LM-79-19 TEST REPORT

for

RAB Lighting INC

408 W 14th St New York, NY 10014

LED Tube

Model: T8-8-48G-835-SD-BYP

Laboratory: Leading Testing Laboratories

NVLAP CODE: 200960-0

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Report No.: HZ25030011a

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-835-SD-BYP**

Luminous Efficacy (Lumens /Watt)	Total Luminous Flux (Lumens)	Power (Watts)	Power Factor
183.9	1541.4	8.38	0.9786

CCT (K)	CRI	Stabilization Time (Light & Power)
3471	81.7	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 : 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

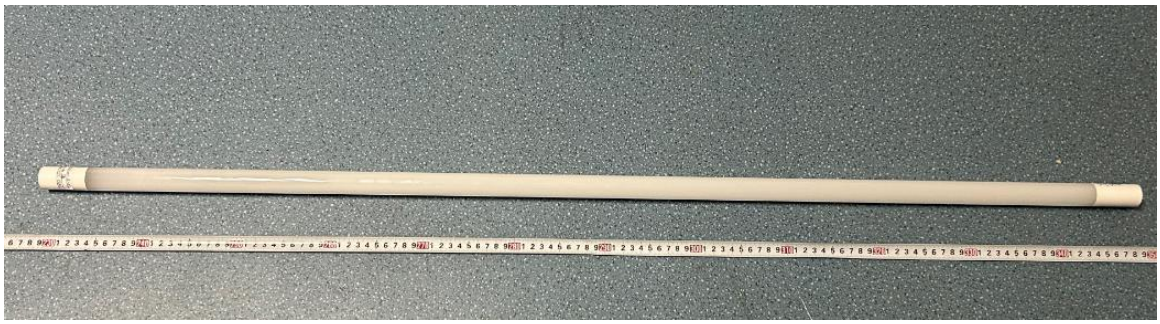


Figure 1- Overview of the sample

Equipment Under Test(EUT)	
Name	: LED Tube
Model	: T8-8-48G-835-SD-BYP
Electrical Ratings	: 120-277V, 50/60Hz, 8.5W
Product Description	: 3500K
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)	0.071	0.034
Power Factor	0.9786	0.9239
Test Power (W)	8.38	8.75
THD A%	18.79	18.01
Luminous Efficacy (lm/W)	183.9	180.5
Total Luminous Flux (lm)	1541.4	1579.0
Color Rendering Index (CRI)	81.7	
R9	6.1	
Correlated Color Temperature (CCT)(K)	3471	
Chromaticity Chroma x	0.4080	
Chromaticity Chroma y	0.3946	
Chromaticity Chroma u	0.2359	
Chromaticity Chroma v	0.3422	
Duv	0.0011	
Chromaticity Chroma u ’	0.2359	
Chromaticity Chroma v’	0.5133	

Special Color Rendering Indices	
R1	79.6
R2	90.3
R3	96
R4	77.8
R5	79.4
R6	86.8
R7	83.4
R8	60.5
R9	6.1
R10	77
R11	75.8
R12	61.5
R13	82
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 ℃.

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)	0.072
Power Factor	0.9779
Power (W)	8.40
Luminous Efficacy (lm/W)	185.1
Total Luminous Flux (lm)	1554.6
Beam Angle (°)	111.8 (0^o-180^o) / 208.9 (90^o-270^o)
Center Beam Candle Power (cd)	274
Maximum Beam Candle Power (cd)	274.5 (At: C=40.0, Gamma=1.5)
Spacing Criteria	1.24 (0^o-180^o) / 1.40 (90^o-270^o)
Zonal Lumens in the 0 °-60 °Zone	44.27%
Zonal Lumens in the 60 °-90 °Zone	26.53%
Zonal Lumens in the 90 °-120 °Zone	17.40%
Zonal Lumens in the 120 °-180 °Zone	11.80%

