

## 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]2X2[blank,/PIR,/LCBS,/MVS,/LCBS/MVS][blank,/E]

### Laboratory: Leading Testing Laboratories

**NVLAP CODE: 200960-0**

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Report No.: HZ25070031a

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



Review by:

*Wei Fei*

Approved by:

*April Zou*

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Engineer: Wei Fei  
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	SWISH2X2 18W 3500K Setting	SWISH2X2 18W 4000K Setting	SWISH2X2 18W 5000K Setting
Luminous Efficacy (Lumens /Watt)	138.9	146.4	144.0
Total Luminous Flux (Lumens)	2386.2	2475.8	2483.3
Power (Watts)	17.18	16.91	17.25
Power Factor	0.9810	0.9807	0.9811
CCT (K)	3410	4042	4857
CRI	82.7	83.6	82.5
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:

<b>Date of Receipt</b>	: Jul. 28, 2025
<b>Date of Test</b>	: Aug. 04, 2025
<b>Test item</b>	: Total Luminous Flux, Luminous Distribution Intensity, Luminous Efficacy, Correlated Color Temperature, Color Rendering Index, Chromaticity Coordinate, Electrical parameters
<b>Reference Standard</b>	: 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

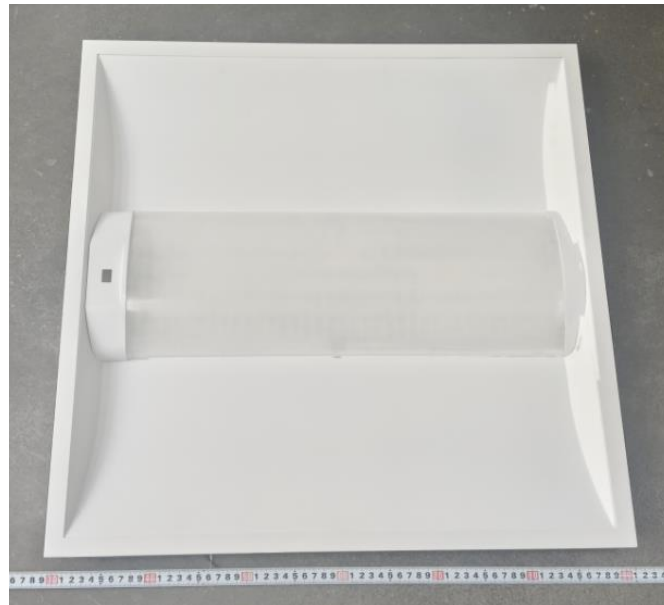


Figure 1- Overview of the sample

### Equipment Under Test(EUT)

<b>Name</b>	: LED Panel Light
<b>Model</b>	: SWISH2X2
<b>Electrical Ratings</b>	: 120-277V, 50/60Hz
<b>Product Description</b>	: Field-Adjustable 18W/26W/35W Color- Tunable 3500K/4000K/5000K
<b>Manufacturer</b>	: RAB Lighting Inc
<b>Address</b>	: 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)	0.146	0.077
Power Factor	0.9810	0.8455
Test Power (W)	17.18	17.98
THD A%	10.73	16.08
Luminous Efficacy (lm/W)	138.9	135.2
Total Luminous Flux (lm)	2386.2	2430.6
Color Rendering Index (CRI)	82.7	
R9	5.6	
Correlated Color Temperature (CCT)(K)	3410	
Chromaticity Chroma x	0.4115	
Chromaticity Chroma y	0.3961	
Chromaticity Chroma u	0.2375	
Chromaticity Chroma v	0.3429	
Duv	0.0010	
Chromaticity Chroma u'	0.2375	
Chromaticity Chroma v'	0.5144	

Special Color Rendering Indices	
R1	80.8
R2	90.7
R3	96.4
R4	80.4
R5	81
R6	87.9
R7	83.8
R8	60.4
R9	5.6
R10	78.5
R11	79.6
R12	65.7
R13	83.3
R14	98.6

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)	0.146
Power Factor	0.9808
Power (W)	17.19
Luminous Efficacy (lm/W)	139.5
Total Luminous Flux (lm)	2397.7
Beam Angle ( ° )	81.7 (0°-180°) / 89.3 (90°-270°)
Center Beam Candle Power (cd)	1148
Maximum Beam Candle Power (cd)	1150 (At: C=180.0, Gamma=2.5)
Spacing Criteria	1.18 (0°-180°) / 1.14 (90°-270°)
Zonal Lumens in the 0 °-60 °Zone	84.89%
Zonal Lumens in the 60 °-90 °Zone	15.03%
Zonal Lumens in the 90 °-120 °Zone	0.02%
Zonal Lumens in the 120 °-180 °Zone	0.06%

Table 3: Test data per Goniophotometer Method

### Spectral Power Distribution - Sphere Spectroradiometer Method

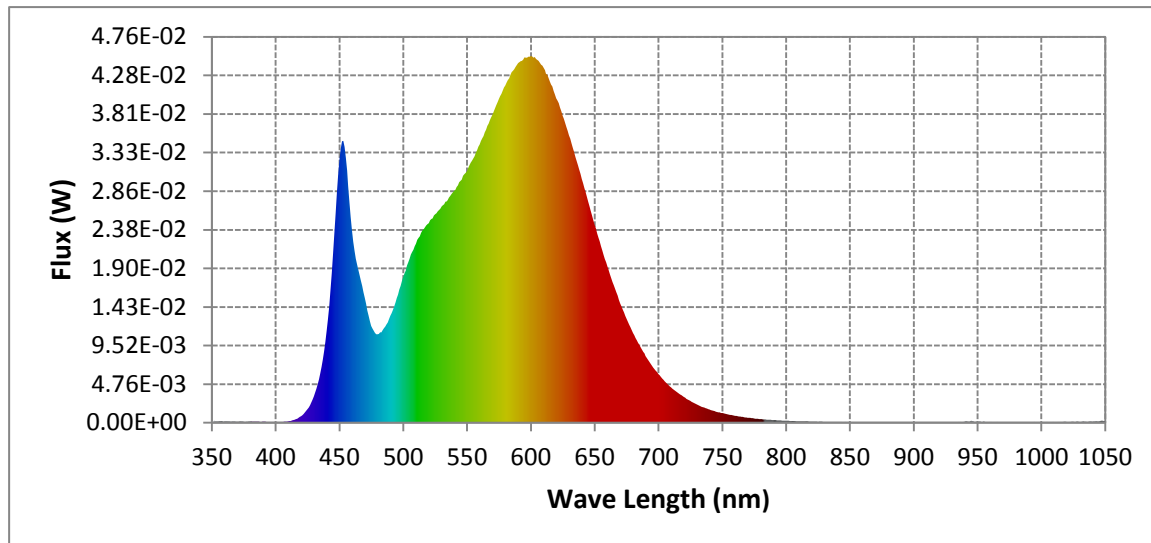


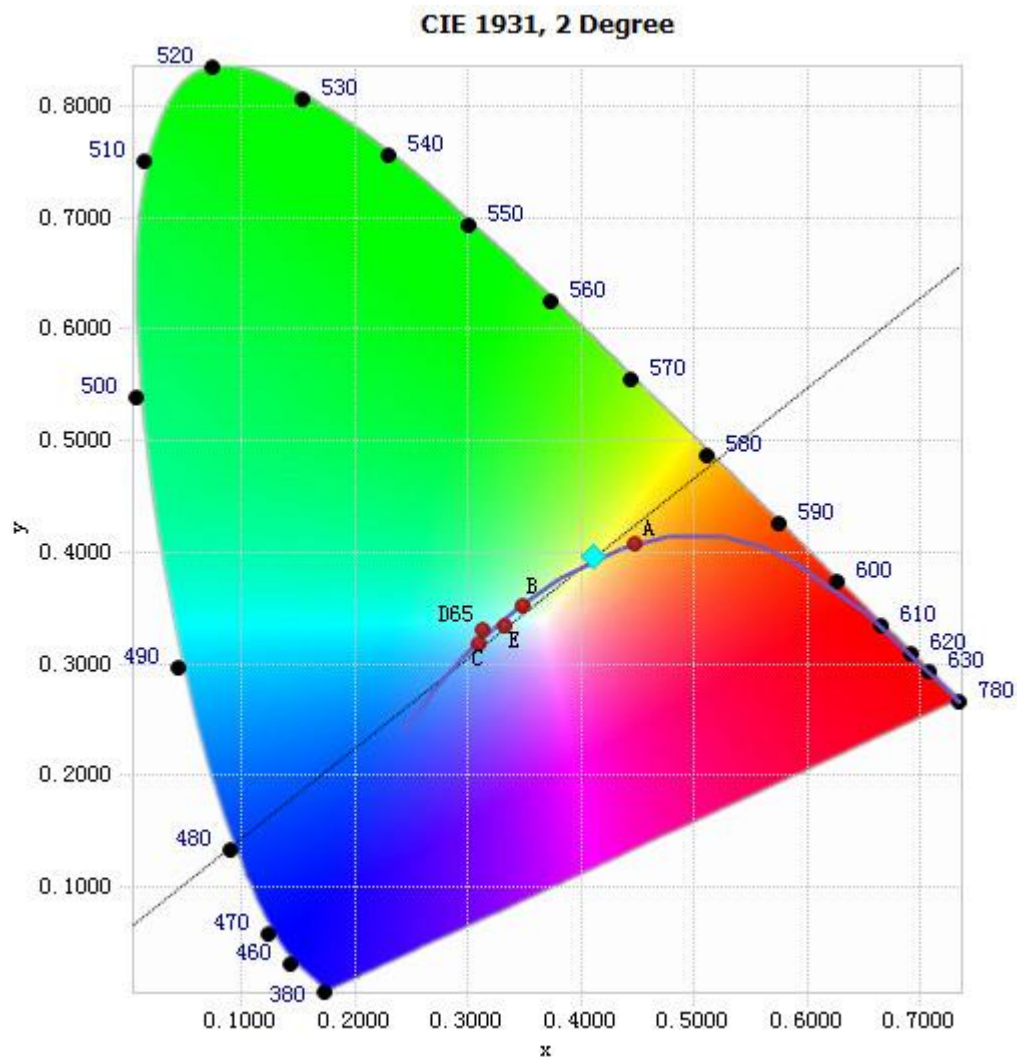
Chart 1: Spectral Power Distribution

Spectral Distribution over Visible Wavelength							
WL(nm)	Radiant(Watts)	WL(nm)	Radiant(Watts)	WL(nm)	Radiant(Watts)	WL(nm)	Radiant(Watts)
380	1.76E-04	485	1.17E-02	590	4.44E-02	695	7.05E-03
385	1.31E-04	490	1.32E-02	595	4.50E-02	700	6.02E-03
390	1.33E-04	495	1.54E-02	600	4.52E-02	705	5.12E-03
395	1.15E-04	500	1.80E-02	605	4.47E-02	710	4.36E-03
400	8.56E-05	505	2.02E-02	610	4.38E-02	715	3.72E-03
405	1.06E-04	510	2.21E-02	615	4.21E-02	720	3.19E-03
410	1.60E-04	515	2.37E-02	620	4.00E-02	725	2.69E-03
415	3.73E-04	520	2.46E-02	625	3.79E-02	730	2.29E-03
420	8.06E-04	525	2.57E-02	630	3.54E-02	735	1.93E-03
425	1.66E-03	530	2.67E-02	635	3.28E-02	740	1.62E-03
430	3.25E-03	535	2.75E-02	640	3.00E-02	745	1.38E-03
435	6.11E-03	540	2.86E-02	645	2.73E-02	750	1.19E-03
440	1.13E-02	545	2.98E-02	650	2.44E-02	755	1.00E-03
445	2.09E-02	550	3.10E-02	655	2.18E-02	760	8.58E-04
450	3.25E-02	555	3.26E-02	660	1.93E-02	765	7.37E-04
455	3.27E-02	560	3.43E-02	665	1.70E-02	770	6.23E-04
460	2.37E-02	565	3.61E-02	670	1.47E-02	775	5.34E-04
465	1.89E-02	570	3.80E-02	675	1.28E-02	780	4.64E-04
470	1.54E-02	575	3.99E-02	680	1.11E-02		
475	1.20E-02	580	4.16E-02	685	9.59E-03		
480	1.09E-02	585	4.32E-02	690	8.23E-03		

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



## Chromaticity Diagram - Sphere Spectroradiometer Method



Tristimulus values(x, y): (0.4115, 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

