

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/940FL40

Laboratory: Leading Testing Laboratories

NVLAP CODE: 200960-0

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Report No.: HZ22090009d

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/940FL40**

Luminous Efficacy (Lumens /Watt)	Total Luminous Flux (Lumens)	Power (Watts)	Power Factor
119.8	975.2	8.14	0.7785
CCT (K)	CRI	Stabilization Time (Light & Power)	
3928	96.7	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/940FL40
Electrical Ratings	: 120V, 60Hz, 8W
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
Voltage frequency (Hz)	60
Test Current (A)	0.087
Power Factor	0.7785
Test Power (W)	8.14
THD A%	62.53
Luminous Efficacy (lm/W)	119.8
Total Luminous Flux (lm)	975.2
Color Rendering Index (CRI)	96.7
R9	83.2
Correlated Color Temperature (CCT)(K)	3928
Chromaticity Chroma x	0.3837
Chromaticity Chroma y	0.3792
Chromaticity Chroma u	0.2263
Chromaticity Chroma v	0.3354
Duv	0.0002
Chromaticity Chroma u'	0.2263
Chromaticity Chroma v'	0.5031

Special Color Rendering Indices	
R1	99
R2	97.7
R3	93.7
R4	98.2
R5	97.3
R6	95.6
R7	97.5
R8	94.5
R9	83.2
R10	91.6
R11	96
R12	75.5
R13	98.9
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)	0.088
Power Factor	0.7744
Power (W)	8.15
Luminous Efficacy (lm/W)	121.1
Total Luminous Flux (lm)	987.1
Beam Angle (°)	35.6 (0°-180°) / 36.4 (90°-270°)
Center Beam Candle Power (cd)	1865
Maximum Beam Candle Power (cd)	1870 (At: C=240.0, Gamma=1.0)
Spacing Criteria	0.59 (0°-180°) / 0.61 (90°-270°)
Zonal Lumens in the 0 °-60 °Zone	97.24%
Zonal Lumens in the 60 °-90 °Zone	2.66%
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

