



LM-79-19 TEST REPORT

for

RAB LIGHTING INC

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

LED Lamp

Model: FHID-65S-EX39-850

Laboratory: Leading Testing Laboratories

NVLAP CODE: 200960-0

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Report No.: HZ25040039e

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

Review by:

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Approved by:



April Zou

Engineer: Wei Fei
May 14, 2025

1 Manager: April Zou
May 14, 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	FHID-65S-EX39-850 Lamp in Philips Lighting C52	FHID-65S-EX39-850
Luminous Efficacy (Lumens /Watt)	136.3	197.1
Total Luminous Flux (Lumens)	8702.6	12601.6
Power (Watts)	63.85	63.93
Power Factor	0.9941	0.9942
CCT (K)	4930	4897
CRI	83.6	82.8
Stabilization Time (Light & Power)	50 mins	50 mins
Note	5000K	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	: Mar. 29, 2024
Date of Test	: Apr. 24, 2024
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



Sample in Philips Lighting C52

Equipment Under Test(EUT)

Name	: LED Lamp
Model	: FHID-65S-EX39-850
Electrical Ratings	: 120-277V, 50/60Hz Field-Adjustable 65W/55W/45W
Product Description	: 5000K

TEST RESULTS (Lamp in Philips Lighting C52)

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
Voltage frequency (Hz)	60	60
Test Current (A)	0.535	0.235
Power Factor	0.9941	0.9285
Test Power (W)	63.85	60.48
THD A%	8.01	12.35
Luminous Efficacy (lm/W)	136.3	140.3
Total Luminous Flux (lm)	8702.6	8487.2
Color Rendering Index (CRI)	83.6	
R9	14.7	
Correlated Color Temperature (CCT)(K)	4930	
Chromaticity Chroma x	0.3473	
Chromaticity Chroma y	0.3565	
Chromaticity Chroma u	0.2110	
Chromaticity Chroma v	0.3249	
Duv	0.0016	
Chromaticity Chroma u'	0.2110	
Chromaticity Chroma v'	0.4874	

Special Color Rendering Indices	
R1	82
R2	89
R3	92.8
R4	82
R5	81.5
R6	83.4
R7	88.5
R8	69.5
R9	14.7
R10	72.4
R11	80.2
R12	57.1
R13	84
R14	96.1

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)	0.534
Power Factor	0.9940
Power (W)	63.80
Luminous Efficacy (lm/W)	136.8
Total Luminous Flux (lm)	8727.4
Beam Angle (°)	335.9 (0°-180°) / 336.5 (90°-270°)
Center Beam Candle Power (cd)	7.22
Zonal Lumens in the 0°-60° Zone	35.79%
Zonal Lumens in the 60°-90° Zone	53.15%
Zonal Lumens in the 90°-120° Zone	7.89%
Zonal Lumens in the 120°-180° Zone	3.18%

Table 3: Test data per Goniophotometer Method

Spectral Power Distribution - Sphere Spectroradiometer Method

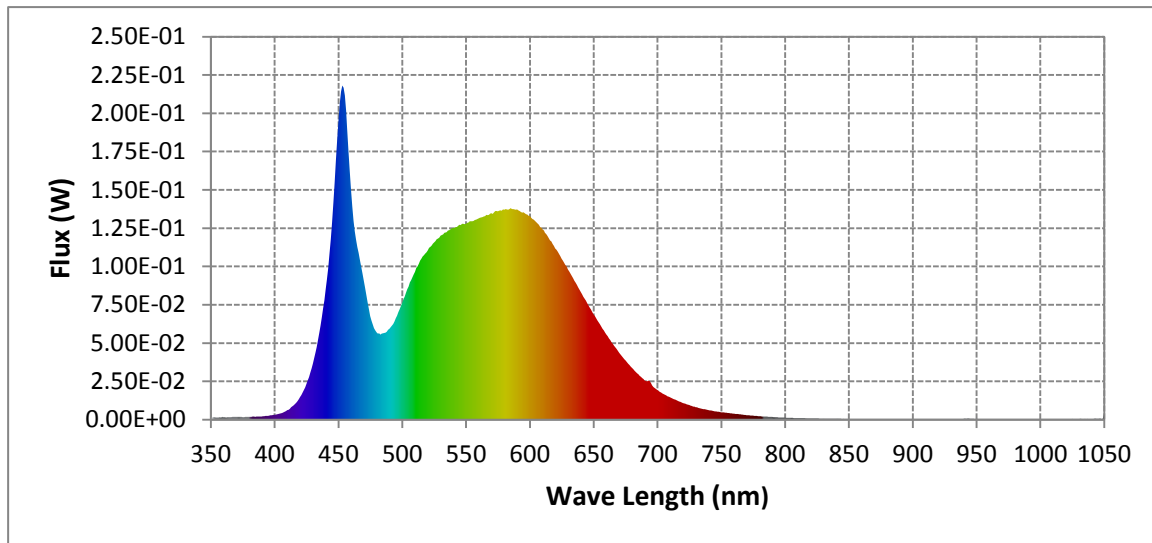
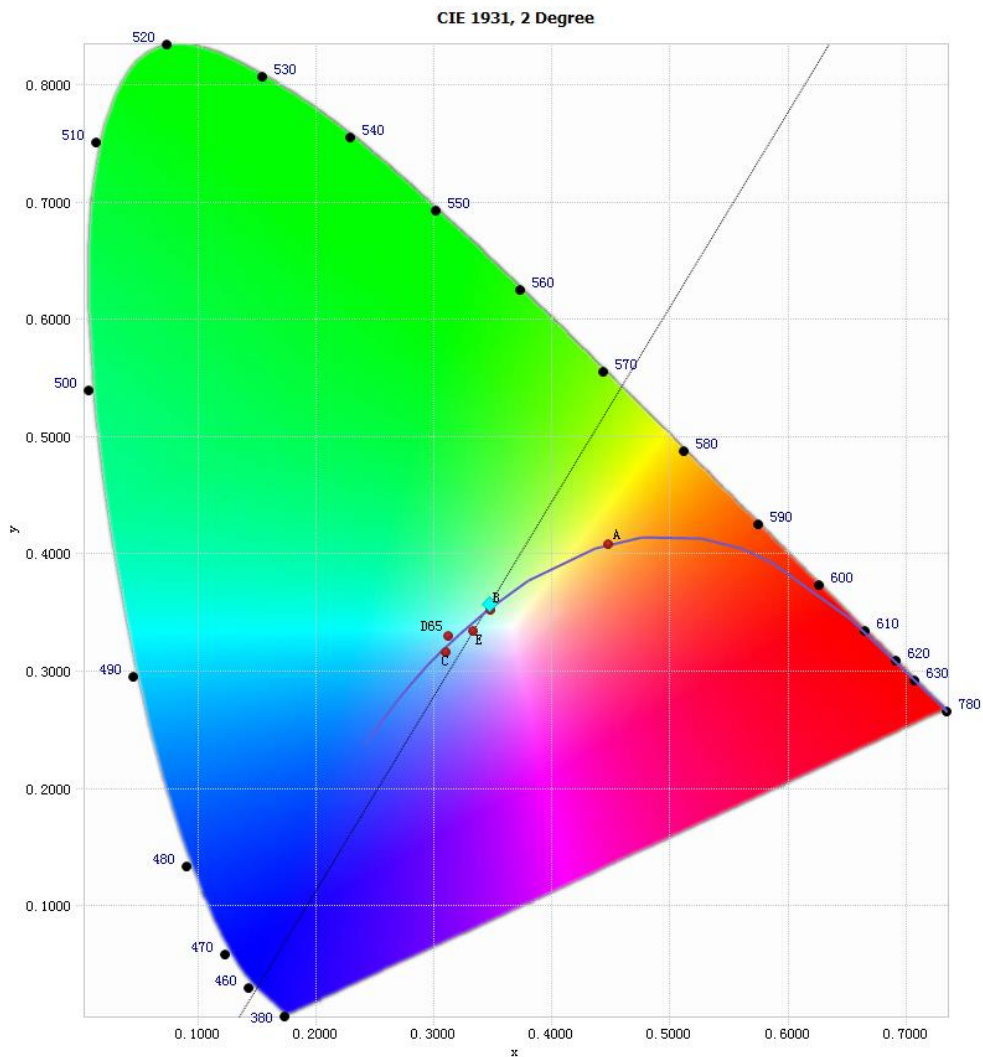


