

LM-79-19 TEST REPORT

for

RAB Lighting Inc

408 W 14th St, New York, NY 10014 United States

LED Panel Light

Model: SWISH[blank,AIR]1X4[blank,/PIR,/LCBS,/MVS,/LCBS/MVS][blank,/E]

Laboratory: Leading Testing Laboratories

NVLAP CODE: 200960-0

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Report No.: HZ25070031f

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

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Aug. 07, 2025

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Aug. 07, 2025

Note: This report does not imply product certification, approval, or endorsement by NVLAP, NIST, or any agency of the Federal Government.

TEST SUMMARY

Tested Model	SWISH1X4 35W 3500K Setting	SWISH1X4 35W 4000K Setting	SWISH1X4 35W 5000K Setting
Luminous Efficacy (Lumens /Watt)	137.3	146.9	141.6
Total Luminous Flux (Lumens)	4715.2	4922.5	4886.8
Power (Watts)	34.35	33.51	34.52
Power Factor	0.9962	0.9960	0.9959
CCT (K)	3354	3929	4770
CRI	83.1	83.6	81.8
Stabilization Time (Light & Power)	50 mins	50 mins	50 mins
Note	3500K	4000K	5000K

Table 1: Executive Data Summary

Note: The above results are recorded/ derived from measurements made using an Integrating Sphere.

Test specifications:

Date of Receipt	: Jul. 28, 2025
Date of Test	: Aug. 05, 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 for the 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 Panel Light
Model	: SWISH1X4
Electrical Ratings	: 120-277V, 50/60Hz
Product Description	: Field-Adjustable 18W/26W/35W Color- Tunable 3500K/4000K/5000K
Manufacturer	: RAB Lighting Inc
Address	: 408 W 14th St, New York, NY 10014 United States

TEST RESULTS (35W 3500K Setting)

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)	0.288	0.129
Power Factor	0.9962	0.9534
Test Power (W)	34.35	33.99
THD A%	6.65	12.44
Luminous Efficacy (lm/W)	137.3	137.9
Total Luminous Flux (lm)	4715.2	4688.7
Color Rendering Index (CRI)	83.1	
R9	11.7	
Correlated Color Temperature (CCT)(K)	3354	
Chromaticity Chroma x	0.4142	
Chromaticity Chroma y	0.3961	
Chromaticity Chroma u	0.2392	
Chromaticity Chroma v	0.3432	
Duv	0.0005	
Chromaticity Chroma u'	0.2392	
Chromaticity Chroma v'	0.5148	

Special Color Rendering Indices	
R1	81.6
R2	89.6
R3	95.7
R4	81.8
R5	81.2
R6	86
R7	85.4
R8	63.4
R9	11.7
R10	75.3
R11	80.8
R12	62.7
R13	83.5
R14	97.6

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 25.1 °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)	0.288
Power Factor	0.9960
Power (W)	34.36
Luminous Efficacy (lm/W)	137.8
Total Luminous Flux (lm)	4733.0
Beam Angle (°)	117.3 (0°-180°) / 116.7 (90°-270°)
Center Beam Candle Power (cd)	1579
Maximum Beam Candle Power (cd)	1580 (At: C=20.0, Gamma=0.5)
Spacing Criteria	1.29 (0°-180°) / 1.27 (90°-270°)
Zonal Lumens in the 0 °-60 °Zone	77.43%
Zonal Lumens in the 60 °-90 °Zone	22.48%
Zonal Lumens in the 90 °-120 °Zone	0.03%
Zonal Lumens in the 120 °-180 °Zone	0.05%

Table 3: Test data per Goniophotometer Method

Spectral Power Distribution - Sphere Spectroradiometer Method

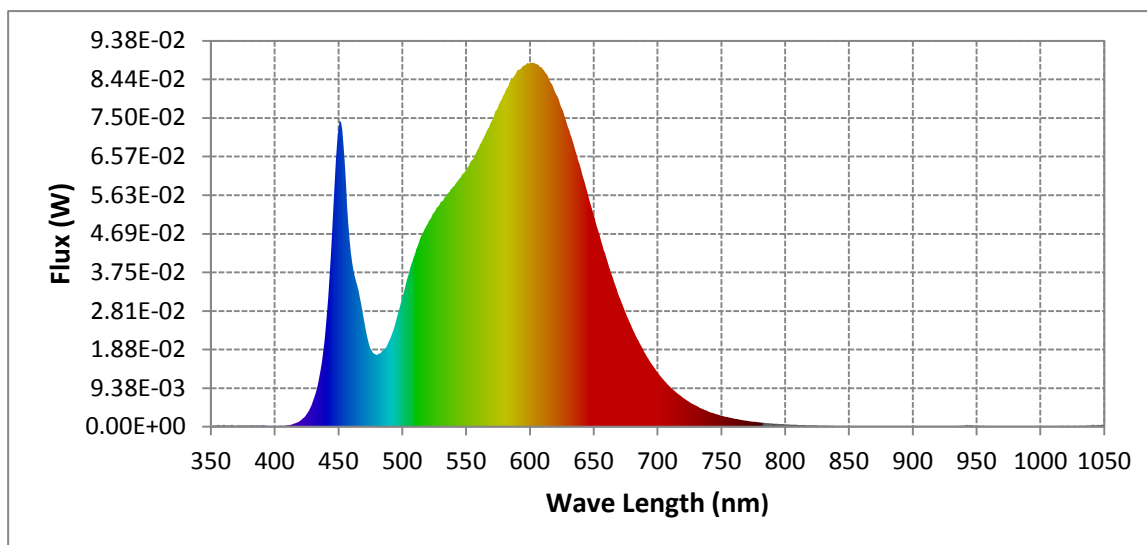
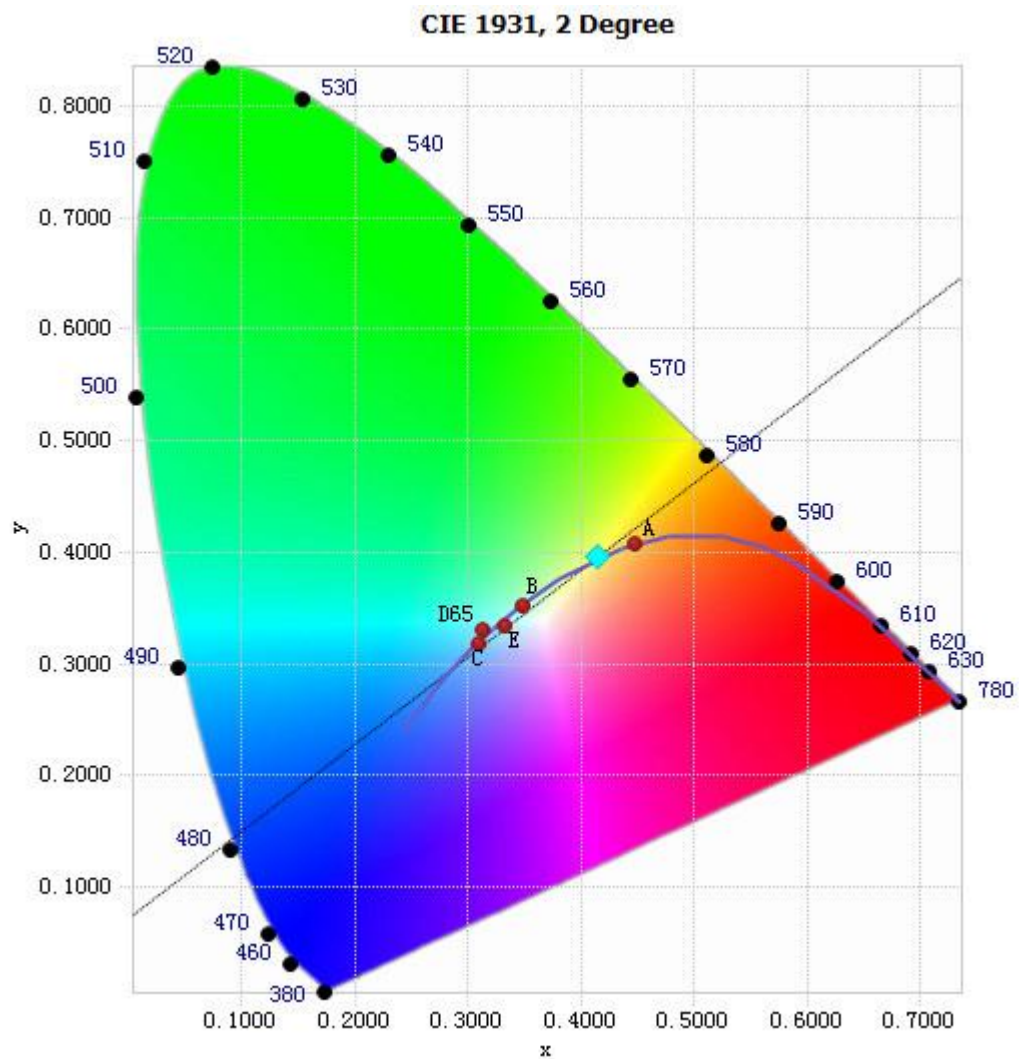


Chart 1: Spectral Power Distribution

Spectral Distribution over Visible Wavelength							
WL(nm)	Radiant(Watts)	WL(nm)	Radiant(Watts)	WL(nm)	Radiant(Watts)	WL(nm)	Radiant(Watts)
380	3.46E-04	485	1.85E-02	590	8.65E-02	695	1.56E-02
385	2.73E-04	490	2.10E-02	595	8.77E-02	700	1.33E-02
390	2.33E-04	495	2.56E-02	600	8.84E-02	705	1.14E-02
395	2.18E-04	500	3.13E-02	605	8.81E-02	710	9.71E-03
400	1.51E-04	505	3.70E-02	610	8.69E-02	715	8.26E-03
405	2.69E-04	510	4.20E-02	615	8.46E-02	720	7.07E-03
410	3.73E-04	515	4.64E-02	620	8.12E-02	725	6.03E-03
415	7.37E-04	520	4.93E-02	625	7.74E-02	730	5.18E-03
420	1.45E-03	525	5.21E-02	630	7.28E-02	735	4.37E-03
425	3.02E-03	530	5.46E-02	635	6.79E-02	740	3.73E-03
430	6.15E-03	535	5.62E-02	640	6.27E-02	745	3.17E-03
435	1.20E-02	540	5.83E-02	645	5.71E-02	750	2.72E-03
440	2.38E-02	545	6.03E-02	650	5.15E-02	755	2.34E-03
445	4.70E-02	550	6.23E-02	655	4.62E-02	760	1.98E-03
450	7.25E-02	555	6.48E-02	660	4.10E-02	765	1.70E-03
455	6.37E-02	560	6.77E-02	665	3.62E-02	770	1.46E-03
460	4.21E-02	565	7.09E-02	670	3.16E-02	775	1.23E-03
465	3.42E-02	570	7.43E-02	675	2.77E-02	780	1.07E-03
470	2.63E-02	575	7.76E-02	680	2.40E-02		
475	1.91E-02	580	8.09E-02	685	2.09E-02		
480	1.75E-02	585	8.42E-02	690	1.81E-02		

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

Chromaticity Diagram - Sphere Spectroradiometer Method



Tristimulus values(x, y): (0.4142, 0.3961)

