

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/ED28/850/277V/EX39

Laboratory: Leading Testing Laboratories

NVLAP CODE: 200960-0

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Report No.: HZ24060009e

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/ED28/850/277V/EX39

Luminous Efficacy (Lumens /Watt)	Total Luminous Flux (Lumens)	Power (Watts)	Power Factor
185.1	7692.7	41.57	0.9936
CCT (K)	CRI	Stabilization Time (Light & Power)	
4913	81.6	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

TABLE OF CONTENT

LM-79-19 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	11
Illuminance Plots- Goniophotometer Method	12
Luminous Intensity Distribution Plots- Goniophotometer Method.....	13
Luminous Intensity Data- Goniophotometer Method	14
EQUIPMENT LIST	15
TEST METHODS	15
Seasoning of SSL Product.....	15
Sphere-Spectroradiometer Method- Photometric and Electrical Measurements.....	15
Goniophotometer Method	16
Photometric and Electrical Measurements	16
Color Characteristics Measurements.....	16

SAMPLE PHOTO

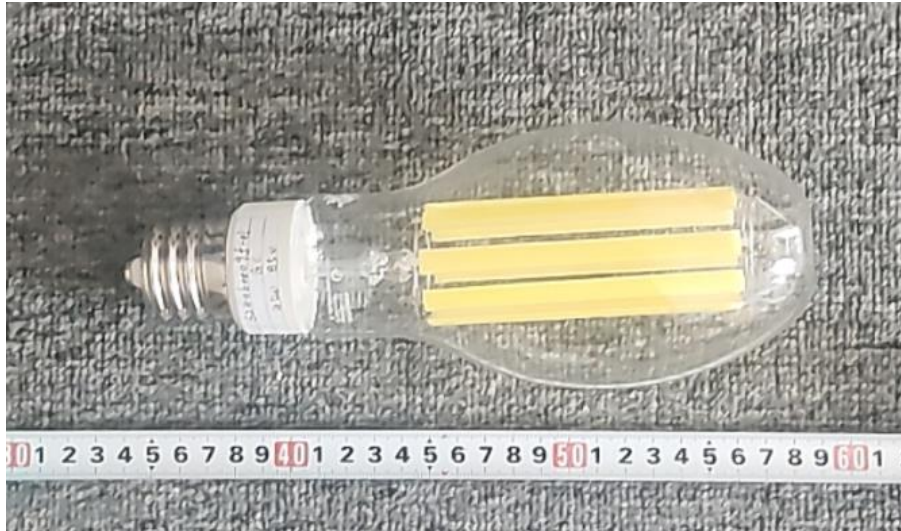


Figure 1- Overview of the sample

Equipment Under Test(EUT)

Name	: LED Lamp
Model	: 45FHIDDIM/ED28/850/277V/EX39
Electrical Ratings	: 120-277V, 50/60Hz, 45W
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 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)	0.349	0.164
Power Factor	0.9936	0.9057
Test Power (W)	41.57	41.24
THD A%	3.51	14.42
Luminous Efficacy (lm/W)	185.1	187.9
Total Luminous Flux (lm)	7692.7	7748.1
Color Rendering Index (CRI)	81.6	
R9	6.7	
Correlated Color Temperature (CCT)(K)	4913	
Chromaticity Chroma x	0.3481	
Chromaticity Chroma y	0.3591	
Chromaticity Chroma u	0.2106	
Chromaticity Chroma v	0.3258	
Duv	0.0025	
Chromaticity Chroma u'	0.2106	
Chromaticity Chroma v'	0.4887	

Special Color Rendering Indices	
R1	79.7
R2	87.3
R3	91.5
R4	79.6
R5	79
R6	81.1
R7	87.8
R8	66.9
R9	6.7
R10	68.1
R11	77
R12	52.6
R13	81.8
R14	95.3

