



LM-79-19 TEST REPORT

for

RAB LIGHTING INC

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

LED Lamp

Model: FHID-45S-EX39-8CCT

Laboratory: Leading Testing Laboratories

NVLAP CODE: 200960-0

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Report No.: HZ25040039d

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

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April Zou

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May 14, 2025

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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-45S-EX39-8CCT 3000K Setting	FHID-45S-EX39-8CCT 4000K Setting	FHID-45S-EX39-8CCT 5000K Setting
Luminous Efficacy (Lumens /Watt)	118.4	126.5	130.0
Total Luminous Flux (Lumens)	5582.3	5891.2	6060.4
Power (Watts)	47.16	46.56	46.62
Power Factor	0.9918	0.9914	0.9911
CCT (K)	3035	3867	4989
CRI	83.7	85.7	84.0
Stabilization Time (Light & Power)	50 mins	50 mins	50 mins
Note	3000K	4000K	5000K

Table 1: Executive Data Summary (**Lamp in Philips Lighting C52**)

Tested Model	FHID-45S-EX39-8CCT 3000K Setting	FHID-45S-EX39-8CCT 4000K Setting	FHID-45S-EX39-8CCT 5000K Setting
Luminous Efficacy (Lumens /Watt)	170.7	180.6	185.0
Total Luminous Flux (Lumens)	8024.9	8451.7	8659.0
Power (Watts)	47.02	46.79	46.80
Power Factor	0.9916	0.9917	0.9916
CCT (K)	2947	3771	4961
CRI	81.8	84.1	82.9
Stabilization Time (Light & Power)	50 mins	50 mins	50 mins
Note	3000K	4000K	5000K

Table 2: Executive Data Summary (**Bare Lamp**)

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

Test specifications:

Date of Receipt : Nov. 28, 2024
Date of Test : Feb. 21, 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



Figure 2-Sample in Philips Lighting C52

Equipment Under Test(EUT)

Name	: LED Lamp
Model	: FHID-45S-EX39-8CCT
Electrical Ratings	: 120-277V, 50/60Hz
Product Description	: Field-Adjustable 45W/38W/30W Color- Tunable 3000K/4000K/5000K

TEST RESULTS (Lamp in Philips Lighting C52) 3000K 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
Voltage frequency (Hz)	60	60
Test Current (A)	0.396	0.184
Power Factor	0.9918	0.8906
Test Power (W)	47.16	45.38
THD A%	8.87	10.42
Luminous Efficacy (lm/W)	118.4	120.4
Total Luminous Flux (lm)	5582.3	5463.3
Color Rendering Index (CRI)	83.7	
R9	14.4	
Correlated Color Temperature (CCT)(K)	3035	
Chromaticity Chroma x	0.4346	
Chromaticity Chroma y	0.4037	
Chromaticity Chroma u	0.2492	
Chromaticity Chroma v	0.3473	
Duv	0.0002	
Chromaticity Chroma u'	0.2492	
Chromaticity Chroma v'	0.5209	

Special Color Rendering Indices	
R1	82.4
R2	90.1
R3	96.4
R4	83
R5	82.1
R6	87.6
R7	85.1
R8	63.1
R9	14.4
R10	76.9
R11	82.7
R12	69.8
R13	84.1
R14	97.9

Table 3: 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)	0.396
Power Factor	0.9916
Power (W)	47.18
Luminous Efficacy (lm/W)	118.6
Total Luminous Flux (lm)	5595.8
Beam Angle (°)	332.4 (0°-180°) / 332.2 (90°-270°)
Center Beam Candle Power (cd)	8.68
Zonal Lumens in the 0 °-60 °Zone	39.82%
Zonal Lumens in the 60 °-90 °Zone	49.26%
Zonal Lumens in the 90 °-120 °Zone	7.59%
Zonal Lumens in the 120 °-180 °Zone	3.33%

Table 4: Test data per Goniophotometer Method

Spectral Power Distribution - Sphere Spectroradiometer Method

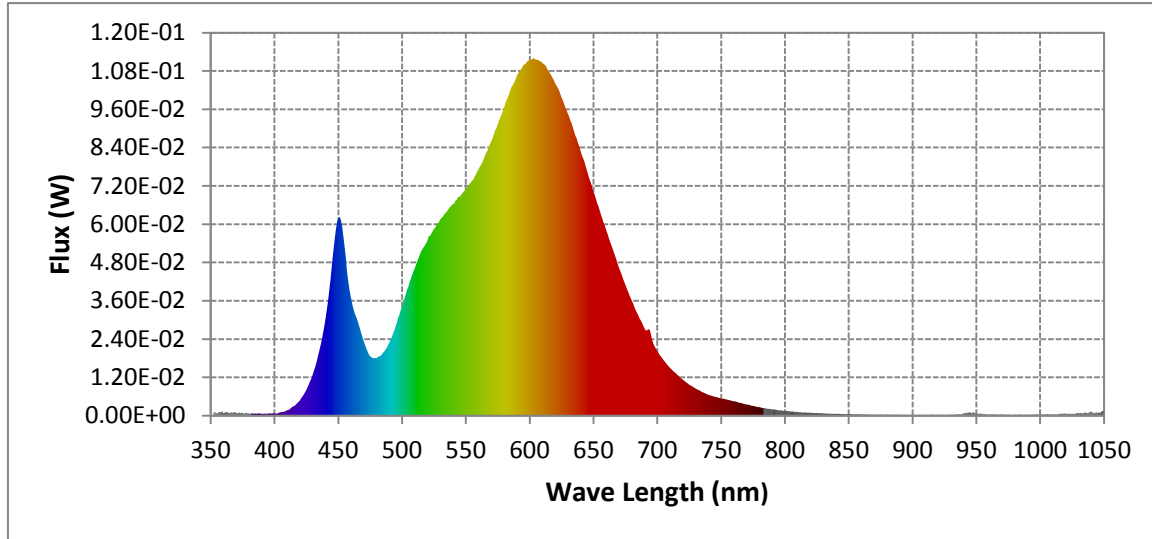
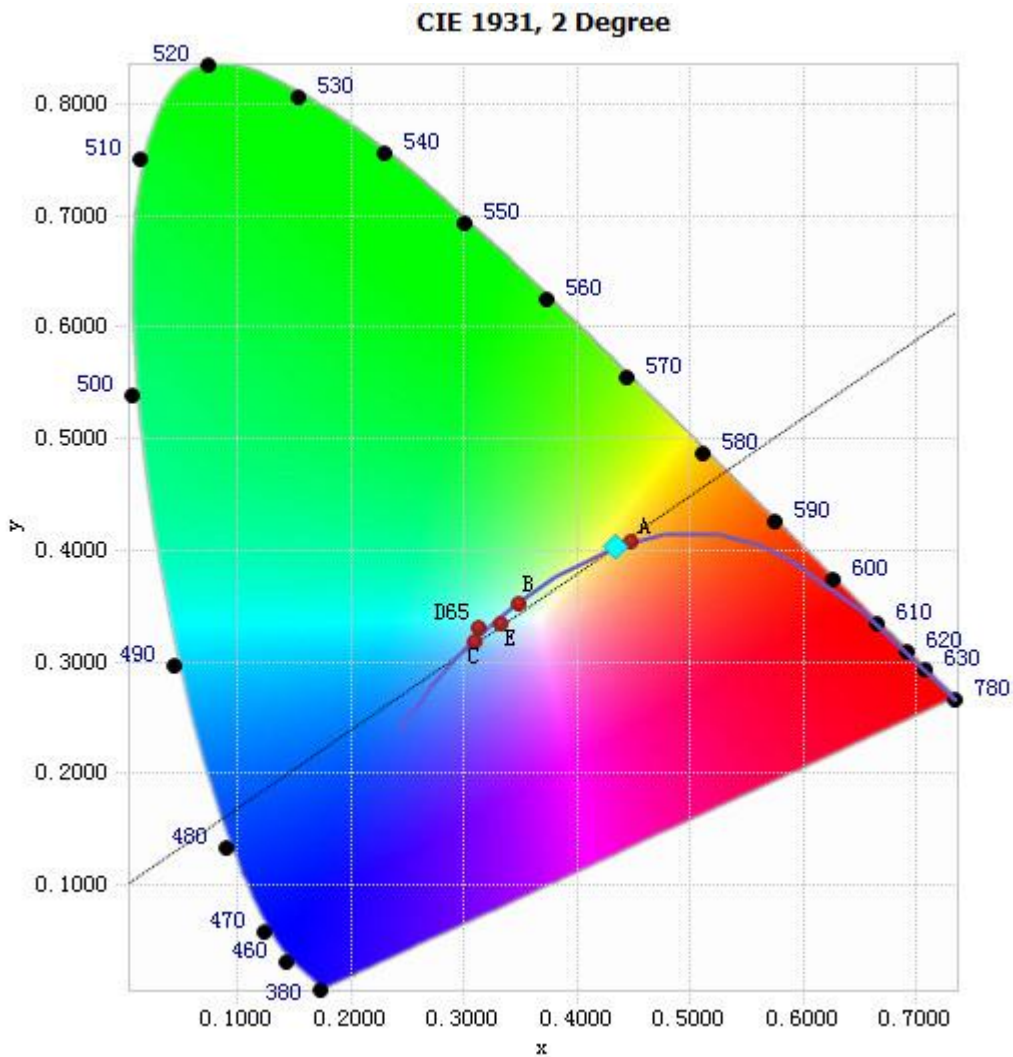


Chart 1: Spectral Power Distribution

Spectral Distribution over Visible Wavelength							
WL(nm)	Radiant(Watts)	WL(nm)	Radiant(Watts)	WL(nm)	Radiant(Watts)	WL(nm)	Radiant(Watts)
380	8.17E-04	485	1.96E-02	590	1.07E-01	695	2.59E-02
385	6.88E-04	490	2.28E-02	595	1.10E-01	700	2.04E-02
390	6.37E-04	495	2.80E-02	600	1.12E-01	705	1.74E-02
395	5.86E-04	500	3.42E-02	605	1.11E-01	710	1.50E-02
400	7.28E-04	505	4.04E-02	610	1.10E-01	715	1.31E-02
405	1.06E-03	510	4.62E-02	615	1.08E-01	720	1.13E-02
410	1.66E-03	515	5.15E-02	620	1.04E-01	725	9.74E-03
415	2.96E-03	520	5.51E-02	625	9.98E-02	730	8.48E-03
420	4.75E-03	525	5.85E-02	630	9.47E-02	735	7.46E-03
425	8.03E-03	530	6.16E-02	635	8.90E-02	740	6.61E-03
430	1.28E-02	535	6.38E-02	640	8.29E-02	745	5.97E-03
435	2.00E-02	540	6.63E-02	645	7.69E-02	750	5.45E-03
440	3.03E-02	545	6.85E-02	650	7.02E-02	755	5.03E-03
445	4.70E-02	550	7.09E-02	655	6.42E-02	760	4.55E-03
450	6.18E-02	555	7.36E-02	660	5.82E-02	765	4.04E-03
455	5.27E-02	560	7.71E-02	665	5.24E-02	770	3.53E-03
460	3.73E-02	565	8.13E-02	670	4.63E-02	775	3.08E-03
465	3.01E-02	570	8.60E-02	675	4.10E-02	780	2.68E-03
470	2.35E-02	575	9.12E-02	680	3.60E-02		
475	1.87E-02	580	9.66E-02	685	3.15E-02		
480	1.81E-02	585	1.02E-01	690	2.75E-02		

Table 5: Spectral Power Distribution Numerical Data per Sphere - Spectroradiometer Method

Chromaticity Diagram - Sphere Spectroradiometer Method



Tristimulus values(x, y): (0.4346, 0.4037)