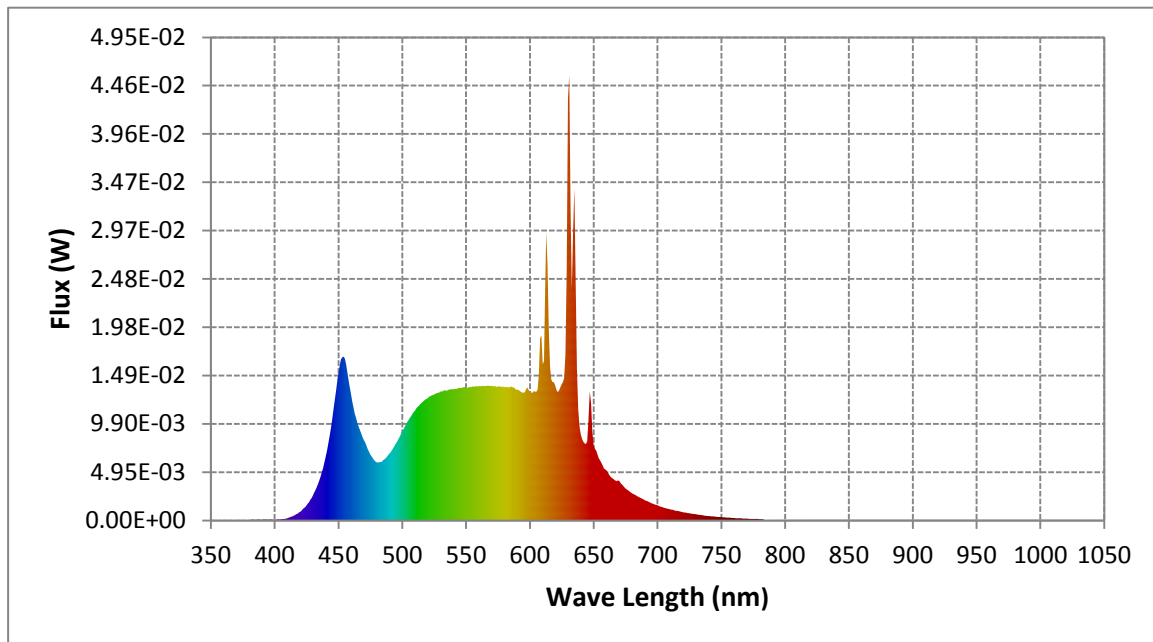
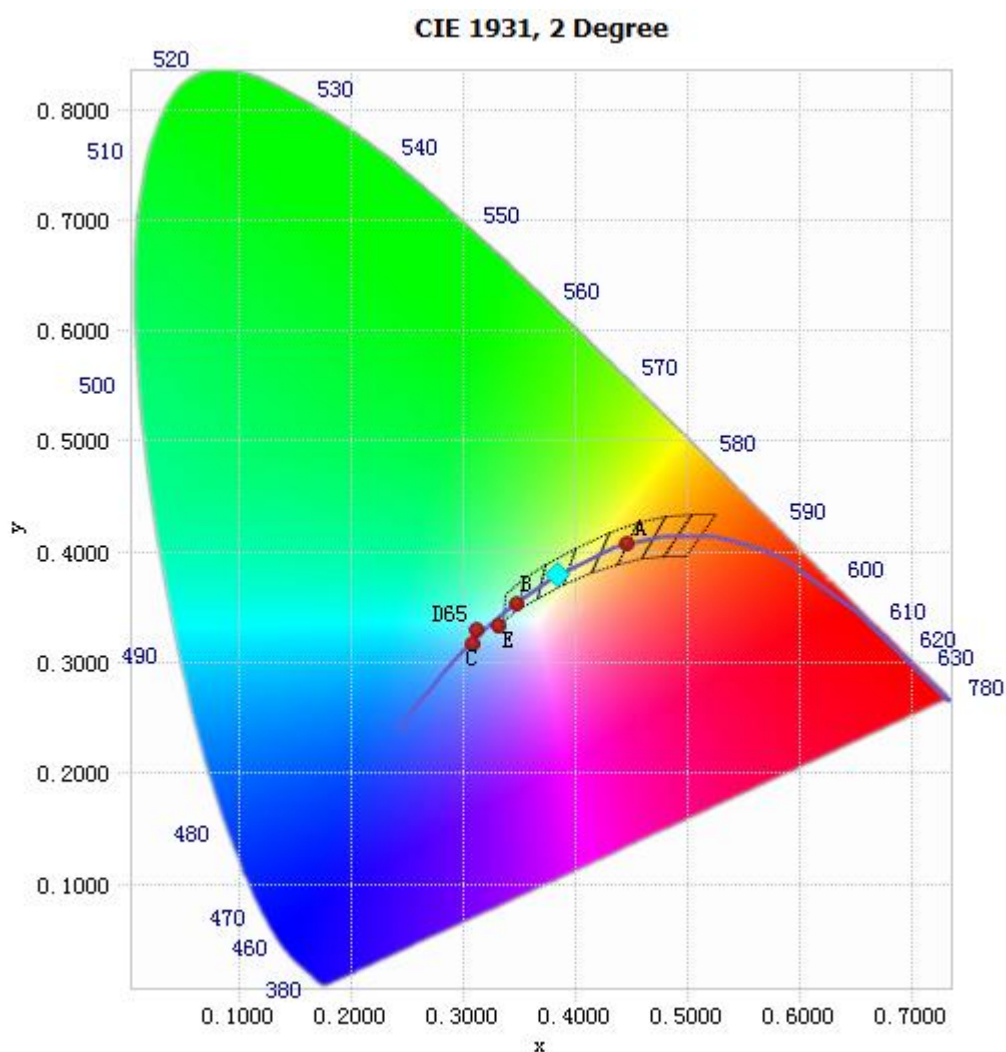


