

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/830/277V/EX39/SD

Laboratory: Leading Testing Laboratories

NVLAP CODE: 200960-0

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Hangzhou, Zhejiang Province, China 311100

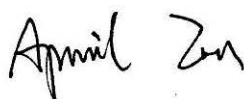
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Report No.: HZ21120007am

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

Review by:



Engineer: April Zou

Dec. 24, 2021

Approved by:



Manager: Jim Zhang

Dec. 24, 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/830/277V/EX39/SD**

Luminous Efficacy (Lumens /Watt)	Total Luminous Flux (Lumens)	Power (Watts)	Power Factor
152.3	5016.6	32.93	0.9911
CCT (K)	CRI	Stabilization Time (Light & Power)	
2996	82.5	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. 23, 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

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SAMPLE PHOTO



Figure 1- Overview of the sample

Equipment Under Test(EUT)

Name	: LED Lamp
Model	: 34HID/830/277V/EX39/SD
Electrical Ratings	: 120-277V, 50/60Hz, 34W
Product Description	: 3000K
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)	0.277	0.120
Power Factor	0.9911	0.9703
Test Power (W)	32.93	32.31
THD A%	11.65	11.17
Luminous Efficacy (lm/W)	152.3	151.5
Total Luminous Flux (lm)	5016.6	4895.7
Color Rendering Index (CRI)	82.5	
R9	3.9	
Correlated Color Temperature (CCT)(K)	2996	
Chromaticity Chroma x	0.4381	
Chromaticity Chroma y	0.4063	
Chromaticity Chroma u	0.2504	
Chromaticity Chroma v	0.3483	
Duv	0.0007	
Chromaticity Chroma u'	0.2504	
Chromaticity Chroma v'	0.5224	

Special Color Rendering Indices	
R1	80.8
R2	91.2
R3	95.8
R4	80.8
R5	81.4
R6	90.1
R7	82.2
R8	57.5
R9	3.9
R10	80.7
R11	80.9
R12	74.2
R13	83.3
R14	98.2

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)	0.277
Power Factor	0.9914
Power (W)	32.99
Luminous Efficacy (lm/W)	154.6
Total Luminous Flux (lm)	5099.7
Beam Angle (°)	223.5 (0°-180°) / 222.1 (90°-270°)
Center Beam Candle Power (cd)	624
Maximum Beam Candle Power (cd)	636.6 (At: C=300.0, Gamma=26.5)
Spacing Criteria	1.48 (0°-180°) / 1.55 (90°-270°)
Zonal Lumens in the 0°-60°Zone	37.08%
Zonal Lumens in the 60°-90°Zone	30.77%
Zonal Lumens in the 90°-120°Zone	21.71%
Zonal Lumens in the 120°-180°Zone	10.44%