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

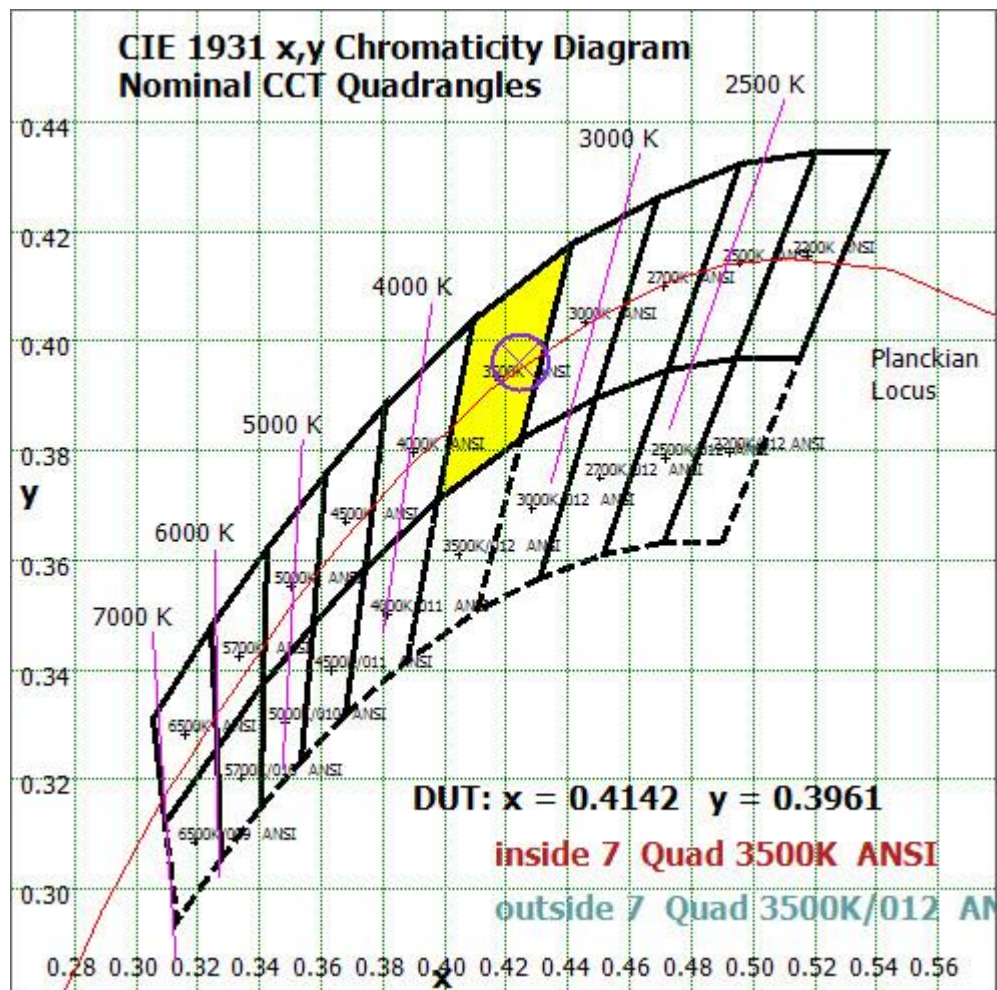


Chart 3: Plot of Lamp x/y coordinates on CIE 1931 Chromaticity Diagram

Color Rendition Report – Sphere Spectroradiometer Method

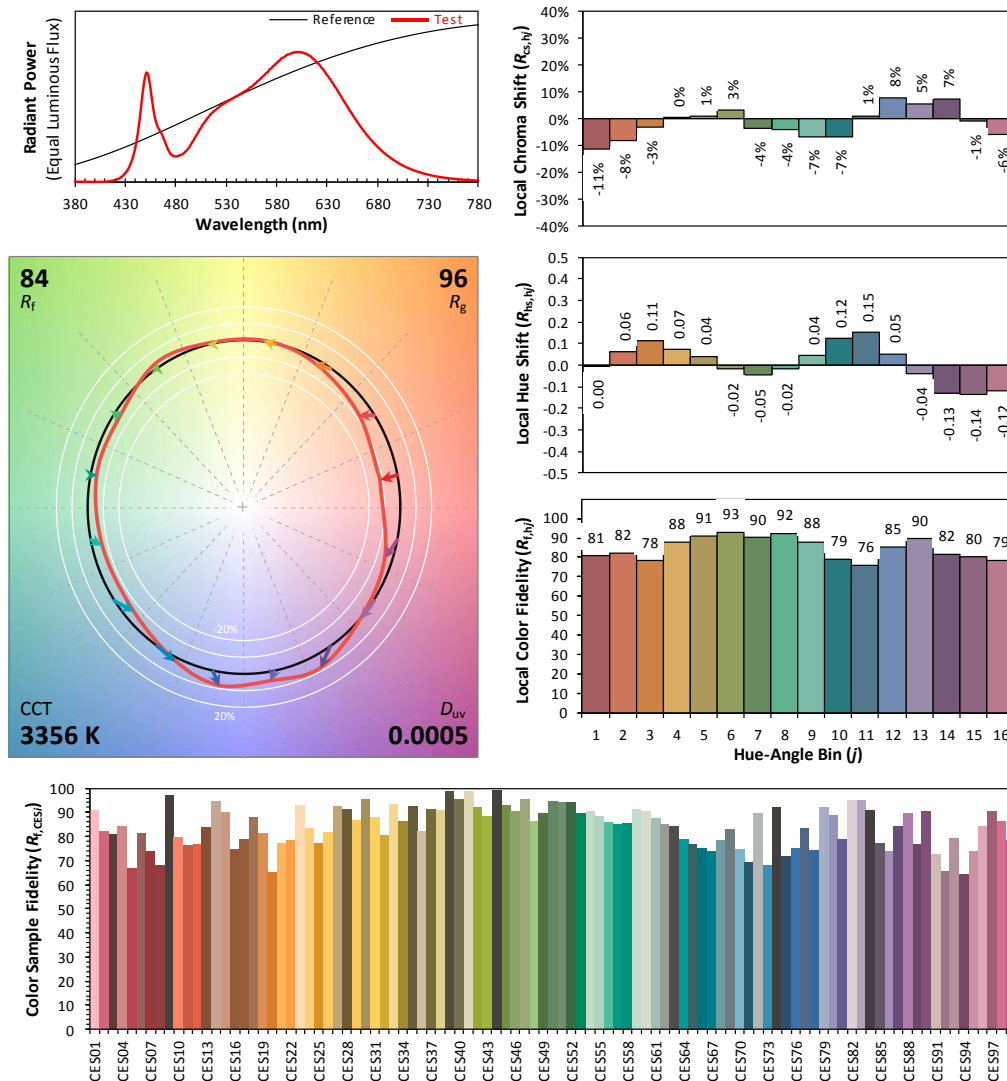
ANSI/IES TM-30-18 Color Rendition Report

Source: LED

Manufacturer: RAB Lighting Inc

Date: 2025/08/05

Model: SWISH1X4



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

x 0.4142
 y 0.3961
 u' 0.2392
 v' 0.5148

CIE 13.3-1995
(CRI)

R_a 83

R_g 12

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	149.524	3.16%
10- 20	429.731	9.08%
20- 30	655.985	13.86%
30- 40	800.537	16.91%
40- 50	845.388	17.86%
50- 60	783.708	16.56%
60- 70	615.414	13.00%
70- 80	360.175	7.61%
80- 90	88.489	1.87%
90-100	0.446	0.01%
100-110	0.536	0.01%
110-120	0.553	0.01%
120-130	0.565	0.01%
130-140	0.595	0.01%
140-150	0.547	0.01%
150-160	0.438	0.01%
160-170	0.293	0.01%
170-180	0.106	0.00%
Total	4733.0	100%

$\gamma(^{\circ})$	Lumens	% Total
0- 60	3664.873	77.43%
60- 90	1064.078	22.48%
0-90	4728.951	99.91%
90- 180	4.079	0.09%
0- 180	4733.0	100%

Table 5: Zonal Lumen

UGR Table (Corrected) - Goniophotometer Method

Reflectances											
Ceiling Cavity		70	70	50	50	30	70	70	50	50	30
Walls		50	30	50	30	30	50	30	50	30	30
Floor Cavity		20	20	20	20	20	20	20	20	20	20
Room Size		UGR Viewed Crosswise					UGR Viewed Endwise				
X=2H	Y=2H	17.2	18.9	17.6	19.2	19.5	17.2	18.9	17.6	19.2	19.5
	3H	19.1	20.6	19.5	20.9	21.3	19.1	20.7	19.5	21.0	21.3
	4H	19.8	21.2	20.1	21.5	21.9	19.8	21.3	20.2	21.6	22.0
	6H	20.2	21.5	20.6	21.9	22.3	20.3	21.6	20.7	22.0	22.4
	8H	20.3	21.6	20.7	22.0	22.4	20.5	21.7	20.9	22.1	22.5
	12H	20.4	21.6	20.8	21.9	22.4	20.6	21.8	21.0	22.1	22.6
4H	2H	17.9	19.4	18.3	19.7	20.1	17.9	19.4	18.3	19.7	20.1
	3H	20.0	21.2	20.4	21.6	22.0	20.1	21.3	20.5	21.7	22.1
	4H	20.8	21.9	21.3	22.3	22.7	20.9	22.0	21.3	22.4	22.8
	6H	21.4	22.3	21.8	22.8	23.2	21.5	22.5	22.0	22.9	23.3
	8H	21.5	22.4	22.0	22.9	23.3	21.7	22.6	22.1	23.0	23.5
	12H	21.6	22.4	22.1	22.9	23.3	21.8	22.6	22.3	23.1	23.6
8H	4H	21.1	22.0	21.6	22.5	22.9	21.2	22.1	21.7	22.6	23.0
	6H	21.8	22.6	22.3	23.1	23.5	22.0	22.7	22.5	23.2	23.7
	8H	22.1	22.7	22.6	23.2	23.7	22.2	22.9	22.7	23.4	23.9
	12H	22.2	22.8	22.7	23.3	23.8	22.4	23.0	22.9	23.5	24.0
12H	4H	21.2	22.0	21.7	22.5	22.9	21.3	22.1	21.8	22.6	23.0
	6H	21.9	22.6	22.4	23.0	23.6	22.1	22.7	22.6	23.2	23.7
	8H	22.2	22.8	22.7	23.2	23.8	22.4	22.9	22.9	23.4	24.0

Chart 5: UGR Table (Corrected)

Illuminance Plots- Goniophotometer Method

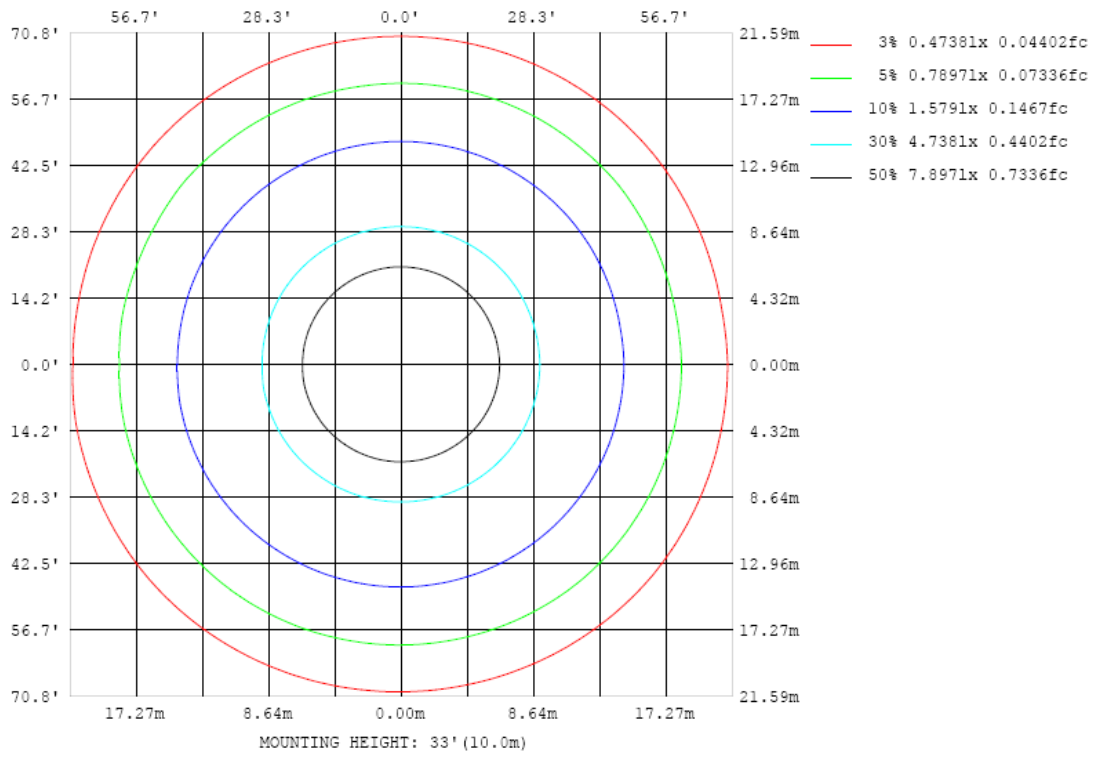


Chart 6: Illuminance Plot (Footcandles)