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)	0.348
Power Factor	0.9956
Power (W)	41.63
Luminous Efficacy (lm/W)	186.3
Total Luminous Flux (lm)	7753.8
Beam Angle (°)	345.5 (0°-180°) / 344.7 (90°-270°)
Center Beam Candle Power (cd)	61.6
Maximum Beam Candle Power (cd)	848.6 (At: C=67.5, Gamma=91.5)
Spacing Criteria	5.00 (0°-180°) / 4.96 (90°-270°)
Zonal Lumens in the 0 °-60 °Zone	20.11%
Zonal Lumens in the 60 °-90 °Zone	30.71%
Zonal Lumens in the 90 °-120 °Zone	30.55%
Zonal Lumens in the 120 °-180 °Zone	18.62%

Table 3: Test data per Goniophotometer Method

Spectral Power Distribution - Sphere Spectroradiometer Method

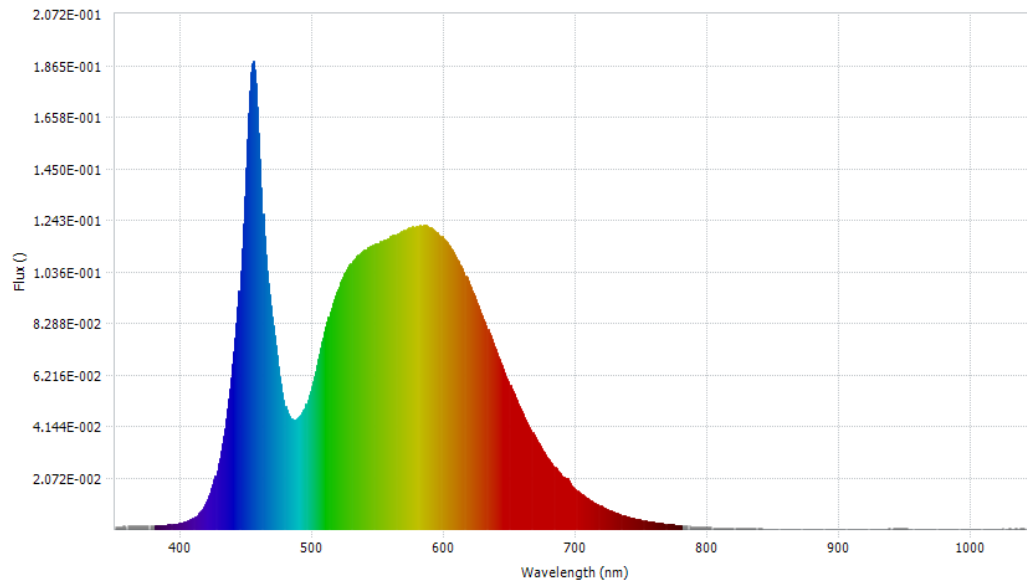
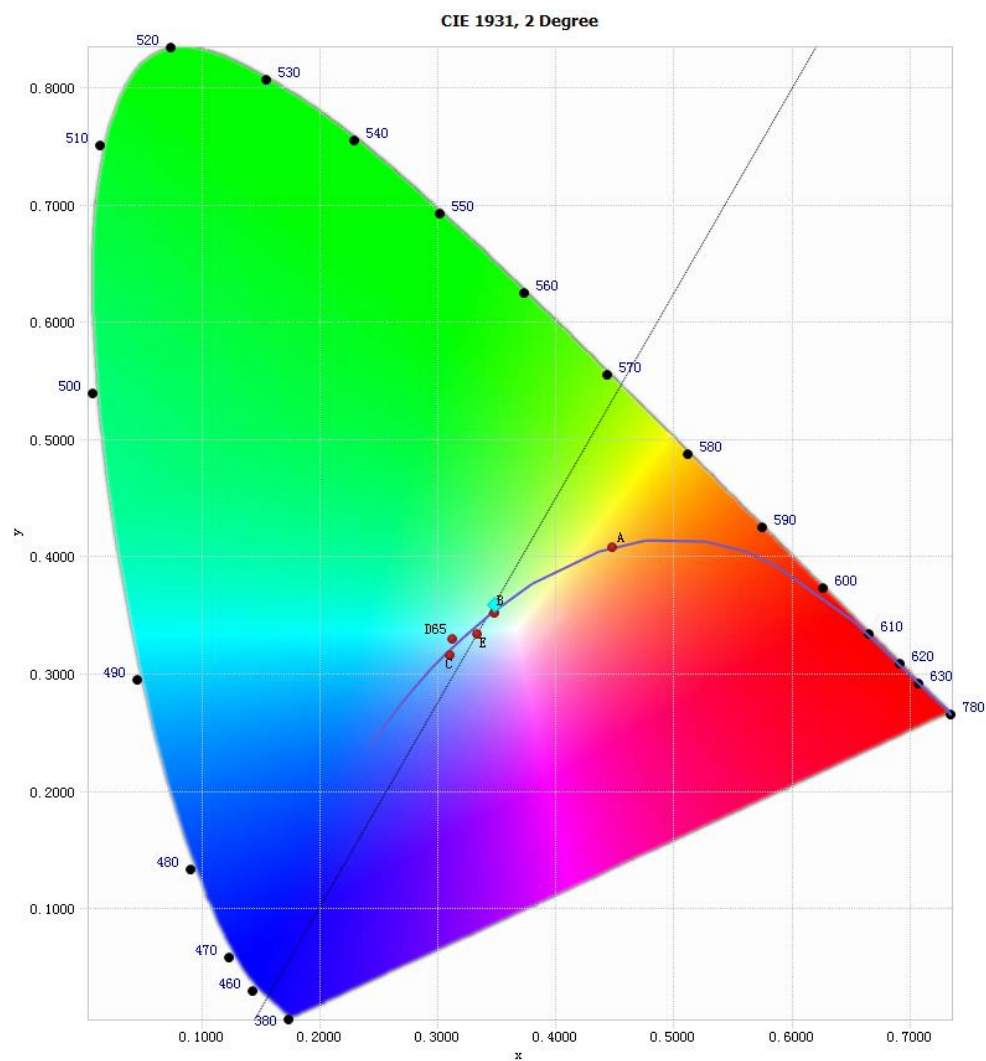