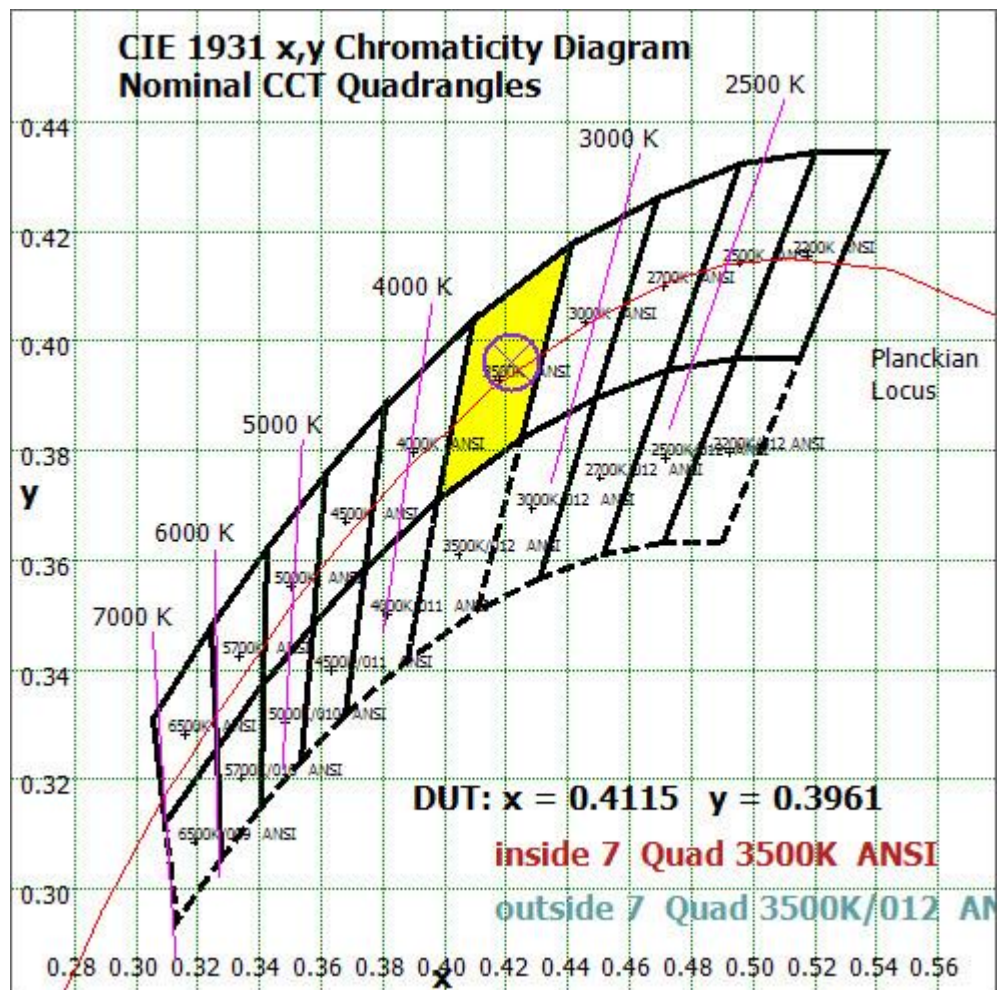


Chart 3: Plot of Lamp x/y coordinates on CIE 1931 Chromaticity Diagram

# Color Rendition Report – Sphere Spectroradiometer Method

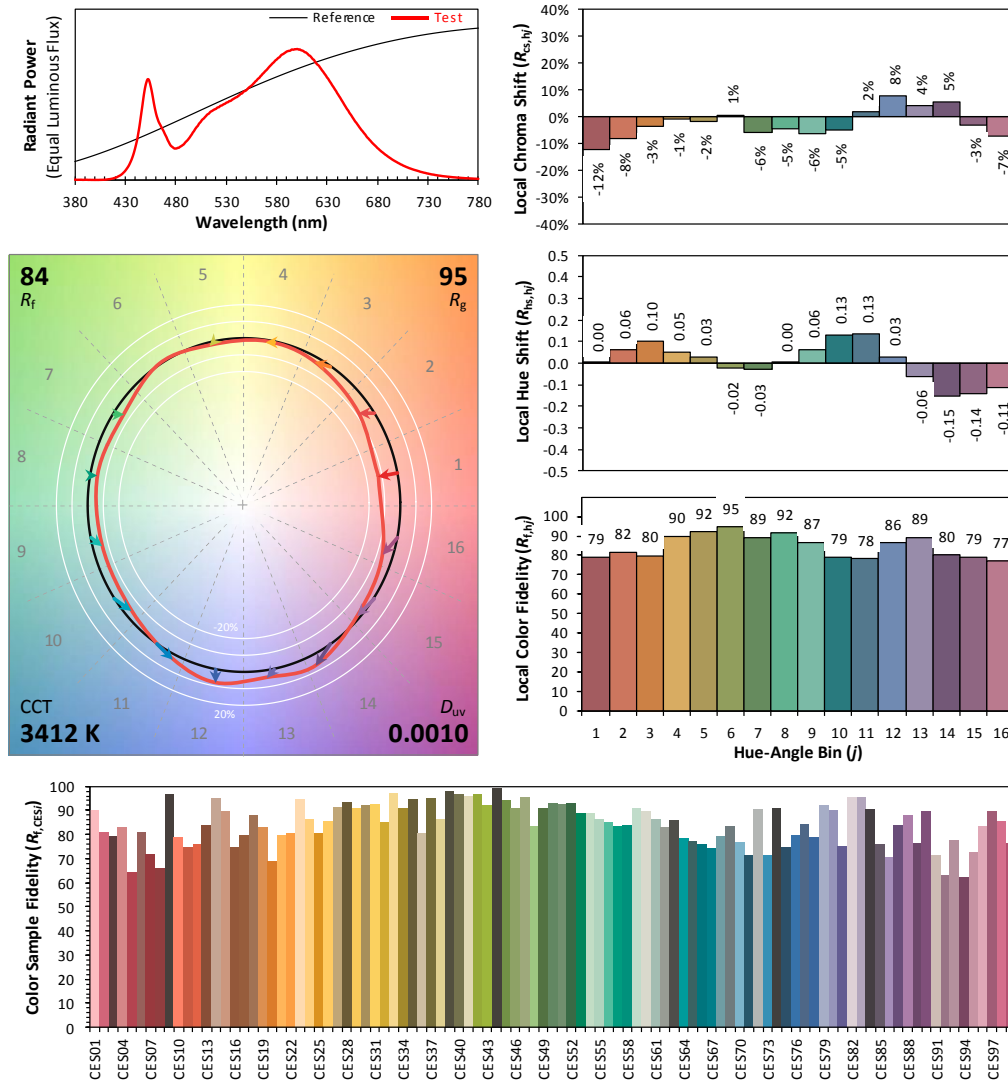
## ANSI/IES TM-30-18 Color Rendition Report

Source: LED

Manufacturer: RAB Lighting Inc

Date: 2025/08/04

Model: SWISH2X2



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

$x$  0.4115  
 $y$  0.3961  
 $u'$  0.2375  
 $v'$  0.5144

CIE 13.3-1995  
(CRI)  
 $R_a$  83  
 $R_g$  6

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

Chart 4: Full Report Created with the IES TM-30 Calculator

Note: The values in this diagram might be a little different from the values in Table 2 due to rounding.

### Zonal Lumen Tabulation- Goniophotometer Method

$\gamma(^{\circ})$	Lumens	% Total
0- 10	108.23	4.51%
10- 20	304.956	12.72%
20- 30	440.683	18.38%
30- 40	478.584	19.96%
40- 50	407.519	17.00%
50- 60	295.487	12.32%
60- 70	204.511	8.53%
70- 80	122.285	5.10%
80- 90	33.549	1.40%
90-100	0.147	0.01%
100-110	0.188	0.01%
110-120	0.218	0.01%
120-130	0.255	0.01%
130-140	0.312	0.01%
140-150	0.314	0.01%
150-160	0.262	0.01%
160-170	0.177	0.01%
170-180	0.067	0.00%
Total	2397.7	100%

$\gamma(^{\circ})$	Lumens	% Total
0- 60	2035.459	84.89%
60- 90	360.345	15.03%
0-90	2395.804	99.92%
90- 180	1.94	0.08%
0- 180	2397.7	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	10.5	12.0	10.8	12.3	12.6	13.9	15.4	14.3	15.7	16.0
	3H	11.9	13.3	12.3	13.6	14.0	15.7	17.1	16.1	17.4	17.8
	4H	12.4	13.7	12.8	14.0	14.4	16.5	17.8	16.9	18.1	18.5
	6H	12.7	13.9	13.1	14.2	14.6	17.3	18.4	17.7	18.8	19.2
	8H	12.8	13.9	13.2	14.3	14.7	17.6	18.7	18.0	19.1	19.5
	12H	12.8	13.8	13.2	14.2	14.6	17.7	18.8	18.1	19.2	19.6
4H	2H	11.5	12.7	11.9	13.1	13.5	14.3	15.6	14.7	15.9	16.3
	3H	13.1	14.2	13.5	14.6	15.0	16.4	17.5	16.8	17.9	18.3
	4H	13.7	14.6	14.1	15.0	15.5	17.4	18.3	17.8	18.7	19.2
	6H	14.1	14.9	14.5	15.3	15.8	18.3	19.2	18.8	19.6	20.1
	8H	14.1	14.9	14.6	15.3	15.8	18.7	19.5	19.2	19.9	20.4
	12H	14.1	14.8	14.6	15.3	15.8	18.9	19.6	19.4	20.1	20.6
8H	4H	14.3	15.0	14.7	15.5	16.0	17.6	18.3	18.0	18.8	19.2
	6H	14.8	15.4	15.3	15.9	16.4	18.7	19.4	19.2	19.9	20.3
	8H	14.9	15.5	15.4	16.0	16.5	19.2	19.8	19.7	20.3	20.8
	12H	14.9	15.4	15.4	15.9	16.5	19.5	20.0	20.0	20.5	21.1
12H	4H	14.4	15.1	14.9	15.6	16.1	17.6	18.3	18.1	18.7	19.2
	6H	15.0	15.6	15.5	16.0	16.6	18.8	19.3	19.3	19.8	20.3
	8H	15.2	15.7	15.7	16.2	16.7	19.3	19.8	19.8	20.3	20.9

Chart 5: UGR Table (Corrected)

## Illuminance Plots- Goniophotometer Method

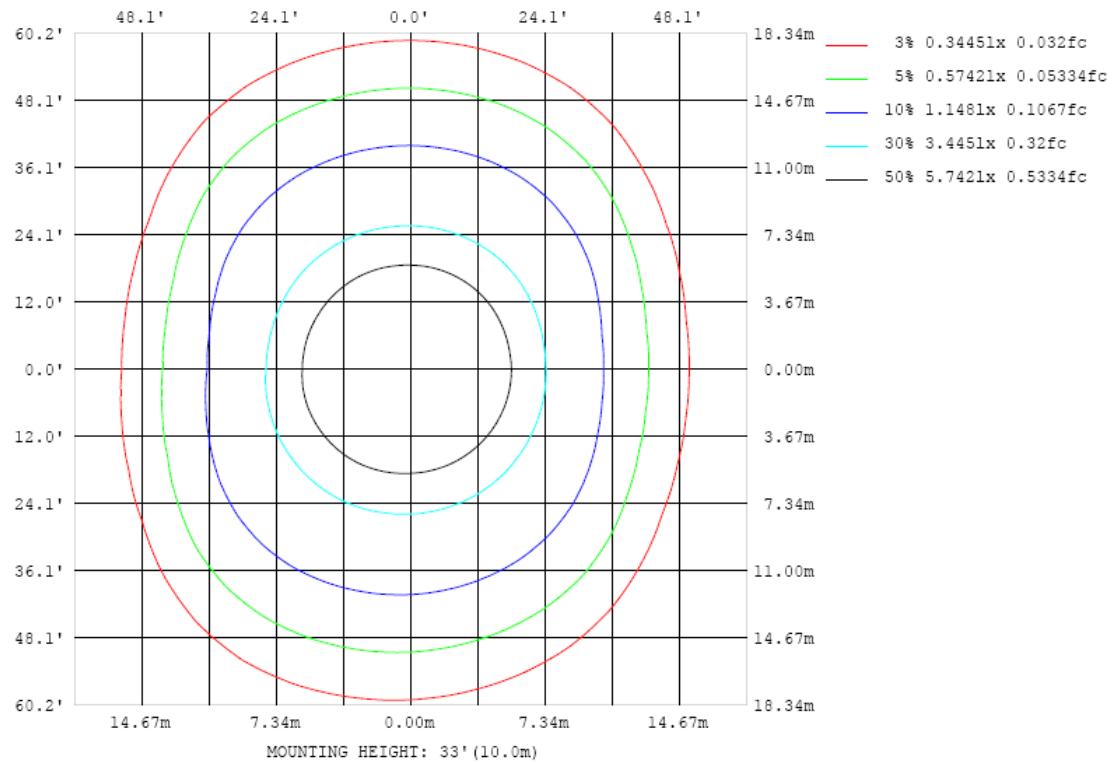


Chart 6: Illuminance Plot (Footcandles)

