



LM-79-19 TEST REPORT

for

RAB Lighting INC

408 W 14th St New York, NY 10014

LED Tube

Model: T8-8-48G-850-SD-BYP

Laboratory: Leading Testing Laboratories

NVLAP CODE: 200960-0

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Report No.: HZ25030011c

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

Review by:

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April Zou

Engineer: Wei Fei
Mar. 20, 2025

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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-850-SD-BYP**

Luminous Efficacy (Lumens /Watt)	Total Luminous Flux (Lumens)	Power (Watts)	Power Factor
193.0	1667.7	8.64	0.9760
CCT (K)	CRI	Stabilization Time (Light & Power)	
4959	82.2	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	: Jul. 31, 2024 & 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

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SAMPLE PHOTO

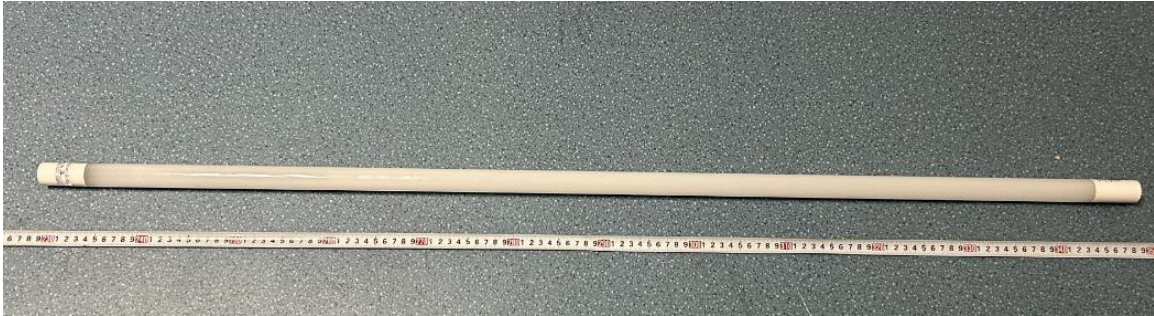


Figure 1- Overview of the sample

Equipment Under Test(EUT)

Name	: LED Tube
Model	: T8-8-48G-850-SD-BYP
Electrical Ratings	: 120-277V, 50/60Hz, 8.5W
Product Description	: 5000K
Manufacturer	: RAB Lighting INC
Address	: 408 W 14th St New York, NY 10014

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)	0.074	0.034
Power Factor	0.9760	0.9421
Test Power (W)	8.64	8.82
THD A%	18.83	14.58
Luminous Efficacy (lm/W)	193.0	190.4
Total Luminous Flux (lm)	1667.7	1679.5
Color Rendering Index (CRI)	82.2	
R9	9.6	
Correlated Color Temperature (CCT)(K)	4959	
Chromaticity Chroma x	0.3465	
Chromaticity Chroma y	0.3565	
Chromaticity Chroma u	0.2105	
Chromaticity Chroma v	0.3248	
Duv	0.0019	
Chromaticity Chroma u'	0.2105	
Chromaticity Chroma v'	0.4873	

Special Color Rendering Indices	
R1	80
R2	87
R3	91.7
R4	81.3
R5	80.1
R6	81.3
R7	87.7
R8	68.3
R9	9.6
R10	68.8
R11	79.8
R12	54.6
R13	81.6
R14	95.5

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)	0.074
Power Factor	0.9768
Power (W)	8.66
Luminous Efficacy (lm/W)	194.0
Total Luminous Flux (lm)	1680.4
Beam Angle (°)	111.6 (0°-180°) / 208.5 (90°-270°)
Center Beam Candle Power (cd)	297
Maximum Beam Candle Power (cd)	297.7 (At: C=280.0, Gamma=3.0)
Spacing Criteria	1.27 (0°-180°) / 1.40 (90°-270°)
Zonal Lumens in the 0°-60° Zone	44.29%
Zonal Lumens in the 60°-90° Zone	26.50%
Zonal Lumens in the 90°-120° Zone	17.39%
Zonal Lumens in the 120°-180° Zone	11.81%

