LM-79-08 TEST REPORT

for

GREEN CREATIVE LTD

756 North Zhongshan Rd., Unit B301 Zhabei District, Shanghai

LED Tube

Model: 6PLV/830/DIR/R

Laboratory: Leading Testing Laboratories

NVLAP CODE: 200960-0

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Report No.: HZ19060003g

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

Review by:

Engineer: April Zou
Jun. 10, 2019

Approved by:

Manager: Jim Zhang
Jun. 10, 2019

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: **6PLV/830/DIR/R**

Luminous Efficacy (Lumens /Watt)	Total Luminous Flux (Lumens)	Power (Watts)/2	Power Factor
96.6	714.2	7.39	0.9966

CCT (K)	CRI	Stabilization Time (Light & Power)
3058	82.5	60

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. 04, 2019

Date of Test : Jun. 05, 2019

Test item : Total Luminous Flux, Luminous Distribution Intensity, Luminous Efficacy, Correlated Color Temperature, Color Rendering Index, Chromaticity Coordinate, Electrical parameters

Reference Standard : IESNA LM-79-2008 Approved Method for the 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

SAMPLE PHOTO

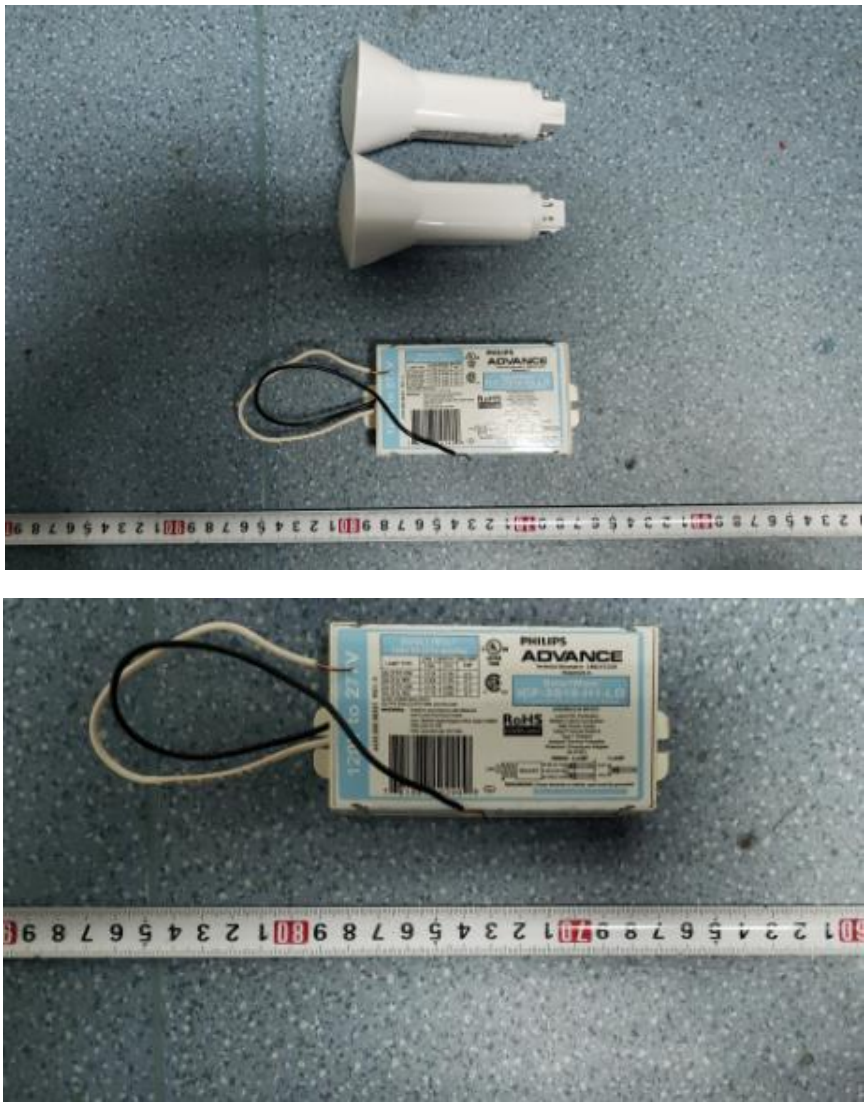


Figure 1- Overview of the sample

Equipment Under Test(EUT)	
Name	: LED Tube
Model	: 6PLV/830/DIR/R
Electrical Ratings	: 120-277V, 60Hz, 6W
Product Description	: 3000K LED Tubes supplied by a high frequency fluorescent lamp ballast: ICF-2S18-H1-LD
Manufacturer	: GREEN CREATIVE LTD
Address	: 756 North Zhongshan Rd., Unit B301 Zhabei District, Shanghai

TEST RESULTS

Test ambient temperature was 25.0 ℃.

Base orientation was light down. Test was conducted without a dimmer in the circuit.

The stabilization time of the sample was 60 minutes, and the total operating time including stabilization was 65 minutes.

