

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.: HZ25070031d

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 18W 3500K Setting	SWISH1X4 18W 4000K Setting	SWISH1X4 18W 5000K Setting
Luminous Efficacy (Lumens /Watt)	145.0	153.0	151.1
Total Luminous Flux (Lumens)	2455.2	2558.7	2583.6
Power (Watts)	16.93	16.72	17.10
Power Factor	0.9836	0.9833	0.9837
CCT (K)	3351	3925	4766
CRI	83.1	83.6	81.9
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 (18W 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)	0.144	0.074
Power Factor	0.9836	0.8603
Test Power (W)	16.93	17.68
THD A%	9.58	14.07
Luminous Efficacy (lm/W)	145.0	141.3
Total Luminous Flux (lm)	2455.2	2497.8
Color Rendering Index (CRI)	83.1	
R9	11.6	
Correlated Color Temperature (CCT)(K)	3351	
Chromaticity Chroma x	0.4143	
Chromaticity Chroma y	0.3961	
Chromaticity Chroma u	0.2393	
Chromaticity Chroma v	0.3432	
Duv	0.0005	
Chromaticity Chroma u'	0.2393	
Chromaticity Chroma v'	0.5148	

Special Color Rendering Indices	
R1	81.6
R2	89.6
R3	95.7
R4	81.9
R5	81.2
R6	86.1
R7	85.4
R8	63.3
R9	11.6
R10	75.4
R11	80.9
R12	62.8
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)	0.144
Power Factor	0.9835
Power (W)	16.95
Luminous Efficacy (lm/W)	145.7
Total Luminous Flux (lm)	2469.4
Beam Angle (°)	117.2 (0°-180°) / 116.7 (90°-270°)
Center Beam Candle Power (cd)	824
Maximum Beam Candle Power (cd)	824.2 (At: C=0.0, Gamma=0.0)
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	22.53%
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

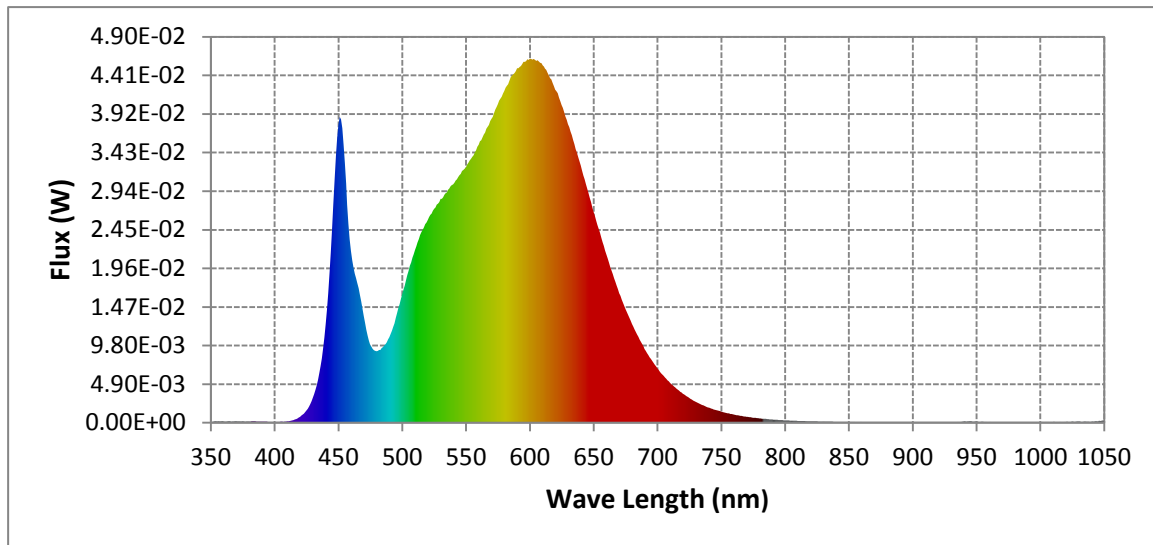
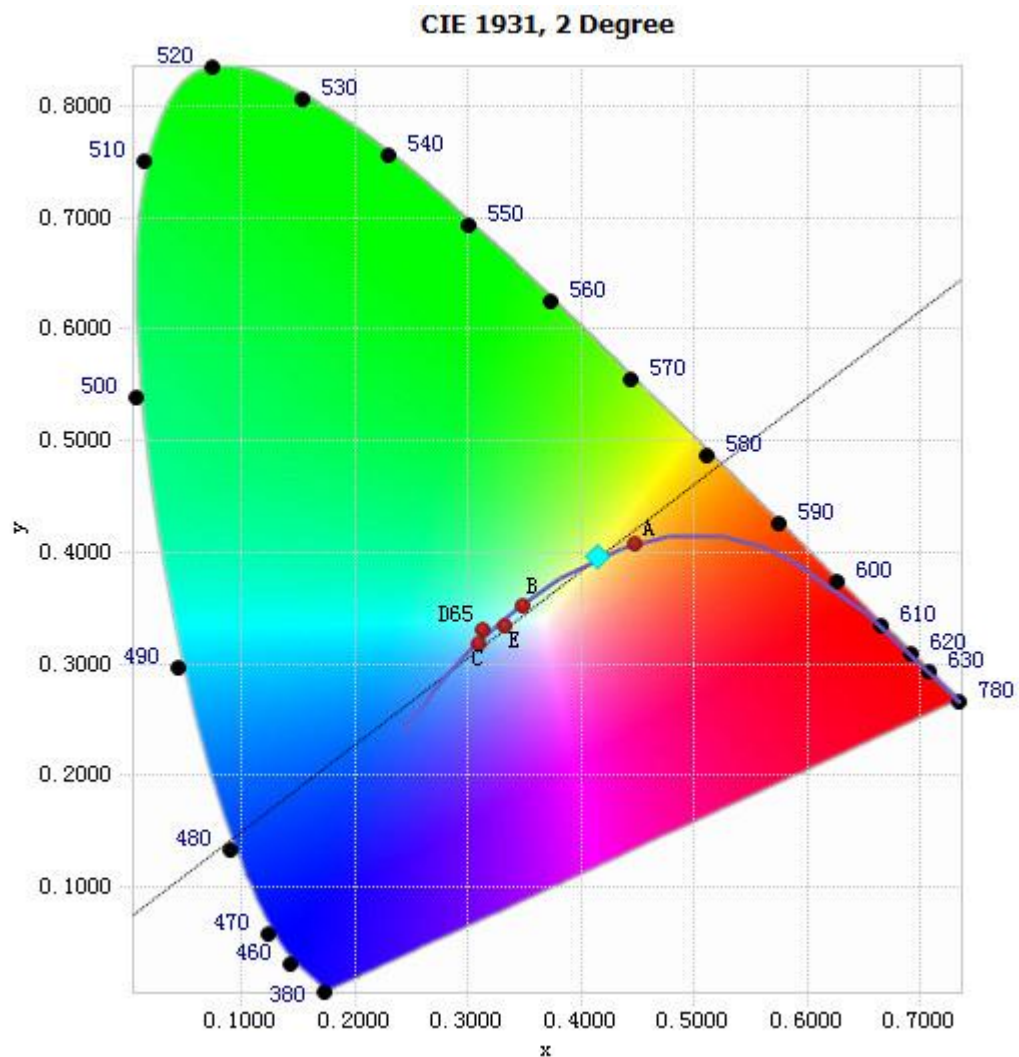


Chart 1: Spectral Power Distribution

Spectral Distribution over Visible Wavelength							
WL(nm)	Radiant(Watts)	WL(nm)	Radiant(Watts)	WL(nm)	Radiant(Watts)	WL(nm)	Radiant(Watts)
380	1.93E-04	485	9.62E-03	590	4.50E-02	695	8.09E-03
385	1.77E-04	490	1.09E-02	595	4.58E-02	700	6.92E-03
390	1.42E-04	495	1.33E-02	600	4.62E-02	705	5.94E-03
395	1.07E-04	500	1.63E-02	605	4.59E-02	710	5.06E-03
400	9.18E-05	505	1.93E-02	610	4.54E-02	715	4.33E-03
405	1.24E-04	510	2.19E-02	615	4.41E-02	720	3.69E-03
410	1.86E-04	515	2.42E-02	620	4.23E-02	725	3.14E-03
415	3.48E-04	520	2.57E-02	625	4.03E-02	730	2.67E-03
420	7.43E-04	525	2.71E-02	630	3.79E-02	735	2.27E-03
425	1.57E-03	530	2.84E-02	635	3.54E-02	740	1.94E-03
430	3.17E-03	535	2.92E-02	640	3.26E-02	745	1.64E-03
435	6.26E-03	540	3.03E-02	645	2.97E-02	750	1.41E-03
440	1.25E-02	545	3.14E-02	650	2.67E-02	755	1.20E-03
445	2.46E-02	550	3.24E-02	655	2.41E-02	760	1.03E-03
450	3.79E-02	555	3.38E-02	660	2.14E-02	765	8.88E-04
455	3.30E-02	560	3.53E-02	665	1.89E-02	770	7.60E-04
460	2.18E-02	565	3.68E-02	670	1.64E-02	775	6.49E-04
465	1.77E-02	570	3.86E-02	675	1.44E-02	780	5.58E-04
470	1.35E-02	575	4.04E-02	680	1.25E-02		
475	9.89E-03	580	4.21E-02	685	1.09E-02		
480	9.09E-03	585	4.39E-02	690	9.38E-03		

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

Chromaticity Diagram - Sphere Spectroradiometer Method



Tristimulus values(x, y): (0.4143, 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