Table 3: Test data per Goniophotometer Method

Spectral Power Distribution - Sphere Spectroradiometer Method

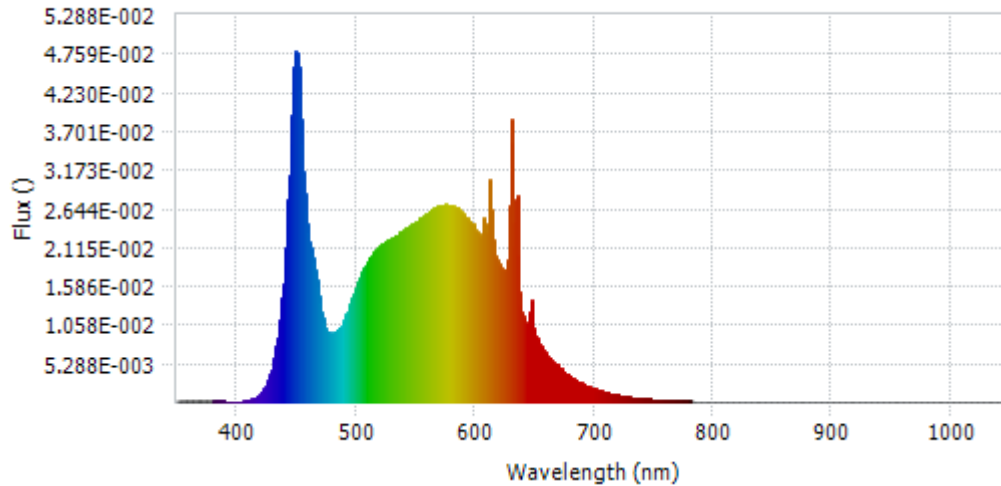
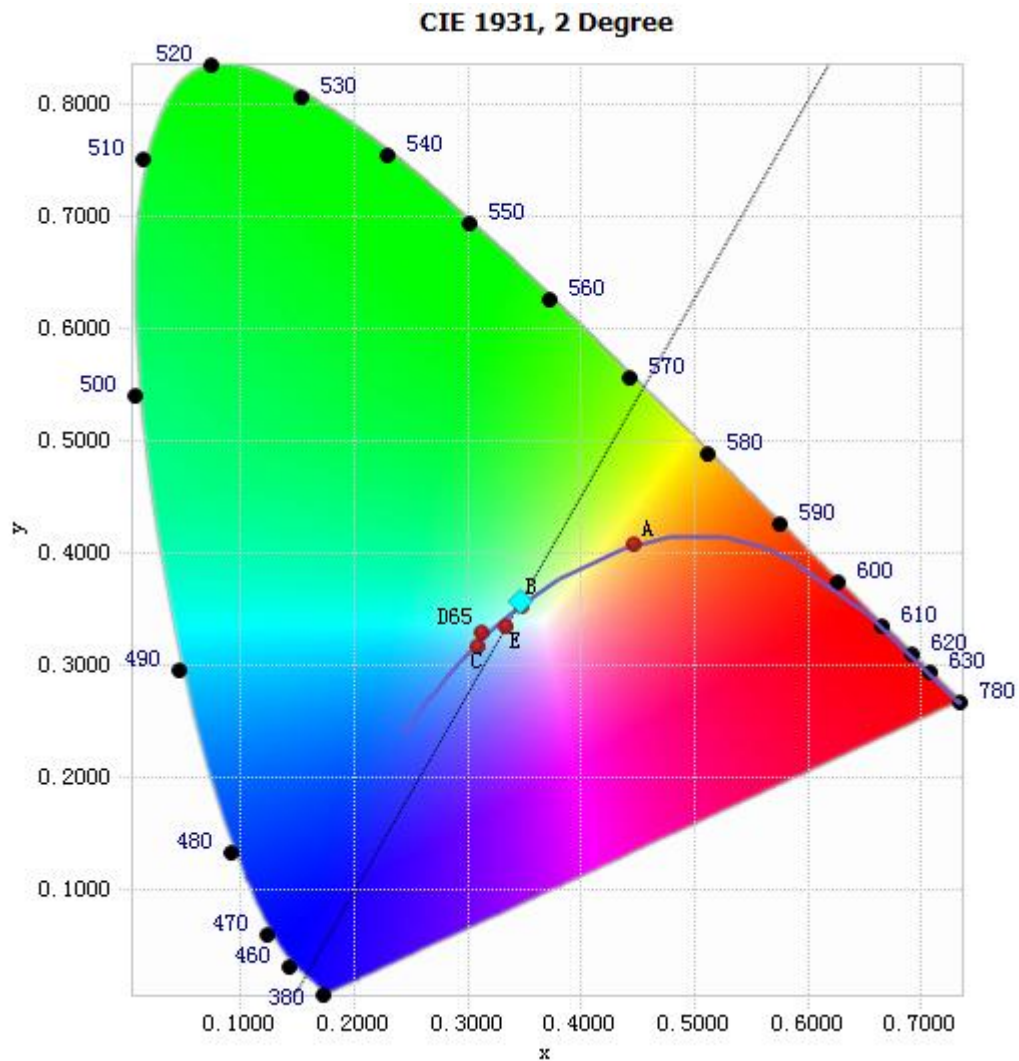


