

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: 8PAR30DIM/930FL40

Laboratory: Leading Testing Laboratories

NVLAP CODE: 200960-0

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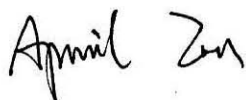
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Report No.: HZ22090009c

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

Review by:



Engineer: April Zou
Sep. 21, 2022

Approved by:



Manager: Jim Zhang
Sep. 21, 2022

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: **8PAR30DIM/930FL40**

Luminous Efficacy (Lumens /Watt)	Total Luminous Flux (Lumens)	Power (Watts)	Power Factor
116.6	918.9	7.88	0.7879
CCT (K)	CRI	Stabilization Time (Light & Power)	
3086	96.0	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	: Sep. 08, 2022
Date of Test	: Sep. 16, 2022
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	: 8PAR30DIM/930FL40
Electrical Ratings	: 120V, 60Hz, 8W
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 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
Voltage frequency (Hz)	60
Test Current (A)	0.083
Power Factor	0.7879
Test Power (W)	7.88
THD A%	61.39
Luminous Efficacy (lm/W)	116.6
Total Luminous Flux (lm)	918.9
Color Rendering Index (CRI)	96
R9	69.9
Correlated Color Temperature (CCT)(K)	3086
Chromaticity Chroma x	0.4312
Chromaticity Chroma y	0.4027
Chromaticity Chroma u	0.2475
Chromaticity Chroma v	0.3467
Duv	0.0003
Chromaticity Chroma u'	0.2475
Chromaticity Chroma v'	0.5200

Special Color Rendering Indices	
R1	98.4
R2	99.3
R3	98.2
R4	97.8
R5	97.3
R6	96.3
R7	93.2
R8	87.1
R9	69.9
R10	95.8
R11	98.8
R12	82.4
R13	99
R14	97.5

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)	0.084
Power Factor	0.7853
Power (W)	7.89
Luminous Efficacy (lm/W)	118.1
Total Luminous Flux (lm)	931.4
Beam Angle (°)	36.4 (0°-180°) / 36.9 (90°-270°)
Center Beam Candle Power (cd)	1708
Maximum Beam Candle Power (cd)	1710 (At: C=180.0, Gamma=0.5)
Spacing Criteria	0.60 (0°-180°) / 0.61 (90°-270°)
Zonal Lumens in the 0 °-60 °Zone	97.01%
Zonal Lumens in the 60 °-90 °Zone	2.89%
Zonal Lumens in the 90 °-120 °Zone	0.00%
Zonal Lumens in the 120 °-180 °Zone	0.10%