## Luminous Intensity Distribution Plots- Goniophotometer Method

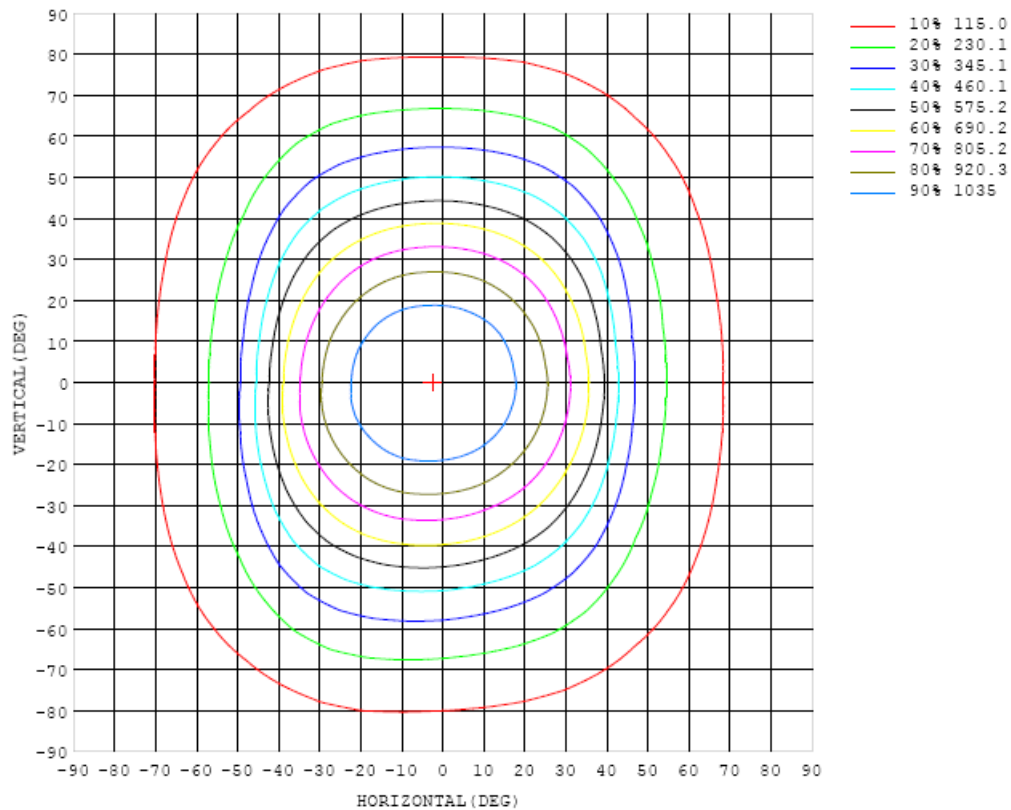


Chart 7: Isocandela Plot

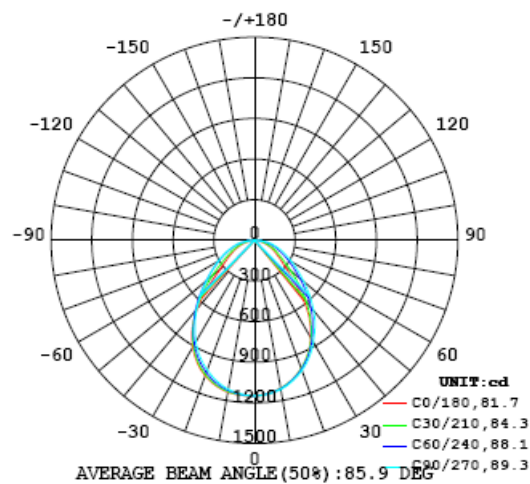


Chart 8: Polar Candela Distribution



## 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	1148	1148	1148	1148	1148	1148	1148	1148	1148	1148	1148	1148	1148	1148	1148	1148	1148	1148	1148
5	1135	1136	1136	1136	1136	1136	1137	1138	1138	1139	1141	1142	1143	1145	1145	1147	1148	1148	1148
10	1110	1111	1110	1110	1110	1111	1113	1114	1116	1118	1120	1123	1125	1129	1133	1135	1138	1138	1137
15	1067	1068	1068	1068	1069	1070	1071	1072	1074	1077	1082	1087	1093	1100	1106	1108	1111	1112	1109
20	1007	1008	1007	1007	1009	1011	1013	1015	1018	1023	1029	1036	1046	1052	1059	1064	1067	1068	1064
25	930	929	930	931	932	935	941	944	949	954	962	972	983	990	996	1003	1005	1005	998
30	830	831	833	836	840	845	850	855	861	868	878	892	903	912	917	921	924	921	911
35	707	710	715	721	731	741	749	758	768	776	787	800	810	818	822	823	823	816	800
40	553	559	576	596	614	633	648	658	669	680	691	705	714	716	715	709	697	682	656
45	391	400	429	466	498	521	538	550	562	575	587	599	608	611	602	581	551	516	480
50	285	289	310	349	389	418	438	450	461	474	485	497	506	502	485	451	400	358	331
55	224	227	238	262	300	332	352	366	377	389	399	408	412	405	380	334	290	268	254
60	178	181	190	204	230	261	283	296	306	316	325	332	334	321	290	250	226	210	200
65	141	143	150	161	177	203	224	237	246	255	262	268	267	251	219	193	176	165	157
70	103	106	112	123	136	156	174	186	195	202	209	212	208	190	164	147	133	125	117
75	67.7	70.2	76.6	86.2	97.9	115	131	142	149	155	161	163	158	140	118	104	92.3	84.8	77.8
80	34.3	36.7	42.7	52.1	63.0	77.3	93.1	104	111	115	120	120	112	93.9	76.8	64.0	54.0	47.5	41.9
85	7.92	9.32	13.3	19.1	25.4	30.6	35.0	37.7	38.9	41.2	45.3	49.5	50.0	45.7	37.7	28.7	21.3	16.7	12.2
90	0.14	0.14	0.15	0.16	0.17	0.18	0.20	0.20	0.21	0.22	0.24	0.24	0.23	0.21	0.17	0.22	0.16	0.20	0.06
95	0.17	0.17	0.18	0.19	0.20	0.22	0.23	0.24	0.24	0.24	0.24	0.23	0.22	0.20	0.18	0.17	0.15	0.15	0.06
100	0.21	0.21	0.21	0.22	0.23	0.25	0.26	0.27	0.27	0.27	0.26	0.25	0.24	0.23	0.21	0.20	0.18	0.18	0.08
105	0.25	0.24	0.24	0.25	0.26	0.28	0.29	0.30	0.30	0.30	0.29	0.29	0.27	0.26	0.24	0.22	0.21	0.22	0.11
110	0.27	0.27	0.28	0.27	0.28	0.30	0.31	0.31	0.32	0.31	0.31	0.30	0.29	0.27	0.25	0.24	0.24	0.24	0.13
115	0.30	0.29	0.30	0.30	0.29	0.30	0.31	0.31	0.31	0.31	0.31	0.30	0.29	0.28	0.26	0.26	0.26	0.26	0.17
120	0.34	0.33	0.33	0.33	0.32	0.30	0.31	0.32	0.32	0.31	0.31	0.30	0.29	0.28	0.28	0.29	0.29	0.29	0.21
125	0.39	0.38	0.37	0.37	0.36	0.34	0.34	0.34	0.34	0.34	0.33	0.32	0.31	0.32	0.32	0.32	0.33	0.33	0.25
130	0.46	0.44	0.44	0.43	0.42	0.41	0.40	0.40	0.40	0.40	0.39	0.39	0.38	0.38	0.38	0.38	0.39	0.39	0.30
135	0.55	0.52	0.53	0.53	0.51	0.51	0.50	0.50	0.50	0.50	0.49	0.49	0.48	0.48	0.48	0.48	0.48	0.49	0.35
140	0.61	0.61	0.61	0.61	0.60	0.59	0.60	0.59	0.60	0.59	0.59	0.57	0.57	0.54	0.55	0.55	0.54	0.56	0.38
145	0.67	0.67	0.66	0.67	0.67	0.66	0.65	0.65	0.66	0.66	0.64	0.62	0.59	0.61	0.61	0.60	0.58	0.61	0.42
150	0.71	0.70	0.69	0.70	0.71	0.69	0.68	0.68	0.67	0.66	0.61	0.63	0.64	0.65	0.64	0.64	0.66	0.69	0.49
155	0.72	0.72	0.73	0.71	0.70	0.68	0.67	0.65	0.61	0.62	0.64	0.64	0.63	0.63	0.65	0.66	0.68	0.69	0.54
160	0.74	0.73	0.73	0.72	0.70	0.69	0.66	0.64	0.65	0.62	0.61	0.61	0.61	0.63	0.63	0.68	0.71	0.73	0.61
165	0.73	0.72	0.72	0.72	0.72	0.70	0.66	0.64	0.62	0.59	0.59	0.57	0.58	0.59	0.63	0.67	0.70	0.71	0.66
170	0.76	0.76	0.78	0.78	0.77	0.76	0.74	0.71	0.67	0.65	0.64	0.64	0.63	0.63	0.66	0.69	0.72	0.73	0.71
175	0.78	0.80	0.81	0.81	0.79	0.77	0.75	0.73	0.70	0.69	0.66	0.69	0.70	0.68	0.68	0.70	0.73	0.75	0.77
180	0.68	0.68	0.68	0.68	0.68	0.68	0.68	0.68	0.68	0.68	0.68	0.68	0.68	0.68	0.68	0.68	0.68	0.68	0.68

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	1148	1148	1148	1148	1148	1148	1148	1148	1148	1148	1148	1148	1148	1148	1148	1148	1148		
5	1148	1146	1146	1145	1144	1142	1141	1140	1139	1138	1137	1137	1137	1136	1136	1136	1135		
10	1137	1135	1133	1130	1127	1124	1121	1119	1116	1115	1114	1113	1111	1110	1109	1109	1108		
15	1109	1106	1103	1101	1097	1089	1084	1080	1076	1074	1073	1072	1071	1069	1068	1067	1065		
20	1062	1059	1056	1051	1045	1038	1030	1023	1019	1016	1015	1014	1012	1011	1008	1005	1003		
25	996	994	989	983	977	971	963	955	950	948	945	942	938	934	933	930	925		
30	908	906	900	897	892	886	880	871	865	862	859	855	851	847	838	831	825		
35	796	795	794	793	791	785	779	771	765	762	759	756	751	741	727	714	701		
40	655	661	670	678	679	679	676	670	665	661	657	654	643	628	607	579	552		
45	483	508	536	556	567	569	567	564	561	558	555	549	535	515	481	436	398		
50	337	365	407	440	458	466	465	463	462	459	457	450	434	405	365	320	291		
55	257	271	301	341	367	379	381	380	380	378	375	366	347	314	274	246	228		
60	203	213	230	261	291	305	309	309	309	307	304	294	273	241	213	194	181		
65	160	168	180	200	227	244	249	249	250	248	244	234	212	185	165	150	141		
70	120	126	136	150	173	190	196	197	197	196	192	182	162	138	123	111	103		
75	80.1	86.2	95.9	108	125	141	148	150	150	149	145	135	117	98.4	84.4	73.7	66.8		
80	43.7	49.5	58.7	69.4	83.1	98.9	108	108	107	107	105	94.5	77.5	62.3	50.2	40.1	33.9		
85	13.5	17.7	24.3	29.9	33.8	35.8	35.1	32.5	30.6	30.3	31.1	30.0	26.8	22.1	16.4	10.7	7.47		
90	0.06	0.06	0.06	0.06	0.06	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.06	0.06	0.06	0.05		
95	0.06	0.06	0.06	0.06	0.07	0.07	0.07	0.07	0.08	0.08	0.07	0.07	0.07	0.07	0.06	0.06	0.06		
100	0.08	0.07	0.07	0.07	0.07	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.07	0.08		
105	0.10	0.10	0.08	0.08	0.09	0.09	0.09	0.10	0.10	0.10	0.10	0.10	0.10	0.09	0.09	0.10	0.11		
110	0.13	0.13	0.10	0.10	0.10	0.11	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.11	0.12	0.13	0.14		
115	0.16	0.15	0.15	0.12	0.13	0.13	0.14	0.14	0.15	0.15	0.15	0.14	0.14	0.15	0.16	0.16	0.17		
120	0.19	0.18	0.18	0.17	0.16	0.17	0.16	0.17	0.18	0.18	0.18	0.18	0.18	0.19	0.21	0.20	0.21		
125	0.23	0.22	0.22	0.21	0.20	0.21	0.20	0.21	0.21	0.22	0.22	0.22	0.22	0.24	0.25	0.24	0.25		
130	0.27	0.28	0.26	0.26	0.26	0.26	0.26	0.26	0.27	0.27	0.27	0.27	0.28	0.29	0.28	0.29	0.31		
135	0.31	0.32	0.31	0.28	0.29	0.30	0.31	0.30	0.31	0.31	0.32	0.31	0.31	0.31	0.34	0.34	0.34		
140	0.35	0.33	0.33	0.32	0.30	0.31	0.32	0.33	0.33	0.33	0.33	0.32	0.32	0.35	0.35	0.35	0.38		
145	0.40	0.36	0.37	0.36	0.33	0.34	0.33	0.33	0.34	0.34	0.34	0.34	0.37	0.38	0.38	0.38	0.44		
150	0.46	0.44	0.43	0.41	0.39	0.38	0.38	0.38	0.37	0.39	0.39	0.39	0.41	0.43	0.43	0.42	0.49		
155	0.51	0.51	0.48	0.46	0.43	0.41	0.41	0.42	0.40	0.43	0.43	0.44	0.46	0.48	0.48	0.50	0.55		
160	0.57	0.57	0.55	0.51	0.47	0.45	0.44	0.44	0.42	0.46	0.47	0.48	0.50	0.51	0.54	0.55	0.61		
165	0.63	0.65	0.64	0.63	0.59	0.55	0.52	0.52	0.51	0.54	0.56	0.58	0.61	0.63	0.64	0.64	0.66		
170	0.67	0.67	0.66	0.65	0.61	0.56	0.54	0.54	0.52	0.54	0.57	0.60	0.63	0.64	0.66	0.66	0.72		
175	0.76	0.77	0.78	0.78	0.78	0.75	0.73	0.71	0.65	0.66	0.70	0.72	0.75	0.77	0.77	0.76	0.78		
180	0.68	0.68	0.68	0.68	0.68	0.68	0.68	0.68	0.68	0.68	0.68	0.68	0.68	0.68	0.68	0.68	0.68		

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)	0.144	0.076
Power Factor	0.9807	0.8441
Test Power (W)	16.91	17.72
THD A%	10.68	16.21
Luminous Efficacy (lm/W)	146.4	142.2
Total Luminous Flux (lm)	2475.8	2519.0
Color Rendering Index (CRI)	83.6	
R9	10.2	
Correlated Color Temperature (CCT)(K)	4042	
Chromaticity Chroma x	0.3789	
Chromaticity Chroma y	0.3772	
Chromaticity Chroma u	0.2239	
Chromaticity Chroma v	0.3344	
Duv	0.0007	
Chromaticity Chroma u'	0.2239	
Chromaticity Chroma v'	0.5016	

Special Color Rendering Indices	
R1	82
R2	90.6
R3	95.7
R4	81.7
R5	81.9
R6	86.4
R7	85.8
R8	64.7
R9	10.2
R10	77.3
R11	80.9
R12	60.9
R13	84.4
R14	98.1

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)	0.144
Power Factor	0.9806
Power (W)	16.93
Luminous Efficacy (lm/W)	146.8
Total Luminous Flux (lm)	2484.6
Beam Angle ( ° )	81.8 (0°-180°) / 89.4 (90°-270°)
Center Beam Candle Power (cd)	1189
Maximum Beam Candle Power (cd)	1190 (At: C=160.0, Gamma=1.5)
Spacing Criteria	1.18 (0°-180°) / 1.14 (90°-270°)
Zonal Lumens in the 0 °-60 °Zone	84.85%
Zonal Lumens in the 60 °-90 °Zone	15.07%
Zonal Lumens in the 90 °-120 °Zone	0.02%
Zonal Lumens in the 120 °-180 °Zone	0.06%