Sphere-Spectroradiometer Method

Parameter	Result	
Test Voltage (V)	120.0	277.0
Voltage frequency (Hz)	60	60
Test Current (A)	0.124	0.057
Power Factor	0.9966	0.9638
Test Power (W)/2	7.39	7.60
THD A%	6.43	9.75
Luminous Efficacy (lm/W)	96.6	94.2
Total Luminous Flux (lm)	714.2	715.5
Color Rendering Index (CRI)	82.5	
R9	7.1	
Correlated Color Temperature (CCT)(K)	3058	
Chromaticity Chroma x	0.4330	
Chromaticity Chroma y	0.4032	
Chromaticity Chroma u	0.2484	
Chromaticity Chroma v	0.3470	
Duv	0.0002	
Chromaticity Chroma u ’	0.2484	
Chromaticity Chroma v’	0.5204	

Special Color Rendering Indices	
R1	81.3
R2	92.5
R3	94.5
R4	79.2
R5	81.5
R6	91
R7	81.8
R8	58.4
R9	7.1
R10	82.8
R11	78.1
R12	72.4
R13	84.2
R14	97.7

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 ℃.

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)	0.124
Power Factor	0.9968
Power (W)/2	7.42
Luminous Efficacy (lm/W)	97.6
Total Luminous Flux (lm)	724.1
Beam Angle (°)	106.6 (0^o-180^o) / 107.0 (90^o-270^o)
Center Beam Candle Power (cd)	259
Maximum Beam Candle Power (cd)	259.2 (At: C=350.0, Gamma=0.5)
Spacing Criteria	1.24 (0^o-180^o) / 1.24 (90^o-270^o)
Zonal Lumens in the 0 °-60 °Zone	77.44%
Zonal Lumens in the 60 °-90 °Zone	21.29%
Zonal Lumens in the 90 °-120 °Zone	1.19%
Zonal Lumens in the 120 °-180 °Zone	0.08%

Table 3: Test data per Goniophotometer Method

Spectral Power Distribution - Sphere Spectroradiometer Method

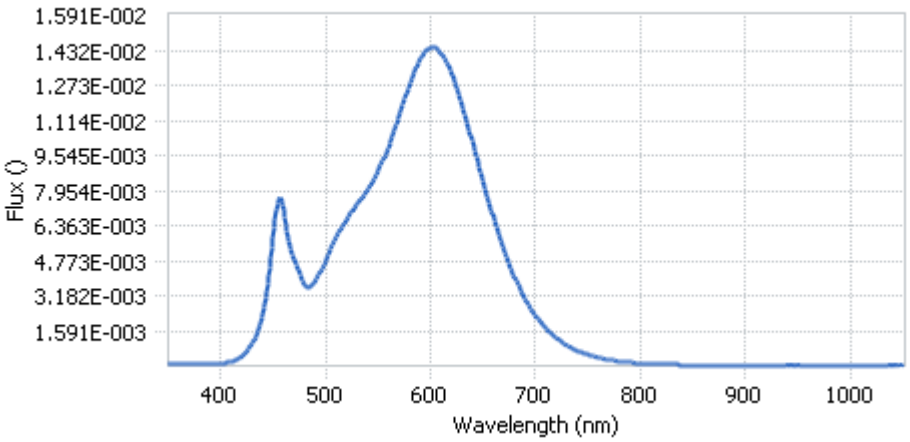
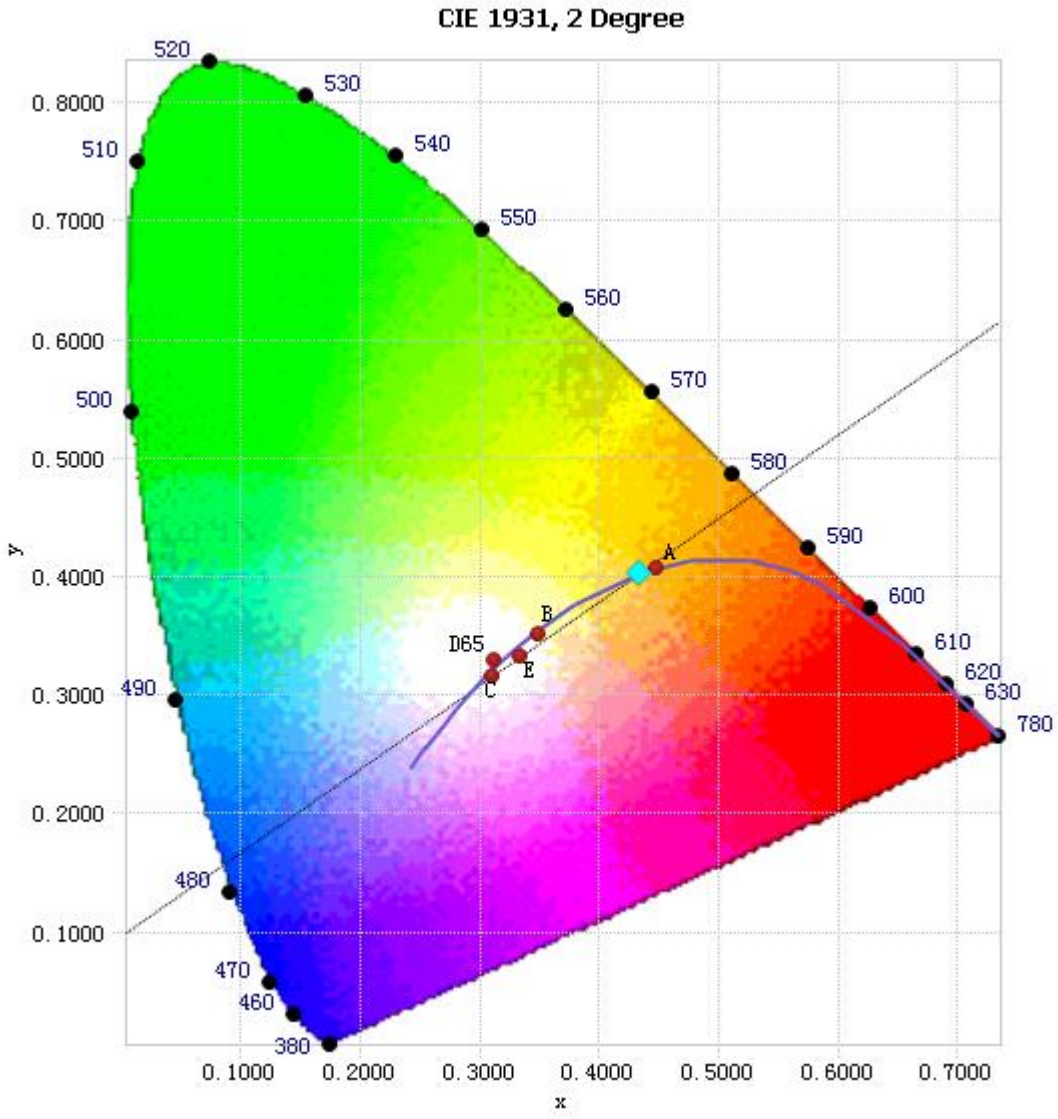