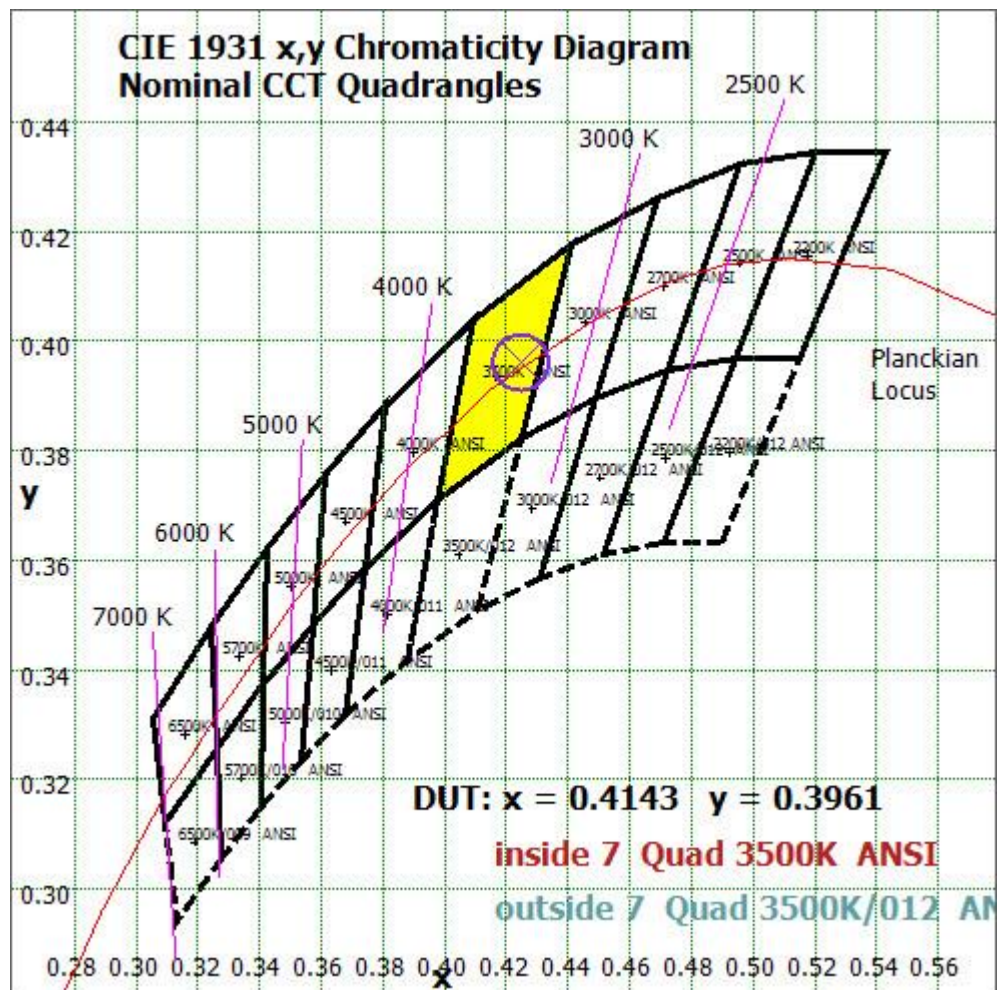


Chart 3: Plot of Lamp x/y coordinates on CIE 1931 Chromaticity Diagram

Color Rendition Report – Sphere Spectroradiometer Method

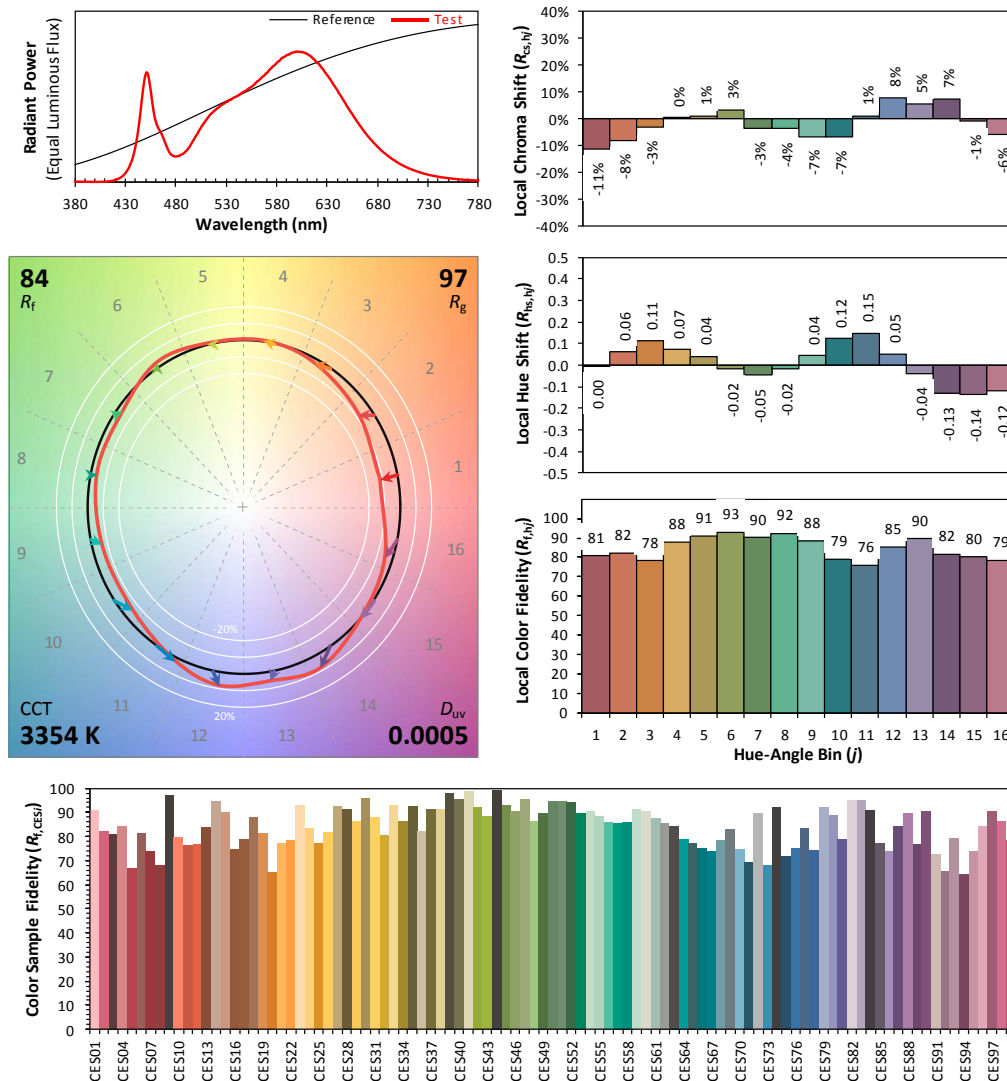
ANSI/IES TM-30-18 Color Rendition Report

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 0.4143
 y 0.3961
 u' 0.2393
 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	77.984	3.16%
10- 20	224.099	9.07%
20- 30	342.099	13.85%
30- 40	417.453	16.90%
40- 50	440.825	17.85%
50- 60	408.614	16.55%
60- 70	321.162	13.01%
70- 80	188.485	7.63%
80- 90	46.652	1.89%
90-100	0.219	0.01%
100-110	0.272	0.01%
110-120	0.282	0.01%
120-130	0.288	0.01%
130-140	0.302	0.01%
140-150	0.278	0.01%
150-160	0.223	0.01%
160-170	0.149	0.01%
170-180	0.054	0.00%
Total	2469.4	100%

$\gamma(^{\circ})$	Lumens	% Total
0- 60	1911.074	77.39%
60- 90	556.299	22.53%
0-90	2467.373	99.92%
90- 180	2.067	0.08%
0- 180	2469.4	100%

Table 5: Zonal Lumen

UGR Table (Corrected) - Goniophotometer Method

Reflectances		70	70	50	50	30	70	70	50	50	30
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	14.9	16.6	15.3	16.9	17.2	15.0	16.6	15.3	16.9	17.3
	3H	16.8	18.3	17.1	18.6	19.0	16.9	18.4	17.3	18.7	19.1
	4H	17.4	18.8	17.8	19.2	19.6	17.6	19.0	18.0	19.4	19.7
	6H	17.8	19.2	18.3	19.5	19.9	18.1	19.4	18.5	19.8	20.2
	8H	18.0	19.2	18.4	19.6	20.0	18.3	19.5	18.7	19.9	20.3
	12H	18.0	19.2	18.4	19.6	20.0	18.4	19.6	18.8	19.9	20.4
4H	2H	15.6	17.0	16.0	17.4	17.7	15.7	17.1	16.1	17.4	17.8
	3H	17.7	18.9	18.1	19.3	19.7	17.8	19.0	18.2	19.4	19.8
	4H	18.5	19.6	18.9	20.0	20.4	18.7	19.7	19.1	20.1	20.6
	6H	19.0	20.0	19.5	20.4	20.9	19.3	20.2	19.7	20.7	21.1
	8H	19.2	20.1	19.6	20.5	21.0	19.5	20.4	19.9	20.8	21.3
	12H	19.3	20.1	19.7	20.5	21.0	19.6	20.4	20.1	20.9	21.4
8H	4H	18.8	19.7	19.3	20.1	20.6	19.0	19.9	19.5	20.3	20.8
	6H	19.5	20.3	20.0	20.7	21.2	19.8	20.5	20.3	21.0	21.5
	8H	19.7	20.4	20.2	20.9	21.4	20.0	20.7	20.5	21.2	21.7
	12H	19.9	20.4	20.4	20.9	21.5	20.2	20.8	20.7	21.3	21.9
12H	4H	18.8	19.7	19.3	20.1	20.6	19.0	19.8	19.5	20.3	20.8
	6H	19.6	20.3	20.1	20.7	21.3	19.9	20.5	20.4	21.0	21.5
	8H	19.8	20.4	20.4	20.9	21.5	20.2	20.7	20.7	21.2	21.8

Chart 5: UGR Table (Corrected)

Illuminance Plots- Goniophotometer Method

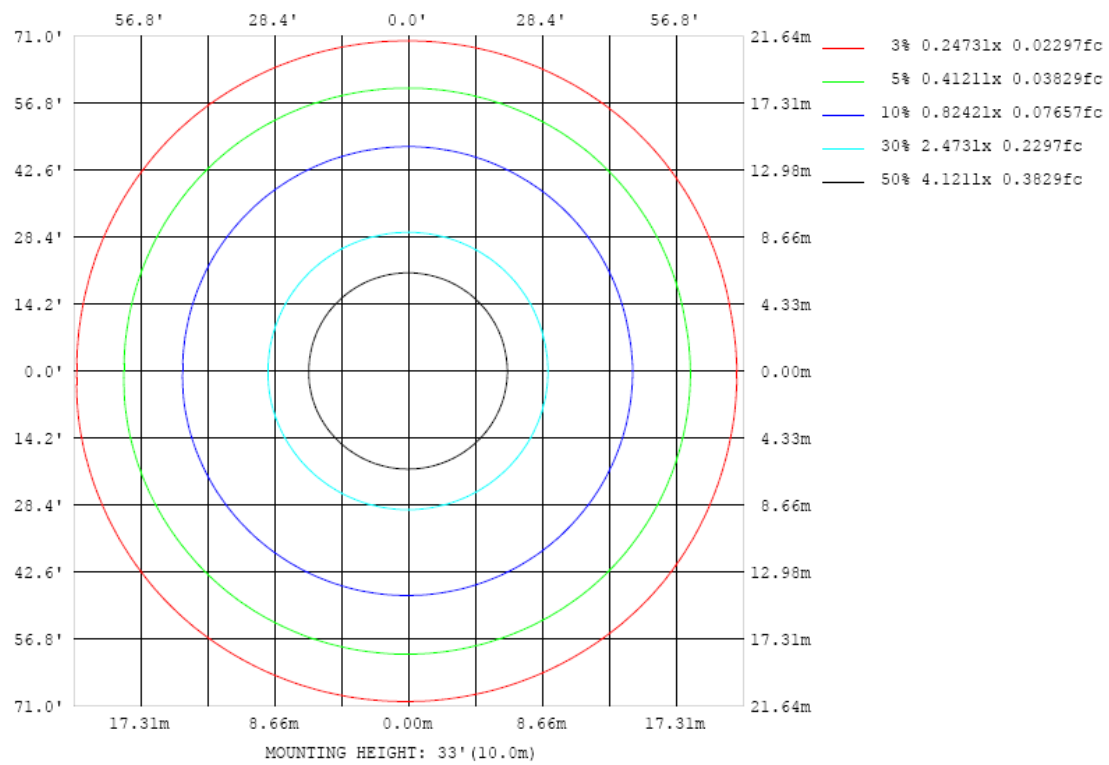


Chart 6: Illuminance Plot (Footcandles)