Table 3: Test data per Goniophotometer Method

Spectral Power Distribution - Sphere Spectroradiometer Method

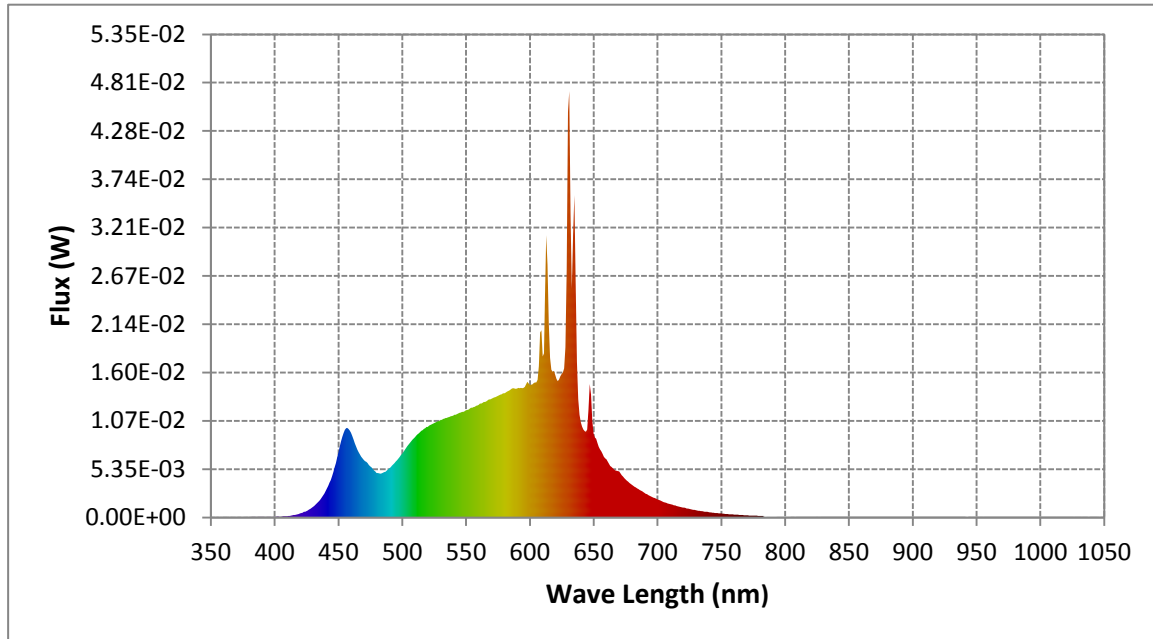
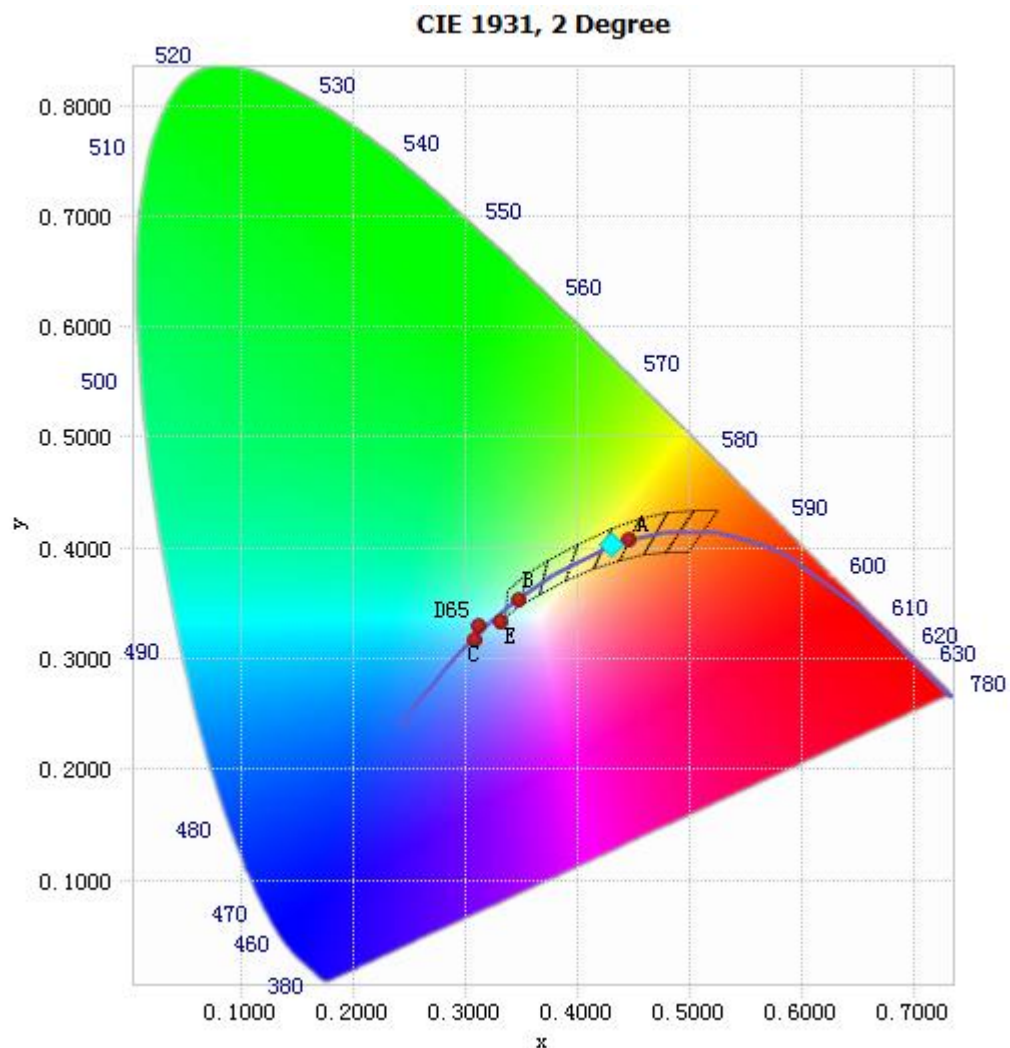