Chart 1: Spectral Power Distribution

Spectral Distribution over Visible Wavelength							
WL(nm)	Radiant(Watts)	WL(nm)	Radiant(Watts)	WL(nm)	Radiant(Watts)	WL(nm)	Radiant(Watts)
380	1.73E-03	485	4.43E-02	590	1.21E-01	695	1.97E-02
385	1.70E-03	490	4.56E-02	595	1.19E-01	700	1.61E-02
390	1.91E-03	495	5.07E-02	600	1.17E-01	705	1.39E-02
395	2.17E-03	500	5.95E-02	605	1.13E-01	710	1.21E-02
400	2.59E-03	505	7.05E-02	610	1.09E-01	715	1.05E-02
405	3.47E-03	510	8.13E-02	615	1.03E-01	720	9.06E-03
410	4.99E-03	515	9.10E-02	620	9.74E-02	725	7.85E-03
415	7.55E-03	520	9.77E-02	625	9.12E-02	730	6.76E-03
420	1.22E-02	525	1.04E-01	630	8.45E-02	735	5.83E-03
425	2.00E-02	530	1.08E-01	635	7.78E-02	740	5.01E-03
430	3.16E-02	535	1.10E-01	640	7.12E-02	745	4.33E-03
435	4.85E-02	540	1.13E-01	645	6.45E-02	750	3.80E-03
440	7.17E-02	545	1.14E-01	650	5.80E-02	755	3.27E-03
445	1.04E-01	550	1.15E-01	655	5.22E-02	760	2.85E-03
450	1.57E-01	555	1.16E-01	660	4.64E-02	765	2.51E-03
455	1.88E-01	560	1.18E-01	665	4.10E-02	770	2.13E-03
460	1.49E-01	565	1.19E-01	670	3.61E-02	775	1.87E-03
465	1.04E-01	570	1.20E-01	675	3.18E-02	780	1.63E-03
470	8.19E-02	575	1.21E-01	680	2.79E-02		
475	6.15E-02	580	1.22E-01	685	2.44E-02		
480	4.78E-02	585	1.22E-01	690	2.13E-02		

