255	255		
130	243	243	242	240	238	237	235	233	232	230	229	229	228	228	227	228	228		
135	217	216	215	214	212	210	209	207	205	204	203	202	202	201	201	201	201		
140	191	190	189	188	186	185	183	181	180	178	177	177	176	175	175	175	175		
145	165	165	164	162	161	159	158	156	155	154	153	152	152	151	151	151	151		
150	141	140	139	138	137	135	134	132	131	130	129	129	128	127	127	127	128		
155	117	116	115	111	112	111	110	109	107	106	106	105	105	105	104	104	105		
160	81.7	84.9	75.0	83.7	85.7	87.1	87.6	86.7	85.7	84.7	84.0	83.8	83.6	83.4	83.3	83.5	84.4		
165	58.3	55.6	55.4	56.9	63.8	64.5	65.2	65.6	65.4	65.1	64.5	64.0	64.0	64.2	64.3	64.8	65.5		
170	44.6	42.5	42.5	42.6	42.8	44.4	46.2	46.3	46.2	46.1	46.5	46.2	46.6	47.3	46.6	46.6	45.8		
175	25.3	26.3	25.6	27.2	27.5	28.2	28.0	27.7	28.0	27.1	27.7	26.3	25.3	27.4	28.4	28.3	26.6		
180	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.88	0.87	0.88	0.88	0.88	0.88	0.89	0.89		

Table 7: Luminous Intensity Data

EQUIPMENT LIST

Test Equipment	Model	Equipment No.	Calibration Date	Calibration Due date
Goniophotometer system	GO-R5000	HZTE011-01	Aug. 05, 2021	Aug. 04, 2022
Digital Power Meter	PF2010A	HZTE028-01	Aug. 05, 2021	Aug. 04, 2022
AC Power Supply	DPS1060	HZTE001-06	Aug. 05, 2021	Aug. 04, 2022
DC Power Supply	WY12010	HZTE004-03	Aug. 05, 2021	Aug. 04, 2022
Temperature recorder	JM624U	HZTE018-08	Aug. 05, 2021	Aug. 04, 2022
Temperature and humidity recorder	JR900	HZTE018-01	Aug. 05, 2021	Aug. 04, 2022
Standard source	D908	HZTE012-01	Aug. 05, 2021	Aug. 04, 2022
Integrate Sphere system	3M	HZTE015-04	Aug. 05, 2021	Aug. 04, 2022
Digital Power Meter	WT210	HZTE008-01	Aug. 05, 2021	Aug. 04, 2022
AC Power Supply	PCR 500L	HZTE001-07	Aug. 05, 2021	Aug. 04, 2022
DC Power Supply	IT6154	HZTE004-04	Aug. 05, 2021	Aug. 04, 2022
Standard source	SCL-1400	HZTE012-02	Aug. 05, 2021	Aug. 04, 2022
Temperature and humidity recorder	JR900	HZTE018-02	Aug. 05, 2021	Aug. 04, 2022
Temperature Meter	TES1310	HZTE017-01	Aug. 05, 2021	Aug. 04, 2022

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

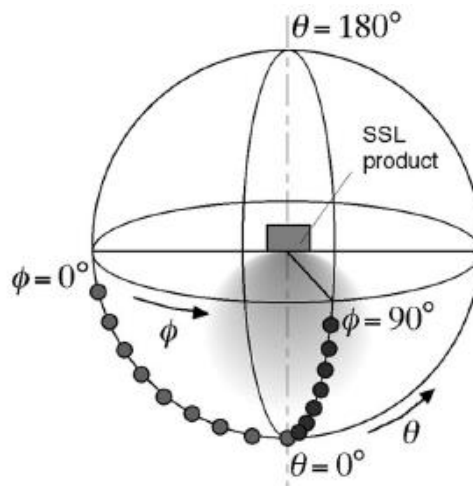
The color characteristics of SSL products include chromaticity coordinates, correlated color temperature, and color rendering index. These characteristics of SSL products may be spatially non-uniform, and thus, in order that they can be specified accurately, the color quantities shall be measured as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

This report is considered invalidated without the Special Seal for Inspection of the LTL. This report shall not be altered, increased or deleted. The results shown in this test report refer only to the sample(s) tested. Without written approval of LTL, this test report shall not be copied except in full and published as advertisement.