Luminous Intensity Distribution Plots- Goniophotometer Method

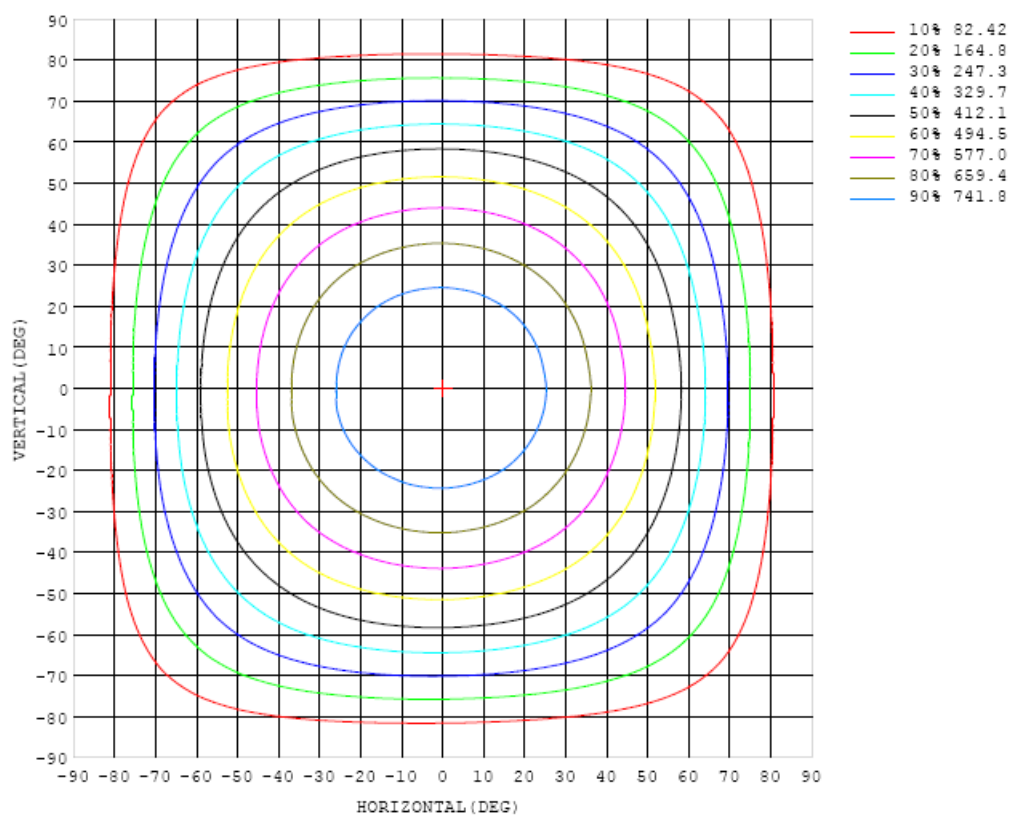


Chart 7: Isocandela Plot

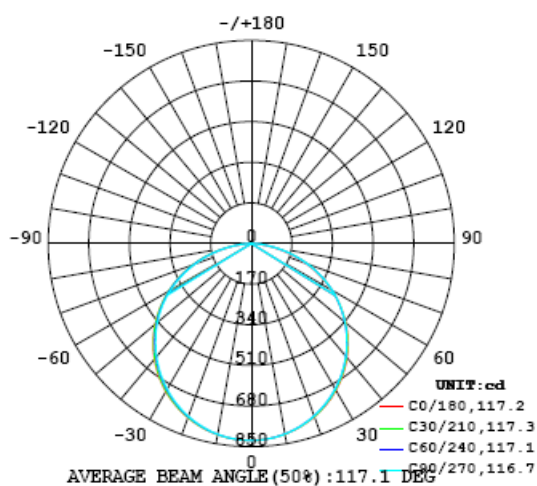


Chart 8: Polar Candela Distribution

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	824	824	824	824	824	824	824	824	824	824	824	824	824	824	824	824	824	824	824
5	820	820	819	820	820	820	820	819	819	820	820	820	820	821	821	821	821	821	821
10	810	810	809	809	809	810	809	809	809	809	809	810	810	811	812	813	812	813	812
15	794	794	793	793	792	792	792	791	791	792	792	793	794	795	796	797	798	798	796
20	772	771	771	770	769	769	767	767	767	768	768	769	770	772	773	775	776	777	776
25	743	743	742	741	740	739	738	737	737	738	738	740	741	744	746	748	749	750	748
30	709	709	707	706	704	704	702	701	701	702	703	704	706	709	712	714	717	717	715
35	669	668	667	666	664	663	661	661	660	661	662	664	666	669	672	675	677	679	676
40	623	623	622	620	618	617	616	615	614	615	617	619	621	625	628	631	633	634	632
45	572	572	570	570	568	567	565	564	564	565	567	568	572	575	578	581	583	584	581
50	516	515	515	514	512	512	511	510	510	512	513	515	517	521	524	527	529	530	526
55	454	454	454	454	453	453	453	453	453	454	456	457	460	463	465	467	469	469	465
60	387	388	389	390	390	391	390	389	389	391	392	395	398	400	402	404	404	404	399
65	316	317	320	322	324	323	322	321	321	322	324	327	331	334	336	336	336	334	328
70	241	244	247	252	252	251	250	249	249	250	252	255	259	263	266	266	264	260	253
75	165	169	174	178	178	177	176	175	175	176	178	181	185	189	192	193	190	185	175
80	90.9	96.3	102	104	104	104	103	103	103	104	106	109	112	116	118	119	117	110	99.3
85	27.6	31.4	34.0	35.3	36.5	37.7	38.4	38.9	39.7	40.8	42.1	43.8	45.7	46.9	47.4	47.4	46.1	41.8	32.8
90	0.22	0.22	0.23	0.23	0.24	0.24	0.24	0.25	0.25	0.25	0.24	0.24	0.23	0.23	0.22	0.14	0.34	0.29	0.10
95	0.28	0.28	0.28	0.29	0.29	0.30	0.30	0.31	0.30	0.30	0.30	0.30	0.29	0.29	0.28	0.28	0.27	0.27	0.09
100	0.32	0.32	0.33	0.33	0.34	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.34	0.34	0.33	0.33	0.32	0.31	0.11
105	0.35	0.35	0.35	0.35	0.36	0.38	0.39	0.40	0.39	0.39	0.39	0.39	0.39	0.38	0.37	0.35	0.34	0.34	0.14
110	0.35	0.34	0.35	0.35	0.36	0.38	0.40	0.41	0.40	0.39	0.40	0.40	0.40	0.39	0.37	0.35	0.34	0.34	0.16
115	0.34	0.34	0.34	0.34	0.35	0.36	0.38	0.39	0.38	0.38	0.38	0.39	0.39	0.38	0.36	0.35	0.33	0.33	0.20
120	0.35	0.35	0.35	0.35	0.35	0.35	0.36	0.37	0.36	0.36	0.36	0.37	0.37	0.36	0.35	0.34	0.34	0.35	0.23
125	0.38	0.38	0.38	0.38	0.36	0.36	0.36	0.36	0.36	0.35	0.36	0.37	0.37	0.37	0.36	0.36	0.36	0.37	0.27
130	0.41	0.42	0.41	0.43	0.40	0.40	0.41	0.39	0.40	0.40	0.39	0.41	0.41	0.40	0.39	0.40	0.39	0.40	0.30
135	0.46	0.46	0.47	0.48	0.47	0.46	0.46	0.45	0.48	0.48	0.46	0.47	0.47	0.46	0.47	0.46	0.45	0.45	0.33
140	0.47	0.49	0.51	0.52	0.52	0.52	0.52	0.50	0.53	0.54	0.53	0.53	0.54	0.51	0.49	0.48	0.47	0.45	0.33
145	0.52	0.53	0.55	0.56	0.56	0.56	0.56	0.55	0.58	0.59	0.58	0.57	0.56	0.55	0.52	0.48	0.49	0.49	0.36
150	0.55	0.55	0.57	0.57	0.58	0.58	0.57	0.57	0.59	0.59	0.57	0.59	0.57	0.54	0.51	0.53	0.54	0.53	0.39
155	0.55	0.55	0.57	0.59	0.58	0.57	0.55	0.55	0.55	0.59	0.57	0.55	0.53	0.53	0.54	0.56	0.55	0.54	0.43
160	0.56	0.56	0.57	0.58	0.59	0.59	0.55	0.52	0.55	0.52	0.53	0.52	0.53	0.55	0.56	0.57	0.56	0.56	0.47
165	0.56	0.56	0.56	0.58	0.59	0.60	0.58	0.55	0.53	0.53	0.53	0.52	0.54	0.54	0.55	0.56	0.56	0.55	0.52
170	0.58	0.58	0.60	0.61	0.62	0.64	0.64	0.60	0.55	0.55	0.56	0.56	0.55	0.54	0.56	0.57	0.57	0.56	0.55
175	0.60	0.61	0.62	0.63	0.63	0.63	0.63	0.61	0.57	0.57	0.56	0.58	0.56	0.54	0.56	0.58	0.57	0.55	0.56
180	0.57	0.57	0.57	0.57	0.57	0.57	0.57	0.57	0.57	0.57	0.57	0.57	0.57	0.57	0.57	0.57	0.57	0.57	0.57

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		824	824	824	824	824	824	824	824	824	824	824	824	824	824	824	824	824	
5		821	821	821	821	821	821	820	820	821	820	820	820	820	820	820	820	820	
10		812	812	812	812	812	811	811	810	810	810	809	809	809	810	810	810	810	
15		797	797	796	795	795	794	793	793	793	792	792	792	793	793	793	793	793	
20		776	775	775	774	773	771	770	769	769	768	768	769	769	770	770	771	770	
25		748	748	747	745	744	742	741	739	739	738	739	739	740	741	741	742	741	
30		715	714	713	711	709	707	705	704	703	703	703	704	705	705	707	707	707	
35		676	675	674	671	669	667	664	663	662	662	662	663	664	665	667	667	667	
40		631	630	629	626	624	621	619	617	616	616	616	617	618	619	621	621	620	
45		581	581	579	576	574	571	569	567	566	565	566	566	568	569	570	570	569	
50		526	525	524	521	519	516	515	513	512	512	511	512	513	513	514	513	513	
55		465	465	464	462	460	458	457	455	454	454	453	453	454	454	453	452	451	
60		399	400	400	399	398	396	394	392	390	390	390	391	390	390	388	387	384	
65		329	331	332	332	331	328	325	322	321	321	321	322	323	323	320	317	313	
70		255	258	261	261	259	256	252	250	248	248	249	250	251	251	249	244	239	
75		179	184	187	187	184	181	178	176	174	174	174	175	177	177	175	170	163	
80		104	110	113	112	110	107	105	104	102	102	102	103	103	103	101	97.3	90.2	
85		37.9	41.4	43.0	43.3	43.6	42.8	41.8	41.0	40.5	39.8	39.4	39.1	38.0	36.2	34.0	31.3	27.4	
90		1.37	0.98	2.32	2.42	1.83	0.02	0.03	0.04	0.04	0.05	0.06	0.08	0.11	0.33	0.02	0.08	0.08	
95		0.09	0.09	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	
100		0.11	0.11	0.12	0.12	0.13	0.13	0.13	0.13	0.13	0.13	0.13	0.13	0.14	0.13	0.13	0.12	0.12	
105		0.13	0.14	0.14	0.14	0.15	0.16	0.16	0.15	0.16	0.16	0.16	0.16	0.16	0.15	0.15	0.14	0.15	
110		0.16	0.16	0.16	0.17	0.18	0.18	0.18	0.17	0.17	0.18	0.19	0.19	0.18	0.18	0.18	0.17	0.17	
115		0.19	0.19	0.19	0.19	0.20	0.21	0.21	0.20	0.20	0.21	0.22	0.22	0.22	0.21	0.21	0.21	0.21	
120		0.23	0.23	0.22	0.22	0.24	0.25	0.23	0.23	0.23	0.24	0.26	0.25	0.25	0.25	0.25	0.25	0.25	
125		0.27	0.26	0.25	0.25	0.27	0.28	0.26	0.26	0.26	0.27	0.28	0.28	0.28	0.28	0.29	0.28	0.28	
130		0.30	0.30	0.29	0.28	0.30	0.32	0.31	0.29	0.30	0.30	0.32	0.31	0.31	0.31	0.32	0.31	0.31	
135		0.33	0.33	0.32	0.31	0.32	0.33	0.32	0.31	0.32	0.32	0.32	0.33	0.32	0.33	0.34	0.33	0.34	
140		0.33	0.33	0.33	0.32	0.33	0.34	0.32	0.32	0.33	0.32	0.31	0.33	0.33	0.33	0.33	0.33	0.35	
145		0.35	0.36	0.35	0.34	0.34	0.35	0.34	0.34	0.34	0.33	0.32	0.34	0.34	0.34	0.35	0.35	0.37	
150		0.39	0.40	0.40	0.37	0.37	0.36	0.36	0.37	0.36	0.36	0.35	0.36	0.37	0.37	0.37	0.38	0.40	
155		0.42	0.43	0.44	0.42	0.40	0.39	0.38	0.39	0.37	0.38	0.39	0.39	0.40	0.41	0.42	0.42	0.43	
160		0.46	0.47	0.48	0.47	0.44	0.42	0.41	0.41	0.39	0.40	0.42	0.43	0.45	0.46	0.46	0.46	0.48	
165		0.52	0.52	0.54	0.54	0.52	0.50	0.49	0.48	0.46	0.46	0.48	0.53	0.54	0.53	0.52	0.51	0.52	
170		0.54	0.55	0.55	0.56	0.54	0.50	0.48	0.51	0.48	0.46	0.50	0.53	0.54	0.52	0.52	0.53	0.55	
175		0.61	0.62	0.62	0.63	0.64	0.61	0.58	0.58	0.55	0.52	0.54	0.54	0.53	0.55	0.56	0.58	0.60	
180		0.57	0.57	0.57	0.57	0.57	0.57	0.57	0.57	0.57	0.57	0.57	0.57	0.57	0.57	0.57	0.57	0.57	

Table 7: Luminous Intensity Data

TEST RESULTS (18W 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)	0.142	0.073
Power Factor	0.9833	0.8602
Test Power (W)	16.72	17.48
THD A%	9.52	13.80
Luminous Efficacy (lm/W)	153.0	148.6
Total Luminous Flux (lm)	2558.7	2597.8
Color Rendering Index (CRI)	83.6	
R9	15.2	
Correlated Color Temperature (CCT)(K)	3925	
Chromaticity Chroma x	0.3838	
Chromaticity Chroma y	0.3790	
Chromaticity Chroma u	0.2264	
Chromaticity Chroma v	0.3354	
Duv	0.0002	
Chromaticity Chroma u'	0.2264	
Chromaticity Chroma v'	0.5031	

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)	0.142
Power Factor	0.9832
Power (W)	16.75
Luminous Efficacy (lm/W)	153.2
Total Luminous Flux (lm)	2565.8
Beam Angle (°)	117.2 (0°-180°) / 116.7 (90°-270°)
Center Beam Candle Power (cd)	856
Maximum Beam Candle Power (cd)	856.7 (At: C=20.0, Gamma=0.5)
Spacing Criteria	1.29 (0°-180°) / 1.27 (90°-270°)
Zonal Lumens in the 0 °-60 °Zone	77.42%
Zonal Lumens in the 60 °-90 °Zone	22.50%
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

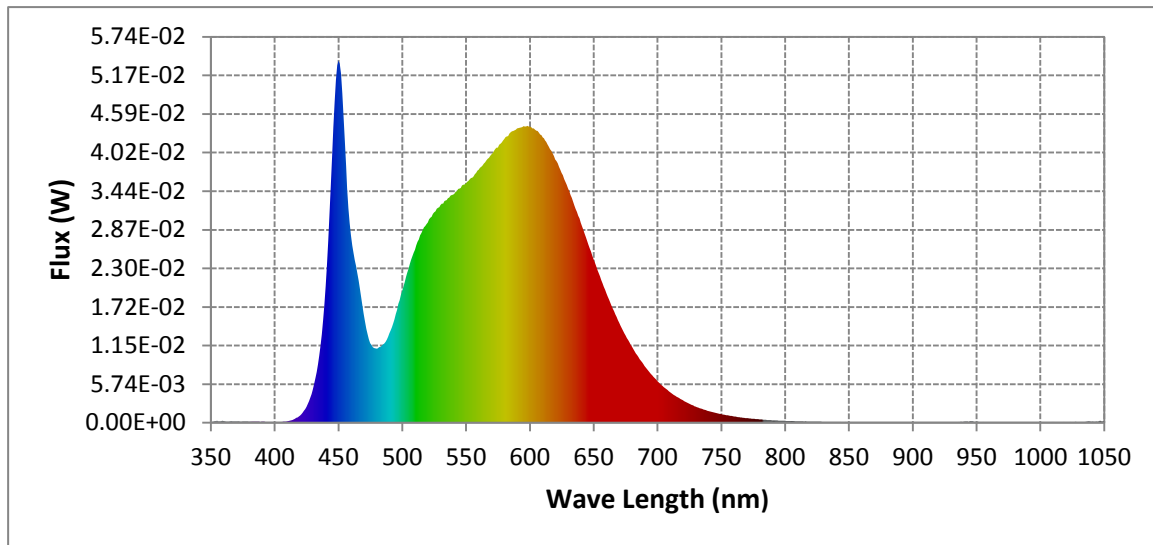
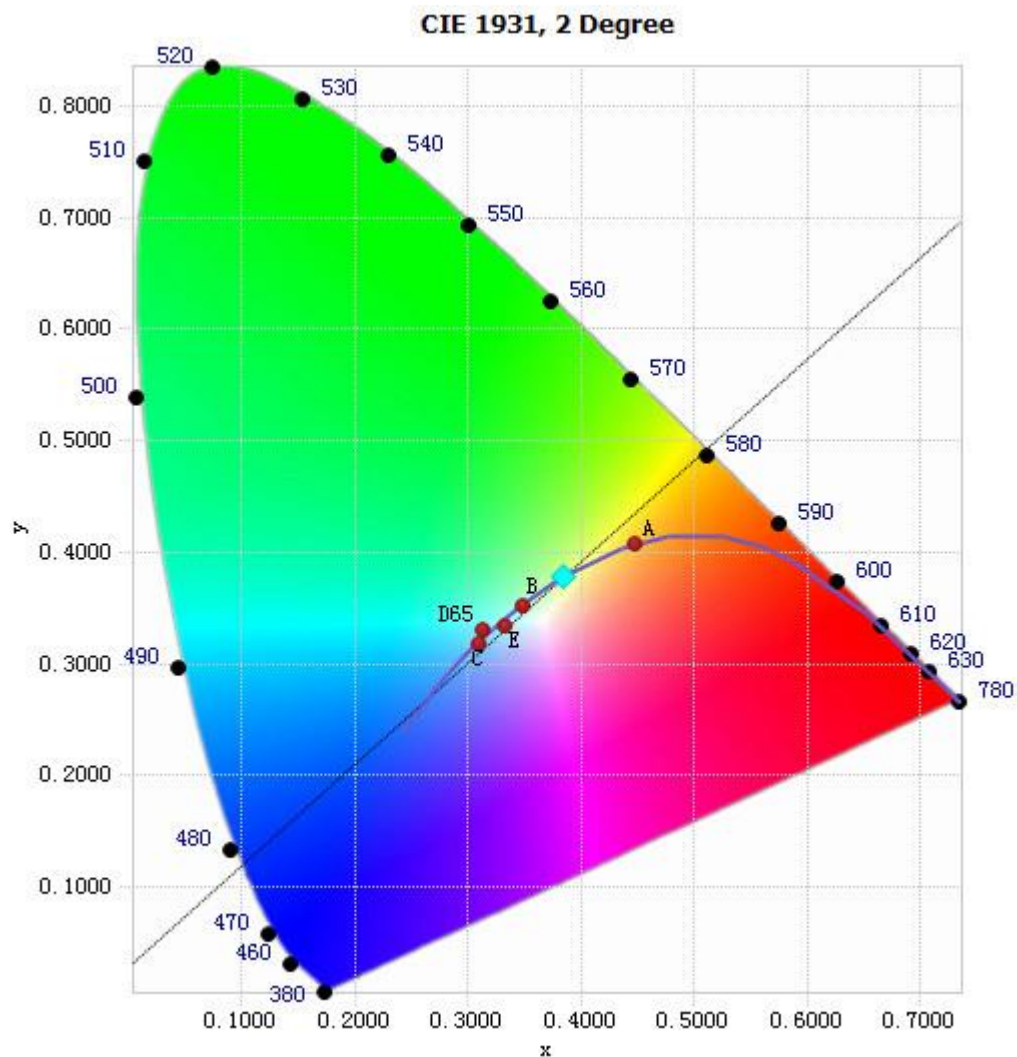