Table 3: Test data per Goniophotometer Method

Spectral Power Distribution - Sphere Spectroradiometer Method

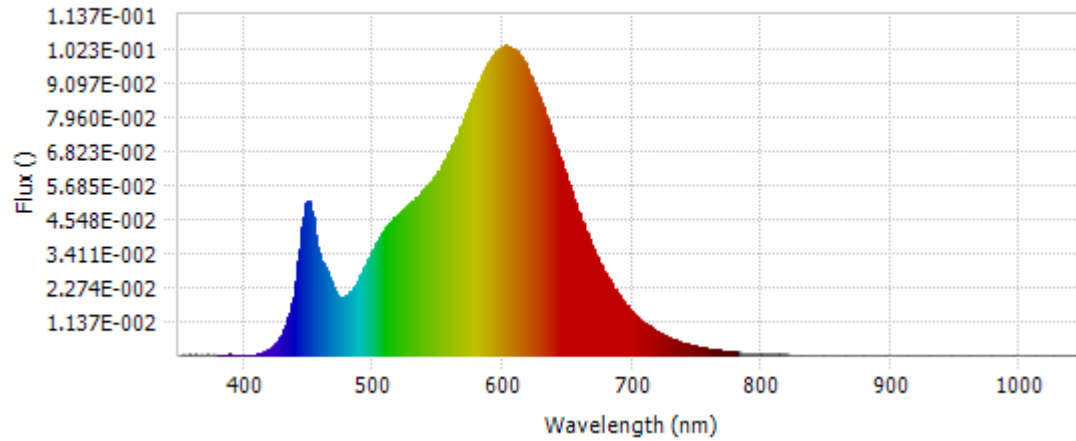
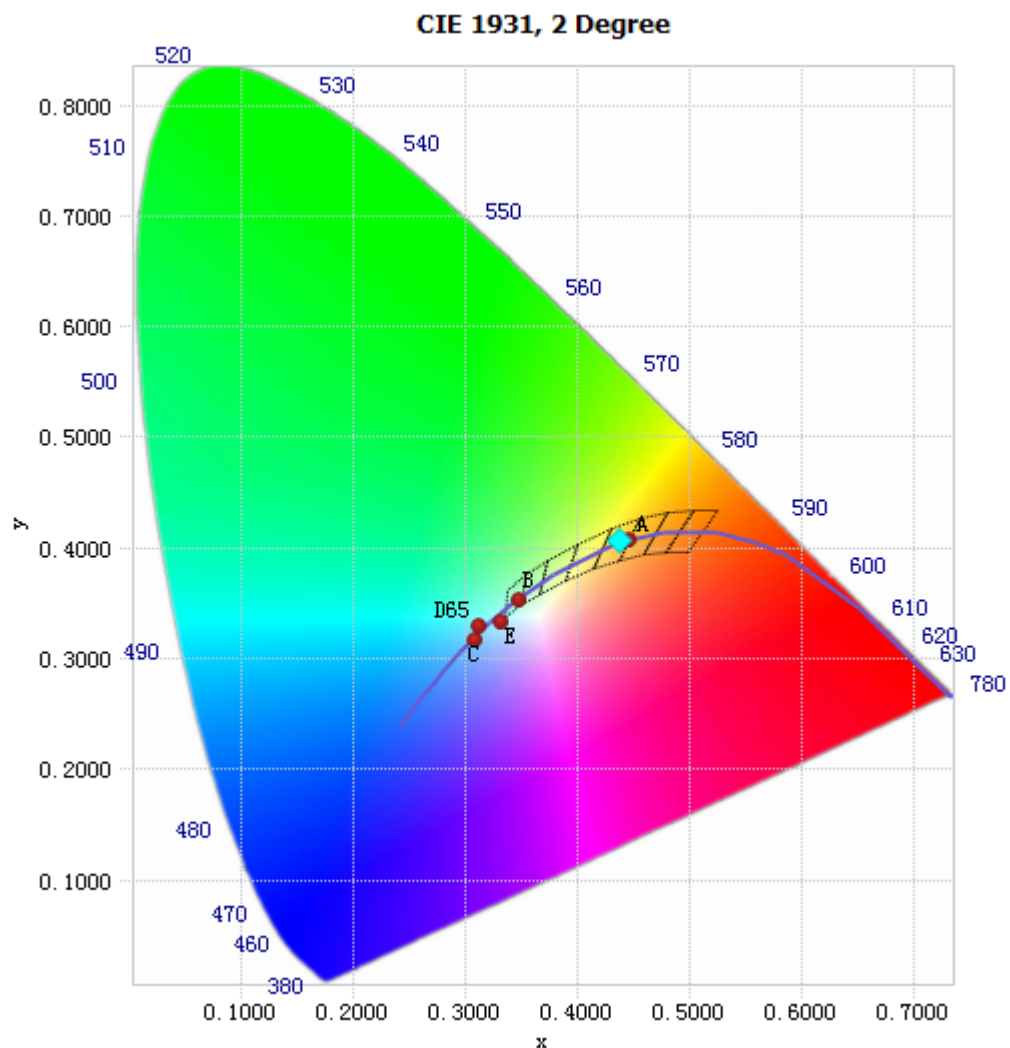