Table 3: Test data per Goniophotometer Method

Spectral Power Distribution - Sphere Spectroradiometer Method

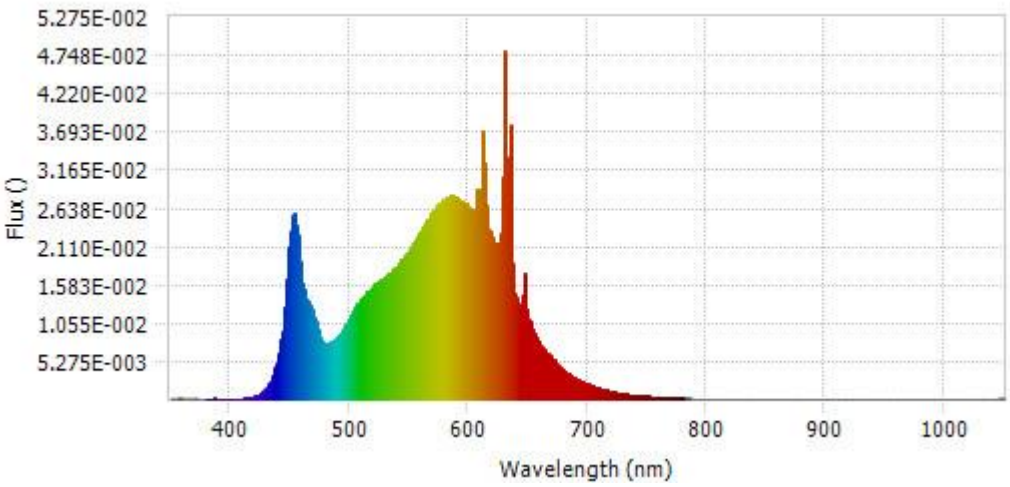
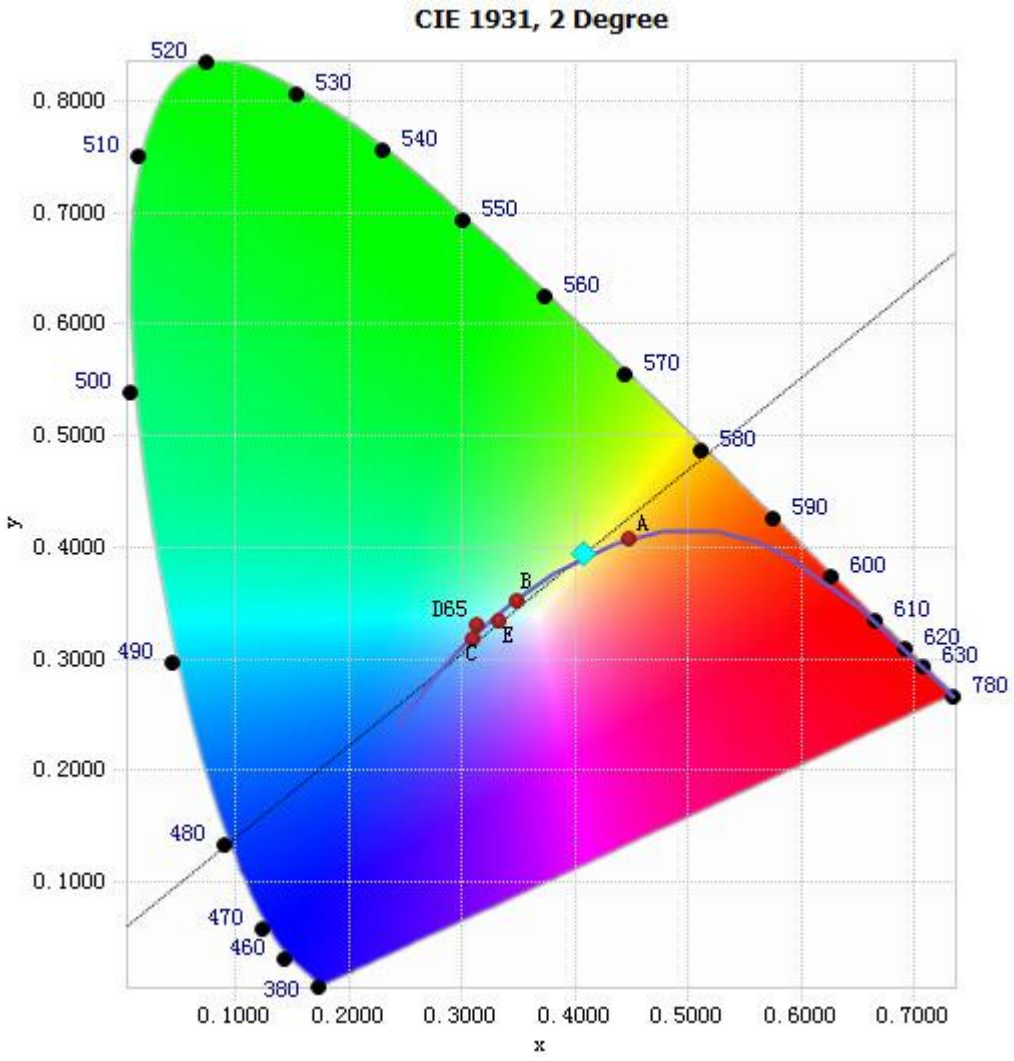