Chart 1: Spectral Power Distribution

Spectral Distribution over Visible Wavelength							
WL(nm)	Radiant(Watts)	WL(nm)	Radiant(Watts)	WL(nm)	Radiant(Watts)	WL(nm)	Radiant(Watts)
380	1.88E-03	485	5.64E-02	590	1.37E-01	695	2.41E-02
385	1.92E-03	490	5.92E-02	595	1.35E-01	700	1.94E-02
390	2.15E-03	495	6.63E-02	600	1.33E-01	705	1.68E-02
395	2.49E-03	500	7.63E-02	605	1.29E-01	710	1.45E-02
400	3.13E-03	505	8.70E-02	610	1.24E-01	715	1.26E-02
405	4.24E-03	510	9.64E-02	615	1.18E-01	720	1.09E-02
410	6.18E-03	515	1.05E-01	620	1.12E-01	725	9.49E-03
415	9.35E-03	520	1.11E-01	625	1.05E-01	730	8.19E-03
420	1.47E-02	525	1.16E-01	630	9.80E-02	735	7.15E-03
425	2.34E-02	530	1.20E-01	635	9.07E-02	740	6.23E-03
430	3.67E-02	535	1.22E-01	640	8.34E-02	745	5.52E-03
435	5.67E-02	540	1.25E-01	645	7.59E-02	750	4.88E-03
440	8.50E-02	545	1.27E-01	650	6.88E-02	755	4.42E-03
445	1.29E-01	550	1.28E-01	655	6.22E-02	760	4.01E-03
450	1.95E-01	555	1.29E-01	660	5.56E-02	765	3.47E-03
455	2.12E-01	560	1.31E-01	665	4.96E-02	770	3.00E-03
460	1.51E-01	565	1.33E-01	670	4.37E-02	775	2.62E-03
465	1.13E-01	570	1.35E-01	675	3.85E-02	780	2.30E-03
470	9.08E-02	575	1.36E-01	680	3.38E-02		
475	6.78E-02	580	1.37E-01	685	2.96E-02		
480	5.69E-02	585	1.38E-01	690	2.58E-02		

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

Chromaticity Diagram - Sphere Spectroradiometer Method



Tristimulus values(x, y): (0.3473, 0.3565)

Chart 2: Chromaticity Diagram per Sphere - Spectroradiometer Method

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

Nominal CCT Quadrangles – Sphere Spectroradiometer Method

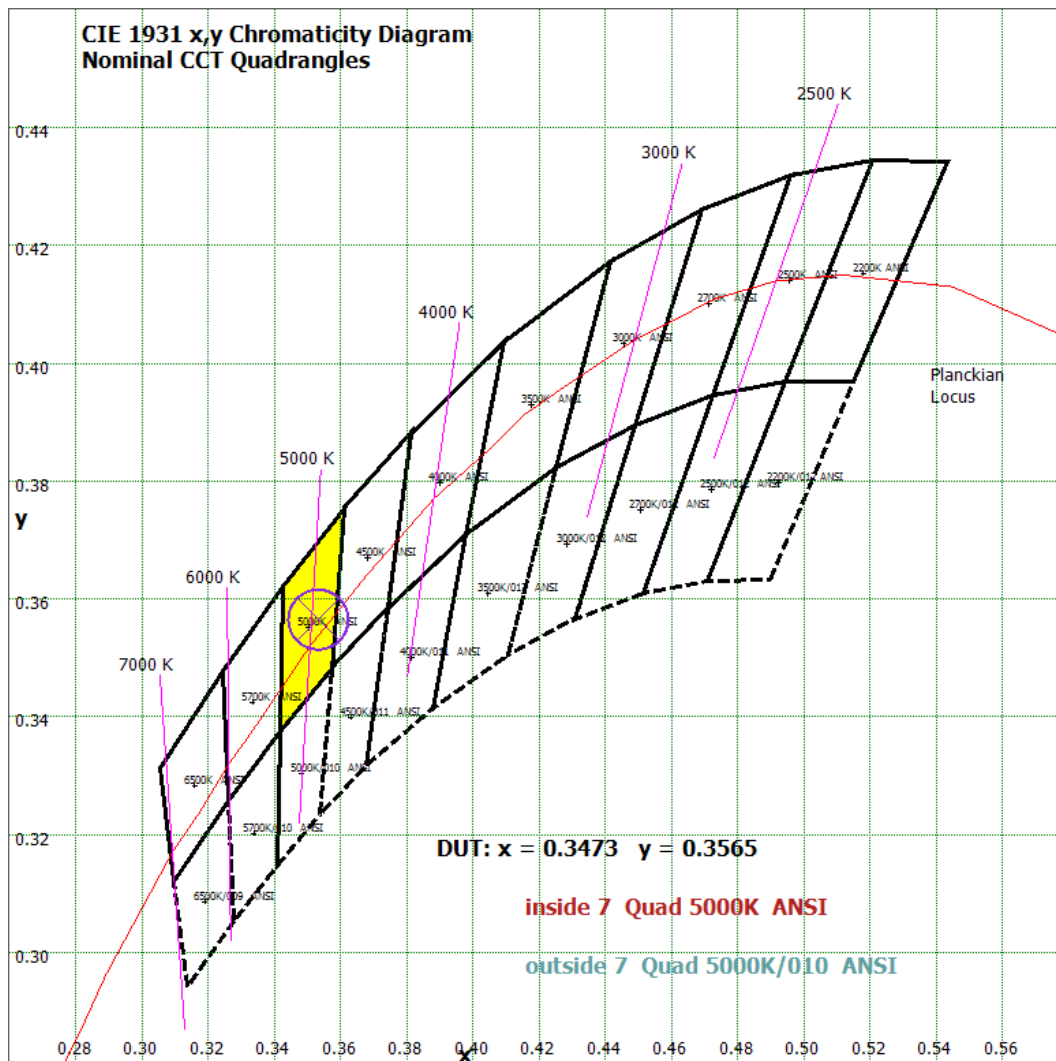


Chart 3: Plot of Lamp x/y coordinates on CIE 1931 Chromaticity Diagram

Color Rendition Report – Sphere Spectroradiometer Method

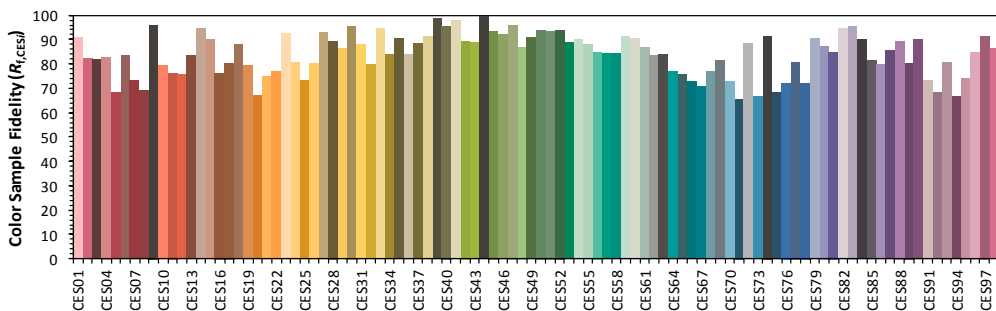
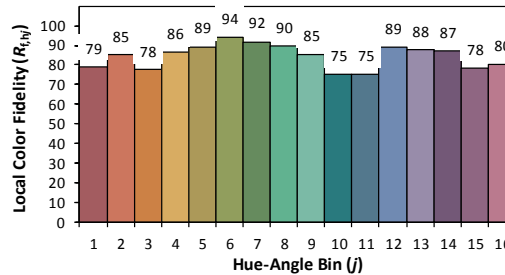
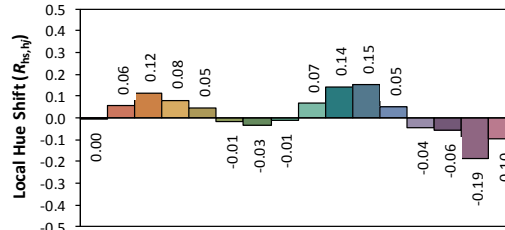
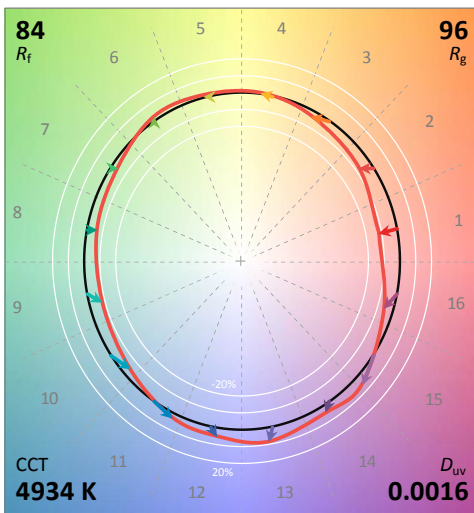
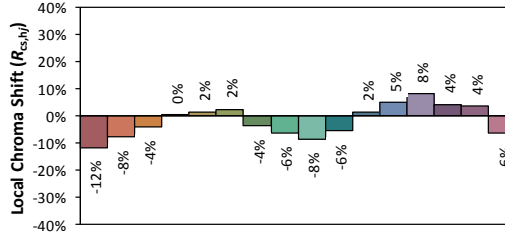
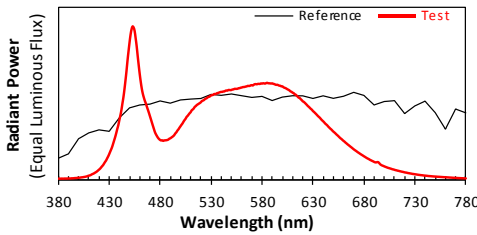
ANSI/IES TM-30-18 Color Rendition Report