Table 9: Test data per Goniophotometer Method

### Spectral Power Distribution - Sphere Spectroradiometer Method

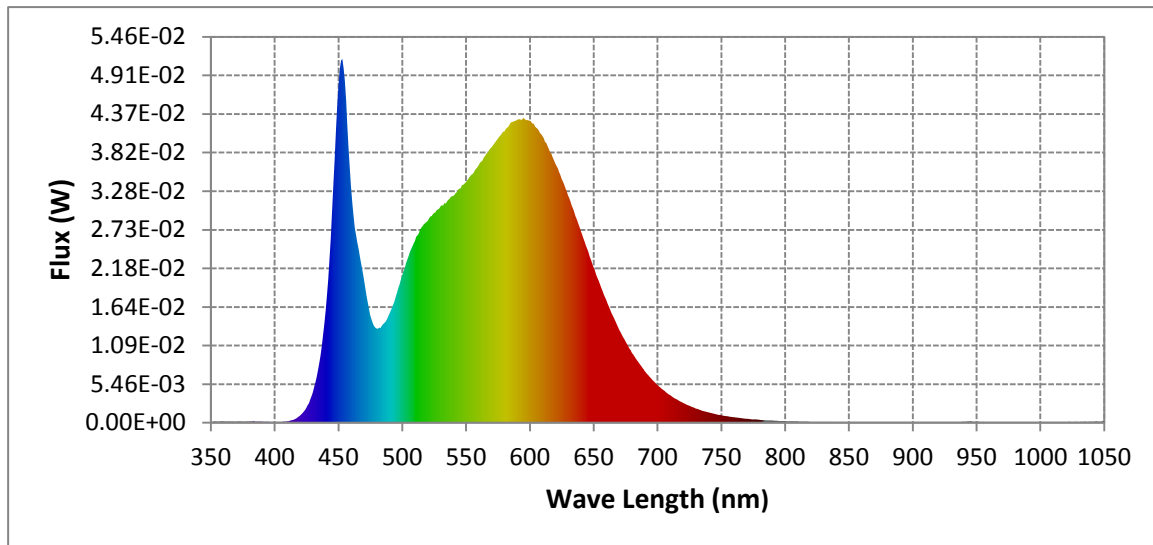
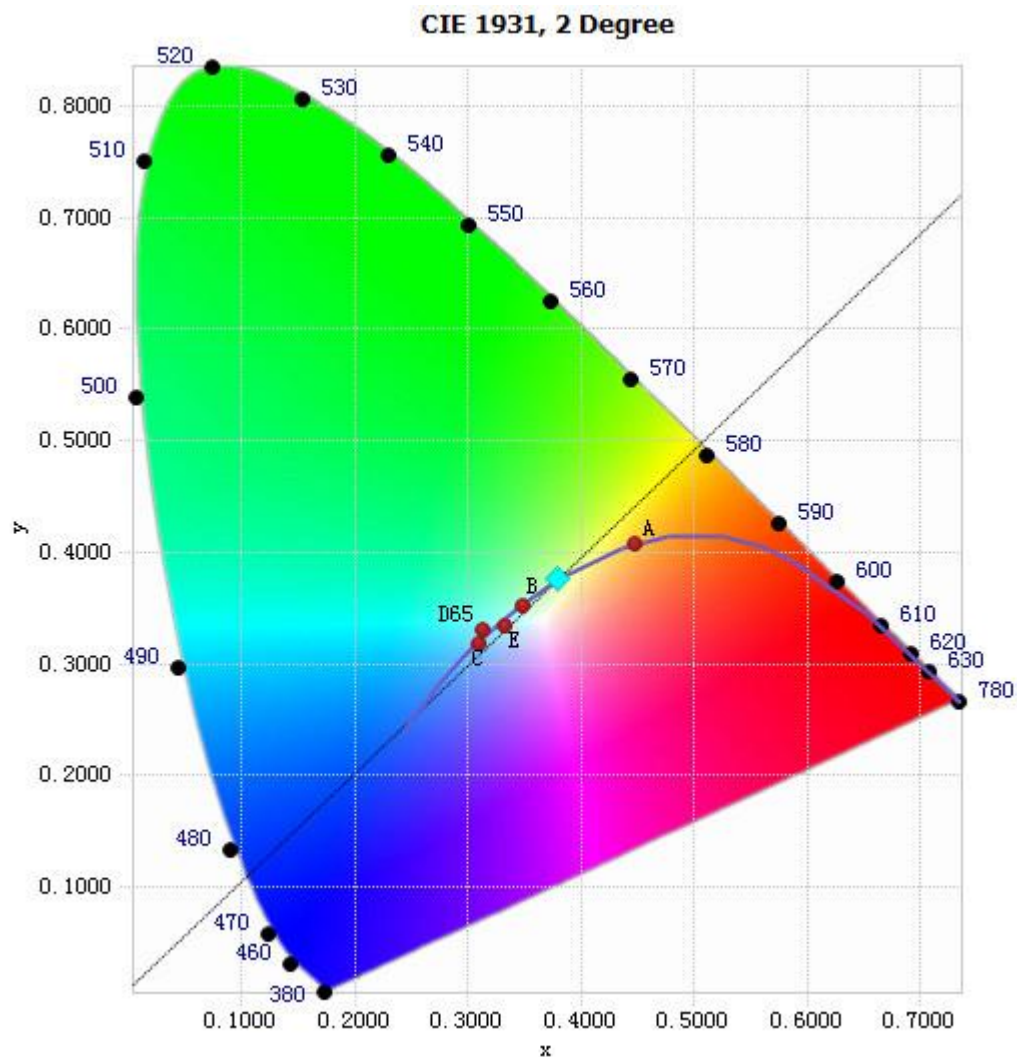


Chart 9: Spectral Power Distribution

Spectral Distribution over Visible Wavelength							
WL(nm)	Radiant(Watts)	WL(nm)	Radiant(Watts)	WL(nm)	Radiant(Watts)	WL(nm)	Radiant(Watts)
380	1.81E-04	485	1.39E-02	590	4.29E-02	695	6.32E-03
385	1.48E-04	490	1.54E-02	595	4.31E-02	700	5.36E-03
390	1.59E-04	495	1.78E-02	600	4.27E-02	705	4.60E-03
395	1.50E-04	500	2.08E-02	605	4.17E-02	710	3.90E-03
400	1.10E-04	505	2.36E-02	610	4.05E-02	715	3.34E-03
405	1.02E-04	510	2.57E-02	615	3.87E-02	720	2.85E-03
410	1.96E-04	515	2.76E-02	620	3.67E-02	725	2.40E-03
415	4.44E-04	520	2.86E-02	625	3.45E-02	730	2.03E-03
420	1.04E-03	525	2.97E-02	630	3.22E-02	735	1.72E-03
425	2.17E-03	530	3.06E-02	635	2.97E-02	740	1.47E-03
430	4.34E-03	535	3.12E-02	640	2.71E-02	745	1.25E-03
435	8.45E-03	540	3.21E-02	645	2.46E-02	750	1.07E-03
440	1.59E-02	545	3.31E-02	650	2.20E-02	755	9.13E-04
445	2.99E-02	550	3.40E-02	655	1.96E-02	760	7.74E-04
450	4.77E-02	555	3.51E-02	660	1.73E-02	765	6.69E-04
455	4.83E-02	560	3.64E-02	665	1.52E-02	770	5.74E-04
460	3.35E-02	565	3.78E-02	670	1.31E-02	775	4.80E-04
465	2.55E-02	570	3.90E-02	675	1.15E-02	780	4.15E-04
470	2.04E-02	575	4.02E-02	680	9.86E-03		
475	1.52E-02	580	4.12E-02	685	8.56E-03		
480	1.33E-02	585	4.24E-02	690	7.37E-03		

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

### Chromaticity Diagram - Sphere Spectroradiometer Method



Tristimulus values(x, y): (0.3789, 0.3772)

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

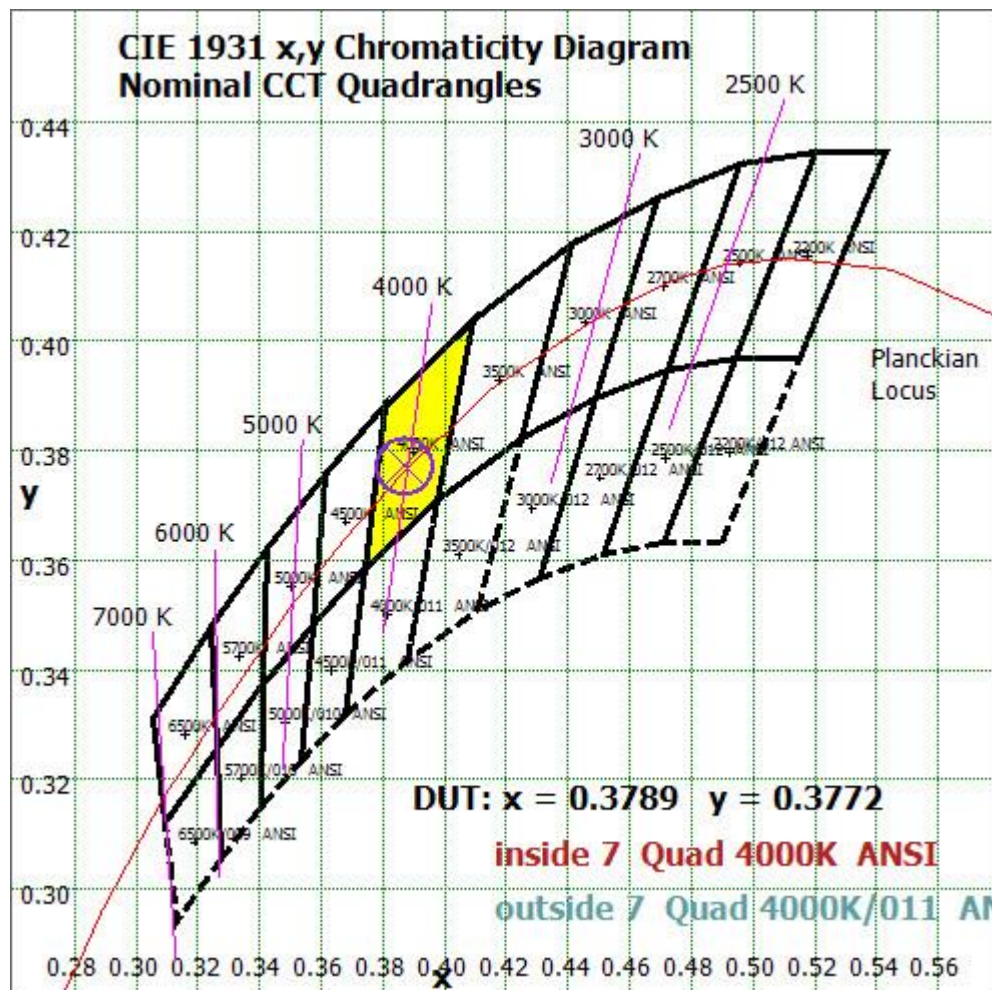


Chart 11: Plot of Lamp x/y coordinates on CIE 1931 Chromaticity Diagram

# Color Rendition Report – Sphere Spectroradiometer Method

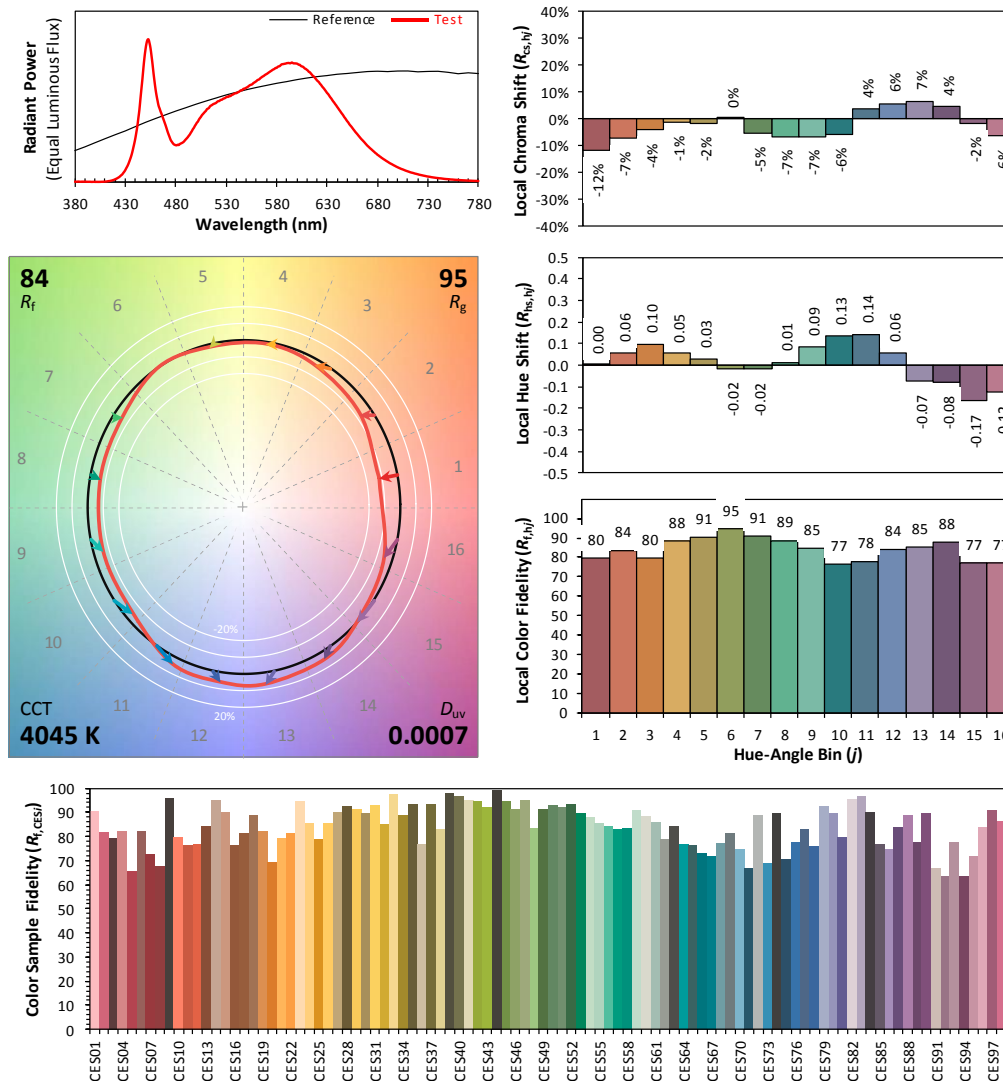
## ANSI/IES TM-30-18 Color Rendition Report

Source: LED

Manufacturer: RAB Lighting Inc

Date: 2025/08/04

Model: SWISH2X2



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

$x$  0.3789  
 $y$  0.3772  
 $u'$  0.2239  
 $v'$  0.5016

CIE 13.3-1995  
(CRI)  
 $R_a$  84  
 $R_g$  10

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	112.083	4.51%
10- 20	315.784	12.71%
20- 30	456.226	18.36%
30- 40	495.375	19.94%
40- 50	422.147	16.99%
50- 60	306.522	12.34%
60- 70	212.363	8.55%
70- 80	127.133	5.12%
80- 90	35.006	1.41%
90-100	0.153	0.01%
100-110	0.195	0.01%
110-120	0.226	0.01%
120-130	0.264	0.01%
130-140	0.321	0.01%
140-150	0.323	0.01%
150-160	0.269	0.01%
160-170	0.182	0.01%
170-180	0.069	0.00%
Total	2484.6	100%