Chart 9: Spectral Power Distribution

Spectral Distribution over Visible Wavelength							
WL(nm)	Radiant(Watts)	WL(nm)	Radiant(Watts)	WL(nm)	Radiant(Watts)	WL(nm)	Radiant(Watts)
380	1.90E-04	485	1.16E-02	590	4.38E-02	695	7.27E-03
385	1.83E-04	490	1.33E-02	595	4.41E-02	700	6.22E-03
390	1.62E-04	495	1.62E-02	600	4.40E-02	705	5.32E-03
395	1.20E-04	500	1.96E-02	605	4.34E-02	710	4.54E-03
400	9.79E-05	505	2.29E-02	610	4.24E-02	715	3.88E-03
405	1.26E-04	510	2.57E-02	615	4.10E-02	720	3.35E-03
410	2.10E-04	515	2.82E-02	620	3.92E-02	725	2.83E-03
415	5.00E-04	520	2.98E-02	625	3.72E-02	730	2.40E-03
420	1.08E-03	525	3.13E-02	630	3.49E-02	735	2.05E-03
425	2.35E-03	530	3.24E-02	635	3.23E-02	740	1.75E-03
430	4.96E-03	535	3.31E-02	640	2.97E-02	745	1.50E-03
435	1.00E-02	540	3.39E-02	645	2.70E-02	750	1.29E-03
440	2.03E-02	545	3.48E-02	650	2.43E-02	755	1.10E-03
445	3.95E-02	550	3.56E-02	655	2.18E-02	760	9.30E-04
450	5.39E-02	555	3.65E-02	660	1.93E-02	765	8.02E-04
455	4.18E-02	560	3.76E-02	665	1.70E-02	770	6.86E-04
460	2.79E-02	565	3.87E-02	670	1.49E-02	775	5.83E-04
465	2.22E-02	570	3.99E-02	675	1.30E-02	780	5.12E-04
470	1.61E-02	575	4.09E-02	680	1.13E-02		
475	1.18E-02	580	4.22E-02	685	9.77E-03		
480	1.10E-02	585	4.32E-02	690	8.45E-03		

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

Chromaticity Diagram - Sphere Spectroradiometer Method



Tristimulus values(x, y): (0.3838, 0.3790)

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

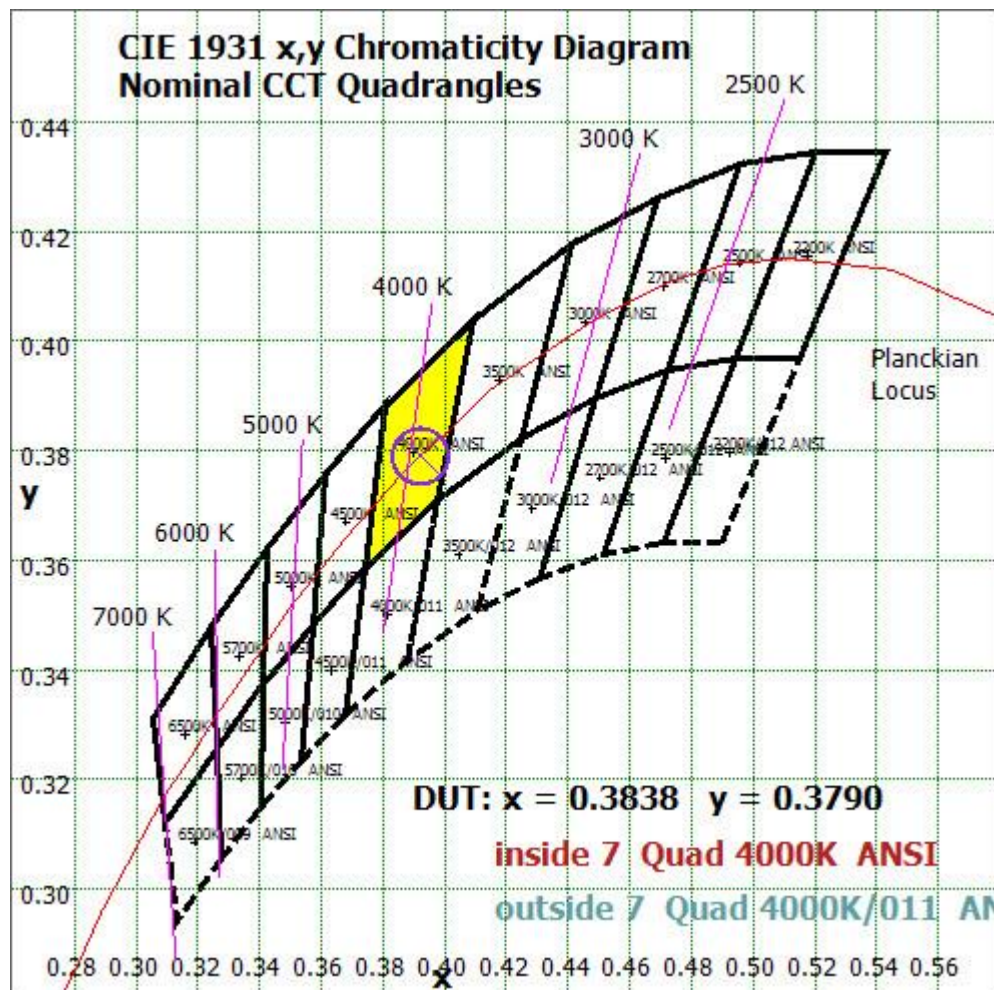


Chart 11: Plot of Lamp x/y coordinates on CIE 1931 Chromaticity Diagram

Color Rendition Report – Sphere Spectroradiometer Method

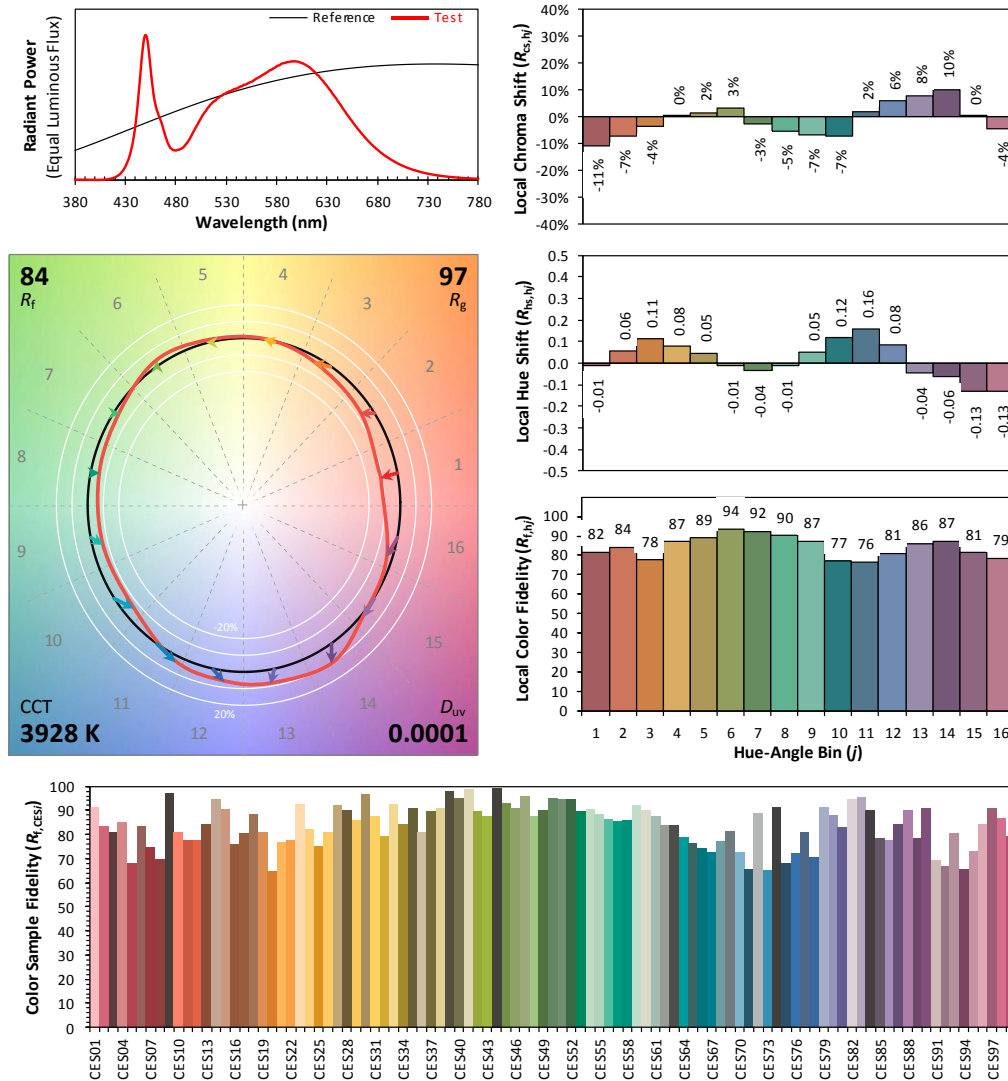
ANSI/IES TM-30-18 Color Rendition Report

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 0.3838
 y 0.3790
 u' 0.2264
 v' 0.5031

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	81.044	3.16%
10- 20	232.907	9.08%
20- 30	355.562	13.86%
30- 40	433.911	16.91%
40- 50	458.239	17.86%
50- 60	424.719	16.55%
60- 70	333.681	13.01%
70- 80	195.512	7.62%
80- 90	48.012	1.87%
90-100	0.235	0.01%
100-110	0.287	0.01%
110-120	0.297	0.01%
120-130	0.304	0.01%
130-140	0.321	0.01%
140-150	0.296	0.01%
150-160	0.237	0.01%
160-170	0.159	0.01%
170-180	0.057	0.00%
Total	2565.8	100%

$\gamma(^{\circ})$	Lumens	% Total
0- 60	1986.382	77.42%
60- 90	577.205	22.50%
0-90	2563.587	99.91%
90- 180	2.193	0.09%
0- 180	2565.8	100%