Source: LED

Manufacturer: RAB LIGHTING INC

Date: 2024/04/24

Model: FHID-65S-EX39-850



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

x **0.3473**
 y **0.3565**
 u' **0.2110**
 v' **0.4874**

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 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	4.792	0.05%
10- 20	29.43	0.34%
20- 30	81.353	0.93%
30- 40	244.786	2.80%
40- 50	834.899	9.57%
50- 60	1927.849	22.09%
60- 70	2271.784	26.03%
70- 80	1687.998	19.34%
80- 90	678.626	7.78%
90-100	322.92	3.70%
100-110	213.744	2.45%
110-120	151.87	1.74%
120-130	126.6	1.45%
130-140	85.8	0.98%
140-150	44.761	0.51%
150-160	17.062	0.20%
160-170	2.982	0.03%
170-180	0.115	0.00%
Total	8727.4	100%

$\gamma(^{\circ})$	Lumens	% Total
0- 60	3123.11	35.79%
60- 90	4638.41	53.15%
0-90	7761.52	88.93%
90- 180	965.854	11.07%
0- 180	8727.4	100%

Table 5: Zonal Lumen

Illuminance Plots- Goniophotometer Method

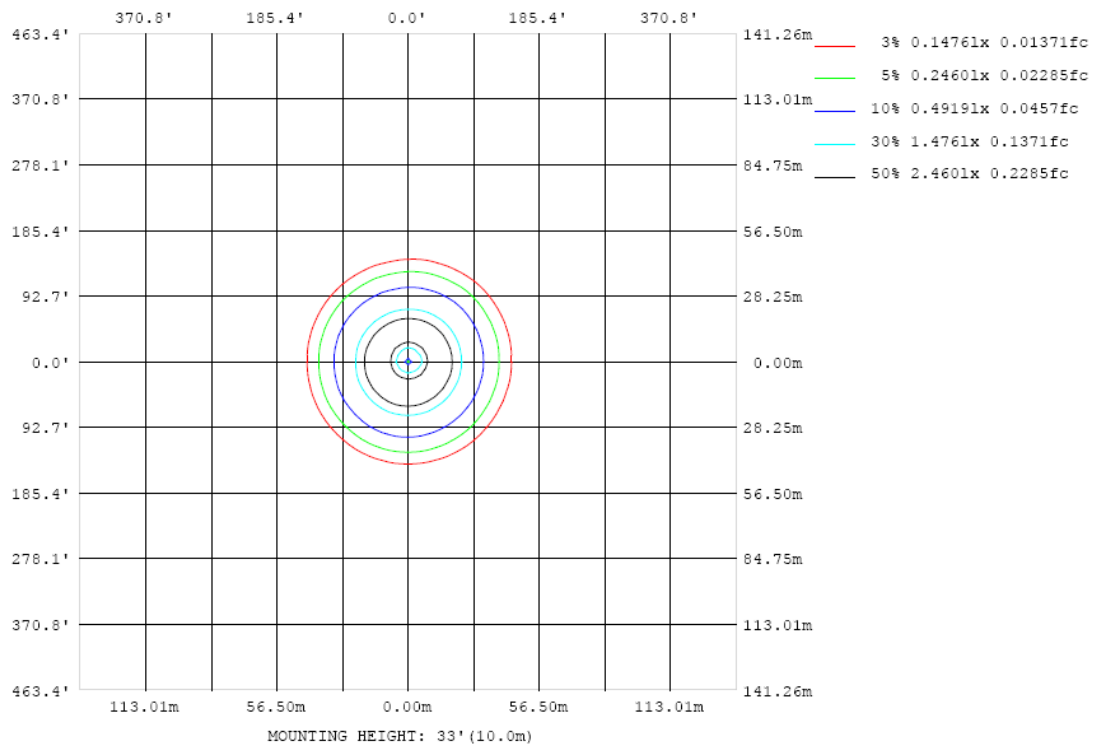


Chart 5: Illuminance Plot (Footcandles)

