LM-79-19 TEST REPORT

for

RAB Lighting INC

408 W 14th St New York, NY 10014

LED Tube

Model: T8-8-48G-840-SD-BYP

Laboratory: Leading Testing Laboratories

NVLAP CODE: 200960-0

3rd Floor, Bld. 2, NO. 96 Longchuanwu Rd Qianjiang Economy Dev. Zone, YuhangDist,
Hangzhou, Zhejiang Province, China 311100
Tel: +86571 86376106
www.ltlqa.com

Report No.: HZ25030011b

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

Review by: Wei Fei

Engineer: Wei Fei
Mar. 20, 2025

Approve by:

Manager: April Zou
Mar. 20, 2025

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: **T8-8-48G-840-SD-BYP**

Luminous Efficacy (Lumens /Watt)	Total Luminous Flux (Lumens)	Power (Watts)	Power Factor
191.9	1640.6	8.55	0.9769

CCT (K)	CRI	Stabilization Time (Light & Power)
3918	82.1	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. 17, 2025

Date of Test : Mar. 18, 2025

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

SAMPLE PHOTO

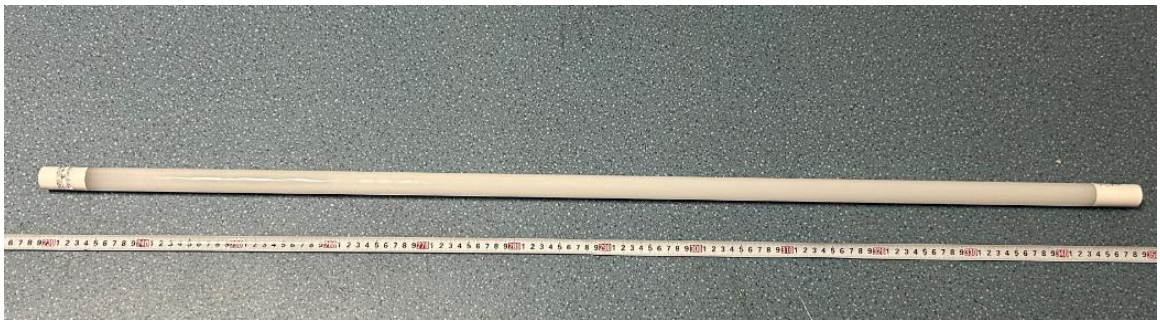


Figure 1- Overview of the sample

Equipment Under Test(EUT)	
Name	: LED Tube
Model	: T8-8-48G-840-SD-BYP
Electrical Ratings	: 120-277V, 50/60Hz, 8.5W
Product Description	: 4000K
Manufacturer	: RAB Lighting INC
Address	: 408 W 14th St New York, NY 10014

TEST RESULTS

Test ambient temperature was 26.0 ℃.

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)	0.073	0.035
Power Factor	0.9769	0.9190
Test Power (W)	8.55	8.82
THD A%	19.37	17.65
Luminous Efficacy (lm/W)	191.9	188.0
Total Luminous Flux (lm)	1640.6	1657.8
Color Rendering Index (CRI)	82.1	
R9	8.1	
Correlated Color Temperature (CCT)(K)	3918	
Chromaticity Chroma x	0.3853	
Chromaticity Chroma y	0.3833	
Chromaticity Chroma u	0.2256	
Chromaticity Chroma v	0.3368	
Duv	0.0017	
Chromaticity Chroma u ’	0.2256	
Chromaticity Chroma v’	0.5052	

Special Color Rendering Indices	
R1	79.8
R2	88.4
R3	94.8
R4	80.1
R5	79.7
R6	83.9
R7	85.9
R8	64.2
R9	8.1
R10	72.5
R11	78.4
R12	58.4
R13	81.6
R14	97.3

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 ℃.

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)	0.073
Power Factor	0.9766
Power (W)	8.57
Luminous Efficacy (lm/W)	193.1
Total Luminous Flux (lm)	1654.7
Beam Angle (°)	111.1 (0^o-180^o) / 203.9 (90^o-270^o)
Center Beam Candle Power (cd)	296
Maximum Beam Candle Power (cd)	297.2 (At: C=240.0, Gamma=3.5)
Spacing Criteria	1.27 (0^o-180^o) / 1.44 (90^o-270^o)
Zonal Lumens in the 0 °-60 °Zone	44.80%
Zonal Lumens in the 60 °-90 °Zone	26.58%
Zonal Lumens in the 90 °-120 °Zone	17.14%
Zonal Lumens in the 120 °-180 °Zone	11.49%