Chart 1: Spectral Power Distribution

Spectral Distribution over Visible Wavelength							
WL(nm)	Radiant(Watts)	WL(nm)	Radiant(Watts)	WL(nm)	Radiant(Watts)	WL(nm)	Radiant(Watts)
380	9.68E-05	485	3.58E-03	590	1.39E-02	695	2.63E-03
385	9.60E-05	490	3.85E-03	595	1.43E-02	700	2.28E-03
390	1.01E-04	495	4.24E-03	600	1.44E-02	705	1.96E-03
395	1.14E-04	500	4.75E-03	605	1.44E-02	710	1.69E-03
400	1.16E-04	505	5.33E-03	610	1.42E-02	715	1.45E-03
405	1.33E-04	510	5.82E-03	615	1.38E-02	720	1.26E-03
410	1.85E-04	515	6.30E-03	620	1.32E-02	725	1.07E-03
415	2.76E-04	520	6.68E-03	625	1.26E-02	730	9.25E-04
420	4.30E-04	525	7.01E-03	630	1.18E-02	735	7.95E-04
425	6.63E-04	530	7.33E-03	635	1.10E-02	740	6.81E-04
430	1.03E-03	535	7.64E-03	640	1.02E-02	745	5.79E-04
435	1.57E-03	540	8.01E-03	645	9.24E-03	750	5.04E-04
440	2.40E-03	545	8.40E-03	650	8.34E-03	755	4.29E-04
445	3.71E-03	550	8.86E-03	655	7.52E-03	760	3.72E-04
450	5.78E-03	555	9.38E-03	660	6.73E-03	765	3.19E-04
455	7.57E-03	560	9.95E-03	665	5.95E-03	770	2.79E-04
460	7.07E-03	565	1.06E-02	670	5.25E-03	775	2.41E-04
465	5.61E-03	570	1.14E-02	675	4.61E-03	780	2.08E-04
470	4.87E-03	575	1.21E-02	680	4.04E-03		
475	4.23E-03	580	1.28E-02	685	3.52E-03		
480	3.66E-03	585	1.34E-02	690	3.04E-03		

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

Chromaticity Diagram - Sphere Spectroradiometer Method



Tristimulus values(x, y): (0.4330, 0.4032)