Chart 1: Spectral Power Distribution

Spectral Distribution over Visible Wavelength							
WL(nm)	Radiant(Watts)	WL(nm)	Radiant(Watts)	WL(nm)	Radiant(Watts)	WL(nm)	Radiant(Watts)
380	8.23E-05	485	4.94E-03	590	1.43E-02	695	2.33E-03
385	6.44E-05	490	5.44E-03	595	1.43E-02	700	2.00E-03
390	6.80E-05	495	6.18E-03	600	1.47E-02	705	1.71E-03
395	6.04E-05	500	7.06E-03	605	1.49E-02	710	1.48E-03
400	6.54E-05	505	8.07E-03	610	1.78E-02	715	1.28E-03
405	8.10E-05	510	8.88E-03	615	2.15E-02	720	1.09E-03
410	1.51E-04	515	9.58E-03	620	1.58E-02	725	9.38E-04
415	2.61E-04	520	1.00E-02	625	1.58E-02	730	8.04E-04
420	4.44E-04	525	1.04E-02	630	4.48E-02	735	6.89E-04
425	7.19E-04	530	1.08E-02	635	3.57E-02	740	5.85E-04
430	1.16E-03	535	1.10E-02	640	1.05E-02	745	5.03E-04
435	1.85E-03	540	1.13E-02	645	9.73E-03	750	4.37E-04
440	2.93E-03	545	1.16E-02	650	9.27E-03	755	3.70E-04
445	4.58E-03	550	1.19E-02	655	7.55E-03	760	3.19E-04
450	7.22E-03	555	1.21E-02	660	6.43E-03	765	2.73E-04
455	9.71E-03	560	1.25E-02	665	5.45E-03	770	2.41E-04
460	9.39E-03	565	1.28E-02	670	5.08E-03	775	2.00E-04
465	7.50E-03	570	1.31E-02	675	4.20E-03	780	1.75E-04
470	6.36E-03	575	1.34E-02	680	3.60E-03		
475	5.65E-03	580	1.37E-02	685	3.14E-03		
480	4.93E-03	585	1.42E-02	690	2.72E-03		

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

Chromaticity Diagram - Sphere Spectroradiometer Method



Tristimulus values(x, y): (0.4312, 0.4027)