Chart 1: Spectral Power Distribution

Spectral Distribution over Visible Wavelength							
WL(nm)	Radiant(Watts)	WL(nm)	Radiant(Watts)	WL(nm)	Radiant(Watts)	WL(nm)	Radiant(Watts)
380	1.41E-04	485	7.91E-03	590	2.79E-02	695	2.56E-03
385	1.15E-04	490	8.57E-03	595	2.73E-02	700	2.16E-03
390	1.19E-04	495	9.57E-03	600	2.66E-02	705	1.84E-03
395	1.23E-04	500	1.11E-02	605	2.56E-02	710	1.54E-03
400	1.10E-04	505	1.26E-02	610	2.60E-02	715	1.31E-03
405	1.19E-04	510	1.38E-02	615	2.69E-02	720	1.12E-03
410	1.05E-04	515	1.48E-02	620	2.25E-02	725	9.67E-04
415	2.33E-04	520	1.55E-02	625	2.15E-02	730	8.13E-04
420	3.77E-04	525	1.62E-02	630	4.80E-02	735	6.97E-04
425	7.72E-04	530	1.68E-02	635	3.77E-02	740	5.88E-04
430	1.50E-03	535	1.75E-02	640	1.40E-02	745	5.17E-04
435	2.97E-03	540	1.83E-02	645	1.26E-02	750	4.36E-04
440	5.62E-03	545	1.94E-02	650	1.12E-02	755	3.80E-04
445	1.09E-02	550	2.04E-02	655	9.30E-03	760	3.17E-04
450	2.10E-02	555	2.17E-02	660	7.91E-03	765	2.80E-04
455	2.52E-02	560	2.31E-02	665	6.57E-03	770	2.42E-04
460	1.75E-02	565	2.45E-02	670	5.91E-03	775	2.04E-04
465	1.35E-02	570	2.57E-02	675	4.83E-03	780	1.75E-04
470	1.18E-02	575	2.68E-02	680	4.10E-03		
475	8.94E-03	580	2.76E-02	685	3.51E-03		
480	7.52E-03	585	2.81E-02	690	3.01E-03		

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

Chromaticity Diagram - Sphere Spectroradiometer Method



Tristimulus values(x, y): (0.4080, 0.3946)