Chart 1: Spectral Power Distribution

Spectral Distribution over Visible Wavelength							
WL(nm)	Radiant(Watts)	WL(nm)	Radiant(Watts)	WL(nm)	Radiant(Watts)	WL(nm)	Radiant(Watts)
380	4.67E-05	485	6.16E-03	590	1.34E-02	695	1.81E-03
385	5.73E-05	490	6.85E-03	595	1.31E-02	700	1.55E-03
390	5.58E-05	495	7.85E-03	600	1.32E-02	705	1.32E-03
395	6.05E-05	500	9.12E-03	605	1.32E-02	710	1.13E-03
400	6.63E-05	505	1.03E-02	610	1.60E-02	715	9.88E-04
405	1.13E-04	510	1.13E-02	615	1.96E-02	720	8.56E-04
410	2.31E-04	515	1.20E-02	620	1.38E-02	725	7.33E-04
415	4.83E-04	520	1.25E-02	625	1.39E-02	730	6.38E-04
420	8.94E-04	525	1.29E-02	630	4.32E-02	735	5.42E-04
425	1.55E-03	530	1.32E-02	635	3.41E-02	740	4.67E-04
430	2.55E-03	535	1.33E-02	640	8.83E-03	745	3.95E-04
435	4.11E-03	540	1.35E-02	645	8.13E-03	750	3.41E-04
440	6.52E-03	545	1.36E-02	650	7.75E-03	755	2.94E-04
445	1.02E-02	550	1.36E-02	655	6.16E-03	760	2.51E-04
450	1.51E-02	555	1.37E-02	660	5.15E-03	765	2.18E-04
455	1.66E-02	560	1.37E-02	665	4.28E-03	770	1.85E-04
460	1.30E-02	565	1.38E-02	670	4.05E-03	775	1.68E-04
465	9.99E-03	570	1.38E-02	675	3.27E-03	780	1.38E-04
470	8.27E-03	575	1.37E-02	680	2.79E-03		
475	6.77E-03	580	1.37E-02	685	2.42E-03		
480	5.97E-03	585	1.37E-02	690	2.09E-03		

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

Chromaticity Diagram - Sphere Spectroradiometer Method



Tristimulus values(x, y): (0.3837, 0.3792)