Table 11: Zonal Lumen

UGR Table (Corrected) - Goniophotometer Method

Reflectances		70	70	50	50	30	70	70	50	50	30
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	15.1	16.8	15.5	17.1	17.4	15.1	16.8	15.5	17.1	17.4
	3H	17.0	18.5	17.4	18.8	19.2	17.1	18.6	17.4	18.9	19.2
	4H	17.6	19.1	18.0	19.4	19.8	17.7	19.2	18.1	19.5	19.9
	6H	18.1	19.4	18.5	19.8	20.2	18.2	19.6	18.7	19.9	20.3
	8H	18.2	19.4	18.6	19.8	20.2	18.4	19.7	18.8	20.0	20.4
	12H	18.2	19.4	18.7	19.8	20.3	18.5	19.7	18.9	20.1	20.5
4H	2H	15.8	17.2	16.2	17.6	18.0	15.8	17.3	16.2	17.6	18.0
	3H	17.9	19.1	18.3	19.5	19.9	18.0	19.2	18.4	19.6	20.0
	4H	18.7	19.8	19.1	20.2	20.6	18.8	19.9	19.2	20.3	20.7
	6H	19.3	20.2	19.7	20.7	21.1	19.4	20.4	19.9	20.8	21.3
	8H	19.4	20.3	19.9	20.7	21.2	19.6	20.5	20.1	20.9	21.4
	12H	19.5	20.3	20.0	20.8	21.2	19.7	20.5	20.2	21.0	21.5
8H	4H	19.0	19.9	19.5	20.4	20.8	19.2	20.0	19.6	20.5	20.9
	6H	19.7	20.5	20.2	21.0	21.4	19.9	20.6	20.4	21.1	21.6
	8H	19.9	20.6	20.5	21.1	21.6	20.2	20.8	20.7	21.3	21.8
	12H	20.1	20.7	20.6	21.1	21.7	20.3	20.9	20.8	21.4	22.0
12H	4H	19.1	19.9	19.6	20.4	20.8	19.2	20.0	19.7	20.5	20.9
	6H	19.8	20.5	20.3	20.9	21.5	20.0	20.7	20.5	21.1	21.6
	8H	20.1	20.6	20.6	21.1	21.7	20.3	20.9	20.8	21.4	21.9

Chart 13: UGR Table (Corrected)

Illuminance Plots- Goniophotometer Method

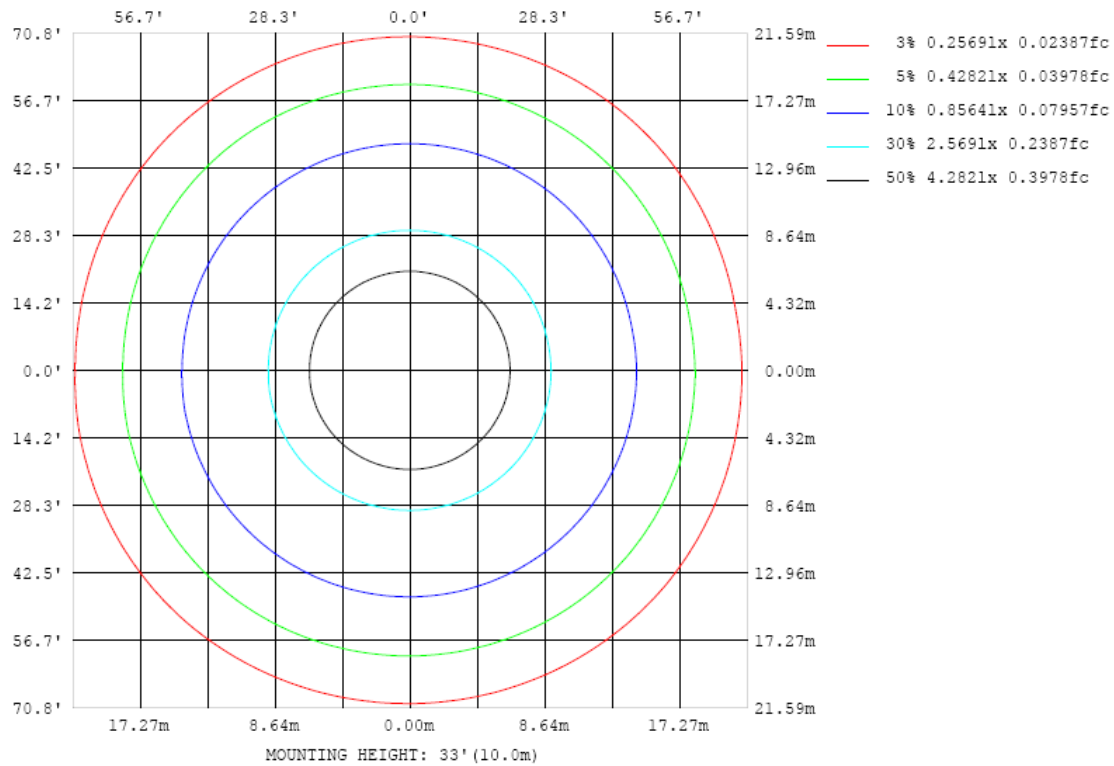


Chart 14: Illuminance Plot (Footcandles)

Luminous Intensity Distribution Plots- Goniophotometer Method

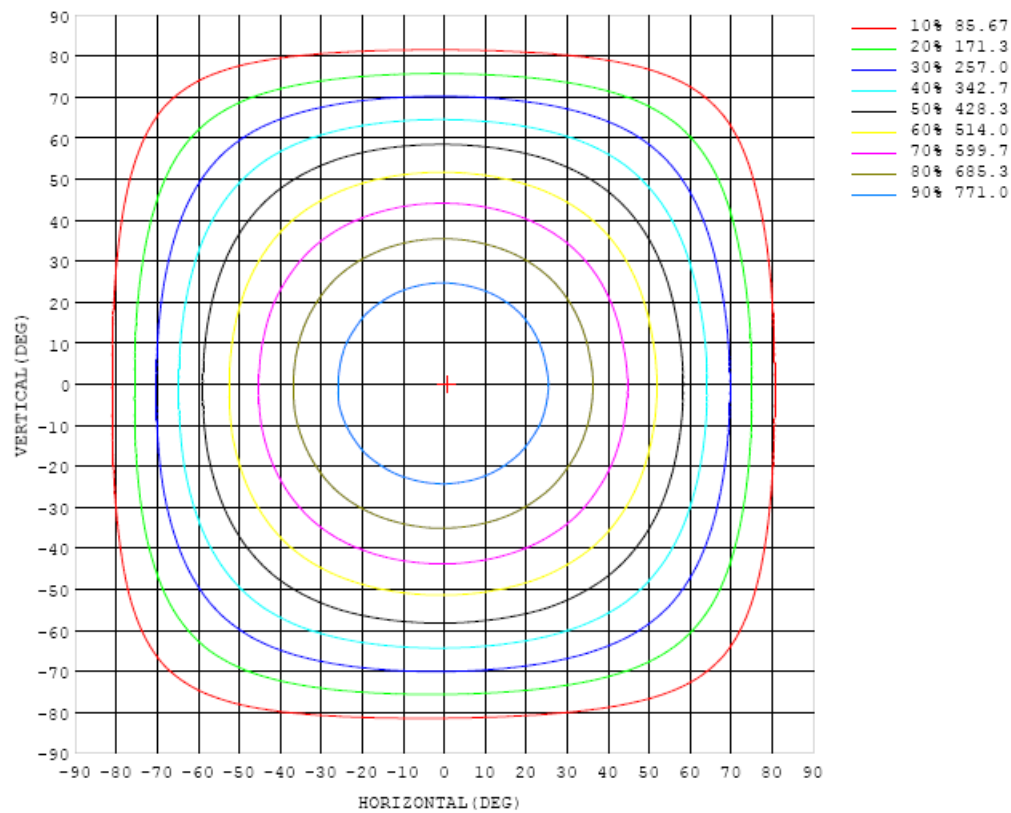


Chart 15: Isocandela Plot

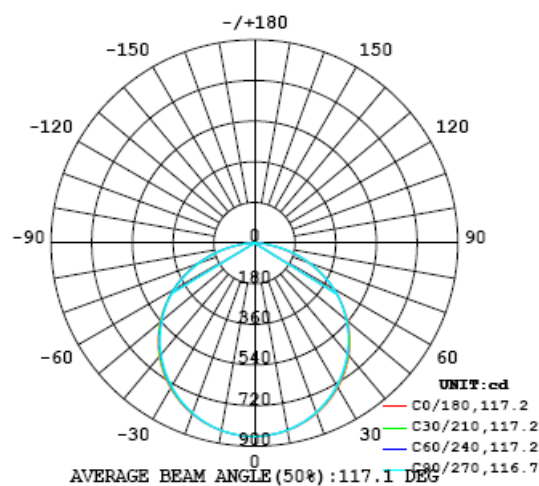


Chart 16: Polar Candela Distribution

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	856	856	856	856	856	856	856	856	856	856	856	856	856	856	856	856	856	856	856
5	852	852	852	852	852	852	852	852	852	852	852	852	852	853	853	853	853	853	853
10	842	842	842	841	841	841	841	841	841	841	840	841	842	842	843	843	844	844	844
15	826	825	825	824	824	823	823	822	822	823	822	823	824	825	827	827	828	829	828
20	803	803	802	800	800	798	798	797	798	797	797	799	800	801	803	804	805	807	805
25	773	773	773	770	769	768	767	766	766	766	766	768	769	771	774	775	777	779	777
30	738	737	737	734	733	731	730	729	729	729	729	731	733	736	739	740	742	744	742
35	697	696	695	692	691	689	688	687	686	686	687	688	691	694	697	700	702	703	702
40	650	649	647	644	643	641	640	639	638	639	640	642	644	647	651	653	656	658	655
45	597	595	594	592	591	589	587	587	586	587	587	590	592	596	599	602	604	606	603
50	538	537	536	534	533	532	531	530	530	531	532	533	536	539	543	545	547	549	545
55	474	473	473	472	472	470	470	470	470	471	472	474	476	479	481	483	485	486	482
60	404	404	405	405	406	406	405	403	403	404	406	409	412	414	416	418	418	418	413
65	330	331	333	334	336	335	334	332	332	333	335	338	342	346	347	348	347	346	340
70	252	254	258	261	261	260	258	257	257	258	260	263	267	272	275	275	272	269	262
75	172	176	181	184	184	183	181	180	180	181	183	186	190	195	198	199	196	191	182
80	94.9	100	106	107	108	106	105	105	105	106	108	111	115	118	122	122	120	114	103
85	28.1	32.4	34.8	35.7	36.7	37.6	38.1	38.7	39.3	40.3	41.8	43.6	45.5	47.0	47.9	48.1	47.0	43.0	34.0
90	0.24	0.24	0.25	0.25	0.26	0.26	0.26	0.27	0.27	0.27	0.26	0.26	0.26	0.25	0.24	0.15	0.36	0.30	0.11
95	0.30	0.30	0.30	0.31	0.31	0.32	0.32	0.32	0.33	0.32	0.32	0.32	0.32	0.31	0.31	0.30	0.29	0.28	0.10
100	0.34	0.34	0.34	0.35	0.35	0.37	0.37	0.37	0.37	0.37	0.37	0.37	0.36	0.36	0.35	0.34	0.33	0.33	0.12
105	0.36	0.36	0.37	0.37	0.38	0.40	0.41	0.42	0.41	0.41	0.41	0.41	0.41	0.40	0.38	0.37	0.36	0.35	0.14
110	0.36	0.36	0.36	0.37	0.38	0.40	0.42	0.43	0.42	0.41	0.42	0.42	0.42	0.41	0.39	0.37	0.36	0.35	0.17
115	0.36	0.35	0.35	0.36	0.37	0.38	0.40	0.41	0.40	0.40	0.40	0.41	0.41	0.40	0.38	0.36	0.35	0.35	0.21
120	0.37	0.37	0.37	0.37	0.36	0.36	0.38	0.39	0.38	0.38	0.38	0.39	0.39	0.38	0.37	0.36	0.36	0.36	0.25
125	0.40	0.40	0.40	0.39	0.38	0.38	0.39	0.38	0.38	0.38	0.38	0.39	0.39	0.39	0.38	0.38	0.38	0.39	0.28
130	0.43	0.44	0.44	0.45	0.42	0.42	0.43	0.42	0.43	0.42	0.42	0.44	0.44	0.43	0.42	0.42	0.41	0.42	0.31
135	0.48	0.49	0.50	0.51	0.50	0.49	0.49	0.48	0.51	0.51	0.50	0.50	0.50	0.49	0.50	0.48	0.48	0.47	0.34
140	0.50	0.52	0.55	0.56	0.56	0.56	0.56	0.53	0.57	0.58	0.56	0.56	0.57	0.55	0.53	0.51	0.50	0.48	0.35
145	0.55	0.56	0.58	0.59	0.60	0.60	0.60	0.59	0.62	0.64	0.62	0.61	0.60	0.59	0.55	0.51	0.52	0.52	0.38
150	0.58	0.59	0.60	0.60	0.62	0.62	0.60	0.61	0.63	0.63	0.61	0.63	0.60	0.58	0.54	0.56	0.57	0.56	0.41
155	0.58	0.59	0.61	0.62	0.62	0.61	0.58	0.58	0.59	0.63	0.60	0.58	0.57	0.56	0.58	0.59	0.59	0.58	0.46
160	0.60	0.59	0.60	0.62	0.62	0.63	0.58	0.55	0.58	0.55	0.56	0.55	0.57	0.58	0.59	0.61	0.60	0.59	0.50
165	0.59	0.59	0.60	0.61	0.63	0.64	0.62	0.58	0.56	0.57	0.56	0.56	0.57	0.58	0.58	0.59	0.59	0.58	0.55
170	0.61	0.62	0.64	0.65	0.66	0.67	0.68	0.63	0.58	0.58	0.60	0.60	0.59	0.58	0.59	0.61	0.61	0.60	0.58
175	0.64	0.65	0.66	0.67	0.67	0.67	0.67	0.65	0.60	0.61	0.60	0.62	0.60	0.58	0.60	0.62	0.60	0.58	0.60
180	0.61	0.61	0.61	0.61	0.61	0.61	0.61	0.61	0.61	0.61	0.61	0.61	0.61	0.61	0.61	0.61	0.61	0.61	0.61