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

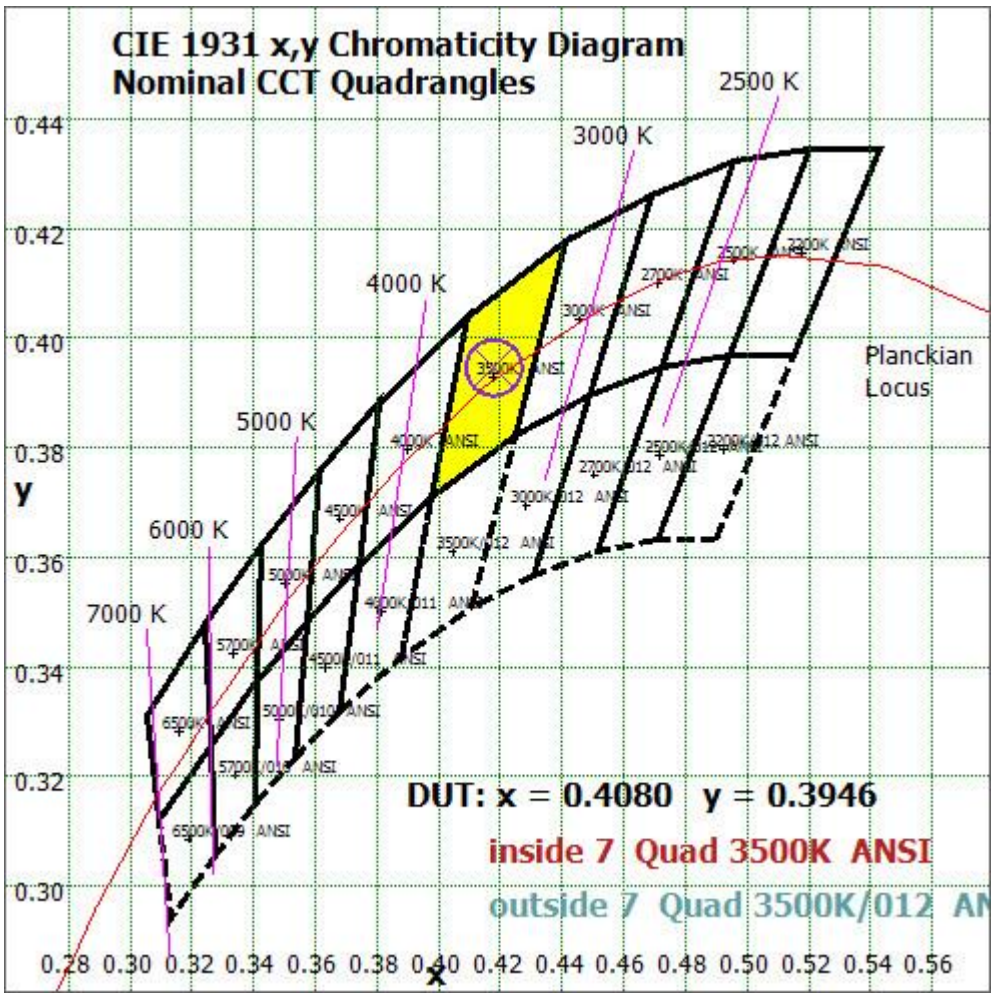


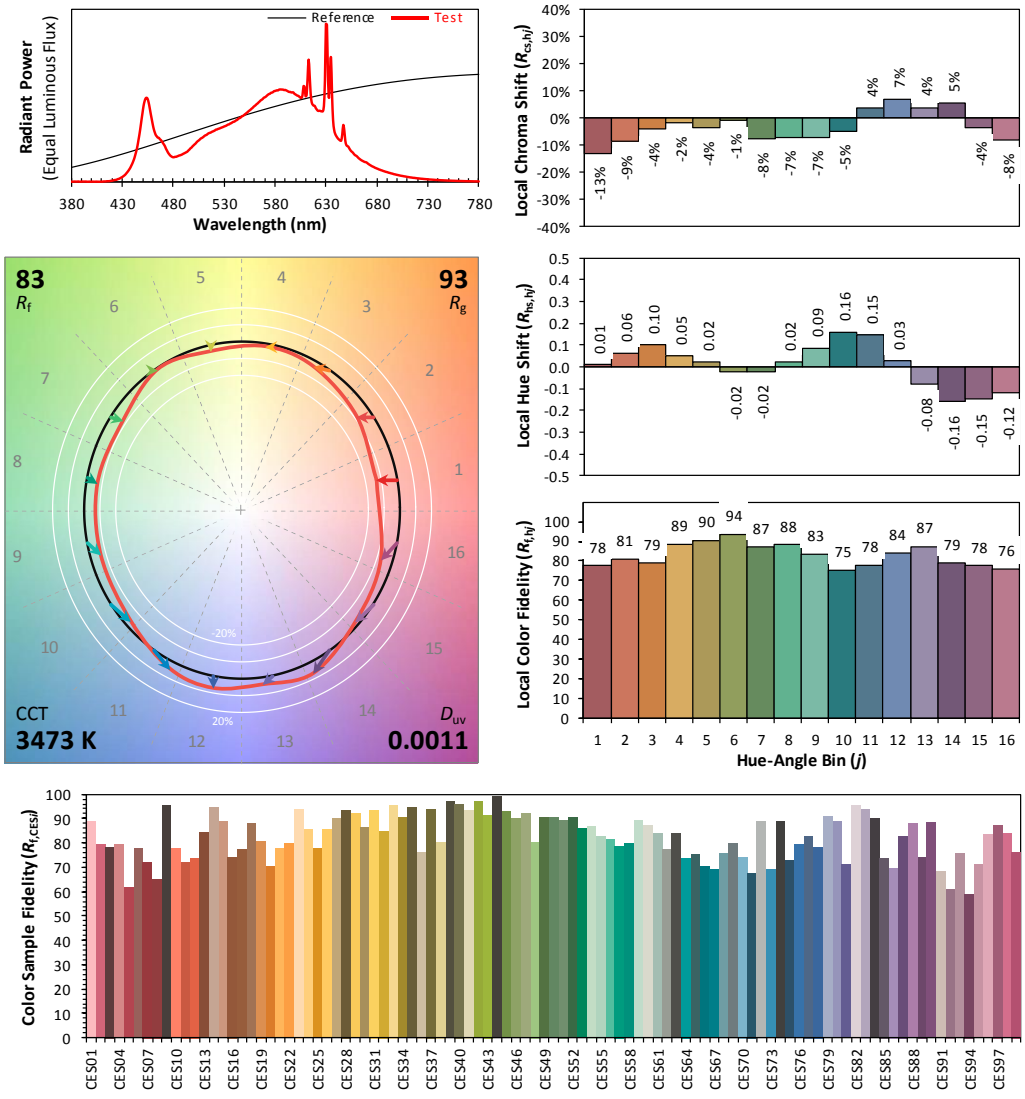
Chart 3: Plot of Lamp x/y coordinates on CIE 1931 Chromaticity Diagram