Table 3: Test data per Goniophotometer Method

Spectral Power Distribution - Sphere Spectroradiometer Method

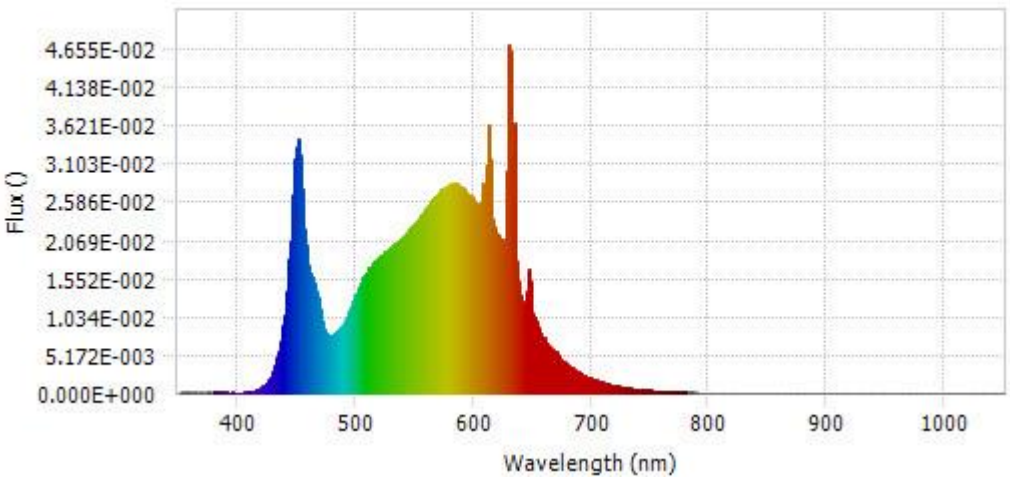
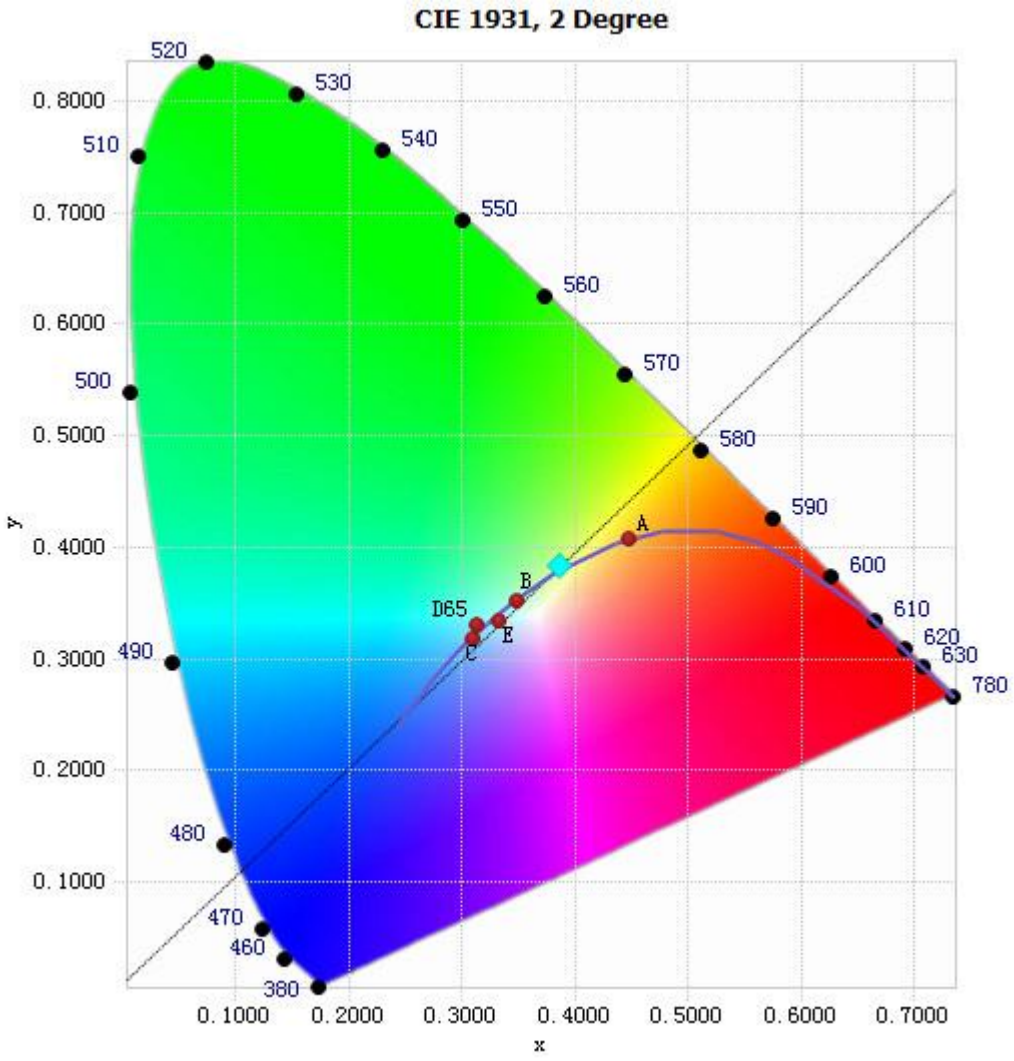


