

LM-79-19 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: 45FHIDDIM/ED28/840/277V/EX39

Laboratory: Leading Testing Laboratories

NVLAP CODE: 200960-0

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Report No.: HZ24060009d

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

Review by:

Wei Fei

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Jun. 19, 2024

Approve by:



April Zou

1 Manager: April Zou
Jun. 19, 2024

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: 45FHIDDIM/ED28/840/277V/EX39

Luminous Efficacy (Lumens /Watt)	Total Luminous Flux (Lumens)	Power (Watts)	Power Factor
182.6	7623.7	41.75	0.9934
CCT (K)	CRI	Stabilization Time (Light & Power)	
3961	81.8	50	

Table 1: Executive Data Summary

Note: The above results are recorded/ derived from measurements made using an Integrating Sphere.

Test specifications:

Date of Receipt	: Jun. 13, 2024
Date of Test	: Jun. 13, 2024
Test item	: Total Luminous Flux, Luminous Distribution Intensity, Luminous Efficacy, Correlated Color Temperature, Color Rendering Index, Chromaticity Coordinate, Electrical parameters
Reference Standard	: IESNA LM-79-2019 Approved Method: 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	: 45FHIDDIM/ED28/840/277V/EX39
Electrical Ratings	: 120-277V, 50/60Hz, 45W
Product Description	: 4000K
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 base up. Test was conducted without a dimmer in the circuit.

The stabilization time of the sample was 50 minutes, and the total operating time including stabilization was 55 minutes.

Sphere-Spectroradiometer Method

Parameter	Result	
Test Voltage (V)	120.0	277.0
Voltage frequency (Hz)	60	60
Test Current (A)	0.350	0.165
Power Factor	0.9934	0.9033
Test Power (W)	41.75	41.37
THD A%	3.43	14.98
Luminous Efficacy (lm/W)	182.6	185.8
Total Luminous Flux (lm)	7623.7	7685.3
Color Rendering Index (CRI)	81.8	
R9	7	
Correlated Color Temperature (CCT)(K)	3961	
Chromaticity Chroma x	0.3834	
Chromaticity Chroma y	0.3826	
Chromaticity Chroma u	0.2247	
Chromaticity Chroma v	0.3364	
Duv	0.0019	
Chromaticity Chroma u'	0.2247	
Chromaticity Chroma v'	0.5046	

Special Color Rendering Indices	
R1	80
R2	88.2
R3	93.8
R4	79.7
R5	79.2
R6	83.1
R7	86.5
R8	64.1
R9	7
R10	70.8
R11	77.2
R12	57.2
R13	82
R14	96.4

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 24.8 °C.

The photometric distance is 2.47 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)	0.350
Power Factor	0.9957
Power (W)	41.79
Luminous Efficacy (lm/W)	184.2
Total Luminous Flux (lm)	7695.5
Beam Angle (°)	341.5 (0°-180°) / 342.6 (90°-270°)
Center Beam Candle Power (cd)	98.4
Maximum Beam Candle Power (cd)	819.1 (At: C=202.5, Gamma=84.5)
Spacing Criteria	4.20 (0°-180°) / 4.23 (90°-270°)
Zonal Lumens in the 0 °-60 °Zone	20.29%
Zonal Lumens in the 60 °-90 °Zone	30.61%
Zonal Lumens in the 90 °-120 °Zone	30.47%
Zonal Lumens in the 120 °-180 °Zone	18.63%