Chart 1: Spectral Power Distribution

Spectral Distribution over Visible Wavelength							
WL(nm)	Radiant(Watts)	WL(nm)	Radiant(Watts)	WL(nm)	Radiant(Watts)	WL(nm)	Radiant(Watts)
380	1.64E-04	485	9.98E-03	590	2.58E-02	695	2.18E-03
385	1.61E-04	490	1.12E-02	595	2.47E-02	700	1.86E-03
390	1.48E-04	495	1.33E-02	600	2.37E-02	705	1.58E-03
395	1.11E-04	500	1.57E-02	605	2.25E-02	710	1.35E-03
400	1.01E-04	505	1.77E-02	610	2.23E-02	715	1.14E-03
405	1.33E-04	510	1.92E-02	615	2.23E-02	720	9.82E-04
410	2.81E-04	515	2.06E-02	620	1.89E-02	725	8.40E-04
415	5.99E-04	520	2.13E-02	625	1.80E-02	730	7.22E-04
420	1.25E-03	525	2.19E-02	630	3.87E-02	735	6.16E-04
425	2.60E-03	530	2.25E-02	635	2.84E-02	740	5.27E-04
430	5.17E-03	535	2.29E-02	640	1.17E-02	745	4.53E-04
435	9.90E-03	540	2.35E-02	645	1.06E-02	750	3.94E-04
440	1.85E-02	545	2.40E-02	650	9.32E-03	755	3.36E-04
445	3.51E-02	550	2.46E-02	655	7.81E-03	760	2.90E-04
450	4.81E-02	555	2.53E-02	660	6.63E-03	765	2.51E-04
455	3.51E-02	560	2.59E-02	665	5.57E-03	770	2.17E-04
460	2.29E-02	565	2.64E-02	670	4.97E-03	775	1.85E-04
465	1.89E-02	570	2.67E-02	675	4.10E-03	780	1.62E-04
470	1.33E-02	575	2.69E-02	680	3.49E-03		
475	9.82E-03	580	2.69E-02	685	2.99E-03		
480	9.45E-03	585	2.66E-02	690	2.56E-03		

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

Chromaticity Diagram - Sphere Spectroradiometer Method



Tristimulus values(x, y): (0.3465, 0.3565)