Luminous Intensity Distribution Plots- Goniophotometer Method

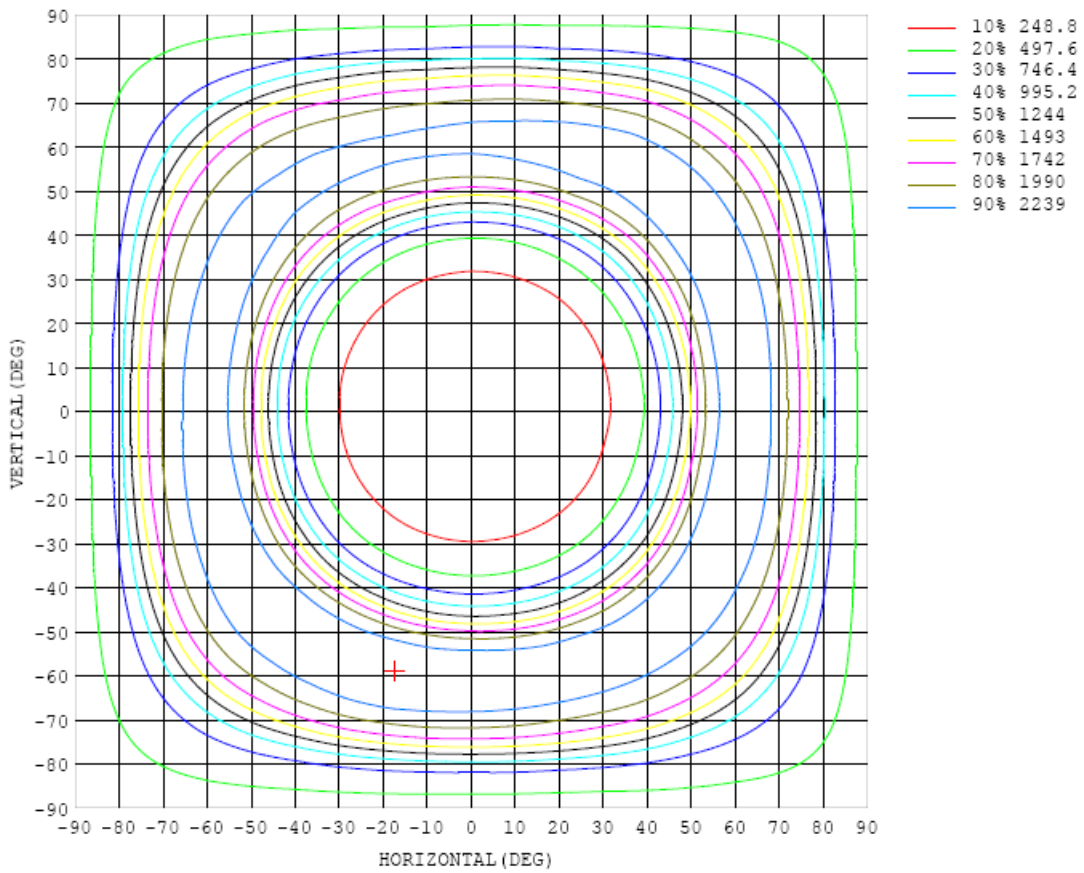


Chart 6: Isocandela Plot

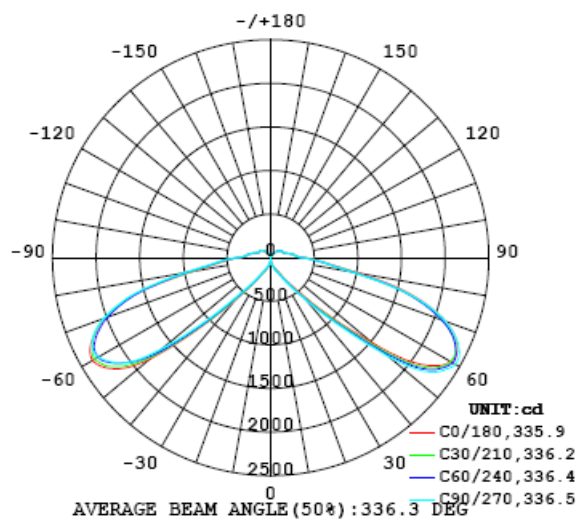


Chart 7: Polar Candela Distribution

Luminous Intensity Data- Goniophotometer Method

Table--1 UNIT: cd

C (DEG) \ γ (DEG)	0	10	20	30	40	50	60	70	80	90	100	110	120	130	140	150	160	170	180
0	7.22	7.22	7.22	7.22	7.22	7.22	7.22	7.22	7.22	7.22	7.22	7.22	7.22	7.22	7.22	7.22	7.22	7.22	7.22
5	34.0	38.4	39.4	41.3	43.1	44.4	45.5	46.1	45.6	45.0	44.8	44.5	44.2	43.8	43.2	43.1	42.6	41.4	40.8
10	70.0	73.1	73.4	76.4	78.5	78.5	77.8	78.1	82.1	83.0	83.7	83.4	82.4	81.2	77.4	77.5	77.9	78.2	77.3
15	93.5	98.7	99.8	102	103	105	105	107	110	111	112	112	111	111	108	108	105	106	104
20	121	128	130	132	134	137	139	143	145	146	147	148	148	147	146	145	142	141	139
25	157	163	166	169	172	175	178	181	184	185	186	187	188	187	186	184	182	181	178
30	214	225	230	235	240	246	252	256	259	259	260	262	262	262	262	260	257	255	251
35	335	350	358	366	374	382	392	398	404	404	406	411	410	407	407	406	402	397	391
40	539	566	584	591	601	610	622	634	639	643	650	653	653	650	650	649	641	638	634
45	920	958	975	980	990	1005	1023	1043	1058	1074	1083	1099	1116	1118	1118	1122	1110	1114	1098
50	1526	1584	1592	1604	1624	1642	1677	1699	1729	1764	1792	1817	1845	1850	1848	1837	1832	1828	1800
55	2145	2197	2200	2198	2206	2211	2241	2245	2268	2290	2289	2303	2301	2301	2304	2279	2255	2245	2220
60	2382	2419	2390	2380	2379	2380	2406	2422	2431	2445	2448	2485	2472	2431	2433	2419	2401	2362	2356
65	2359	2379	2346	2334	2331	2325	2331	2351	2367	2372	2385	2408	2393	2353	2334	2338	2313	2279	2263
70	2132	2132	2110	2094	2083	2094	2086	2095	2114	2133	2139	2145	2127	2102	2085	2086	2062	2043	2015
75	1694	1697	1668	1658	1652	1655	1641	1643	1657	1658	1667	1665	1662	1634	1616	1620	1612	1593	1583
80	1024	1002	980	970	963	971	958	941	945	940	935	932	930	915	925	919	904	904	906
85	617	611	615	597	593	594	583	588	586	590	584	592	585	586	580	582	581	572	567
90	400	395	388	383	381	379	373	373	375	374	374	377	376	375	378	378	377	372	367
95	283	284	283	283	283	285	283	284	285	285	285	288	287	285	285	285	285	282	279
100	248	249	247	247	247	247	245	245	244	243	243	246	245	244	244	245	245	244	242
105	198	198	197	196	195	195	194	193	193	193	193	196	196	195	196	196	196	196	195
110	162	163	163	163	164	165	164	164	165	165	165	165	163	161	161	161	161	160	160
115	148	152	153	154	155	156	156	157	159	161	159	158	156	154	153	151	150	148	149
120	145	147	148	149	150	150	150	152	154	154	153	152	152	150	150	150	149	147	147
125	141	143	142	141	141	141	139	141	143	142	141	140	140	139	138	139	138	138	138
130	129	127	125	123	122	120	120	121	121	121	121	122	122	122	122	122	123	123	122
135	112	109	106	105	103	103	102	102	103	103	103	105	106	106	106	107	107	107	107
140	92.2	89.9	88.3	86.4	84.8	84.0	83.4	82.8	82.4	82.0	82.1	82.6	83.3	83.8	84.0	84.6	85.3	85.5	86.1
145	70.7	68.5	67.0	65.8	64.8	64.2	63.7	63.0	62.6	62.8	62.8	63.5	63.6	63.6	64.1	64.6	65.1	65.1	65.4
150	53.6	52.5	51.4	50.5	49.5	48.8	48.4	47.7	46.9	46.5	46.6	46.8	46.9	47.1	47.6	48.1	48.7	49.4	50.1
155	36.6	35.5	34.7	34.0	33.3	32.8	32.6	32.4	31.8	31.6	31.8	31.8	31.6	31.7	31.8	32.2	32.8	33.6	34.2
160	21.3	20.4	19.7	19.3	19.0	18.6	18.4	18.2	17.9	17.4	17.2	17.3	17.4	17.4	17.7	18.0	18.4	19.0	19.6
165	8.36	8.00	7.88	7.71	7.53	7.32	7.21	7.13	7.03	6.90	6.84	6.79	6.87	6.98	7.07	7.22	7.41	7.69	8.03
170	1.87	1.66	1.58	1.55	1.54	1.51	1.53	1.59	1.64	1.67	1.75	1.80	1.82	1.81	1.82	1.83	1.80	1.77	1.75
175	1.00	1.01	1.03	1.04	1.05	1.06	1.08	1.08	1.09	1.10	1.10	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.10
180	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05