Table 3: Test data per Goniophotometer Method

Spectral Power Distribution - Sphere Spectroradiometer Method

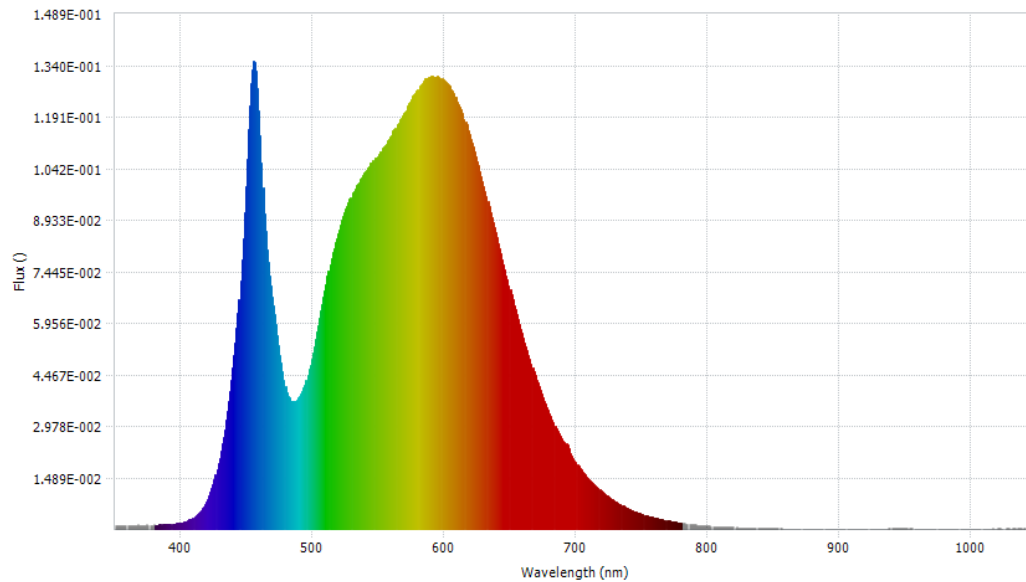
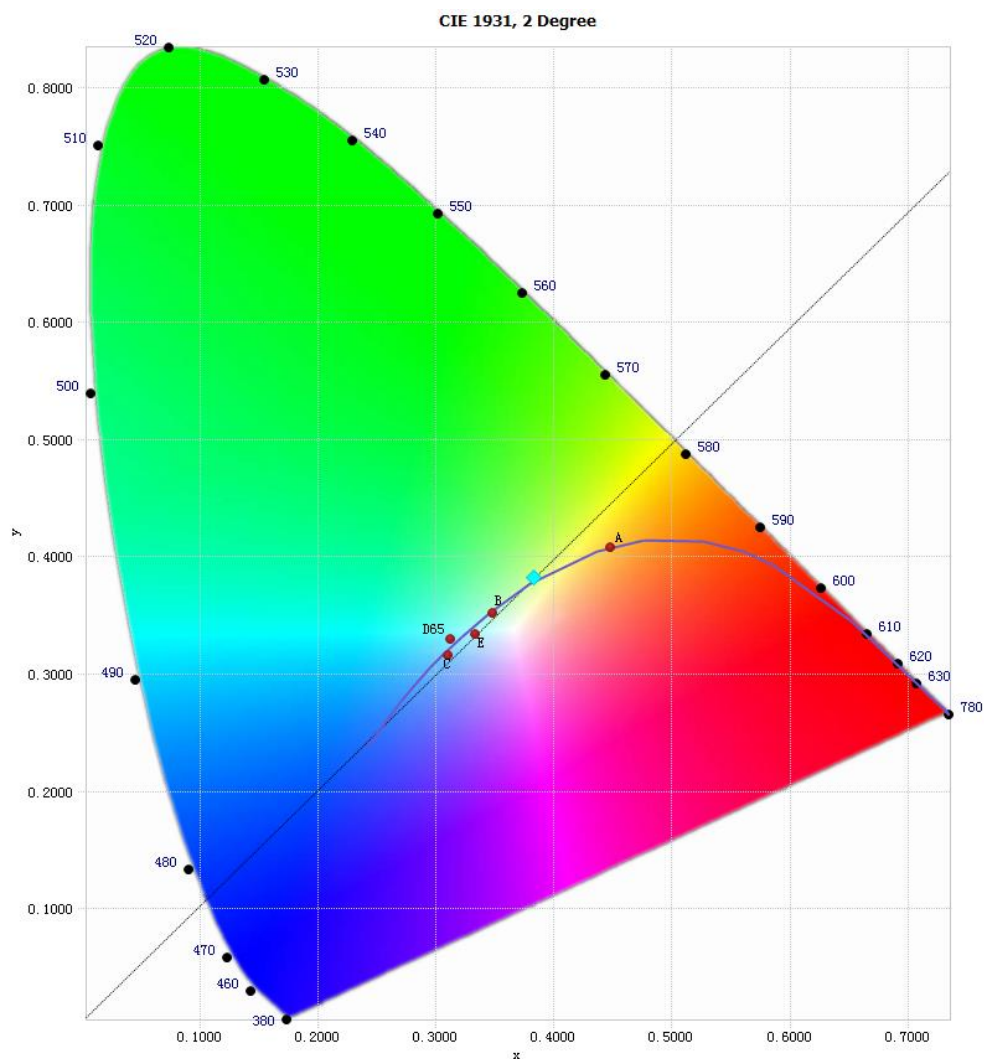