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

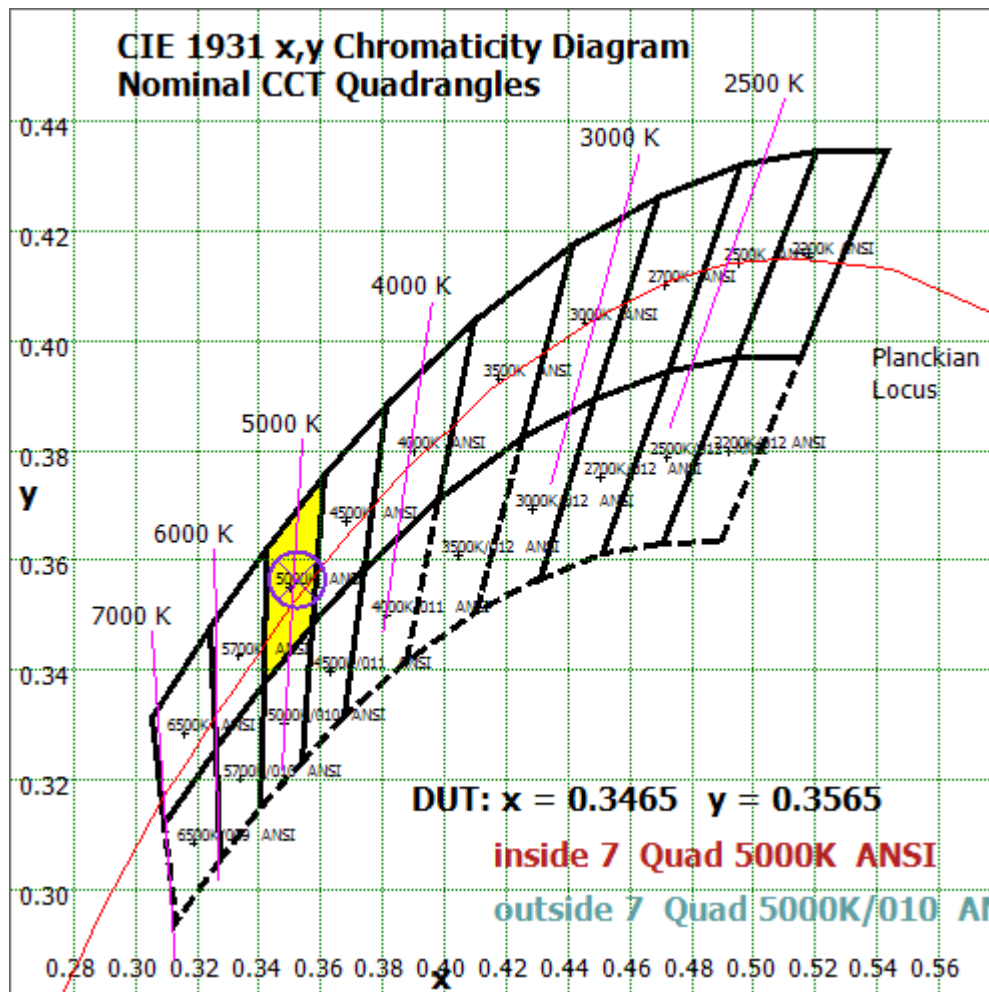


Chart 3: Plot of Lamp x/y coordinates on CIE 1931 Chromaticity Diagram

Color Rendition Report – Sphere Spectroradiometer Method

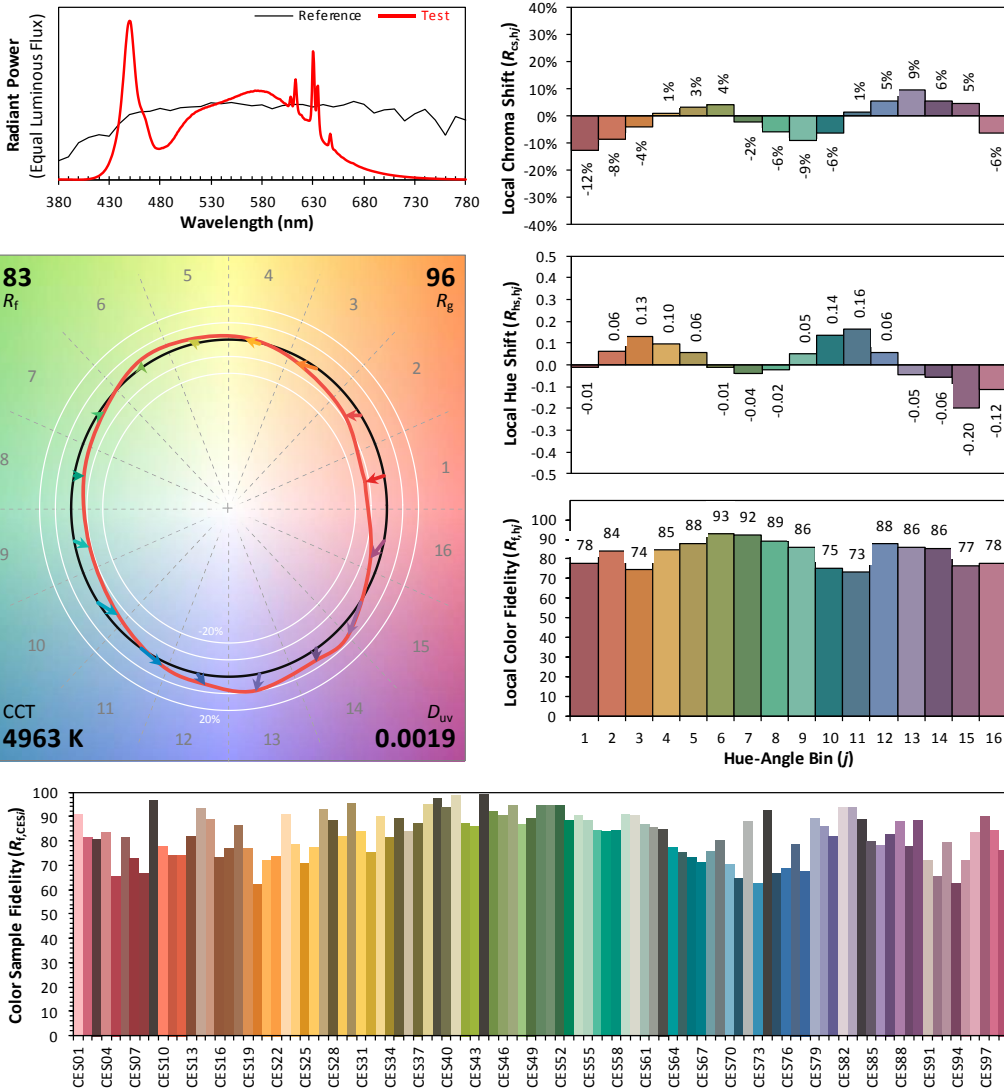
ANSI/IES TM-30-18 Color Rendition Report