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

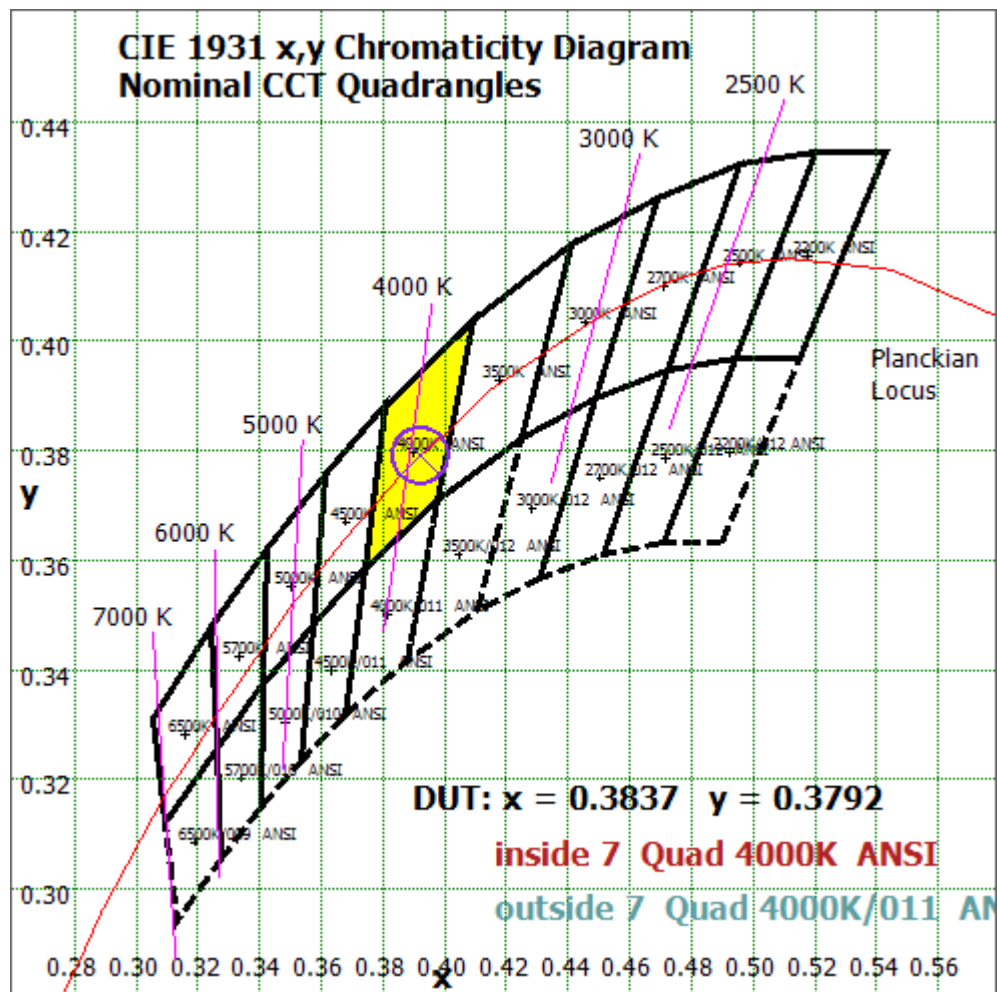


Chart 3: Plot of Lamp x/y coordinates on CIE 1931 Chromaticity Diagram

Color Rendition Report – Sphere Spectroradiometer Method

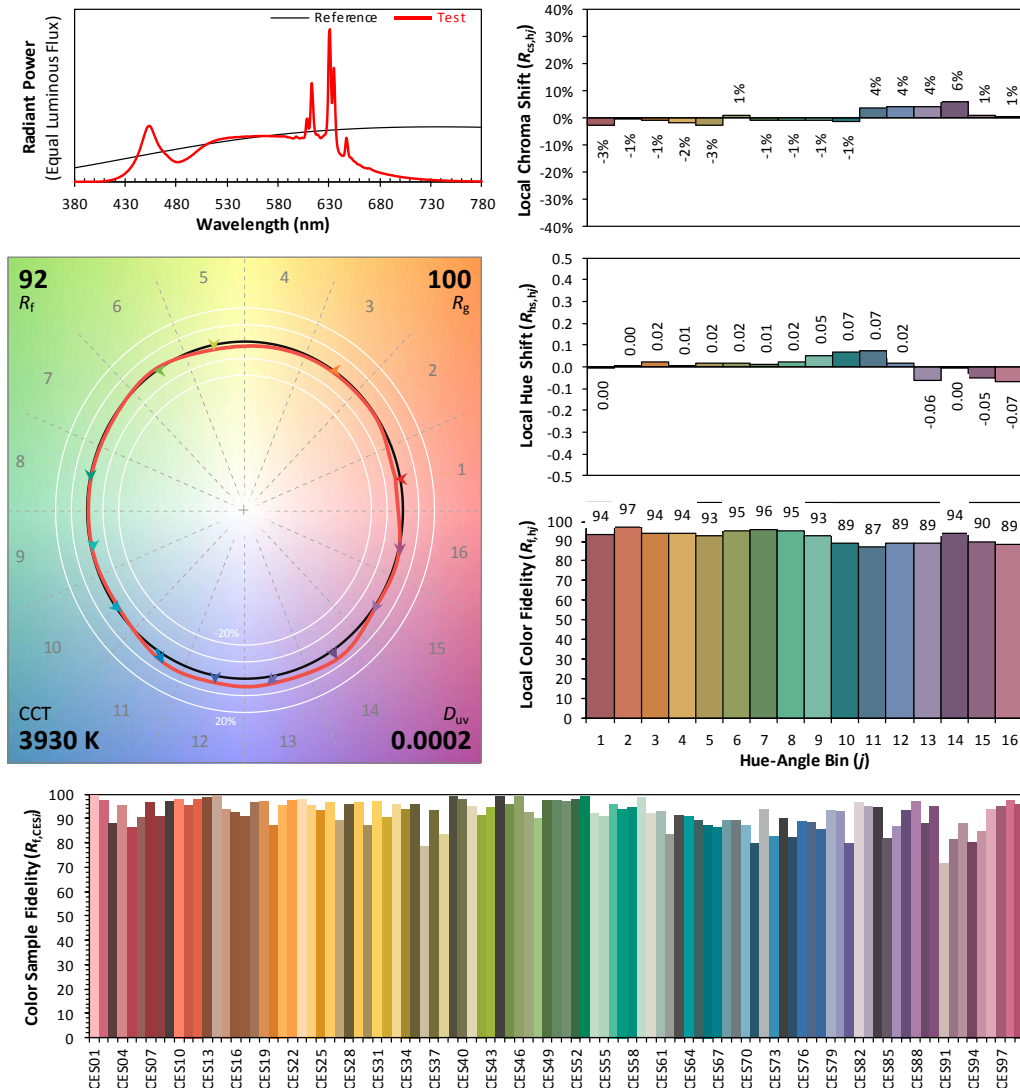
ANSI/IES TM-30-18 Color Rendition Report