Chart 1: Spectral Power Distribution

Spectral Distribution over Visible Wavelength							
WL(nm)	Radiant(Watts)	WL(nm)	Radiant(Watts)	WL(nm)	Radiant(Watts)	WL(nm)	Radiant(Watts)
380	1.34E-03	485	3.70E-02	590	1.31E-01	695	2.34E-02
385	1.35E-03	490	3.86E-02	595	1.31E-01	700	1.94E-02
390	1.54E-03	495	4.33E-02	600	1.30E-01	705	1.67E-02
395	1.72E-03	500	5.12E-02	605	1.27E-01	710	1.45E-02
400	2.02E-03	505	6.10E-02	610	1.23E-01	715	1.26E-02
405	2.58E-03	510	7.09E-02	615	1.19E-01	720	1.09E-02
410	3.72E-03	515	8.01E-02	620	1.13E-01	725	9.43E-03
415	5.64E-03	520	8.66E-02	625	1.06E-01	730	8.11E-03
420	8.81E-03	525	9.26E-02	630	9.92E-02	735	6.99E-03
425	1.44E-02	530	9.72E-02	635	9.18E-02	740	6.00E-03
430	2.26E-02	535	1.00E-01	640	8.43E-02	745	5.16E-03
435	3.43E-02	540	1.03E-01	645	7.66E-02	750	4.48E-03
440	5.04E-02	545	1.06E-01	650	6.92E-02	755	3.91E-03
445	7.20E-02	550	1.09E-01	655	6.23E-02	760	3.37E-03
450	1.07E-01	555	1.11E-01	660	5.55E-02	765	2.96E-03
455	1.35E-01	560	1.14E-01	665	4.92E-02	770	2.56E-03
460	1.14E-01	565	1.18E-01	670	4.33E-02	775	2.20E-03
465	8.10E-02	570	1.21E-01	675	3.82E-02	780	1.90E-03
470	6.46E-02	575	1.24E-01	680	3.35E-02		
475	5.03E-02	580	1.27E-01	685	2.93E-02		
480	3.98E-02	585	1.30E-01	690	2.56E-02		

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

Chromaticity Diagram - Sphere Spectroradiometer Method



Tristimulus values(x, y): (0.3834, 0.3826)