Source: LED

Manufacturer: RAB Lighting INC

Date: 2024/07/31

Model: T8-8-48G-850-SD-BYP



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

x 0.3465
 y 0.3565
 u' 0.2105
 v' 0.4873

CIE 13.3-1995 (CRI)	
R_a	82
R_9	10

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	28.144	1.67%
10- 20	81.29	4.84%
20- 30	125.784	7.49%
30- 40	157.544	9.38%
40- 50	174.536	10.39%
50- 60	177.022	10.53%
60- 70	167.254	9.95%
70- 80	149.211	8.88%
80- 90	128.8	7.66%
90-100	111.785	6.65%
100-110	97.186	5.78%
110-120	83.332	4.96%
120-130	69.324	4.13%
130-140	54.557	3.25%
140-150	39.649	2.36%
150-160	24.468	1.46%
160-170	9.203	0.55%
170-180	1.332	0.08%
Total	1680.4	100%

$\gamma(^{\circ})$	Lumens	% Total
0- 60	744.32	44.29%
60- 90	445.265	26.50%
0-90	1189.585	70.79%
90- 180	490.836	29.21%
0- 180	1680.4	100%

Table 5: Zonal Lumen

Illuminance Plots- Goniophotometer Method

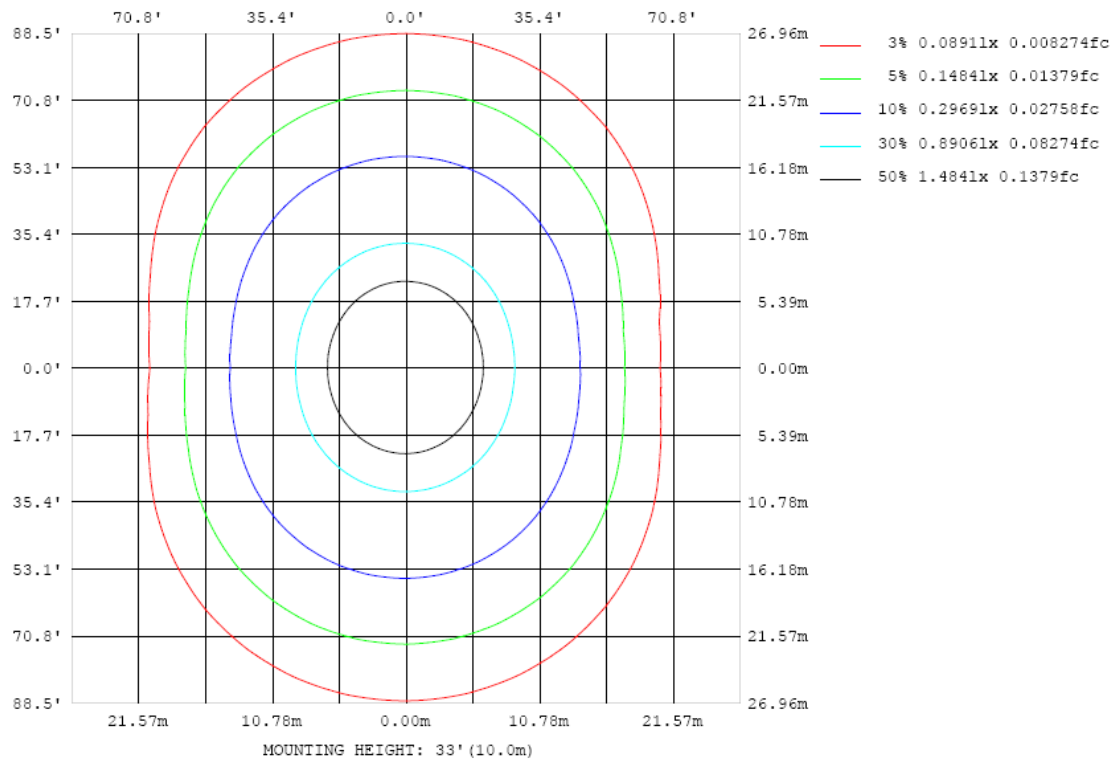


Chart 5: Illuminance Plot (Footcandles)