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	7.22	7.22	7.22	7.22	7.22	7.22	7.22	7.22	7.22	7.22	7.22	7.22	7.22	7.22	7.22	7.22	7.22		
5	38.2	37.1	36.3	35.0	34.1	33.4	32.7	32.1	31.3	30.6	30.4	30.1	29.8	30.7	31.3	32.0	32.9		
10	72.8	71.3	72.4	71.6	70.4	69.2	67.7	64.7	63.7	64.0	63.6	65.1	62.5	64.5	67.3	68.5	69.4		
15	102	100	99.3	97.4	95.7	94.2	92.9	89.9	89.0	88.1	89.1	87.3	87.3	88.6	90.5	91.4	92.6		
20	135	133	132	130	128	125	123	122	119	116	116	115	115	115	116	117	119		
25	175	173	170	167	164	161	159	157	154	152	152	151	151	151	152	154	156		
30	243	239	235	229	224	219	216	213	210	207	207	206	206	208	209	211	212		
35	380	375	371	365	358	349	341	336	330	329	326	327	326	325	326	329	332		
40	619	606	604	596	585	568	558	542	529	531	532	535	534	534	537	535	535		
45	1080	1061	1065	1064	1043	1029	1006	981	964	949	938	933	930	925	921	920	918		
50	1776	1768	1744	1726	1718	1703	1698	1655	1617	1618	1607	1601	1574	1559	1553	1531	1521		
55	2213	2200	2177	2142	2128	2110	2102	2109	2111	2109	2127	2148	2125	2127	2149	2137	2157		
60	2369	2340	2329	2302	2292	2282	2277	2279	2278	2296	2334	2359	2364	2382	2378	2372	2377		
65	2259	2257	2252	2232	2234	2218	2216	2231	2257	2272	2311	2353	2362	2374	2369	2358	2390		
70	2025	2028	2030	2021	2007	1986	1994	2000	2034	2061	2094	2121	2153	2151	2148	2151	2147		
75	1607	1600	1606	1615	1600	1579	1596	1588	1626	1667	1678	1709	1755	1740	1722	1726	1715		
80	935	940	944	947	964	973	982	979	998	1032	1024	1053	1078	1079	1066	1070	1040		
85	588	592	602	600	608	603	609	601	620	631	623	635	644	642	639	638	622		
90	379	381	387	387	391	390	393	390	401	406	404	412	415	418	417	415	405		
95	283	285	286	286	287	285	284	282	285	285	285	288	288	286	285	285	284		
100	247	249	251	252	254	252	252	249	252	251	249	251	250	249	248	248	247		
105	201	203	205	205	206	205	205	203	204	204	203	203	203	202	202	201	199		
110	165	166	167	167	168	167	168	167	167	167	166	166	166	165	164	163	162		
115	152	153	152	151	151	149	150	150	149	149	148	147	148	148	147	147	147		
120	149	148	148	147	147	146	147	147	147	147	147	145	145	145	145	144	145		
125	143	143	145	145	146	145	146	146	145	146	146	146	146	145	144	143	142		
130	128	129	130	132	133	133	134	134	134	136	138	137	136	136	135	133	131		
135	111	112	113	115	117	118	119	119	119	120	122	122	121	120	119	116	114		
140	90.2	91.7	93.9	95.6	97.4	98.6	100	101	100	101	102	102	100	99.7	98.8	96.4	94.6		
145	68.0	69.3	70.9	71.7	72.9	74.0	75.5	76.1	76.0	76.5	77.1	77.3	76.6	76.6	75.8	74.3	72.6		
150	52.2	53.2	54.8	55.6	56.5	57.3	58.3	58.8	58.3	58.3	58.7	58.7	58.3	57.8	57.5	56.4	54.9		
155	36.0	36.8	37.5	38.0	38.4	38.8	39.1	39.4	39.4	39.7	39.9	40.0	39.5	39.3	38.8	38.2	37.2		
160	20.9	21.3	22.1	22.9	23.4	23.7	23.8	23.8	23.8	23.8	23.9	23.9	23.6	23.3	23.0	22.5	22.0		
165	8.79	9.25	9.77	10.3	10.6	10.8	10.8	10.8	10.5	10.3	10.2	10.0	9.89	9.65	9.30	9.00	8.67		
170	1.89	1.96	2.05	2.11	2.17	2.22	2.30	2.38	2.43	2.41	2.35	2.26	2.17	2.14	2.06	1.99	1.94		
175	1.10	1.09	1.08	1.07	1.06	1.05	1.04	1.02	1.01	1.00	0.99	0.98	0.98	0.97	0.98	0.98	0.99		
180	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05		

Table 7: Luminous Intensity Data

TEST RESULTS (Bare Lamp)

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
Voltage frequency (Hz)	60	60
Test Current (A)	0.536	0.235
Power Factor	0.9942	0.9311
Test Power (W)	63.93	60.61
THD A%	8.18	12.56
Luminous Efficacy (lm/W)	197.1	202.0
Total Luminous Flux (lm)	12601.6	12243.1
Color Rendering Index (CRI)	82.8	
R9	9.6	
Correlated Color Temperature (CCT)(K)	4897	
Chromaticity Chroma x	0.3483	
Chromaticity Chroma y	0.3568	
Chromaticity Chroma u	0.2116	
Chromaticity Chroma v	0.3251	
Duv	0.0013	
Chromaticity Chroma u'	0.2116	
Chromaticity Chroma v'	0.4876	

Special Color Rendering Indices	
R1	81
R2	88.5
R3	92.8
R4	81.2
R5	80.7
R6	82.8
R7	87.7
R8	67.6
R9	9.6
R10	71.4
R11	79.4
R12	56.6
R13	83.1
R14	96.1

Table 8: 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 2.47 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)	0.537
Power Factor	0.9945
Power (W)	64.04
Luminous Efficacy (lm/W)	197.3
Total Luminous Flux (lm)	12633
Beam Angle (°)	351.1 (0°-180°) / 353.2 (90°-270°)
Center Beam Candle Power (cd)	69.8
Maximum Beam Candle Power (cd)	1429 (At: C=180.0, Gamma=85.5)
Spacing Criteria	5.98 (0°-180°) / 5.76 (90°-270°)
Zonal Lumens in the 0°-60° Zone	20.92%
Zonal Lumens in the 60°-90° Zone	30.85%
Zonal Lumens in the 90°-120° Zone	30.03%
Zonal Lumens in the 120°-180° Zone	18.20%

Table 9: Test data per Goniophotometer Method

Spectral Power Distribution - Sphere Spectroradiometer Method

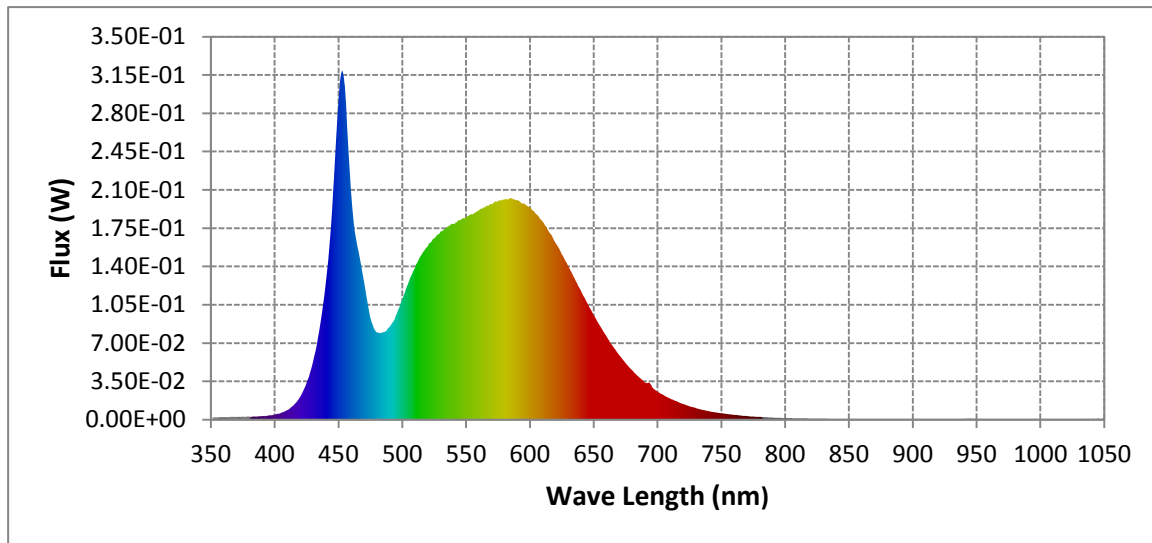
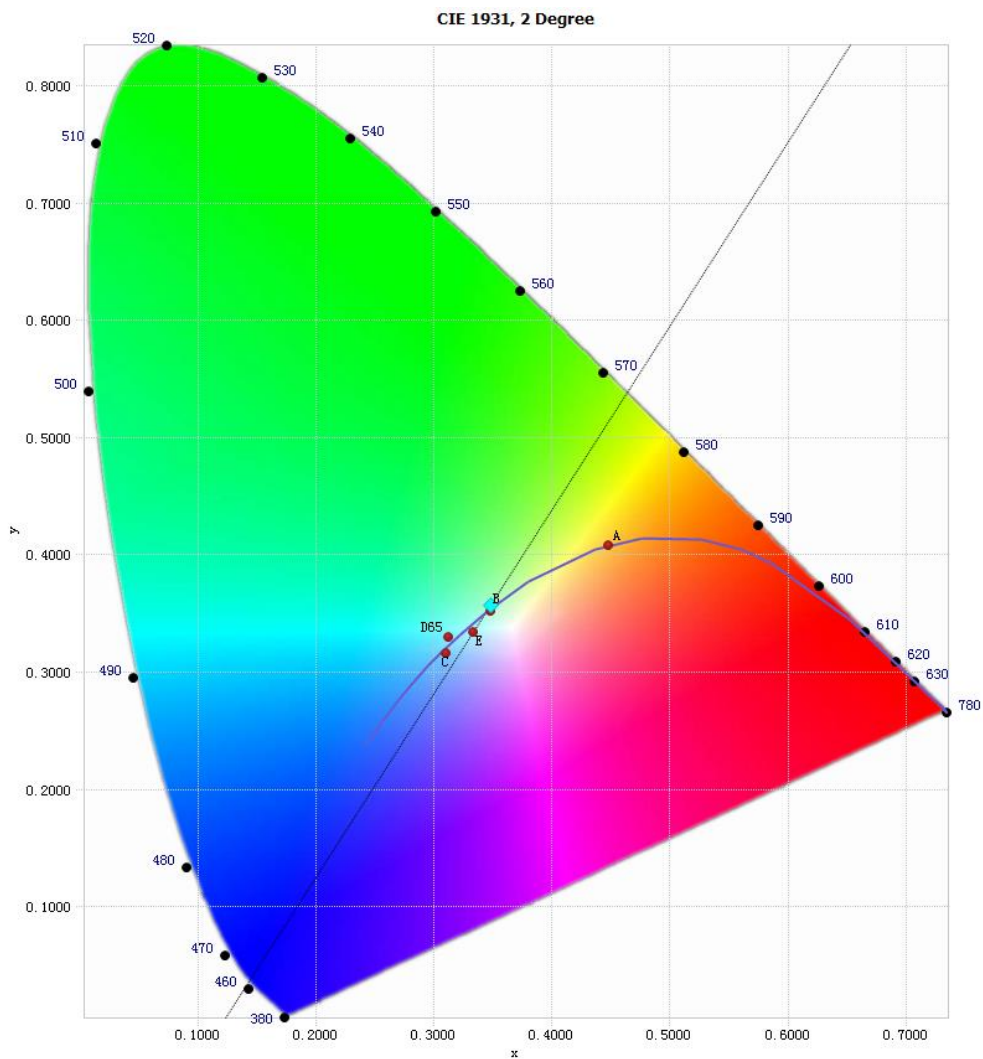