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

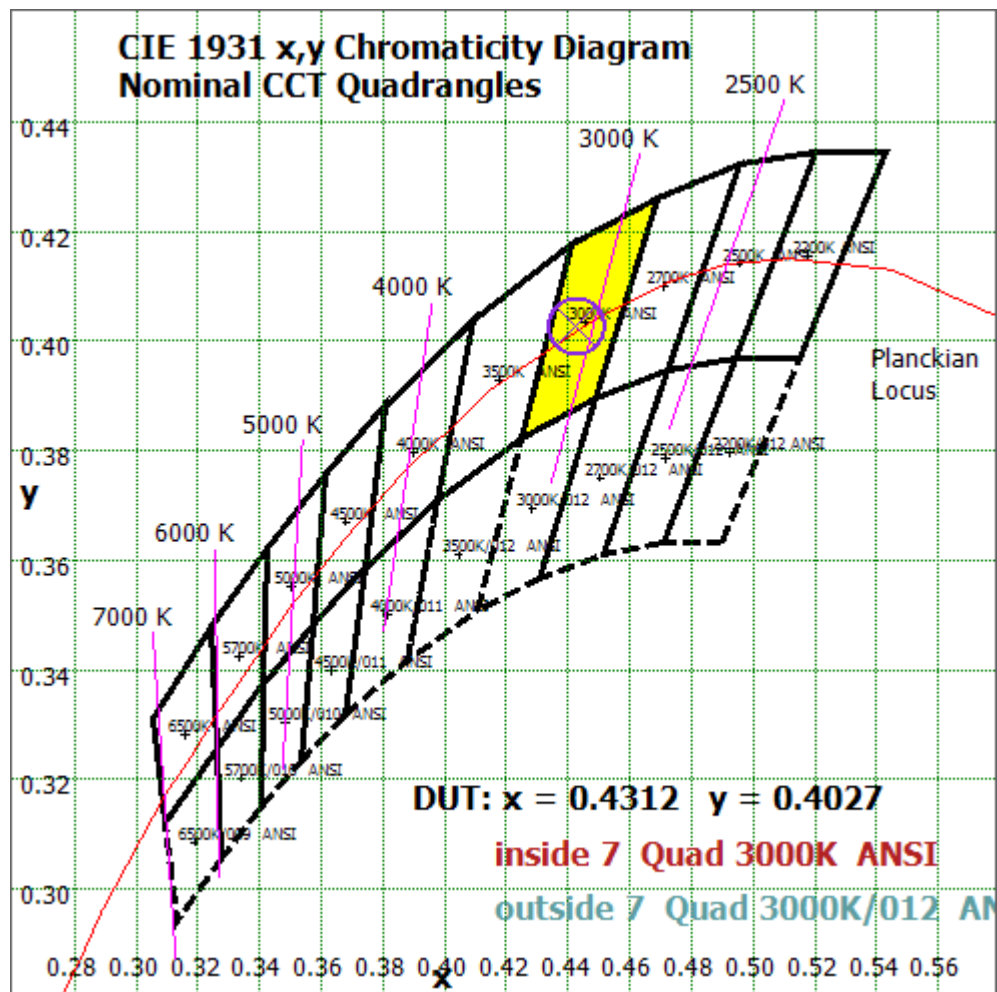


Chart 3: Plot of Lamp x/y coordinates on CIE 1931 Chromaticity Diagram

Color Rendition Report – Sphere Spectroradiometer Method

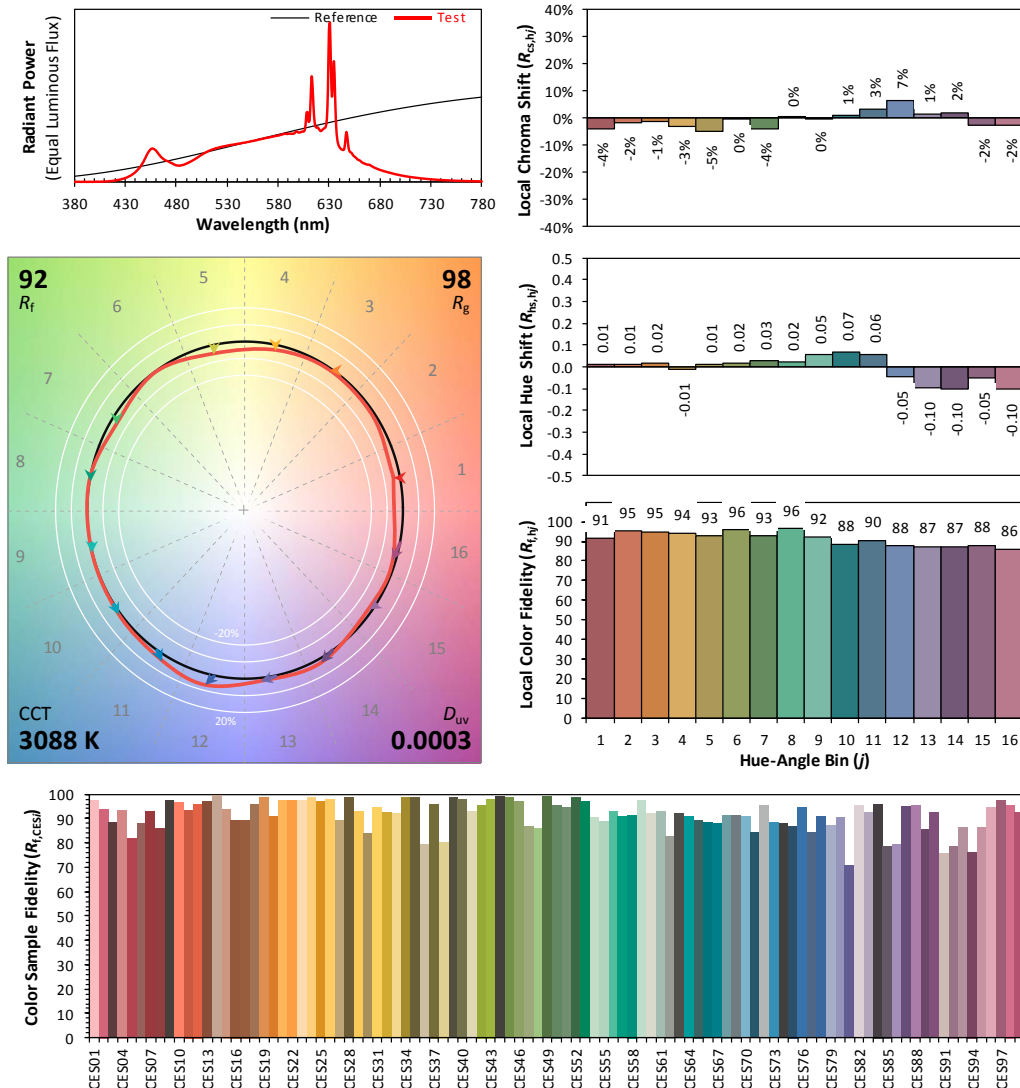
ANSI/IES TM-30-18 Color Rendition Report

Source: LED

Manufacturer: GREEN CREATIVE LTD

Date: 2022/09/16

Model: 8PAR30DIM/930FL40



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

x 0.4312
 y 0.4027
 u' 0.2475
 v' 0.5200

CIE 13.3-1995
(CRI)
 R_a 96
 R_9 70

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	143.532	15.41%
10- 20	288.613	30.99%
20- 30	246.44	26.46%
30- 40	140.138	15.05%
40- 50	58.974	6.33%
50- 60	25.908	2.78%
60- 70	16.738	1.80%
70- 80	8.432	0.91%
80- 90	1.733	0.19%
90-100	0.002	0.00%
100-110	0.006	0.00%
110-120	0.016	0.00%
120-130	0.051	0.01%
130-140	0.131	0.01%
140-150	0.213	0.02%
150-160	0.239	0.03%
160-170	0.191	0.02%
170-180	0.068	0.01%
Total	931.4	100%