Luminous Intensity Distribution Plots- Goniophotometer Method

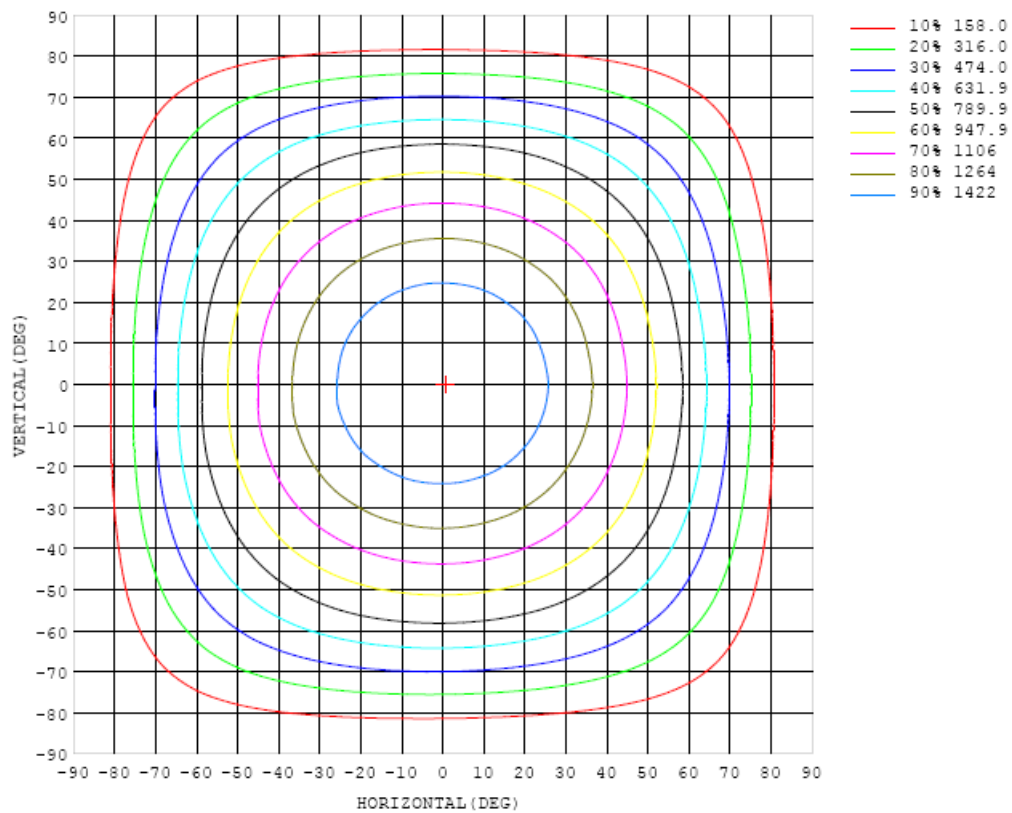


Chart 7: Isocandela Plot

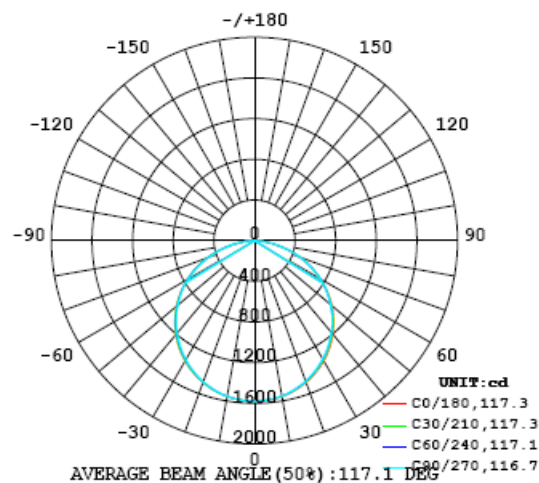


Chart 8: Polar Candela Distribution

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	1579	1579	1579	1579	1579	1579	1579	1579	1579	1579	1579	1579	1579	1579	1579	1579	1579	1579	1579
5	1574	1573	1573	1572	1572	1571	1571	1570	1571	1572	1571	1572	1571	1573	1574	1574	1574	1574	1572
10	1556	1554	1554	1553	1551	1552	1551	1550	1550	1551	1551	1552	1552	1554	1556	1556	1557	1558	1555
15	1526	1524	1523	1522	1520	1518	1518	1516	1517	1516	1516	1518	1519	1521	1525	1526	1526	1529	1526
20	1483	1481	1481	1478	1475	1474	1471	1470	1470	1469	1470	1473	1474	1477	1482	1483	1485	1488	1484
25	1430	1428	1426	1423	1419	1417	1414	1413	1411	1412	1413	1416	1418	1421	1427	1430	1432	1436	1432
30	1365	1362	1360	1356	1352	1349	1346	1343	1342	1343	1345	1347	1351	1355	1361	1365	1368	1372	1368
35	1289	1286	1283	1279	1275	1272	1268	1265	1264	1265	1267	1269	1273	1278	1285	1289	1293	1298	1292
40	1202	1199	1196	1191	1187	1183	1180	1177	1176	1177	1178	1182	1186	1193	1199	1204	1209	1213	1207
45	1103	1101	1098	1095	1091	1087	1084	1081	1080	1081	1083	1086	1091	1097	1104	1109	1113	1117	1110
50	995	994	991	988	984	981	978	976	976	977	979	983	988	993	1000	1005	1008	1011	1003
55	877	875	874	873	870	868	867	866	866	867	869	872	876	881	887	891	894	896	887
60	749	749	749	748	748	749	746	744	743	744	747	752	759	762	767	769	771	771	760
65	611	612	615	618	621	618	614	612	611	613	616	622	628	635	640	640	639	638	624
70	467	471	477	482	482	480	476	473	472	474	477	484	492	499	505	505	501	497	479
75	319	326	335	340	339	337	333	330	330	331	336	342	350	358	364	366	360	353	332
80	177	186	195	198	198	195	193	192	192	194	197	203	209	217	222	224	220	210	187
85	52.6	60.5	64.6	66.1	67.6	69.0	69.9	70.6	71.8	73.7	76.4	79.6	83.4	86.2	87.9	88.6	86.8	79.9	61.1
90	0.46	0.46	0.47	0.47	0.48	0.49	0.50	0.50	0.50	0.50	0.49	0.49	0.48	0.47	0.43	0.07	0.56	0.55	2.21
95	0.55	0.56	0.56	0.57	0.58	0.59	0.60	0.61	0.61	0.60	0.60	0.59	0.58	0.57	0.56	0.54	0.53	0.53	0.20
100	0.63	0.63	0.64	0.65	0.66	0.68	0.69	0.70	0.69	0.68	0.68	0.68	0.68	0.67	0.66	0.64	0.62	0.61	0.24
105	0.68	0.67	0.68	0.69	0.71	0.74	0.77	0.78	0.77	0.76	0.76	0.76	0.76	0.75	0.73	0.72	0.69	0.66	0.27
110	0.67	0.66	0.67	0.69	0.70	0.74	0.78	0.79	0.78	0.77	0.77	0.78	0.78	0.75	0.72	0.69	0.66	0.66	0.32
115	0.66	0.66	0.66	0.67	0.68	0.70	0.74	0.76	0.75	0.74	0.74	0.76	0.75	0.73	0.70	0.67	0.65	0.65	0.39
120	0.69	0.68	0.68	0.68	0.68	0.68	0.71	0.72	0.71	0.70	0.71	0.73	0.72	0.71	0.69	0.67	0.66	0.67	0.46
125	0.75	0.75	0.74	0.74	0.71	0.71	0.72	0.70	0.71	0.70	0.70	0.73	0.73	0.73	0.71	0.70	0.70	0.72	0.53
130	0.80	0.81	0.81	0.84	0.79	0.78	0.80	0.77	0.79	0.79	0.78	0.81	0.82	0.79	0.77	0.78	0.77	0.78	0.58
135	0.89	0.91	0.92	0.94	0.92	0.91	0.91	0.88	0.94	0.94	0.92	0.92	0.93	0.91	0.92	0.89	0.88	0.87	0.64
140	0.92	0.97	1.01	1.03	1.03	1.03	1.03	0.99	1.05	1.06	1.04	1.04	1.05	1.01	0.97	0.94	0.92	0.88	0.65
145	1.01	1.03	1.07	1.09	1.10	1.11	1.11	1.08	1.14	1.17	1.15	1.12	1.11	1.09	1.02	0.95	0.96	0.96	0.69
150	1.07	1.08	1.12	1.11	1.15	1.14	1.11	1.12	1.16	1.16	1.12	1.16	1.11	1.07	1.00	1.04	1.06	1.03	0.76
155	1.08	1.08	1.13	1.15	1.15	1.12	1.08	1.08	1.08	1.16	1.12	1.08	1.04	1.03	1.07	1.09	1.08	1.06	0.84
160	1.11	1.10	1.11	1.14	1.15	1.16	1.08	1.02	1.08	1.02	1.03	1.02	1.05	1.07	1.09	1.12	1.10	1.09	0.92
165	1.10	1.10	1.10	1.12	1.16	1.18	1.14	1.08	1.03	1.05	1.04	1.03	1.06	1.06	1.08	1.09	1.09	1.07	1.01
170	1.13	1.14	1.17	1.20	1.21	1.24	1.25	1.17	1.08	1.07	1.10	1.11	1.08	1.06	1.09	1.12	1.11	1.09	1.07
175	1.18	1.19	1.21	1.23	1.23	1.23	1.23	1.19	1.11	1.12	1.11	1.14	1.10	1.06	1.11	1.13	1.10	1.07	1.11
180	1.13	1.13	1.13	1.13	1.13	1.13	1.13	1.13	1.13	1.13	1.13	1.13	1.13	1.13	1.13	1.13	1.13	1.13	1.13

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	1579	1579	1579	1579	1579	1579	1579	1579	1579	1579	1579	1579	1579	1579	1579	1579	1579		
5	1574	1573	1573	1573	1573	1573	1573	1573	1572	1572	1572	1573	1571	1573	1574	1573	1572		
10	1555	1555	1555	1555	1555	1554	1553	1554	1554	1553	1554	1553	1553	1554	1555	1553	1554		
15	1526	1526	1525	1524	1523	1522	1521	1520	1520	1522	1521	1521	1522	1524	1524	1523	1525		
20	1485	1485	1483	1481	1479	1479	1477	1476	1475	1475	1476	1477	1478	1481	1482	1480	1481		
25	1431	1431	1429	1426	1424	1423	1420	1420	1418	1418	1420	1422	1422	1426	1426	1425	1426		
30	1367	1366	1363	1360	1359	1356	1352	1352	1351	1351	1352	1353	1356	1360	1360	1360	1361		
35	1292	1292	1288	1285	1281	1278	1274	1274	1272	1271	1274	1276	1278	1281	1283	1283	1283		
40	1205	1205	1202	1199	1195	1190	1187	1185	1184	1184	1186	1189	1190	1194	1196	1195	1196		
45	1109	1110	1107	1103	1098	1094	1090	1089	1088	1089	1090	1091	1094	1097	1098	1097	1096		
50	1004	1004	1002	999	994	991	989	987	985	985	986	988	989	991	992	990	989		
55	888	889	888	886	883	880	877	876	875	875	876	875	876	876	876	873	870		
60	761	764	765	764	763	761	758	754	752	752	754	756	755	753	752	746	742		
65	626	631	634	635	634	630	624	621	619	619	621	623	624	623	618	611	603		
70	485	492	498	499	496	491	486	482	480	479	482	484	485	486	480	470	460		
75	340	351	357	357	353	349	343	340	338	337	338	340	342	343	338	327	314		
80	198	210	215	215	212	207	204	201	199	198	199	199	200	200	196	187	173		
85	70.4	77.8	81.1	82.6	83.0	82.0	80.5	79.1	78.0	77.0	76.4	75.4	72.8	70.0	65.1	60.6	52.9		
90	3.47	2.36	2.63	1.58	0.81	2.65	0.38	0.20	0.21	0.23	0.29	0.36	0.46	0.59	0.72	0.13	0.09		
95	0.20	0.20	0.21	0.21	0.21	0.22	0.22	0.22	0.22	0.22	0.22	0.22	0.21	0.21	0.21	0.21	0.21		
100	0.23	0.24	0.25	0.26	0.26	0.26	0.26	0.26	0.26	0.26	0.27	0.27	0.27	0.27	0.26	0.25	0.24		
105	0.27	0.28	0.28	0.29	0.31	0.32	0.32	0.31	0.31	0.32	0.33	0.33	0.32	0.31	0.31	0.29	0.29		
110	0.32	0.33	0.33	0.33	0.35	0.37	0.36	0.35	0.35	0.37	0.38	0.38	0.37	0.36	0.36	0.34	0.34		
115	0.38	0.38	0.38	0.38	0.40	0.42	0.41	0.40	0.39	0.42	0.44	0.44	0.43	0.42	0.43	0.41	0.41		
120	0.46	0.45	0.44	0.45	0.47	0.49	0.45	0.45	0.45	0.48	0.51	0.50	0.49	0.49	0.50	0.49	0.48		
125	0.54	0.51	0.49	0.50	0.53	0.55	0.52	0.51	0.52	0.53	0.56	0.55	0.55	0.56	0.56	0.55	0.55		
130	0.60	0.59	0.58	0.56	0.58	0.62	0.60	0.57	0.60	0.60	0.62	0.62	0.60	0.61	0.62	0.60	0.61		
135	0.66	0.65	0.64	0.62	0.63	0.65	0.63	0.61	0.64	0.63	0.64	0.64	0.63	0.65	0.67	0.65	0.66		
140	0.65	0.65	0.65	0.63	0.65	0.66	0.63	0.63	0.65	0.63	0.62	0.64	0.64	0.65	0.66	0.65	0.68		
145	0.70	0.71	0.69	0.67	0.67	0.69	0.67	0.66	0.67	0.65	0.64	0.66	0.67	0.68	0.68	0.69	0.71		
150	0.76	0.79	0.78	0.73	0.73	0.72	0.72	0.73	0.71	0.71	0.70	0.70	0.72	0.74	0.73	0.74	0.77		
155	0.83	0.85	0.87	0.82	0.78	0.76	0.76	0.77	0.74	0.75	0.77	0.77	0.79	0.81	0.82	0.82	0.84		
160	0.92	0.93	0.93	0.92	0.86	0.82	0.81	0.82	0.77	0.78	0.83	0.85	0.89	0.90	0.91	0.90	0.92		
165	1.02	1.03	1.05	1.05	1.01	0.98	0.96	0.94	0.90	0.90	0.95	1.03	1.05	1.04	1.02	1.01	1.02		
170	1.07	1.08	1.09	1.10	1.06	0.99	0.95	1.01	0.95	0.91	0.98	1.05	1.06	1.03	1.03	1.03	1.07		
175	1.20	1.22	1.23	1.25	1.25	1.19	1.13	1.15	1.07	1.03	1.05	1.07	1.04	1.07	1.10	1.13	1.17		
180	1.13	1.13	1.13	1.13	1.13	1.13	1.13	1.13	1.13	1.13	1.13	1.13	1.13	1.13	1.13	1.13	1.13		

Table 7: Luminous Intensity Data

TEST RESULTS (35W 4000K Setting)

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)	0.280	0.126
Power Factor	0.9960	0.9507
Test Power (W)	33.51	33.18
THD A%	6.56	12.49
Luminous Efficacy (lm/W)	146.9	147.6
Total Luminous Flux (lm)	4922.5	4898.9
Color Rendering Index (CRI)	83.6	
R9	15.2	
Correlated Color Temperature (CCT)(K)	3929	
Chromaticity Chroma x	0.3836	
Chromaticity Chroma y	0.3789	
Chromaticity Chroma u	0.2263	
Chromaticity Chroma v	0.3353	
Duv	0.0002	
Chromaticity Chroma u'	0.2263	
Chromaticity Chroma v'	0.5030	

Special Color Rendering Indices	
R1	82.4
R2	88.9
R3	93.4
R4	83.3
R5	82.1
R6	84.2
R7	87.1
R8	67.3
R9	15.2
R10	73.2
R11	82.4
R12	59.8
R13	84
R14	96.3

Table 8: Test data per Sphere-Spectroradiometer Method

Note: According to CIE 1976 (u', v') diagram, $u' = u / (-2x + 12y + 3)$, $v' = 3v / 2 = 9y / (-2x + 12y + 3)$.

Goniophotometer Method

Test ambient temperature was 25.1 °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)	0.280
Power Factor	0.9960
Power (W)	33.52
Luminous Efficacy (lm/W)	147.5
Total Luminous Flux (lm)	4944.5
Beam Angle (°)	117.3 (0°-180°) / 116.7 (90°-270°)
Center Beam Candle Power (cd)	1651
Maximum Beam Candle Power (cd)	1651 (At: C=340.0, Gamma=0.5)
Spacing Criteria	1.28 (0°-180°) / 1.27 (90°-270°)
Zonal Lumens in the 0°-60° Zone	77.43%
Zonal Lumens in the 60°-90° Zone	22.48%
Zonal Lumens in the 90°-120° Zone	0.03%
Zonal Lumens in the 120°-180° Zone	0.05%

