

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 Tube

Model: 12T8/3F/835/UEB

Laboratory: Leading Testing Laboratories

NVLAP CODE: 200960-0

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Report No.: HZ23030039d

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

Review by:



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Apr. 04, 2023

Approved by:



Manager: Jim Zhang

Apr. 04, 2023

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: **12T8/3F/835/UEB**

Luminous Efficacy (Lumens /Watt)	Total Luminous Flux (Lumens)	Power (Watts)	Power Factor
129.5	1556.3	12.02	0.9847
CCT (K)	CRI	Stabilization Time (Light & Power)	
3489	83.4	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	: Mar. 28, 2023
Date of Test	: Mar. 30, 2023
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 Tube
Model	: 12T8/3F/835/UEB
Electrical Ratings	: 120-277V, 50/60Hz, 12W
Product Description	: 3500K
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)	0.101	0.047
Power Factor	0.9847	0.9313
Test Power (W)	12.02	12.25
THD A%	15.18	15.13
Luminous Efficacy (lm/W)	129.5	128.6
Total Luminous Flux (lm)	1556.3	1575.8
Color Rendering Index (CRI)	83.4	
R9	12.4	
Correlated Color Temperature (CCT)(K)	3489	
Chromaticity Chroma x	0.4058	
Chromaticity Chroma y	0.3909	
Chromaticity Chroma u	0.2359	
Chromaticity Chroma v	0.3409	
Duv	0	
Chromaticity Chroma u'	0.2359	
Chromaticity Chroma v'	0.5114	

Special Color Rendering Indices	
R1	81.9
R2	91
R3	96.3
R4	80.8
R5	81.6
R6	87.6
R7	84.8
R8	63.3
R9	12.4
R10	78.4
R11	79.5
R12	64.6
R13	84.2
R14	98.4

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 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)	0.102
Power Factor	0.9848
Power (W)	12.04
Luminous Efficacy (lm/W)	130.3
Total Luminous Flux (lm)	1568.4
Beam Angle (°)	108.3 (0°-180°) / 209.4 (90°-270°)
Center Beam Candle Power (cd)	281
Maximum Beam Candle Power (cd)	281.7 (At: C=320.0, Gamma=0.5)
Spacing Criteria	1.23 (0°-180°) / 1.38 (90°-270°)
Zonal Lumens in the 0°-60° Zone	44.66%
Zonal Lumens in the 60°-90° Zone	26.55%
Zonal Lumens in the 90°-120° Zone	17.25%
Zonal Lumens in the 120°-180° Zone	11.54%