Chart 8: Spectral Power Distribution

Spectral Distribution over Visible Wavelength							
WL(nm)	Radiant(Watts)	WL(nm)	Radiant(Watts)	WL(nm)	Radiant(Watts)	WL(nm)	Radiant(Watts)
380	2.86E-03	485	7.99E-02	590	2.01E-01	695	3.20E-02
385	2.79E-03	490	8.45E-02	595	1.98E-01	700	2.58E-02
390	3.12E-03	495	9.49E-02	600	1.94E-01	705	2.24E-02
395	3.72E-03	500	1.10E-01	605	1.88E-01	710	1.92E-02
400	4.55E-03	505	1.26E-01	610	1.81E-01	715	1.68E-02
405	6.06E-03	510	1.39E-01	615	1.72E-01	720	1.43E-02
410	8.82E-03	515	1.51E-01	620	1.62E-01	725	1.24E-02
415	1.33E-02	520	1.59E-01	625	1.52E-01	730	1.07E-02
420	2.08E-02	525	1.66E-01	630	1.41E-01	735	9.16E-03
425	3.32E-02	530	1.72E-01	635	1.30E-01	740	7.85E-03
430	5.23E-02	535	1.75E-01	640	1.18E-01	745	6.75E-03
435	8.16E-02	540	1.79E-01	645	1.07E-01	750	5.86E-03
440	1.24E-01	545	1.82E-01	650	9.55E-02	755	5.12E-03
445	1.91E-01	550	1.85E-01	655	8.57E-02	760	4.40E-03
450	2.92E-01	555	1.88E-01	660	7.62E-02	765	3.82E-03
455	3.05E-01	560	1.91E-01	665	6.72E-02	770	3.34E-03
460	2.10E-01	565	1.94E-01	670	5.90E-02	775	2.83E-03
465	1.59E-01	570	1.97E-01	675	5.17E-02	780	2.53E-03
470	1.28E-01	575	2.00E-01	680	4.53E-02		
475	9.38E-02	580	2.01E-01	685	3.94E-02		
480	7.97E-02	585	2.03E-01	690	3.42E-02		

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

Chromaticity Diagram - Sphere Spectroradiometer Method



Tristimulus values(x, y): (0.3483, 0.3568)