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-835-SD-BYP



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

x	0.4080
y	0.3946
u'	0.2359
v'	0.5133

CIE 13.3-1995 (CRI)

R_a	82
R_9	6

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	25.994	1.67%
10- 20	75.071	4.83%
20- 30	116.185	7.47%
30- 40	145.607	9.37%
40- 50	161.443	10.39%
50- 60	163.918	10.54%
60- 70	154.926	9.97%
70- 80	138.226	8.89%
80- 90	119.292	7.67%
90-100	103.536	6.66%
100-110	89.918	5.78%
110-120	77.035	4.96%
120-130	64.034	4.12%
130-140	50.417	3.24%
140-150	36.582	2.35%
150-160	22.584	1.45%
160-170	8.543	0.55%
170-180	1.252	0.08%
Total	1554.6	100%

γ(°)	Lumens	% Total
0- 60	688.218	44.27%
60- 90	412.444	26.53%
0-90	1100.662	70.80%
90- 180	453.901	29.20%
0- 180	1554.6	100%

Table 5: Zonal Lumen

Illuminance Plots- Goniophotometer Method

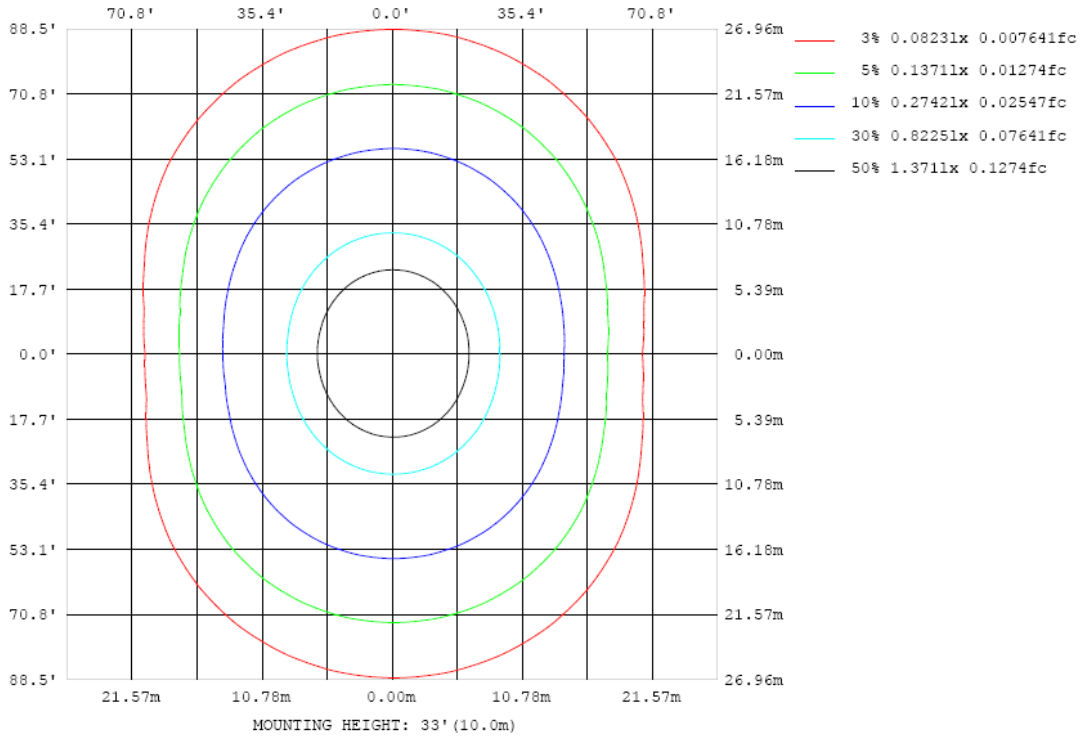


Chart 5: Illuminance Plot (Footcandles)