$\gamma(^{\circ})$	Lumens	% Total
0- 60	903.605	97.01%
60- 90	26.903	2.89%
0-90	930.508	99.90%
90- 180	0.917	0.10%
0- 180	931.4	100%

Table 5: Zonal Lumen

Illuminance Plots- Goniophotometer Method

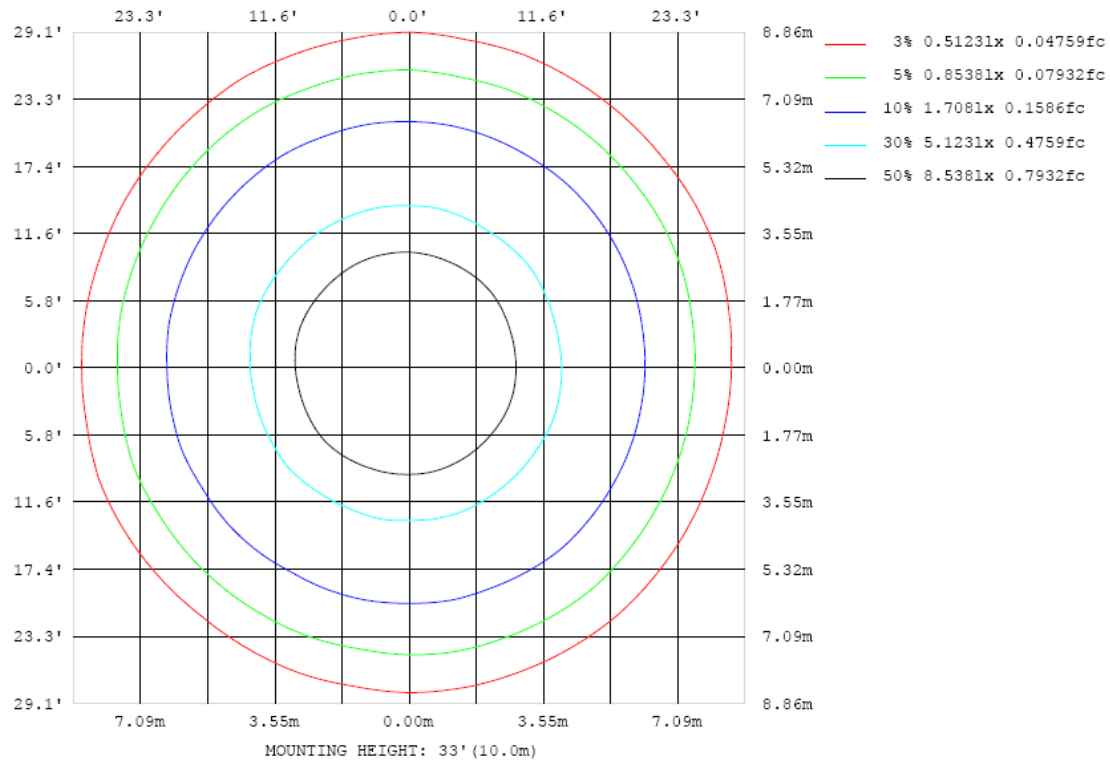


Chart 5: Illuminance Plot (Footcandles)