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

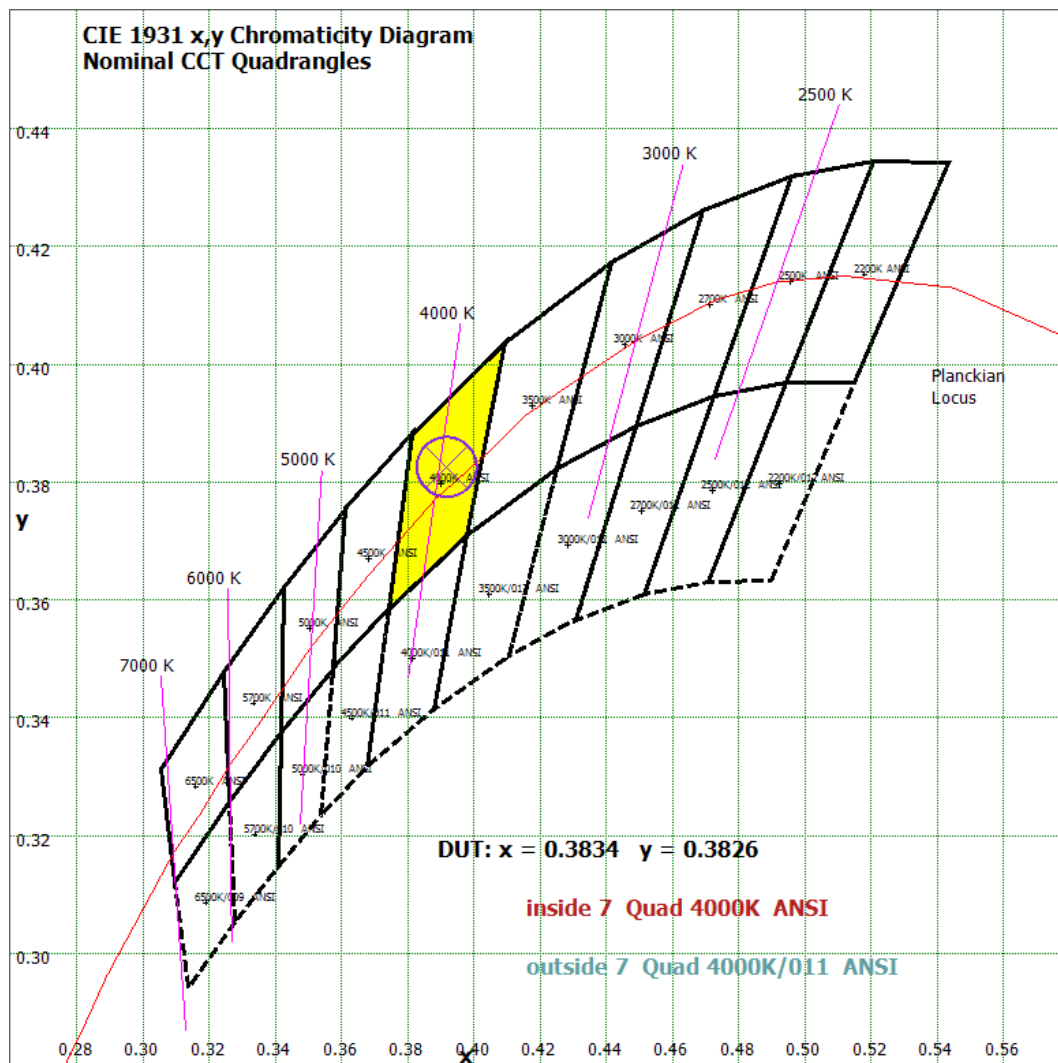


Chart 3: Plot of Lamp x/y coordinates on CIE 1931 Chromaticity Diagram

Color Rendition Report – Sphere Spectroradiometer Method

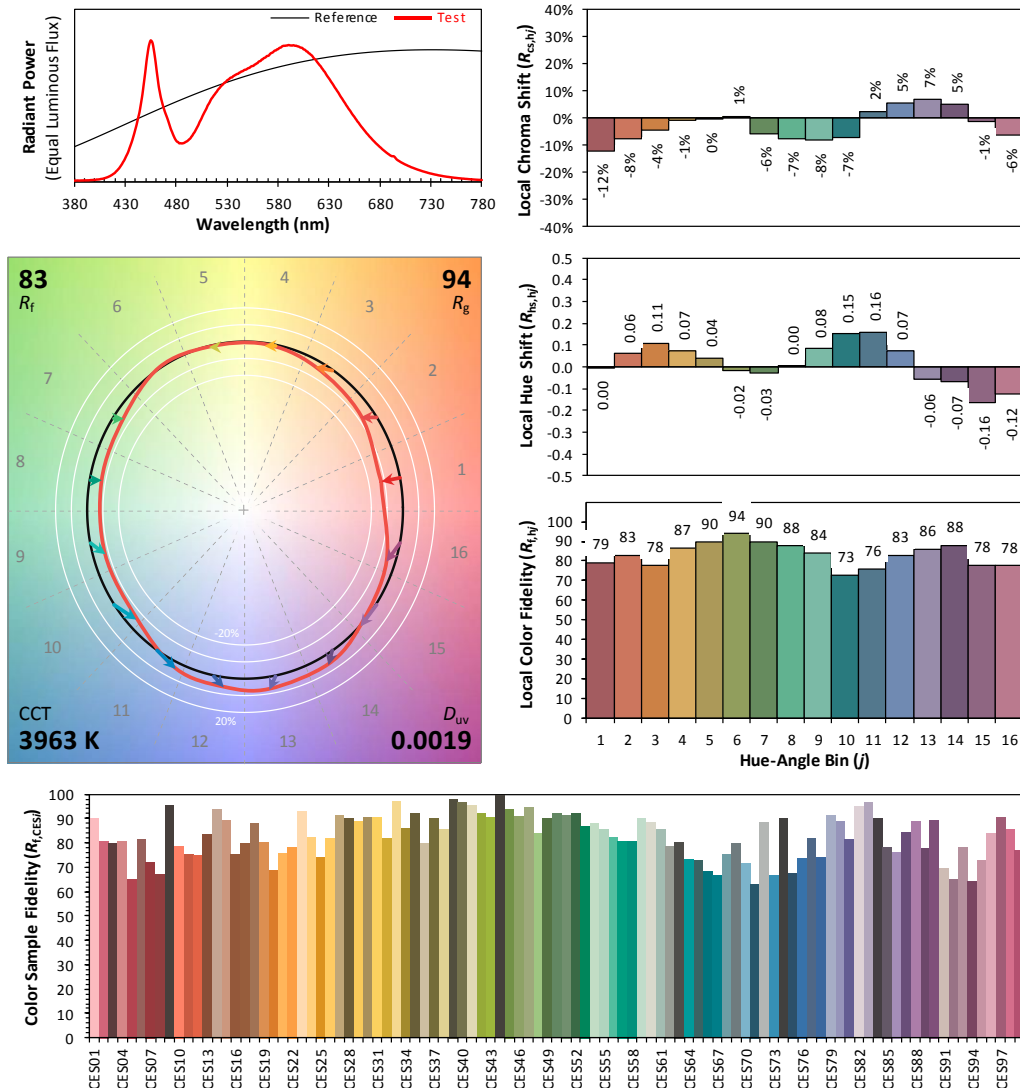
ANSI/IES TM-30-18 Color Rendition Report

Source: LED

Manufacturer: GREEN CREATIVE LTD

Date: 2024/06/13

Model: 45FHIDDIM/ED28/840/277V/EX39



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

x 0.3834
 y 0.3826
 u' 0.2247
 v' 0.5046

CIE 13.3-1995
(CRI)

R_a 82
 R_9 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	12.412	0.16%
10- 20	65.063	0.85%
20- 30	163.859	2.13%
30- 40	294.74	3.83%
40- 50	440.584	5.73%
50- 60	584.751	7.60%
60- 70	708.632	9.21%
70- 80	799.285	10.39%
80- 90	847.824	11.02%
90-100	846.953	11.01%
100-110	796.153	10.35%
110-120	701.474	9.12%
120-130	571.487	7.43%
130-140	420.782	5.47%
140-150	267.752	3.48%
150-160	130.784	1.70%
160-170	39.321	0.51%
170-180	3.605	0.05%
Total	7695.5	100%

$\gamma(^{\circ})$	Lumens	% Total
0-130	6833.22	88.80%
130-180	862.244	11.20%
0-180	7695.5	100%