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

Chromaticity Diagram - Sphere Spectroradiometer Method



Tristimulus values(x, y): (0.3481, 0.3591)

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

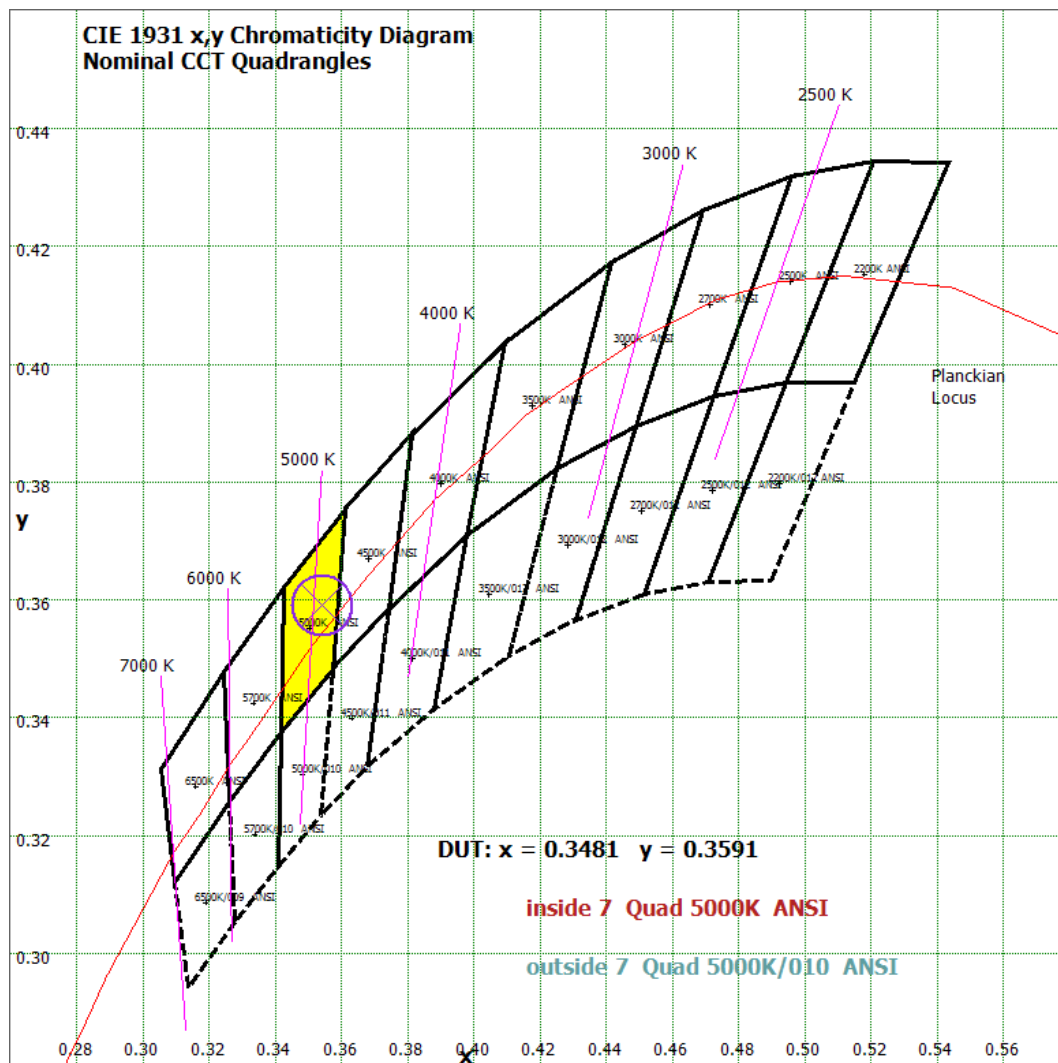