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

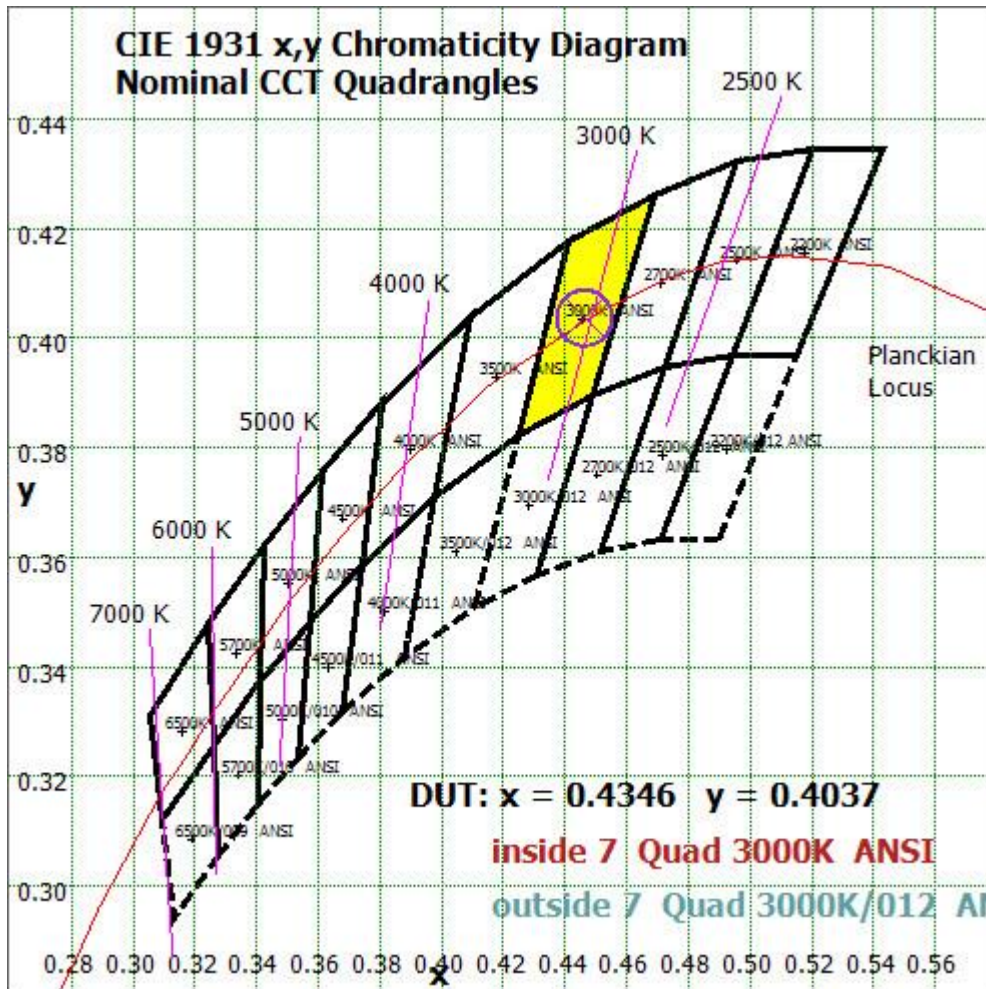


Chart 3: Plot of Lamp x/y coordinates on CIE 1931 Chromaticity Diagram

Color Rendition Report – Sphere Spectroradiometer Method

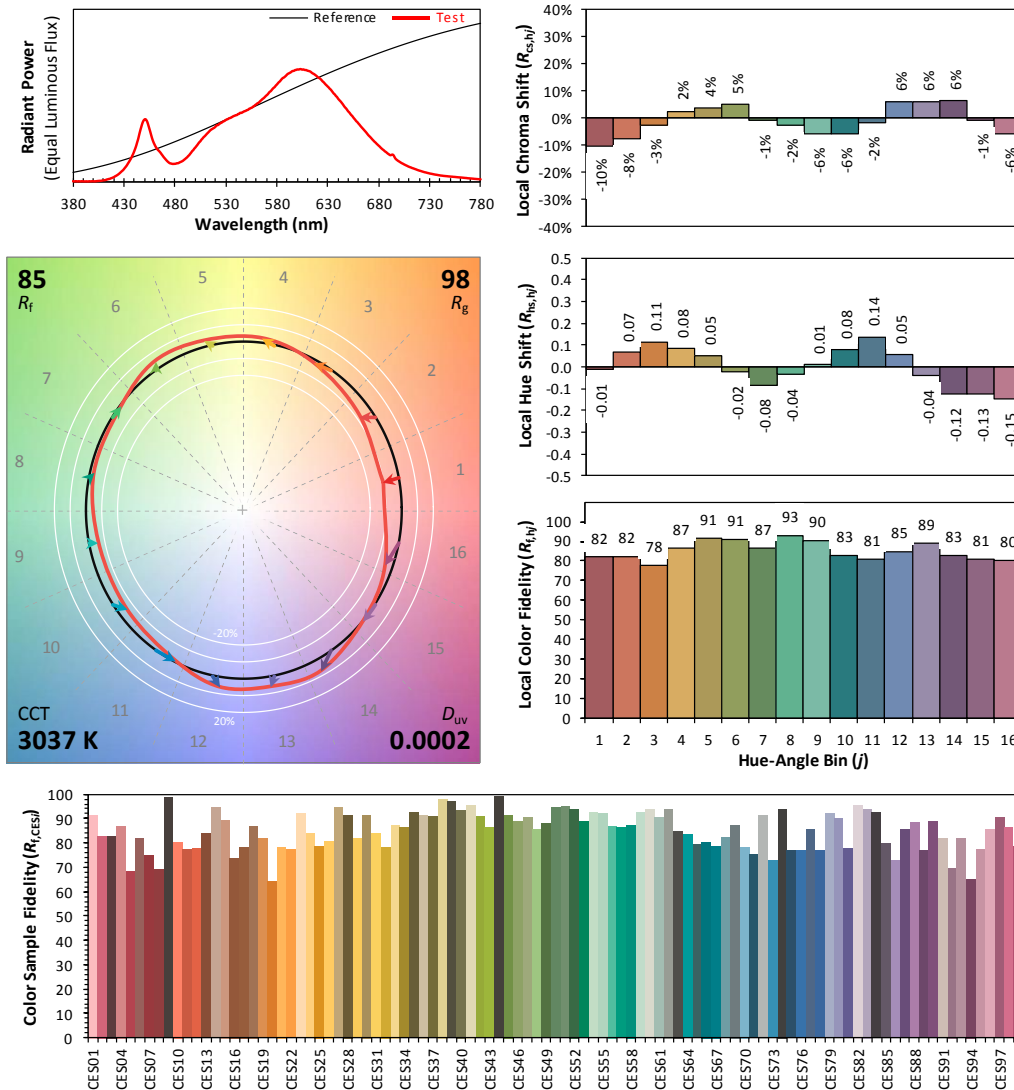
ANSI/IES TM-30-18 Color Rendition Report

Source: LED

Manufacturer: RAB LIGHTING INC

Date: 2025/02/21

Model: FHID-45S-EX39-8CCT



Notes: This is a recommended method for displaying ANSI/IES TM-30-18 information.	x	0.4346	CIE 13.3-1995 (CRI) R_a 84 R_9 15
	y	0.4037	
	u'	0.2492	
	v'	0.5209	

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 3 due to rounding.

Zonal Lumen Tabulation- Goniophotometer Method

$\gamma(^{\circ})$	Lumens	% Total
0- 10	3.309	0.06%
10- 20	20.626	0.37%
20- 30	61.796	1.10%
30- 40	178.898	3.20%
40- 50	629.588	11.25%
50- 60	1334.179	23.84%
60- 70	1450.21	25.92%
70- 80	956.531	17.09%
80- 90	349.598	6.25%
90-100	191.511	3.42%
100-110	131.975	2.36%
110-120	101.284	1.81%
120-130	86.24	1.54%
130-140	57.29	1.02%
140-150	29.557	0.53%
150-160	11.134	0.20%
160-170	1.98	0.04%
170-180	0.081	0.00%
Total	5595.8	100%

$\gamma(^{\circ})$	Lumens	% Total
0- 60	2228.396	39.82%
60- 90	2756.339	49.26%
0-90	4984.735	89.08%
90- 180	611.052	10.92%
0- 180	5595.8	100%

Table 6: Zonal Lumen

Illuminance Plots- Goniophotometer Method

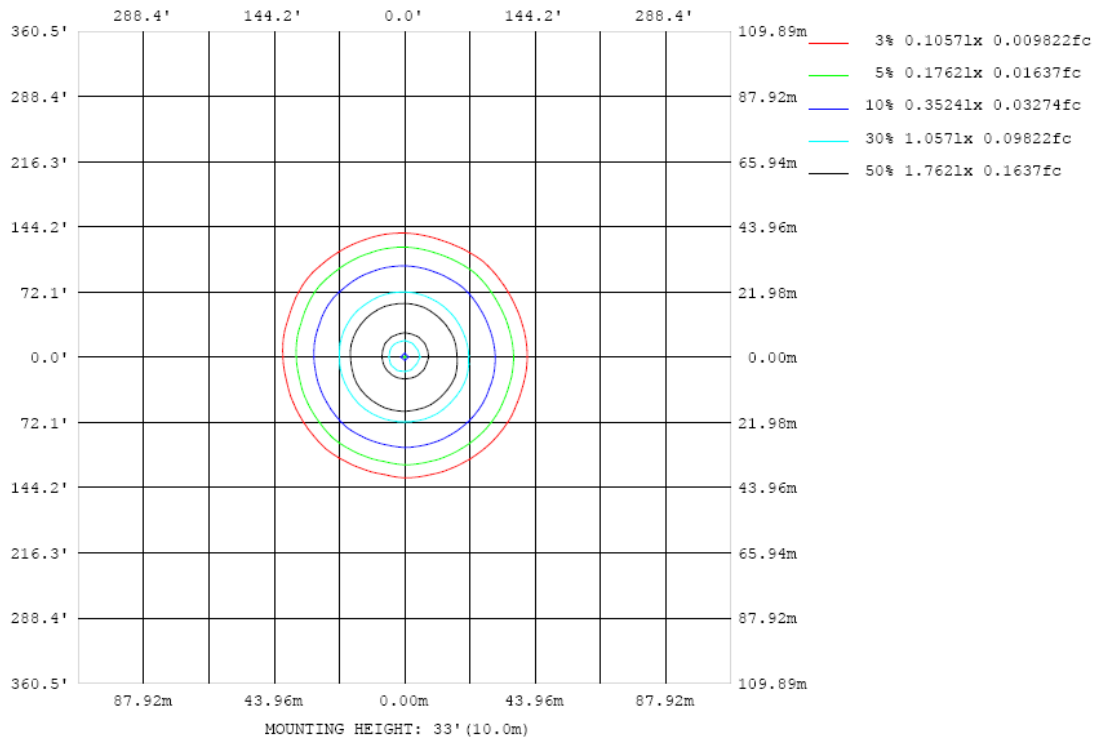


Chart 5: Illuminance Plot (Footcandles)