Luminous Intensity Distribution Plots- Goniophotometer Method

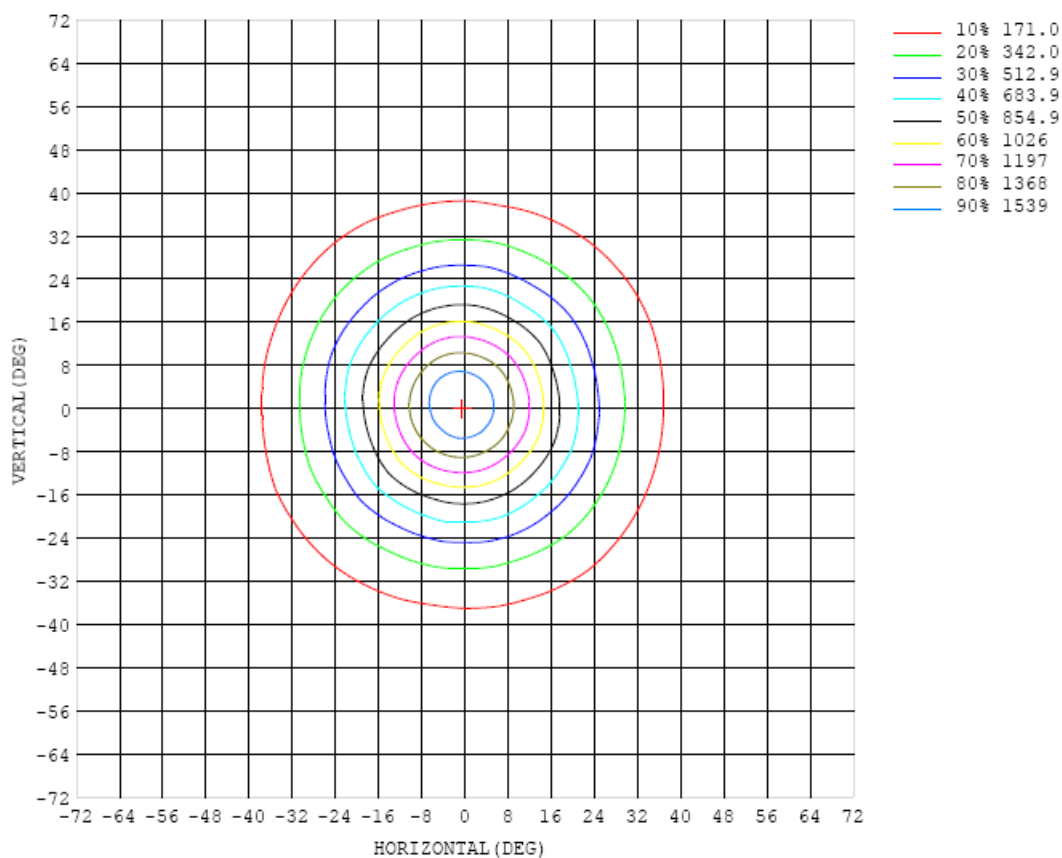


Chart 6: Isocandela Plot

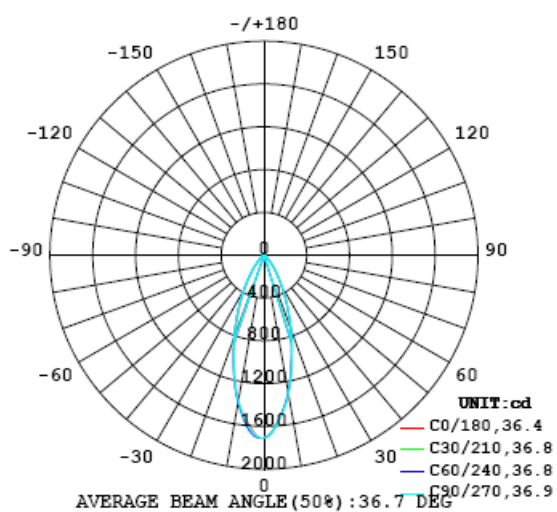


Chart 7: Polar Candela Distribution

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	1708	1708	1708	1708	1708	1708	1708	1708	1708	1708	1708	1708	1708	1708	1708	1708	1708	1708	1708
5	1554	1553	1551	1550	1548	1552	1553	1556	1558	1560	1565	1567	1567	1569	1572	1578	1582	1587	1595
10	1317	1312	1310	1307	1303	1303	1303	1306	1310	1313	1320	1328	1336	1346	1352	1360	1369	1376	1383
15	1002	1002	1002	996	988	988	991	996	1000	1000	1005	1013	1027	1042	1054	1055	1056	1063	1077
20	732	736	738	727	723	725	731	733	736	737	739	737	744	756	772	769	770	776	791
25	507	508	512	504	504	503	508	512	512	506	511	508	510	522	535	532	539	540	552
30	331	329	330	330	332	334	329	328	334	332	336	335	333	343	350	349	358	358	361
35	207	205	204	203	205	210	208	207	210	207	207	209	208	214	217	218	226	224	225
40	121	119	118	119	121	123	123	123	125	126	123	125	124	124	127	131	134	130	130
45	68.8	67.2	65.9	67.1	68.2	69.9	72.7	73.2	71.8	68.6	69.4	70.9	69.4	71.2	74.0	73.9	74.4	72.8	71.4
50	40.4	39.9	37.3	37.5	40.9	43.0	42.1	41.8	42.7	40.7	37.7	39.3	41.1	42.6	41.6	39.7	39.7	39.3	39.5
55	28.6	28.6	26.6	26.3	28.4	29.4	27.8	27.6	28.4	27.2	25.0	25.7	27.4	27.7	26.6	26.1	26.3	26.3	27.1
60	22.4	22.6	21.0	20.7	22.2	22.7	21.4	21.2	22.1	21.0	19.3	19.8	21.2	21.1	20.4	20.5	20.7	20.7	21.5
65	17.4	17.5	16.2	15.9	17.1	17.4	16.3	16.3	17.0	16.3	15.0	15.4	16.5	16.4	15.9	16.2	16.4	16.5	17.2
70	12.3	12.4	11.6	11.4	12.0	12.2	11.5	11.5	12.0	11.6	10.9	11.1	11.8	11.8	11.4	11.8	12.0	12.1	12.5
75	7.93	7.94	7.52	7.35	7.57	7.61	7.26	7.28	7.54	7.34	7.03	7.12	7.57	7.59	7.45	7.75	7.92	7.99	8.29