Chart 1: Spectral Power Distribution

Spectral Distribution over Visible Wavelength							
WL(nm)	Radiant(Watts)	WL(nm)	Radiant(Watts)	WL(nm)	Radiant(Watts)	WL(nm)	Radiant(Watts)
380	1.29E-04	485	8.47E-03	590	2.79E-02	695	2.38E-03
385	1.13E-04	490	9.32E-03	595	2.71E-02	700	2.02E-03
390	9.94E-05	495	1.12E-02	600	2.62E-02	705	1.70E-03
395	1.30E-04	500	1.31E-02	605	2.50E-02	710	1.44E-03
400	8.85E-05	505	1.50E-02	610	2.53E-02	715	1.21E-03
405	1.08E-04	510	1.64E-02	615	2.60E-02	720	1.05E-03
410	1.67E-04	515	1.76E-02	620	2.17E-02	725	8.96E-04
415	3.65E-04	520	1.83E-02	625	2.08E-02	730	7.50E-04
420	6.87E-04	525	1.91E-02	630	4.70E-02	735	6.49E-04
425	1.44E-03	530	1.97E-02	635	3.65E-02	740	5.53E-04
430	2.86E-03	535	2.03E-02	640	1.34E-02	745	4.75E-04
435	5.58E-03	540	2.11E-02	645	1.20E-02	750	4.04E-04
440	1.05E-02	545	2.20E-02	650	1.07E-02	755	3.56E-04
445	2.07E-02	550	2.28E-02	655	8.84E-03	760	2.88E-04
450	3.33E-02	555	2.40E-02	660	7.48E-03	765	2.60E-04
455	2.76E-02	560	2.50E-02	665	6.22E-03	770	2.17E-04
460	1.74E-02	565	2.61E-02	670	5.61E-03	775	1.90E-04
465	1.49E-02	570	2.70E-02	675	4.55E-03	780	1.61E-04
470	1.14E-02	575	2.77E-02	680	3.86E-03		
475	8.23E-03	580	2.82E-02	685	3.29E-03		
480	7.89E-03	585	2.84E-02	690	2.78E-03		

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

Chromaticity Diagram - Sphere Spectroradiometer Method



Tristimulus values(x, y): (0.3853, 0.3833)