Table 5: Zonal Lumen

Illuminance Plots- Goniophotometer Method

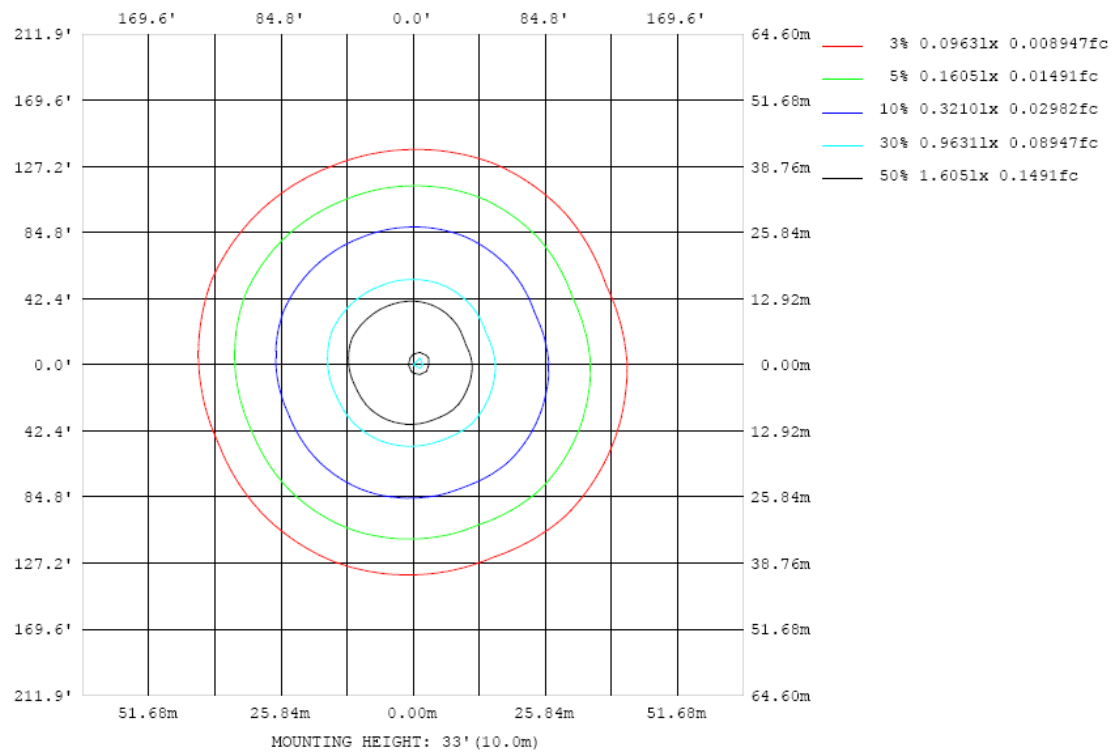


Chart 5: Illuminance Plot (Footcandles)