Luminous Intensity Distribution Plots- Goniophotometer Method

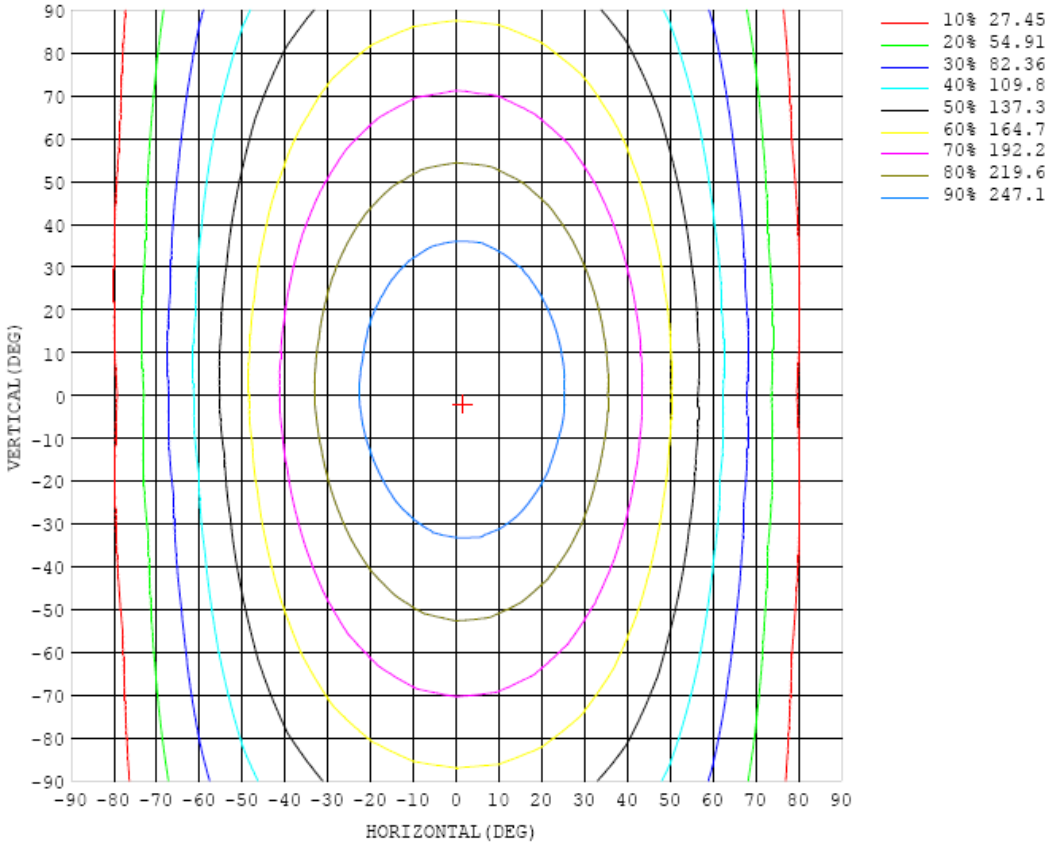


Chart 6: Isocandela Plot

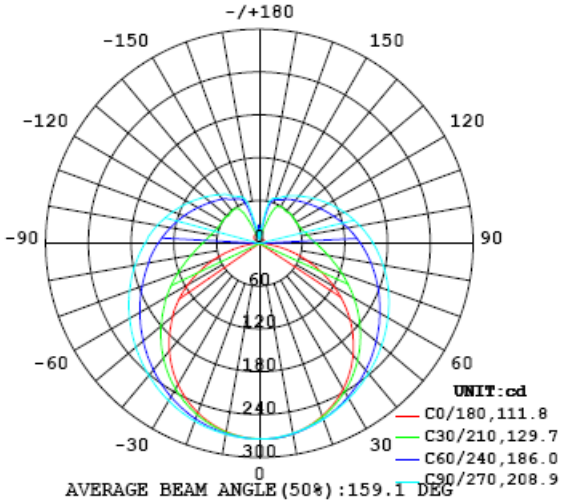


Chart 7: Polar Candela Distribution

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	274	274	274	274	274	274	274	274	274	274	274	274	274	274	274	274	274	274	274
5	274	274	273	274	274	274	274	274	273	273	274	273	273	273	273	273	273	272	272
10	270	271	271	271	271	271	271	271	271	270	270	270	270	269	269	269	268	268	268
15	265	266	265	266	267	266	267	267	267	266	267	266	265	264	263	262	262	261	261
20	258	258	258	259	260	261	262	262	263	262	262	260	259	257	256	254	253	252	253
25	248	248	248	250	252	254	256	257	258	257	256	255	252	249	247	244	243	241	242
30	235	236	237	239	243	246	249	250	252	251	250	248	245	241	237	233	230	228	228
35	221	222	224	228	232	237	241	244	245	245	243	240	236	231	225	220	216	214	213
40	204	206	209	214	221	227	232	236	238	238	236	233	228	221	214	206	200	197	197
45	186	187	192	200	208	216	223	228	231	231	229	225	219	210	201	192	184	179	178
50	166	168	175	185	196	205	214	220	223	223	222	216	209	199	188	177	166	159	159
55	144	147	156	169	182	195	205	211	215	216	214	208	200	189	175	161	148	139	138
60	121	125	137	153	170	184	195	203	207	208	206	200	191	178	163	146	130	117	116
65	96.5	102	118	138	157	173	186	195	200	201	198	192	182	168	151	131	111	95.6	92.6
70	71.7	79.9	99.8	123	145	163	177	186	192	193	190	184	173	158	139	117	93.8	74.2	68.9
75	48.1	59.1	82.8	110	134	153	168	178	183	185	182	175	164	149	129	104	77.8	54.6	45.7
80	25.7	40.0	68.3	97.8	123	144	159	169	175	176	174	167	156	140	119	93.4	64.9	36.6	24.3
85	7.51	25.6	57.6	87.8	114	135	150	161	167	168	166	159	147	131	110	83.8	54.3	23.3	7.34
90	0.24	17.9	49.6	79.6	106	127	142	152	158	160	157	151	139	123	102	76.2	46.9	16.5	0.24