Chart 9: 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

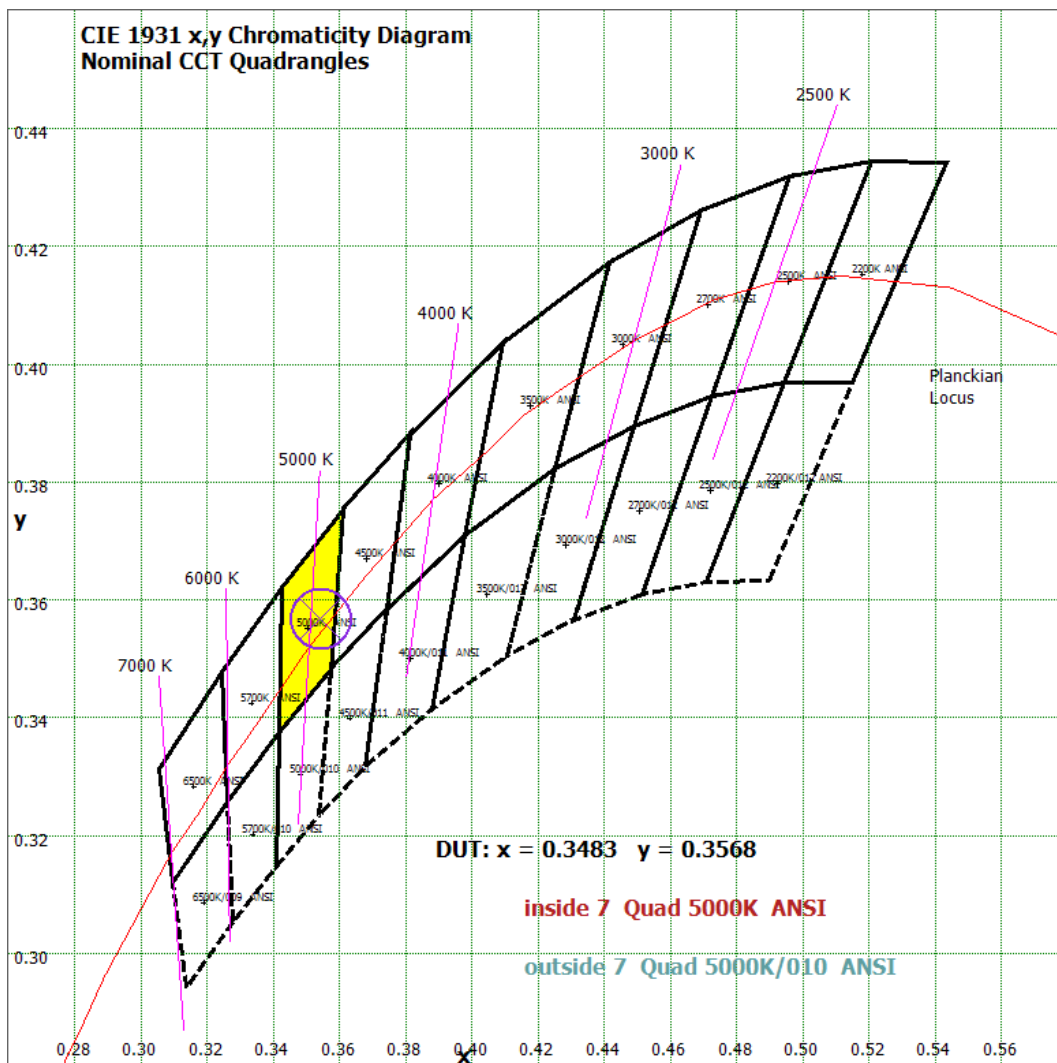


Chart 10: Plot of Lamp x/y coordinates on CIE 1931 Chromaticity Diagram

Color Rendition Report – Sphere Spectroradiometer Method

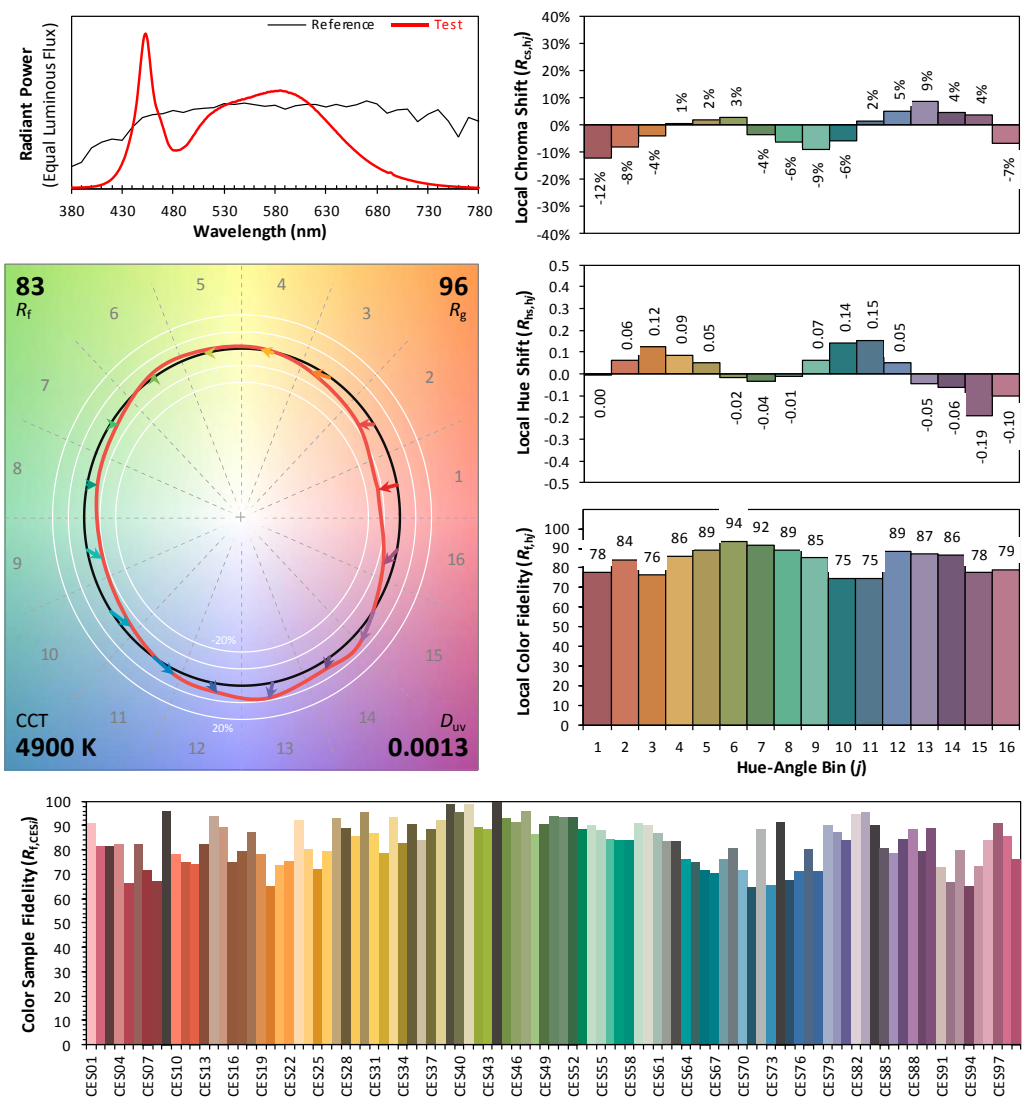
ANSI/IES TM-30-18 Color Rendition Report

Source: LED

Manufacturer: RAB LIGHTING INC

Date: 2024/04/24

Model: FHID-65S-EX39-850



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

x 0.3483
 y 0.3568
 u' 0.2116
 v' 0.4876

CIE 13.3-1995 (CRI)	
R_a	83
R_g	10

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

Chart 11: 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	14.571	0.12%
10- 20	98.18	0.78%
20- 30	271.021	2.15%
30- 40	503.941	3.99%
40- 50	756.999	5.99%
50- 60	997.667	7.90%
60- 70	1193.147	9.44%
70- 80	1323.123	10.47%
80- 90	1381.357	10.93%
90-100	1370.077	10.85%
100-110	1287.621	10.19%
110-120	1135.871	8.99%
120-130	928.453	7.35%
130-140	682.479	5.40%
140-150	425.518	3.37%
150-160	196.136	1.55%
160-170	59.582	0.47%
170-180	7.227	0.06%
Total	12633.0	100%

$\gamma(^{\circ})$	Lumens	% Total
0-130	11262	89.15%
130-180	1370.94	10.85%
0-180	12633.0	100%

Table 11: Zonal Lumen

Illuminance Plots- Goniophotometer Method

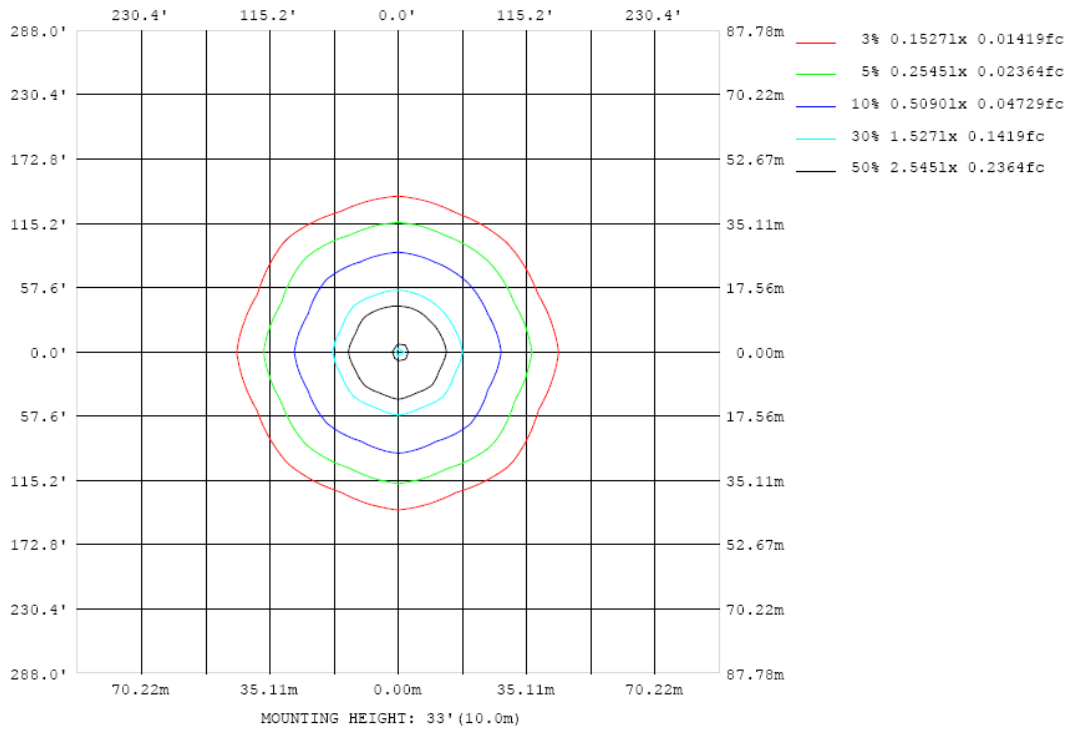


Chart 12: Illuminance Plot (Footcandles)