Luminous Intensity Distribution Plots- Goniophotometer Method

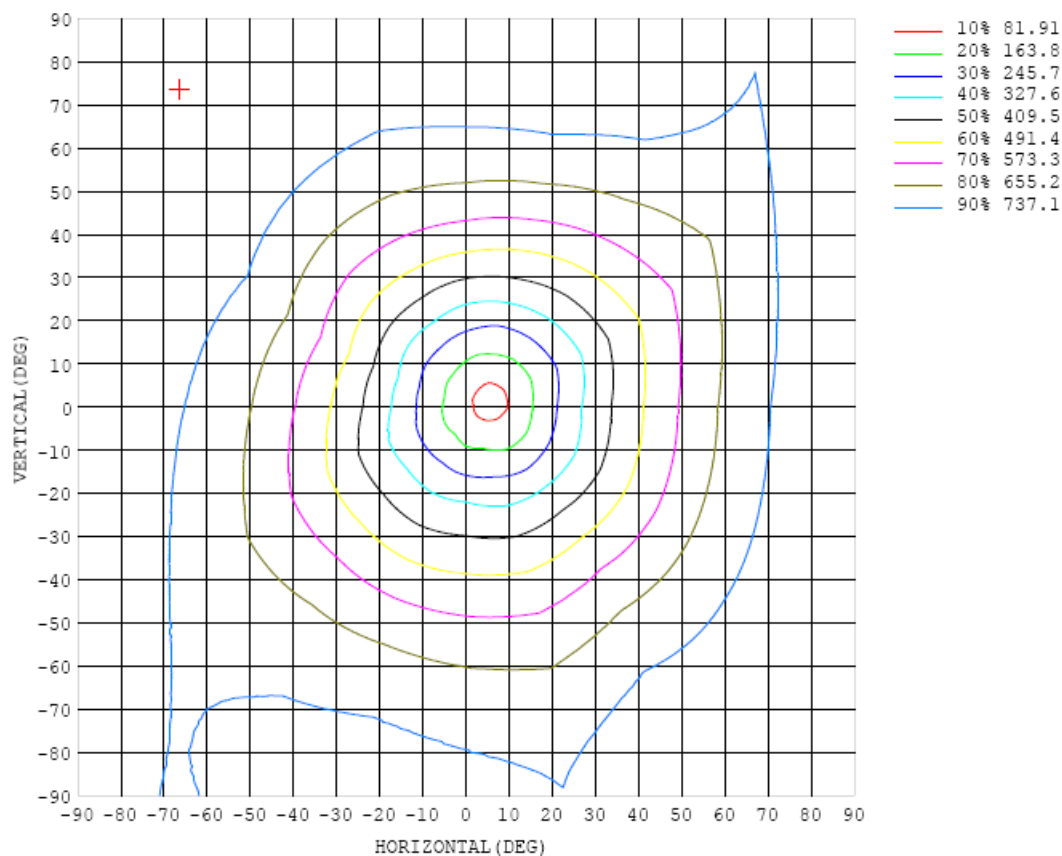


Chart 6: Isocandela Plot

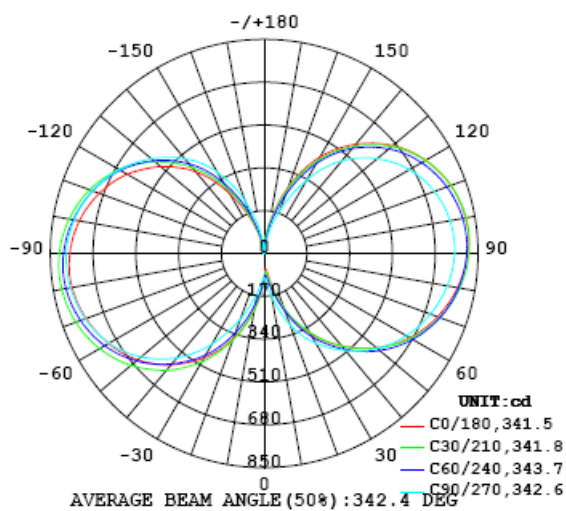


Chart 7: Polar Candela Distribution

Luminous Intensity Data- Goniophotometer Method

Table--1

UNIT: cd

C (DEG) γ (DEG)	0	22.5	45	67.5	90	112.5	135	157.5	180	202.5	225	247.5	270	292.5	315	337.5			
0	98.4	98.4	98.4	98.4	98.4	98.4	98.4	98.4	98.4	98.4	98.4	98.4	98.4	98.4	98.4	98.4			
5	61.7	72.3	88.5	105	123	141	148	154	158	157	144	129	116	95.7	72.5	61.1			
10	84.6	100.0	124	160	173	196	205	214	225	222	201	188	158	123	98.7	84.9			
15	158	161	179	216	234	257	269	277	295	296	268	245	210	188	158	146			
20	229	230	245	277	301	315	331	333	359	367	336	314	278	243	222	208			
25	304	298	316	332	361	365	382	388	422	433	402	383	344	315	291	276			
30	367	361	382	389	411	416	435	441	478	497	465	445	413	385	357	338			
35	425	421	439	440	458	466	485	490	529	553	520	504	481	451	419	397			
40	479	479	497	488	503	514	533	536	576	605	572	556	541	511	479	451			
45	531	532	550	534	547	559	576	576	619	650	621	605	592	567	534	500			
50	581	584	598	573	585	601	617	613	657	691	663	646	639	618	586	546			
55	627	631	644	611	621	640	651	646	690	726	701	681	679	665	633	587			
60	668	673	681	641	654	673	681	671	714	756	732	710	711	705	675	626			
65	704	710	714	669	680	701	706	693	736	778	758	735	738	737	711	659			
70	734	743	744	690	703	725	726	711	754	797	777	754	758	766	741	686			
75	760	769	767	708	723	743	742	722	767	810	791	765	771	786	765	708			
80	781	788	784	722	738	759	753	731	776	816	801	775	782	800	783	725			
85	797	805	798	733	751	766	758	734	778	819	803	777	787	812	798	737			
90	810	813	805	739	757	768	757	731	773	815	798	774	786	814	805	744			
95	815	816	806	740	756	766	748	723	762	804	787	767	780	812	805	746			
100	813	815	803	737	750	755	736	710	746	787	771	755	767	804	799	743			
105	805	805	789	729	738	741	718	692	725	766	751	737	749	787	785	733			
110	790	789	773	716	720	720	694	669	698	738	726	715	727	767	768	719			
115	768	768	751	698	697	693	665	640	667	706	697	689	699	739	744	700			
120	740	739	721	673	666	659	630	605	629	666	662	656	666	706	714	674			
125	707	704	688	642	629	616	587	563	585	619	619	619	628	666	679	642			