Table 3: Test data per Goniophotometer Method

Spectral Power Distribution - Sphere Spectroradiometer Method

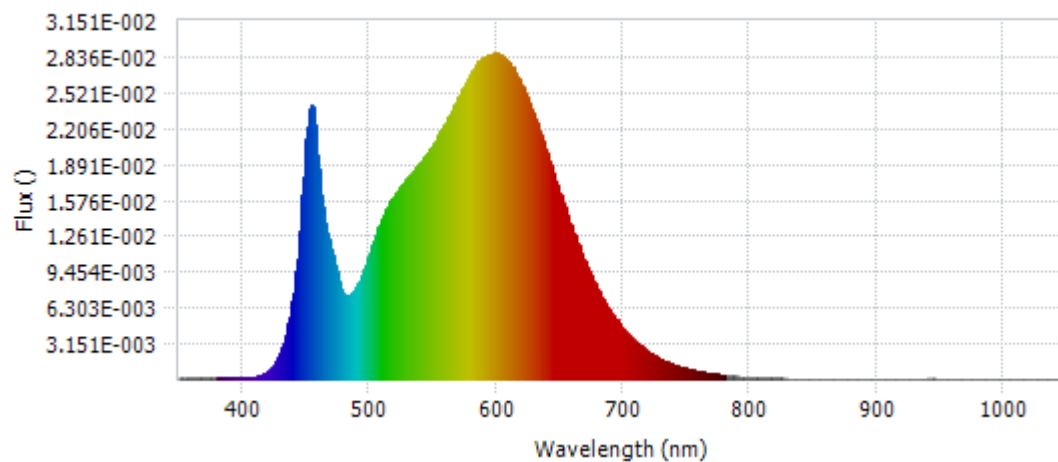
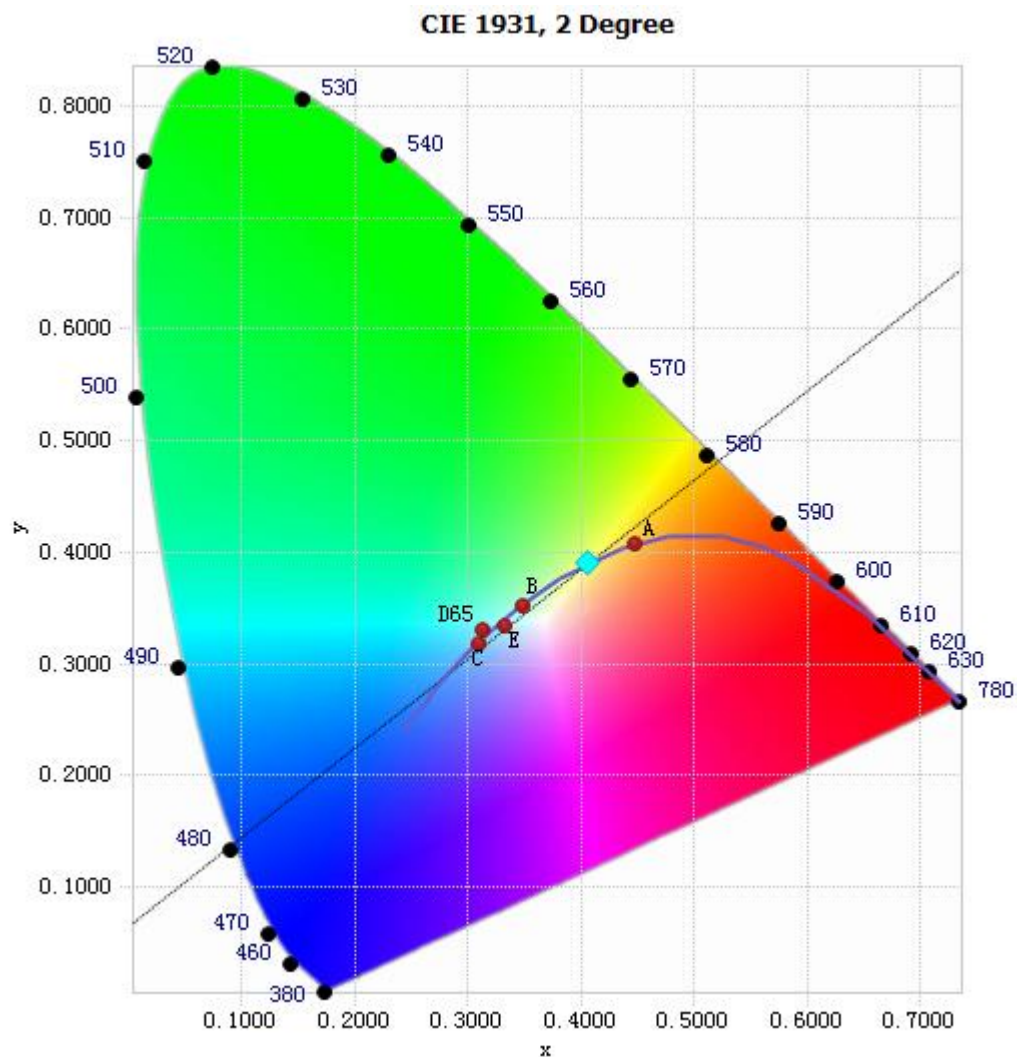