Chart 1: Spectral Power Distribution

Spectral Distribution over Visible Wavelength							
WL(nm)	Radiant(Watts)	WL(nm)	Radiant(Watts)	WL(nm)	Radiant(Watts)	WL(nm)	Radiant(Watts)
380	2.86E-04	485	2.27E-02	590	9.86E-02	695	1.71E-02
385	2.65E-04	490	2.64E-02	595	1.02E-01	700	1.46E-02
390	3.16E-04	495	3.10E-02	600	1.03E-01	705	1.25E-02
395	2.89E-04	500	3.57E-02	605	1.03E-01	710	1.06E-02
400	2.33E-04	505	3.94E-02	610	1.02E-01	715	9.13E-03
405	2.18E-04	510	4.26E-02	615	9.89E-02	720	7.75E-03
410	4.27E-04	515	4.55E-02	620	9.49E-02	725	6.64E-03
415	1.02E-03	520	4.76E-02	625	8.99E-02	730	5.63E-03
420	2.31E-03	525	4.93E-02	630	8.43E-02	735	4.76E-03
425	4.32E-03	530	5.14E-02	635	7.80E-02	740	4.07E-03
430	7.83E-03	535	5.34E-02	640	7.17E-02	745	3.46E-03
435	1.38E-02	540	5.57E-02	645	6.50E-02	750	2.98E-03
440	2.49E-02	545	5.84E-02	650	5.83E-02	755	2.54E-03
445	4.27E-02	550	6.14E-02	655	5.21E-02	760	2.14E-03
450	5.15E-02	555	6.48E-02	660	4.62E-02	765	1.83E-03
455	4.05E-02	560	6.89E-02	665	4.05E-02	770	1.55E-03
460	3.17E-02	565	7.38E-02	670	3.55E-02	775	1.36E-03
465	2.73E-02	570	7.90E-02	675	3.09E-02	780	1.16E-03
470	2.16E-02	575	8.43E-02	680	2.68E-02		
475	1.92E-02	580	8.98E-02	685	2.31E-02		
480	2.03E-02	585	9.48E-02	690	1.99E-02		

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

Chromaticity Diagram - Sphere Spectroradiometer Method



Tristimulus values(x, y): (0.4381, 0.4063)