Luminous Intensity Distribution Plots- Goniophotometer Method

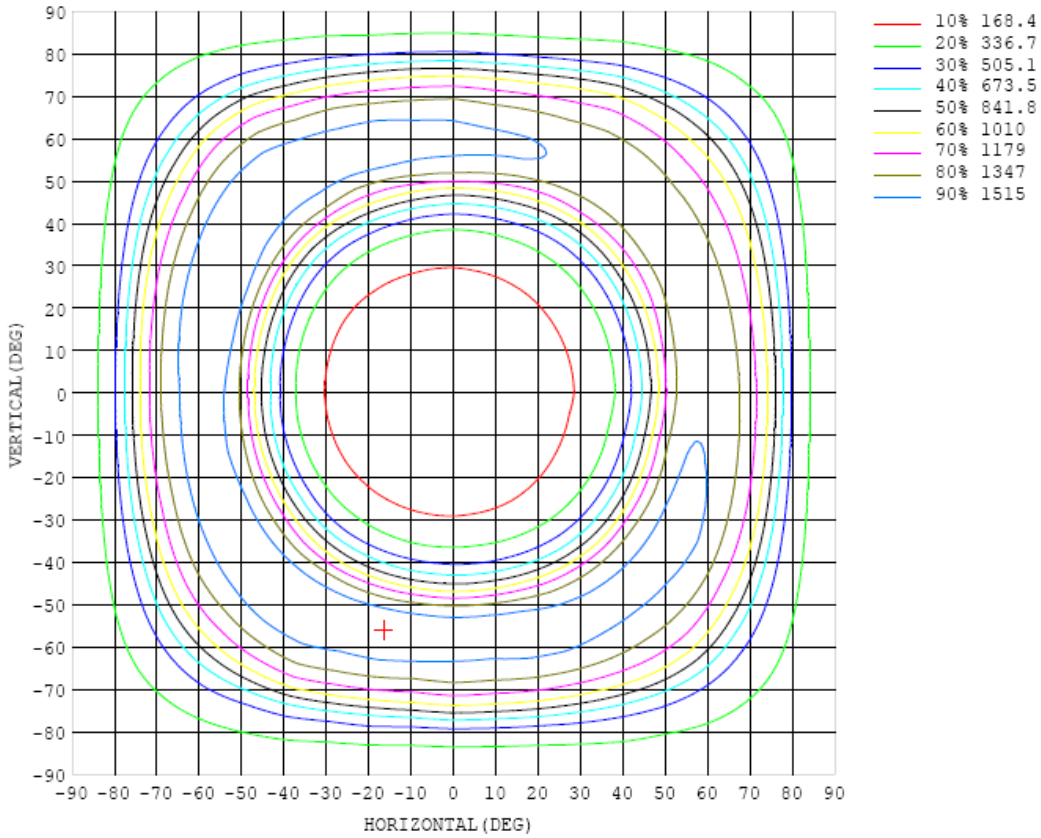


Chart 6: Isocandela Plot

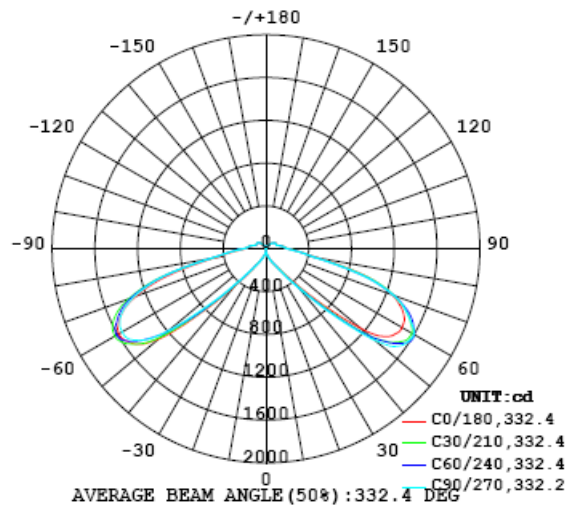


Chart 7: Polar Candela Distribution

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	8.68	8.68	8.68	8.68	8.68	8.68	8.68	8.68	8.68	8.68	8.68	8.68	8.68	8.68	8.68	8.68	8.68	8.68	8.68
5	26.6	28.8	30.2	31.2	31.8	32.5	32.7	32.8	32.6	33.3	33.6	32.6	31.9	31.2	30.8	30.3	29.9	29.2	29.0
10	49.2	53.9	54.6	54.4	52.8	52.9	54.2	56.9	57.3	55.7	55.7	56.3	55.9	55.0	53.8	53.2	51.9	49.1	48.7
15	70.8	75.8	76.0	76.1	74.3	73.9	73.6	75.3	75.7	75.4	74.9	74.7	73.9	72.9	71.7	70.6	69.5	68.4	67.7
20	96.4	103	103	103	103	102	102	102	102	101	100	99.4	98.9	97.8	96.7	95.4	94.2	92.1	91.0
25	131	140	141	141	142	141	139	138	138	135	134	132	130	128	127	125	124	122	121
30	183	190	188	186	184	183	182	182	182	181	180	180	178	177	174	171	168	165	163
35	255	273	272	272	275	281	287	288	289	291	288	289	291	289	286	281	274	270	267
40	405	434	440	446	452	456	463	474	475	480	488	490	488	483	480	483	472	454	449
45	707	757	767	778	778	790	802	820	834	835	845	849	849	859	866	872	853	822	813
50	1155	1229	1239	1272	1269	1267	1276	1310	1325	1328	1337	1325	1328	1333	1322	1332	1320	1316	1308
55	1421	1482	1512	1518	1518	1523	1542	1569	1571	1567	1594	1627	1590	1574	1592	1595	1571	1533	1538
60	1470	1527	1586	1574	1562	1574	1598	1601	1577	1594	1617	1635	1617	1610	1636	1643	1619	1578	1587
65	1417	1452	1486	1468	1461	1475	1495	1487	1466	1465	1462	1492	1496	1528	1524	1503	1494	1501	1504
70	1256	1264	1263	1274	1269	1267	1268	1266	1250	1267	1232	1252	1267	1311	1278	1261	1267	1257	1296
75	942	929	909	927	923	910	897	894	888	897	851	857	877	915	889	880	886	887	921
80	494	485	473	480	488	477	468	459	458	458	440	465	453	469	461	466	463	469	491
85	313	312	308	310	308	312	306	299	296	295	290	293	290	298	295	292	290	295	302
90	210	212	211	211	210	209	207	205	202	200	197	199	199	202	200	199	197	199	200
95	175	179	178	178	177	177	177	175	174	172	171	173	174	176	175	174	173	172	173
100	151	154	152	152	150	150	149	148	147	146	144	146	147	148	148	148	147	147	148
105	125	126	125	124	123	122	121	120	119	118	117	119	120	120	120	120	119	120	120
110	109	109	108	106	105	104	104	103	102	103	103	103	104	103	103	103	103	102	102
115	107	107	105	103	102	102	101	101	101	101	101	101	100	100	98.9	99.0	99.1	98.9	99.0
120	106	105	105	103	104	103	102	102	101	102	101	101	101	102	101	101	99.9	99.0	99.2
125	97.7	96.9	96.7	96.0	95.1	94.7	94.9	95.1	94.7	95.5	96.3	97.8	98.4	99.1	99.1	98.9	98.5	97.6	98.2
130	84.6	84.5	84.6	84.2	83.1	82.8	83.2	83.4	82.7	82.4	84.2	85.1	85.1	85.2	86.1	86.4	85.8	85.2	86.3
135	71.0	71.9	72.0	72.2	71.4	70.8	71.6	71.6	71.0	70.5	72.1	73.0	73.5	73.9	75.0	75.9	75.7	74.7	75.4
140	57.7	58.5	58.5	58.3	58.0	57.2	57.4	57.3	56.7	56.5	57.5	58.6	59.3	59.5	60.5	61.5	61.3	60.7	61.1
145	44.0	44.7	44.5	44.4	44.0	43.9	43.8	43.6	43.5	43.5	43.8	44.6	45.1	45.4	45.9	46.5	46.8	46.6	46.9
150	33.5	33.5	33.1	32.7	32.4	32.0	31.9	31.8	31.9	31.9	32.0	32.4	32.6	32.8	33.3	33.5	33.8	33.7	33.9
155	23.2	23.2	22.7	22.2	21.8	21.5	21.5	21.6	21.7	21.8	21.9	22.0	22.1	22.3	22.4	22.5	22.7	22.7	22.9
160	14.0	13.6	13.3	13.0	12.6	12.4	12.2	12.1	12.1	12.1	12.0	12.1	12.3	12.6	12.7	12.7	12.7	12.7	12.7
165	6.34	6.09	5.88	5.78	5.58	5.42	5.26	4.98	4.86	4.77	4.74	4.84	4.91	5.01	5.08	5.11	5.12	5.09	5.08
170	1.93	1.73	1.64	1.56	1.45	1.34	1.22	1.10	1.00	0.95	0.90	0.84	0.78	0.74	0.72	0.70	0.68	0.66	0.69
175	0.72	0.72	0.72	0.73	0.73	0.72	0.72	0.72	0.71	0.70	0.70	0.69	0.69	0.68	0.67	0.66	0.66	0.65	0.64
180	0.67	0.67	0.67	0.67	0.67	0.67	0.67	0.67	0.67	0.67	0.67	0.67	0.67	0.67	0.67	0.67	0.67	0.67	0.67

Table 7: 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	8.68	8.68	8.68	8.68	8.68	8.68	8.68	8.68	8.68	8.68	8.68	8.68	8.68	8.68	8.68	8.68	8.68		
5	26.6	25.4	25.0	24.4	23.8	22.9	22.0	21.0	20.0	19.5	19.9	20.3	20.8	21.5	22.1	23.3	25.0		
10	50.5	48.6	45.9	45.0	44.2	46.1	45.9	45.0	43.7	42.4	41.0	41.8	43.3	44.6	44.3	44.1	46.8		
15	66.9	67.2	63.8	62.5	62.4	64.3	64.4	64.6	64.5	64.7	64.5	64.9	65.6	67.5	67.2	67.7	69.5		
20	89.8	88.0	85.1	84.3	84.7	85.4	85.9	86.6	87.1	88.4	89.3	89.9	90.6	93.1	93.7	95.1	96.0		
25	121	120	118	118	119	119	119	119	119	121	123	125	126	129	130	131	132		
30	163	163	163	164	168	169	172	173	174	178	180	181	183	185	187	186	184		
35	261	257	249	246	244	246	248	245	241	245	251	255	252	254	258	259	256		
40	444	439	425	410	408	410	408	399	392	398	400	396	397	401	404	407	406		
45	803	791	764	740	740	745	740	728	706	704	701	694	694	700	706	708	710		
50	1305	1295	1275	1253	1234	1200	1182	1195	1193	1176	1147	1133	1148	1143	1134	1133	1156		
55	1598	1604	1549	1524	1523	1509	1515	1499	1491	1471	1461	1431	1393	1399	1407	1398	1420		
60	1653	1656	1633	1635	1620	1612	1610	1567	1554	1549	1537	1495	1461	1465	1469	1473	1467		
65	1547	1559	1571	1579	1552	1529	1531	1507	1501	1460	1437	1420	1412	1398	1380	1388	1401		
70	1316	1326	1362	1381	1341	1345	1322	1311	1318	1268	1255	1242	1258	1231	1203	1201	1220		
75	952	950	1002	1032	995	991	979	990	989	953	934	948	971	934	909	911	926		
80	497	505	528	543	534	537	531	536	536	511	497	500	516	507	499	491	500		
85	313	318	327	333	331	335	328	332	333	324	318	318	323	317	315	311	318		
90	207	210	213	214	213	215	214	215	215	212	211	212	214	211	210	209	211		
95	175	175	176	175	172	174	173	175	175	174	174	175	177	175	175	174	175		
100	151	151	151	151	149	151	151	152	153	152	152	153	154	153	153	152	152		
105	124	124	124	124	123	124	124	125	125	125	125	126	127	126	126	125	125		
110	105	105	105	104	104	104	104	105	106	106	106	107	108	109	109	108	109		
115	101	98.7	98.3	98.3	97.0	97.0	97.6	98.9	101	101	102	103	104	104	105	105	106		
120	101	98.8	98.1	98.2	96.0	96.7	96.9	98.2	101	100	101	102	103	102	103	105	106		
125	101	100	99.5	99.9	98.0	96.8	96.8	96.6	98.2	97.7	97.1	97.6	97.6	96.4	96.5	98.0	98.0		
130	91.7	91.9	90.6	90.5	90.5	88.8	88.7	87.5	88.1	87.4	86.5	85.8	85.2	85.0	84.6	85.6	84.7		
135	81.1	81.0	79.4	79.6	79.3	77.4	76.6	75.4	74.5	74.1	72.9	72.0	71.6	71.7	71.6	71.5	71.4		
140	65.2	65.3	64.6	65.0	65.2	64.2	63.1	62.3	61.3	61.3	60.4	59.5	58.9	59.0	59.2	58.4	57.8		
145	49.5	50.0	49.7	49.7	49.9	49.6	48.7	48.0	47.7	46.9	46.3	45.6	45.3	45.3	44.9	44.4	43.9		
150	35.8	36.1	36.3	36.6	36.8	36.9	36.6	36.4	36.4	36.0	35.7	35.5	35.1	35.1	34.9	34.2	33.7		
155	24.3	24.5	24.6	24.8	25.0	25.1	25.1	25.1	25.0	24.8	24.5	24.2	24.1	24.2	24.1	23.7	23.3		
160	13.7	13.9	14.1	14.3	14.6	14.8	15.0	15.1	15.1	15.0	14.9	15.0	14.9	15.0	15.0	14.7	14.3		
165	5.48	5.54	5.71	5.87	5.99	6.16	6.26	6.41	6.58	6.73	6.81	6.84	6.87	6.83	6.82	6.69	6.50		
170	0.88	1.02	1.17	1.32	1.44	1.58	1.69	1.77	1.83	1.88	1.91	1.95	2.01	2.05	2.06	2.05	2.00		
175	0.63	0.62	0.62	0.62	0.62	0.63	0.63	0.64	0.65	0.66	0.67	0.69	0.69	0.70	0.70	0.71	0.72		
180	0.67	0.67	0.67	0.67	0.67	0.67	0.67	0.67	0.67	0.67	0.67	0.67	0.67	0.67	0.67	0.67	0.67		

Table 8: Luminous Intensity Data

TEST RESULTS (Lamp in Philips Lighting C52) 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
Voltage frequency (Hz)	60	60
Test Current (A)	0.391	0.183
Power Factor	0.9914	0.8906
Test Power (W)	46.56	45.03
THD A%	8.90	10.34
Luminous Efficacy (lm/W)	126.5	130.3
Total Luminous Flux (lm)	5891.2	5868.6
Color Rendering Index (CRI)	85.7	
R9	25.6	
Correlated Color Temperature (CCT)(K)	3867	
Chromaticity Chroma x	0.3858	
Chromaticity Chroma y	0.3783	
Chromaticity Chroma u	0.2280	
Chromaticity Chroma v	0.3354	
Duv	-0.0008	
Chromaticity Chroma u'	0.2280	
Chromaticity Chroma v'	0.5031	

Special Color Rendering Indices	
R1	85.2
R2	90.9
R3	94.2
R4	85.1
R5	84.4
R6	86.7
R7	88.3
R8	70.7
R9	25.6
R10	77.2
R11	84.2
R12	62.6
R13	86.8
R14	96.6

Table 9: Test data per Sphere-Spectroradiometer Method

Note: According to CIE 1976 (u',v') diagram, $u' = u = 4x/(-2x+12y+3)$, $v' = 3v/2 = 9y/(-2x+12y+3)$.