Source: LED

Manufacturer: GREEN CREATIVE LTD

Date: 2022/09/16

Model: 8PAR30DIM/940FL40



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

x 0.3837
 y 0.3792
 u' 0.2263
 v' 0.5031

CIE 13.3-1995
(CRI)
 R_a 97
 R_g 83

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	156.459	15.85%
10- 20	311.396	31.55%
20- 30	264.435	26.79%
30- 40	145.983	14.79%
40- 50	56.965	5.77%
50- 60	24.708	2.50%
60- 70	16.311	1.65%
70- 80	8.237	0.83%
80- 90	1.682	0.17%
90-100	0.002	0.00%
100-110	0.005	0.00%
110-120	0.015	0.00%
120-130	0.051	0.01%
130-140	0.137	0.01%
140-150	0.226	0.02%
150-160	0.256	0.03%
160-170	0.205	0.02%
170-180	0.073	0.01%
Total	987.1	100%

$\gamma(^{\circ})$	Lumens	% Total
0- 60	959.946	97.24%
60- 90	26.23	2.66%
0-90	986.176	99.90%
90- 180	0.97	0.10%
0- 180	987.1	100%

Table 5: Zonal Lumen

Illuminance Plots- Goniophotometer Method

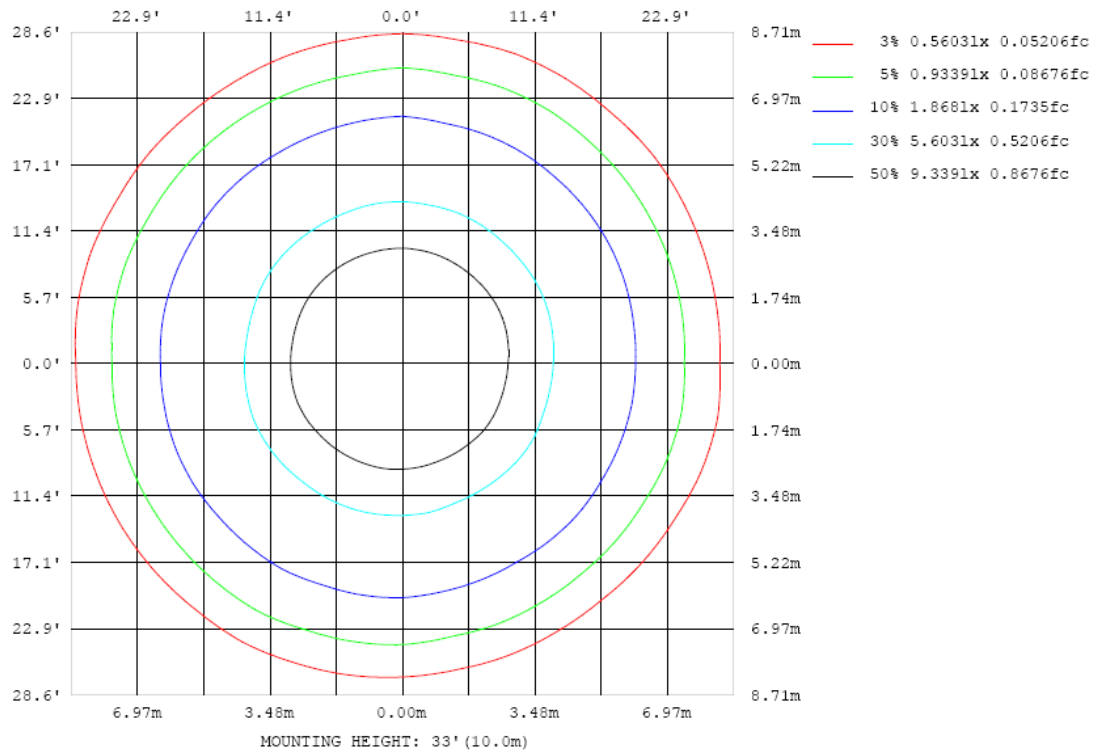


Chart 5: Illuminance Plot (Footcandles)