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

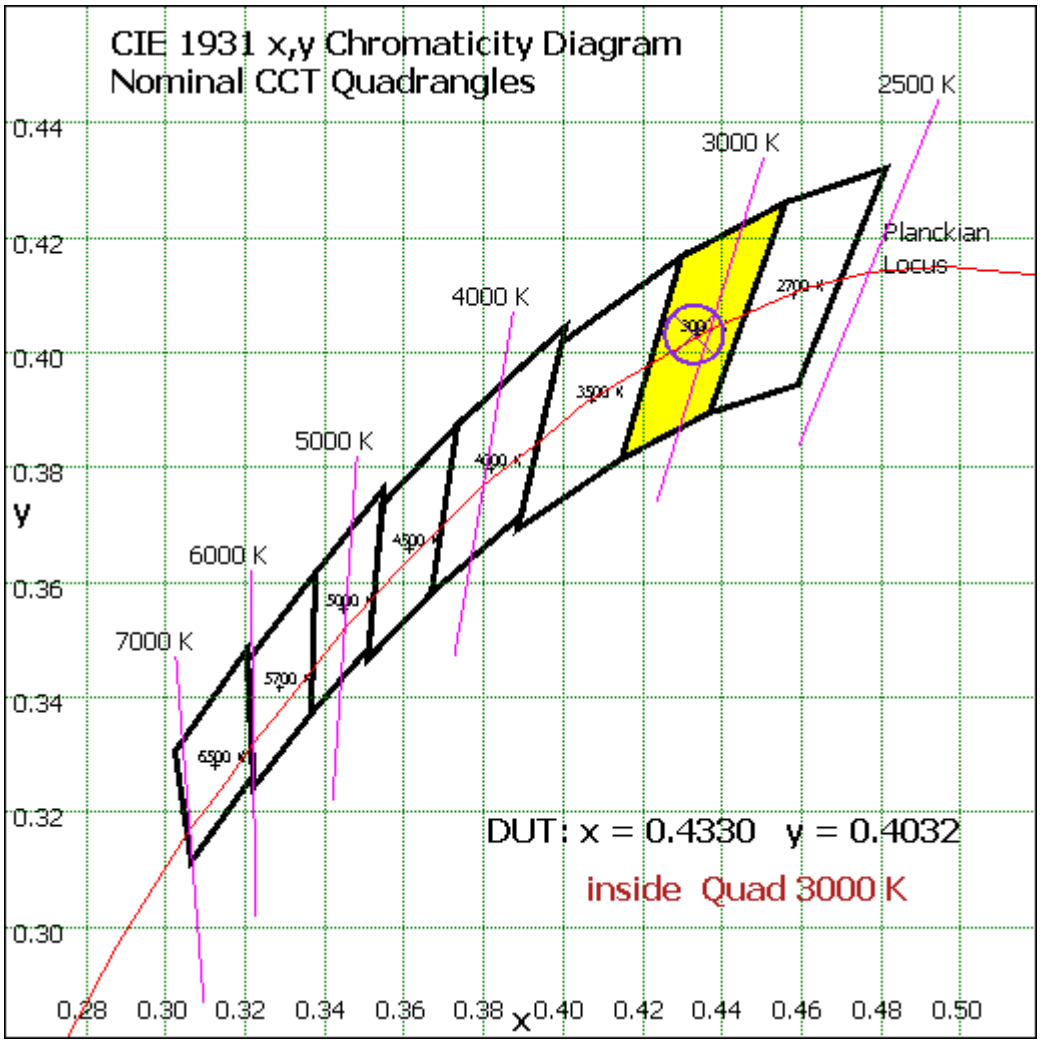
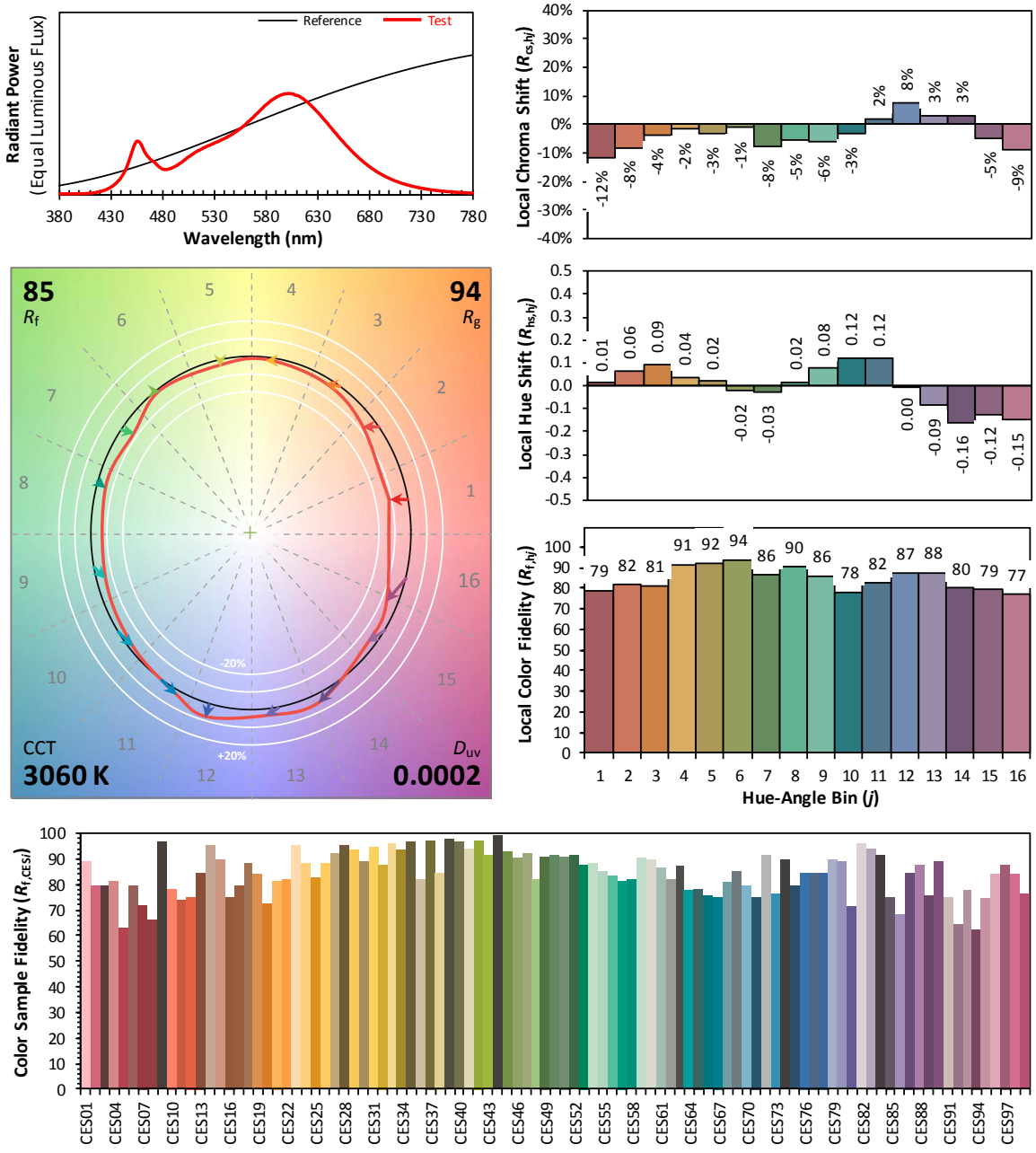