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	856	856	856	856	856	856	856	856	856	856	856	856	856	856	856	856	856		
5	853	852	853	853	853	853	853	854	853	853	852	852	852	853	853	852	852		
10	844	843	843	843	842	843	842	843	842	842	842	842	842	842	842	841	841		
15	828	828	826	827	826	826	825	825	824	824	823	824	825	825	825	825	825		
20	805	805	804	803	802	802	801	800	800	799	799	800	800	802	802	802	802		
25	777	776	775	774	772	771	770	769	769	768	768	769	770	772	772	772	772		
30	742	742	739	739	736	735	733	733	732	732	732	733	734	736	736	736	736		
35	701	701	699	697	695	693	692	690	690	689	689	690	692	693	694	694	695		
40	655	654	652	651	648	646	644	643	642	641	642	643	644	645	646	646	647		
45	603	603	600	599	596	593	592	591	590	589	590	591	592	593	594	594	593		
50	545	545	543	542	539	537	535	534	533	533	533	534	535	536	536	535	535		
55	482	483	481	480	478	477	476	475	475	473	473	473	473	474	473	472	470		
60	415	415	415	415	414	413	410	408	407	407	407	408	408	407	405	403	401		
65	341	344	344	345	344	342	339	337	336	335	336	337	338	337	334	331	327		
70	264	268	271	272	269	266	263	261	260	259	260	262	262	263	260	255	249		
75	186	191	194	194	192	189	186	184	182	182	183	184	185	185	183	177	170		
80	108	115	117	117	115	112	110	109	107	107	107	108	108	108	106	102	93.9		
85	39.4	43.3	44.9	45.6	45.6	44.8	43.8	43.1	42.4	41.8	41.5	41.1	39.8	38.0	35.7	32.8	28.6		
90	1.52	1.05	2.52	1.07	2.09	0.14	0.11	0.10	0.10	0.10	0.08	0.10	0.17	0.50	0.01	0.09	0.09		
95	0.10	0.10	0.11	0.11	0.11	0.11	0.11	0.11	0.12	0.12	0.12	0.11	0.11	0.11	0.11	0.11	0.11		
100	0.12	0.12	0.13	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.15	0.14	0.14	0.13	0.13		
105	0.14	0.14	0.15	0.15	0.16	0.17	0.17	0.16	0.17	0.17	0.18	0.17	0.17	0.16	0.16	0.15	0.15		
110	0.17	0.17	0.17	0.18	0.19	0.20	0.19	0.18	0.19	0.20	0.20	0.20	0.20	0.19	0.19	0.18	0.18		
115	0.20	0.20	0.20	0.21	0.22	0.22	0.22	0.21	0.21	0.22	0.24	0.23	0.23	0.22	0.23	0.22	0.22		
120	0.25	0.24	0.24	0.24	0.25	0.26	0.24	0.24	0.24	0.25	0.27	0.27	0.26	0.27	0.27	0.26	0.26		
125	0.29	0.28	0.26	0.27	0.28	0.29	0.28	0.28	0.28	0.28	0.30	0.30	0.29	0.30	0.30	0.30	0.30		
130	0.32	0.31	0.31	0.30	0.31	0.33	0.32	0.31	0.32	0.32	0.33	0.33	0.32	0.33	0.33	0.32	0.33		
135	0.35	0.35	0.34	0.33	0.34	0.35	0.34	0.33	0.34	0.34	0.34	0.35	0.34	0.35	0.36	0.35	0.36		
140	0.35	0.35	0.35	0.34	0.35	0.36	0.34	0.34	0.35	0.34	0.33	0.35	0.35	0.35	0.35	0.35	0.37		
145	0.38	0.38	0.37	0.36	0.36	0.37	0.36	0.36	0.36	0.35	0.34	0.36	0.36	0.37	0.37	0.37	0.39		
150	0.41	0.42	0.42	0.39	0.40	0.39	0.39	0.39	0.38	0.38	0.38	0.38	0.39	0.40	0.39	0.40	0.42		
155	0.45	0.46	0.47	0.44	0.42	0.41	0.41	0.42	0.40	0.41	0.41	0.42	0.43	0.44	0.44	0.44	0.46		
160	0.49	0.50	0.51	0.50	0.47	0.45	0.44	0.44	0.41	0.42	0.45	0.46	0.48	0.49	0.49	0.49	0.50		
165	0.55	0.56	0.57	0.57	0.55	0.53	0.52	0.51	0.49	0.48	0.51	0.56	0.57	0.56	0.55	0.55	0.55		
170	0.58	0.58	0.59	0.60	0.58	0.53	0.52	0.54	0.51	0.49	0.53	0.57	0.57	0.56	0.56	0.56	0.58		
175	0.65	0.66	0.67	0.67	0.68	0.65	0.61	0.62	0.58	0.56	0.57	0.58	0.57	0.58	0.60	0.62	0.64		
180	0.61	0.61	0.61	0.61	0.61	0.61	0.61	0.61	0.61	0.61	0.61	0.61	0.61	0.61	0.61	0.61	0.61		

Table 13: Luminous Intensity Data

TEST RESULTS (18W 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)	0.145	0.074
Power Factor	0.9837	0.8648
Test Power (W)	17.10	17.84
THD A%	9.50	13.65
Luminous Efficacy (lm/W)	151.1	147.0
Total Luminous Flux (lm)	2583.6	2623.0
Color Rendering Index (CRI)	81.9	
R9	9.3	
Correlated Color Temperature (CCT)(K)	4766	
Chromaticity Chroma x	0.3526	
Chromaticity Chroma y	0.3625	
Chromaticity Chroma u	0.2123	
Chromaticity Chroma v	0.3273	
Duv	0.0025	
Chromaticity Chroma u'	0.2123	
Chromaticity Chroma v'	0.4910	

Special Color Rendering Indices	
R1	80.3
R2	85.8
R3	89.8
R4	82.5
R5	80.3
R6	80.1
R7	87.7
R8	68.5
R9	9.3
R10	66.1
R11	81.4
R12	54.9
R13	81.4
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)	0.145
Power Factor	0.9837
Power (W)	17.12
Luminous Efficacy (lm/W)	151.4
Total Luminous Flux (lm)	2592.4
Beam Angle (°)	117.3 (0°-180°) / 116.7 (90°-270°)
Center Beam Candle Power (cd)	864
Maximum Beam Candle Power (cd)	864.9 (At: C=210.0, Gamma=0.5)
Spacing Criteria	1.29 (0°-180°) / 1.27 (90°-270°)
Zonal Lumens in the 0°-60° Zone	77.41%
Zonal Lumens in the 60°-90° Zone	22.50%
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

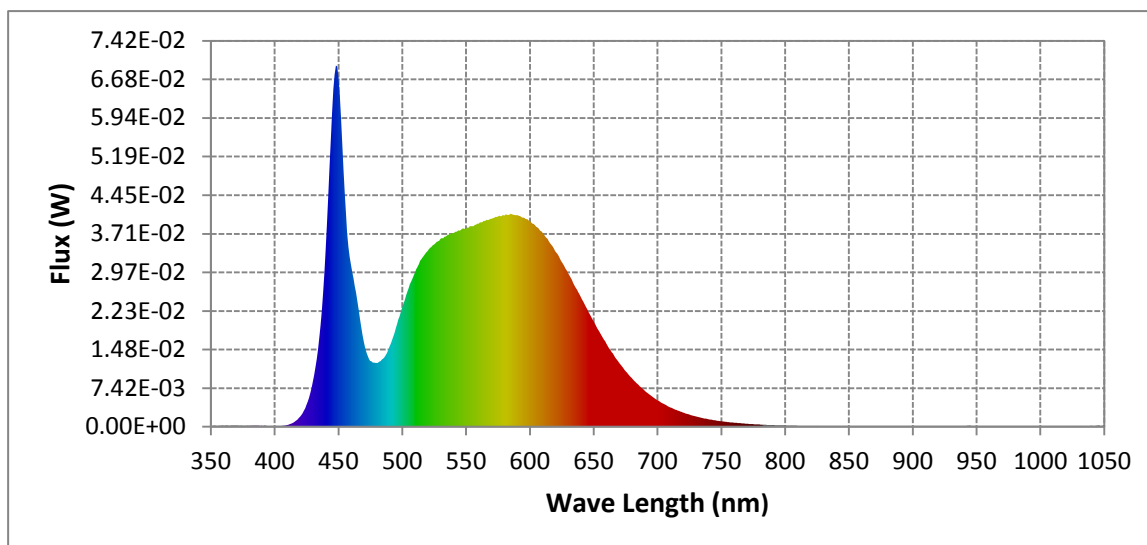
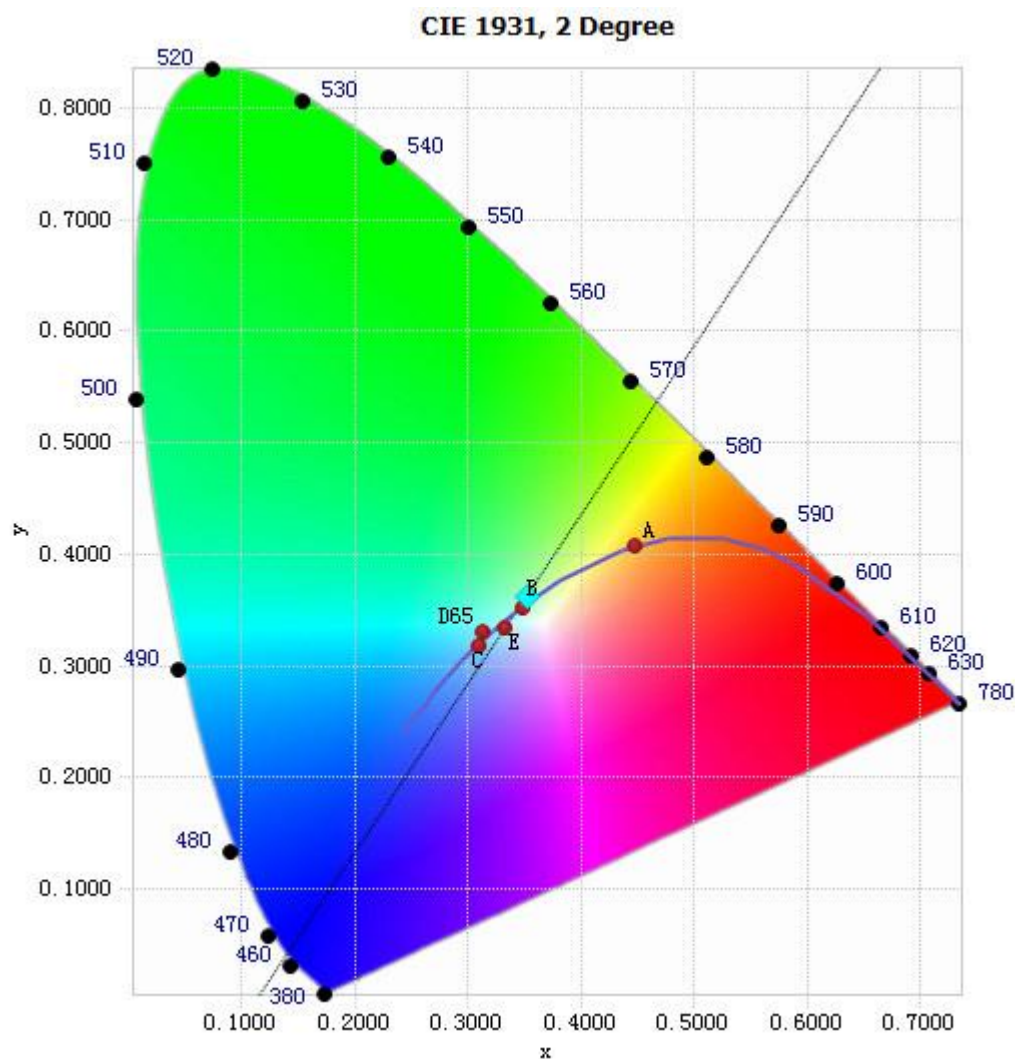


Chart 17: Spectral Power Distribution

Spectral Distribution over Visible Wavelength							
WL(nm)	Radiant(Watts)	WL(nm)	Radiant(Watts)	WL(nm)	Radiant(Watts)	WL(nm)	Radiant(Watts)
380	2.16E-04	485	1.30E-02	590	4.07E-02	695	5.98E-03
385	1.91E-04	490	1.53E-02	595	4.02E-02	700	5.11E-03
390	1.86E-04	495	1.89E-02	600	3.95E-02	705	4.39E-03
395	1.02E-04	500	2.29E-02	605	3.84E-02	710	3.74E-03
400	8.25E-05	505	2.66E-02	610	3.73E-02	715	3.21E-03
405	1.48E-04	510	2.96E-02	615	3.57E-02	720	2.75E-03
410	3.36E-04	515	3.22E-02	620	3.37E-02	725	2.35E-03
415	8.39E-04	520	3.38E-02	625	3.17E-02	730	1.99E-03
420	1.94E-03	525	3.51E-02	630	2.96E-02	735	1.69E-03
425	4.18E-03	530	3.61E-02	635	2.72E-02	740	1.45E-03
430	8.69E-03	535	3.67E-02	640	2.49E-02	745	1.23E-03
435	1.71E-02	540	3.72E-02	645	2.26E-02	750	1.06E-03
440	3.40E-02	545	3.77E-02	650	2.03E-02	755	9.07E-04
445	6.03E-02	550	3.80E-02	655	1.80E-02	760	7.77E-04
450	6.72E-02	555	3.86E-02	660	1.59E-02	765	6.77E-04
455	4.45E-02	560	3.90E-02	665	1.41E-02	770	5.82E-04
460	3.11E-02	565	3.95E-02	670	1.23E-02	775	4.92E-04
465	2.42E-02	570	4.00E-02	675	1.07E-02	780	4.33E-04
470	1.64E-02	575	4.04E-02	680	9.31E-03		
475	1.26E-02	580	4.06E-02	685	8.07E-03		
480	1.23E-02	585	4.09E-02	690	6.96E-03		