Luminous Intensity Distribution Plots- Goniophotometer Method

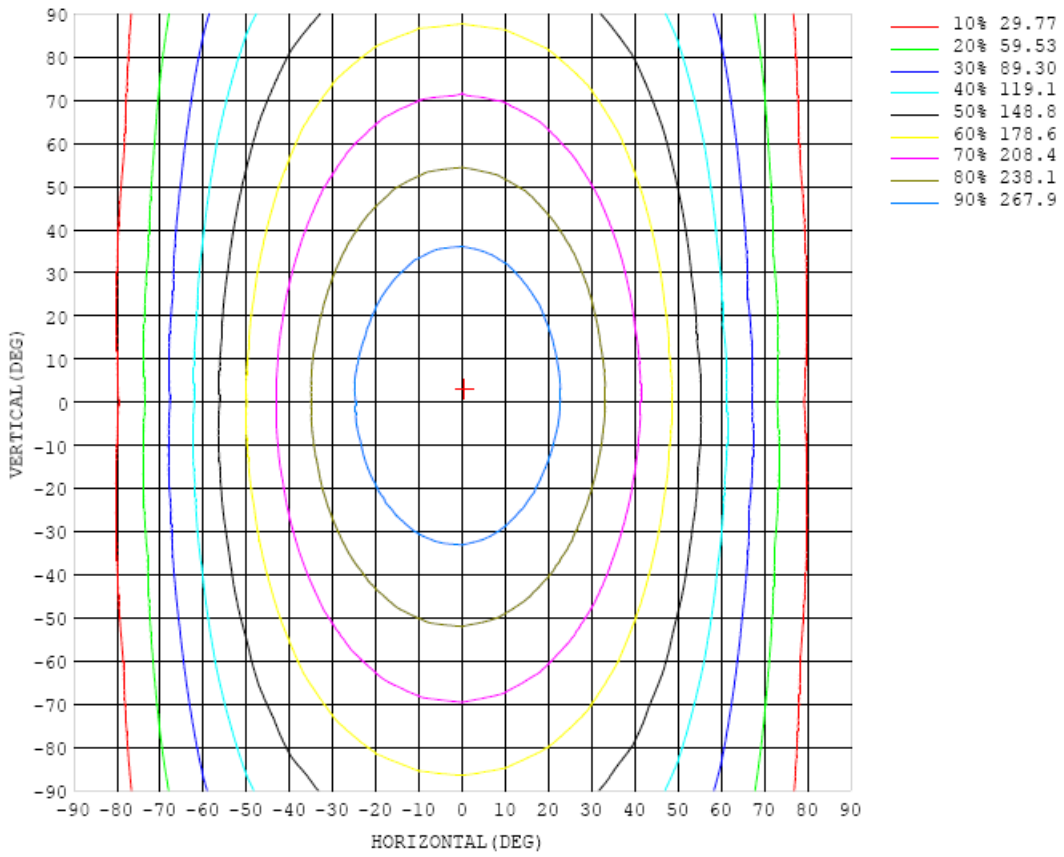


Chart 6: Isocandela Plot

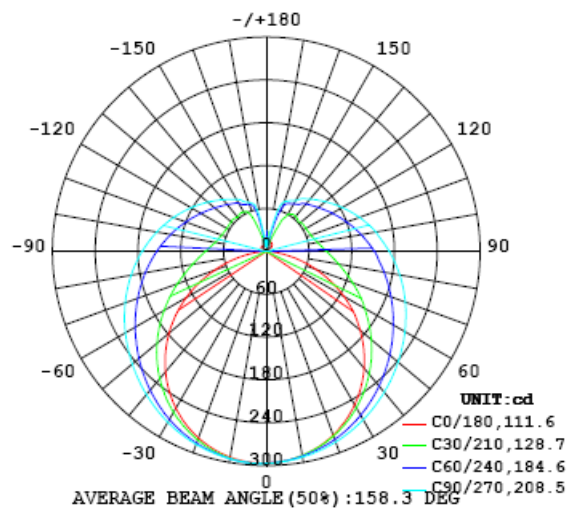


Chart 7: Polar Candela Distribution

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	297	297	297	297	297	297	297	297	297	297	297	297	297	297	297	297	297	297	297
5	295	295	295	295	294	295	294	295	295	295	295	296	295	296	296	296	296	296	296
10	290	291	291	290	291	291	291	292	292	292	293	293	292	293	293	293	293	293	293
15	283	283	283	284	284	286	286	287	288	289	289	289	289	288	287	287	287	287	287
20	274	274	274	275	277	278	281	282	284	284	284	284	282	282	281	280	279	278	278
25	262	262	263	265	267	270	273	276	277	278	279	278	277	274	272	270	268	268	267
30	248	248	250	253	256	261	265	268	271	272	272	271	269	266	262	259	256	254	254
35	232	232	235	239	245	250	256	261	264	265	265	263	260	256	251	246	242	240	238
40	214	214	218	224	232	240	246	252	256	257	257	255	250	245	238	231	225	222	220
45	193	195	200	209	218	228	236	243	248	250	249	246	241	233	225	216	208	203	200
50	172	174	181	192	204	216	226	234	239	242	241	237	230	222	211	199	189	182	178
55	150	153	162	176	190	204	216	225	231	233	232	228	220	210	197	183	169	160	155
60	126	130	143	159	177	193	206	216	222	225	224	219	210	198	183	166	150	137	130
65	100	107	123	144	163	182	196	207	213	216	215	210	200	187	169	150	129	112	104
70	74.5	83.3	104	129	152	171	186	198	205	207	206	201	190	175	157	134	109	87.8	76.9
75	49.4	61.2	87.0	115	140	161	177	189	196	199	197	191	180	165	145	120	90.6	64.5	51.7
80	26.2	41.8	72.2	103	130	152	168	180	187	190	188	182	171	156	134	107	74.9	43.8	27.7
85	7.83	27.3	60.6	92.8	121	143	159	171	178	181	180	173	162	147	124	95.9	62.3	28.0	8.10
90	0.21	19.6	52.5	84.7	112	135	152	162	170	172	171	165	154	138	115	86.7	52.8	18.1	0.25