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

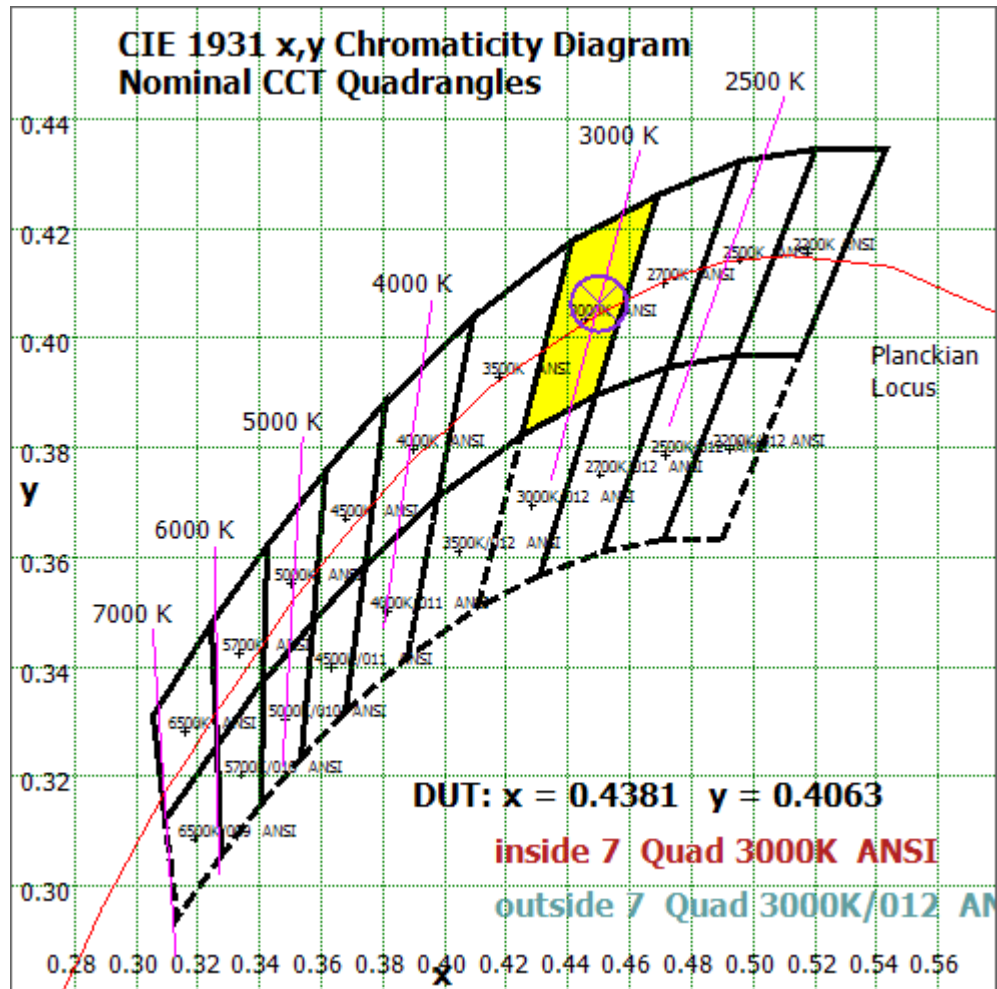


Chart 3: Plot of Lamp x/y coordinates on CIE 1931 Chromaticity Diagram

Color Rendition Report – Sphere Spectroradiometer Method

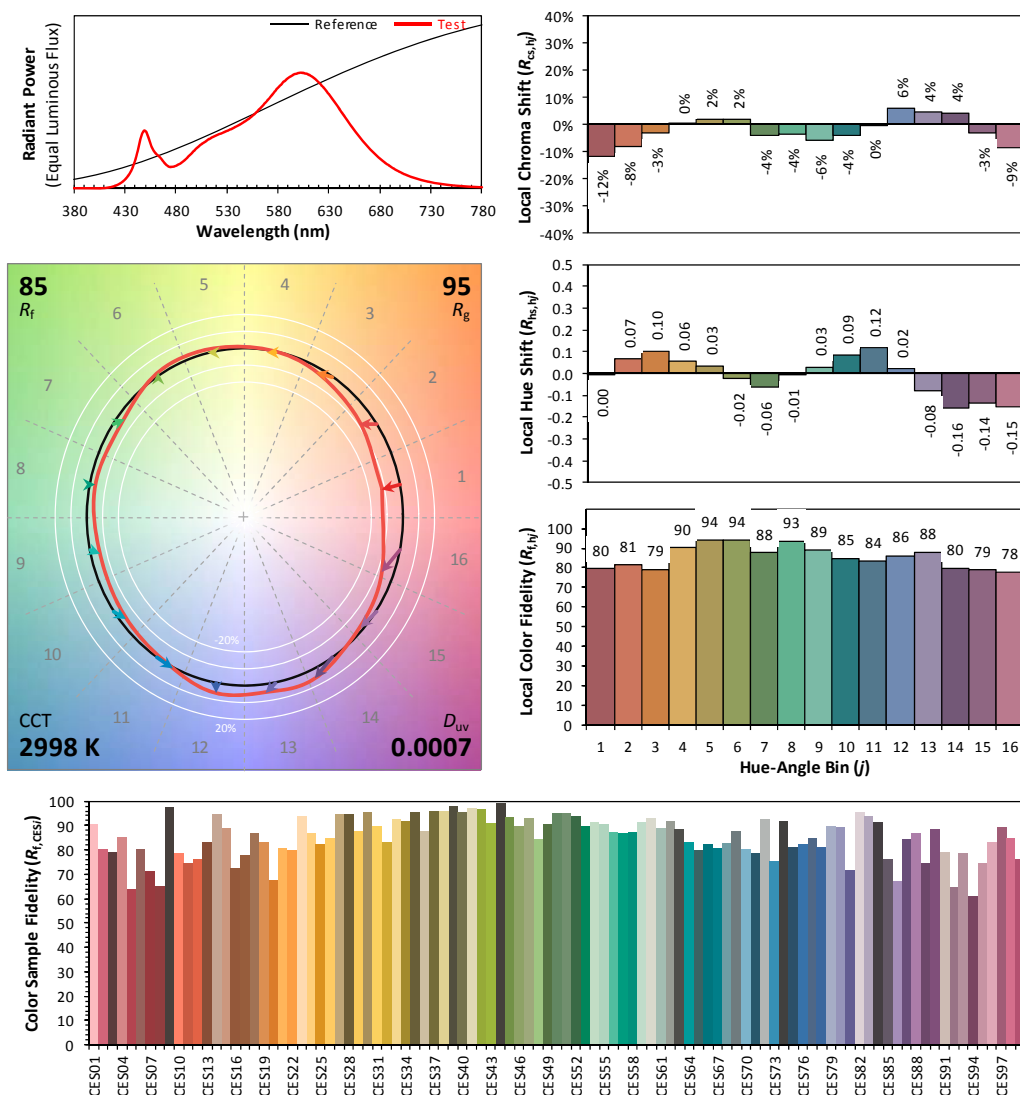
ANSI/IES TM-30-18 Color Rendition Report