Chart 1: Spectral Power Distribution

Spectral Distribution over Visible Wavelength							
WL(nm)	Radiant(Watts)	WL(nm)	Radiant(Watts)	WL(nm)	Radiant(Watts)	WL(nm)	Radiant(Watts)
380	1.51E-04	485	7.51E-03	590	2.84E-02	695	5.21E-03
385	1.38E-04	490	8.21E-03	595	2.86E-02	700	4.50E-03
390	1.31E-04	495	9.47E-03	600	2.87E-02	705	3.85E-03
395	1.30E-04	500	1.11E-02	605	2.83E-02	710	3.32E-03
400	1.10E-04	505	1.27E-02	610	2.78E-02	715	2.84E-03
405	1.57E-04	510	1.42E-02	615	2.70E-02	720	2.44E-03
410	2.34E-04	515	1.54E-02	620	2.59E-02	725	2.10E-03
415	4.14E-04	520	1.62E-02	625	2.46E-02	730	1.80E-03
420	7.72E-04	525	1.71E-02	630	2.31E-02	735	1.54E-03
425	1.41E-03	530	1.78E-02	635	2.15E-02	740	1.32E-03
430	2.51E-03	535	1.84E-02	640	1.99E-02	745	1.13E-03
435	4.45E-03	540	1.90E-02	645	1.82E-02	750	9.62E-04
440	7.60E-03	545	1.98E-02	650	1.64E-02	755	8.32E-04
445	1.30E-02	550	2.06E-02	655	1.48E-02	760	7.12E-04
450	2.11E-02	555	2.16E-02	660	1.32E-02	765	6.07E-04
455	2.39E-02	560	2.26E-02	665	1.17E-02	770	5.30E-04
460	1.86E-02	565	2.37E-02	670	1.03E-02	775	4.49E-04
465	1.38E-02	570	2.48E-02	675	9.09E-03	780	3.84E-04
470	1.14E-02	575	2.59E-02	680	7.94E-03		
475	8.94E-03	580	2.68E-02	685	6.94E-03		
480	7.49E-03	585	2.79E-02	690	6.01E-03		

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

Chromaticity Diagram - Sphere Spectroradiometer Method



Tristimulus values(x, y): (0.4058, 0.3909)