Luminous Intensity Distribution Plots- Goniophotometer Method

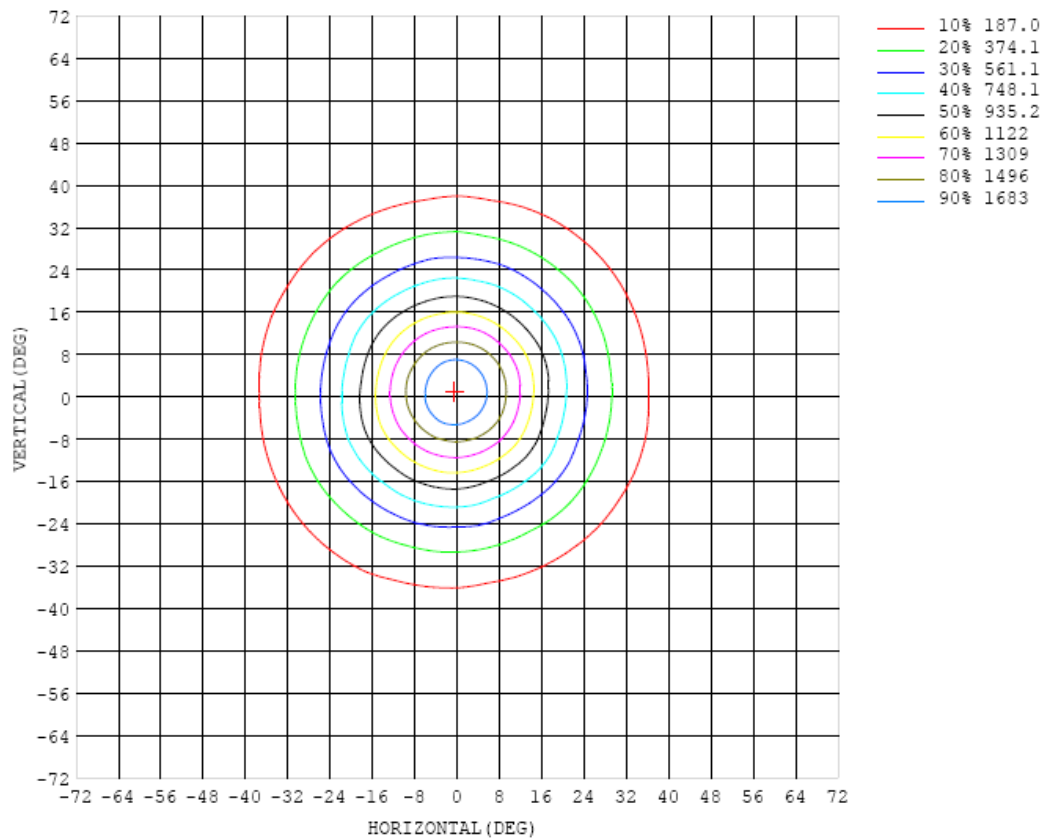


Chart 6: Isocandela Plot

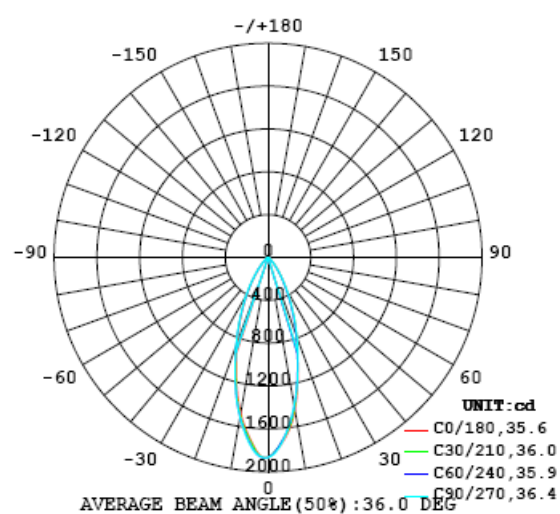


Chart 7: Polar Candela Distribution

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	1865	1865	1865	1865	1865	1865	1865	1865	1865	1865	1865	1865	1865	1865	1865	1865	1865	1865	1865
5	1710	1704	1698	1693	1692	1690	1688	1690	1694	1698	1705	1712	1719	1723	1727	1729	1733	1735	1736
10	1445	1434	1431	1424	1418	1411	1406	1403	1402	1401	1404	1411	1420	1427	1437	1447	1455	1466	1474
15	1080	1069	1066	1072	1073	1064	1061	1061	1070	1081	1088	1092	1100	1109	1118	1136	1147	1148	1150
20	779	770	768	782	780	770	765	765	783	793	798	804	813	814	828	843	853	851	845
25	543	533	526	533	530	525	521	528	545	543	554	562	564	570	584	596	603	598	597
30	348	344	340	338	339	335	329	335	343	353	357	359	370	374	380	391	396	392	393
35	212	215	210	203	201	198	197	200	201	213	216	218	230	229	231	236	240	242	241
40	122	126	122	115	111	107	107	109	110	114	119	123	128	129	133	135	137	138	139
45	69.9	67.9	64.5	61.4	59.4	56.8	54.9	53.3	57.6	61.2	64.2	67.3	69.7	68.0	69.3	71.5	72.6	75.0	78.2
50	39.3	36.4	34.7	33.6	34.5	33.9	32.2	30.4	32.8	36.6	37.3	37.1	39.2	39.8	38.2	38.2	40.2	43.1	42.9
55	26.7	25.6	25.2	24.5	25.5	25.8	24.4	23.0	24.6	27.1	27.1	26.2	27.5	28.2	26.4	25.9	27.7	29.2	28.2
60	20.8	20.2	20.1	19.5	20.2	20.7	19.4	18.5	19.7	21.6	21.5	20.6	21.6	22.3	20.7	20.2	21.8	22.7	21.8
65	16.0	15.6	15.7	15.2	15.6	16.0	15.1	14.6	15.3	16.7	16.6	16.0	16.8	17.4	16.3	16.0	17.2	17.8	17.1
70	11.3	11.1	11.1	10.9	11.1	11.3	10.8	10.5	10.9	11.8	11.8	11.4	12.0	12.3	11.7	11.7	12.4	12.8	12.3
75	7.16	7.08	7.06	6.92	6.97	7.07	6.89	6.80	6.99	7.36	7.44	7.36	7.69	7.94	7.77	7.84	8.28	8.54	8.29
80	3.43	3.36	3.34	3.30	3.30	3.31	3.30	3.30	3.37	3.50	3.59	3.67	3.86	4.04	4.11	4.23	4.44	4.59	4.57
85	1.08	1.05	1.04	1.03	1.03	1.04	1.05	1.05	1.07	1.11	1.16	1.23	1.31	1.40	1.49	1.57	1.63	1.68	1.71
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	0.01	0.03	0.05	0.06	0.08
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	0.00	0.00	0.00	0.00	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	0.01	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