Source: LED

Manufacturer: GREEN CREATIVE LTD

Date: 2021/12/23

Model: 34HID/830/277V/EX39/SD



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

x 0.4381
 y 0.4063
 u' 0.2504
 v' 0.5224

CIE 13.3-1995
(CRI)
 R_a 83
 R_9 4

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	59.58	1.17%
10- 20	176.609	3.46%
20- 30	287.084	5.63%
30- 40	385.521	7.56%
40- 50	464.689	9.11%
50- 60	517.533	10.15%
60- 70	540.07	10.59%
70- 80	532.131	10.43%
80- 90	497.01	9.75%
90-100	440.805	8.64%
100-110	371.007	7.28%
110-120	295.166	5.79%
120-130	219.869	4.31%
130-140	150.88	2.96%
140-150	92.709	1.82%
150-160	48.038	0.94%
160-170	17.887	0.35%
170-180	3.138	0.06%
Total	5099.7	100%

$\gamma(^{\circ})$	Lumens	% Total
0- 60	1891.02	37.08%
60- 90	1569.21	30.77%
0-90	3460.23	67.85%
90- 180	1639.5	32.15%
0- 180	5099.7	100%

Table 5: Zonal Lumen

Illuminance Plots- Goniophotometer Method

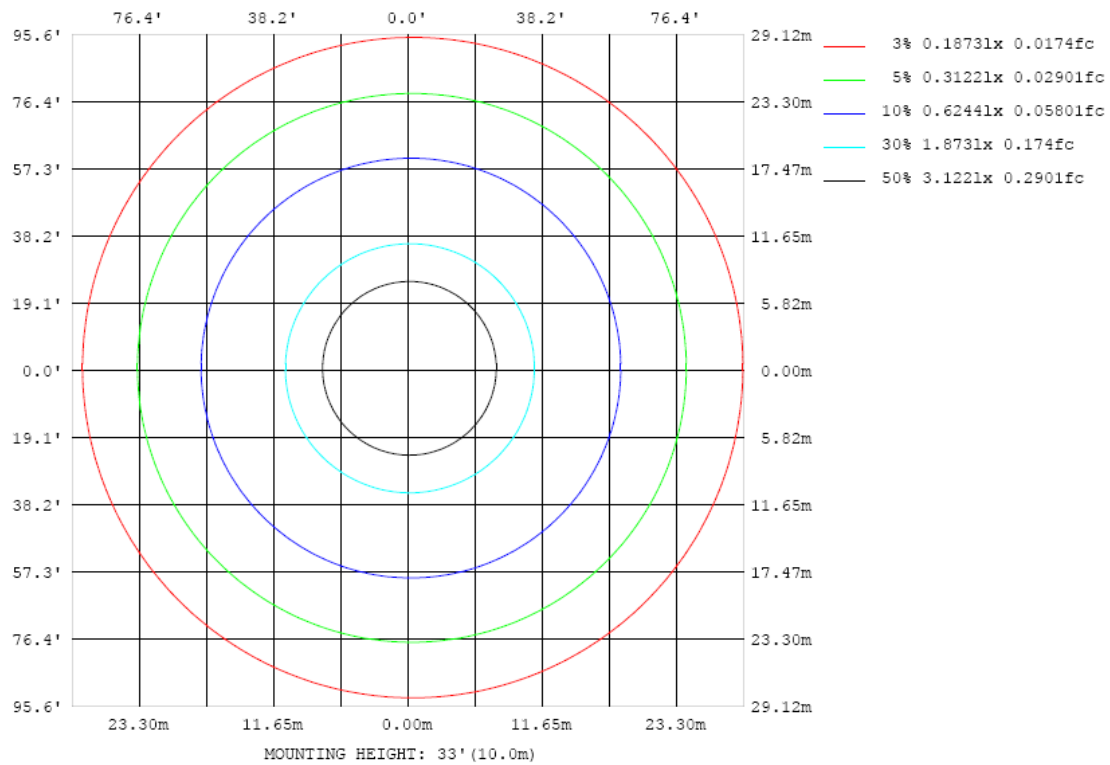


Chart 5: Illuminance Plot (Footcandles)