Chart 3: Plot of Lamp x/y coordinates on CIE 1931 Chromaticity Diagram

Color Rendition Report – Sphere Spectroradiometer Method

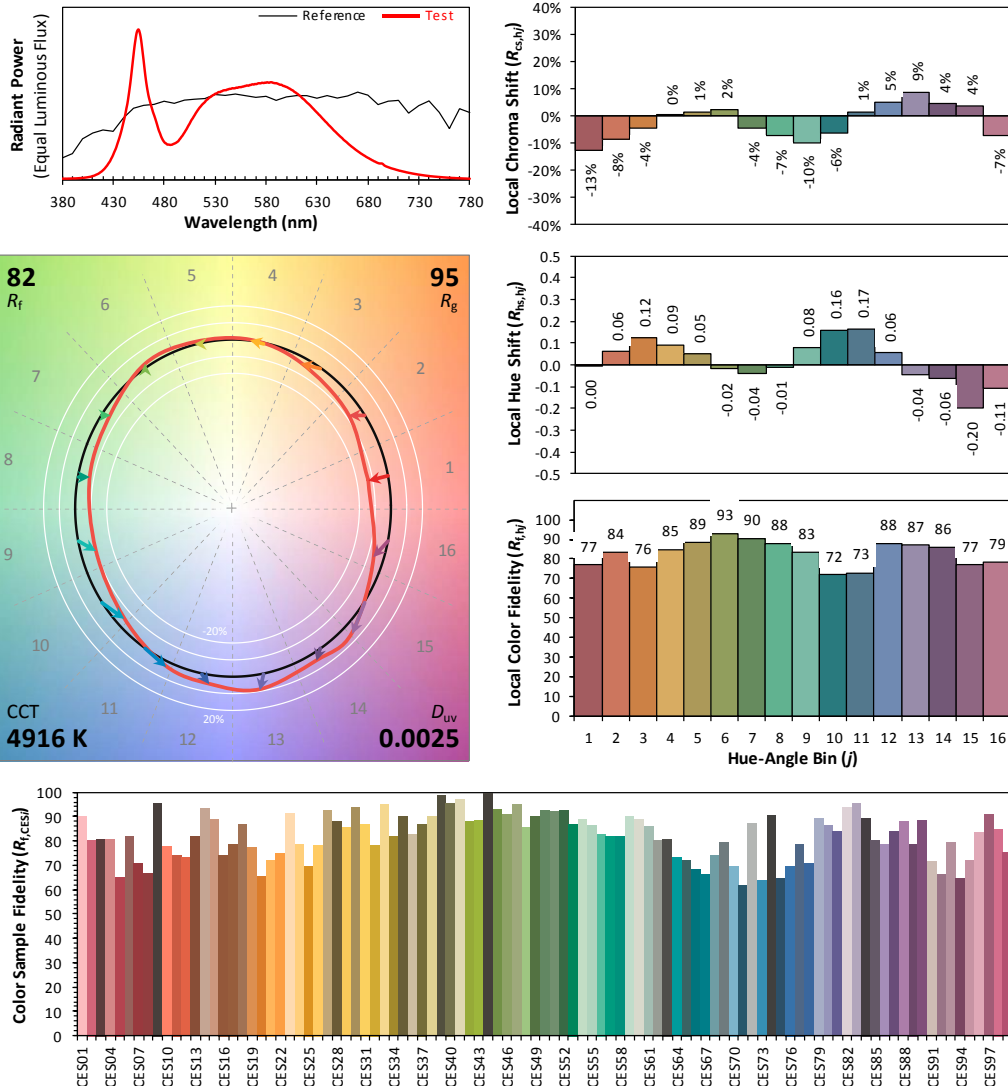
ANSI/IES TM-30-18 Color Rendition Report