80	3.95	3.90	3.74	3.62	3.59	3.55	3.47	3.46	3.51	3.51	3.50	3.55	3.70	3.78	3.82	3.97	4.10	4.19	4.37
85	1.24	1.20	1.17	1.13	1.10	1.09	1.10	1.10	1.10	1.12	1.16	1.19	1.24	1.29	1.33	1.39	1.45	1.50	1.56
90	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	0.01
95	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	0.00
100	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	0.00
105	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.01
110	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
115	0.01	0.01	0.01	0.01	0.02	0.01	0.01	0.01	0.02	0.02	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.02
120	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03
125	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05
130	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.09
135	0.15	0.15	0.15	0.15	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.17
140	0.21	0.21	0.21	0.22	0.22	0.22	0.22	0.22	0.21	0.21	0.21	0.21	0.22	0.22	0.22	0.21	0.21	0.21	0.25
145	0.27	0.28	0.28	0.28	0.28	0.29	0.29	0.29	0.29	0.29	0.29	0.29	0.29	0.29	0.29	0.28	0.28	0.27	0.33
150	0.34	0.35	0.35	0.35	0.35	0.35	0.35	0.36	0.36	0.36	0.36	0.36	0.36	0.36	0.36	0.36	0.36	0.35	0.40
155	0.42	0.42	0.42	0.42	0.43	0.43	0.43	0.43	0.43	0.43	0.43	0.44	0.44	0.44	0.44	0.44	0.44	0.43	0.46
160	0.50	0.50	0.50	0.51	0.51	0.51	0.51	0.51	0.51	0.51	0.51	0.52	0.52	0.52	0.52	0.52	0.52	0.52	0.52
165	0.56	0.56	0.56	0.57	0.57	0.57	0.57	0.58	0.58	0.58	0.58	0.58	0.59	0.59	0.59	0.59	0.59	0.59	0.58
170	0.61	0.61	0.61	0.61	0.61	0.61	0.62	0.62	0.62	0.63	0.63	0.63	0.63	0.64	0.64	0.64	0.64	0.64	0.64
175	0.64	0.63	0.63	0.63	0.63	0.64	0.64	0.65	0.65	0.65	0.65	0.65	0.66	0.66	0.66	0.66	0.66	0.67	0.67
180	0.77	0.77	0.77	0.77	0.77	0.77	0.77	0.77	0.77	0.77	0.77	0.77	0.77	0.77	0.77	0.77	0.77	0.77	0.77