Luminous Intensity Distribution Plots- Goniophotometer Method

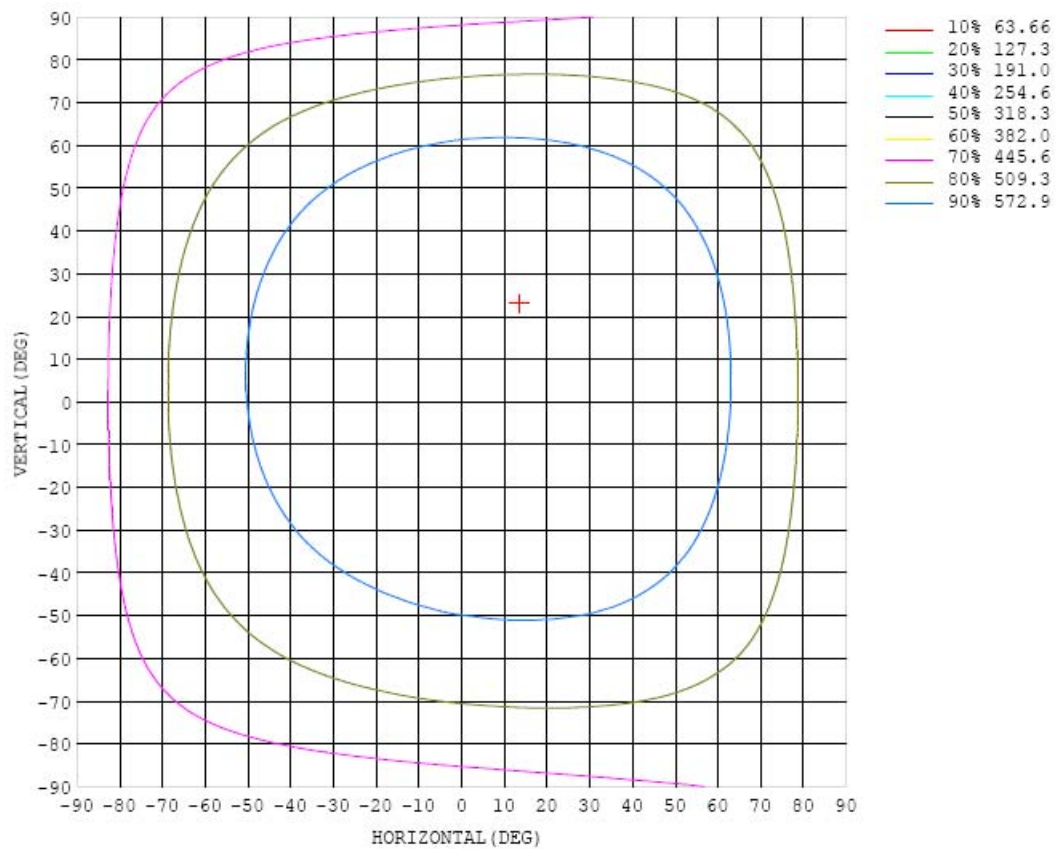


Chart 6: Isocandela Plot

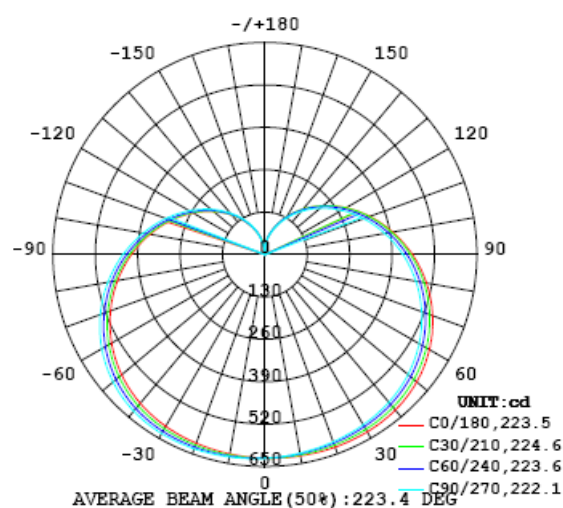


Chart 7: Polar Candela Distribution

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	624	624	624	624	624	624	624	624	624	624	624	624	624	624	624	624	624	624	624
5	626	625	625	624	624	623	622	622	622	621	621	621	621	621	621	622	622	622	623
10	627	626	625	624	623	621	620	619	619	618	618	617	617	617	618	618	619	620	621
15	628	626	624	623	621	619	618	616	615	615	614	614	614	614	614	615	616	617	618
20	628	626	624	622	620	618	616	614	612	611	610	610	609	609	610	611	613	614	616
25	628	626	623	621	618	615	613	610	608	607	606	605	605	605	606	607	609	610	612
30	628	625	622	619	616	612	609	607	604	603	601	600	600	600	601	602	604	606	608
35	626	623	619	616	612	609	605	602	599	597	596	594	594	594	595	596	598	600	602
40	622	619	615	611	607	604	600	596	594	591	589	587	587	586	587	588	590	592	595
45	616	613	609	605	601	597	592	589	586	583	581	579	578	577	578	579	581	583	586
50	608	604	600	596	592	588	583	579	576	573	570	568	567	566	566	567	569	571	574
55	596	593	589	585	581	576	572	567	564	560	558	555	554	553	553	553	555	557	559
60	583	579	575	571	567	562	558	554	550	546	543	541	539	538	537	538	539	541	543
65	566	563	560	556	551	547	542	537	533	530	527	524	522	520	520	520	521	522	524
70	547	544	541	537	533	529	524	520	515	512	508	505	503	501	500	500	501	502	504
75	526	524	521	517	513	509	504	500	495	492	488	485	483	481	479	479	479	481	482
80	503	501	498	495	491	487	483	478	474	470	466	463	461	459	457	457	457	457	459