$\gamma(^{\circ})$	Lumens	% Total
0- 60	2108.137	84.85%
60- 90	374.502	15.07%
0-90	2482.639	99.92%
90- 180	2.002	0.08%
0- 180	2484.6	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	10.7	12.2	11.1	12.5	12.9	14.2	15.7	14.5	16.0	16.3
	3H	12.2	13.5	12.6	13.9	14.2	16.0	17.3	16.4	17.7	18.0
	4H	12.7	13.9	13.1	14.3	14.7	16.8	18.0	17.2	18.4	18.8
	6H	12.9	14.1	13.3	14.5	14.9	17.5	18.7	17.9	19.1	19.5
	8H	13.0	14.1	13.4	14.5	14.9	17.8	18.9	18.3	19.3	19.7
	12H	13.0	14.1	13.4	14.4	14.9	18.0	19.0	18.4	19.4	19.8
4H	2H	11.7	13.0	12.1	13.3	13.7	14.5	15.8	14.9	16.1	16.5
	3H	13.3	14.4	13.8	14.8	15.2	16.7	17.7	17.1	18.1	18.5
	4H	13.9	14.9	14.3	15.3	15.7	17.6	18.6	18.0	19.0	19.4
	6H	14.3	15.1	14.7	15.6	16.0	18.6	19.4	19.1	19.9	20.3
	8H	14.4	15.1	14.8	15.6	16.0	19.0	19.7	19.4	20.2	20.7
	12H	14.4	15.1	14.8	15.5	16.0	19.2	19.9	19.7	20.3	20.8
8H	4H	14.5	15.3	15.0	15.7	16.2	17.8	18.6	18.3	19.0	19.5
	6H	15.0	15.6	15.5	16.1	16.6	19.0	19.6	19.5	20.1	20.6
	8H	15.1	15.7	15.6	16.2	16.7	19.5	20.0	20.0	20.6	21.0
	12H	15.1	15.7	15.6	16.1	16.7	19.8	20.3	20.3	20.8	21.3
12H	4H	14.7	15.3	15.1	15.8	16.3	17.8	18.5	18.3	19.0	19.5
	6H	15.2	15.8	15.7	16.3	16.8	19.0	19.6	19.5	20.0	20.6
	8H	15.4	15.9	15.9	16.4	16.9	19.6	20.1	20.1	20.6	21.1

Chart 13: UGR Table (Corrected)

## Illuminance Plots- Goniophotometer Method

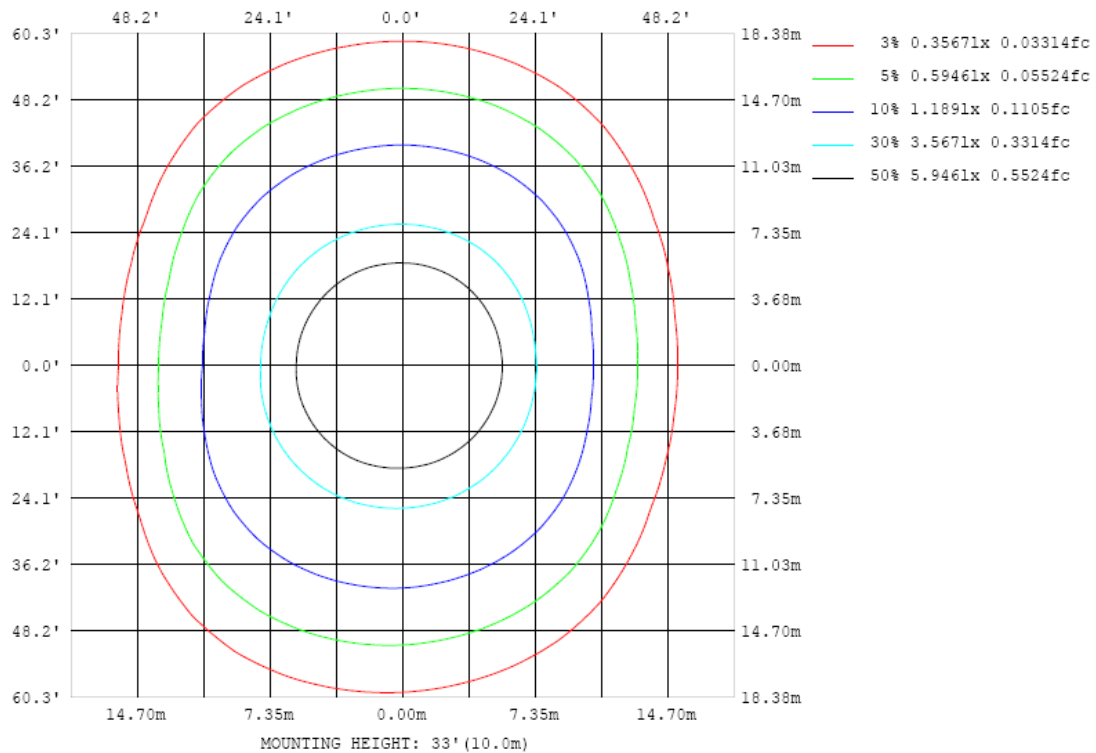


Chart 14: Illuminance Plot (Footcandles)

## Luminous Intensity Distribution Plots- Goniophotometer Method

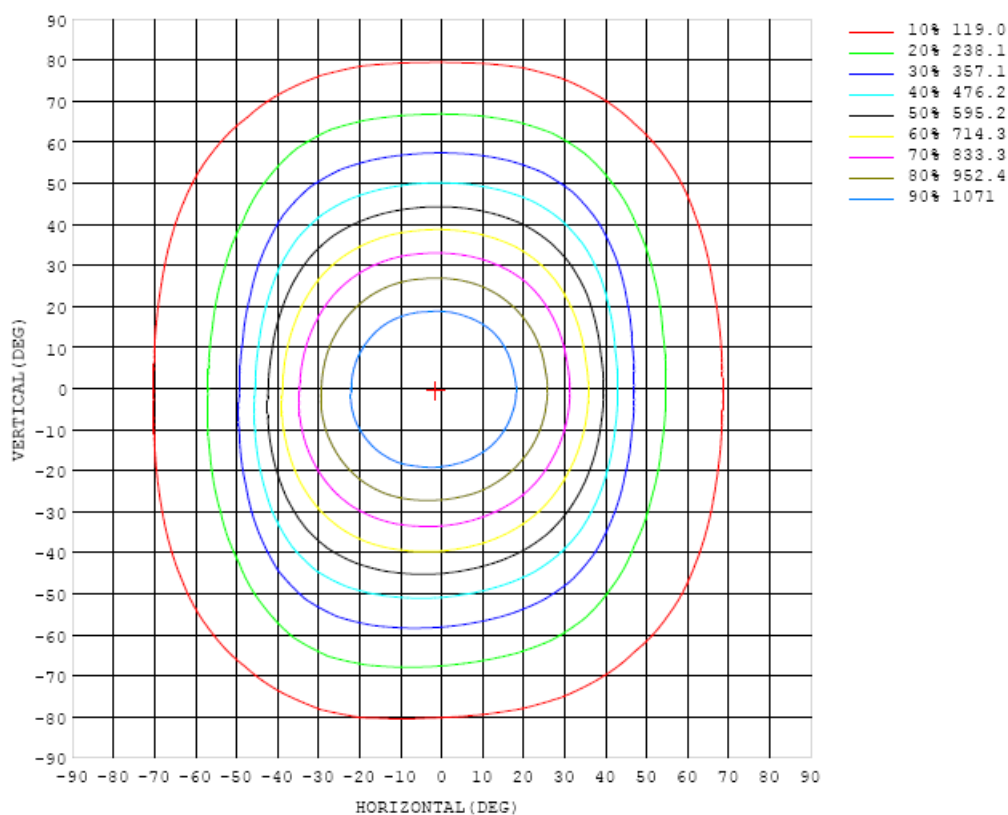


Chart 15: Isocandela Plot

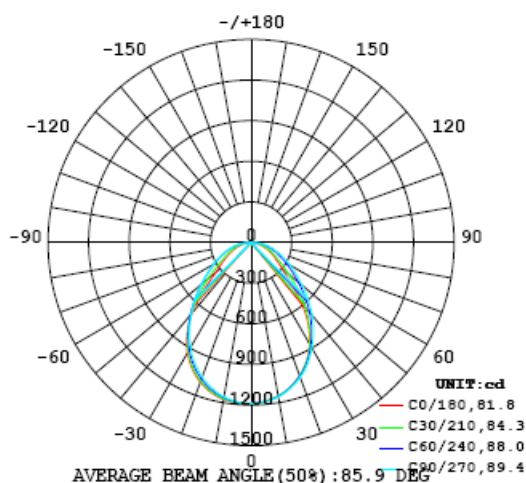


Chart 16: Polar Candela Distribution

## 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	1189	1189	1189	1189	1189	1189	1189	1189	1189	1189	1189	1189	1189	1189	1189	1189	1189	1189	1189
5	1176	1177	1177	1178	1176	1178	1179	1179	1179	1179	1182	1183	1183	1184	1185	1186	1187	1187	1187
10	1151	1152	1151	1151	1151	1153	1154	1154	1155	1158	1159	1162	1165	1168	1171	1174	1177	1177	1177
15	1109	1110	1110	1109	1110	1111	1111	1111	1112	1116	1120	1123	1130	1137	1141	1144	1146	1148	1146
20	1047	1047	1046	1047	1048	1050	1051	1053	1057	1059	1065	1071	1081	1088	1093	1097	1100	1101	1097
25	967	967	968	969	969	972	976	980	982	988	995	1006	1015	1022	1028	1033	1036	1036	1029
30	864	865	868	870	875	879	882	888	893	899	909	921	933	941	946	949	951	949	940
35	736	740	743	751	761	771	778	787	796	804	814	826	836	844	848	848	846	840	825
40	577	582	601	621	640	659	673	684	693	705	716	728	737	738	737	731	717	701	677
45	409	417	448	486	519	543	560	573	584	597	608	619	628	631	620	598	566	529	495
50	298	302	324	364	406	436	456	469	480	493	504	515	523	519	500	464	410	366	341
55	234	237	248	272	312	346	367	382	394	405	415	423	427	419	392	343	297	275	262
60	186	188	197	212	239	272	295	309	319	330	339	346	347	333	300	256	231	216	207
65	146	149	156	167	184	211	234	248	258	267	275	280	278	261	226	197	180	170	163
70	107	110	117	127	141	162	181	194	204	212	219	222	218	198	169	150	137	128	121
75	70.0	72.7	79.5	89.4	102	119	137	149	156	163	168	170	165	146	122	107	95.2	87.4	81.1
80	35.2	37.7	44.0	53.9	65.3	80.0	96.9	109	116	121	126	126	117	98.5	80.1	66.7	56.3	49.5	44.2
85	7.73	9.20	13.2	19.2	25.7	31.0	35.6	38.5	39.6	42.0	46.3	50.8	52.0	48.0	40.1	30.6	22.6	17.7	13.5
90	0.14	0.14	0.15	0.17	0.18	0.19	0.21	0.21	0.22	0.23	0.25	0.25	0.23	0.21	0.16	0.21	0.17	0.20	0.07
95	0.17	0.18	0.18	0.20	0.21	0.23	0.24	0.25	0.25	0.25	0.25	0.24	0.22	0.21	0.19	0.18	0.16	0.15	0.06
100	0.22	0.22	0.21	0.22	0.24	0.26	0.27	0.28	0.28	0.28	0.28	0.27	0.25	0.24	0.22	0.20	0.19	0.19	0.08
105	0.25	0.25	0.25	0.26	0.27	0.29	0.30	0.31	0.31	0.31	0.30	0.30	0.28	0.26	0.25	0.23	0.22	0.22	0.11
110	0.28	0.28	0.29	0.28	0.29	0.31	0.32	0.33	0.33	0.32	0.32	0.31	0.30	0.28	0.26	0.24	0.25	0.25	0.14
115	0.31	0.30	0.31	0.31	0.30	0.31	0.31	0.32	0.33	0.32	0.32	0.31	0.29	0.28	0.27	0.27	0.27	0.27	0.17
120	0.35	0.34	0.34	0.35	0.33	0.31	0.32	0.33	0.33	0.32	0.32	0.31	0.30	0.29	0.29	0.30	0.30	0.30	0.21
125	0.40	0.39	0.38	0.38	0.37	0.36	0.35	0.35	0.34	0.35	0.34	0.33	0.32	0.33	0.33	0.33	0.34	0.35	0.26
130	0.48	0.45	0.45	0.44	0.43	0.42	0.42	0.41	0.42	0.41	0.41	0.40	0.39	0.40	0.39	0.39	0.40	0.41	0.31
135	0.57	0.54	0.55	0.55	0.53	0.52	0.52	0.51	0.52	0.51	0.51	0.51	0.50	0.49	0.49	0.50	0.50	0.51	0.36
140	0.63	0.63	0.63	0.63	0.62	0.61	0.61	0.61	0.61	0.61	0.60	0.59	0.59	0.56	0.56	0.57	0.56	0.58	0.39
145	0.70	0.69	0.68	0.69	0.69	0.68	0.67	0.67	0.67	0.68	0.66	0.64	0.61	0.63	0.62	0.62	0.60	0.63	0.43
150	0.73	0.72	0.71	0.72	0.73	0.71	0.70	0.70	0.69	0.67	0.63	0.65	0.66	0.67	0.66	0.67	0.68	0.71	0.50
155	0.75	0.75	0.75	0.73	0.72	0.70	0.69	0.67	0.63	0.64	0.65	0.66	0.65	0.65	0.67	0.68	0.70	0.71	0.56
160	0.77	0.76	0.75	0.74	0.72	0.71	0.68	0.65	0.66	0.63	0.63	0.62	0.63	0.64	0.65	0.70	0.73	0.75	0.63
165	0.75	0.75	0.75	0.75	0.74	0.72	0.68	0.66	0.64	0.61	0.60	0.59	0.60	0.61	0.65	0.69	0.72	0.73	0.68
170	0.78	0.79	0.80	0.80	0.80	0.78	0.76	0.73	0.69	0.67	0.66	0.66	0.65	0.65	0.67	0.71	0.74	0.76	0.73
175	0.81	0.83	0.83	0.84	0.81	0.80	0.78	0.75	0.73	0.72	0.68	0.71	0.72	0.70	0.70	0.73	0.76	0.78	0.79
180	0.70	0.70	0.70	0.70	0.70	0.70	0.70	0.70	0.70	0.70	0.70	0.70	0.70	0.70	0.70	0.70	0.70	0.70	0.70