Spectral Power Distribution - Sphere Spectroradiometer Method

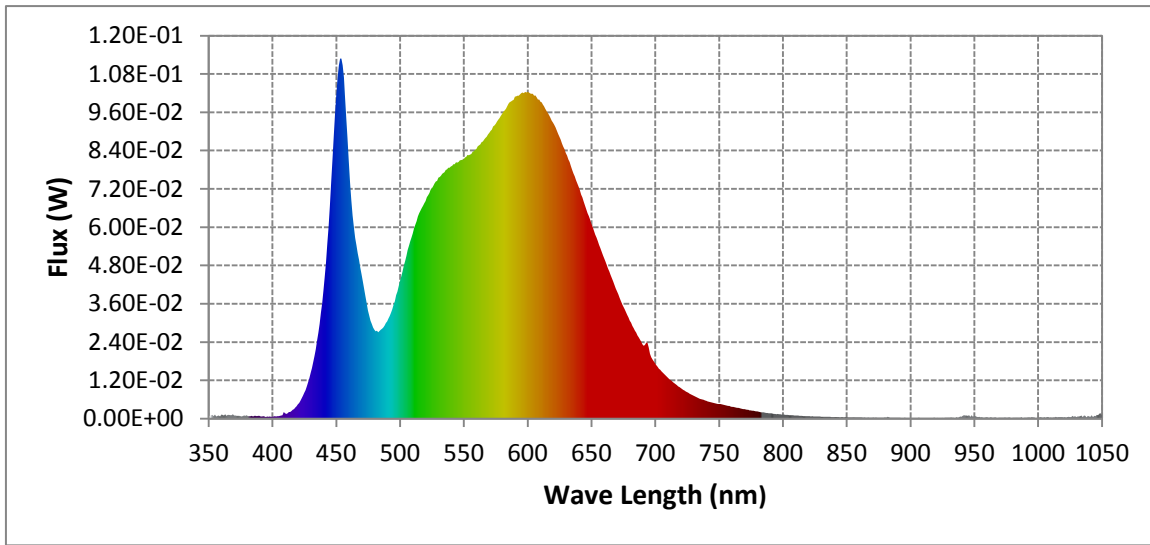
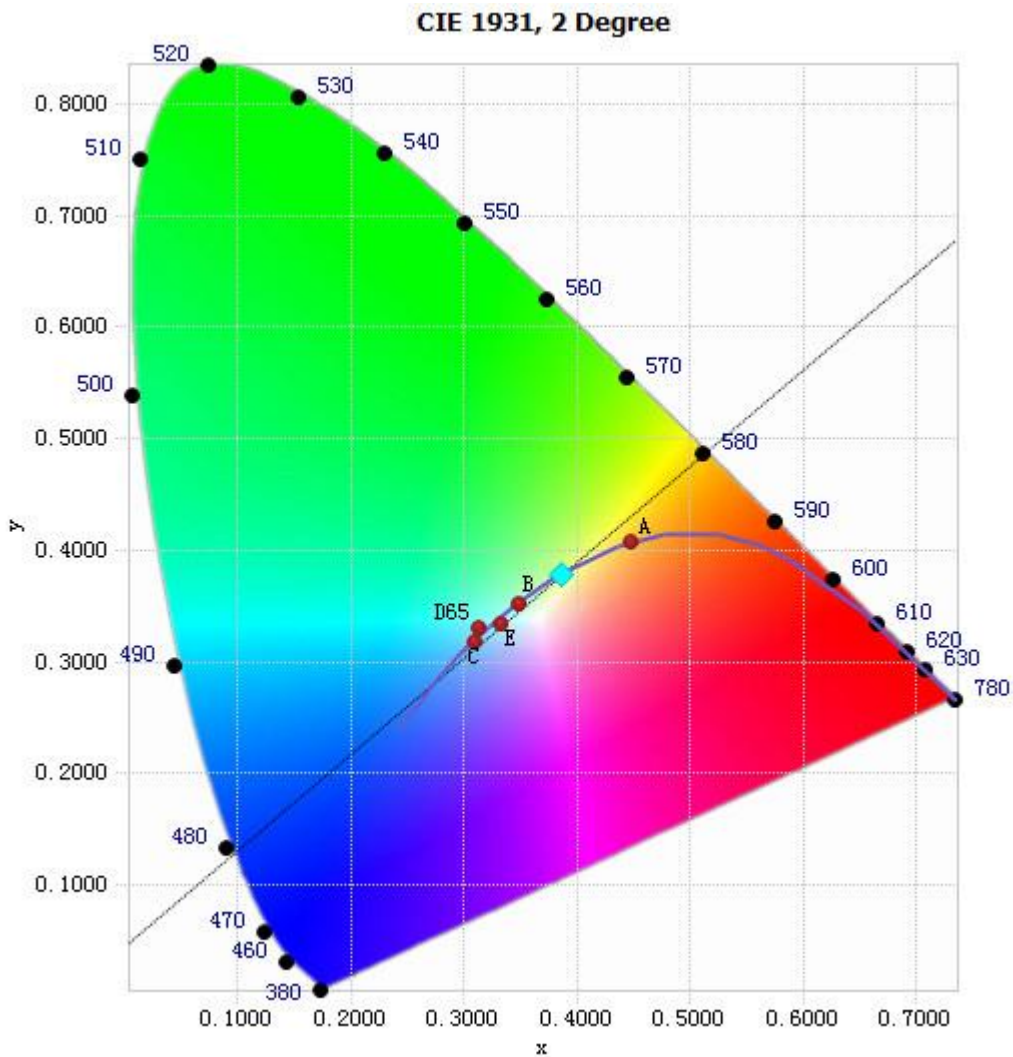


Chart 8: Spectral Power Distribution

Spectral Distribution over Visible Wavelength							
WL(nm)	Radiant(Watts)	WL(nm)	Radiant(Watts)	WL(nm)	Radiant(Watts)	WL(nm)	Radiant(Watts)
380	1.06E-03	485	2.78E-02	590	1.01E-01	695	2.24E-02
385	7.36E-04	490	3.05E-02	595	1.02E-01	700	1.73E-02
390	8.56E-04	495	3.57E-02	600	1.02E-01	705	1.49E-02
395	5.04E-04	500	4.31E-02	605	1.01E-01	710	1.28E-02
400	5.88E-04	505	5.09E-02	610	9.93E-02	715	1.11E-02
405	8.32E-04	510	5.81E-02	615	9.63E-02	720	9.60E-03
410	1.71E-03	515	6.43E-02	620	9.27E-02	725	8.29E-03
415	2.38E-03	520	6.82E-02	625	8.83E-02	730	7.18E-03
420	4.48E-03	525	7.23E-02	630	8.33E-02	735	6.24E-03
425	8.08E-03	530	7.55E-02	635	7.80E-02	740	5.56E-03
430	1.43E-02	535	7.73E-02	640	7.27E-02	745	4.99E-03
435	2.44E-02	540	7.90E-02	645	6.68E-02	750	4.58E-03
440	4.03E-02	545	8.02E-02	650	6.11E-02	755	4.18E-03
445	6.66E-02	550	8.12E-02	655	5.57E-02	760	3.73E-03
450	1.01E-01	555	8.28E-02	660	5.02E-02	765	3.35E-03
455	1.11E-01	560	8.45E-02	665	4.50E-02	770	2.96E-03
460	8.08E-02	565	8.68E-02	670	3.99E-02	775	2.60E-03
465	5.67E-02	570	8.96E-02	675	3.51E-02	780	2.26E-03
470	4.52E-02	575	9.23E-02	680	3.07E-02		
475	3.39E-02	580	9.54E-02	685	2.70E-02		
480	2.78E-02	585	9.87E-02	690	2.34E-02		

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

Chromaticity Diagram - Sphere Spectroradiometer Method



Tristimulus values(x, y): (0.3858, 0.3783)

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

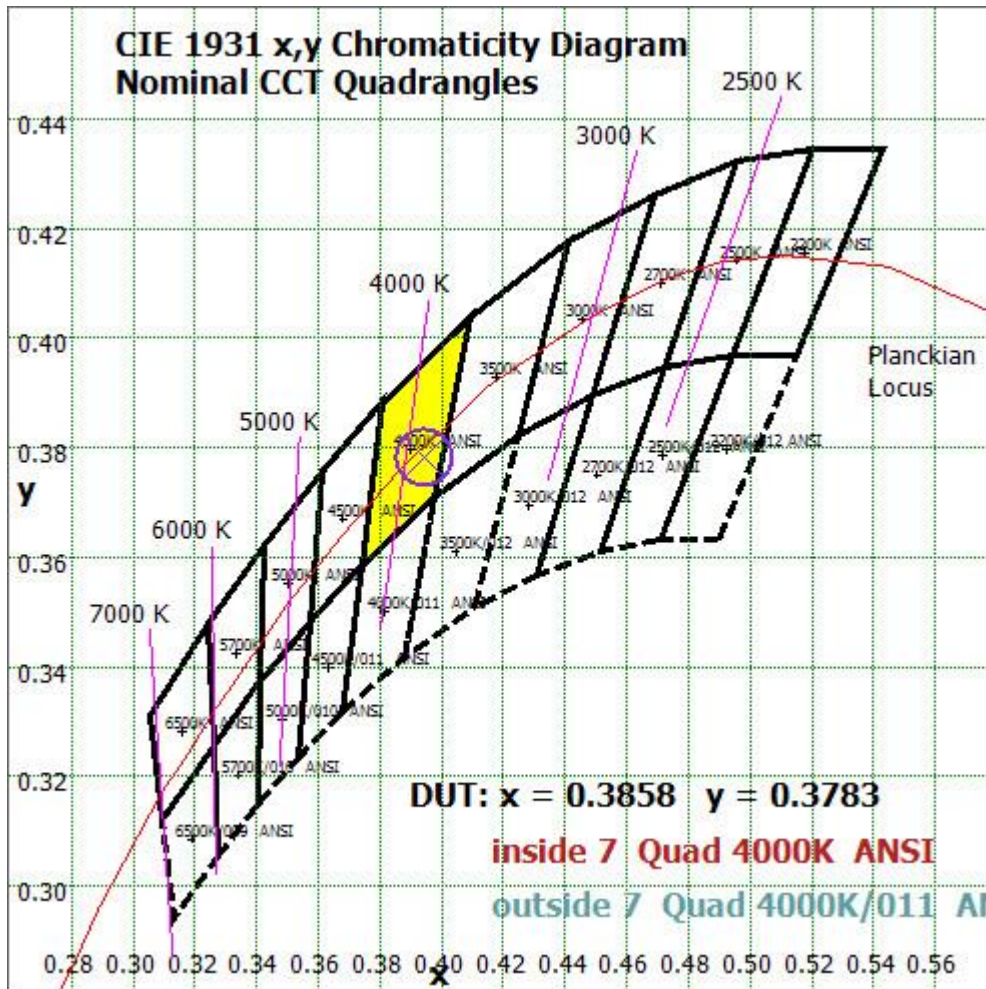


Chart 10: Plot of Lamp x/y coordinates on CIE 1931 Chromaticity Diagram

Color Rendition Report – Sphere Spectroradiometer Method

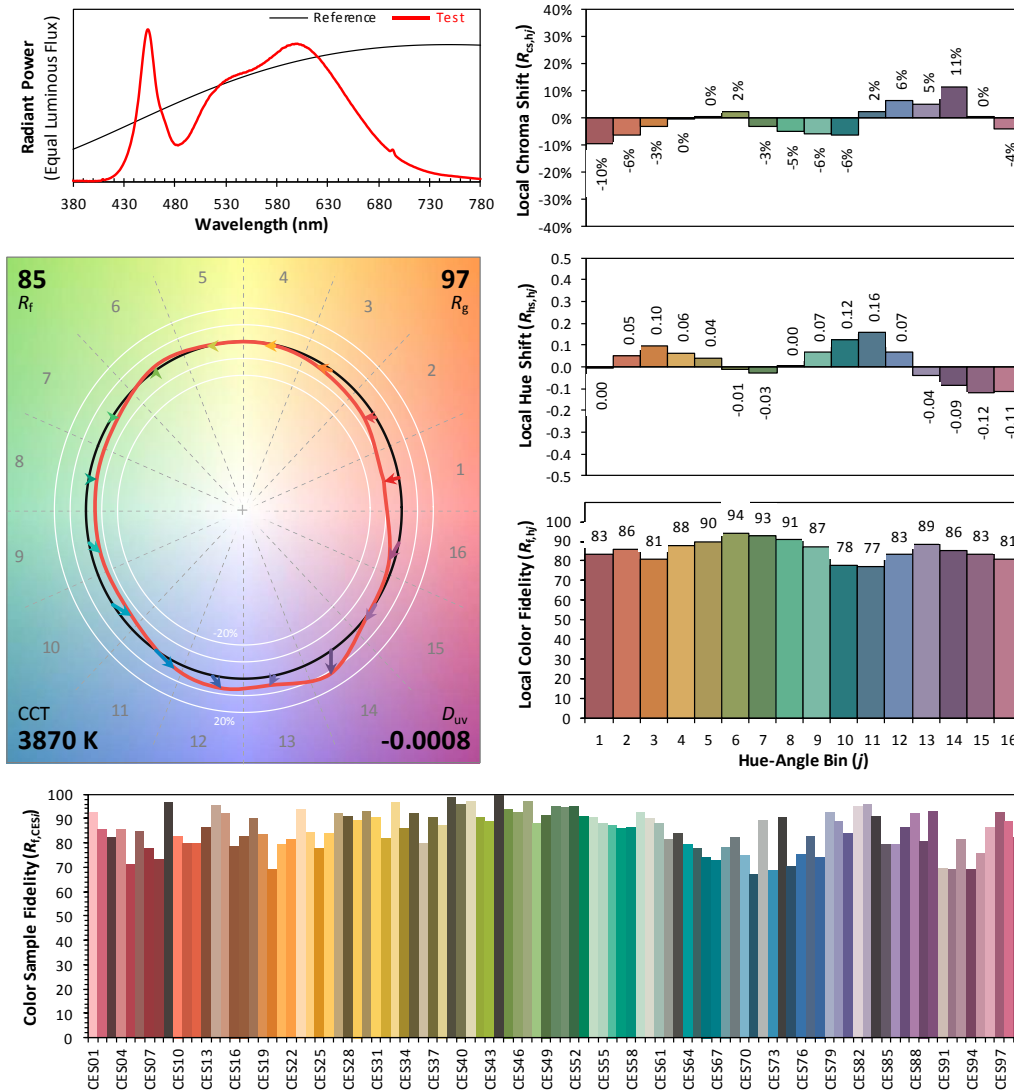
ANSI/IES TM-30-18 Color Rendition Report

Source: LED

Manufacturer: RAB LIGHTING INC

Date: 2025/02/21

Model: FHID-45S-EX39-8CCT



Notes: This is a recommended method for displaying ANSI/IES TM-30-18 information.	x	0.3858	CIE 13.3-1995 (CRI) R_a 86 R_9 26
	y	0.3783	
	u'	0.2280	
	v'	0.5031	

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 9 due to rounding.

TEST RESULTS (Lamp in Philips Lighting C52) 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
Voltage frequency (Hz)	60	60
Test Current (A)	0.392	0.183
Power Factor	0.9911	0.8906
Test Power (W)	46.62	45.27
THD A%	9.22	10.31
Luminous Efficacy (lm/W)	130.0	131.8
Total Luminous Flux (lm)	6060.4	5965.0
Color Rendering Index (CRI)	84.0	
R9	18.6	
Correlated Color Temperature (CCT)(K)	4989	
Chromaticity Chroma x	0.3460	
Chromaticity Chroma y	0.3588	
Chromaticity Chroma u	0.2092	
Chromaticity Chroma v	0.3255	
Duv	0.0032	
Chromaticity Chroma u'	0.2092	
Chromaticity Chroma v'	0.4883	

Special Color Rendering Indices	
R1	82.6
R2	89.7
R3	93.1
R4	81.5
R5	81.3
R6	83.9
R7	89.1
R8	70.8
R9	18.6
R10	73.4
R11	79.5
R12	53.8
R13	84.8
R14	96.2

Table 11: Test data per Sphere-Spectroradiometer Method

Note: According to CIE 1976 (u',v') diagram, $u' = u = 4x/(-2x+12y+3)$, $v' = 3v/2 = 9y/(-2x+12y+3)$.