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

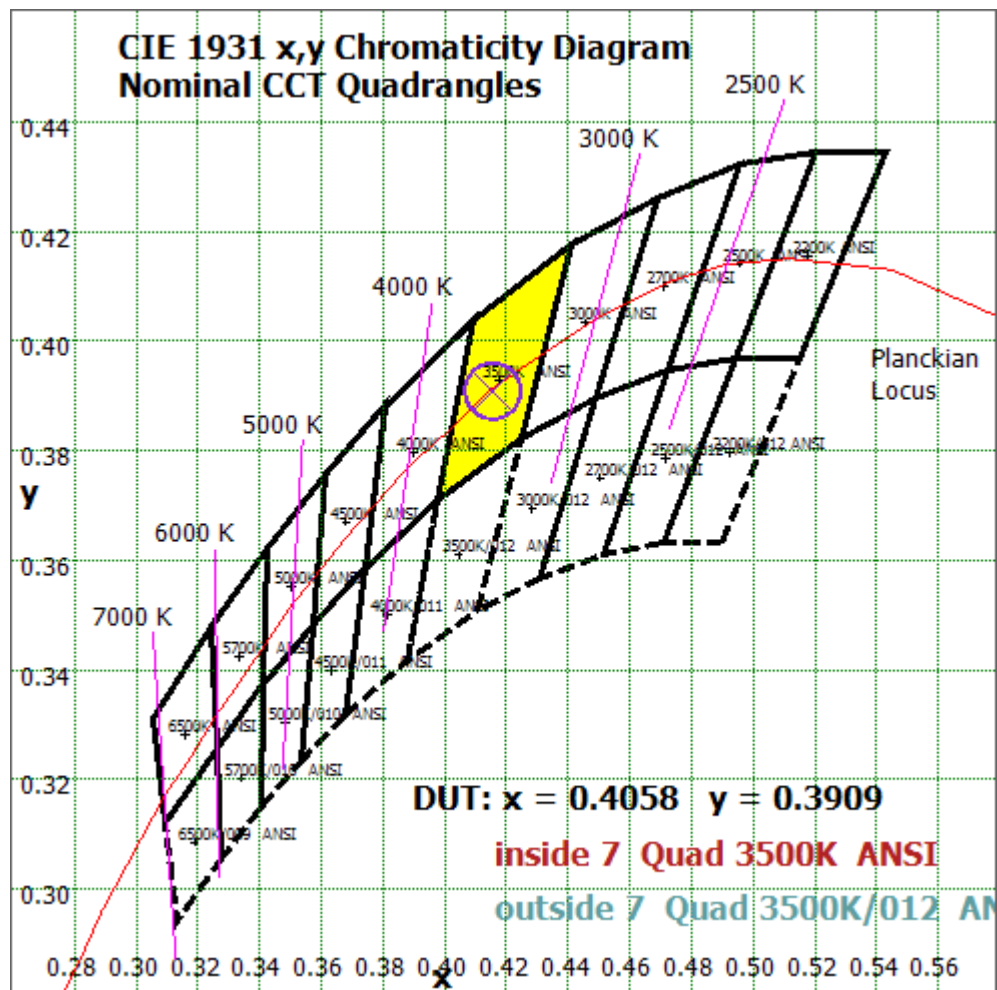


Chart 3: Plot of Lamp x/y coordinates on CIE 1931 Chromaticity Diagram

Color Rendition Report – Sphere Spectroradiometer Method

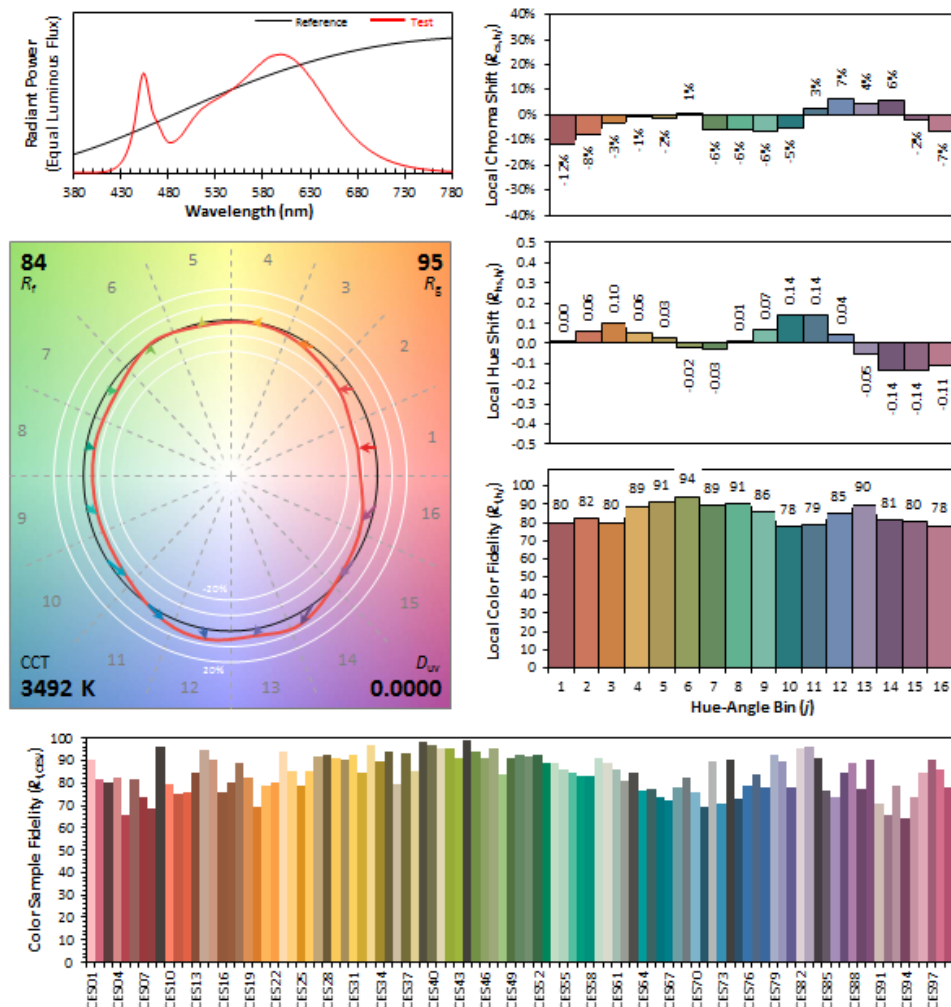
ANSI/IES TM-30-18 Color Rendition Report

Source: LED

Manufacturer: GREEN CREATIVE LTD

Date: 2023/03/30

Model: 12T8/3F/835/UEB



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

x 0.4058
 y 0.3909
 u' 0.2359
 v' 0.5114

CIE 13.3-1995
 (CRI)
 R_a 83
 R_g 13

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	26.673	1.70%
10- 20	77.04	4.91%
20- 30	118.861	7.58%
30- 40	148.319	9.46%
40- 50	163.758	10.44%
50- 60	165.736	10.57%
60- 70	156.371	9.97%
70- 80	139.528	8.90%
80- 90	120.515	7.68%
90-100	104.229	6.65%
100-110	89.838	5.73%
110-120	76.506	4.88%
120-130	63.491	4.05%
130-140	49.881	3.18%
140-150	36.217	2.31%
150-160	22.085	1.41%
160-170	8.199	0.52%
170-180	1.115	0.07%
Total	1568.4	100%