Table 9: Test data per Goniophotometer Method

Spectral Power Distribution - Sphere Spectroradiometer Method

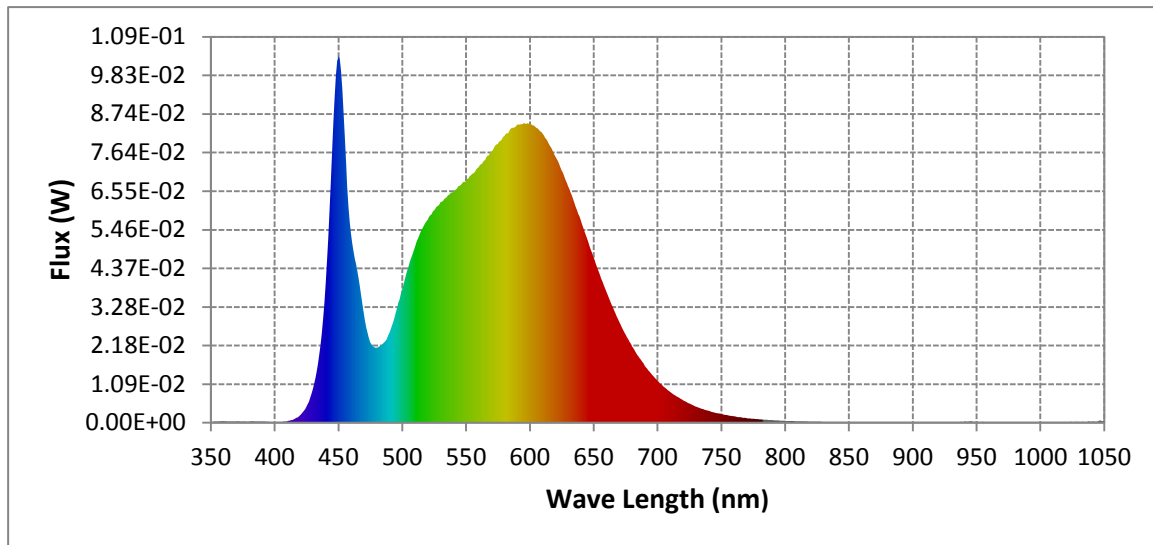
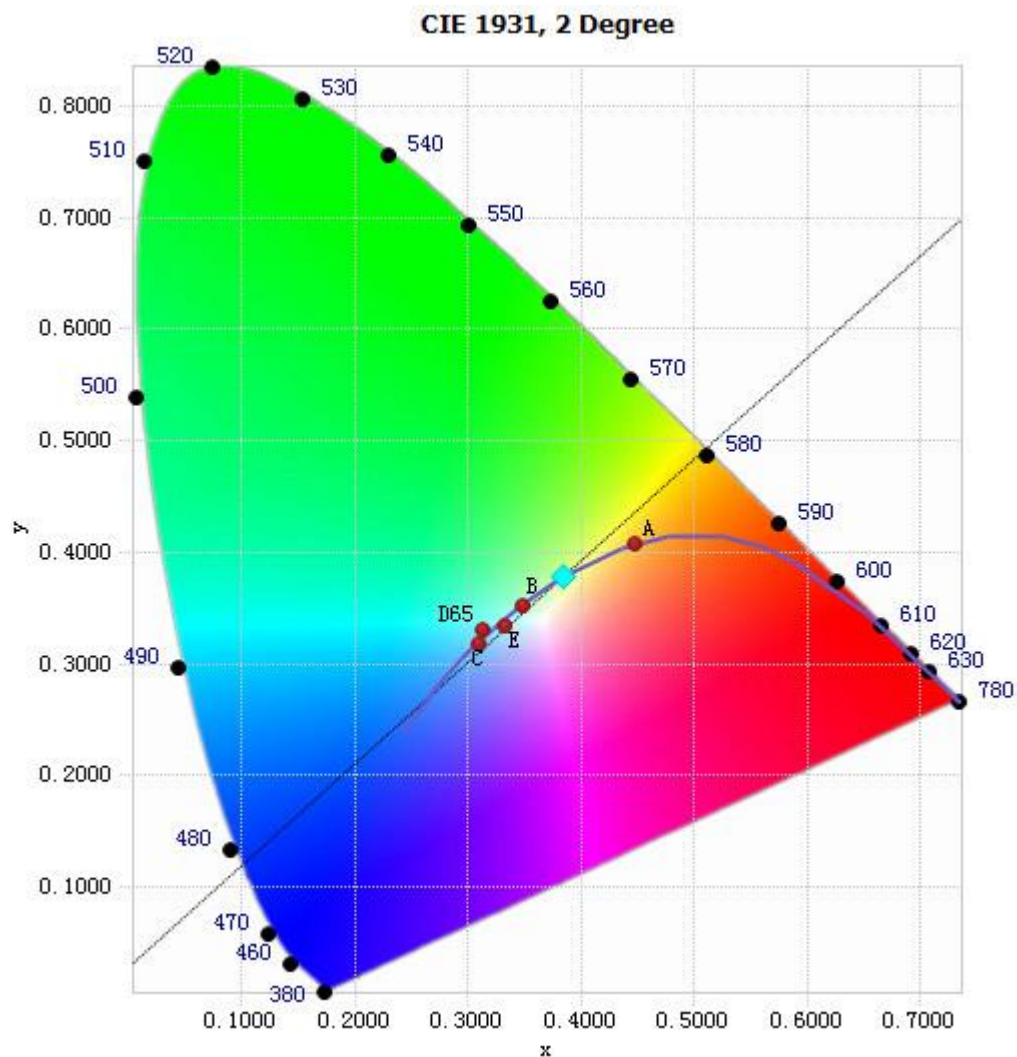


Chart 9: Spectral Power Distribution

Spectral Distribution over Visible Wavelength							
WL(nm)	Radiant(Watts)	WL(nm)	Radiant(Watts)	WL(nm)	Radiant(Watts)	WL(nm)	Radiant(Watts)
380	3.43E-04	485	2.24E-02	590	8.44E-02	695	1.39E-02
385	3.47E-04	490	2.54E-02	595	8.47E-02	700	1.20E-02
390	3.20E-04	495	3.12E-02	600	8.46E-02	705	1.02E-02
395	2.79E-04	500	3.77E-02	605	8.34E-02	710	8.73E-03
400	1.75E-04	505	4.42E-02	610	8.17E-02	715	7.48E-03
405	2.31E-04	510	4.97E-02	615	7.89E-02	720	6.39E-03
410	4.22E-04	515	5.44E-02	620	7.54E-02	725	5.45E-03
415	9.38E-04	520	5.75E-02	625	7.14E-02	730	4.61E-03
420	2.10E-03	525	6.01E-02	630	6.70E-02	735	3.90E-03
425	4.56E-03	530	6.24E-02	635	6.22E-02	740	3.36E-03
430	9.56E-03	535	6.38E-02	640	5.72E-02	745	2.86E-03
435	1.94E-02	540	6.53E-02	645	5.20E-02	750	2.45E-03
440	3.92E-02	545	6.70E-02	650	4.68E-02	755	2.10E-03
445	7.64E-02	550	6.83E-02	655	4.18E-02	760	1.81E-03
450	1.04E-01	555	7.04E-02	660	3.71E-02	765	1.55E-03
455	8.07E-02	560	7.23E-02	665	3.27E-02	770	1.33E-03
460	5.36E-02	565	7.43E-02	670	2.86E-02	775	1.14E-03
465	4.29E-02	570	7.67E-02	675	2.50E-02	780	9.76E-04
470	3.10E-02	575	7.89E-02	680	2.16E-02		
475	2.28E-02	580	8.10E-02	685	1.88E-02		
480	2.12E-02	585	8.31E-02	690	1.62E-02		

Table10: Spectral Power Distribution Numerical Data per Sphere - Spectroradiometer Method

Chromaticity Diagram - Sphere Spectroradiometer Method



Tristimulus values(x, y): (0.3836, 0.3789)

Chart 10: 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

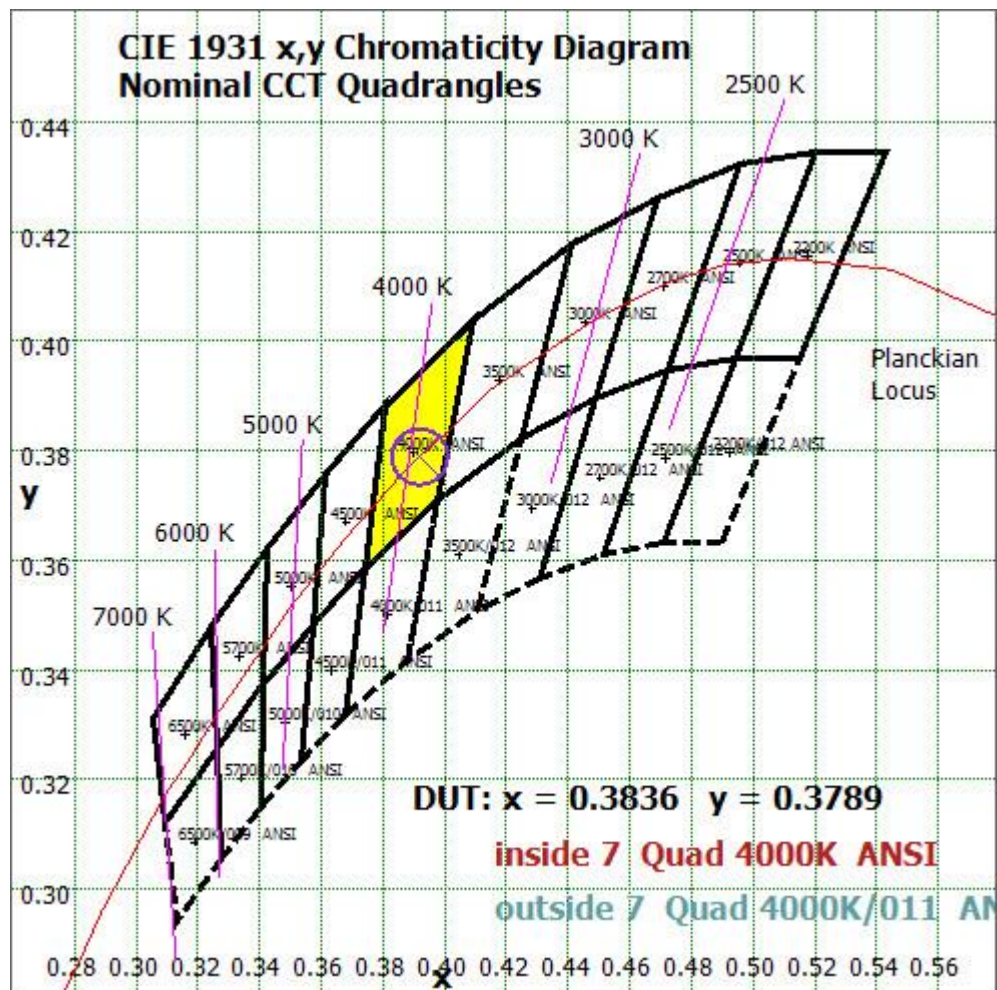


Chart 11: Plot of Lamp x/y coordinates on CIE 1931 Chromaticity Diagram

Color Rendition Report – Sphere Spectroradiometer Method

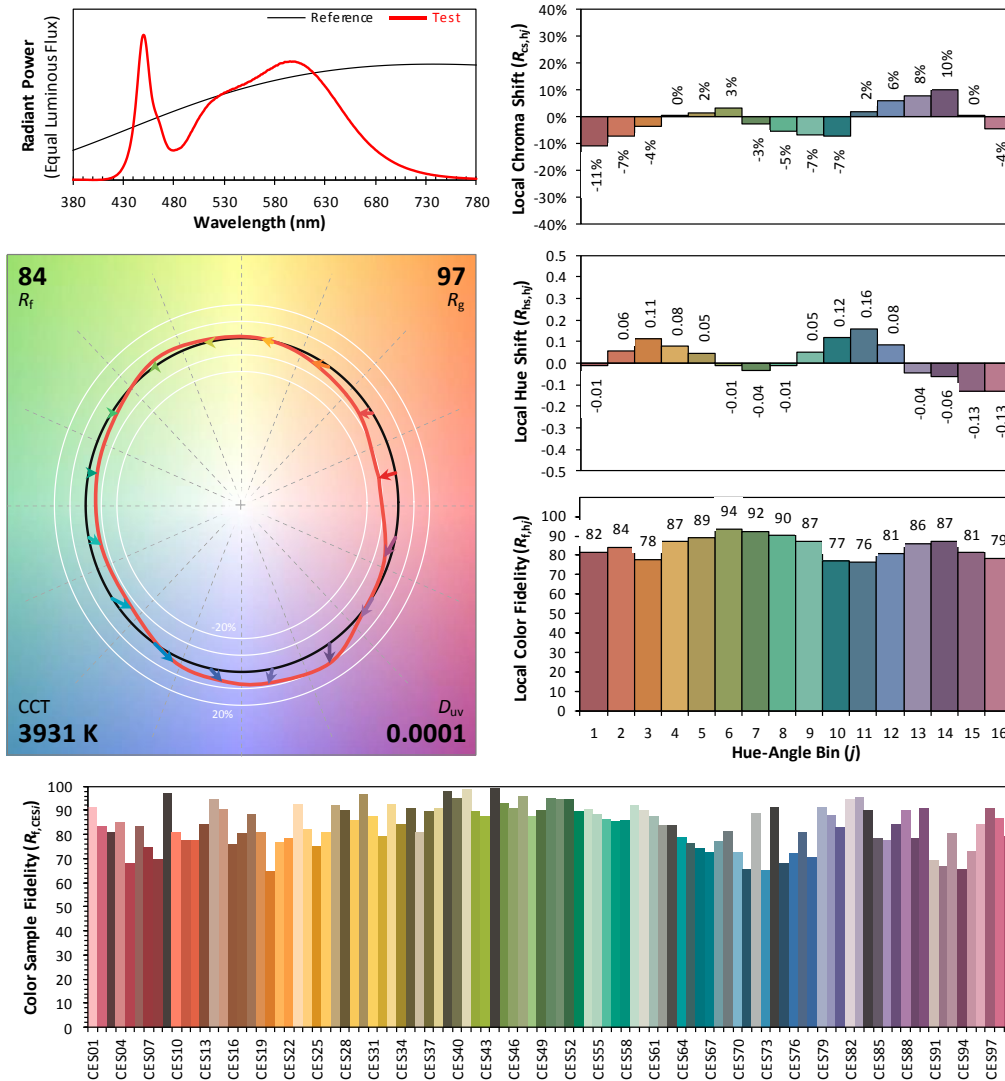
ANSI/IES TM-30-18 Color Rendition Report

Source: LED

Manufacturer: RAB Lighting Inc

Date: 2025/08/05

Model: SWISH1X4



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

x 0.3836
 y 0.3789
 u' 0.2263
 v' 0.5030

CIE 13.3-1995
(CRI)

R_a 84
 R_g 15

Colors are for visual orientation purposes only. Created with the ANSI/IES TM-30-18 Calculator Version 2.00.

Chart 12: 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 8 due to rounding.