Spectral Power Distribution - Sphere Spectroradiometer Method

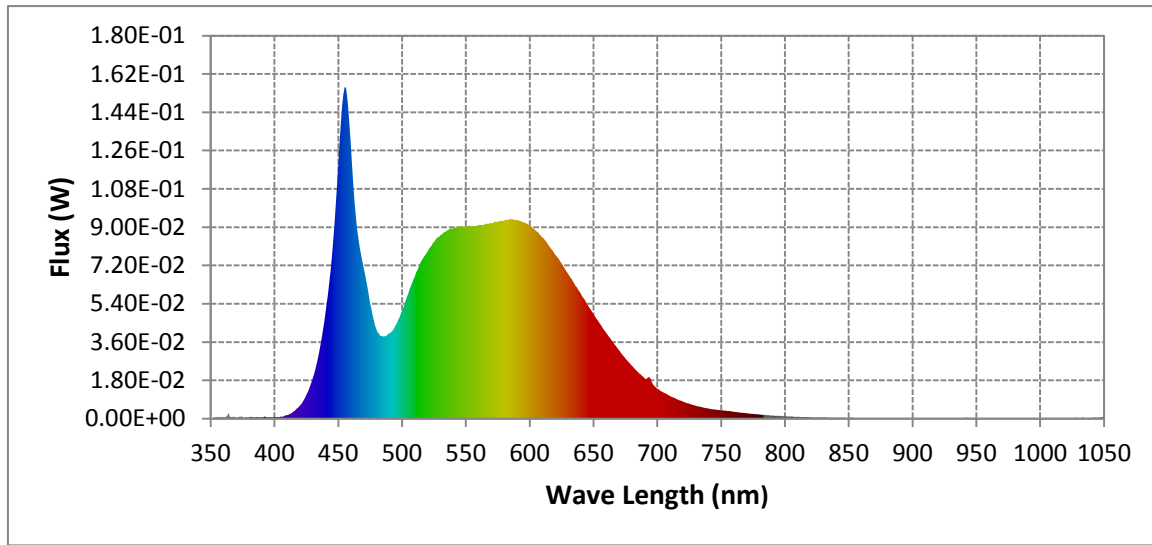
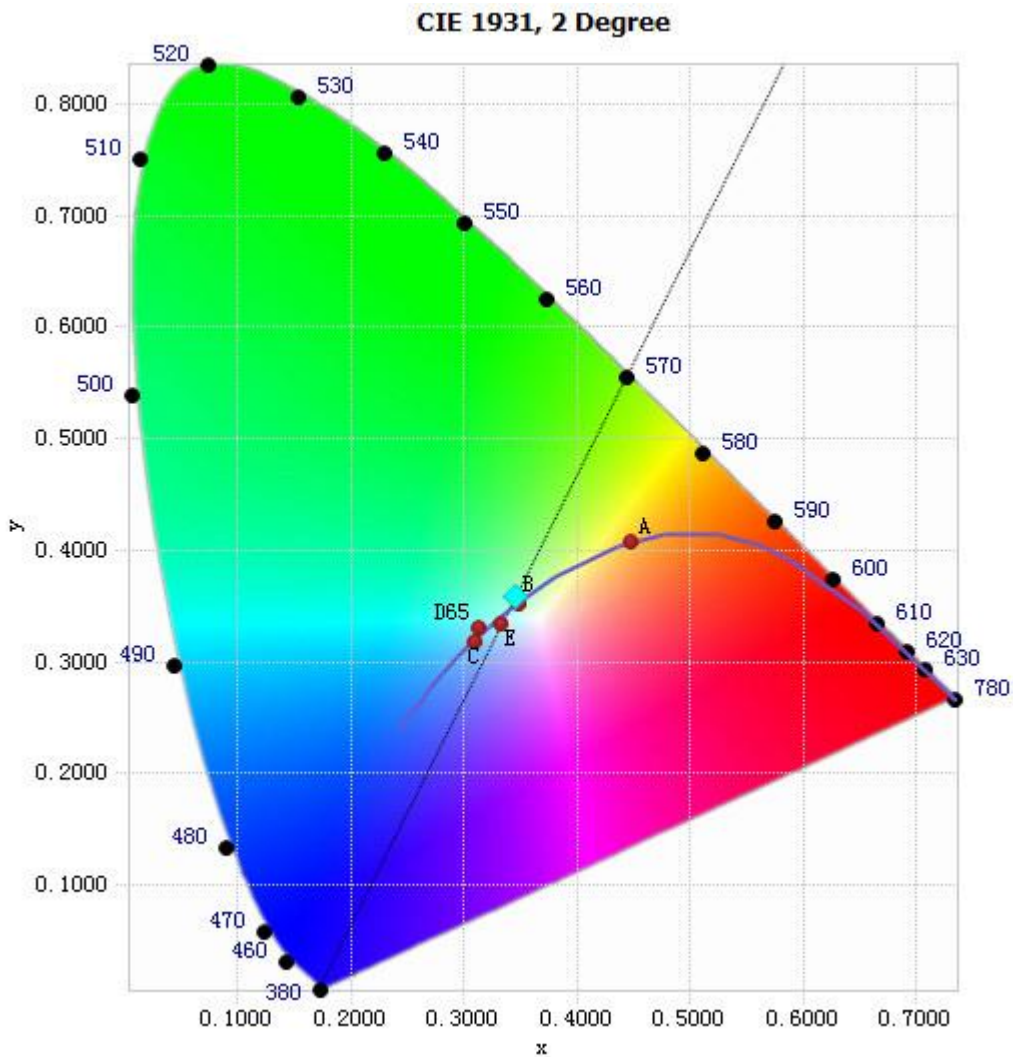


Chart 42: Spectral Power Distribution

Spectral Distribution over Visible Wavelength							
WL(nm)	Radiant(Watts)	WL(nm)	Radiant(Watts)	WL(nm)	Radiant(Watts)	WL(nm)	Radiant(Watts)
380	6.95E-04	485	3.87E-02	590	9.35E-02	695	1.86E-02
385	4.77E-04	490	4.01E-02	595	9.24E-02	700	1.42E-02
390	5.96E-04	495	4.39E-02	600	9.10E-02	705	1.24E-02
395	5.89E-04	500	5.07E-02	605	8.82E-02	710	1.07E-02
400	6.84E-04	505	5.90E-02	610	8.50E-02	715	9.34E-03
405	9.81E-04	510	6.68E-02	615	8.16E-02	720	8.04E-03
410	1.60E-03	515	7.40E-02	620	7.72E-02	725	7.00E-03
415	3.36E-03	520	7.85E-02	625	7.31E-02	730	6.10E-03
420	6.16E-03	525	8.30E-02	630	6.82E-02	735	5.40E-03
425	1.11E-02	530	8.63E-02	635	6.36E-02	740	4.78E-03
430	1.89E-02	535	8.81E-02	640	5.89E-02	745	4.32E-03
435	3.12E-02	540	8.94E-02	645	5.40E-02	750	3.97E-03
440	4.98E-02	545	9.01E-02	650	4.91E-02	755	3.65E-03
445	7.58E-02	550	8.99E-02	655	4.47E-02	760	3.28E-03
450	1.19E-01	555	9.05E-02	660	4.03E-02	765	2.88E-03
455	1.56E-01	560	9.09E-02	665	3.63E-02	770	2.60E-03
460	1.29E-01	565	9.13E-02	670	3.22E-02	775	2.28E-03
465	8.89E-02	570	9.20E-02	675	2.83E-02	780	1.97E-03
470	7.11E-02	575	9.25E-02	680	2.50E-02		
475	5.47E-02	580	9.30E-02	685	2.18E-02		
480	4.21E-02	585	9.38E-02	690	1.91E-02		

Table 12: Spectral Power Distribution Numerical Data per Sphere - Spectroradiometer Method

Chromaticity Diagram - Sphere Spectroradiometer Method



Tristimulus values(x, y): (0.3460, 0.3588)

Chart13: 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

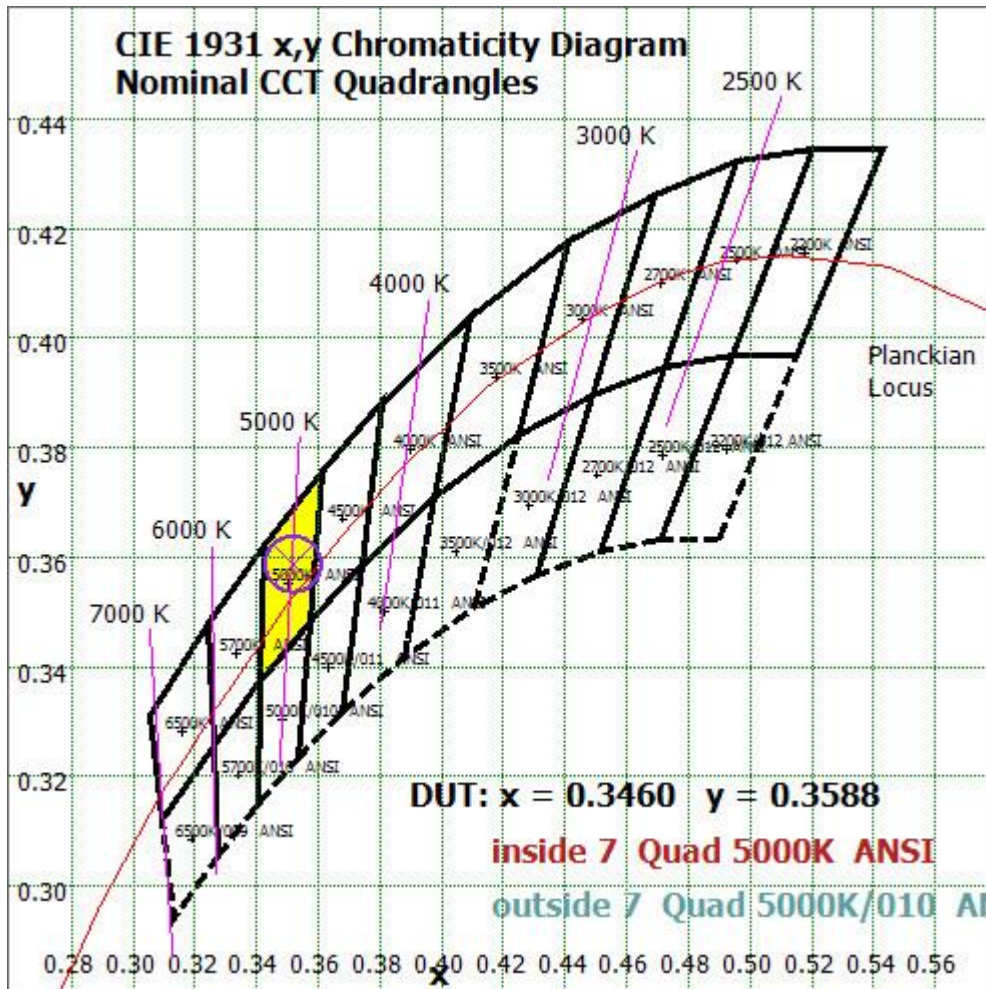


Chart 14: Plot of Lamp x/y coordinates on CIE 1931 Chromaticity Diagram

Color Rendition Report – Sphere Spectroradiometer Method

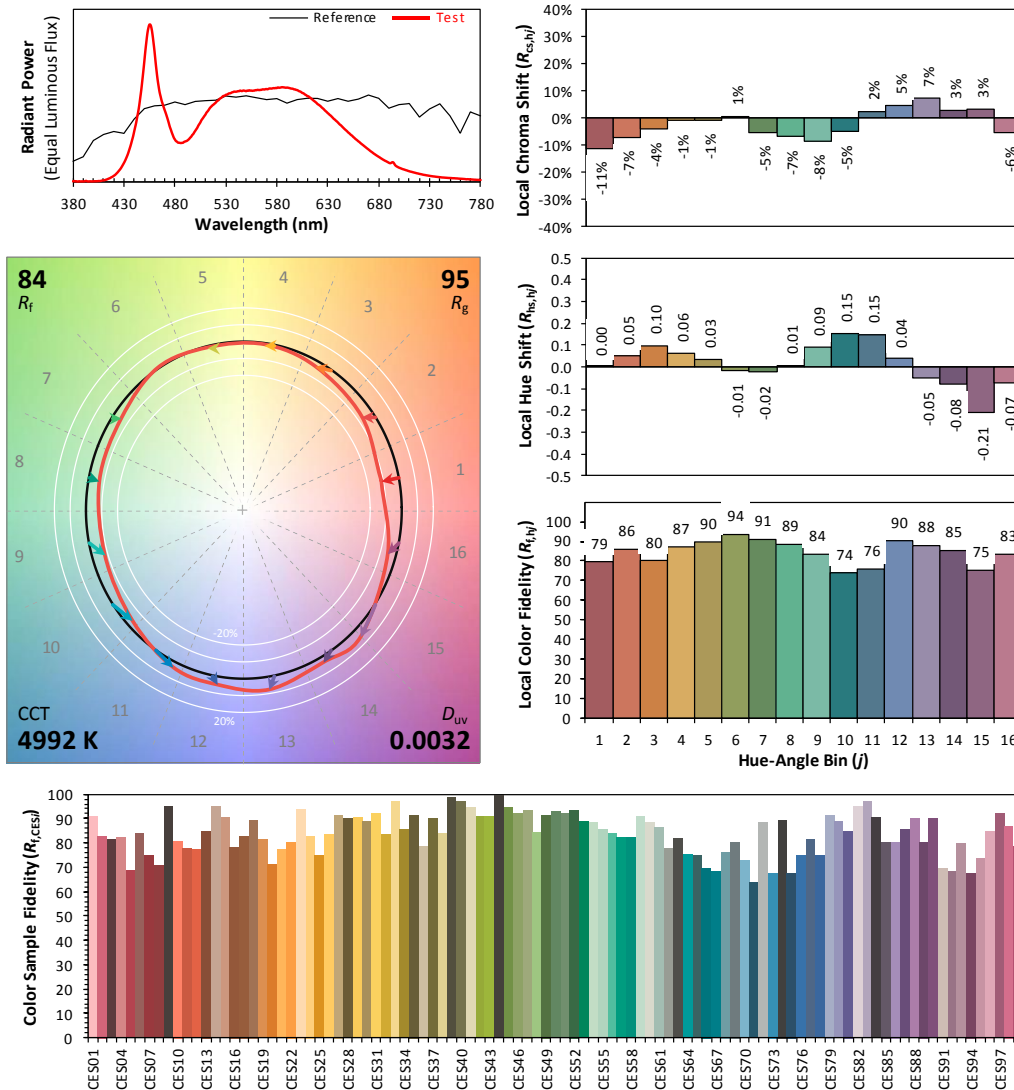
ANSI/IES TM-30-18 Color Rendition Report

Source: LED

Manufacturer: RAB LIGHTING INC

Date: 2025/02/21

Model: FHID-45S-EX39-8CCT



Notes: This is a recommended method for displaying ANSI/IES TM-30-18 information.	x	0.3460	CIE 13.3-1995 (CRI) R_a 84 R_9 19
	y	0.3588	
	u'	0.2092	
	v'	0.4883	

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

Chart 15: 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 11 due to rounding.