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		1189	1189	1189	1189	1189	1189	1189	1189	1189	1189	1189	1189	1189	1189	1189	1189	1189		
5		1187	1186	1186	1185	1184	1183	1182	1180	1180	1179	1178	1178	1179	1178	1178	1177	1177		
10		1176	1174	1171	1169	1166	1162	1160	1157	1156	1156	1154	1153	1152	1151	1150	1150	1151		
15		1145	1143	1140	1137	1133	1126	1121	1117	1114	1113	1111	1111	1111	1111	1109	1108	1108		
20		1096	1093	1090	1084	1079	1072	1065	1058	1056	1053	1051	1051	1051	1049	1046	1045	1045		
25		1028	1025	1019	1014	1008	1001	995	987	983	981	978	977	974	971	970	968	964		
30		937	933	928	924	919	913	907	898	894	892	890	888	884	880	873	866	860		
35		822	819	818	817	814	808	802	795	791	789	787	785	781	771	758	745	734		
40		673	680	689	697	699	698	695	691	688	684	681	680	669	654	633	605	579		
45		498	523	552	572	583	585	584	582	580	578	575	570	557	537	503	458	419		
50		347	375	419	453	472	479	480	479	478	476	473	468	452	423	382	335	305		
55		265	279	310	351	378	390	393	393	394	392	389	380	362	328	287	258	239		
60		210	220	237	270	300	315	319	320	321	319	315	306	285	252	222	203	189		
65		165	173	185	206	235	252	258	259	259	258	253	243	221	193	172	156	147		
70		124	131	141	155	179	197	204	205	205	204	200	189	168	144	128	115	107		
75		83.2	89.5	99.1	111	130	147	154	156	155	155	151	140	121	102	87.6	76.6	69.8		
80		46.1	52.1	61.6	72.1	87.0	103	113	113	112	112	110	98.1	80.0	64.1	51.8	41.5	35.2		
85		15.0	19.5	26.7	32.6	36.5	38.0	36.6	33.8	31.9	31.6	32.6	31.4	27.7	22.5	16.4	10.7	7.52		
90		0.07	0.06	0.07	0.00	0.00	0.07	0.07	0.08	0.08	0.08	0.07	0.08	0.07	0.07	0.07	0.06	0.06		
95		0.06	0.06	0.06	0.07	0.07	0.07	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.07	0.07	0.06	0.07		
100		0.08	0.07	0.07	0.07	0.08	0.08	0.08	0.09	0.09	0.09	0.09	0.09	0.09	0.08	0.08	0.08	0.09		
105		0.10	0.10	0.08	0.08	0.09	0.09	0.10	0.10	0.11	0.11	0.11	0.10	0.10	0.10	0.10	0.10	0.11		
110		0.13	0.13	0.11	0.10	0.11	0.11	0.12	0.12	0.13	0.13	0.13	0.12	0.12	0.12	0.12	0.14	0.14		
115		0.16	0.15	0.15	0.13	0.13	0.13	0.14	0.15	0.15	0.16	0.16	0.15	0.15	0.15	0.17	0.17	0.18		
120		0.20	0.19	0.19	0.18	0.17	0.17	0.17	0.18	0.18	0.19	0.19	0.19	0.19	0.20	0.21	0.20	0.22		
125		0.24	0.23	0.23	0.22	0.21	0.22	0.21	0.22	0.22	0.23	0.23	0.22	0.23	0.25	0.26	0.25	0.26		
130		0.28	0.28	0.26	0.26	0.27	0.27	0.27	0.26	0.28	0.28	0.28	0.28	0.29	0.30	0.29	0.31	0.32		
135		0.32	0.32	0.32	0.28	0.30	0.31	0.32	0.31	0.31	0.32	0.33	0.32	0.32	0.32	0.35	0.35	0.35		
140		0.36	0.34	0.34	0.33	0.31	0.32	0.33	0.34	0.34	0.34	0.34	0.33	0.33	0.36	0.37	0.37	0.40		
145		0.41	0.37	0.38	0.37	0.34	0.35	0.34	0.34	0.35	0.35	0.35	0.35	0.38	0.39	0.39	0.39	0.45		
150		0.47	0.45	0.45	0.42	0.41	0.39	0.39	0.39	0.38	0.40	0.40	0.40	0.42	0.45	0.44	0.43	0.51		
155		0.53	0.52	0.49	0.47	0.45	0.43	0.43	0.43	0.41	0.44	0.44	0.45	0.47	0.49	0.49	0.51	0.57		
160		0.59	0.59	0.57	0.53	0.48	0.46	0.46	0.45	0.43	0.47	0.48	0.49	0.52	0.53	0.55	0.57	0.63		
165		0.65	0.66	0.66	0.65	0.60	0.56	0.54	0.53	0.52	0.55	0.57	0.60	0.62	0.65	0.66	0.66	0.69		
170		0.69	0.69	0.68	0.67	0.63	0.57	0.55	0.56	0.54	0.55	0.59	0.61	0.64	0.67	0.68	0.69	0.74		
175		0.78	0.80	0.81	0.80	0.80	0.77	0.75	0.73	0.67	0.68	0.72	0.74	0.77	0.79	0.80	0.79	0.80		
180		0.70	0.70	0.70	0.70	0.70	0.70	0.70	0.70	0.70	0.70	0.70	0.70	0.70	0.70	0.70	0.70	0.70		

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)	0.146	0.077
Power Factor	0.9811	0.8509
Test Power (W)	17.25	18.08
THD A%	10.62	15.78
Luminous Efficacy (lm/W)	144.0	139.8
Total Luminous Flux (lm)	2483.3	2527.8
Color Rendering Index (CRI)	82.5	
R9	5.5	
Correlated Color Temperature (CCT)(K)	4857	
Chromaticity Chroma x	0.3499	
Chromaticity Chroma y	0.3616	
Chromaticity Chroma u	0.2108	
Chromaticity Chroma v	0.3268	
Duv	0.0031	
Chromaticity Chroma u'	0.2108	
Chromaticity Chroma v'	0.4902	

Special Color Rendering Indices	
R1	80.2
R2	88.4
R3	93.8
R4	80.7
R5	80.2
R6	83
R7	87.3
R8	66
R9	5.5
R10	72.1
R11	79.6
R12	54.4
R13	82.5
R14	96.9

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)	0.147
Power Factor	0.9813
Power (W)	17.28
Luminous Efficacy (lm/W)	144.3
Total Luminous Flux (lm)	2493.9
Beam Angle ( ° )	81.9 (0°-180°) / 89.5 (90°-270°)
Center Beam Candle Power (cd)	1191
Maximum Beam Candle Power (cd)	1192 (At: C=150.0, Gamma=0.5)
Spacing Criteria	1.18 (0°-180°) / 1.14 (90°-270°)
Zonal Lumens in the 0 °-60 °Zone	84.78%
Zonal Lumens in the 60 °-90 °Zone	15.14%
Zonal Lumens in the 90 °-120 °Zone	0.02%
Zonal Lumens in the 120 °-180 °Zone	0.06%

Table 15: Test data per Goniophotometer Method

### Spectral Power Distribution - Sphere Spectroradiometer Method

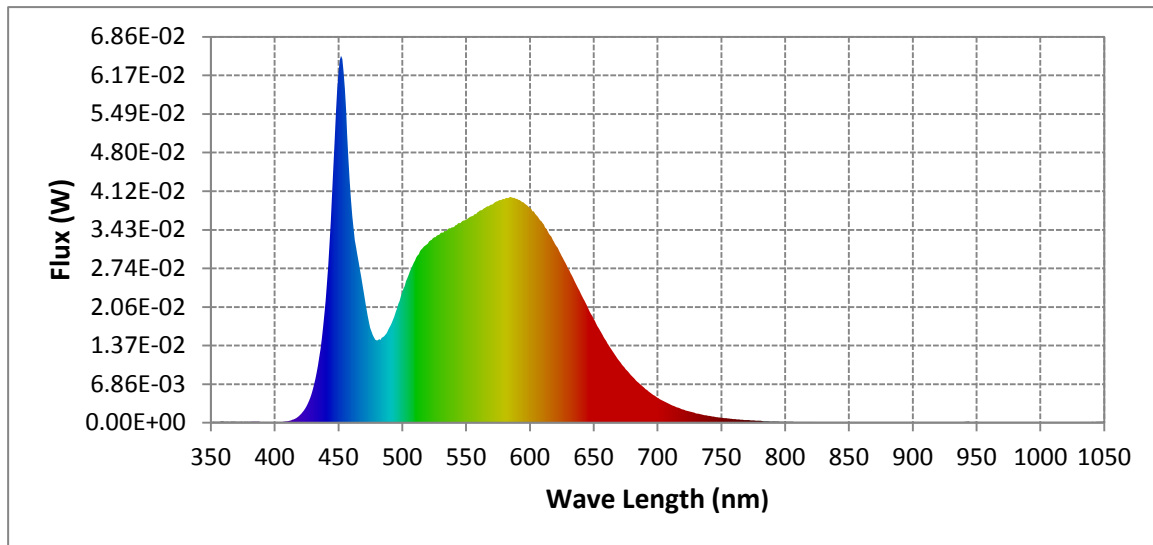


Chart 17: Spectral Power Distribution

Spectral Distribution over Visible Wavelength							
WL(nm)	Radiant(Watts)	WL(nm)	Radiant(Watts)	WL(nm)	Radiant(Watts)	WL(nm)	Radiant(Watts)
380	2.26E-04	485	1.52E-02	590	3.98E-02	695	5.27E-03
385	1.86E-04	490	1.69E-02	595	3.92E-02	700	4.49E-03
390	1.61E-04	495	1.97E-02	600	3.82E-02	705	3.84E-03
395	1.44E-04	500	2.32E-02	605	3.69E-02	710	3.25E-03
400	1.05E-04	505	2.62E-02	610	3.55E-02	715	2.77E-03
405	1.30E-04	510	2.88E-02	615	3.37E-02	720	2.37E-03
410	2.56E-04	515	3.08E-02	620	3.17E-02	725	2.00E-03
415	6.15E-04	520	3.18E-02	625	2.97E-02	730	1.71E-03
420	1.37E-03	525	3.30E-02	630	2.75E-02	735	1.44E-03
425	2.91E-03	530	3.37E-02	635	2.52E-02	740	1.23E-03
430	5.94E-03	535	3.41E-02	640	2.29E-02	745	1.05E-03
435	1.17E-02	540	3.47E-02	645	2.07E-02	750	8.94E-04
440	2.18E-02	545	3.55E-02	650	1.84E-02	755	7.82E-04
445	4.07E-02	550	3.60E-02	655	1.64E-02	760	6.55E-04
450	6.22E-02	555	3.67E-02	660	1.45E-02	765	5.67E-04
455	5.94E-02	560	3.75E-02	665	1.27E-02	770	4.79E-04
460	3.97E-02	565	3.82E-02	670	1.10E-02	775	4.09E-04
465	2.98E-02	570	3.88E-02	675	9.54E-03	780	3.59E-04
470	2.32E-02	575	3.94E-02	680	8.26E-03		
475	1.69E-02	580	3.97E-02	685	7.15E-03		
480	1.47E-02	585	4.01E-02	690	6.15E-03		

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



### Chromaticity Diagram - Sphere Spectroradiometer Method

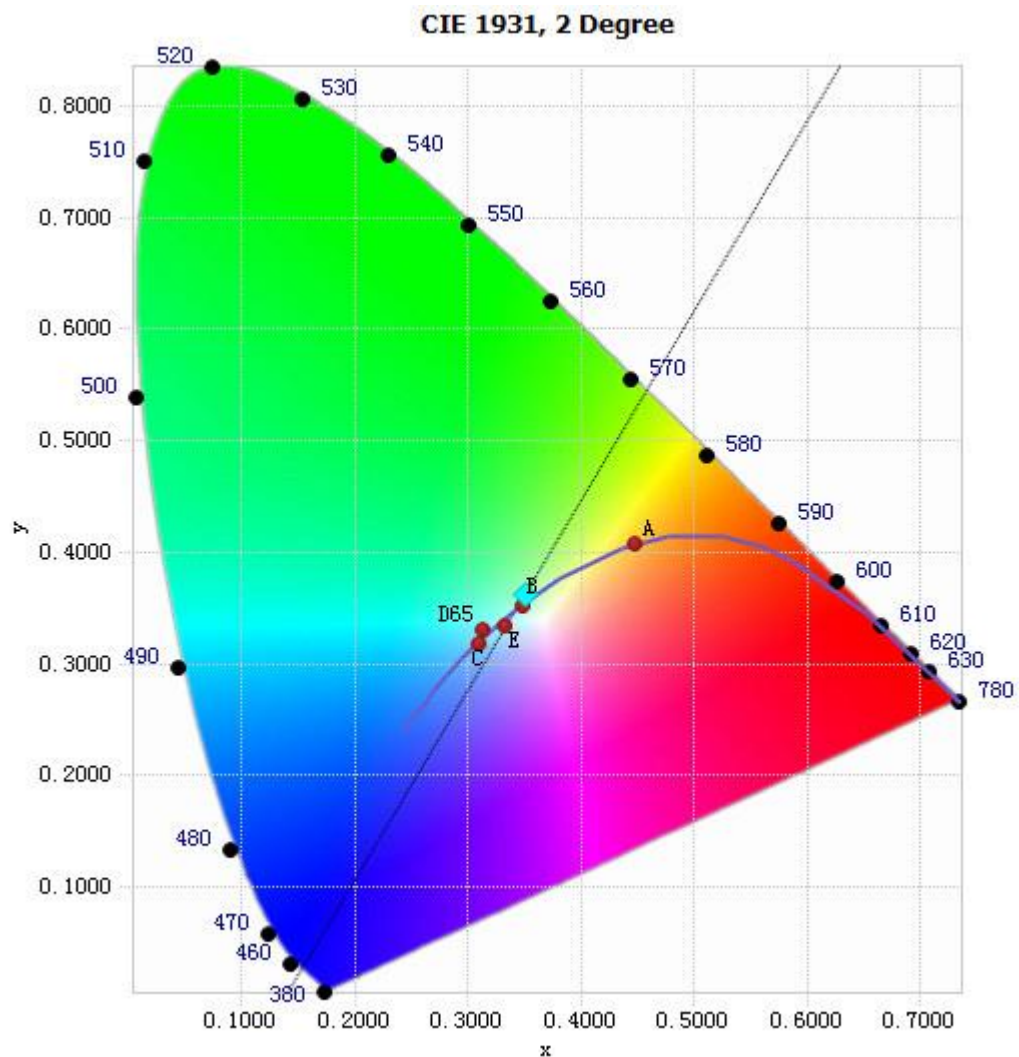


Chart 18: Chromaticity Diagram per Sphere - Spectroradiometer Method

Note: The location on the diagram of the tristimulus coordinates are indicated by the blue diamond.