Zonal Lumen Tabulation- Goniophotometer Method

$\gamma(^{\circ})$	Lumens	% Total
0- 10	156.154	3.16%
10- 20	448.808	9.08%
20- 30	685.148	13.86%
30- 40	836.213	16.91%
40- 50	883.2	17.86%
50- 60	818.941	16.56%
60- 70	643.066	13.01%
70- 80	376.314	7.61%
80- 90	92.373	1.87%
90-100	0.475	0.01%
100-110	0.57	0.01%
110-120	0.586	0.01%
120-130	0.599	0.01%
130-140	0.629	0.01%
140-150	0.578	0.01%
150-160	0.463	0.01%
160-170	0.309	0.01%
170-180	0.112	0.00%
Total	4944.5	100%

$\gamma(^{\circ})$	Lumens	% Total
0- 60	3828.464	77.43%
60- 90	1111.753	22.48%
0-90	4940.217	99.91%
90- 180	4.321	0.09%
0- 180	4944.5	100%

Table 11: Zonal Lumen

UGR Table (Corrected) - Goniophotometer Method

Reflectances												
Ceiling Cavity		70	70	50	50	30		70	70	50	50	30
Walls		50	30	50	30	30		50	30	50	30	30
Floor Cavity		20	20	20	20	20		20	20	20	20	20
Room Size		UGR Viewed Crosswise						UGR Viewed Endwise				
X=2H	Y=2H	17.5	19.2	17.9	19.5	19.8		17.4	19.1	17.8	19.4	19.7
	3H	19.3	20.9	19.7	21.2	21.5		19.4	20.9	19.7	21.2	21.6
	4H	20.0	21.4	20.4	21.8	22.1		20.1	21.5	20.5	21.8	22.2
	6H	20.4	21.8	20.8	22.1	22.5		20.5	21.9	21.0	22.2	22.6
	8H	20.6	21.8	21.0	22.2	22.6		20.7	22.0	21.1	22.4	22.8
	12H	20.6	21.8	21.0	22.2	22.6		20.8	22.0	21.2	22.4	22.8
4H	2H	18.2	19.6	18.6	19.9	20.3		18.1	19.6	18.5	19.9	20.3
	3H	20.3	21.5	20.7	21.9	22.3		20.3	21.5	20.7	21.9	22.3
	4H	21.1	22.1	21.5	22.6	23.0		21.1	22.2	21.5	22.6	23.0
	6H	21.6	22.6	22.1	23.0	23.5		21.7	22.7	22.2	23.1	23.6
	8H	21.8	22.7	22.2	23.1	23.6		21.9	22.8	22.4	23.3	23.7
	12H	21.9	22.6	22.3	23.1	23.6		22.1	22.8	22.5	23.3	23.8
8H	4H	21.4	22.3	21.9	22.7	23.2		21.5	22.4	21.9	22.8	23.3
	6H	22.1	22.8	22.6	23.3	23.8		22.2	23.0	22.7	23.4	23.9
	8H	22.3	23.0	22.8	23.5	24.0		22.5	23.1	23.0	23.6	24.1
	12H	22.4	23.0	22.9	23.5	24.1		22.7	23.2	23.2	23.7	24.3
12H	4H	21.4	22.2	21.9	22.7	23.2		21.5	22.3	22.0	22.8	23.3
	6H	22.2	22.8	22.7	23.3	23.8		22.3	23.0	22.8	23.4	24.0
	8H	22.4	23.0	22.9	23.5	24.0		22.6	23.2	23.1	23.7	24.2

Chart 13: UGR Table (Corrected)

Illuminance Plots- Goniophotometer Method

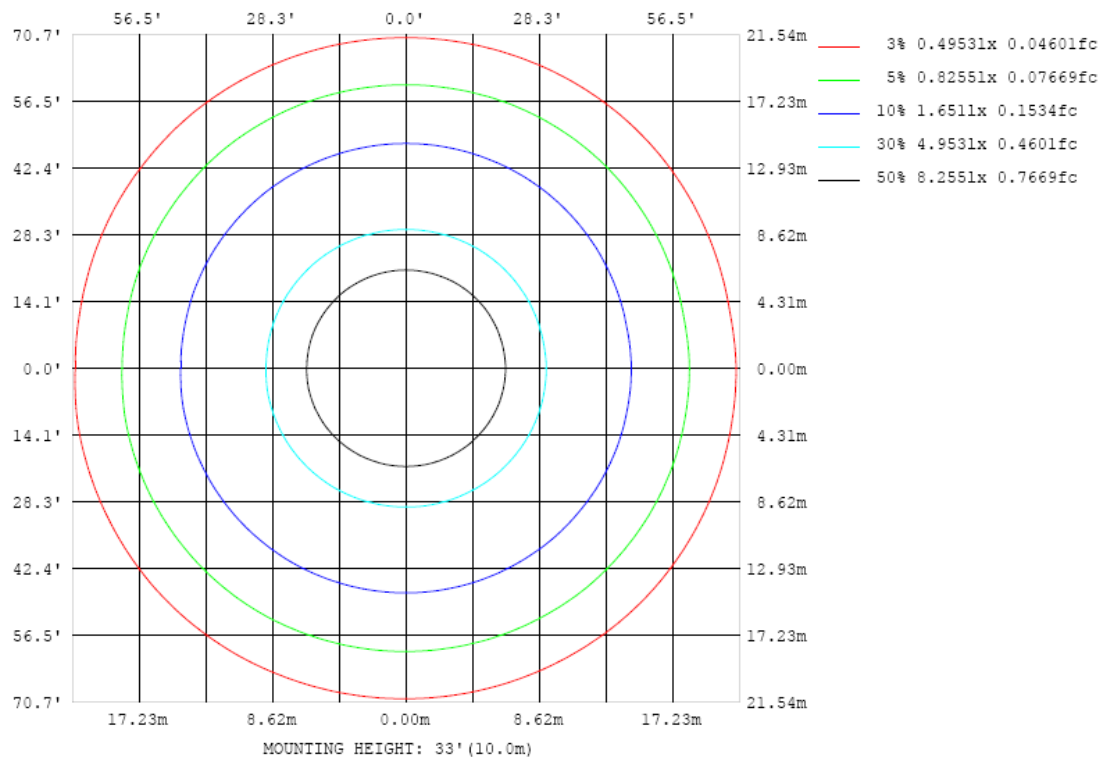


Chart 14: Illuminance Plot (Footcandles)

Luminous Intensity Distribution Plots- Goniophotometer Method

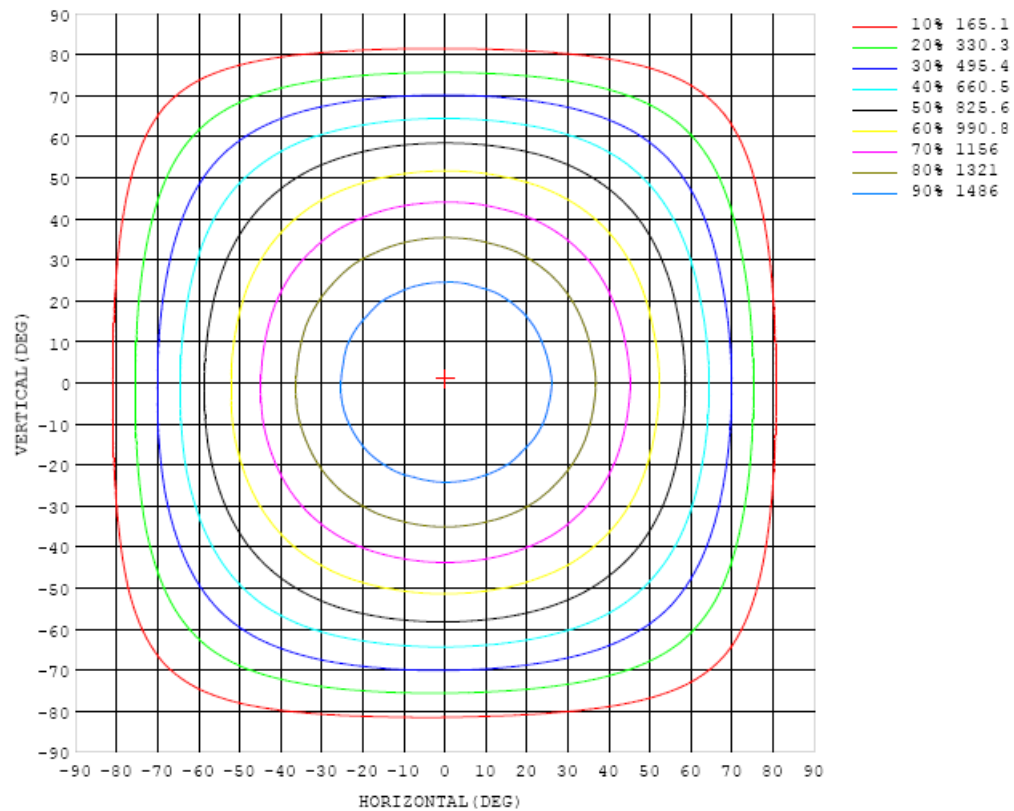


Chart 15: Isocandela Plot

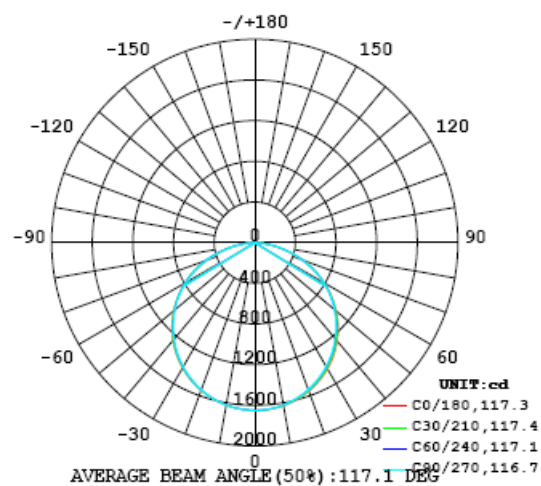


Chart 16: Polar Candela Distribution

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	1651	1651	1651	1651	1651	1651	1651	1651	1651	1651	1651	1651	1651	1651	1651	1651	1651	1651	1651
5	1644	1645	1643	1646	1642	1643	1643	1641	1640	1641	1640	1639	1642	1642	1642	1641	1642	1643	1640
10	1630	1627	1626	1626	1620	1625	1620	1620	1618	1619	1618	1618	1621	1622	1622	1623	1622	1624	1621
15	1597	1595	1598	1594	1589	1590	1587	1585	1585	1585	1583	1583	1587	1588	1590	1590	1591	1592	1591
20	1554	1552	1554	1551	1545	1544	1540	1540	1537	1537	1538	1536	1541	1541	1542	1545	1549	1549	1547
25	1498	1493	1496	1491	1485	1485	1479	1477	1477	1475	1476	1475	1480	1483	1487	1488	1490	1493	1490
30	1433	1428	1427	1424	1417	1416	1409	1407	1405	1404	1404	1406	1410	1412	1417	1420	1422	1425	1423
35	1351	1349	1348	1343	1336	1334	1327	1324	1323	1322	1323	1324	1329	1333	1337	1342	1345	1349	1343
40	1262	1257	1257	1251	1244	1242	1237	1235	1232	1230	1231	1232	1239	1242	1249	1253	1255	1260	1255
45	1160	1155	1155	1150	1144	1142	1135	1133	1131	1130	1130	1133	1140	1143	1149	1152	1156	1160	1154
50	1047	1044	1043	1039	1033	1031	1027	1024	1023	1023	1023	1026	1031	1034	1039	1044	1047	1049	1043
55	922	919	921	918	915	914	908	908	909	909	909	911	916	918	922	926	928	929	921
60	788	786	790	789	787	787	783	781	779	778	781	785	792	794	797	799	799	800	789
65	644	644	649	651	652	650	646	643	642	642	645	649	657	663	666	665	663	661	647
70	492	496	503	510	508	506	500	497	496	496	500	507	515	521	526	526	520	516	498
75	337	343	354	359	358	355	351	348	347	349	352	358	366	373	379	380	374	365	345
80	186	196	206	210	209	207	204	202	203	205	208	213	220	227	232	233	229	217	194
85	55.4	63.9	68.7	70.6	72.3	74.3	75.0	75.7	76.9	78.9	81.4	84.5	88.8	91.3	92.7	93.0	91.0	83.4	64.4
90	0.49	0.49	0.50	0.51	0.52	0.52	0.53	0.53	0.53	0.53	0.53	0.52	0.52	0.51	0.47	0.13	0.70	0.60	1.49
95	0.59	0.59	0.60	0.61	0.61	0.63	0.63	0.64	0.64	0.64	0.63	0.62	0.61	0.59	0.58	0.57	0.56	0.56	0.22
100	0.67	0.67	0.68	0.68	0.70	0.72	0.73	0.74	0.73	0.72	0.72	0.72	0.71	0.69	0.67	0.65	0.64	0.64	0.26
105	0.71	0.71	0.72	0.72	0.74	0.78	0.81	0.82	0.81	0.80	0.80	0.81	0.80	0.78	0.76	0.73	0.70	0.69	0.30
110	0.70	0.69	0.71	0.72	0.74	0.78	0.82	0.84	0.82	0.81	0.82	0.83	0.82	0.80	0.76	0.72	0.70	0.69	0.35
115	0.70	0.69	0.69	0.71	0.72	0.74	0.78	0.80	0.79	0.78	0.79	0.80	0.80	0.78	0.74	0.71	0.69	0.68	0.42
120	0.72	0.72	0.72	0.72	0.71	0.71	0.75	0.76	0.75	0.74	0.75	0.77	0.76	0.75	0.72	0.70	0.70	0.71	0.49
125	0.79	0.79	0.78	0.78	0.75	0.75	0.76	0.75	0.75	0.74	0.74	0.77	0.77	0.77	0.75	0.74	0.74	0.76	0.56
130	0.85	0.86	0.86	0.88	0.83	0.82	0.85	0.81	0.83	0.83	0.82	0.86	0.86	0.84	0.81	0.82	0.81	0.82	0.62
135	0.94	0.95	0.97	0.99	0.97	0.95	0.96	0.93	0.99	1.00	0.97	0.97	0.98	0.96	0.96	0.94	0.92	0.92	0.68
140	0.97	1.02	1.06	1.08	1.08	1.09	1.08	1.04	1.11	1.12	1.09	1.09	1.11	1.07	1.02	0.99	0.97	0.93	0.69
145	1.06	1.09	1.13	1.15	1.16	1.17	1.17	1.14	1.20	1.24	1.21	1.18	1.17	1.14	1.07	1.00	1.01	1.01	0.74
150	1.13	1.14	1.18	1.18	1.21	1.21	1.18	1.19	1.23	1.23	1.19	1.22	1.17	1.13	1.05	1.09	1.11	1.09	0.81
155	1.14	1.14	1.20	1.22	1.21	1.18	1.14	1.14	1.15	1.23	1.18	1.14	1.10	1.09	1.12	1.15	1.14	1.12	0.89
160	1.17	1.16	1.18	1.20	1.22	1.22	1.13	1.08	1.14	1.08	1.09	1.08	1.10	1.13	1.15	1.18	1.16	1.14	0.98
165	1.16	1.16	1.16	1.19	1.22	1.24	1.20	1.14	1.09	1.11	1.10	1.08	1.12	1.12	1.13	1.14	1.14	1.13	1.07
170	1.19	1.20	1.24	1.26	1.28	1.31	1.32	1.23	1.14	1.13	1.16	1.16	1.14	1.12	1.15	1.17	1.17	1.15	1.13
175	1.24	1.26	1.28	1.30	1.30	1.30	1.30	1.26	1.17	1.18	1.17	1.20	1.17	1.12	1.16	1.19	1.16	1.13	1.16
180	1.19	1.19	1.19	1.19	1.19	1.19	1.19	1.19	1.19	1.19	1.19	1.19	1.19	1.19	1.19	1.19	1.19	1.19	1.19