Source: LED

Manufacturer: GREEN CREATIVE LTD

Date: 2024/06/13

Model: 45FHIDDIM/ED28/850/277V/EX39



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

x 0.3481
 y 0.3591
 u' 0.2106
 v' 0.4887

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	10.237	0.13%
10- 20	62.321	0.80%
20- 30	162.438	2.09%
30- 40	294.128	3.79%
40- 50	441.999	5.70%
50- 60	588.245	7.59%
60- 70	715.113	9.22%
70- 80	808.387	10.43%
80- 90	857.843	11.06%
90-100	856.485	11.05%
100-110	804.296	10.37%
110-120	708.404	9.14%
120-130	577.53	7.45%
130-140	424.951	5.48%
140-150	269.228	3.47%
150-160	130.711	1.69%
160-170	38.462	0.50%
170-180	3.068	0.04%
Total	7753.8	100%

$\gamma(^{\circ})$	Lumens	% Total
0-130	6887.43	88.83%
130-180	866.42	11.17%
0-180	7753.8	100%

Table 5: Zonal Lumen

Illuminance Plots- Goniophotometer Method

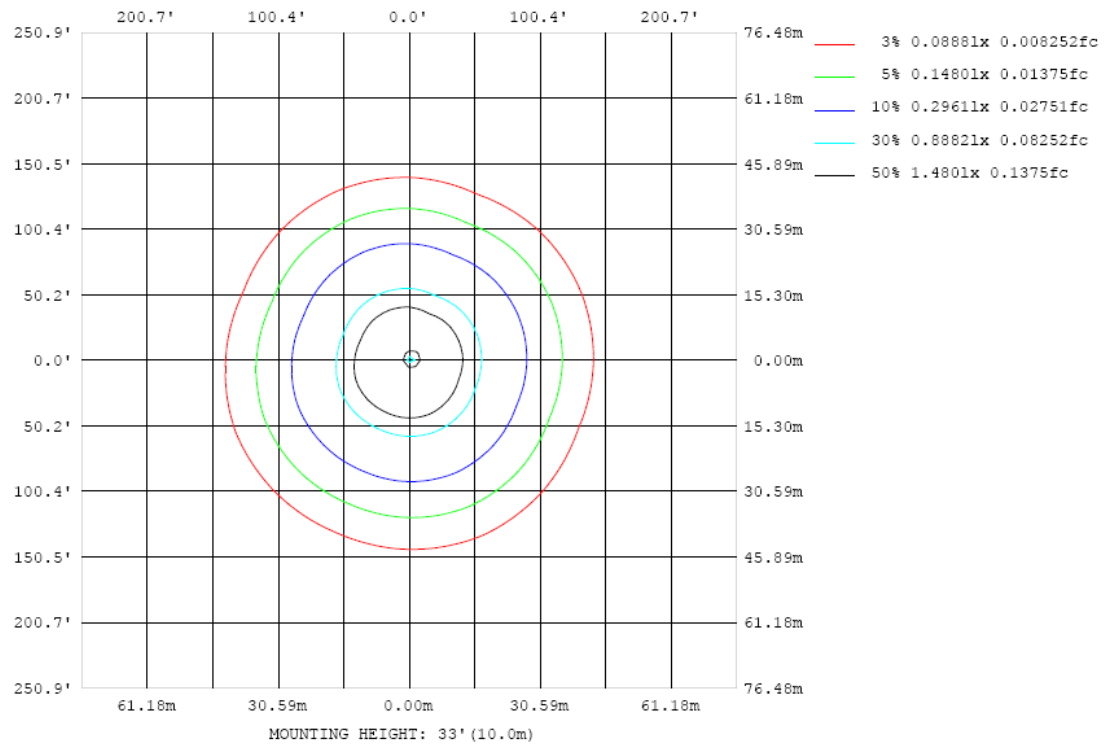


Chart 5: Illuminance Plot (Footcandles)