Chart 3: Plot of Lamp x/y coordinates on CIE 1931 Chromaticity Diagram

Color Rendition Report – Sphere Spectroradiometer Method



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

x	0.4330
y	0.4032
u'	0.2484
v'	0.5205

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

γ(°)	Lumens	% Total
0- 10	24.506	3.38%
10- 20	70.067	9.68%
20- 30	105.347	14.55%
30- 40	124.865	17.24%
40- 50	126.05	17.41%
50- 60	109.866	15.17%
60- 70	81.504	11.26%
70- 80	49.48	6.83%
80- 90	23.173	3.20%
90-100	7.284	1.01%
100-110	1.192	0.16%
110-120	0.137	0.02%
120-130	0.101	0.01%
130-140	0.129	0.02%
140-150	0.139	0.02%
150-160	0.12	0.02%
160-170	0.08	0.01%
170-180	0.028	0.00%
Total	724.1	100%

γ(°)	Lumens	% Total
0- 60	560.701	77.44%
60- 90	154.157	21.29%
0-90	714.858	98.73%
90- 180	9.21	1.27%
0- 180	724.1	100%

Table 5: Zonal Lumen

Illuminance Plots- Goniophotometer Method

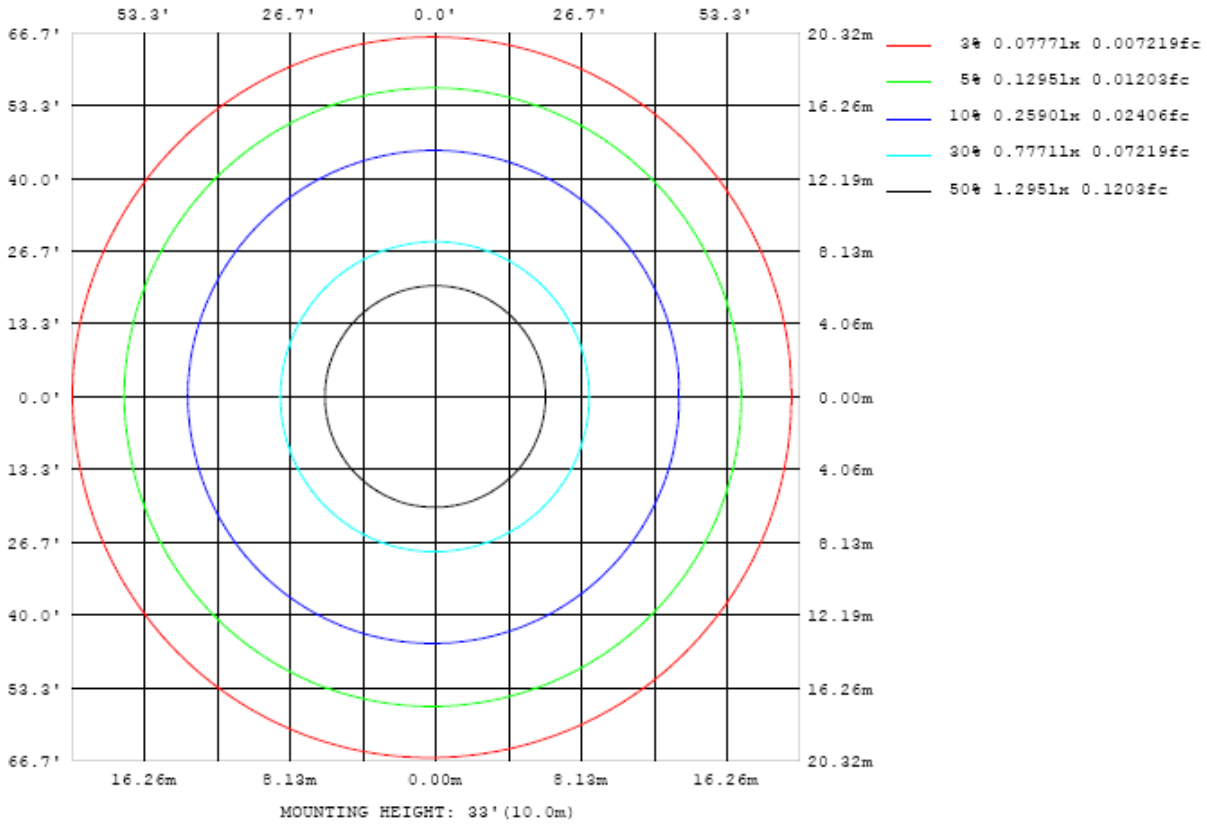


Chart 5: Illuminance Plot (Footcandles)