TEST RESULTS (Bare Lamp) 3000K 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
Voltage frequency (Hz)	60	60
Test Current (A)	0.395	0.184
Power Factor	0.9916	0.8870
Test Power (W)	47.02	45.26
THD A%	9.16	12.69
Luminous Efficacy (lm/W)	170.7	172.4
Total Luminous Flux (lm)	8024.9	7801.2
Color Rendering Index (CRI)	81.8	
R9	5.3	
Correlated Color Temperature (CCT)(K)	2947	
Chromaticity Chroma x	0.4397	
Chromaticity Chroma y	0.4034	
Chromaticity Chroma u	0.2526	
Chromaticity Chroma v	0.3477	
Duv	-0.0006	
Chromaticity Chroma u'	0.2526	
Chromaticity Chroma v'	0.5215	

Special Color Rendering Indices	
R1	80
R2	89.4
R3	96.5
R4	80.2
R5	80
R6	86.9
R7	82.7
R8	58.4
R9	5.3
R10	75.8
R11	79.6
R12	69.5
R13	82.1
R14	98.3

Table 13: 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)	0.397
Power Factor	0.9916
Power (W)	47.25
Luminous Efficacy (lm/W)	171.3
Total Luminous Flux (lm)	8094.4
Beam Angle (°)	344.0 (0°-180°) / 347.3 (90°-270°)
Center Beam Candle Power (cd)	88.4
Maximum Beam Candle Power (cd)	890.2 (At: C=40.0, Gamma=88.0)
Spacing Criteria	4.38 (0°-180°) / 4.46 (90°-270°)
Zonal Lumens in the 0 °-60 °Zone	21.67%
Zonal Lumens in the 60 °-90 °Zone	30.28%
Zonal Lumens in the 90 °-120 °Zone	29.42%
Zonal Lumens in the 120 °-180 °Zone	18.64%

Table 14: Test data per Goniophotometer Method

Spectral Power Distribution - Sphere Spectroradiometer Method

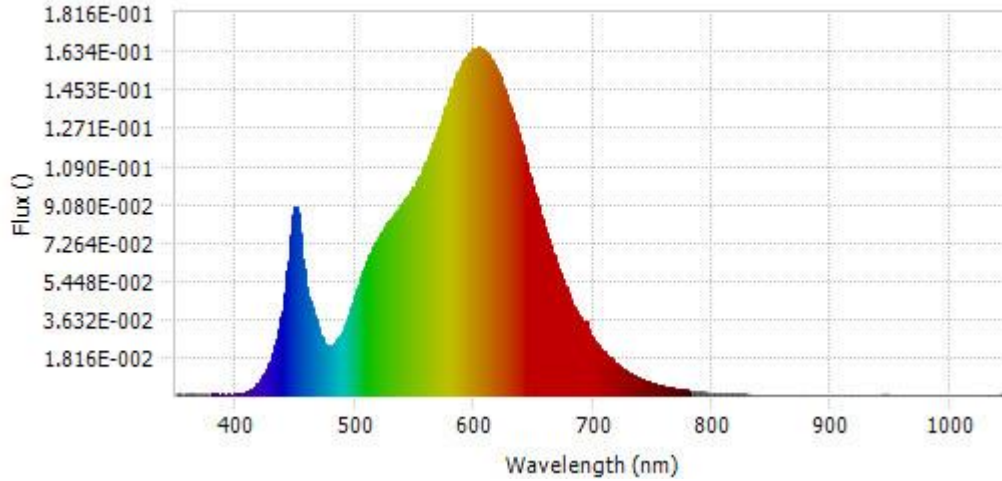
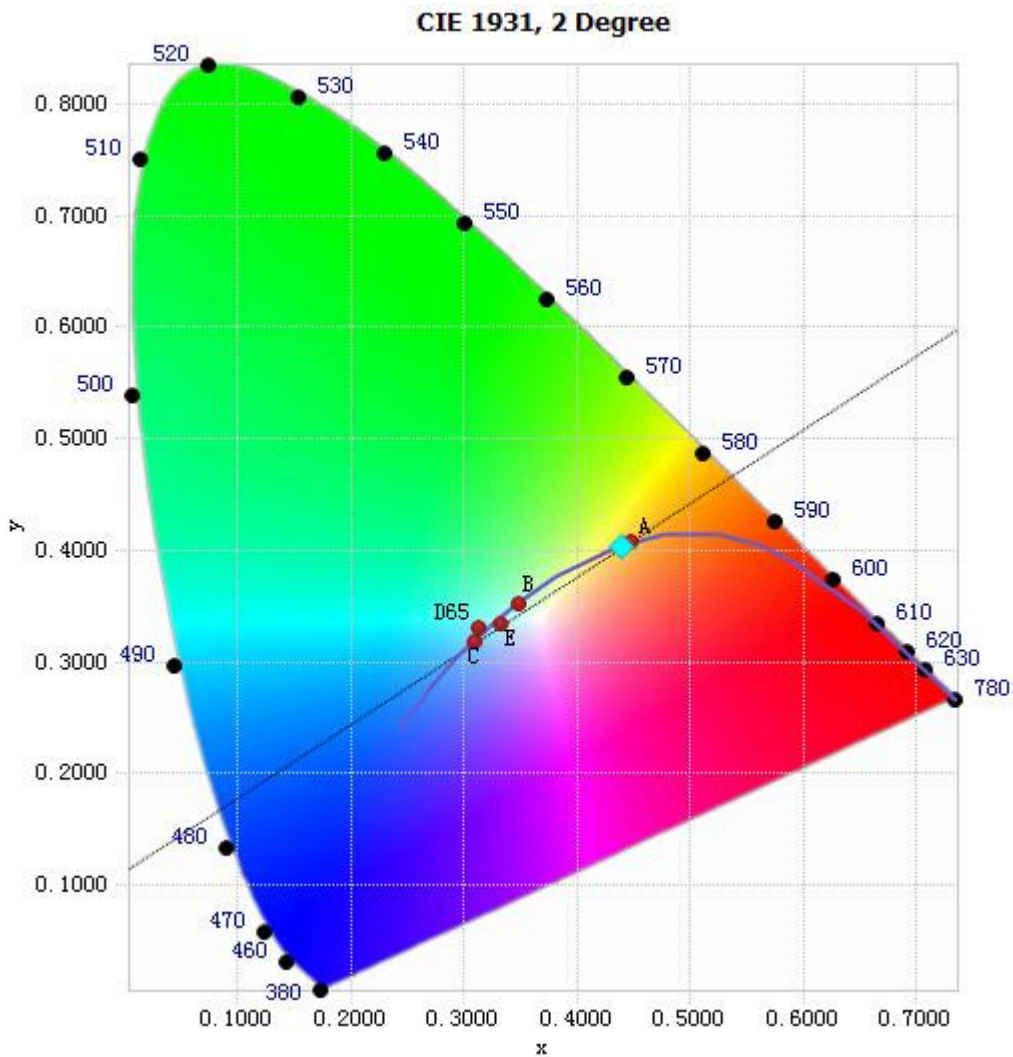


Chart 16: Spectral Power Distribution

Spectral Distribution over Visible Wavelength							
WL(nm)	Radiant(Watts)	WL(nm)	Radiant(Watts)	WL(nm)	Radiant(Watts)	WL(nm)	Radiant(Watts)
380	6.13E-04	485	2.63E-02	590	1.58E-01	695	3.41E-02
385	5.34E-04	490	3.09E-02	595	1.62E-01	700	2.68E-02
390	5.04E-04	495	3.85E-02	600	1.65E-01	705	2.31E-02
395	5.33E-04	500	4.73E-02	605	1.65E-01	710	1.99E-02
400	6.68E-04	505	5.59E-02	610	1.63E-01	715	1.72E-02
405	1.12E-03	510	6.37E-02	615	1.59E-01	720	1.48E-02
410	2.11E-03	515	7.08E-02	620	1.53E-01	725	1.27E-02
415	3.84E-03	520	7.54E-02	625	1.46E-01	730	1.08E-02
420	6.57E-03	525	7.99E-02	630	1.37E-01	735	9.23E-03
425	1.13E-02	530	8.39E-02	635	1.28E-01	740	7.82E-03
430	1.83E-02	535	8.71E-02	640	1.19E-01	745	6.70E-03
435	2.88E-02	540	9.13E-02	645	1.08E-01	750	5.80E-03
440	4.44E-02	545	9.53E-02	650	9.78E-02	755	4.98E-03
445	7.00E-02	550	9.92E-02	655	8.79E-02	760	4.33E-03
450	8.97E-02	555	1.05E-01	660	7.86E-02	765	3.67E-03
455	7.08E-02	560	1.11E-01	665	6.97E-02	770	3.19E-03
460	4.93E-02	565	1.19E-01	670	6.14E-02	775	2.71E-03
465	4.02E-02	570	1.26E-01	675	5.39E-02	780	2.36E-03
470	3.05E-02	575	1.35E-01	680	4.69E-02		
475	2.42E-02	580	1.44E-01	685	4.11E-02		
480	2.41E-02	585	1.52E-01	690	3.59E-02		

Table15: Spectral Power Distribution Numerical Data per Sphere - Spectroradiometer Method

Chromaticity Diagram - Sphere Spectroradiometer Method



Tristimulus values(x, y): (0.4397, 0.4034)