Table 12: 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	1651	1651	1651	1651	1651	1651	1651	1651	1651	1651	1651	1651	1651	1651	1651	1651	1651		
5	1643	1644	1641	1642	1643	1641	1643	1642	1643	1643	1641	1643	1645	1644	1644	1643	1643		
10	1622	1624	1621	1621	1624	1620	1621	1621	1623	1622	1621	1624	1624	1625	1625	1624	1626		
15	1590	1592	1589	1588	1591	1589	1587	1588	1589	1588	1588	1590	1591	1594	1593	1592	1594		
20	1545	1547	1546	1543	1544	1541	1540	1541	1541	1542	1540	1545	1547	1549	1549	1550	1550		
25	1489	1492	1489	1484	1486	1483	1482	1481	1482	1482	1481	1487	1489	1491	1492	1493	1494		
30	1422	1423	1419	1416	1417	1412	1411	1410	1411	1412	1410	1417	1420	1422	1424	1424	1427		
35	1342	1344	1340	1336	1336	1332	1328	1327	1328	1328	1330	1335	1337	1342	1344	1345	1345		
40	1251	1255	1251	1247	1245	1239	1239	1237	1238	1237	1238	1245	1246	1251	1253	1253	1255		
45	1152	1153	1150	1146	1144	1139	1138	1136	1137	1139	1138	1144	1147	1149	1151	1151	1152		
50	1041	1043	1041	1037	1035	1031	1030	1029	1028	1029	1030	1035	1037	1038	1040	1039	1039		
55	920	923	921	919	918	915	914	914	915	913	913	917	918	919	918	916	914		
60	789	794	793	793	794	792	788	786	784	785	787	793	791	790	788	784	780		
65	648	655	659	658	659	653	650	646	645	646	648	651	654	653	648	641	634		
70	502	511	516	517	515	509	504	501	500	500	502	506	508	509	503	494	484		
75	351	363	370	369	366	360	356	353	350	351	352	356	358	358	355	344	330		
80	205	217	222	221	218	214	210	208	206	205	206	208	209	209	205	196	182		
85	73.2	80.2	83.1	84.4	84.9	84.0	81.8	80.8	79.7	78.8	78.1	77.5	75.1	71.6	67.9	62.9	55.2		
90	3.51	2.40	2.49	1.61	0.83	2.37	0.21	0.21	0.16	0.17	0.19	0.23	0.33	0.48	0.65	0.09	0.17		
95	0.22	0.22	0.23	0.23	0.24	0.24	0.24	0.24	0.24	0.24	0.24	0.24	0.24	0.24	0.23	0.23	0.23		
100	0.25	0.26	0.27	0.28	0.29	0.29	0.29	0.28	0.28	0.29	0.29	0.29	0.30	0.29	0.28	0.27	0.26		
105	0.29	0.30	0.31	0.32	0.34	0.35	0.34	0.34	0.34	0.35	0.36	0.35	0.34	0.33	0.33	0.31	0.31		
110	0.35	0.35	0.35	0.36	0.38	0.40	0.39	0.38	0.38	0.40	0.41	0.40	0.40	0.38	0.38	0.37	0.36		
115	0.41	0.40	0.41	0.41	0.44	0.45	0.44	0.43	0.43	0.45	0.47	0.47	0.46	0.45	0.45	0.44	0.44		
120	0.49	0.48	0.47	0.48	0.51	0.52	0.49	0.49	0.49	0.51	0.54	0.53	0.52	0.52	0.52	0.51	0.51		
125	0.57	0.55	0.52	0.53	0.57	0.59	0.56	0.55	0.55	0.56	0.60	0.59	0.58	0.59	0.59	0.58	0.58		
130	0.63	0.62	0.62	0.59	0.63	0.67	0.64	0.61	0.64	0.64	0.66	0.66	0.64	0.64	0.66	0.64	0.65		
135	0.70	0.68	0.67	0.65	0.67	0.70	0.68	0.65	0.68	0.67	0.67	0.68	0.67	0.69	0.70	0.69	0.70		
140	0.69	0.69	0.69	0.66	0.70	0.71	0.68	0.68	0.69	0.67	0.65	0.68	0.68	0.68	0.69	0.68	0.72		
145	0.74	0.75	0.73	0.71	0.72	0.74	0.71	0.71	0.71	0.69	0.68	0.70	0.71	0.71	0.72	0.73	0.76		
150	0.81	0.83	0.83	0.77	0.78	0.77	0.77	0.78	0.76	0.75	0.74	0.74	0.77	0.78	0.77	0.78	0.82		
155	0.88	0.90	0.92	0.87	0.83	0.81	0.81	0.83	0.78	0.80	0.81	0.81	0.83	0.85	0.87	0.86	0.89		
160	0.97	0.98	0.99	0.97	0.92	0.88	0.86	0.87	0.82	0.83	0.87	0.89	0.94	0.95	0.95	0.94	0.98		
165	1.08	1.09	1.11	1.11	1.08	1.04	1.01	1.01	0.96	0.95	1.00	1.09	1.11	1.10	1.07	1.06	1.07		
170	1.13	1.13	1.15	1.16	1.13	1.04	1.01	1.06	1.01	0.97	1.03	1.10	1.12	1.08	1.08	1.09	1.13		
175	1.26	1.29	1.29	1.31	1.31	1.26	1.19	1.21	1.14	1.09	1.11	1.12	1.10	1.13	1.15	1.19	1.23		
180	1.19	1.19	1.19	1.19	1.19	1.19	1.19	1.19	1.19	1.19	1.19	1.19	1.19	1.19	1.19	1.19	1.19		

Table 13: Luminous Intensity Data

TEST RESULTS (35W 5000K Setting)

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)	0.289	0.129
Power Factor	0.9959	0.9541
Test Power (W)	34.52	34.17
THD A%	6.63	12.30
Luminous Efficacy (lm/W)	141.6	142.2
Total Luminous Flux (lm)	4886.8	4859.1
Color Rendering Index (CRI)	81.8	
R9	9	
Correlated Color Temperature (CCT)(K)	4770	
Chromaticity Chroma x	0.3525	
Chromaticity Chroma y	0.3626	
Chromaticity Chroma u	0.2122	
Chromaticity Chroma v	0.3274	
Duv	0.0026	
Chromaticity Chroma u'	0.2122	
Chromaticity Chroma v'	0.4910	

Special Color Rendering Indices	
R1	80.2
R2	85.7
R3	89.8
R4	82.4
R5	80.2
R6	80
R7	87.7
R8	68.4
R9	9
R10	66
R11	81.3
R12	54.8
R13	81.3
R14	94.4

Table 14: Test data per Sphere-Spectroradiometer Method

Note: According to CIE 1976 (u', v') diagram, $u' = u / (-2x + 12y + 3)$, $v' = 3v / 2 = 9y / (-2x + 12y + 3)$.

Goniophotometer Method

Test ambient temperature was 25.1 °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)	0.289
Power Factor	0.9961
Power (W)	34.56
Luminous Efficacy (lm/W)	141.9
Total Luminous Flux (lm)	4904.6
Beam Angle (°)	117.3 (0°-180°) / 116.8 (90°-270°)
Center Beam Candle Power (cd)	1633
Maximum Beam Candle Power (cd)	1635 (At: C=290.0, Gamma=0.5)
Spacing Criteria	1.29 (0°-180°) / 1.27 (90°-270°)
Zonal Lumens in the 0°-60° Zone	77.39%
Zonal Lumens in the 60°-90° Zone	22.52%
Zonal Lumens in the 90°-120° Zone	0.03%
Zonal Lumens in the 120°-180° Zone	0.05%

Table 15: Test data per Goniophotometer Method

Spectral Power Distribution - Sphere Spectroradiometer Method

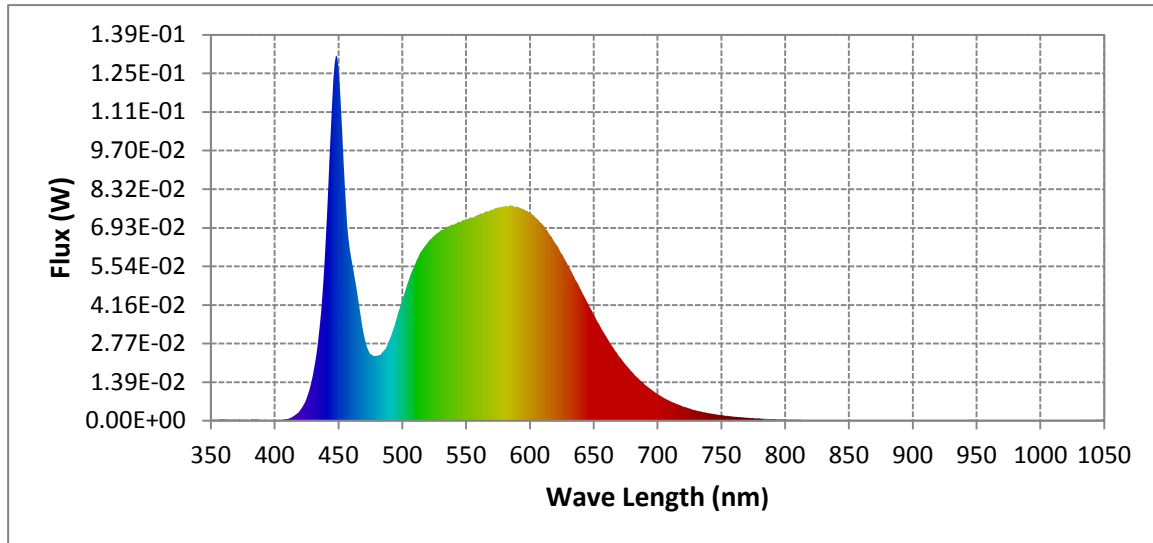
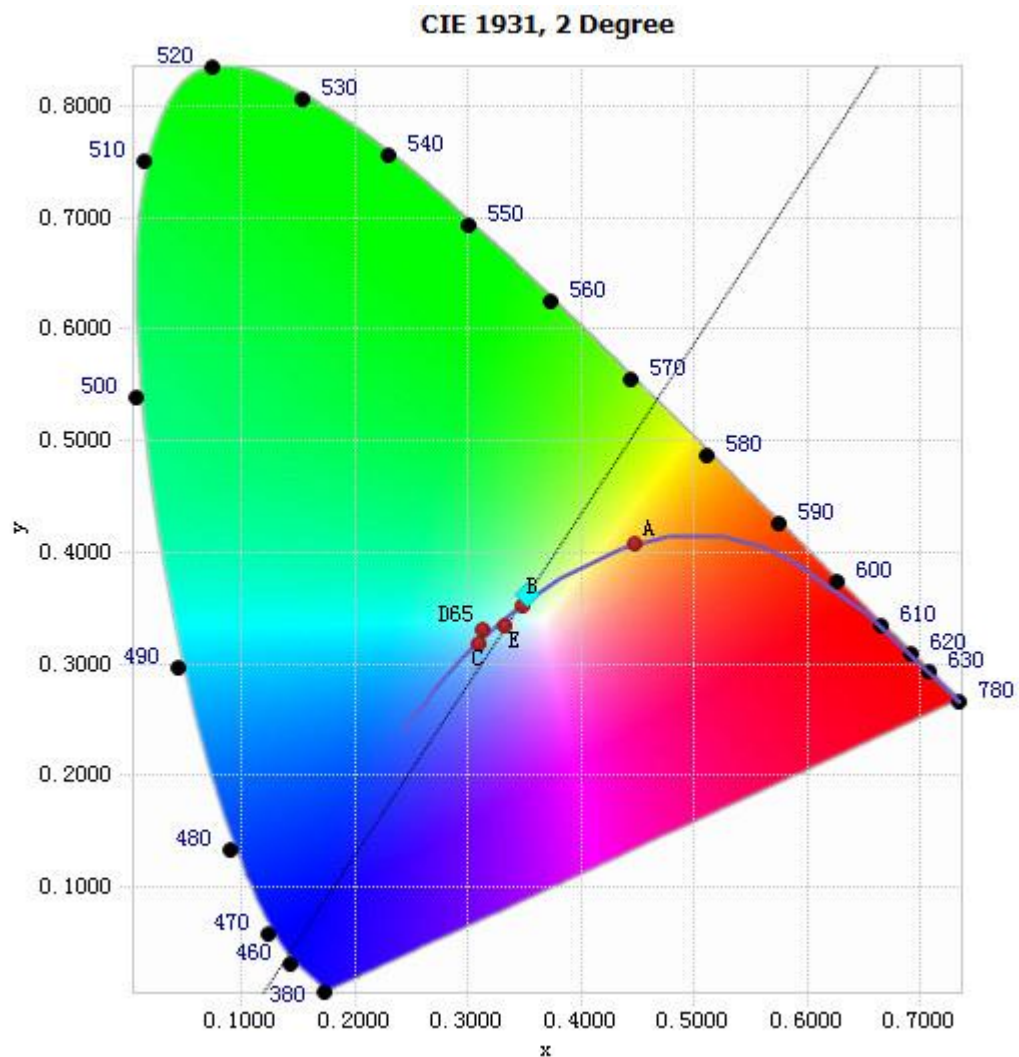


Chart 17: Spectral Power Distribution

Spectral Distribution over Visible Wavelength							
WL(nm)	Radiant(Watts)	WL(nm)	Radiant(Watts)	WL(nm)	Radiant(Watts)	WL(nm)	Radiant(Watts)
380	3.31E-04	485	2.48E-02	590	7.69E-02	695	1.13E-02
385	3.73E-04	490	2.91E-02	595	7.60E-02	700	9.68E-03
390	3.12E-04	495	3.58E-02	600	7.47E-02	705	8.24E-03
395	1.93E-04	500	4.32E-02	605	7.27E-02	710	7.07E-03
400	1.85E-04	505	5.03E-02	610	7.03E-02	715	6.03E-03
405	2.53E-04	510	5.60E-02	615	6.73E-02	720	5.16E-03
410	6.85E-04	515	6.09E-02	620	6.38E-02	725	4.42E-03
415	1.63E-03	520	6.39E-02	625	5.99E-02	730	3.77E-03
420	3.68E-03	525	6.64E-02	630	5.57E-02	735	3.21E-03
425	7.90E-03	530	6.84E-02	635	5.15E-02	740	2.74E-03
430	1.64E-02	535	6.94E-02	640	4.71E-02	745	2.30E-03
435	3.24E-02	540	7.03E-02	645	4.26E-02	750	1.99E-03
440	6.43E-02	545	7.13E-02	650	3.81E-02	755	1.73E-03
445	1.14E-01	550	7.20E-02	655	3.41E-02	760	1.46E-03
450	1.27E-01	555	7.29E-02	660	3.02E-02	765	1.28E-03
455	8.41E-02	560	7.38E-02	665	2.65E-02	770	1.08E-03
460	5.90E-02	565	7.49E-02	670	2.30E-02	775	9.53E-04
465	4.55E-02	570	7.56E-02	675	2.02E-02	780	8.16E-04
470	3.11E-02	575	7.63E-02	680	1.75E-02		
475	2.40E-02	580	7.68E-02	685	1.52E-02		
480	2.34E-02	585	7.73E-02	690	1.31E-02		