85	478	477	474	472	468	464	460	455	451	447	444	440	438	435	434	433	433	433	435
90	453	451	449	447	443	440	436	431	427	423	420	417	414	411	410	409	408	409	410
95	425	425	423	421	418	414	410	406	402	399	395	392	389	387	385	384	383	383	384
100	398	397	396	394	392	388	385	381	377	373	370	367	364	362	360	358	358	358	358
105	370	370	369	367	365	362	359	355	351	348	345	341	339	336	334	333	332	332	332
110	342	342	341	340	338	336	332	329	326	322	319	316	313	311	309	307	306	306	306
115	314	315	314	313	311	309	306	303	300	297	293	291	288	286	284	282	281	281	281
120	287	287	287	286	285	282	280	277	274	271	268	265	263	260	258	257	256	255	255
125	260	260	260	259	258	256	254	251	249	246	243	240	238	236	234	232	231	230	230
130	233	233	233	233	232	230	228	226	224	221	218	216	213	211	209	208	206	206	206
135	207	207	208	207	206	205	203	201	199	196	194	192	189	187	185	184	182	182	182
140	181	182	182	182	181	180	179	177	175	173	170	168	166	164	162	160	159	159	158
145	157	157	158	157	157	156	155	154	151	149	147	145	143	141	139	138	137	137	137
150	133	134	134	134	134	133	132	131	129	127	125	123	121	119	118	116	115	115	115
155	110	111	111	111	111	111	110	109	107	105	104	102	100	98.6	97.2	95.9	94.9	94.4	94.1
160	89.0	89.6	90.1	90.5	90.7	90.4	89.6	88.5	87.0	85.4	83.8	82.3	80.8	79.5	78.2	77.1	76.1	75.5	74.9
165	69.2	70.1	70.8	71.3	71.6	71.4	70.6	69.6	68.2	66.8	65.8	64.8	63.7	62.7	61.6	60.7	59.7	58.4	57.3
170	52.5	53.3	53.9	54.6	55.0	54.8	54.1	53.3	52.6	51.8	50.5	49.1	48.2	47.5	46.5	45.0	43.5	42.3	41.3
175	34.3	36.0	37.4	38.3	38.8	38.9	38.6	38.2	37.7	37.2	36.3	35.4	34.5	33.5	32.2	30.5	28.4	25.9	23.5
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	0.08	0.46	0.83