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

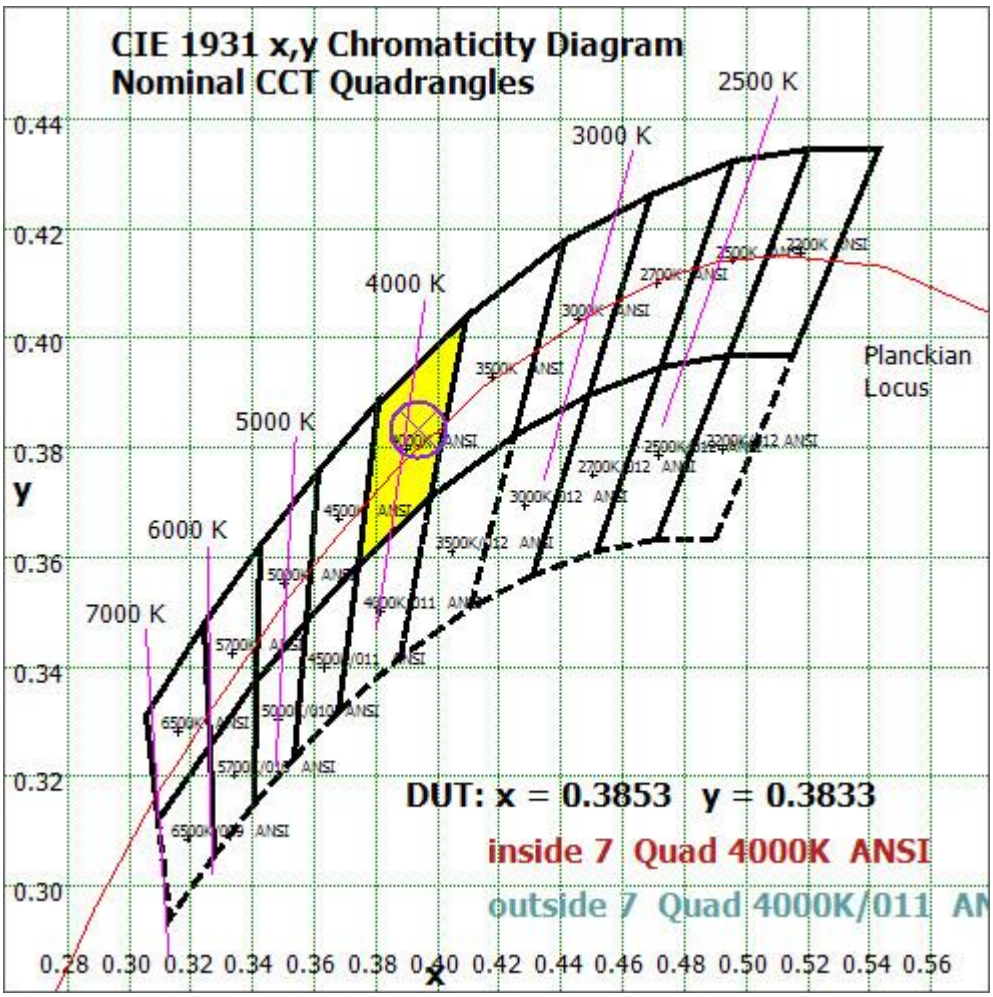


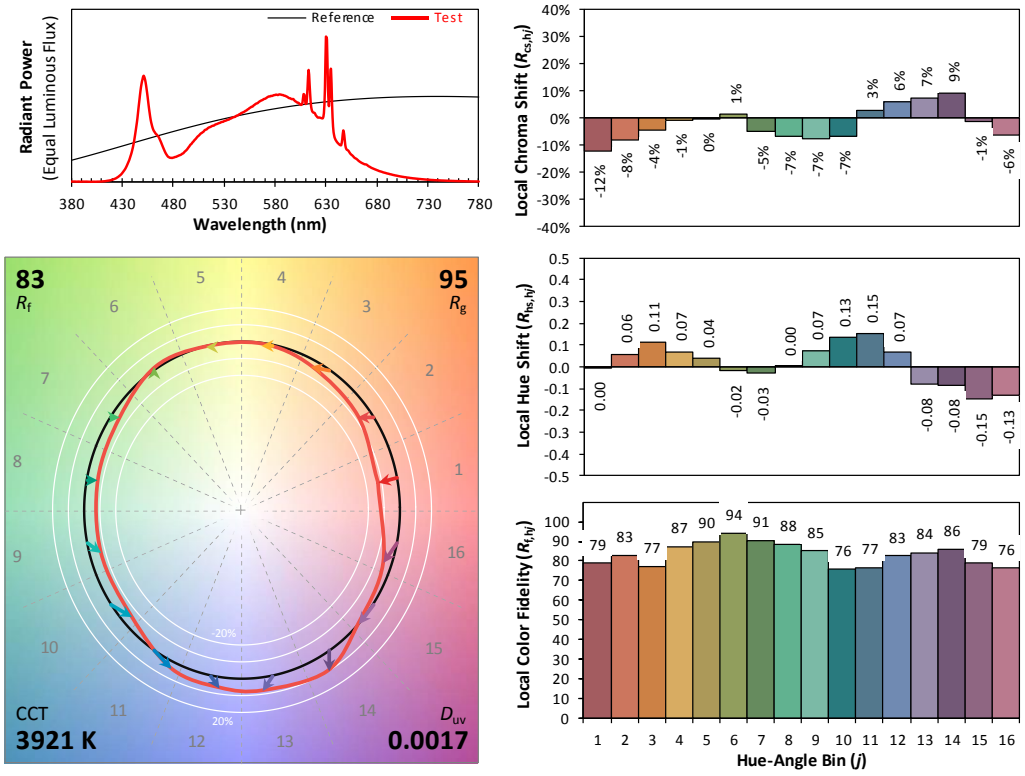
Chart 3: Plot of Lamp x/y coordinates on CIE 1931 Chromaticity Diagram

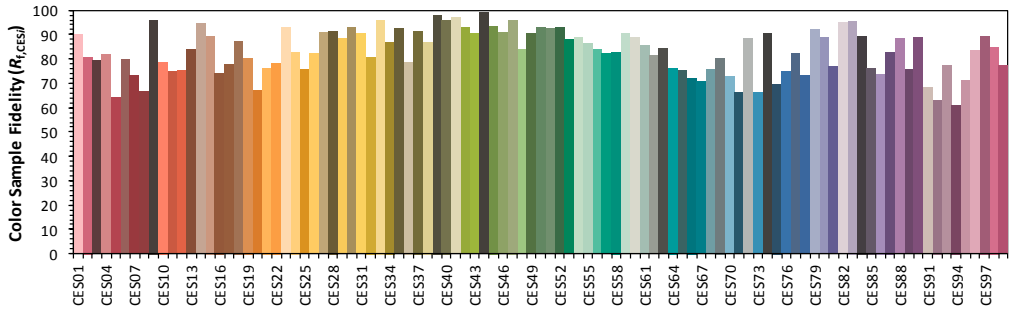
Color Rendition Report – Sphere Spectroradiometer Method