$\gamma(^{\circ})$	Lumens	% Total
0- 60	700.387	44.66%
60- 90	416.414	26.55%
0-90	1116.8	71.21%
90- 180	451.561	28.79%
0- 180	1568.4	100%

Table 5: Zonal Lumen

Illuminance Plots- Goniophotometer Method

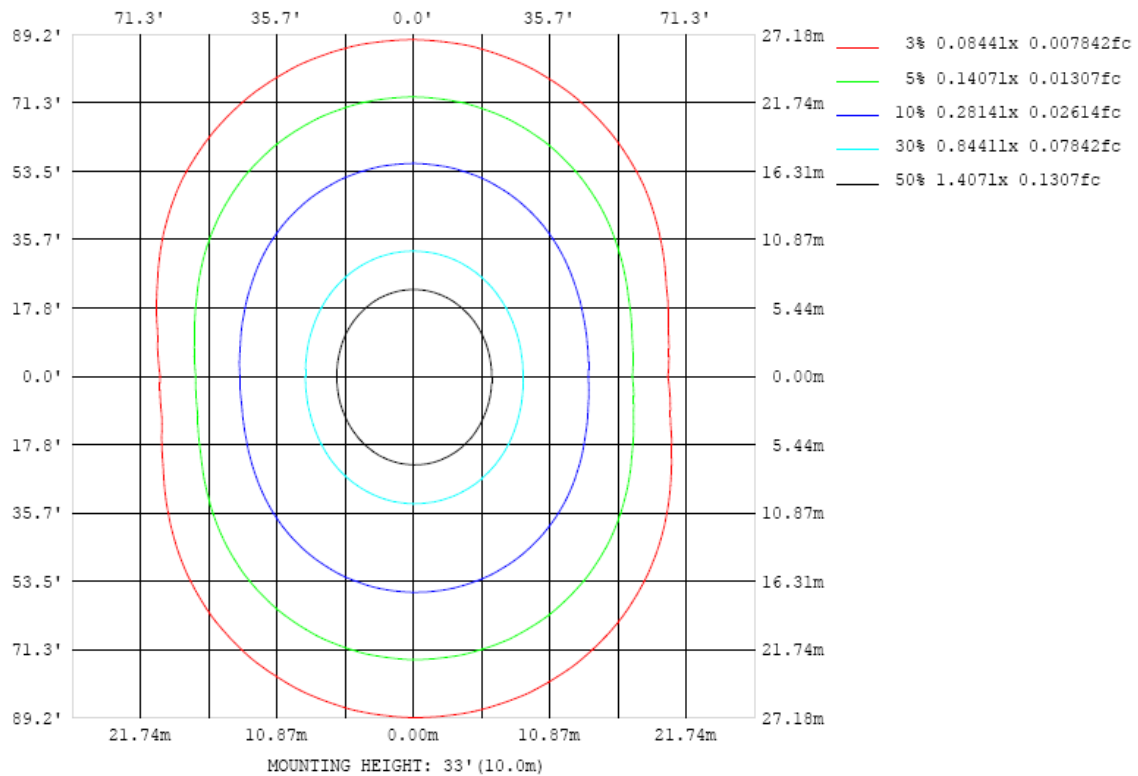


Chart 5: Illuminance Plot (Footcandles)