120	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.02	0.03	0.02	0.03	0.03	0.03	0.02	0.02	0.03	0.02	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	0.09	0.09	0.09	0.09	0.09	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	0.10
135	0.16	0.16	0.16	0.15	0.15	0.15	0.15	0.15	0.15	0.14	0.14	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.18
140	0.23	0.23	0.23	0.23	0.23	0.23	0.23	0.23	0.23	0.23	0.23	0.23	0.23	0.23	0.23	0.23	0.23	0.22	0.26
145	0.29	0.30	0.30	0.30	0.30	0.30	0.31	0.31	0.31	0.31	0.31	0.31	0.31	0.31	0.31	0.31	0.30	0.29	0.35
150	0.37	0.37	0.37	0.38	0.38	0.38	0.38	0.38	0.38	0.38	0.38	0.39	0.39	0.39	0.38	0.38	0.38	0.37	0.43
155	0.45	0.45	0.45	0.45	0.46	0.46	0.46	0.46	0.46	0.46	0.46	0.47	0.47	0.47	0.47	0.47	0.47	0.46	0.49
160	0.54	0.54	0.54	0.54	0.54	0.54	0.54	0.54	0.55	0.55	0.55	0.55	0.55	0.56	0.56	0.56	0.56	0.56	0.55
165	0.60	0.60	0.61	0.61	0.61	0.61	0.61	0.62	0.62	0.62	0.62	0.62	0.63	0.63	0.63	0.63	0.63	0.63	0.62
170	0.65	0.66	0.66	0.66	0.66	0.66	0.66	0.66	0.67	0.67	0.67	0.67	0.68	0.68	0.68	0.68	0.68	0.69	0.69
175	0.68	0.68	0.67	0.67	0.68	0.68	0.69	0.69	0.70	0.70	0.70	0.70	0.70	0.71	0.71	0.71	0.71	0.72	0.72
180	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	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	1865	1865	1865	1865	1865	1865	1865	1865	1865	1865	1865	1865	1865	1865	1865	1865	1865		
5	1737	1741	1748	1756	1766	1773	1779	1782	1782	1775	1767	1759	1749	1739	1731	1724	1718		
10	1484	1494	1499	1505	1512	1516	1518	1517	1514	1515	1512	1508	1501	1494	1484	1470	1457		
15	1153	1161	1174	1183	1189	1192	1191	1187	1188	1185	1175	1162	1150	1144	1135	1119	1100		
20	838	850	869	877	877	874	873	878	877	866	861	852	839	832	829	814	799		
25	598	604	616	620	616	613	618	626	620	615	614	602	590	583	580	568	550		
30	399	400	403	407	406	403	409	417	415	402	399	393	386	382	376	366	353		
35	249	250	247	251	251	249	249	250	258	246	247	244	236	232	228	223	218		
40	145	147	143	143	142	141	143	142	146	141	144	142	138	137	132	128	125		
45	80.1	79.4	78.3	77.3	74.4	75.0	74.7	75.6	75.5	77.6	80.8	77.6	72.5	71.9	71.1	70.0	70.6		
50	42.2	41.9	41.2	41.7	41.3	38.9	37.0	39.8	43.3	42.5	41.5	42.4	40.9	37.6	36.2	39.2	41.1		