ANSI/IES TM-30-18 Color Rendition Report

Source: LED **Manufacturer:** RAB Lighting INC

Date: 2025/03/18 **Model:** T8-8-48G-840-SD-BYP





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

x	0.3853
y	0.3833
u'	0.2256
v'	0.5052

CIE 13.3-1995 (CRI)	
R_a	82
R_9	8

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

γ(°)	Lumens	% Total
0- 10	28.034	1.69%
10- 20	80.987	4.89%
20- 30	125.343	7.57%
30- 40	157.001	9.49%
40- 50	173.849	10.51%
50- 60	176.086	10.64%
60- 70	165.928	10.03%
70- 80	147.401	8.91%
80- 90	126.497	7.64%
90-100	109.062	6.59%
100-110	94.157	5.69%
110-120	80.334	4.85%
120-130	66.607	4.03%
130-140	52.241	3.16%
140-150	37.796	2.28%
150-160	23.299	1.41%
160-170	8.83	0.53%
170-180	1.286	0.08%
Total	1654.7	100%

γ(°)	Lumens	% Total
0- 60	741.3	44.80%
60- 90	439.826	26.58%
0-90	1181.126	71.38%
90- 180	473.612	28.62%
0- 180	1654.7	100%

Table 5: Zonal Lumen

Illuminance Plots- Goniophotometer Method

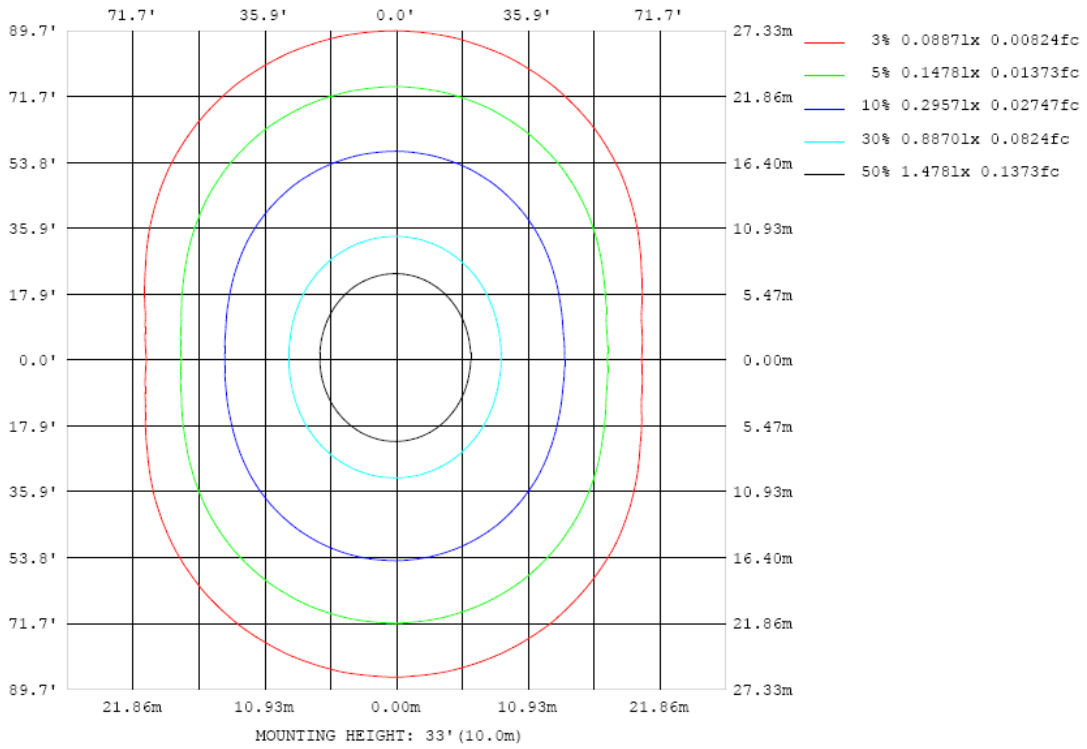


Chart 5: Illuminance Plot (Footcandles)