Luminous Intensity Distribution Plots- Goniophotometer Method

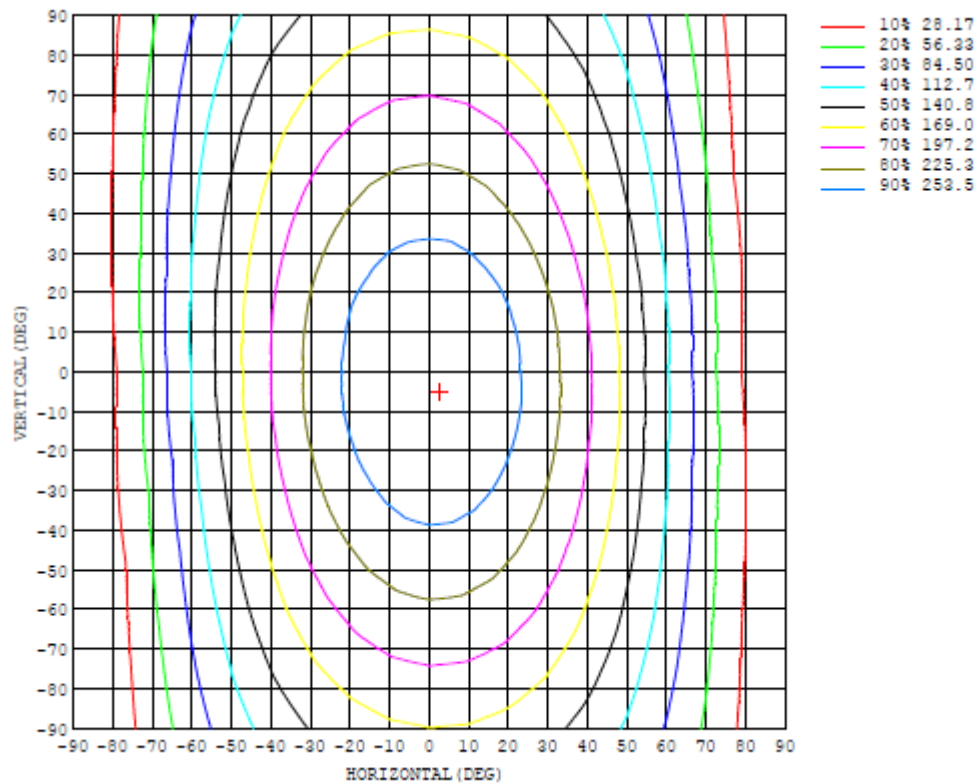


Chart 6: Isocandela Plot

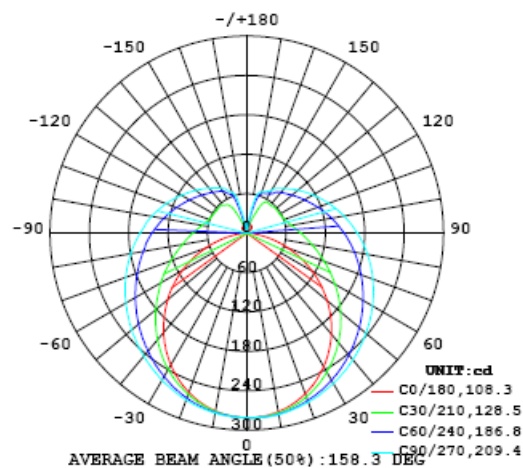


Chart 7: Polar Candela Distribution

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	281	281	281	281	281	281	281	281	281	281	281	281	281	281	281	281	281	281	281
5	280	280	281	281	281	281	281	282	282	281	281	281	281	281	280	280	280	279	279
10	276	277	277	278	279	279	280	280	281	280	280	280	279	278	278	277	276	275	275
15	269	270	271	273	274	276	276	277	278	278	277	276	275	274	273	271	270	268	268
20	260	261	263	265	267	269	271	273	274	274	273	271	270	267	265	263	261	259	258
25	249	250	253	256	259	262	265	268	269	269	268	266	263	259	256	253	249	247	246
30	235	237	240	244	249	254	258	262	264	264	263	260	256	250	245	240	236	233	232
35	219	221	226	231	238	245	251	255	258	258	256	253	247	240	233	226	221	216	216
40	201	204	209	217	226	235	242	248	251	252	250	245	238	229	220	211	204	199	197
45	181	185	192	202	214	224	233	240	244	245	242	237	229	218	207	196	186	180	178
50	160	165	174	187	200	213	224	232	237	237	234	228	218	207	193	179	167	159	157
55	138	144	156	171	187	202	214	223	229	230	226	219	208	194	178	162	147	138	136
60	115	122	137	155	174	191	205	215	221	221	218	210	198	183	165	145	128	116	113
65	91.1	100.0	118	140	161	180	195	206	212	213	210	201	189	172	151	129	108	92.9	90.3
70	67.4	78.5	101	126	149	170	186	197	203	205	201	193	179	161	139	114	89.7	70.9	67.1
75	44.9	59.3	84.5	113	138	159	176	188	195	196	192	183	169	151	127	101	72.8	50.6	44.6
80	24.0	41.8	70.9	101	128	150	166	179	186	187	183	174	160	141	117	88.9	59.2	32.0	24.2
85	7.32	28.8	60.8	91.0	118	140	157	169	176	178	174	165	151	132	108	79.1	48.0	18.1	8.25
90	0.65	21.3	52.6	82.6	109	131	148	161	167	169	165	156	142	123	99.4	71.1	40.6	11.3	1.46