130	668	662	647	603	586	569	539	515	537	567	573	575	585	620	637	604			
135	619	612	597	558	536	514	485	462	482	509	521	530	539	567	589	558			
140	566	556	545	507	481	455	424	406	424	445	465	479	491	511	537	507			
145	507	496	483	447	414	385	355	340	354	377	399	418	439	452	478	452			
150	442	427	412	377	336	310	280	270	276	300	325	351	373	387	413	392			
155	364	351	330	299	256	231	202	193	201	221	244	274	299	317	337	328			
160	280	270	246	220	180	157	129	120	129	144	166	192	221	242	259	257			
165	197	186	166	144	117	95.0	74.2	66.7	70.9	81.1	99.8	120	145	166	182	184			
170	122	114	89.6	49.2	21.6	34.0	29.8	20.9	22.1	31.2	49.1	64.1	83.1	101	114	117			
175	56.1	50.1	34.8	15.3	5.92	2.21	1.14	1.45	3.58	4.53	8.17	20.3	36.1	47.0	55.2	58.9			
180	0.00	0.00	0.00	0.51	0.48	0.47	0.45	0.45	0.52	0.53	0.53	0.51	0.48	0.47	0.46	0.45			

Table 6: Luminous Intensity Data

EQUIPMENT LIST

Test Equipment	Model	Equipment No.	Calibration Date	Calibration Due date
Goniophotometer system	GO-R5000	HZTE011-01	Feb. 18, 2024	-
Digital Power Meter	PF2010A	HZTE028-01	Aug. 01, 2023	Jul. 31, 2024
AC Power Supply	DPS1060	HZTE001-06	Aug. 01, 2023	Jul. 31, 2024
DC Power Supply	WY12010	HZTE004-03	Aug. 01, 2023	Jul. 31, 2024
Temperature recorder	JM624U	HZTE018-08	Aug. 04, 2023	Aug. 03, 2024
Temperature and humidity recorder	JR900	HZTE018-01	Aug. 04, 2023	Aug. 03, 2024
Standard source	D908	HZTE012-01	Aug. 14, 2018	-
Integrate Sphere system	3M	HZTE015-04	Feb. 18, 2024	-
Digital Power Meter	WT210	HZTE008-01	Aug. 01, 2023	Jul. 31, 2024
AC Power Supply	PCR 500L	HZTE001-07	Aug. 01, 2023	Jul.31, 2024
DC Power Supply	IT6154	HZTE004-04	Aug. 01, 2023	Jul. 31, 2024
Standard source	SCL-1400	HZTE012-06	Nov. 04, 2021	-
Temperature and humidity recorder	JR900	HZTE018-02	Aug. 04, 2023	Aug. 03, 2024
Temperature Meter	TES1310	HZTE017-01	Aug. 04, 2023	Aug. 03, 2024

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 3 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 20 min, taken 10 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 20 min, taken 10 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.

*** End of Report ***

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