Luminous Intensity Distribution Plots- Goniophotometer Method

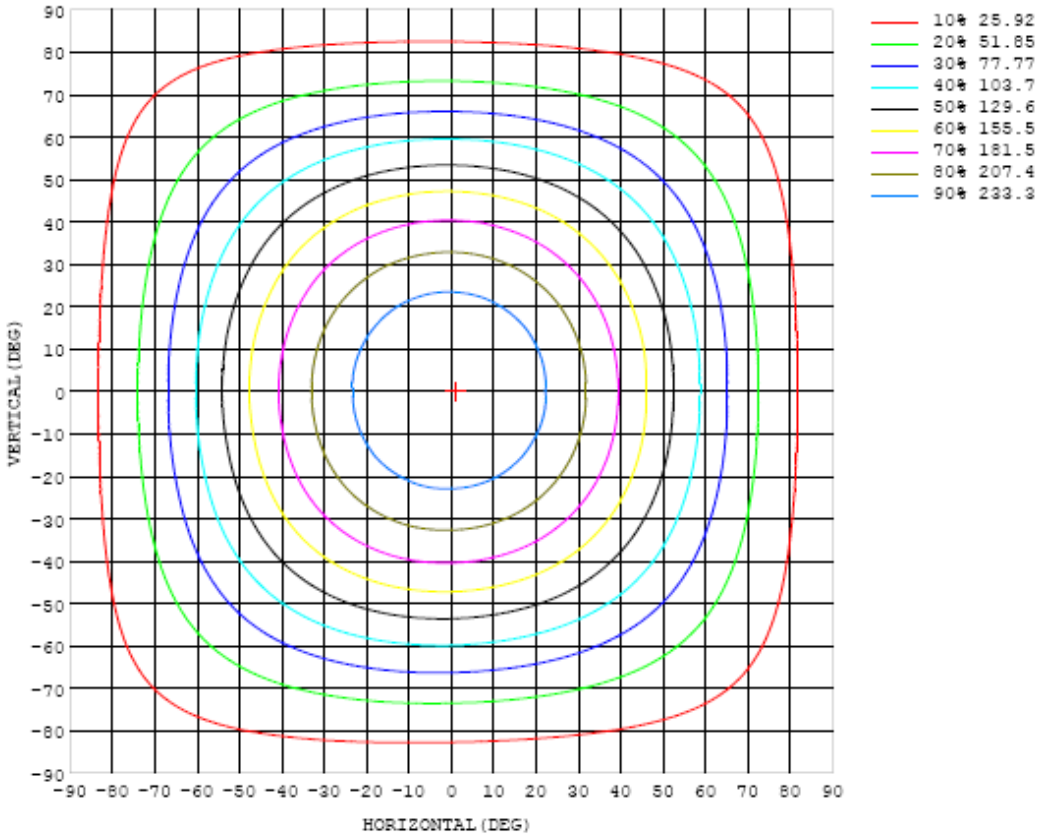


Chart 6: Isocandela Plot

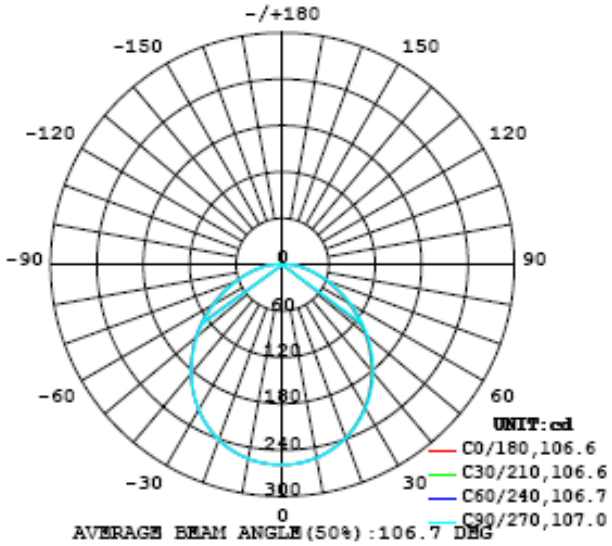


Chart 7: Polar Candela Distribution

Luminous Intensity Data- Goniophotometer Method

Table--1 UNIT: cd

γ (DEG) \ C (DEG)	0	10	20	30	40	50	60	70	80	90	100	110	120	130	140	150	160	170	180
0	259	259	259	259	259	259	259	259	259	259	259	259	259	259	259	259	259	259	259
5	258	258	258	258	258	257	258	258	258	258	258	258	258	258	258	258	258	258	258
10	254	254	254	254	254	254	254	254	254	254	254	254	254	254	255	255	255	255	255
15	247	248	247	247	247	248	248	248	248	248	248	248	248	248	249	249	249	249	249
20	238	238	238	238	239	239	239	239	239	239	240	240	240	240	240	240	240	240	241
25	227	227	227	227	227	227	228	228	228	229	229	229	229	229	230	230	230	230	230
30	213	213	213	213	213	214	214	214	215	215	216	216	216	216	217	217	216	216	217
35	197	197	197	197	198	198	199	199	200	200	201	201	201	202	202	202	201	201	201
40	179	179	180	180	180	181	181	182	182	183	184	184	184	185	185	185	185	184	184
45	160	160	160	161	161	161	162	163	163	164	165	166	166	166	166	166	166	166	166
50	139	140	140	141	141	141	142	143	143	144	145	146	146	146	147	146	146	146	147
55	119	119	119	120	120	121	121	122	123	124	124	125	126	126	126	126	126	126	126
60	98.3	98.7	99.0	99.2	99.6	100	101	101	102	103	104	105	105	105	105	105	105	105	106
65	78.4	78.8	79.0	79.2	79.6	80.1	80.7	81.2	82.0	82.8	83.6	84.4	84.9	85.2	85.3	85.3	85.1	85.0	85.5
70	60.3	60.6	60.8	60.9	61.3	61.7	62.2	62.7	63.3	64.1	64.9	65.6	66.0	66.1	66.4	66.6	66.3	66.3	66.2
75	43.8	43.9	44.1	44.3	44.5	44.8	45.2	45.7	46.2	46.9	47.5	48.2	48.6	48.8	48.9	49.0	48.9	48.9	48.9
80	30.0	30.1	30.2	30.3	30.5	30.8	31.1	31.6	32.0	32.4	33.0	33.5	33.8	34.1	34.2	34.2	34.2	34.2	34.2
85	19.1	19.2	19.2	19.3	19.4	19.7	19.9	20.2	20.6	21.0	21.4	21.8	22.1	22.3	22.4	22.4	22.4	22.4	22.4
90	11.0	11.0	11.1	11.1	11.3	11.4	11.6	11.8	12.0	12.3	12.6	12.9	13.2	13.3	13.4	13.5	13.5	13.5	13.5
95	5.37	5.40	5.45	5.52	5.60	5.70	5.87	5.98	6.11	6.33	6.56	6.79	6.95	7.09	7.18	7.22	7.22	7.21	7.12
100	2.17	2.19	2.22	2.25	2.30	2.35	2.41	2.47	2.54	2.63	2.75	2.85	2.96	3.05	3.13	3.16	3.18	3.17	3.18
105	0.77	0.78	0.79	0.80	0.82	0.83	0.86	0.87	0.90	0.93	0.97	1.00	1.04	1.07	1.11	1.13	1.14	1.14	1.14
110	0.28	0.28	0.28	0.29	0.29	0.30	0.30	0.31	0.32	0.32	0.33	0.34	0.36	0.37	0.38	0.39	0.40	0.40	0.40
115	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.09	0.09	0.09	0.09	0.09	0.10	0.11	0.11	0.11	0.11	0.12
120	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09
125	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.10	0.11	0.11	0.10	0.10	0.11	0.11
130	0.13	0.13	0.13	0.13	0.13	0.13	0.13	0.13	0.13	0.13	0.13	0.13	0.13	0.13	0.13	0.13	0.12	0.13	0.14
135	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.18
140	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.22
145	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.25
150	0.21	0.21	0.21	0.21	0.21	0.21	0.21	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.21	0.28
155	0.23	0.22	0.22	0.22	0.22	0.22	0.22	0.22	0.22	0.22	0.22	0.22	0.22	0.22	0.22	0.22	0.22	0.22	0.30
160	0.24	0.24	0.24	0.24	0.24	0.24	0.24	0.24	0.24	0.24	0.24	0.24	0.24	0.24	0.24	0.24	0.24	0.24	0.31
165	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.31
170	0.27	0.26	0.27	0.26	0.26	0.26	0.27	0.26	0.26	0.26	0.26	0.26	0.26	0.26	0.26	0.26	0.26	0.27	0.31