Luminous Intensity Distribution Plots- Goniophotometer Method

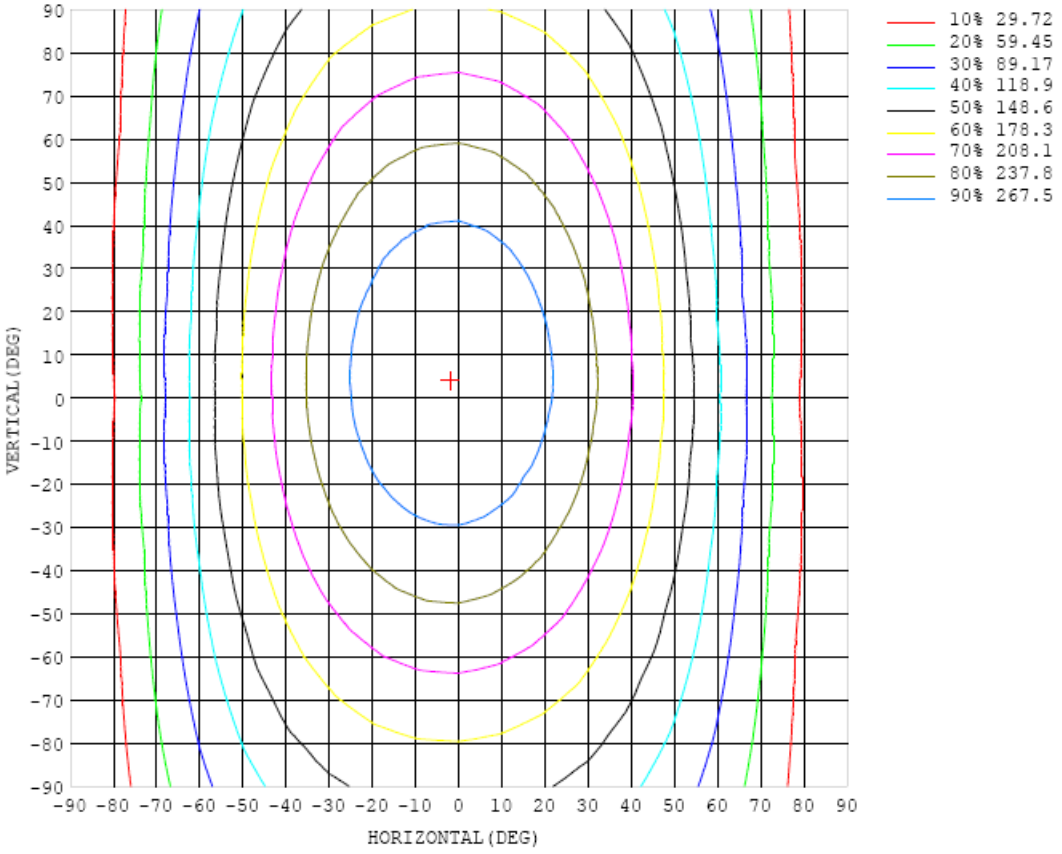


Chart 6: Isocandela Plot

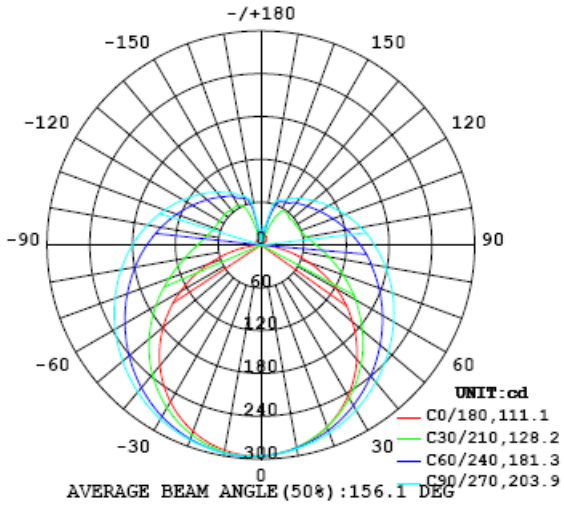


Chart 7: Polar Candela Distribution

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	296	296	296	296	296	296	296	296	296	296	296	296	296	296	296	296	296	296	296
5	293	293	293	293	293	292	293	293	293	293	294	294	294	294	295	295	294	295	295
10	289	288	288	288	288	288	289	289	289	290	290	290	290	291	291	291	292	292	292
15	281	280	280	280	281	281	283	284	285	286	286	286	286	285	285	286	285	286	286
20	271	270	270	271	273	274	276	278	279	280	281	280	280	279	279	278	278	278	278
25	259	258	258	260	263	265	269	270	272	274	274	274	272	271	270	268	267	267	267
30	244	244	245	248	251	255	260	263	265	267	267	266	264	262	259	257	255	254	254
35	228	227	229	234	239	244	250	254	257	259	259	258	255	252	248	243	240	239	238
40	209	209	213	219	226	232	240	245	249	251	251	249	245	241	235	229	224	221	221
45	189	189	195	202	212	220	229	235	240	242	242	240	235	229	222	213	206	202	201
50	168	169	176	186	197	208	218	226	231	233	233	230	224	217	207	197	188	181	179
55	146	148	157	169	183	196	208	216	222	224	224	221	214	205	193	180	168	159	156
60	122	125	138	154	169	184	197	206	212	215	215	211	203	192	179	163	148	136	131
65	97.1	102	118	138	157	172	187	196	203	206	205	201	192	181	165	147	128	112	105
70	72.0	79.9	99.7	123	145	161	176	187	193	197	196	191	182	169	153	131	108	87.6	78.1
75	47.7	58.6	82.7	109	133	152	166	177	184	187	186	181	172	158	140	116	89.3	64.2	52.4
80	25.2	40.0	68.3	96.9	122	142	157	168	175	178	177	172	162	149	129	103	73.1	43.3	28.7
85	7.53	26.1	56.8	86.4	112	132	149	158	165	168	167	162	153	139	118	91.4	59.9	27.2	8.78
90	0.24	18.4	48.4	77.8	103	123	140	151	157	159	158	154	144	129	108	81.3	49.3	16.5	0.24