# Nominal CCT Quadrangles – Sphere Spectroradiometer Method

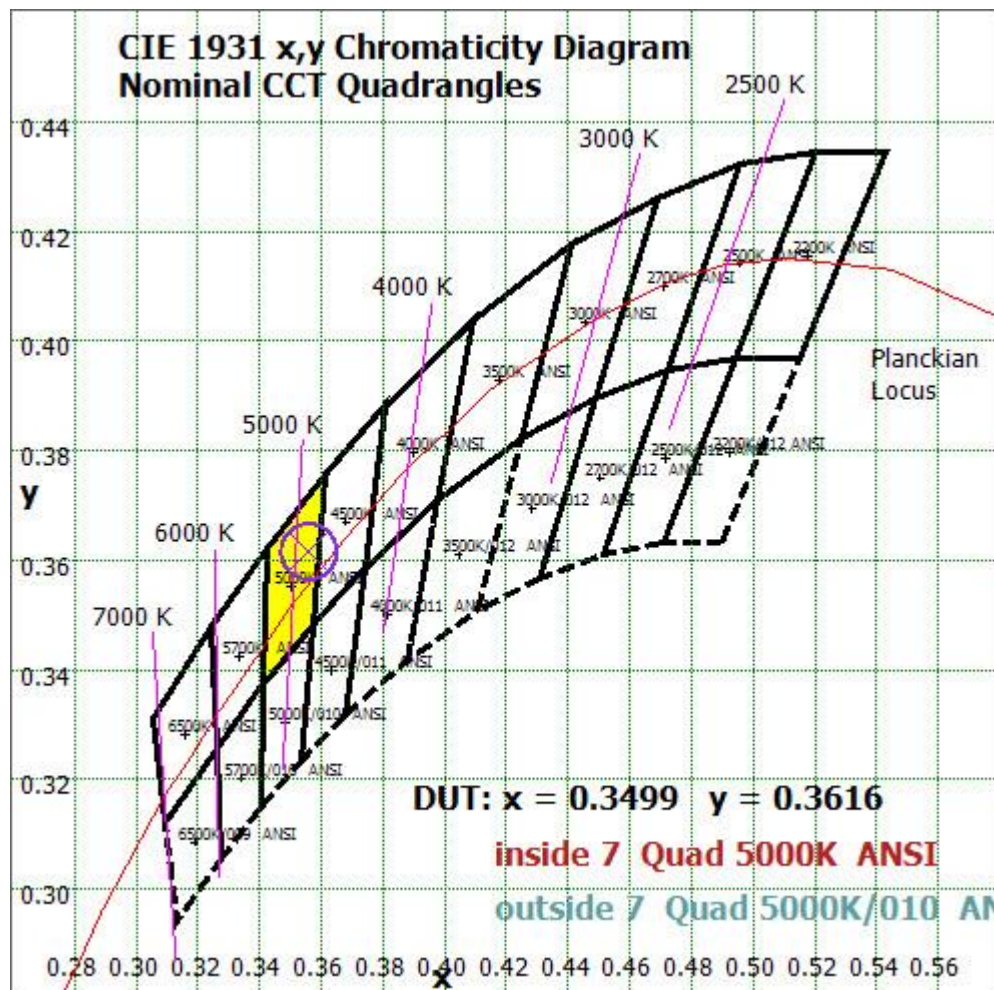


Chart 19: Plot of Lamp x/y coordinates on CIE 1931 Chromaticity Diagram

## Color Rendition Report – Sphere Spectroradiometer Method

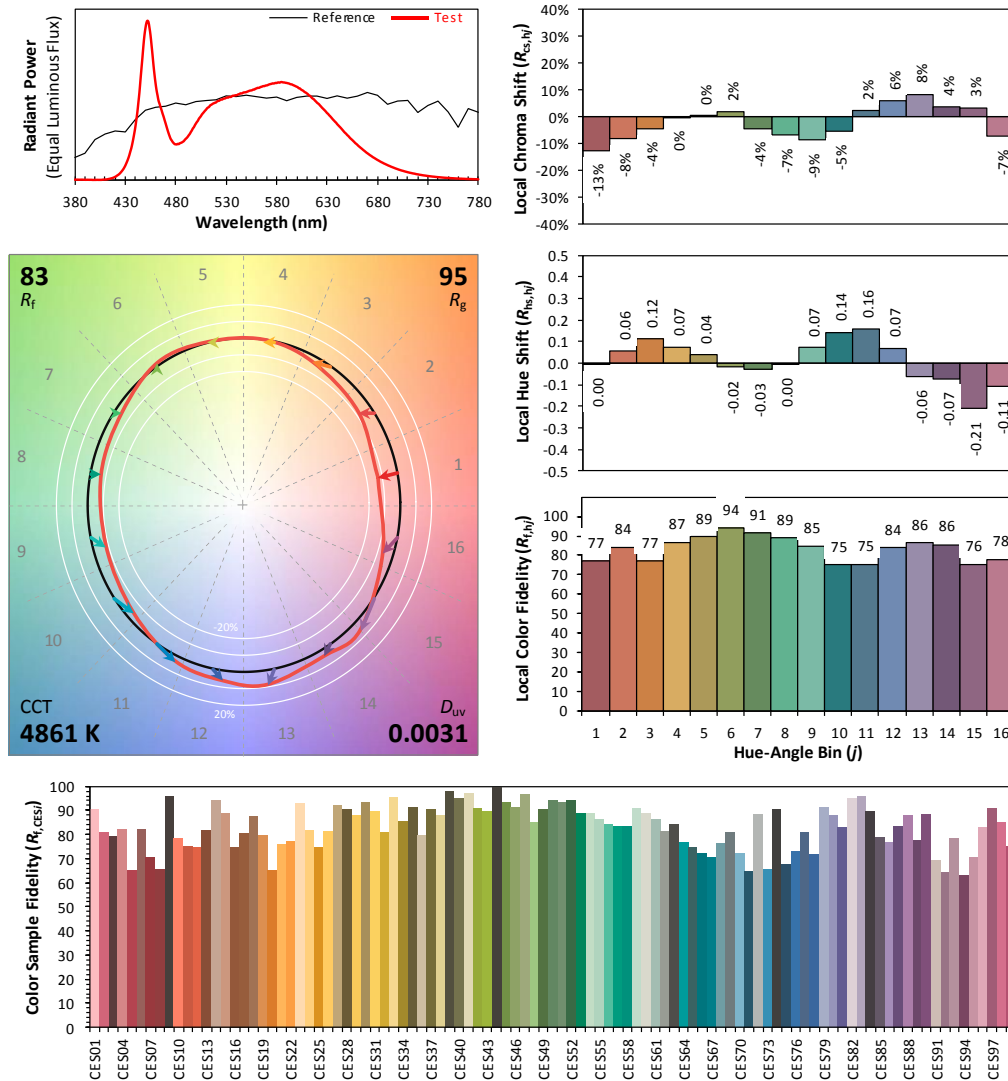
### ANSI/IES TM-30-18 Color Rendition Report

Source: LED

Manufacturer: RAB Lighting Inc

Date: 2025/08/04

Model: SWISH2X2



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

$x$  0.3499  
 $y$  0.3616  
 $u'$  0.2108  
 $v'$  0.4902

CIE 13.3-1995  
(CRI)

$R_a$  82  
 $R_g$  6

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	112.328	4.50%
10- 20	316.457	12.69%
20- 30	457.168	18.33%
30- 40	496.416	19.91%
40- 50	423.58	16.98%
50- 60	308.28	12.36%
60- 70	213.943	8.58%
70- 80	128.263	5.14%
80- 90	35.411	1.42%
90-100	0.154	0.01%
100-110	0.196	0.01%
110-120	0.227	0.01%
120-130	0.265	0.01%
130-140	0.322	0.01%
140-150	0.324	0.01%
150-160	0.27	0.01%
160-170	0.183	0.01%
170-180	0.069	0.00%
Total	2493.9	100%

$\gamma(^{\circ})$	Lumens	% Total
0- 60	2114.229	84.78%
60- 90	377.617	15.14%
0-90	2491.846	99.92%
90- 180	2.01	0.08%
0- 180	2493.9	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	10.8	12.3	11.2	12.6	12.9		14.2	15.7	14.6	16.0	16.3
	3H	12.3	13.6	12.6	13.9	14.3		16.1	17.4	16.4	17.7	18.1
	4H	12.7	14.0	13.1	14.3	14.7		16.8	18.1	17.2	18.5	18.8
	6H	13.0	14.2	13.4	14.5	14.9		17.6	18.8	18.0	19.1	19.5
	8H	13.0	14.2	13.5	14.5	14.9		17.9	19.0	18.3	19.4	19.8
	12H	13.0	14.1	13.5	14.5	14.9		18.0	19.1	18.5	19.5	19.9
4H	2H	11.8	13.0	12.2	13.4	13.8		14.6	15.8	15.0	16.2	16.6
	3H	13.4	14.5	13.8	14.9	15.3		16.7	17.8	17.1	18.2	18.6
	4H	14.0	14.9	14.4	15.3	15.8		17.7	18.6	18.1	19.0	19.5
	6H	14.3	15.2	14.8	15.6	16.1		18.7	19.5	19.1	19.9	20.4
	8H	14.4	15.2	14.9	15.6	16.1		19.0	19.8	19.5	20.3	20.7
	12H	14.4	15.1	14.9	15.6	16.0		19.2	19.9	19.7	20.4	20.9
8H	4H	14.6	15.3	15.0	15.8	16.2		17.9	18.6	18.3	19.1	19.6
	6H	15.0	15.7	15.5	16.2	16.7		19.0	19.7	19.5	20.2	20.6
	8H	15.1	15.7	15.7	16.2	16.7		19.5	20.1	20.0	20.6	21.1
	12H	15.2	15.7	15.7	16.2	16.7		19.8	20.3	20.3	20.8	21.4
12H	4H	14.7	15.4	15.2	15.9	16.3		17.9	18.6	18.4	19.0	19.5
	6H	15.3	15.8	15.8	16.3	16.8		19.1	19.6	19.6	20.1	20.7
	8H	15.4	15.9	15.9	16.4	17.0		19.6	20.1	20.1	20.6	21.2

Chart 21: UGR Table (Corrected)

## Illuminance Plots- Goniophotometer Method

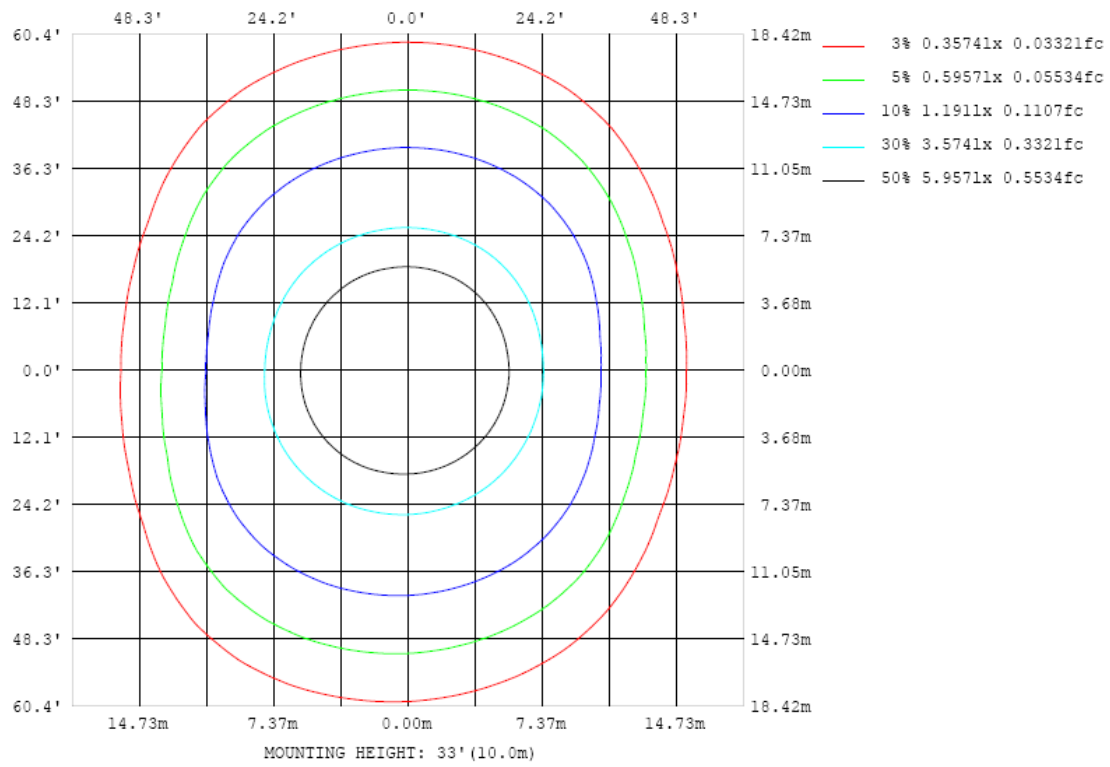


Chart 22: Illuminance Plot (Footcandles)