Table 16: Spectral Power Distribution Numerical Data per Sphere - Spectroradiometer Method

Chromaticity Diagram - Sphere Spectroradiometer Method



Tristimulus values(x, y): (0.3525, 0.3626)

Chart 18: 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

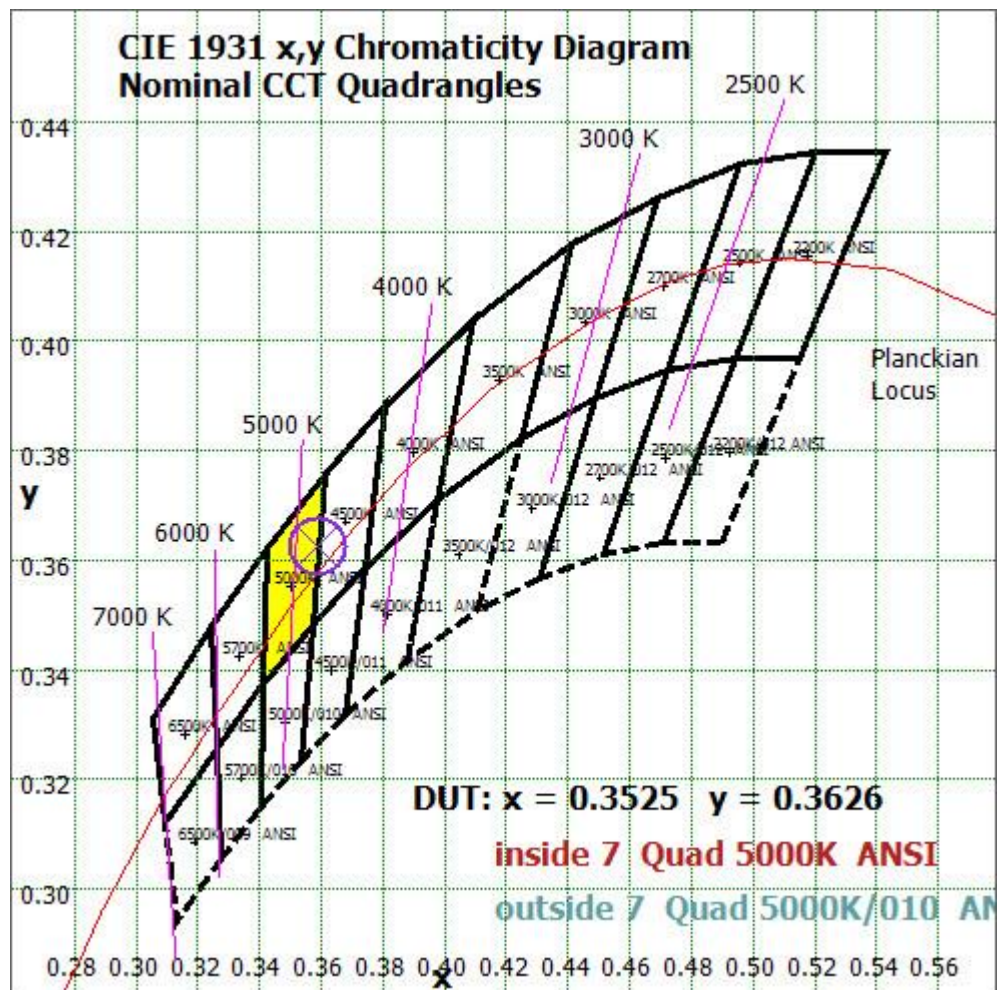


Chart 19: Plot of Lamp x/y coordinates on CIE 1931 Chromaticity Diagram

Color Rendition Report – Sphere Spectroradiometer Method

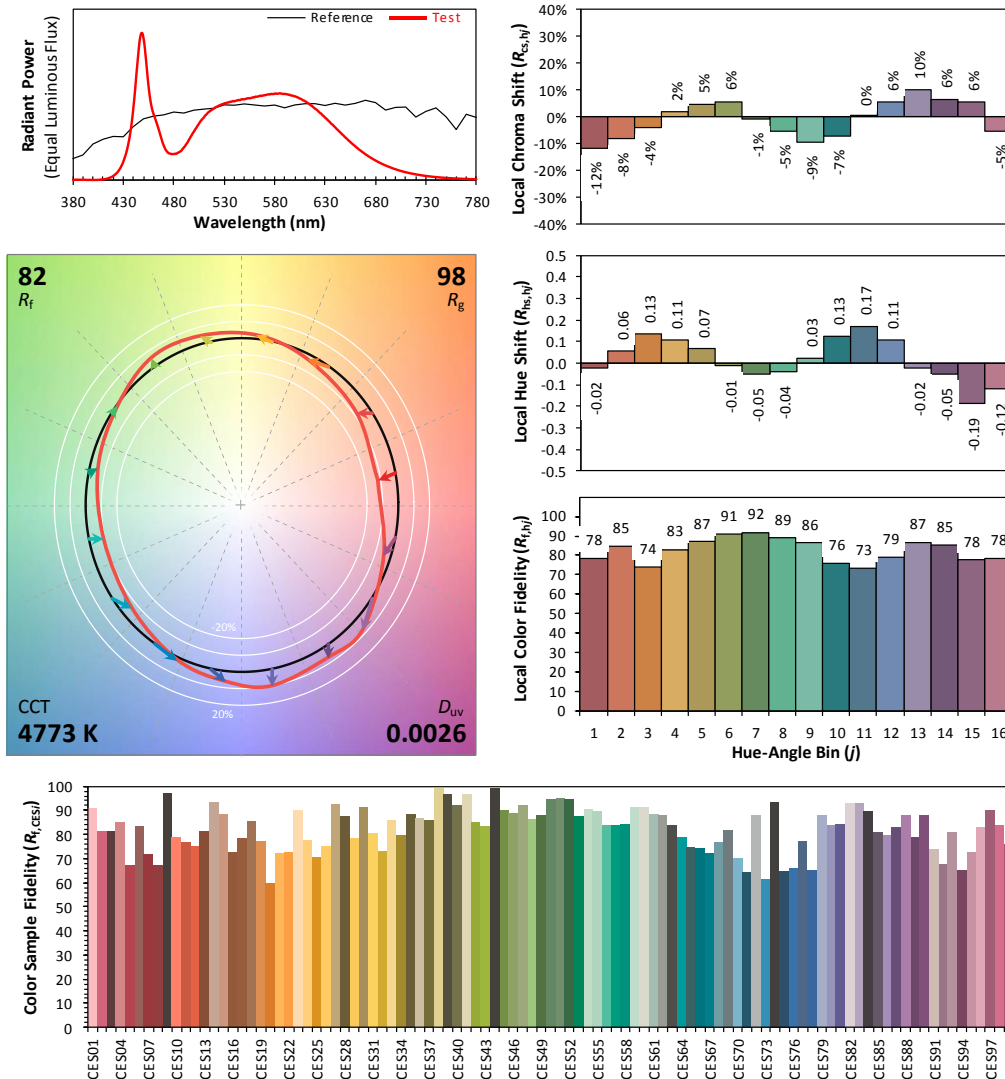
ANSI/IES TM-30-18 Color Rendition Report

Source: LED

Manufacturer: RAB Lighting Inc

Date: 2025/08/05

Model: SWISH1X4



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

x 0.3525
 y 0.3626
 u' 0.2122
 v' 0.4910

CIE 13.3-1995
(CRI)

R_a 82
 R_g 9

Colors are for visual orientation purposes only. Created with the ANSI/IES TM-30-18 Calculator Version 2.00.

Chart 20: 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 14 due to rounding.

Zonal Lumen Tabulation- Goniophotometer Method

$\gamma(^{\circ})$	Lumens	% Total
0- 10	154.742	3.16%
10- 20	444.796	9.07%
20- 30	679.257	13.85%
30- 40	829.133	16.91%
40- 50	875.802	17.86%
50- 60	812.162	16.56%
60- 70	638.268	13.01%
70- 80	373.959	7.62%
80- 90	92.444	1.88%
90-100	0.461	0.01%
100-110	0.536	0.01%
110-120	0.546	0.01%
120-130	0.555	0.01%
130-140	0.586	0.01%
140-150	0.538	0.01%
150-160	0.432	0.01%
160-170	0.29	0.01%
170-180	0.106	0.00%
Total	4904.6	100%

$\gamma(^{\circ})$	Lumens	% Total
0- 60	3795.892	77.39%
60- 90	1104.671	22.52%
0-90	4900.563	99.92%
90- 180	4.05	0.08%
0- 180	4904.6	100%

Table 17: Zonal Lumen

UGR Table (Corrected) - Goniophotometer Method

Reflectances		70	70	50	50	30	70	70	50	50	30
Ceiling Cavity		50	30	50	30	30	50	30	50	30	30
Walls		20	20	20	20	20	20	20	20	20	20
Floor Cavity											
Room Size		UGR Viewed Crosswise					UGR Viewed Endwise				
X=2H	Y=2H	17.4	19.0	17.7	19.3	19.6	17.4	19.1	17.8	19.4	19.7
	3H	19.2	20.7	19.6	21.0	21.4	19.3	20.8	19.7	21.2	21.5
	4H	19.8	21.3	20.2	21.6	22.0	20.0	21.4	20.4	21.8	22.2
	6H	20.3	21.6	20.7	22.0	22.4	20.5	21.8	20.9	22.2	22.6
	8H	20.4	21.6	20.8	22.0	22.4	20.7	21.9	21.1	22.3	22.7
	12H	20.4	21.6	20.9	22.0	22.4	20.8	22.0	21.2	22.3	22.8
4H	2H	18.0	19.5	18.4	19.8	20.2	18.1	19.5	18.5	19.9	20.2
	3H	20.1	21.3	20.5	21.7	22.1	20.2	21.4	20.6	21.8	22.2
	4H	20.9	22.0	21.3	22.4	22.8	21.1	22.2	21.5	22.6	23.0
	6H	21.5	22.4	21.9	22.8	23.3	21.7	22.6	22.1	23.1	23.5
	8H	21.6	22.5	22.1	22.9	23.4	21.9	22.8	22.3	23.2	23.7
	12H	21.7	22.5	22.1	22.9	23.4	22.0	22.8	22.5	23.3	23.8
8H	4H	21.2	22.1	21.7	22.6	23.0	21.4	22.3	21.9	22.8	23.2
	6H	21.9	22.7	22.4	23.1	23.6	22.2	22.9	22.7	23.4	23.9
	8H	22.1	22.8	22.6	23.3	23.8	22.4	23.1	22.9	23.6	24.1
	12H	22.2	22.8	22.8	23.3	23.9	22.6	23.2	23.1	23.7	24.3
12H	4H	21.3	22.1	21.7	22.6	23.0	21.5	22.3	21.9	22.7	23.2
	6H	22.0	22.7	22.5	23.1	23.7	22.3	22.9	22.8	23.4	23.9
	8H	22.2	22.8	22.7	23.3	23.9	22.6	23.1	23.1	23.6	24.2

Chart 21: UGR Table (Corrected)

Illuminance Plots- Goniophotometer Method

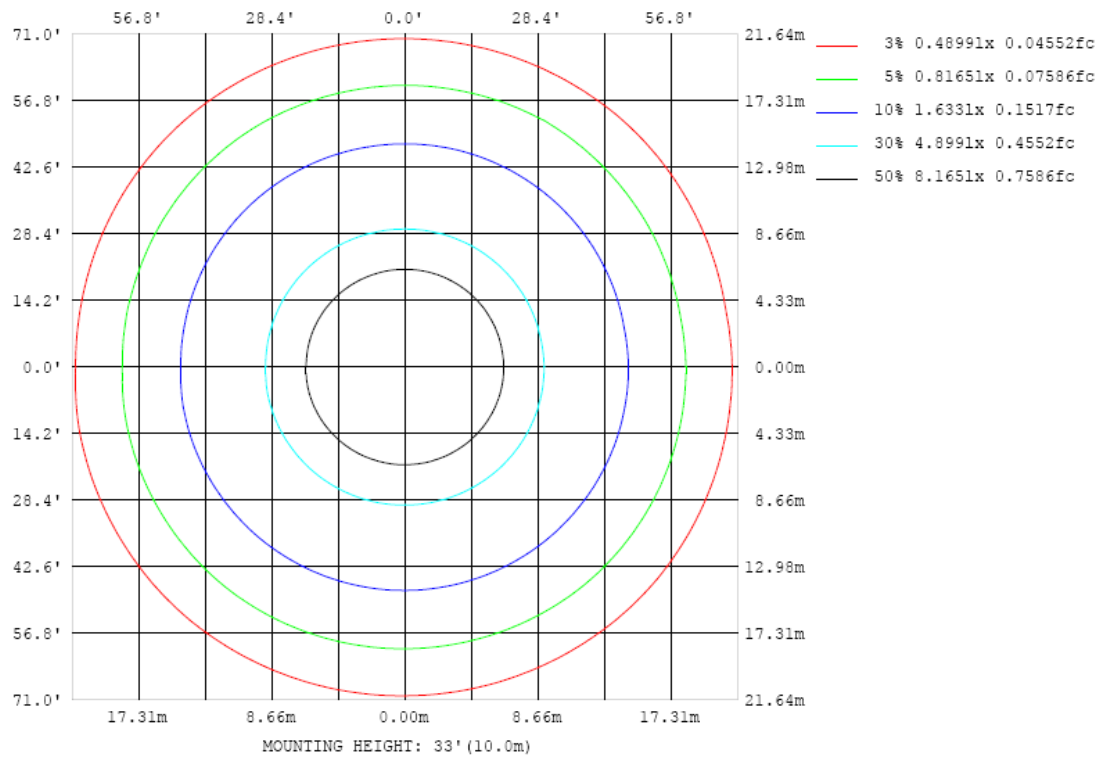


Chart 22: Illuminance Plot (Footcandles)