95	0.36	17.6	47.6	78.0	105	127	143	155	161	164	162	157	146	129	107	79.5	46.5	14.1	0.49
100	0.36	18.9	45.0	73.1	98.3	119	135	147	154	156	155	148	137	121	100	73.8	43.3	14.5	1.56
105	0.33	22.0	44.2	69.3	92.4	112	128	139	145	148	146	140	129	114	94.3	69.7	42.1	16.7	2.64
110	0.80	26.2	44.8	66.8	87.7	106	120	131	137	139	137	132	122	107	89.0	66.9	42.4	19.6	4.07
115	2.91	31.0	46.3	65.0	83.5	100	113	123	129	131	129	124	114	101	84.6	64.9	43.7	23.0	5.43
120	4.59	35.2	48.6	64.4	80.3	95.0	107	116	121	123	121	116	108	95.9	81.1	64.1	45.8	17.2	7.31
125	7.24	37.6	49.9	64.1	77.7	90.4	101	109	114	115	114	109	102	91.3	78.3	63.8	48.3	6.30	9.07
130	9.48	29.6	52.4	62.5	75.8	86.6	95.7	103	107	108	107	103	96.1	87.0	76.3	62.7	49.8	7.16	9.37
135	11.4	18.8	54.0	62.5	73.8	83.2	90.9	96.6	100	102	100	97.1	91.2	83.8	73.8	62.7	46.8	8.07	9.30
140	12.8	11.5	53.9	63.9	70.2	79.9	86.7	91.5	94.5	95.6	94.7	91.7	87.0	79.8	70.1	63.2	30.9	6.34	8.97
145	13.6	9.78	44.5	63.5	69.8	75.1	80.3	86.6	89.2	90.1	89.2	86.5	80.5	75.0	70.3	60.9	14.8	12.7	8.70
150	14.2	10.9	25.3	57.6	68.2	73.3	76.9	79.6	81.5	82.3	81.5	79.9	76.9	73.7	68.5	45.9	14.4	16.8	9.05
155	14.6	6.92	11.0	36.3	60.4	70.3	74.0	76.2	77.6	78.0	77.8	76.5	74.4	70.7	58.3	21.9	13.2	16.1	9.26
160	14.7	13.3	11.8	12.2	32.5	54.1	66.4	71.6	72.9	73.6	73.1	72.1	67.0	55.4	29.4	16.2	11.0	15.7	9.11
165	14.1	18.3	7.52	12.0	9.17	17.6	28.5	41.1	49.7	53.0	51.2	43.9	34.0	20.9	16.4	12.7	14.6	14.6	8.92
170	13.8	13.5	22.7	8.72	13.8	11.3	8.40	8.26	13.2	16.2	17.5	16.9	14.6	12.8	12.0	16.5	16.3	18.1	9.17
175	14.0	14.0	20.3	28.3	21.6	11.4	9.30	9.99	7.48	6.60	11.0	17.5	17.0	14.7	13.5	19.9	27.3	21.0	11.0
180	13.4	13.4	13.3	13.0	12.2	11.2	10.2	8.75	8.69	9.14	6.95	3.40	12.1	13.1	14.5	16.4	17.5	18.3	13.3