95	0.80	15.9	44.4	72.9	98.3	119	134	144	150	151	149	142	131	116	95.1	70.1	42.3	14.5	0.66
100	2.40	17.2	41.8	68.7	91.9	111	126	136	142	143	141	134	124	109	89.1	66.3	39.8	14.8	0.50
105	4.49	20.4	40.9	64.8	86.0	104	118	128	134	135	133	127	117	102	83.7	62.7	38.9	16.8	0.41
110	6.33	24.6	41.5	62.0	81.2	98.0	111	120	126	127	125	119	110	96.1	79.2	60.3	39.4	19.3	0.48
115	7.05	29.3	43.0	60.4	77.1	92.3	104	113	118	119	118	112	103	90.7	75.5	58.8	40.6	23.0	3.22
120	7.46	34.2	45.2	59.6	73.9	87.2	98.1	106	111	112	110	105	97.1	86.0	72.5	58.1	41.7	26.7	4.82
125	8.12	38.3	47.7	59.5	71.4	82.9	92.4	99.4	104	105	103	98.8	91.7	81.8	70.2	57.8	42.9	28.0	6.82
130	7.95	40.1	50.3	59.8	70.0	79.1	87.4	93.4	97.2	98.2	96.9	93.0	86.8	78.4	69.2	57.6	44.0	22.7	8.93
135	7.64	33.8	51.6	60.0	68.7	76.0	82.8	87.9	91.2	92.1	91.1	87.7	82.5	75.3	67.7	56.8	47.1	11.6	10.7
140	7.05	23.1	52.7	58.2	67.5	73.2	78.7	83.1	85.9	86.6	85.7	82.9	78.4	72.6	65.3	56.5	49.2	8.73	11.9
145	6.53	15.1	52.9	59.4	64.3	70.6	75.2	78.7	80.8	81.4	80.7	78.5	74.7	69.4	63.3	57.2	47.1	6.05	12.7
150	6.78	10.1	45.0	59.3	63.1	67.0	71.4	74.2	76.0	76.4	75.7	73.6	70.5	66.2	61.9	56.3	33.7	9.02	13.2
155	7.12	6.41	26.9	56.1	62.6	65.1	67.1	68.8	70.0	70.5	69.8	69.2	66.8	64.6	58.5	47.0	15.9	10.6	13.6
160	7.05	5.63	13.6	37.8	57.5	62.5	65.3	66.5	67.0	67.3	67.2	66.4	64.5	57.0	46.3	24.7	7.42	9.38	13.7
165	6.92	9.39	7.49	15.8	30.7	48.6	57.5	61.9	62.7	62.9	62.7	60.3	49.1	34.8	20.6	11.6	11.1	5.31	13.4
170	7.54	10.8	6.88	7.62	11.2	15.9	23.6	27.1	31.2	33.3	31.4	20.2	14.7	12.2	8.52	12.3	8.87	8.79	13.3
175	10.0	13.4	14.0	10.5	8.16	8.08	7.27	9.19	11.2	12.7	9.78	10.7	10.1	8.77	8.27	9.06	10.5	16.0	13.6
180	13.0	12.6	12.4	11.7	10.9	12.3	14.1	13.7	18.0	19.3	15.3	14.6	13.3	23.0	23.6	23.8	22.6	19.4	13.0