175	0.29	0.29	0.29	0.29	0.29	0.29	0.29	0.29	0.29	0.29	0.29	0.29	0.29	0.29	0.29	0.29	0.29	0.29	0.30
180	0.29	0.29	0.29	0.29	0.29	0.29	0.29	0.29	0.29	0.29	0.29	0.29	0.29	0.29	0.29	0.29	0.29	0.29	0.29

Table 6: Luminous Intensity Data

Table--2 UNIT: cd

γ (DEG) \ C (DEG)	190	200	210	220	230	240	250	260	270	280	290	300	310	320	330	340	350		
0	259	259	259	259	259	259	259	259	259	259	259	259	259	259	259	259	259		
5	258	258	258	258	258	258	258	258	258	258	258	258	258	258	258	258	258		
10	255	255	255	255	255	255	255	255	255	255	255	254	254	254	254	254	254		
15	249	249	249	249	249	249	249	249	249	249	249	248	248	248	248	248	247		
20	241	241	241	241	241	241	241	241	241	241	240	240	240	239	239	239	239		
25	230	230	230	230	230	230	230	230	230	229	229	229	228	228	228	227	227		
30	217	217	217	217	217	217	217	216	216	216	216	215	214	214	214	214	213		
35	201	201	201	201	201	201	201	201	201	200	200	199	199	198	198	197	197		
40	184	184	184	184	184	184	183	183	183	183	182	181	180	180	180	179	179		
45	166	165	165	165	165	165	164	164	164	163	163	162	161	161	161	160	160		
50	147	146	146	145	145	145	145	144	144	143	143	142	141	141	141	140	140		
55	126	126	125	125	124	124	124	123	123	122	122	121	121	120	120	120	120		
60	105	105	104	104	104	103	103	102	102	101	101	101	99.9	99.4	99.1	99.0	98.9		
65	85.3	84.9	84.4	83.9	83.5	83.2	82.7	82.3	81.8	81.5	81.0	80.6	80.0	79.6	79.3	79.1	79.1		
70	66.1	65.8	65.3	65.0	64.6	64.3	63.9	63.4	62.9	62.5	62.2	61.7	61.2	60.8	60.5	60.4	60.4		
75	48.8	48.5	48.1	47.8	47.5	47.2	46.9	46.4	46.1	45.7	45.4	45.0	44.6	44.2	43.9	43.9	43.8		
80	34.1	33.9	33.6	33.3	33.1	32.9	32.6	32.2	32.0	31.7	31.4	31.1	30.7	30.5	30.2	30.1	30.1		
85	22.3	22.2	21.9	21.7	21.5	21.3	21.1	20.9	20.7	20.4	20.2	20.0	19.7	19.5	19.3	19.2	19.2		
90	13.3	13.2	13.0	12.9	12.7	12.5	12.4	12.2	12.1	11.9	11.7	11.6	11.4	11.2	11.1	11.0	11.0		
95	7.08	7.00	6.89	6.77	6.65	6.52	6.39	6.28	6.17	6.05	5.95	5.85	5.76	5.66	5.56	5.49	5.44		
100	3.15	3.11	3.04	2.95	2.87	2.78	2.70	2.62	2.55	2.49	2.43	2.38	2.34	2.29	2.26	2.23	2.21		
105	1.13	1.10	1.07	1.03	0.99	0.96	0.92	0.89	0.87	0.84	0.83	0.81	0.80	0.80	0.79	0.79	0.79		
110	0.40	0.38	0.37	0.36	0.35	0.34	0.33	0.32	0.31	0.30	0.29	0.29	0.29	0.29	0.29	0.29	0.29		
115	0.12	0.11	0.11	0.10	0.09	0.09	0.09	0.09	0.09	0.08	0.08	0.08	0.08	0.09	0.09	0.09	0.09		
120	0.09	0.09	0.09	0.09	0.09	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10		
125	0.11	0.11	0.11	0.11	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12		
130	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15		
135	0.18	0.18	0.18	0.18	0.18	0.18	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19		
140	0.22	0.22	0.22	0.22	0.22	0.22	0.22	0.22	0.22	0.22	0.22	0.22	0.22	0.22	0.23	0.22	0.23		
145	0.25	0.26	0.26	0.26	0.26	0.26	0.26	0.26	0.26	0.26	0.26	0.26	0.26	0.26	0.26	0.26	0.26		
150	0.28	0.28	0.28	0.28	0.28	0.28	0.28	0.28	0.28	0.28	0.28	0.28	0.28	0.28	0.29	0.28	0.28		
155	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30		
160	0.31	0.31	0.31	0.31	0.31	0.31	0.31	0.31	0.31	0.31	0.31	0.31	0.31	0.31	0.31	0.31	0.31		
165	0.31	0.31	0.31	0.31	0.31	0.31	0.31	0.31	0.31	0.31	0.31	0.31	0.31	0.31	0.31	0.31	0.31		
170	0.31	0.31	0.31	0.31	0.31	0.31	0.31	0.31	0.31	0.31	0.31	0.31	0.31	0.31	0.31	0.31	0.31		
175	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30		
180	0.29	0.29	0.29	0.29	0.29	0.29	0.29	0.29	0.29	0.29	0.29	0.29	0.29	0.29	0.29	0.29	0.29		