Chart 17: 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

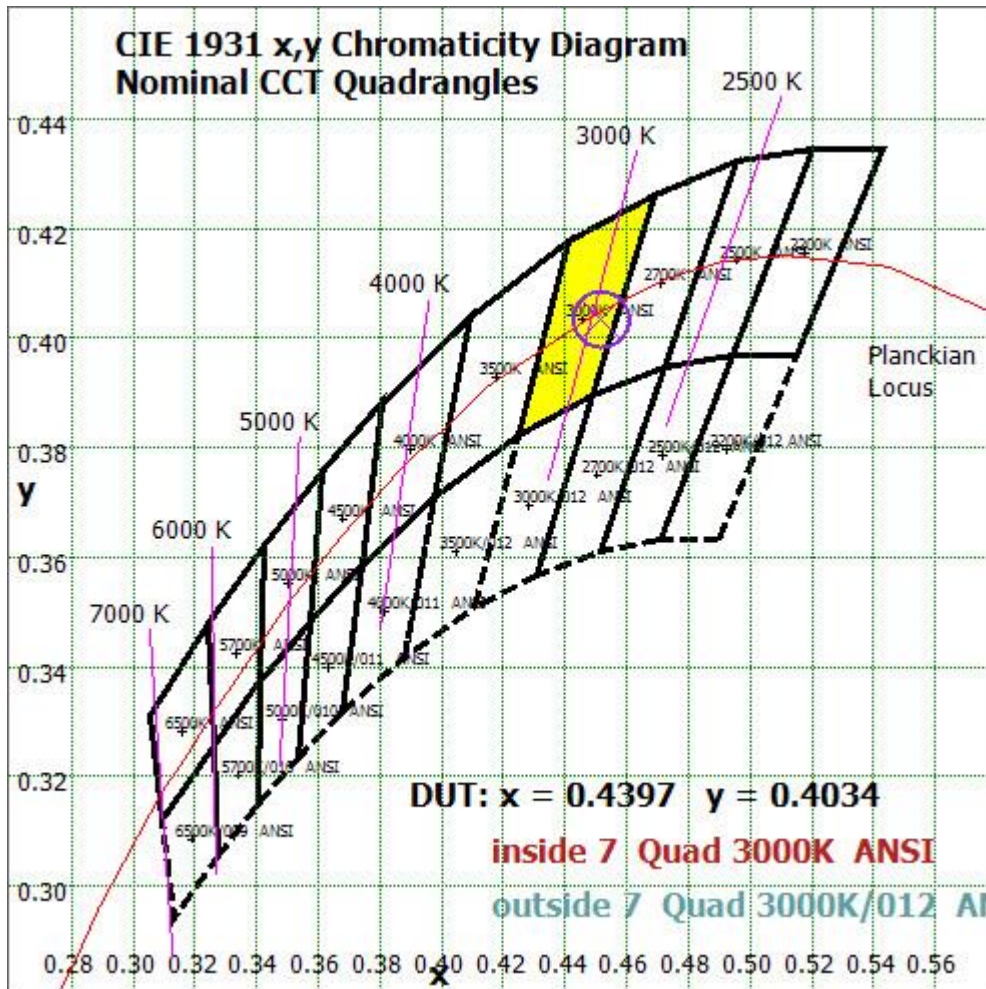


Chart 18: Plot of Lamp x/y coordinates on CIE 1931 Chromaticity Diagram

Color Rendition Report – Sphere Spectroradiometer Method

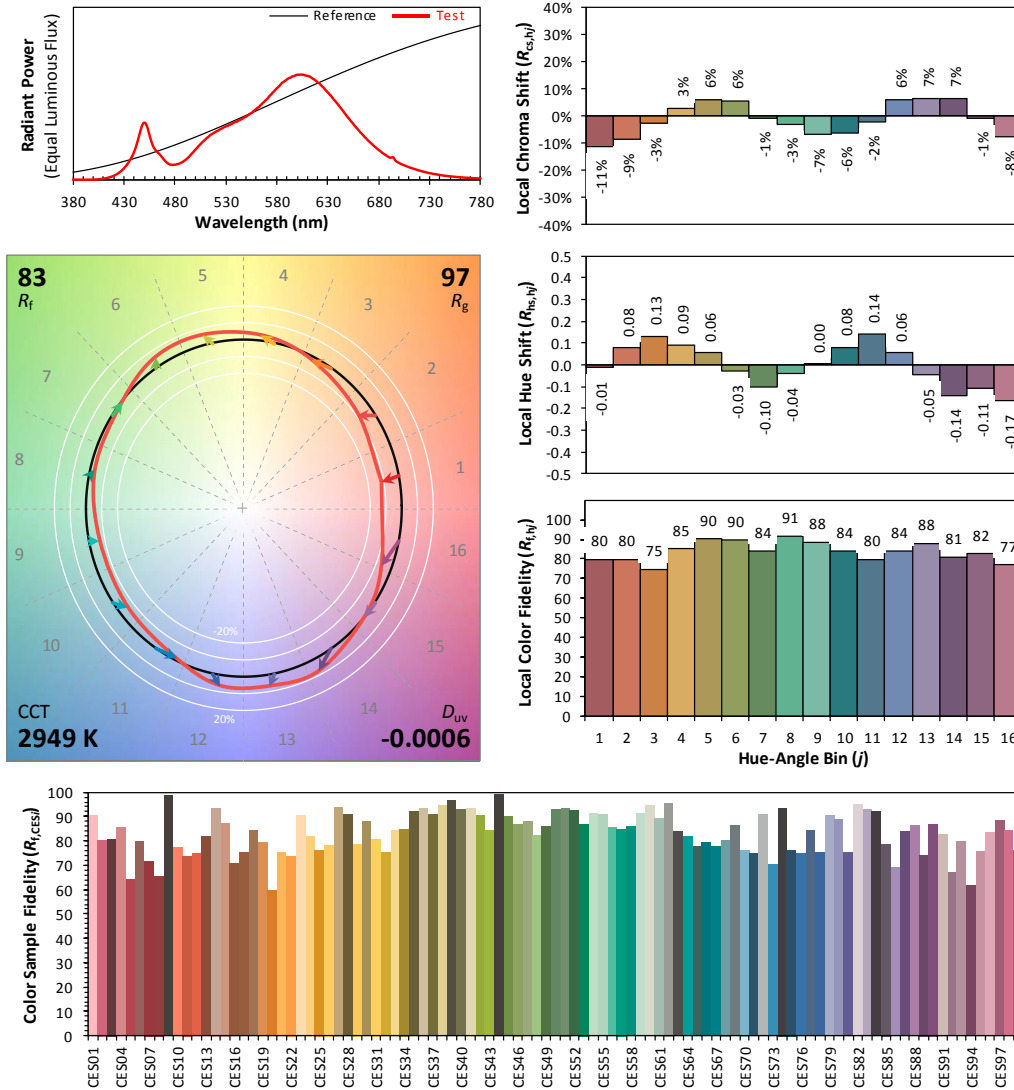
ANSI/IES TM-30-18 Color Rendition Report

Source: LED

Manufacturer: RAB LIGHTING INC

Date: 2025/02/21

Model: FHID-45S-EX39-8CCT



Notes: This is a recommended method for displaying ANSI/IES TM-30-18 information.	x	0.4397	CIE 13.3-1995 (CRI) R_a 82 R_9 6
	y	0.4034	
	u'	0.2526	
	v'	0.5215	

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

Chart 19: 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 13 due to rounding.

Zonal Lumen Tabulation- Goniophotometer Method

$\gamma(^{\circ})$	Lumens	% Total
0- 10	12.556	0.16%
10- 20	73.394	0.91%
20- 30	190.678	2.36%
30- 40	339.194	4.19%
40- 50	495.925	6.13%
50- 60	641.954	7.93%
60- 70	756.583	9.35%
70- 80	829.669	10.25%
80- 90	864.493	10.68%
90-100	857.966	10.60%
100-110	807.007	9.97%
110-120	715.984	8.85%
120-130	591.303	7.31%
130-140	444.377	5.49%
140-150	287.313	3.55%
150-160	139.855	1.73%
160-170	41.596	0.51%
170-180	4.509	0.06%
Total	8094.4	100%

$\gamma(^{\circ})$	Lumens	% Total
0- 60	1753.701	21.67%
60- 90	2450.745	30.28%
0-90	4204.446	51.94%
90- 180	3889.91	48.06%
0- 180	8094.4	100%

Table 16: Zonal Lumen

Illuminance Plots- Goniophotometer Method

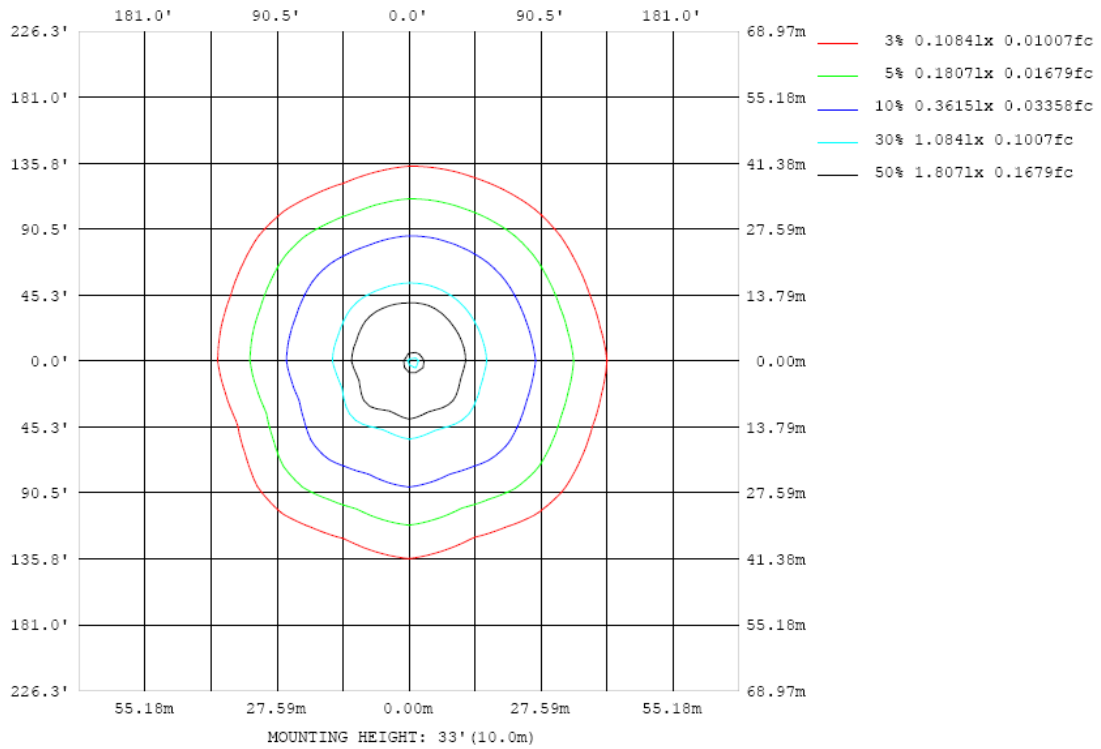


Chart 20: Illuminance Plot (Footcandles)