Table 6: Luminous Intensity Data

C (DEG) γ (DEG)	190	200	210	220	230	240	250	260	270	280	290	300	310	320	330	340	350		
0	624	624	624	624	624	624	624	624	624	624	624	624	624	624	624	624	624		
5	623	624	625	625	626	626	626	627	628	628	627	627	627	627	627	627	626		
10	622	623	624	625	626	627	628	629	630	630	630	630	630	630	630	629	628		
15	620	622	623	625	627	628	630	631	632	633	633	633	633	632	632	631	629		
20	618	620	622	624	626	629	631	632	634	635	635	635	635	634	633	632	630		
25	615	617	620	623	625	628	630	632	634	635	636	636	636	635	634	633	631		
30	611	614	617	620	623	626	629	631	634	635	636	636	636	636	635	633	630		
35	605	609	612	616	619	622	626	629	631	633	634	635	635	634	633	631	629		
40	598	601	605	609	613	616	620	623	626	628	630	631	631	631	630	628	626		
45	589	592	596	600	604	608	611	615	619	621	623	624	625	625	624	622	620		
50	577	580	584	588	592	596	600	604	608	610	613	614	615	615	615	613	611		
55	562	566	569	574	578	582	586	590	594	597	600	602	603	603	603	602	600		
60	546	549	553	557	561	565	569	574	578	581	584	586	587	588	588	587	585		
65	527	530	534	538	542	546	550	554	559	562	565	568	569	570	571	570	569		
70	507	510	513	517	521	525	529	533	537	541	544	547	549	550	551	551	549		
75	485	487	491	494	498	502	506	510	514	518	521	524	526	528	529	529	528		
80	461	464	467	470	473	477	481	485	489	493	496	499	501	503	505	505	504		
85	436	439	442	445	448	451	455	459	463	466	470	473	475	477	479	480	479		
90	411	413	416	418	421	424	428	432	435	439	442	445	448	450	452	453	453		
95	385	387	389	392	394	397	400	404	408	411	414	417	420	423	424	425	426		
100	359	361	363	365	367	370	373	376	379	383	386	389	392	394	396	398	398		
105	333	334	336	338	340	343	345	348	351	354	358	360	363	366	368	369	370		
110	307	308	310	311	313	315	318	321	324	326	329	332	335	337	339	341	342		
115	281	282	283	285	286	288	291	293	296	299	301	304	307	309	311	313	314		
120	256	256	257	259	260	262	264	266	269	271	274	276	279	281	283	285	286		
125	231	231	232	233	234	236	238	240	242	244	247	249	252	254	256	258	259		
130	206	207	207	208	209	210	212	214	216	218	220	223	225	227	229	231	232		
135	182	182	183	184	184	186	187	189	191	193	195	197	199	201	203	205	206		
140	159	159	159	160	161	162	163	165	166	168	170	172	174	176	178	180	181		
145	137	137	137	138	138	139	141	142	144	145	147	149	150	152	154	155	156		
150	115	115	115	115	116	117	118	119	121	122	124	125	127	129	131	132	133		
155	94.1	94.2	94.3	94.5	94.8	95.4	96.2	97.4	98.8	100	102	103	105	106	108	110	110		
160	73.9	73.3	73.6	74.5	75.1	75.4	75.5	75.6	76.2	78.1	80.3	82.0	83.3	84.8	86.5	87.8	88.6		
165	56.7	56.3	55.7	55.1	54.4	53.4	52.4	51.5	50.4	48.7	47.9	50.6	55.0	58.9	61.6	64.2	66.7		
170	41.0	40.7	39.7	38.2	37.0	35.9	33.4	28.6	24.5	24.6	26.5	29.5	33.1	37.3	41.7	45.9	49.4		
175	22.2	21.2	20.2	19.1	17.8	16.4	16.0	17.0	18.5	19.6	20.9	22.3	24.0	26.0	28.3	30.6	32.5		
180	0.88	0.85	0.83	0.84	0.84	0.83	0.83	0.83	0.83	0.82	0.82	0.86	0.90	0.93	0.91	0.77	0.46		

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

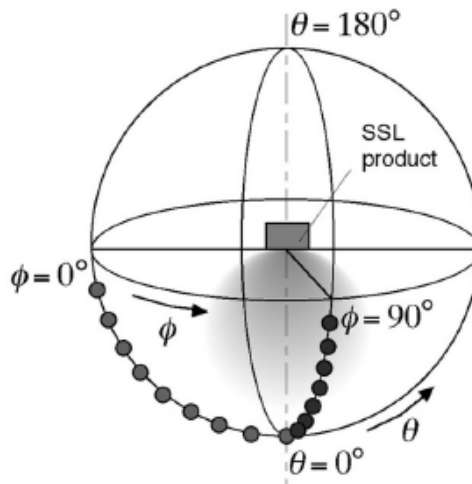
The color characteristics of SSL products include chromaticity coordinates, correlated color temperature, and color rendering index. These characteristics of SSL products may be spatially non-uniform, and thus, in order that they can be specified accurately, the color quantities shall be measured as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

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