55	27.9	27.9	27.4	28.3	28.6	27.1	25.3	27.1	29.2	28.1	27.0	28.3	27.8	25.3	24.3	26.4	27.8		
60	21.8	22.0	21.6	22.2	22.8	21.6	20.3	21.5	23.1	22.2	21.3	22.2	22.0	20.0	19.1	20.6	21.7		
65	17.3	17.5	17.1	17.6	18.2	17.1	16.3	17.1	18.3	17.6	16.8	17.5	17.4	15.8	15.0	15.9	16.7		
70	12.5	12.7	12.5	12.8	13.2	12.4	12.0	12.4	13.2	12.7	12.1	12.5	12.4	11.3	10.8	11.3	11.7		
75	8.45	8.56	8.45	8.60	8.76	8.40	8.14	8.30	8.63	8.34	8.01	8.12	8.01	7.45	7.14	7.22	7.37		
80	4.66	4.71	4.67	4.71	4.76	4.63	4.52	4.52	4.56	4.41	4.22	4.15	4.03	3.78	3.60	3.53	3.51		
85	1.73	1.73	1.74	1.74	1.74	1.73	1.70	1.67	1.62	1.56	1.49	1.41	1.34	1.27	1.20	1.14	1.10		
90	0.09	0.10	0.10	0.11	0.10	0.10	0.09	0.08	0.06	0.04	0.02	0.00	0.00	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	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.01	0.01	0.01	0.01	0.00	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	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.02	0.01	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	0.05	0.05	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.07	0.07	0.07	0.07	0.06	0.07	0.06		
130	0.11	0.11	0.11	0.12	0.12	0.12	0.12	0.13	0.13	0.13	0.13	0.13	0.13	0.13	0.13	0.13	0.11		
135	0.20	0.19	0.20	0.20	0.20	0.20	0.20	0.21	0.21	0.21	0.21	0.21	0.22	0.22	0.22	0.22	0.20		
140	0.31	0.30	0.30	0.30	0.30	0.30	0.31	0.31	0.31	0.32	0.32	0.32	0.32	0.32	0.32	0.33	0.29		
145	0.43	0.42	0.42	0.42	0.42	0.42	0.42	0.43	0.43	0.43	0.43	0.44	0.44	0.44	0.44	0.46	0.38		
150	0.56	0.55	0.54	0.55	0.55	0.55	0.55	0.55	0.55	0.56	0.56	0.56	0.57	0.57	0.57	0.59	0.45		
155	0.66	0.65	0.66	0.66	0.66	0.67	0.67	0.68	0.68	0.68	0.68	0.68	0.68	0.68	0.68	0.69	0.50		
160	0.75	0.78	0.78	0.79	0.80	0.81	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.81	0.80	0.78	0.53		
165	0.74	0.87	0.87	0.88	0.90	0.91	0.92	0.93	0.93	0.93	0.92	0.92	0.91	0.90	0.91	0.78	0.60		
170	0.67	0.83	0.90	0.90	0.91	0.92	0.94	0.94	0.95	0.95	0.95	0.94	0.93	0.93	0.86	0.64	0.65		
175	0.74	0.76	0.77	0.78	0.83	0.83	0.84	0.88	0.92	0.91	0.88	0.86	0.78	0.77	0.75	0.73	0.70		
180	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83		

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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