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

Chromaticity Diagram - Sphere Spectroradiometer Method



Tristimulus values(x, y): (0.3526, 0.3625)

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

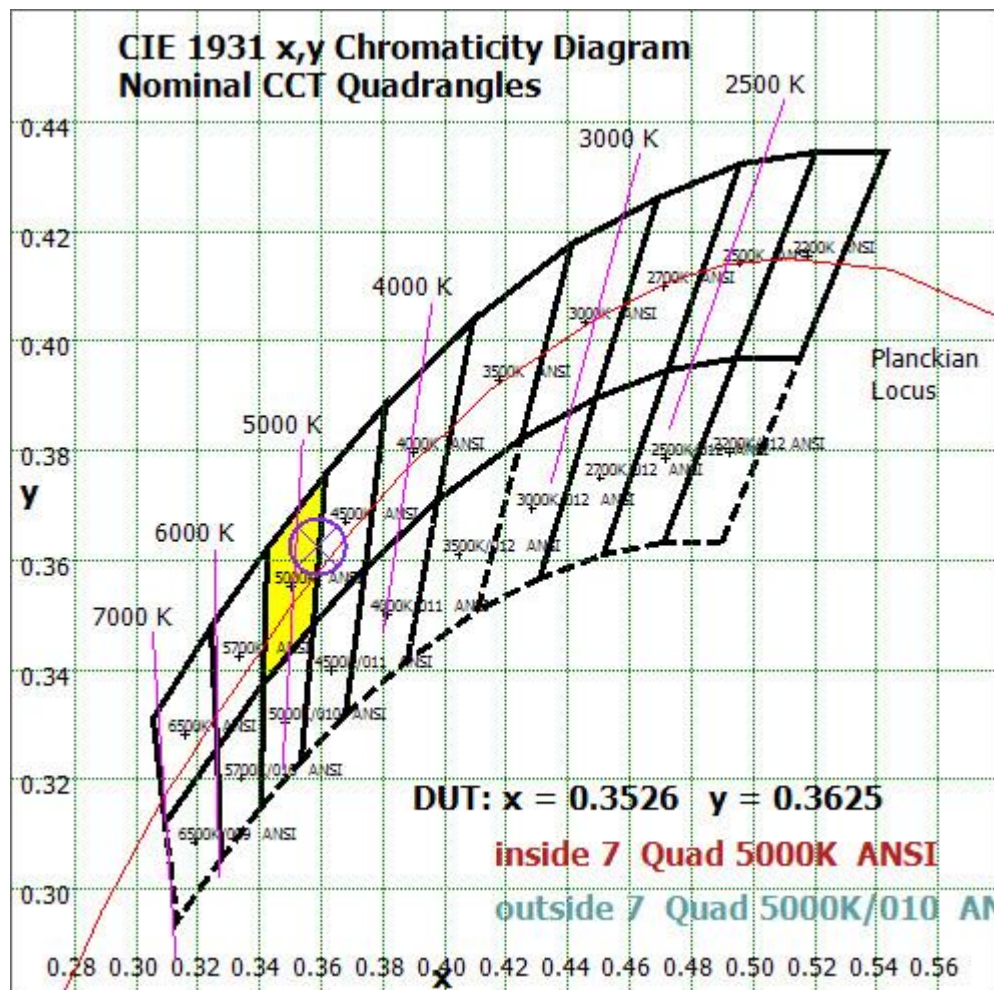


Chart 19: Plot of Lamp x/y coordinates on CIE 1931 Chromaticity Diagram

Color Rendition Report – Sphere Spectroradiometer Method

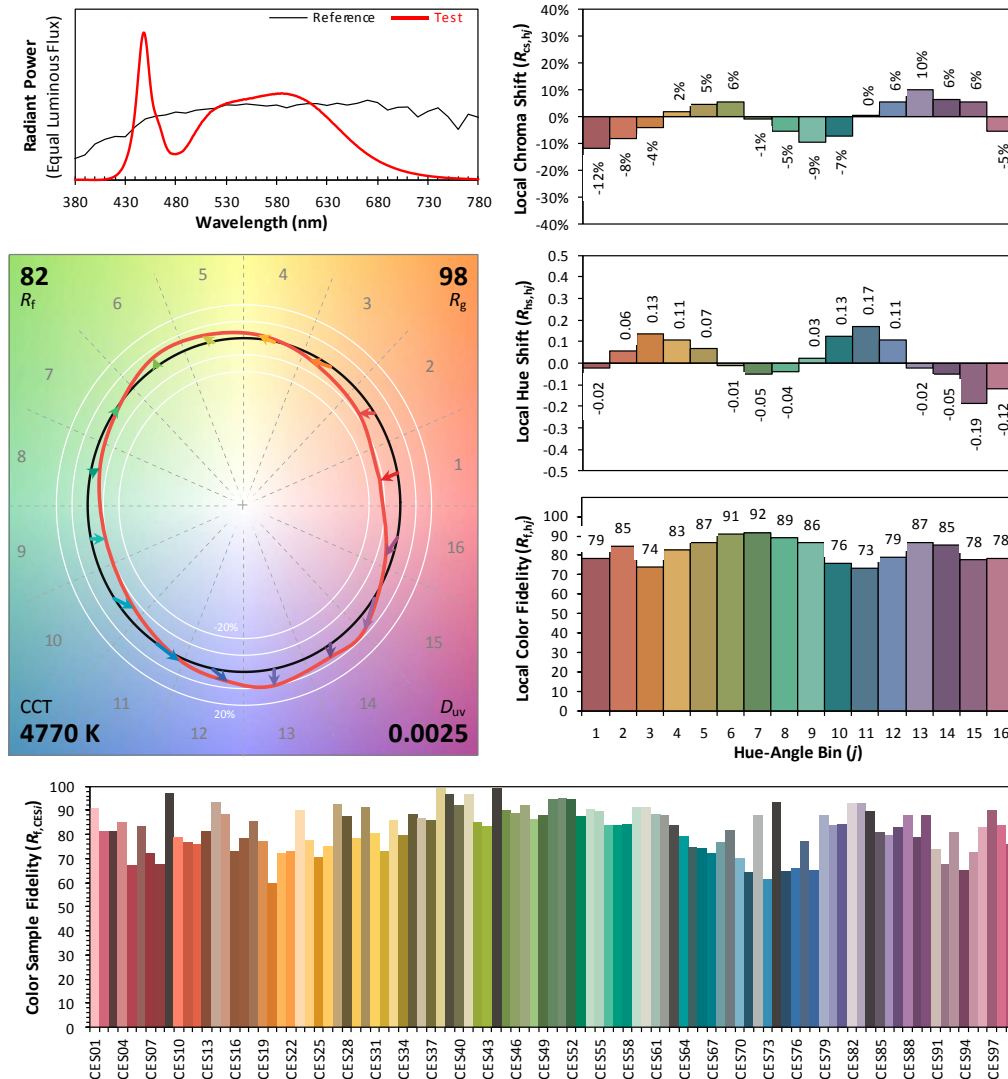
ANSI/IES TM-30-18 Color Rendition Report

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 0.3526
 y 0.3625
 u' 0.2123
 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	81.857	3.16%
10- 20	235.248	9.07%
20- 30	359.169	13.85%
30- 40	438.375	16.91%
40- 50	463.009	17.86%
50- 60	429.213	16.56%
60- 70	337.228	13.01%
70- 80	197.568	7.62%
80- 90	48.499	1.87%
90-100	0.234	0.01%
100-110	0.289	0.01%
110-120	0.299	0.01%
120-130	0.305	0.01%
130-140	0.321	0.01%
140-150	0.297	0.01%
150-160	0.238	0.01%
160-170	0.159	0.01%
170-180	0.058	0.00%
Total	2592.4	100%

$\gamma(^{\circ})$	Lumens	% Total
0- 60	2006.871	77.41%
60- 90	583.295	22.50%
0-90	2590.166	99.92%
90- 180	2.2	0.08%
0- 180	2592.4	100%

Table 17: 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	15.1	16.8	15.5	17.1	17.4	15.2	16.8	15.5	17.2	17.5
	3H	17.0	18.5	17.4	18.8	19.2	17.1	18.6	17.5	18.9	19.3
	4H	17.6	19.1	18.0	19.4	19.8	17.8	19.2	18.2	19.6	19.9
	6H	18.1	19.4	18.5	19.8	20.1	18.3	19.6	18.7	20.0	20.4
	8H	18.2	19.4	18.6	19.8	20.2	18.5	19.7	18.9	20.1	20.5
	12H	18.2	19.4	18.7	19.8	20.2	18.6	19.8	19.0	20.1	20.6
4H	2H	15.8	17.2	16.2	17.6	18.0	15.9	17.3	16.3	17.6	18.0
	3H	17.9	19.1	18.3	19.5	19.9	18.0	19.2	18.4	19.6	20.0
	4H	18.7	19.8	19.1	20.2	20.6	18.9	19.9	19.3	20.3	20.8
	6H	19.3	20.2	19.7	20.6	21.1	19.5	20.4	19.9	20.9	21.3
	8H	19.4	20.3	19.9	20.7	21.2	19.7	20.6	20.1	21.0	21.5
	12H	19.5	20.3	20.0	20.8	21.2	19.8	20.6	20.3	21.1	21.6
8H	4H	19.0	19.9	19.5	20.4	20.8	19.2	20.1	19.7	20.5	21.0
	6H	19.7	20.5	20.2	21.0	21.4	20.0	20.7	20.5	21.2	21.7
	8H	19.9	20.6	20.4	21.1	21.6	20.2	20.9	20.7	21.4	21.9
	12H	20.1	20.6	20.6	21.1	21.7	20.4	21.0	20.9	21.5	22.1
12H	4H	19.1	19.9	19.6	20.3	20.8	19.3	20.1	19.7	20.5	21.0
	6H	19.8	20.5	20.3	20.9	21.5	20.1	20.7	20.6	21.2	21.7
	8H	20.1	20.6	20.6	21.1	21.7	20.4	20.9	20.9	21.4	22.0

Chart 21: UGR Table (Corrected)

Illuminance Plots- Goniophotometer Method

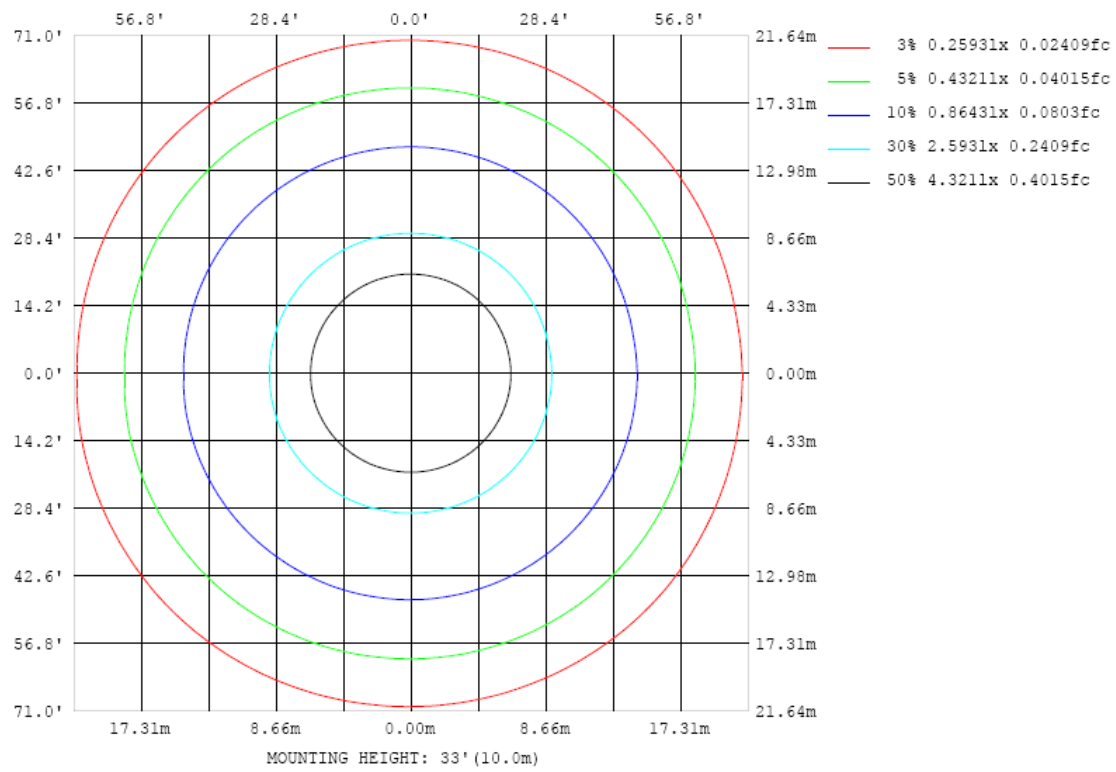


Chart 22: Illuminance Plot (Footcandles)