## Luminous Intensity Distribution Plots- Goniophotometer Method

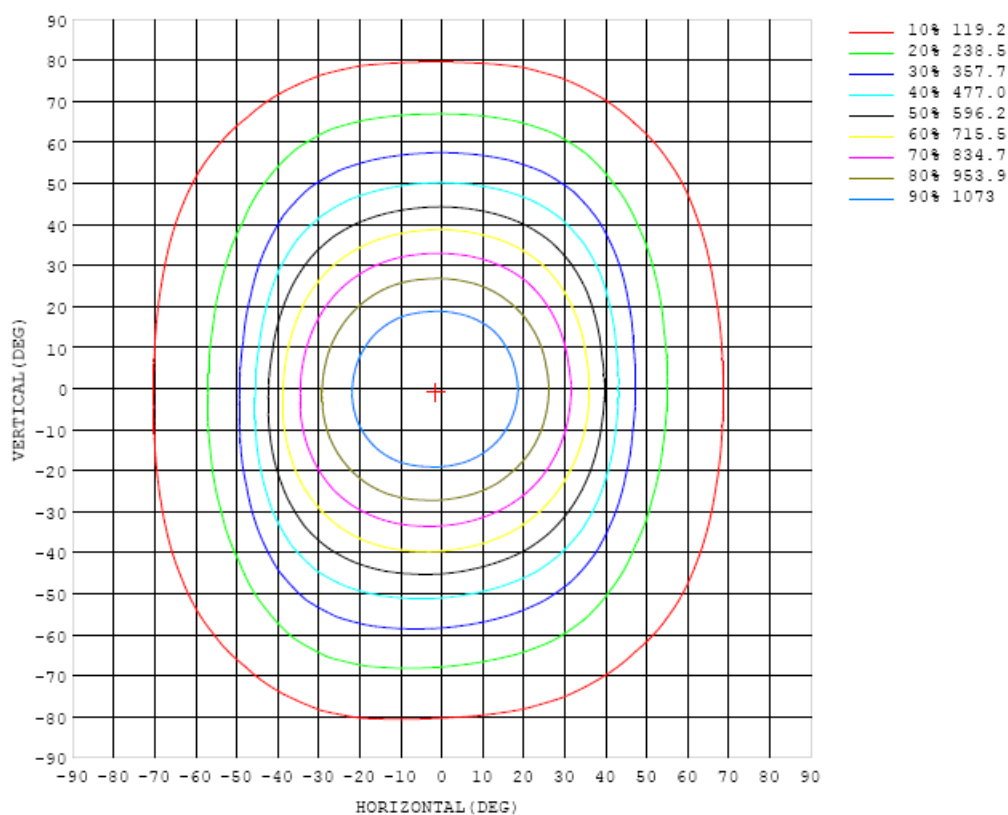


Chart 23: Isocandela Plot

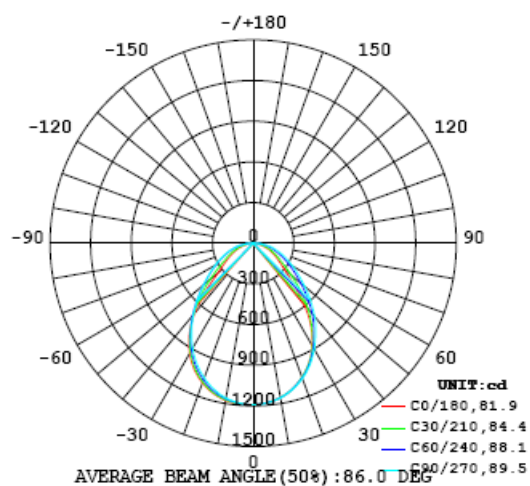


Chart 24: Polar Candela Distribution



## 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	1191	1191	1191	1191	1191	1191	1191	1191	1191	1191	1191	1191	1191	1191	1191	1191	1191	1191	1191
5	1181	1182	1181	1181	1181	1180	1181	1181	1181	1183	1184	1185	1186	1187	1187	1189	1189	1190	1189
10	1157	1158	1156	1155	1155	1155	1156	1157	1157	1159	1160	1163	1165	1167	1170	1174	1177	1178	1177
15	1116	1116	1114	1115	1115	1115	1115	1114	1115	1117	1120	1124	1131	1138	1141	1143	1145	1146	1145
20	1054	1053	1052	1052	1054	1054	1057	1057	1059	1062	1066	1072	1080	1087	1092	1096	1098	1097	1096
25	975	974	975	976	976	977	982	984	986	990	996	1006	1015	1021	1026	1030	1033	1032	1029
30	871	871	875	877	882	884	887	891	895	901	909	921	932	940	945	948	948	945	938
35	743	746	749	757	767	776	783	790	798	807	814	826	834	842	847	846	843	835	823
40	583	588	606	626	645	663	678	687	697	707	717	729	737	738	736	729	714	697	675
45	414	423	453	491	524	547	565	576	588	600	609	620	628	630	620	597	564	525	494
50	302	306	328	368	410	439	460	473	484	496	506	517	523	519	500	463	409	364	341
55	237	240	251	275	316	349	372	386	397	409	418	427	429	420	393	343	296	273	262
60	188	190	200	214	242	275	299	313	323	334	342	350	350	335	300	255	230	215	207
65	148	150	158	169	185	213	237	251	261	271	278	284	281	263	226	196	179	169	163
70	108	111	118	129	142	163	183	197	207	215	222	226	220	200	169	150	136	128	122
75	70.5	73.1	80.0	90.1	102	120	138	151	158	165	171	172	167	147	122	107	95.5	87.5	81.7
80	35.0	37.7	44.2	54.2	65.7	80.4	98.0	111	118	123	128	128	119	100	80.8	67.3	57.0	50.0	45.3
85	7.35	8.81	13.0	18.8	25.3	30.7	35.3	38.2	39.3	41.7	46.1	50.7	52.5	48.9	41.2	31.5	23.3	18.2	14.4
90	0.14	0.14	0.15	0.17	0.18	0.20	0.21	0.21	0.22	0.22	0.24	0.25	0.23	0.21	0.15	0.20	0.17	0.19	0.07
95	0.18	0.18	0.18	0.20	0.21	0.23	0.24	0.25	0.25	0.25	0.25	0.24	0.22	0.21	0.19	0.17	0.16	0.15	0.06
100	0.22	0.22	0.21	0.23	0.24	0.26	0.27	0.28	0.28	0.28	0.27	0.27	0.25	0.24	0.22	0.20	0.19	0.19	0.09
105	0.26	0.25	0.25	0.26	0.28	0.29	0.30	0.31	0.31	0.31	0.30	0.29	0.28	0.27	0.25	0.23	0.22	0.23	0.11
110	0.29	0.28	0.29	0.28	0.29	0.31	0.32	0.33	0.33	0.33	0.32	0.31	0.30	0.28	0.26	0.25	0.25	0.25	0.14
115	0.31	0.31	0.31	0.31	0.30	0.31	0.32	0.32	0.33	0.32	0.32	0.31	0.29	0.28	0.27	0.27	0.27	0.27	0.17
120	0.36	0.34	0.34	0.35	0.33	0.32	0.32	0.33	0.33	0.32	0.32	0.31	0.30	0.29	0.29	0.30	0.30	0.31	0.21
125	0.41	0.39	0.39	0.39	0.37	0.36	0.35	0.35	0.34	0.34	0.34	0.33	0.32	0.33	0.33	0.33	0.34	0.35	0.26
130	0.48	0.46	0.45	0.44	0.43	0.42	0.42	0.42	0.42	0.42	0.40	0.40	0.39	0.40	0.40	0.39	0.40	0.41	0.31
135	0.57	0.54	0.55	0.55	0.53	0.53	0.52	0.51	0.52	0.52	0.51	0.51	0.50	0.50	0.50	0.50	0.50	0.51	0.36
140	0.64	0.64	0.63	0.63	0.63	0.61	0.62	0.61	0.62	0.61	0.60	0.59	0.59	0.56	0.56	0.57	0.56	0.58	0.39
145	0.70	0.70	0.68	0.70	0.69	0.68	0.67	0.67	0.68	0.68	0.66	0.64	0.61	0.63	0.63	0.62	0.61	0.63	0.44
150	0.73	0.72	0.71	0.73	0.73	0.72	0.70	0.70	0.70	0.68	0.63	0.65	0.66	0.67	0.66	0.67	0.69	0.71	0.50
155	0.75	0.75	0.76	0.74	0.73	0.70	0.69	0.67	0.63	0.64	0.65	0.66	0.65	0.65	0.67	0.67	0.70	0.71	0.56
160	0.77	0.76	0.76	0.74	0.72	0.71	0.68	0.65	0.67	0.63	0.63	0.62	0.63	0.64	0.65	0.70	0.73	0.75	0.63
165	0.76	0.75	0.75	0.75	0.75	0.72	0.69	0.67	0.64	0.62	0.60	0.59	0.60	0.61	0.65	0.69	0.72	0.73	0.68
170	0.79	0.79	0.81	0.81	0.80	0.79	0.77	0.73	0.69	0.67	0.66	0.66	0.65	0.65	0.67	0.71	0.74	0.75	0.73
175	0.81	0.83	0.84	0.84	0.82	0.80	0.78	0.75	0.73	0.72	0.68	0.71	0.72	0.70	0.70	0.73	0.76	0.78	0.79
180	0.71	0.71	0.71	0.71	0.71	0.71	0.71	0.71	0.71	0.71	0.71	0.71	0.71	0.71	0.71	0.71	0.71	0.71	0.71

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	1191	1191	1191	1191	1191	1191	1191	1191	1191	1191	1191	1191	1191	1191	1191	1191	1191		
5	1189	1188	1187	1186	1186	1185	1183	1182	1182	1182	1182	1182	1182	1182	1181	1180	1180		
10	1176	1175	1172	1169	1167	1164	1161	1160	1159	1158	1157	1157	1157	1156	1156	1156	1156		
15	1144	1142	1140	1137	1133	1128	1122	1118	1116	1115	1115	1115	1116	1116	1115	1116	1115		
20	1095	1092	1088	1084	1079	1073	1065	1059	1058	1055	1056	1057	1057	1055	1053	1053	1053		
25	1026	1022	1018	1011	1005	1001	994	987	984	982	982	981	979	977	976	975	972		
30	934	931	926	921	915	911	905	898	895	893	893	892	890	887	879	874	868		
35	819	817	815	814	811	807	801	795	791	790	790	789	787	778	766	754	742		
40	671	677	687	694	696	696	693	690	688	685	684	683	675	660	640	613	587		
45	496	520	549	570	581	584	583	582	581	579	578	574	561	543	510	465	427		
50	346	374	418	452	470	479	479	479	480	478	476	471	457	429	388	341	311		
55	264	278	310	351	377	390	394	394	395	394	391	383	365	333	292	262	243		
60	210	220	237	270	301	316	321	322	323	321	318	308	288	255	225	206	192		
65	166	173	185	207	235	253	260	260	261	259	255	245	223	194	174	159	149		
70	124	131	141	156	180	198	205	206	207	206	201	191	169	145	129	117	109		
75	83.9	90.0	99.5	112	131	148	156	157	157	156	152	141	122	103	88.5	77.4	70.3		
80	47.2	53.2	62.7	73.4	88.3	105	114	115	113	113	111	98.8	80.3	64.2	51.8	41.7	35.5		
85	16.0	20.9	28.4	34.4	38.0	39.0	37.2	34.0	32.1	31.9	33.0	31.7	27.8	22.3	16.0	10.3	7.31		
90	0.07	0.07	0.07	0.04	0.04	0.00	0.08	0.08	0.08	0.08	0.08	0.07	0.07	0.07	0.06	0.06	0.06		
95	0.06	0.06	0.06	0.07	0.07	0.07	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.07	0.07	0.07	0.07		
100	0.08	0.07	0.07	0.07	0.08	0.08	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.08	0.08	0.08	0.09		
105	0.10	0.10	0.08	0.08	0.09	0.09	0.10	0.10	0.11	0.11	0.11	0.11	0.10	0.10	0.10	0.10	0.11		
110	0.13	0.13	0.11	0.10	0.11	0.11	0.12	0.12	0.13	0.13	0.13	0.12	0.12	0.12	0.12	0.14	0.14		
115	0.16	0.15	0.15	0.13	0.13	0.13	0.15	0.15	0.15	0.16	0.16	0.15	0.15	0.15	0.17	0.17	0.18		
120	0.20	0.19	0.19	0.18	0.17	0.17	0.17	0.18	0.18	0.19	0.19	0.19	0.19	0.20	0.21	0.21	0.22		
125	0.24	0.23	0.23	0.22	0.21	0.22	0.21	0.22	0.22	0.23	0.23	0.22	0.23	0.25	0.26	0.25	0.27		
130	0.28	0.28	0.27	0.27	0.27	0.27	0.27	0.27	0.28	0.28	0.28	0.28	0.30	0.30	0.29	0.31	0.32		
135	0.32	0.32	0.32	0.29	0.30	0.31	0.32	0.31	0.31	0.32	0.33	0.33	0.33	0.32	0.35	0.35	0.35		
140	0.36	0.34	0.34	0.33	0.31	0.32	0.33	0.34	0.34	0.34	0.34	0.34	0.33	0.36	0.37	0.37	0.40		
145	0.41	0.37	0.38	0.37	0.35	0.35	0.34	0.34	0.35	0.35	0.35	0.35	0.38	0.39	0.40	0.39	0.45		
150	0.47	0.45	0.45	0.42	0.41	0.39	0.39	0.39	0.38	0.40	0.40	0.40	0.42	0.45	0.44	0.43	0.51		
155	0.53	0.52	0.49	0.48	0.45	0.43	0.43	0.43	0.41	0.44	0.44	0.45	0.47	0.49	0.49	0.52	0.57		
160	0.59	0.59	0.57	0.53	0.48	0.46	0.46	0.45	0.43	0.47	0.48	0.50	0.52	0.53	0.56	0.57	0.63		
165	0.66	0.67	0.66	0.65	0.60	0.56	0.54	0.53	0.52	0.55	0.57	0.60	0.62	0.65	0.66	0.66	0.69		
170	0.69	0.69	0.69	0.67	0.63	0.57	0.55	0.56	0.54	0.55	0.59	0.61	0.64	0.67	0.68	0.69	0.75		
175	0.78	0.80	0.81	0.81	0.80	0.77	0.75	0.73	0.66	0.68	0.72	0.74	0.77	0.79	0.80	0.79	0.81		
180	0.71	0.71	0.71	0.71	0.71	0.71	0.71	0.71	0.71	0.71	0.71	0.71	0.71	0.71	0.71	0.71	0.71		

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  $4\pi$ . 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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