Table 7: Luminous Intensity Data

EQUIPMENT LIST

Test Equipment	Model	Equipment No.	Calibration Date	Calibration Due date
Goniophotometer system	GO-R5000	HZTE011-01	Aug. 14, 2018	Aug. 13, 2019
Digital Power Meter	PF2010A	HZTE028-01	Sep. 12, 2018	Sep. 11, 2019
AC Power Supply	DPS1060	HZTE001-06	Aug. 09, 2018	Aug. 08, 2019
DC Power Supply	WY12010	HZTE004-03	Aug. 09, 2018	Aug. 08, 2019
Temperature recorder	JM624U	HZTE018-08	Aug. 09, 2018	Aug. 08, 2019
Temperature and humidity recorder	JR900	HZTE018-01	Aug. 09, 2018	Aug. 08, 2019
Standard source	D908	HZTE012-01	Aug. 14, 2018	Aug. 13, 2019
Integrate Sphere system	3M	HZTE015-04	Aug. 16, 2018	Aug. 15, 2019
Digital Power Meter	WT210	HZTE008-01	Aug. 02, 2018	Aug. 01, 2019
AC Power Supply	PCR 500L	HZTE001-07	Aug. 09, 2018	Aug. 08, 2019
DC Power Supply	IT6154	HZTE004-04	Aug. 09, 2018	Aug. 08, 2019
Standard source	SCL-1400	HZTE012-02	Aug. 16, 2018	Aug. 15, 2019
Temperature and humidity recorder	JR900	HZTE018-02	Aug. 09, 2018	Aug. 08, 2019
Temperature Meter	TES1310	HZTE017-01	Aug. 09, 2018	Aug. 08, 2019

Table 8: 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 Two 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 30 min, taken 15 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.

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The uncertainty of integrating sphere system reported in this document is expended 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 30 min, taken 15 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 expended uncertainty is 2.3% with a coverage factor k=2.

Color Characteristics Measurements

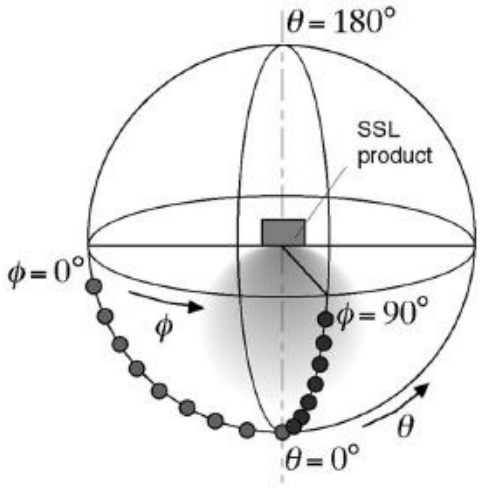
The color characteristics of SSL products include chromaticity coordinates, correlated color temperature, and color rendering index. These characteristics of SSL products may be spatially non-uniform, and thus, in order that they can be specified accurately, the color quantities shall be measured as 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.

Color Spatial Uniformity

The characteristics of SSL products may be spatially non-uniform, the chromaticity coordinate shall be measured at two vertical planes (C=0 °/180 ° and C=90 °/270 °) and at 10 ° or less intervals for vertical angle until the light output dropped to below 10% of the peak intensity. The averaged weighted chromaticity coordinate

was calculated from these points. The data was then analyzed to check for delta color differences of the u', v' chromaticity coordinates. The spatial non-uniformity of chromaticity, Δu'v', is determined as the maximum deviation (distance on the CIE (u', v') diagram) among all measured points from the spatially averaged chromaticity coordinate.

The geometry for the chromaticity measurement using gonio-spectroradiometer is shown as following.



*** End of Report ***