Luminous Intensity Distribution Plots- Goniophotometer Method

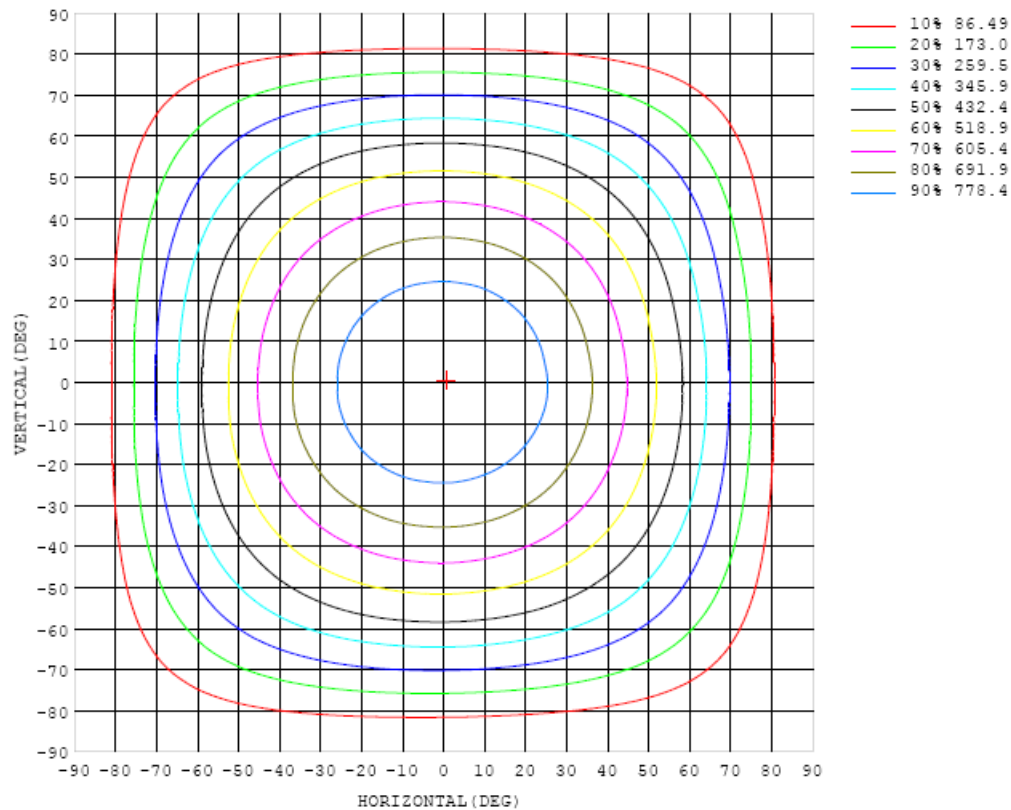


Chart 23: Isocandela Plot

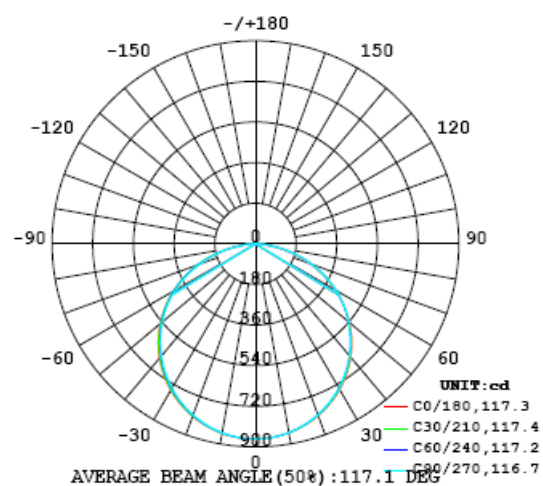


Chart 24: Polar Candela Distribution

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	864	864	864	864	864	864	864	864	864	864	864	864	864	864	864	864	864	864	864
5	860	861	861	860	860	861	861	861	861	861	861	862	862	862	861	861	861	861	862
10	850	851	851	850	850	850	850	850	849	849	849	850	851	851	852	852	852	852	852
15	834	835	833	832	832	832	832	831	831	831	832	832	833	834	835	836	836	836	836
20	810	811	810	809	808	807	807	806	806	806	807	808	809	811	812	813	814	814	814
25	781	781	780	778	777	777	775	774	775	775	775	778	779	780	783	784	786	786	785
30	745	745	743	742	741	740	738	737	737	737	738	740	742	744	747	749	751	751	750
35	703	703	701	700	698	697	695	694	694	694	695	698	700	703	706	708	710	711	709
40	656	655	654	652	651	649	648	647	646	647	648	650	653	655	659	662	663	665	662
45	602	602	600	599	598	596	594	594	594	594	595	598	601	604	607	609	611	612	609
50	543	543	542	541	540	539	537	537	537	538	539	541	544	547	550	552	554	555	551
55	478	478	478	477	477	477	476	476	477	477	479	481	483	485	488	490	491	491	487
60	408	409	409	410	411	411	411	410	409	410	412	415	418	420	422	423	424	423	418
65	333	335	336	338	341	340	339	338	337	338	340	344	347	351	353	352	352	350	343
70	254	257	261	265	265	265	263	262	261	262	265	268	272	276	279	278	276	272	265
75	174	178	184	187	187	186	185	184	183	185	187	190	194	198	202	202	198	193	184
80	95.7	102	107	110	110	109	108	108	108	109	111	114	118	122	124	125	122	116	104
85	28.3	33.1	35.8	37.1	38.4	39.5	40.2	40.7	41.6	42.7	44.2	45.8	47.8	49.1	49.8	49.7	48.3	43.8	34.4
90	0.24	0.25	0.25	0.26	0.26	0.26	0.27	0.27	0.27	0.27	0.26	0.26	0.25	0.23	0.24	0.20	0.42	0.34	0.18
95	0.30	0.30	0.30	0.31	0.31	0.32	0.32	0.33	0.33	0.32	0.32	0.32	0.31	0.31	0.30	0.29	0.29	0.28	0.10
100	0.34	0.34	0.35	0.35	0.36	0.37	0.37	0.38	0.37	0.37	0.37	0.37	0.36	0.36	0.35	0.35	0.33	0.33	0.12
105	0.37	0.36	0.37	0.37	0.38	0.40	0.42	0.42	0.41	0.41	0.41	0.41	0.41	0.40	0.39	0.37	0.36	0.36	0.15
110	0.36	0.36	0.36	0.37	0.38	0.40	0.42	0.43	0.42	0.42	0.42	0.43	0.42	0.41	0.39	0.37	0.36	0.36	0.17
115	0.36	0.36	0.36	0.36	0.37	0.38	0.40	0.41	0.41	0.40	0.40	0.41	0.41	0.40	0.38	0.36	0.35	0.35	0.21
120	0.37	0.37	0.37	0.37	0.37	0.37	0.38	0.39	0.39	0.38	0.39	0.40	0.39	0.39	0.37	0.36	0.36	0.36	0.25
125	0.40	0.40	0.40	0.40	0.38	0.38	0.39	0.38	0.38	0.38	0.38	0.39	0.39	0.39	0.38	0.38	0.38	0.39	0.28
130	0.44	0.44	0.44	0.45	0.42	0.42	0.43	0.41	0.43	0.42	0.42	0.44	0.44	0.43	0.41	0.42	0.42	0.42	0.32
135	0.49	0.49	0.50	0.51	0.50	0.49	0.49	0.48	0.51	0.51	0.49	0.50	0.50	0.49	0.50	0.49	0.48	0.47	0.35
140	0.50	0.52	0.55	0.56	0.56	0.56	0.56	0.53	0.57	0.57	0.56	0.56	0.57	0.55	0.53	0.51	0.50	0.48	0.35
145	0.55	0.56	0.58	0.59	0.60	0.60	0.60	0.59	0.61	0.63	0.62	0.61	0.60	0.59	0.56	0.51	0.52	0.52	0.38
150	0.58	0.59	0.61	0.61	0.62	0.62	0.60	0.61	0.63	0.63	0.61	0.63	0.61	0.58	0.54	0.56	0.57	0.56	0.42
155	0.59	0.59	0.61	0.63	0.62	0.61	0.59	0.59	0.59	0.63	0.61	0.59	0.57	0.56	0.58	0.59	0.59	0.58	0.46
160	0.60	0.60	0.60	0.62	0.63	0.63	0.58	0.56	0.58	0.55	0.56	0.56	0.57	0.58	0.59	0.61	0.60	0.59	0.51
165	0.60	0.59	0.60	0.61	0.63	0.64	0.62	0.58	0.56	0.57	0.56	0.56	0.58	0.58	0.58	0.59	0.59	0.58	0.55
170	0.62	0.62	0.64	0.65	0.66	0.68	0.68	0.63	0.58	0.58	0.60	0.60	0.59	0.58	0.59	0.61	0.61	0.60	0.58
175	0.64	0.65	0.66	0.67	0.67	0.67	0.67	0.64	0.60	0.60	0.60	0.62	0.60	0.58	0.59	0.62	0.60	0.59	0.59
180	0.61	0.61	0.61	0.61	0.61	0.61	0.61	0.61	0.61	0.61	0.61	0.61	0.61	0.61	0.61	0.61	0.61	0.61	0.61

Table 18: 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		864	864	864	864	864	864	864	864	864	864	864	864	864	864	864	864	864
5		862	861	861	862	861	861	861	861	861	861	861	861	861	861	861	861	860
10		852	852	852	851	851	851	850	850	850	850	850	850	850	850	850	850	849
15		836	835	835	834	834	833	833	832	832	831	832	832	832	833	833	832	832
20		814	813	812	812	810	809	808	807	807	806	807	808	808	809	808	809	808
25		785	784	783	782	780	778	777	776	775	775	776	777	777	778	778	779	779
30		750	749	747	745	744	742	740	739	738	738	738	739	740	741	742	743	743
35		709	708	706	704	702	700	697	696	695	695	696	697	697	699	700	700	700
40		662	661	659	657	654	652	649	648	647	646	648	648	649	651	652	652	652
45		610	608	607	604	601	599	597	595	594	594	595	596	597	598	599	599	598
50		551	551	549	547	544	542	540	538	537	537	538	538	539	540	540	540	539
55		488	487	486	485	483	481	479	478	477	476	477	477	477	477	476	475	474
60		418	419	419	418	417	416	413	411	409	409	410	411	411	410	408	407	404
65		345	347	348	348	347	344	341	338	337	336	338	339	340	339	336	333	329
70		267	271	273	273	271	268	264	262	260	260	261	262	263	264	261	256	251
75		188	193	196	195	192	189	186	183	182	182	182	184	185	185	184	178	171
80		109	115	117	117	114	112	109	107	106	106	106	107	108	108	106	102	94.3
85		39.7	43.2	44.4	44.6	44.4	43.9	42.3	41.4	40.6	40.1	39.8	39.6	38.4	36.9	34.9	32.5	28.6
90		1.37	0.89	2.23	0.08	1.49	0.02	0.04	0.06	0.07	0.07	0.05	0.06	0.07	0.14	0.06	0.00	0.09
95		0.10	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.12	0.12	0.12	0.11	0.11	0.11	0.11	0.11	0.11
100		0.12	0.12	0.13	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.15	0.14	0.14	0.13	0.13
105		0.14	0.15	0.15	0.15	0.16	0.17	0.17	0.16	0.17	0.17	0.18	0.17	0.17	0.17	0.16	0.15	0.15
110		0.17	0.17	0.17	0.18	0.19	0.20	0.19	0.19	0.19	0.20	0.20	0.20	0.20	0.19	0.19	0.18	0.18
115		0.20	0.20	0.20	0.21	0.22	0.22	0.22	0.21	0.21	0.23	0.24	0.23	0.23	0.23	0.23	0.22	0.22
120		0.25	0.24	0.24	0.24	0.25	0.26	0.24	0.24	0.24	0.26	0.28	0.27	0.26	0.27	0.27	0.26	0.26
125		0.29	0.28	0.27	0.27	0.29	0.30	0.28	0.28	0.28	0.29	0.30	0.30	0.29	0.30	0.30	0.30	0.30
130		0.32	0.32	0.31	0.30	0.32	0.34	0.33	0.31	0.33	0.33	0.34	0.33	0.32	0.33	0.34	0.33	0.33
135		0.35	0.35	0.34	0.33	0.34	0.35	0.34	0.33	0.34	0.34	0.34	0.35	0.34	0.35	0.36	0.35	0.36
140		0.35	0.35	0.35	0.34	0.35	0.36	0.34	0.34	0.35	0.34	0.33	0.35	0.35	0.35	0.36	0.35	0.37
145		0.38	0.38	0.37	0.36	0.36	0.38	0.36	0.36	0.36	0.35	0.35	0.36	0.36	0.37	0.37	0.37	0.39
150		0.41	0.43	0.43	0.40	0.40	0.39	0.39	0.39	0.38	0.39	0.38	0.38	0.39	0.40	0.40	0.40	0.42
155		0.45	0.46	0.47	0.45	0.42	0.41	0.41	0.42	0.40	0.41	0.42	0.42	0.43	0.44	0.45	0.44	0.46
160		0.50	0.50	0.51	0.50	0.47	0.45	0.44	0.44	0.41	0.42	0.45	0.46	0.48	0.49	0.49	0.49	0.51
165		0.55	0.56	0.57	0.57	0.56	0.54	0.52	0.52	0.49	0.49	0.52	0.56	0.57	0.57	0.56	0.55	0.56
170		0.58	0.58	0.59	0.60	0.58	0.54	0.52	0.54	0.52	0.50	0.53	0.57	0.57	0.56	0.56	0.56	0.59
175		0.65	0.66	0.67	0.67	0.68	0.66	0.62	0.62	0.59	0.56	0.57	0.57	0.57	0.59	0.60	0.62	0.64
180		0.61	0.61	0.61	0.61	0.61	0.61	0.61	0.61	0.61	0.61	0.61	0.61	0.61	0.61	0.61	0.61	0.61

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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