Luminous Intensity Distribution Plots- Goniophotometer Method

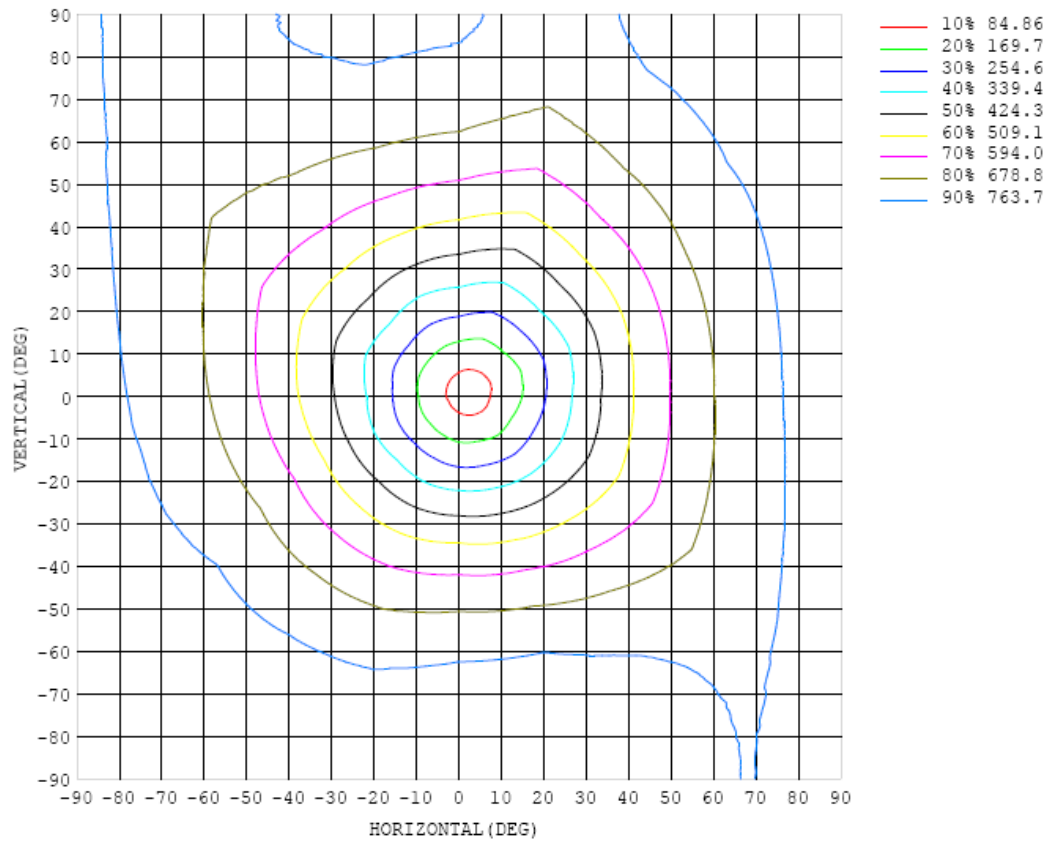


Chart 6: Isocandela Plot

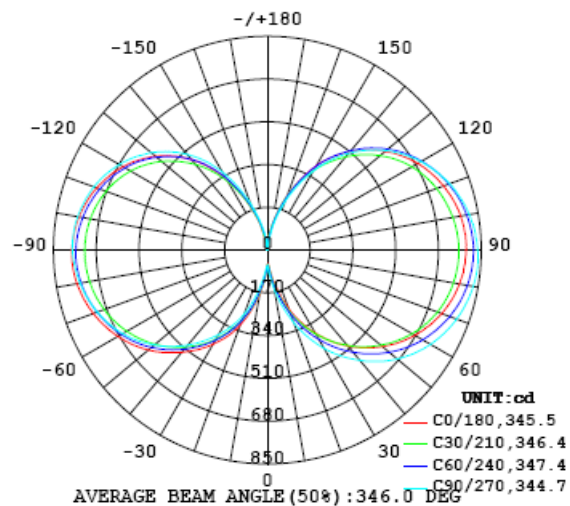


Chart 7: Polar Candela Distribution

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	61.6	61.6	61.6	61.6	61.6	61.6	61.6	61.6	61.6	61.6	61.6	61.6	61.6	61.6	61.6	61.6			
5	62.4	67.1	76.4	87.5	95.7	106	112	112	108	106	99.6	88.7	80.4	69.4	64.1	61.1			
10	114	125	135	150	159	173	179	178	176	165	157	148	129	118	110	105			
15	171	192	199	221	231	245	253	248	246	233	229	212	200	174	173	160			
20	247	264	272	295	306	317	329	318	317	294	296	276	270	240	239	231			
25	317	326	344	365	381	385	396	385	378	353	359	337	332	298	307	299			
30	381	385	410	435	451	452	458	452	432	408	414	396	387	354	370	361			
35	442	441	473	498	515	513	517	512	483	459	465	453	441	407	426	425			
40	497	494	529	558	572	565	570	566	531	503	514	508	493	456	480	483			
45	550	543	583	614	626	617	621	617	575	545	560	556	542	505	532	538			
50	596	588	632	664	673	660	665	661	618	582	602	601	587	548	579	588			
55	639	628	675	709	715	700	704	700	655	616	638	641	628	588	623	635			
60	677	665	713	748	749	731	738	734	686	645	670	675	663	623	661	676			
65	710	694	745	781	777	760	764	763	713	670	698	707	694	655	694	712			
70	738	719	771	807	800	778	789	785	737	690	720	733	719	680	721	740			
75	759	738	792	827	817	795	805	804	755	707	740	753	740	700	744	764			
80	775	751	806	840	831	804	818	815	769	717	751	766	756	715	762	781			
85	785	758	816	847	838	811	824	823	776	725	760	776	768	726	773	792			