95	0.59	15.9	43.0	70.9	95.5	115	131	142	149	151	150	145	135	120	99.5	73.0	41.9	12.0	0.84
100	0.57	16.6	39.9	65.4	88.6	107	123	133	140	143	141	136	126	112	91.9	66.6	38.2	11.9	2.50
105	0.51	19.2	38.8	61.4	82.7	101	115	125	131	134	133	128	118	104	85.5	62.2	36.5	13.7	4.54
110	0.67	23.1	39.2	58.7	77.9	94.2	108	117	123	126	124	119	110	97.4	80.0	59.0	36.6	16.2	6.61
115	3.44	27.5	40.6	57.2	74.0	88.6	101	110	116	118	116	112	103	91.3	75.8	57.1	37.8	19.0	7.41
120	5.90	32.0	42.7	56.5	70.9	83.9	95.1	103	108	110	109	105	97.0	86.2	72.3	56.3	39.8	11.7	7.91
125	8.58	33.9	43.9	56.5	68.7	79.8	89.5	96.8	101	103	102	98.0	91.2	81.7	69.8	56.3	42.2	5.09	8.75
130	10.5	26.9	46.6	55.3	67.1	76.5	84.9	91.1	95.1	96.8	95.7	92.3	86.2	78.1	68.2	55.7	44.1	6.26	8.63
135	12.0	18.0	48.5	55.5	65.6	73.6	80.8	86.0	89.4	90.7	89.9	86.8	81.8	75.0	66.0	55.9	39.4	7.06	8.33
140	13.1	11.7	49.0	57.2	62.6	70.8	77.1	81.4	84.2	85.3	84.6	82.1	77.9	71.6	63.1	56.5	22.2	7.01	7.90
145	13.9	7.85	39.0	57.1	62.7	67.0	71.9	77.1	79.6	80.6	79.9	77.6	72.4	67.6	63.7	53.5	12.4	13.9	7.41
150	14.3	9.56	22.0	51.8	61.6	65.7	69.1	71.4	73.1	73.8	73.3	71.9	69.3	66.8	62.2	35.9	13.0	15.4	7.68
155	14.5	7.33	11.0	31.5	54.2	63.3	66.7	68.7	69.9	70.5	70.2	69.3	67.5	63.9	49.7	18.1	11.1	16.9	7.88
160	14.5	12.6	9.81	12.4	27.6	46.9	59.1	64.6	66.1	66.6	66.4	64.9	59.4	46.5	24.5	15.2	11.4	17.7	8.01
165	13.5	18.4	7.56	10.3	8.91	16.3	23.8	34.5	41.6	44.3	42.5	36.6	28.6	18.6	15.5	10.8	15.8	16.7	7.95
170	12.9	13.3	21.9	8.43	14.5	9.53	7.27	8.80	12.3	15.1	16.2	15.3	13.1	11.0	12.0	16.8	16.8	16.5	8.39
175	12.6	12.7	19.3	27.0	21.1	11.5	8.93	9.57	7.66	5.37	10.8	16.5	16.2	15.3	14.9	19.0	23.6	18.7	9.84
180	12.1	12.1	12.0	11.7	11.2	10.2	9.32	8.08	7.74	8.01	2.65	9.30	9.84	10.6	11.8	13.5	14.6	15.4	12.0