Luminous Intensity Distribution Plots- Goniophotometer Method

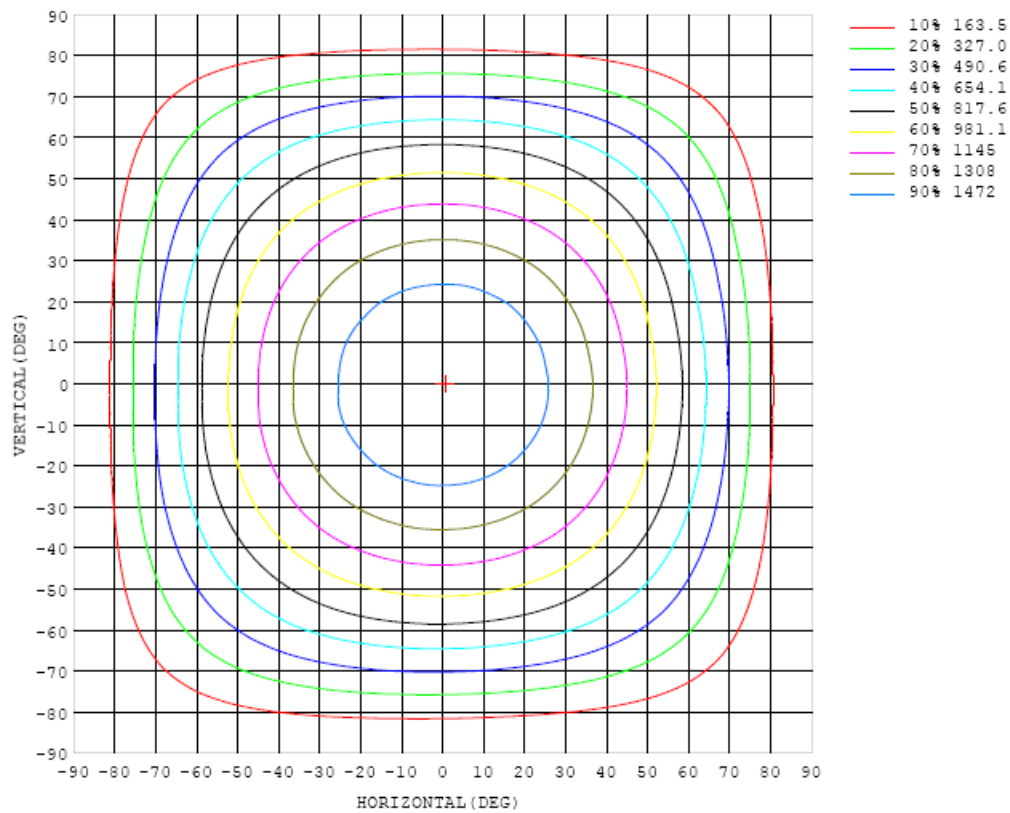


Chart 23: Isocandela Plot

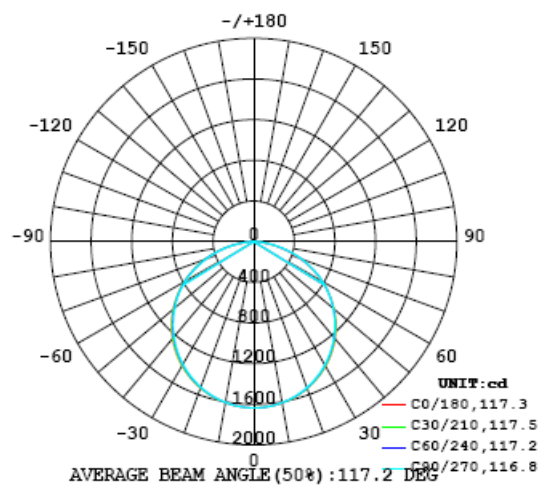


Chart 24: Polar Candela Distribution

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	1633	1633	1633	1633	1633	1633	1633	1633	1633	1633	1633	1633	1633	1633	1633	1633	1633	1633	1633
5	1627	1628	1629	1630	1629	1630	1628	1628	1628	1627	1629	1627	1628	1628	1628	1629	1628	1627	1627
10	1607	1610	1612	1611	1609	1610	1608	1608	1607	1607	1608	1609	1608	1610	1609	1610	1611	1609	1608
15	1578	1580	1580	1580	1578	1578	1576	1574	1573	1573	1575	1575	1575	1577	1577	1578	1580	1578	1575
20	1537	1538	1538	1538	1534	1534	1530	1527	1528	1526	1529	1529	1531	1532	1533	1536	1538	1537	1532
25	1481	1482	1483	1480	1477	1475	1472	1472	1470	1469	1470	1471	1474	1476	1477	1481	1484	1482	1477
30	1415	1415	1415	1412	1409	1406	1403	1400	1399	1398	1400	1402	1404	1408	1411	1413	1418	1417	1411
35	1336	1337	1336	1333	1329	1326	1322	1319	1318	1317	1320	1322	1324	1329	1332	1336	1340	1341	1333
40	1246	1246	1245	1242	1238	1236	1232	1229	1227	1227	1229	1231	1234	1240	1244	1248	1252	1253	1244
45	1145	1145	1144	1141	1137	1135	1131	1129	1128	1128	1131	1132	1137	1142	1145	1149	1154	1154	1146
50	1032	1033	1033	1030	1028	1026	1023	1021	1021	1021	1023	1025	1029	1034	1038	1042	1045	1046	1036
55	910	910	911	911	908	908	906	906	906	907	909	912	914	919	922	924	928	927	916
60	776	778	780	781	781	783	781	778	778	779	782	786	792	795	798	799	800	799	785
65	633	636	641	644	648	646	643	641	641	642	646	651	658	664	667	666	665	661	646
70	482	487	495	502	504	502	498	496	495	497	502	508	515	523	528	527	523	516	498
75	328	336	347	353	354	352	349	347	347	349	354	360	368	376	382	383	377	368	347
80	180	190	201	205	206	204	202	202	202	205	209	215	222	230	235	237	233	221	197
85	51.5	59.8	65.1	67.4	69.9	72.4	74.1	75.5	77.6	80.1	83.3	87.1	91.0	94.7	96.5	96.9	95.1	87.0	67.3
90	0.49	0.49	0.50	0.51	0.51	0.52	0.53	0.53	0.53	0.53	0.52	0.51	0.51	0.51	0.51	0.10	0.29	1.18	1.04
95	0.58	0.58	0.59	0.60	0.61	0.62	0.62	0.63	0.63	0.63	0.62	0.62	0.61	0.60	0.58	0.57	0.55	0.55	0.19
100	0.66	0.66	0.66	0.67	0.68	0.71	0.72	0.72	0.72	0.71	0.71	0.71	0.70	0.69	0.68	0.66	0.64	0.63	0.22
105	0.70	0.69	0.70	0.70	0.72	0.76	0.79	0.80	0.79	0.78	0.78	0.79	0.78	0.76	0.74	0.71	0.68	0.67	0.26
110	0.69	0.68	0.69	0.70	0.71	0.75	0.79	0.81	0.80	0.78	0.79	0.80	0.80	0.78	0.74	0.70	0.68	0.67	0.31
115	0.67	0.67	0.67	0.68	0.69	0.70	0.74	0.77	0.76	0.75	0.75	0.78	0.77	0.75	0.71	0.69	0.66	0.66	0.38
120	0.70	0.69	0.69	0.69	0.68	0.68	0.70	0.72	0.71	0.71	0.72	0.74	0.73	0.72	0.70	0.68	0.67	0.68	0.46
125	0.75	0.75	0.75	0.74	0.71	0.71	0.71	0.70	0.70	0.70	0.70	0.74	0.74	0.74	0.72	0.71	0.71	0.72	0.52
130	0.81	0.81	0.81	0.83	0.79	0.78	0.79	0.77	0.79	0.79	0.78	0.82	0.82	0.81	0.78	0.79	0.77	0.78	0.58
135	0.90	0.91	0.92	0.94	0.92	0.91	0.91	0.88	0.94	0.95	0.92	0.93	0.94	0.93	0.93	0.90	0.88	0.88	0.64
140	0.93	0.97	1.00	1.03	1.02	1.02	1.03	0.99	1.05	1.07	1.06	1.05	1.07	1.02	0.98	0.95	0.93	0.90	0.65
145	1.01	1.04	1.07	1.09	1.10	1.10	1.10	1.07	1.13	1.17	1.16	1.13	1.12	1.10	1.03	0.96	0.96	0.97	0.69
150	1.07	1.09	1.11	1.11	1.14	1.14	1.11	1.12	1.16	1.16	1.13	1.17	1.13	1.08	1.01	1.04	1.06	1.04	0.76
155	1.08	1.09	1.13	1.15	1.14	1.12	1.07	1.07	1.08	1.16	1.13	1.09	1.06	1.05	1.07	1.10	1.08	1.06	0.83
160	1.11	1.10	1.12	1.14	1.15	1.15	1.07	1.02	1.07	1.02	1.04	1.04	1.06	1.09	1.10	1.13	1.12	1.09	0.92
165	1.10	1.10	1.10	1.13	1.16	1.18	1.14	1.08	1.03	1.05	1.04	1.04	1.07	1.08	1.09	1.11	1.11	1.08	1.01
170	1.13	1.14	1.18	1.21	1.23	1.26	1.26	1.18	1.08	1.08	1.11	1.12	1.10	1.09	1.12	1.14	1.14	1.11	1.07
175	1.19	1.20	1.22	1.24	1.24	1.24	1.24	1.20	1.12	1.12	1.12	1.16	1.13	1.08	1.11	1.14	1.12	1.09	1.11
180	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10

Table 18: 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		1633	1633	1633	1633	1633	1633	1633	1633	1633	1633	1633	1633	1633	1633	1633	1633	1633	
5		1628	1628	1628	1628	1628	1626	1626	1626	1626	1626	1627	1626	1627	1627	1627	1627	1628	
10		1609	1609	1608	1607	1607	1606	1604	1605	1604	1606	1606	1605	1606	1606	1607	1609	1608	
15		1577	1578	1576	1573	1573	1572	1570	1571	1569	1571	1572	1571	1574	1573	1575	1576	1576	
20		1533	1534	1531	1529	1528	1525	1523	1523	1523	1524	1525	1524	1528	1529	1531	1533	1532	
25		1478	1478	1475	1470	1470	1466	1464	1463	1462	1463	1465	1465	1471	1472	1473	1476	1477	
30		1412	1410	1408	1403	1401	1397	1394	1393	1391	1394	1395	1397	1401	1403	1405	1408	1408	
35		1334	1333	1329	1324	1321	1316	1313	1311	1309	1311	1313	1316	1319	1322	1326	1329	1329	
40		1245	1244	1239	1234	1231	1225	1223	1220	1218	1220	1223	1224	1229	1231	1235	1238	1238	
45		1147	1145	1141	1136	1131	1127	1123	1120	1119	1121	1122	1124	1129	1131	1134	1137	1136	
50		1037	1035	1032	1028	1024	1019	1016	1013	1013	1014	1016	1016	1020	1021	1023	1024	1024	
55		916	917	915	912	909	905	902	899	899	900	901	900	903	903	903	902	900	
60		788	789	789	787	785	783	778	774	772	773	776	776	778	776	774	771	766	
65		648	653	654	655	653	647	642	638	636	636	638	639	643	642	636	631	623	
70		503	510	515	516	512	506	500	495	492	492	494	496	498	498	494	485	475	
75		354	364	371	370	366	360	354	349	346	346	346	348	350	350	347	337	323	
80		208	220	224	224	220	215	210	206	203	203	202	203	204	203	199	191	177	
85		76.0	83.6	86.4	87.2	87.4	85.5	83.4	80.9	79.4	78.2	76.6	75.5	72.4	69.5	64.2	59.9	52.6	
90		2.43	3.20	5.12	2.56	1.48	0.76	2.07	0.19	0.13	0.14	0.18	0.21	0.28	0.36	0.43	0.12	0.16	
95		0.19	0.19	0.20	0.20	0.20	0.21	0.21	0.21	0.21	0.21	0.21	0.21	0.20	0.21	0.20	0.20	0.20	
100		0.22	0.22	0.23	0.24	0.24	0.25	0.24	0.24	0.24	0.25	0.25	0.25	0.26	0.25	0.25	0.24	0.23	
105		0.26	0.26	0.26	0.27	0.29	0.30	0.30	0.29	0.29	0.30	0.31	0.30	0.30	0.29	0.29	0.28	0.27	
110		0.31	0.31	0.30	0.31	0.33	0.34	0.33	0.32	0.32	0.34	0.35	0.35	0.34	0.34	0.34	0.33	0.33	
115		0.37	0.36	0.36	0.35	0.37	0.38	0.38	0.36	0.36	0.39	0.41	0.40	0.40	0.40	0.41	0.40	0.40	
120		0.44	0.43	0.42	0.41	0.43	0.45	0.42	0.42	0.42	0.44	0.47	0.47	0.46	0.47	0.48	0.47	0.47	
125		0.51	0.49	0.47	0.46	0.49	0.52	0.48	0.48	0.48	0.49	0.53	0.52	0.52	0.53	0.55	0.54	0.54	
130		0.57	0.56	0.55	0.52	0.55	0.59	0.56	0.54	0.57	0.57	0.59	0.59	0.57	0.59	0.61	0.60	0.60	
135		0.63	0.63	0.61	0.58	0.59	0.62	0.60	0.58	0.61	0.60	0.60	0.62	0.61	0.63	0.65	0.65	0.65	
140		0.63	0.62	0.62	0.59	0.61	0.62	0.59	0.60	0.61	0.60	0.58	0.61	0.61	0.62	0.65	0.64	0.67	
145		0.68	0.68	0.66	0.63	0.63	0.65	0.62	0.62	0.63	0.61	0.60	0.62	0.63	0.65	0.67	0.67	0.70	
150		0.74	0.76	0.76	0.69	0.69	0.67	0.67	0.68	0.67	0.67	0.66	0.67	0.69	0.72	0.72	0.73	0.76	
155		0.81	0.82	0.83	0.79	0.74	0.71	0.71	0.73	0.69	0.72	0.73	0.73	0.76	0.79	0.80	0.80	0.83	
160		0.90	0.90	0.90	0.88	0.82	0.78	0.77	0.77	0.73	0.75	0.80	0.82	0.87	0.89	0.89	0.88	0.91	
165		1.01	1.01	1.03	1.02	0.98	0.94	0.91	0.90	0.87	0.87	0.92	1.00	1.04	1.03	1.01	1.00	1.01	
170		1.06	1.06	1.07	1.07	1.03	0.94	0.91	0.96	0.91	0.90	0.95	1.02	1.04	1.02	1.02	1.03	1.07	
175		1.20	1.21	1.22	1.23	1.23	1.17	1.11	1.12	1.05	1.02	1.03	1.05	1.04	1.07	1.10	1.13	1.17	
180		1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	

Table 19: 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 20: 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 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 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 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 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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