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	274	274	274	274	274	274	274	274	274	274	274	274	274	274	274	274	274		
5	273	272	273	273	273	273	273	273	273	274	274	274	274	274	274	274	273		
10	268	268	269	270	270	270	271	272	272	272	272	272	272	272	272	271	271		
15	262	262	263	264	266	267	268	269	269	269	270	269	268	267	267	266	266		
20	253	254	256	258	260	262	263	265	265	265	265	264	263	262	260	259	258		
25	242	244	246	249	253	256	258	260	260	261	260	258	256	254	252	250	249		
30	230	232	236	240	244	248	252	254	255	255	253	251	248	245	242	239	236		
35	215	218	223	229	235	240	244	247	248	249	246	244	239	234	230	225	223		
40	198	203	210	218	225	232	237	240	242	241	239	235	229	223	216	210	207		
45	181	187	195	205	214	222	229	232	234	234	231	225	218	210	201	194	188		
50	161	169	180	192	203	213	220	225	227	226	222	216	207	197	186	176	169		
55	142	152	165	179	192	203	211	217	219	218	213	206	196	184	170	158	149		
60	121	134	151	167	181	194	203	208	211	210	204	196	185	170	155	139	127		
65	99.4	116	136	155	171	184	194	200	202	201	196	187	174	158	140	120	104		
70	77.9	98.1	121	144	161	175	186	192	194	193	187	177	163	146	125	101	81.4		
75	57.6	82.0	109	133	152	166	177	183	186	184	178	168	155	135	111	84.0	59.5		
80	39.8	68.3	97.3	123	143	158	169	175	177	176	170	159	145	124	98.6	69.0	40.1		
85	26.4	57.5	88.0	114	135	151	160	167	169	167	161	152	136	115	88.4	57.2	25.3		
90	19.2	50.0	79.9	106	126	142	153	159	161	159	154	144	128	106	79.9	48.3	16.1		
95	17.2	45.3	74.0	98.9	119	134	145	152	154	152	146	135	120	99.0	73.0	42.3	12.4		
100	18.3	42.9	69.0	92.7	112	127	137	143	145	144	138	127	112	92.5	67.7	39.4	12.9		
105	21.2	42.0	65.7	87.4	105	120	130	135	137	136	130	120	106	86.9	64.0	38.3	14.9		
110	25.0	42.5	62.9	82.7	99.4	113	122	128	129	128	122	113	99.4	82.1	61.3	38.7	17.7		
115	29.3	43.8	61.5	78.9	94.0	106	115	120	122	120	115	106	93.8	78.1	59.7	40.0	20.5		
120	33.7	45.8	60.5	75.6	89.0	100	108	113	114	113	108	100.0	88.9	74.9	58.9	42.0	12.9		
125	35.8	46.8	60.4	73.2	84.8	94.5	102	106	107	106	101	94.3	84.5	72.4	58.7	44.3	4.29		
130	29.3	49.1	58.8	71.2	81.1	89.5	95.7	99.5	101	99.4	95.6	89.2	80.7	70.5	57.7	45.7	7.00		
135	18.7	50.5	58.4	69.4	78.0	85.0	90.3	93.6	94.5	93.6	90.0	84.7	77.6	68.1	58.0	41.6	7.28		
140	11.1	50.6	59.6	65.7	74.7	81.0	85.4	88.1	89.1	88.1	85.2	80.7	73.8	64.9	58.5	24.9	6.06		
145	9.45	42.1	59.2	65.4	70.2	75.1	80.7	83.1	83.7	83.0	80.3	74.8	69.4	65.2	55.1	11.8	13.3		
150	10.1	24.0	53.8	63.8	68.3	71.7	74.3	75.8	76.5	75.9	74.1	71.3	68.3	63.2	39.7	13.4	15.5		
155	6.42	10.0	34.4	56.8	65.5	69.0	71.1	72.2	72.5	72.3	71.1	69.2	65.4	52.7	18.7	12.1	14.1		
160	12.6	11.2	11.0	30.2	50.2	61.6	66.5	67.7	68.2	68.0	66.7	61.8	50.1	26.3	15.0	10.2	13.7		
165	16.5	7.16	11.4	8.19	15.8	26.2	37.5	45.4	48.2	46.5	39.8	30.9	18.0	15.0	11.9	14.7	13.1		
170	12.6	21.1	8.49	12.8	10.9	8.43	8.72	11.9	14.4	15.7	15.1	13.5	12.2	10.9	16.4	13.7	18.3		
175	13.4	17.8	25.7	21.0	11.3	8.67	8.98	6.95	4.28	9.82	15.8	15.0	12.5	12.3	20.2	25.9	17.2		
180	13.1	12.9	12.6	12.0	11.1	10.2	9.18	9.31	9.85	3.08	6.05	7.41	13.6	14.8	16.4	17.3	17.9		

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.

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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 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 ***