90	790	761	820	848	836	809	822	822	777	726	762	779	775	730	780	799			
95	788	757	814	844	828	804	815	817	771	723	755	776	773	731	778	798			
100	779	749	806	833	815	790	802	804	760	715	746	770	765	725	772	791			
105	766	734	788	816	795	775	783	786	744	701	730	753	752	714	759	778			
110	746	716	767	795	771	752	759	762	722	683	709	736	734	698	740	760			
115	720	692	740	764	740	724	729	732	694	658	684	709	710	676	717	736			
120	689	663	707	729	704	689	693	695	663	629	654	678	680	650	687	705			
125	654	627	670	686	663	648	651	649	625	591	617	642	645	616	654	669			
130	610	584	624	637	615	601	601	599	580	548	575	596	602	576	611	623			
135	563	537	574	581	562	546	547	542	529	498	527	545	554	530	562	573			
140	510	484	517	519	503	486	486	477	471	444	470	488	497	478	509	517			
145	451	426	454	452	437	418	416	407	401	383	407	423	434	421	449	455			
150	386	365	384	378	361	346	336	331	323	316	333	351	358	355	379	385			
155	306	299	303	298	282	269	256	249	243	241	256	270	277	281	303	311			
160	229	225	221	216	204	190	177	169	165	168	178	187	198	205	223	232			
165	154	151	147	139	131	122	109	101	99.0	104	113	117	125	133	149	155			
170	89.9	87.5	74.8	45.5	34.5	52.1	47.0	38.3	27.1	32.1	57.9	64.8	70.2	77.1	86.4	90.6			
175	40.6	37.7	27.8	10.9	3.83	1.83	1.54	1.92	3.22	4.41	9.05	18.3	26.4	34.0	40.2	43.0			
180	0.00	0.00	0.26	0.45	0.46	0.43	0.40	0.47	0.51	0.51	0.51	0.50	0.47	0.46	0.46	0.46			

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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