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	296	296	296	296	296	296	296	296	296	296	296	296	296	296	296	296	296		
5	295	296	297	297	296	297	297	297	297	297	296	296	296	295	295	295	293		
10	293	294	295	295	295	296	296	296	296	295	295	294	293	292	291	290	289		
15	287	289	290	291	291	293	294	294	294	293	292	290	288	287	285	284	282		
20	280	281	283	285	287	290	290	291	291	290	288	285	282	280	277	274	272		
25	269	271	274	278	280	284	286	287	287	285	283	279	275	271	266	263	260		
30	256	259	263	269	273	277	280	282	282	280	277	272	266	260	254	250	246		
35	241	245	251	258	263	270	274	276	276	274	270	263	256	249	241	234	230		
40	223	229	237	246	253	261	265	268	269	266	261	254	246	236	226	217	212		
45	204	212	222	233	242	252	258	261	261	259	253	245	234	222	210	199	192		
50	183	192	205	219	230	241	248	253	253	250	244	234	222	209	193	180	171		
55	160	172	188	204	218	231	239	244	245	242	235	224	210	194	177	160	148		
60	137	152	171	190	206	220	229	235	236	233	225	214	198	180	160	140	125		
65	112	131	153	176	194	210	220	226	227	224	216	203	187	166	143	120	102		
70	87.6	111	137	162	183	200	210	217	218	214	206	193	175	154	128	102	79.3		
75	64.4	92.0	122	150	172	189	201	207	209	205	197	183	165	142	114	84.5	58.4		
80	44.0	75.9	109	138	161	180	191	198	199	196	187	174	155	131	102	69.8	39.4		
85	28.1	64.1	98.1	128	151	170	181	188	190	187	178	165	146	122	92.2	59.4	25.4		
90	19.7	55.3	89.2	119	142	160	172	179	181	177	169	156	137	113	84.3	51.8	18.3		
95	17.8	50.0	82.1	111	133	151	163	169	171	168	160	147	129	106	78.0	47.2	16.4		
100	19.4	47.3	76.7	104	126	143	154	160	162	159	151	139	122	99.7	73.4	45.0	16.9		
105	22.7	46.5	72.7	97.6	118	134	145	151	153	150	143	131	115	94.2	69.9	44.2	18.3		
110	27.2	46.9	69.7	92.1	111	126	136	142	144	141	134	123	108	89.4	68.2	44.6	21.9		
115	32.0	48.4	68.5	87.5	104	118	128	133	135	133	126	116	102	85.4	66.4	44.6	25.2		
120	36.8	50.4	67.4	83.8	98.7	111	120	125	127	124	119	109	96.9	81.8	65.5	46.6	29.6		
125	41.0	52.8	66.7	80.4	93.7	105	112	117	119	117	111	103	92.0	78.9	63.5	48.6	30.3		
130	42.9	55.3	66.7	78.0	89.0	98.7	105	110	111	109	105	97.4	87.8	75.7	63.8	48.3	25.4		
135	37.5	56.4	66.5	75.9	85.1	93.2	99.0	103	104	102	98.4	92.0	83.2	73.2	64.0	51.4	12.1		
140	25.5	56.9	63.8	74.0	81.3	87.9	92.8	96.1	97.1	95.8	92.2	86.4	79.4	72.2	61.8	53.6	7.82		
145	15.8	56.7	64.8	70.0	78.2	83.6	87.0	89.3	90.0	88.9	86.0	82.1	76.8	69.0	62.2	50.5	6.66		
150	10.6	49.6	64.0	68.9	72.5	79.0	82.4	84.3	84.7	83.9	81.9	78.2	71.6	67.5	60.2	37.7	10.9		
155	7.62	30.7	59.9	67.2	70.0	72.8	75.2	77.1	77.8	76.8	74.8	72.1	69.3	62.6	49.5	16.3	11.4		
160	6.83	14.6	42.4	61.3	67.7	69.9	71.4	72.2	72.5	72.2	71.2	67.9	60.2	48.3	27.2	7.10	8.46		
165	9.50	7.60	15.8	35.1	53.8	61.4	66.6	67.6	67.6	67.8	64.6	51.3	38.3	22.4	10.2	13.1	4.42		
170	10.5	7.09	8.41	12.9	15.6	24.6	30.3	35.1	37.0	34.3	21.7	14.1	10.6	10.7	14.3	7.51	10.3		
175	10.9	14.5	12.1	8.04	7.92	7.68	10.2	12.2	13.9	10.4	11.1	9.92	7.97	7.93	9.13	12.0	17.3		
180	11.7	11.3	9.07	7.52	12.3	15.8	12.0	17.2	21.5	26.1	22.3	14.7	12.1	22.9	22.1	18.9	17.1		

Table 7: Luminous Intensity Data

EQUIPMENT LIST

Test Equipment	Model	Equipment No.	Calibration Date	Calibration Due date
Goniophotometer system	GO-R5000	HZTE011-01	Feb. 05, 2025	-
Digital Power Meter	PF2010A	HZTE028-01	Aug. 08, 2024	Aug. 07, 2025
AC Power Supply	DPS1060	HZTE001-06	Aug. 08, 2024	Aug. 07, 2025
DC Power Supply	WY12010	HZTE004-03	Aug. 08, 2024	Aug. 07, 2025
Temperature recorder	JM624U	HZTE018-08	Aug. 08, 2024	Aug. 07, 2025
Temperature and humidity recorder	JR900	HZTE018-01	Aug. 08, 2024	Aug. 07, 2025
Standard source	D908	HZTE012-01	Aug. 14, 2018	-
Integrate Sphere system	3M	HZTE015-04	Dec. 10, 2024	-
Digital Power Meter	WT210	HZTE008-01	Aug. 08, 2024	Aug. 07, 2025
AC Power Supply	PCR 500L	HZTE001-07	Aug. 08, 2024	Aug. 07, 2025
DC Power Supply	IT6154	HZTE004-04	Aug. 08, 2024	Aug. 07, 2025
Standard source	SCL-1400	HZTE012-06	Nov. 04, 2021	-
Temperature and humidity recorder	JR900	HZTE018-02	Aug. 08, 2024	Aug. 07, 2025
Temperature Meter	TES1310	HZTE017-01	Aug. 08, 2024	Aug. 07, 2025

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 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.

3rd Floor, Bld. 2, NO. 96 Longchuanwu Rd Qianjiang Economy Dev. Zone, YuhangDist,
Hangzhou, Zhejiang Province, China 311100
Tel: +86 571 86376106 www.ltlqa.com

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 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 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.

*** End of Report ***