Table 6: Luminous Intensity Data

Table--2

UNIT: cd

C (DEG) γ (DEG)	190	200	210	220	230	240	250	260	270	280	290	300	310	320	330	340	350		
0	1708	1708	1708	1708	1708	1708	1708	1708	1708	1708	1708	1708	1708	1708	1708	1708	1708		
5	1604	1613	1624	1632	1637	1637	1633	1626	1615	1604	1593	1584	1577	1571	1566	1561	1557		
10	1390	1390	1393	1395	1395	1398	1395	1388	1382	1373	1366	1362	1356	1346	1335	1325	1321		
15	1090	1097	1098	1095	1096	1102	1103	1099	1091	1079	1068	1060	1056	1044	1027	1011	1004		
20	809	820	817	812	814	819	819	818	815	807	792	777	774	771	751	734	729		
25	566	581	578	574	579	582	582	582	575	577	561	547	546	544	529	514	506		
30	371	377	381	382	383	385	383	386	382	382	370	362	362	357	349	340	333		
35	232	231	233	236	240	244	240	242	239	235	232	228	226	222	219	216	210		
40	133	133	135	137	140	143	141	143	146	139	140	137	134	132	133	130	125		
45	70.4	69.1	71.4	72.7	74.7	80.8	81.5	79.8	79.3	79.2	79.1	77.9	79.1	77.8	75.7	74.3	70.8		
50	39.1	36.9	37.4	40.0	42.7	44.1	44.8	46.4	45.2	42.7	44.1	46.2	46.9	44.9	42.9	41.6	40.2		
55	27.1	25.8	25.7	27.3	28.7	28.7	29.0	30.5	30.0	28.1	28.9	30.9	30.9	29.5	29.1	28.4	27.8		
60	21.5	20.5	20.4	21.6	22.6	22.4	22.6	23.8	23.4	21.7	22.2	23.8	23.6	22.6	22.7	22.1	21.6		
65	17.2	16.4	16.3	17.3	18.1	17.8	17.9	18.9	18.5	17.2	17.4	18.6	18.3	17.6	17.7	17.3	16.7		
70	12.5	12.0	12.0	12.6	13.1	12.9	12.9	13.5	13.3	12.4	12.4	13.1	12.8	12.3	12.5	12.2	11.8		
75	8.32	8.07	8.09	8.41	8.76	8.64	8.62	8.97	8.78	8.31	8.25	8.55	8.37	8.07	8.11	7.92	7.69		
80	4.43	4.39	4.42	4.56	4.72	4.71	4.71	4.82	4.74	4.55	4.48	4.53	4.41	4.25	4.21	4.10	3.96		
85	1.60	1.64	1.68	1.71	1.74	1.77	1.77	1.75	1.73	1.70	1.64	1.59	1.53	1.47	1.40	1.34	1.28		
90	0.02	0.03	0.04	0.05	0.06	0.07	0.07	0.07	0.06	0.05	0.04	0.02	0.01	0.00	0.00	0.00	0.00		
95	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		
100	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		
105	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01		
110	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01		
115	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02		
120	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03		
125	0.05	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06		
130	0.10	0.11	0.11	0.12	0.12	0.12	0.12	0.12	0.13	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.11		
135	0.19	0.19	0.19	0.19	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.18		
140	0.29	0.29	0.29	0.29	0.29	0.29	0.29	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.31	0.27		
145	0.41	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.41	0.41	0.41	0.41	0.41	0.41	0.42	0.43	0.35		
150	0.52	0.51	0.51	0.51	0.51	0.51	0.51	0.52	0.52	0.52	0.52	0.53	0.53	0.53	0.53	0.55	0.42		
155	0.62	0.61	0.61	0.61	0.62	0.62	0.63	0.63	0.63	0.63	0.64	0.64	0.64	0.64	0.63	0.64	0.46		
160	0.69	0.72	0.73	0.74	0.75	0.75	0.76	0.76	0.76	0.77	0.76	0.76	0.76	0.75	0.75	0.73	0.50		
165	0.69	0.81	0.81	0.82	0.84	0.85	0.85	0.86	0.86	0.86	0.86	0.85	0.85	0.84	0.84	0.84	0.56		
170	0.63	0.77	0.84	0.84	0.85	0.86	0.87	0.88	0.88	0.88	0.88	0.87	0.87	0.87	0.87	0.80	0.60		
175	0.69	0.71	0.72	0.73	0.77	0.77	0.79	0.82	0.85	0.84	0.82	0.80	0.73	0.72	0.70	0.68	0.65		
180	0.77	0.77	0.77	0.77	0.77	0.77	0.77	0.77	0.77	0.77	0.77	0.77	0.77	0.77	0.77	0.77	0.77		

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, 2022	Aug. 04, 2023
Digital Power Meter	PF2010A	HZTE028-01	Aug. 05, 2022	Aug. 04, 2023
AC Power Supply	DPS1060	HZTE001-06	Aug. 05, 2022	Aug. 04, 2023
DC Power Supply	WY12010	HZTE004-03	Aug. 05, 2022	Aug. 04, 2023
Temperature recorder	JM624U	HZTE018-08	Aug. 05, 2022	Aug. 04, 2023
Temperature and humidity recorder	JR900	HZTE018-01	Aug. 05, 2022	Aug. 04, 2023
Standard source	D908	HZTE012-01	Aug. 05, 2022	Aug. 04, 2023
Integrate Sphere system	3M	HZTE015-04	Aug. 05, 2022	Aug. 04, 2023
Digital Power Meter	WT210	HZTE008-01	Aug. 05, 2022	Aug. 04, 2023
AC Power Supply	PCR 500L	HZTE001-07	Aug. 05, 2022	Aug. 04, 2023
DC Power Supply	IT6154	HZTE004-04	Aug. 05, 2022	Aug. 04, 2023
Standard source	SCL-1400	HZTE012-02	Aug. 05, 2022	Aug. 04, 2023
Temperature and humidity recorder	JR900	HZTE018-02	Aug. 05, 2022	Aug. 04, 2023
Temperature Meter	TES1310	HZTE017-01	Aug. 05, 2022	Aug. 04, 2023

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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