95	0.33	15.8	46.0	75.2	101	123	140	152	158	160	156	147	134	115	92.2	65.8	36.3	10.2	0.21
100	0.37	14.5	41.0	69.0	94.1	115	131	143	149	150	147	139	126	108	86.1	61.4	34.5	11.5	0.16
105	0.40	16.0	38.8	64.5	87.7	108	123	134	140	142	138	131	118	101	80.8	58.3	34.4	14.8	0.17
110	0.46	18.4	38.5	61.3	82.1	101	115	126	132	133	130	123	111	95.3	76.4	56.3	33.9	18.9	0.21
115	0.59	21.5	39.4	59.2	77.9	94.9	108	118	123	125	122	115	104	90.0	73.1	54.1	34.3	23.3	0.46
120	1.73	24.8	40.9	58.1	74.5	89.7	102	110	115	116	114	108	98.0	85.4	70.2	52.9	39.7	27.8	1.76
125	4.51	22.9	42.8	57.8	71.9	85.1	95.6	103	108	109	107	101	92.5	81.1	66.4	53.4	42.4	30.9	4.67
130	7.74	13.8	44.6	57.9	69.7	81.1	90.1	96.9	101	102	99.5	94.8	86.2	75.1	66.0	54.0	45.4	31.0	8.11
135	10.5	9.42	46.7	57.3	68.9	77.7	85.2	90.9	94.2	94.9	92.3	87.0	81.6	74.2	65.7	54.0	46.1	23.2	10.4
140	12.2	7.35	44.3	55.8	64.3	74.4	80.8	85.5	88.0	88.5	87.1	83.8	78.7	71.8	61.6	55.4	47.6	17.9	10.9
145	13.4	7.90	35.1	56.3	63.0	68.5	75.7	80.4	82.7	83.1	82.1	79.1	73.1	67.1	61.3	56.1	47.1	14.3	11.4
150	13.8	8.15	21.0	54.4	62.4	66.7	70.5	72.6	74.5	74.9	73.9	71.8	68.9	64.9	61.1	56.2	38.7	11.1	11.4
155	13.4	9.80	13.1	39.2	60.4	64.5	66.9	68.5	69.6	69.6	68.8	68.2	66.3	63.2	59.9	50.2	24.8	8.38	12.0
160	12.7	12.5	11.3	20.0	43.5	59.3	64.5	66.0	66.7	66.9	66.4	65.7	64.0	60.9	49.2	33.2	15.8	7.61	12.3
165	12.3	11.8	9.01	14.7	19.9	33.8	46.5	55.5	59.1	60.3	59.8	57.6	52.0	40.4	27.8	16.7	8.62	7.92	12.2
170	11.9	15.8	11.3	9.55	11.7	16.6	19.5	21.5	24.3	26.4	26.3	23.4	19.6	15.4	10.4	7.64	8.18	8.58	12.5
175	11.9	15.1	16.1	15.3	13.6	11.5	10.2	10.6	11.1	10.5	7.51	6.97	8.82	10.00	11.6	13.0	9.65	9.02	14.6
180	15.8	15.3	14.9	13.6	12.1	10.9	11.1	10.0	1.07	1.77	3.05	10.4	11.0	11.2	11.3	11.7	12.0	12.6	15.9