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	297	297	297	297	297	297	297	297	297	297	297	297	297	297	297	297	297		
5	297	297	297	297	297	297	297	297	297	297	297	296	297	296	296	295	295		
10	294	294	294	294	294	295	295	295	295	295	294	294	294	293	292	291	291		
15	288	288	289	289	291	291	292	292	292	291	290	289	288	287	286	285	284		
20	280	280	281	282	284	286	287	288	288	287	286	283	282	279	278	276	275		
25	269	270	271	274	277	279	281	283	283	281	280	277	274	271	267	265	263		
30	255	257	260	264	268	272	275	276	276	275	273	269	265	260	255	251	249		
35	240	243	247	253	259	263	267	269	269	268	265	260	255	248	242	236	233		
40	222	226	233	240	247	254	259	261	262	260	257	251	243	235	227	219	215		
45	203	208	217	226	236	244	250	253	254	252	248	240	232	222	211	201	195		
50	181	189	200	212	224	233	240	245	245	244	238	230	220	207	194	182	174		
55	158	169	183	198	212	223	231	236	237	235	229	220	208	193	177	162	152		
60	135	148	166	184	200	212	222	227	228	226	220	209	196	179	161	142	128		
65	110	127	149	170	188	202	213	218	220	217	210	199	185	166	144	122	105		
70	85.8	107	133	157	177	192	203	209	211	208	201	190	174	153	129	103	81.5		
75	62.9	88.8	118	144	166	182	194	200	202	199	192	180	163	141	115	85.8	60.1		
80	42.4	73.0	105	133	156	172	184	191	193	190	183	170	153	131	103	71.0	40.7		
85	26.8	61.4	94.3	123	146	163	175	182	183	181	174	161	144	121	92.6	60.3	26.3		
90	18.5	52.7	85.4	114	137	154	166	173	174	172	164	152	135	112	84.4	52.3	18.9		
95	16.5	47.3	78.2	106	128	145	157	163	165	163	156	144	127	105	77.7	47.3	16.6		
100	18.0	44.5	72.9	98.7	120	136	148	154	156	154	147	135	119	98.2	72.6	44.5	16.8		
105	21.5	43.7	69.3	92.8	113	128	139	145	147	145	139	128	112	92.4	69.2	43.4	19.0		
110	26.2	44.3	66.8	87.4	106	120	131	137	139	137	130	120	106	87.4	66.8	43.6	22.5		
115	31.5	46.1	65.0	83.2	99.8	113	123	128	130	128	122	113	99.8	83.3	65.0	44.9	26.5		
120	36.5	48.6	64.3	79.7	94.5	106	115	120	122	120	115	106	94.6	79.8	64.1	47.0	30.7		
125	40.9	51.4	64.2	77.1	89.7	100	108	113	114	113	108	100	89.9	77.2	63.9	49.2	31.0		
130	42.2	54.4	64.6	75.0	85.8	94.8	102	106	107	106	102	94.9	86.0	75.1	64.3	49.5	24.7		
135	33.6	55.6	64.9	73.5	82.4	89.8	95.8	99.4	101	99.5	95.9	90.1	82.5	73.7	64.6	53.0	12.2		
140	22.5	56.7	62.9	72.3	79.4	85.7	90.4	93.4	94.5	93.6	90.6	85.8	79.8	72.6	63.1	54.1	9.45		
145	14.0	56.4	64.4	69.0	76.9	81.8	85.8	88.2	89.0	88.3	86.0	82.3	77.5	69.2	63.6	51.4	6.62		
150	10.4	47.1	63.6	68.6	71.7	77.9	81.5	83.5	84.1	83.6	81.8	78.3	72.5	68.6	61.1	36.2	9.66		
155	6.86	27.5	59.8	67.1	70.0	72.2	74.7	76.6	77.4	76.9	75.3	72.8	70.6	64.4	51.0	16.8	11.3		
160	6.85	13.2	38.4	61.3	67.6	69.9	71.6	72.4	72.8	72.7	71.9	69.8	61.4	49.8	25.9	7.26	9.95		
165	9.89	7.54	14.9	31.5	51.5	61.3	67.3	68.1	68.5	68.3	65.9	52.9	37.5	21.4	11.5	12.3	5.34		
170	11.1	7.50	7.88	12.4	15.1	24.0	28.1	32.1	34.1	32.2	21.1	14.8	11.8	9.24	13.8	8.87	9.57		
175	13.4	15.3	11.7	8.44	7.44	7.83	9.92	11.9	13.8	10.9	11.3	10.4	8.85	8.41	9.29	11.4	17.9		
180	13.1	12.7	11.8	10.6	8.70	8.37	9.87	12.0	19.1	6.26	17.2	23.3	23.7	23.0	21.4	22.4	20.2		

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.

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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