Luminous Intensity Distribution Plots- Goniophotometer Method

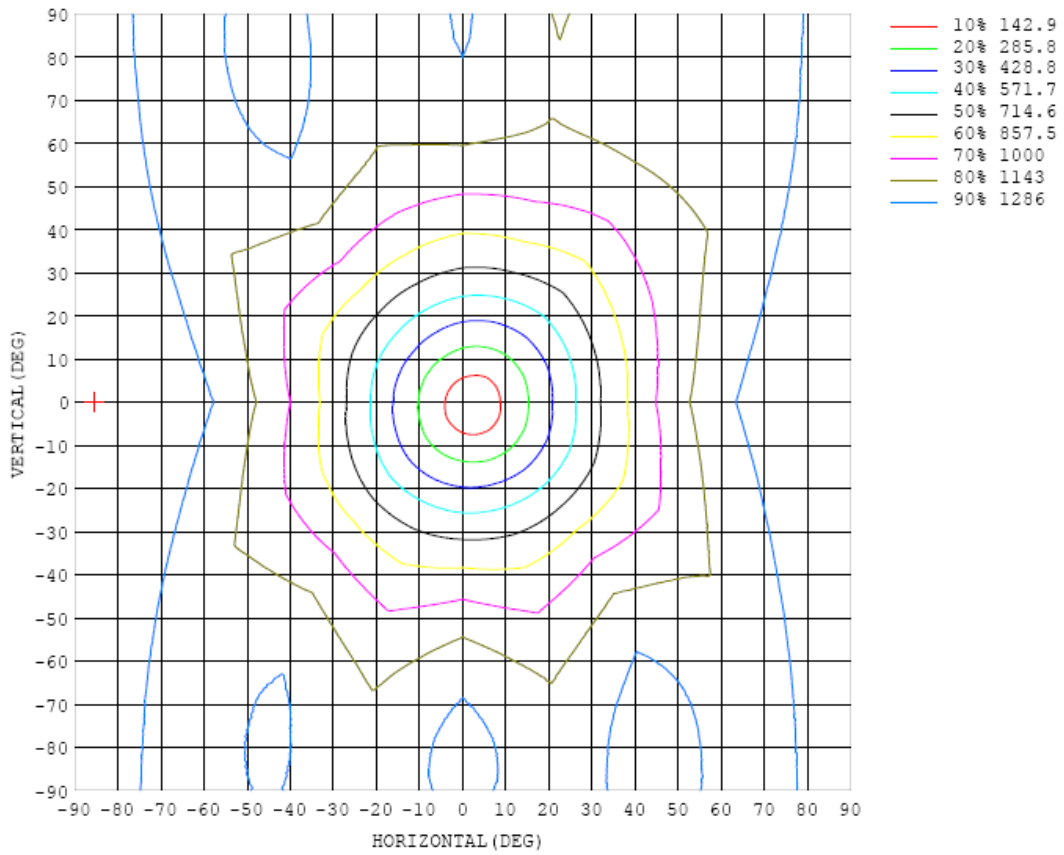


Chart 13 Isocandela Plot

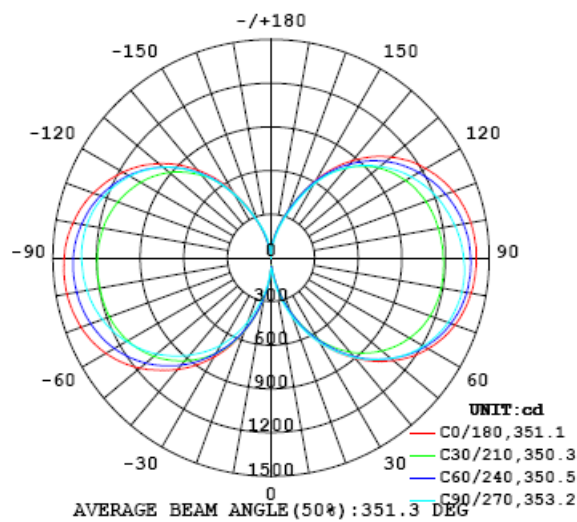


Chart 14: Polar Candela Distribution

Luminous Intensity Data- Goniophotometer Method

Table--1 UNIT: cd

C (DEG) \ γ (DEG)	0	22.5	45	67.5	90	112.5	135	157.5	180	202.5	225	247.5	270	292.5	315	337.5			
0	69.8	69.8	69.8	69.8	69.8	69.8	69.8	69.8	69.8	69.8	69.8	69.8	69.8	69.8	69.8	69.8			
5	78.5	72.5	75.8	86.9	105	124	139	154	163	162	158	147	131	115	96.1	84.2			
10	169	162	165	180	200	223	243	267	280	280	271	255	234	205	182	169			
15	280	273	277	294	317	335	358	383	399	401	396	371	340	313	290	280			
20	406	395	402	421	435	455	474	509	533	528	522	499	465	432	408	399			
25	539	524	531	544	556	578	597	638	667	651	645	619	583	553	523	529			
30	667	642	652	660	673	689	710	746	786	756	756	730	693	669	637	651			
35	788	750	767	760	785	782	820	842	900	845	865	832	786	777	736	766			
40	898	844	884	848	891	863	917	924	1000	922	961	918	872	869	822	866			
45	1005	923	984	922	988	932	1007	996	1092	992	1046	989	953	949	903	949			
50	1097	994	1074	986	1074	992	1087	1056	1178	1052	1124	1053	1027	1017	973	1019			
55	1181	1054	1157	1043	1150	1043	1157	1106	1250	1101	1190	1098	1091	1070	1042	1075			
60	1248	1100	1220	1090	1210	1084	1212	1144	1313	1138	1244	1136	1148	1109	1099	1114			
65	1304	1138	1277	1130	1258	1121	1256	1174	1357	1166	1288	1162	1196	1135	1149	1144			
70	1346	1164	1316	1160	1297	1150	1286	1197	1392	1183	1320	1174	1235	1150	1191	1161			
75	1377	1181	1347	1181	1319	1171	1305	1208	1412	1192	1344	1180	1265	1153	1223	1169			
80	1397	1187	1366	1195	1333	1187	1309	1217	1426	1196	1357	1183	1286	1150	1251	1170			
85	1407	1189	1374	1202	1335	1196	1308	1220	1429	1197	1364	1178	1297	1141	1270	1164			
90	1411	1184	1371	1203	1324	1202	1301	1221	1422	1194	1360	1172	1304	1129	1280	1159			
95	1407	1177	1364	1205	1309	1203	1279	1218	1410	1187	1348	1161	1300	1116	1280	1146			
100	1393	1169	1345	1196	1283	1199	1255	1205	1383	1173	1323	1146	1288	1102	1270	1134			
105	1372	1154	1315	1181	1252	1188	1216	1186	1348	1151	1293	1128	1264	1083	1246	1119			
110	1333	1134	1276	1164	1216	1168	1168	1158	1300	1122	1248	1102	1227	1058	1214	1095			
115	1286	1104	1232	1132	1168	1137	1116	1121	1243	1082	1196	1064	1180	1024	1170	1068			
120	1230	1066	1171	1093	1114	1096	1053	1076	1177	1037	1132	1022	1122	986	1117	1029			
125	1161	1020	1109	1043	1050	1045	986	1021	1100	980	1057	969	1052	939	1053	985			
130	1079	963	1031	982	978	981	914	951	1008	914	971	907	967	885	974	931			
135	983	892	941	911	899	899	828	869	904	832	870	829	867	819	886	865			
140	872	805	841	821	809	805	735	766	789	740	761	739	755	737	789	787			
145	750	714	730	719	707	689	631	652	664	636	638	637	635	641	672	695			
150	617	600	607	597	582	558	512	514	523	502	501	511	505	523	549	580			
155	473	471	471	454	440	415	376	375	380	368	368	377	371	394	419	448			
160	344	344	344	329	316	290	262	259	261	259	258	267	266	284	302	326			
165	240	242	240	229	215	190	169	162	162	155	161	180	186	199	211	230			
170	157	161	157	140	128	113	96.4	88.5	81.9	65.9	75.1	100.0	114	129	140	151			
175	83.1	84.8	83.8	74.6	62.2	55.8	47.2	38.7	26.7	25.1	26.4	39.8	53.8	64.0	72.5	78.6			
180	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.82	0.82	0.81	0.82	0.79	0.76	0.74	0.76			

Table 12: Luminous Intensity Data

EQUIPMENT LIST

Test Equipment	Model	Equipment No.	Calibration Date	Calibration Due date
Goniophotometer system	GO-R5000	HZTE011-01	Feb. 18, 2024	-
Digital Power Meter	PF2010A	HZTE028-01	Aug. 01, 2023	Jul. 31, 2024
AC Power Supply	DPS1060	HZTE001-06	Aug. 01, 2023	Jul. 31, 2024
DC Power Supply	WY12010	HZTE004-03	Aug. 01, 2023	Jul. 31, 2024
Temperature recorder	JM624U	HZTE018-08	Aug. 04, 2023	Aug. 03, 2024
Temperature and humidity recorder	JR900	HZTE018-01	Aug. 04, 2023	Aug. 03, 2024
Standard source	D908	HZTE012-01	Aug. 14, 2018	-
Integrate Sphere system	3M	HZTE015-04	Feb. 18, 2024	-
Digital Power Meter	WT210	HZTE008-01	Aug. 01, 2023	Jul. 31, 2024
AC Power Supply	PCR 500L	HZTE001-07	Aug. 01, 2023	Jul.31, 2024
DC Power Supply	IT6154	HZTE004-04	Aug. 01, 2023	Jul. 31, 2024
Standard source	SCL-1400	HZTE012-06	Nov. 04, 2021	-
Temperature and humidity recorder	JR900	HZTE018-02	Aug. 04, 2023	Aug. 03, 2024
Temperature Meter	TES1310	HZTE017-01	Aug. 04, 2023	Aug. 03, 2024

Table 13: 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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