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	281	281	281	281	281	281	281	281	281	281	281	281	281	281	281	281	281		
5	280	280	279	280	280	280	280	280	281	280	280	280	280	280	280	280	280		
10	275	275	276	276	277	277	278	278	278	278	278	278	277	277	277	276	276		
15	268	269	269	271	272	273	274	275	275	275	274	274	273	272	271	270	269		
20	258	260	261	264	266	267	269	270	270	270	269	268	266	265	263	261	261		
25	247	248	251	255	258	260	263	265	265	264	263	261	258	256	253	251	249		
30	233	235	240	244	248	252	256	258	258	258	256	253	249	245	241	238	235		
35	217	221	226	232	238	244	248	251	252	251	248	244	238	233	227	223	220		
40	200	205	212	220	228	234	240	244	244	243	240	234	227	219	212	206	202		
45	181	188	197	207	217	225	232	236	237	235	231	224	215	206	196	188	183		
50	161	170	181	194	206	216	223	228	229	227	222	214	204	192	180	169	162		
55	142	153	166	181	195	206	215	220	221	218	213	204	192	178	163	151	142		
60	121	134	152	168	184	196	206	212	213	210	204	194	180	164	147	131	120		
65	99.7	117	137	156	173	187	197	204	205	202	195	184	169	152	131	111	96.9		
70	78.8	99.7	123	145	163	178	189	195	196	194	186	174	158	139	116	92.2	74.0		
75	59.6	84.6	111	135	154	169	180	187	188	185	177	165	149	127	102	75.0	52.3		
80	43.1	71.6	99.9	125	146	160	172	179	180	177	169	156	139	117	89.9	60.2	33.4		
85	30.8	61.2	90.5	116	137	153	163	170	171	168	160	148	130	108	79.8	48.8	19.2		
90	23.3	53.3	82.3	108	129	145	155	161	163	160	153	140	122	99.3	71.9	41.3	12.1		
95	18.0	46.9	75.3	100	121	137	148	154	155	153	145	132	114	92.2	65.8	37.0	11.0		
100	16.5	42.4	69.5	93.5	114	129	140	146	147	144	137	125	107	86.3	61.5	35.2	12.9		
105	17.6	40.1	64.7	87.5	107	121	132	138	139	136	129	117	101	81.3	58.5	35.1	16.4		
110	19.5	39.8	61.5	82.3	100	114	124	130	131	128	121	110	95.3	77.0	56.6	36.3	20.8		
115	21.7	40.4	59.6	78.3	94.6	107	117	122	123	121	114	104	90.1	73.6	55.7	38.4	25.4		
120	22.9	41.5	58.5	74.9	89.6	101	109	114	115	113	107	98.0	85.5	71.0	55.5	41.1	30.1		
125	16.7	43.2	57.9	72.2	85.1	95.2	103	107	108	106	101	92.4	81.5	69.1	56.0	44.0	30.2		
130	6.16	42.9	57.8	70.1	81.2	90.0	96.6	101	101	99.5	94.9	87.6	78.2	67.7	56.7	46.5	22.6		
135	4.77	42.3	58.0	68.4	77.8	85.4	91.0	94.4	95.1	93.4	89.5	83.3	75.4	66.7	57.8	48.1	14.8		
140	5.41	39.2	55.7	67.2	75.0	81.2	85.9	88.7	89.2	87.8	84.5	79.5	73.1	66.1	58.1	44.4	9.92		
145	6.22	22.8	53.1	64.8	72.5	77.4	81.2	83.6	84.0	82.8	80.2	76.2	70.9	64.7	57.0	34.6	7.36		
150	6.83	11.9	45.3	60.0	67.5	73.8	77.1	79.0	79.2	78.4	76.4	72.4	65.4	60.1	49.1	23.5	7.02		
155	11.7	7.79	21.2	47.3	62.4	66.2	69.6	72.2	72.7	71.4	68.7	65.0	62.3	55.6	35.6	14.6	7.31		
160	14.4	7.32	9.60	19.4	38.4	57.5	63.7	65.6	65.7	65.2	64.5	60.6	53.3	38.2	20.8	8.48	7.71		
165	15.1	11.9	8.21	8.27	10.1	16.1	32.2	41.3	46.1	46.3	41.9	36.4	28.3	18.8	11.6	6.61	7.74		
170	12.8	16.3	11.5	10.4	7.08	5.17	6.77	13.6	14.3	15.1	14.6	13.4	10.9	6.24	7.62	7.55	8.15		
175	14.5	13.4	15.1	15.6	14.4	13.2	11.0	10.4	9.87	13.7	13.2	10.2	8.77	9.36	11.1	12.5	12.7		
180	16.7	15.8	15.1	14.3	12.8	11.4	10.9	8.53	2.94	2.13	3.61	9.27	10.4	11.3	11.6	12.0	12.2		

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 Tubes) 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 Tubes) 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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