Luminous Intensity Distribution Plots- Goniophotometer Method

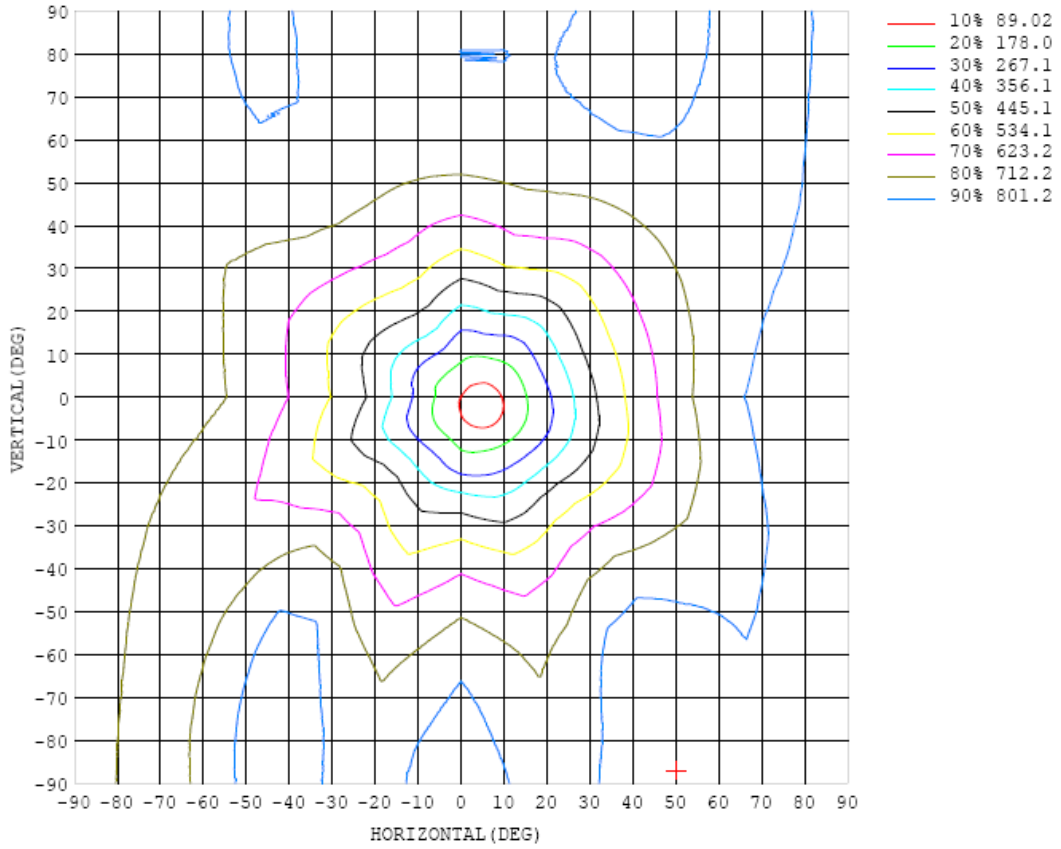


Chart 21: Isocandela Plot

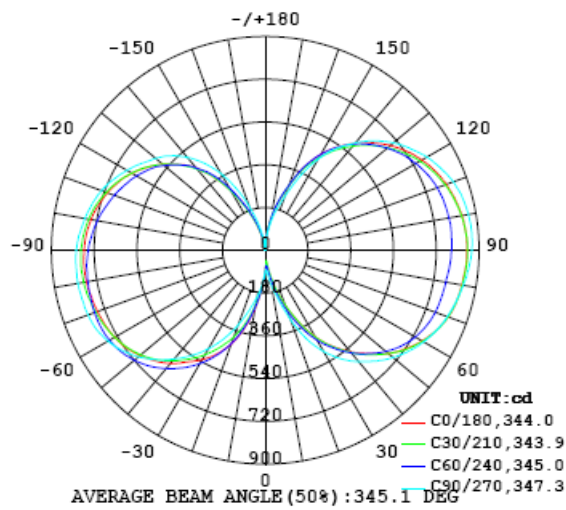


Chart 22: Polar Candela Distribution

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	88.4	88.4	88.4	88.4	88.4	88.4	88.4	88.4	88.4	88.4	88.4	88.4	88.4	88.4	88.4	88.4	88.4	88.4	88.4
5	55.0	47.7	44.4	45.8	50.8	57.5	65.5	74.4	83.8	94.0	105	117	126	134	139	142	147	155	161
10	95.5	88.1	84.7	85.1	89.6	98.6	112	126	139	154	170	184	192	197	202	209	219	234	246
15	173	165	161	165	173	183	194	202	207	216	241	266	280	286	285	282	289	315	337
20	251	239	237	246	260	270	274	280	294	310	325	341	362	381	380	364	362	392	420
25	334	322	320	335	356	363	358	362	387	411	411	411	436	466	464	433	419	450	481
30	420	405	403	423	449	453	437	434	464	492	479	465	492	531	530	491	471	499	530
35	493	475	473	495	525	527	503	496	528	558	533	508	537	585	587	543	517	544	574
40	557	538	537	563	595	595	564	550	583	612	578	546	580	637	641	589	557	587	621
45	615	594	591	621	658	656	616	596	629	659	620	583	624	692	694	630	589	620	658
50	676	648	644	676	717	711	662	635	670	702	659	619	663	737	736	662	613	646	688
55	722	694	690	725	769	760	701	668	704	739	694	653	699	775	771	686	632	667	714
60	762	733	729	766	810	796	729	691	731	770	724	679	727	804	797	705	646	683	732
65	795	764	758	796	841	824	749	708	752	797	749	701	746	821	811	717	656	693	743
70	819	787	780	819	864	843	762	717	765	814	768	720	763	836	822	725	662	701	753
75	834	803	796	833	877	852	768	723	777	832	785	735	774	842	826	729	667	705	758
80	840	811	806	842	884	858	772	728	787	846	799	748	784	849	831	733	671	711	764
85	846	818	813	848	888	863	779	738	799	859	810	755	787	849	830	733	673	713	766
90	850	822	817	851	890	865	784	747	809	870	818	758	787	845	826	730	671	710	762
95	847	821	815	847	884	861	787	753	814	872	818	757	781	834	813	722	666	706	757
100	842	815	809	839	875	855	785	755	814	868	813	750	770	819	800	714	661	697	745
105	826	801	796	824	858	841	780	754	809	859	804	741	756	799	781	703	656	688	729
110	812	786	780	806	839	826	771	748	799	843	788	726	737	776	761	690	646	672	707
115	789	764	757	782	813	802	754	734	778	816	765	706	714	747	733	671	632	653	681
120	761	736	730	752	781	773	731	714	754	787	739	683	685	711	698	645	611	628	649
125	727	702	694	714	741	738	705	690	721	745	704	656	654	671	658	614	584	595	609
130	686	663	655	672	696	695	670	660	685	704	666	622	616	626	613	577	551	556	564
135	640	619	611	626	647	649	630	622	640	652	620	581	571	573	558	527	505	506	509
140	589	567	559	572	593	597	584	576	585	590	564	533	519	513	497	472	453	452	451
145	531	510	503	515	535	540	530	522	526	524	501	473	454	441	425	405	389	381	375
150	465	446	439	448	465	472	467	459	453	442	420	396	375	356	338	321	307	298	291
155	386	377	374	378	385	390	388	380	363	342	320	298	277	258	244	235	227	218	211
160	285	283	283	286	289	292	292	284	264	243	232	221	197	170	154	151	149	143	137
165	205	205	205	207	209	212	213	207	190	172	166	156	127	90.0	67.0	61.3	63.5	69.8	76.4
170	132	134	134	130	126	127	131	131	120	106	94.3	81.2	65.4	49.3	35.8	26.1	20.7	20.4	21.8
175	60.7	63.4	64.6	64.3	62.9	61.4	59.8	57.7	54.8	50.6	44.4	36.9	27.9	18.9	12.0	7.84	5.58	5.00	5.28
180	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.06	0.37	0.66

Table 17: 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	88.4	88.4	88.4	88.4	88.4	88.4	88.4	88.4	88.4	88.4	88.4	88.4	88.4	88.4	88.4	88.4	88.4		
5	160	158	158	158	157	154	149	143	137	128	119	110	101	90.6	79.6	69.5	61.5		
10	240	232	231	235	240	241	235	216	197	186	177	167	155	141	127	114	104		
15	330	317	315	320	327	332	323	292	260	256	256	242	222	207	199	192	183		
20	408	390	388	397	408	417	408	371	335	338	344	325	295	279	279	278	267		
25	467	448	450	464	479	488	480	444	410	417	428	409	377	361	363	363	352		
30	519	503	507	524	540	550	542	508	478	490	504	485	451	435	440	444	436		
35	565	551	559	577	594	604	597	566	540	556	573	555	520	503	507	512	505		
40	610	596	607	630	646	649	640	617	597	613	629	613	582	566	568	570	566		
45	649	636	650	675	690	689	680	663	651	662	673	660	637	622	621	621	618		
50	680	668	684	713	726	720	709	702	697	705	711	701	682	670	667	667	670		
55	705	693	712	743	754	743	731	732	735	740	743	735	722	711	706	705	710		
60	724	712	732	765	774	757	745	753	764	766	764	761	757	748	738	734	744		
65	735	724	748	783	788	764	749	766	785	785	782	784	787	779	763	755	768		
70	746	736	760	796	797	765	747	768	794	795	791	799	808	801	779	768	784		
75	752	743	769	806	802	762	739	766	799	800	796	809	824	815	786	771	790		
80	758	748	776	814	807	759	732	763	800	801	798	813	833	823	789	770	791		
85	759	749	779	819	810	755	725	758	799	798	793	814	840	832	792	770	792		
90	755	744	775	817	805	746	713	751	796	792	784	810	843	836	792	767	791		
95	747	734	767	810	798	733	698	738	785	778	768	800	842	837	790	761	786		
100	734	721	755	800	786	718	680	723	773	763	751	786	833	831	782	752	779		
105	716	703	737	783	768	698	660	703	754	742	728	767	821	821	770	737	763		
110	691	677	713	762	748	677	638	682	733	719	704	745	803	806	755	722	748		
115	664	650	685	733	720	652	615	658	706	691	676	719	780	785	734	701	726		
120	629	614	650	699	691	627	590	628	673	658	645	690	752	757	708	676	700		
125	589	576	611	659	653	595	563	597	637	624	613	656	717	724	678	648	670		
130	544	531	564	610	606	556	528	563	602	589	577	618	676	685	644	617	637		
135	490	478	509	553	552	509	487	523	562	548	534	572	628	639	603	578	596		
140	433	421	447	485	486	453	439	475	511	498	485	520	571	581	550	529	547		
145	362	356	376	404	408	388	383	415	448	441	434	465	508	517	490	474	491		
150	278	272	287	310	316	304	307	340	373	373	371	399	435	444	426	415	431		
155	201	195	204	219	223	217	223	254	284	286	287	312	345	356	347	343	358		
160	132	129	135	144	148	146	152	172	193	196	199	220	246	256	249	248	261		
165	74.5	71.7	73.1	77.2	81.3	85.4	92.9	106	119	124	130	144	160	169	170	175	187		
170	21.2	21.0	21.9	24.2	28.2	33.8	40.8	48.7	57.7	67.7	77.9	88.2	97.5	103	106	110	119		
175	5.42	5.80	6.34	7.19	8.46	10.3	13.4	18.1	22.9	26.3	29.7	34.4	39.7	44.6	48.7	52.7	56.7		
180	0.70	0.67	0.65	0.65	0.65	0.65	0.65	0.65	0.65	0.66	0.66	0.65	0.64	0.66	0.66	0.58	0.35		

Table 18: Luminous Intensity Data

TEST RESULTS (Bare Lamp)) 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
Voltage frequency (Hz)	60	60
Test Current (A)	0.393	0.183
Power Factor	0.9917	0.8871
Test Power (W)	46.79	44.92
THD A%	9.10	12.68
Luminous Efficacy (lm/W)	180.6	186.4
Total Luminous Flux (lm)	8451.7	8372.4
Color Rendering Index (CRI)	84.1	
R9	16.7	
Correlated Color Temperature (CCT)(K)	3771	
Chromaticity Chroma x	0.3892	
Chromaticity Chroma y	0.3773	
Chromaticity Chroma u	0.2306	
Chromaticity Chroma v	0.3354	
Duv	-0.0022	
Chromaticity Chroma u'	0.2306	
Chromaticity Chroma v'	0.5031	

Special Color Rendering Indices	
R1	83.3
R2	90.6
R3	94.8
R4	82.7
R5	82.8
R6	86.3
R7	86.1
R8	66.5
R9	16.7
R10	76.7
R11	81.4
R12	63.2
R13	85.2
R14	97.2

Table 19: Test data per Sphere-Spectroradiometer Method

Note: According to CIE 1976 (u',v') diagram, $u' = u = 4x/(-2x+12y+3)$, $v' = 3v/2 = 9y/(-2x+12y+3)$.

Spectral Power Distribution - Sphere Spectroradiometer Method

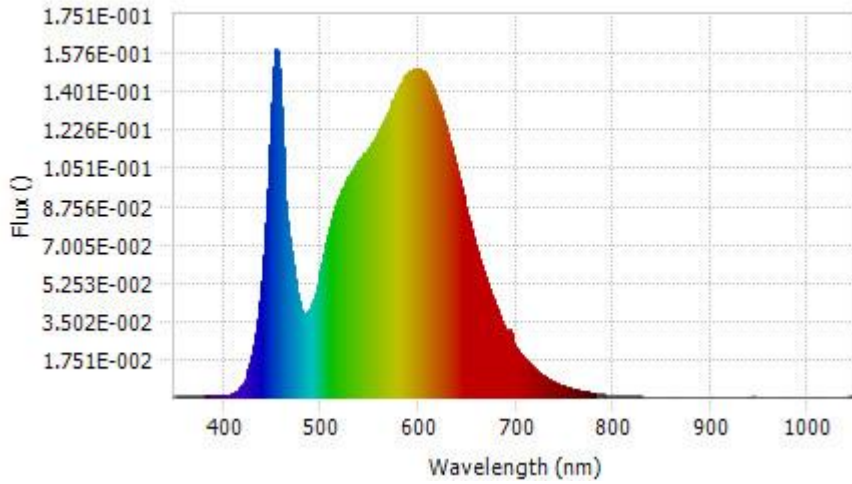
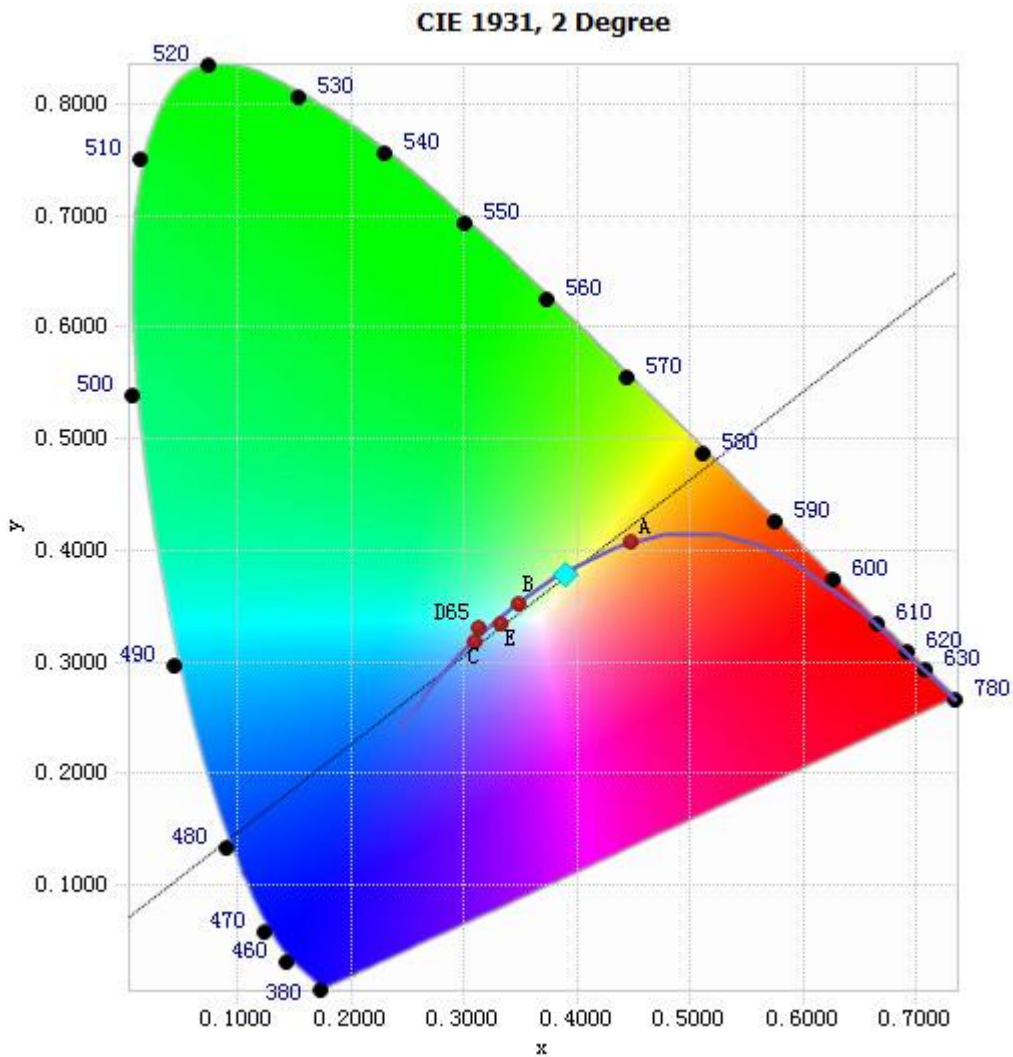


Chart 23: Spectral Power Distribution

Spectral Distribution over Visible Wavelength							
WL(nm)	Radiant(Watts)	WL(nm)	Radiant(Watts)	WL(nm)	Radiant(Watts)	WL(nm)	Radiant(Watts)
380	8.49E-04	485	3.92E-02	590	1.49E-01	695	2.92E-02
385	7.77E-04	490	4.29E-02	595	1.51E-01	700	2.27E-02
390	6.82E-04	495	4.98E-02	600	1.51E-01	705	1.95E-02
395	6.95E-04	500	5.96E-02	605	1.49E-01	710	1.68E-02
400	7.55E-04	505	7.03E-02	610	1.45E-01	715	1.47E-02
405	1.03E-03	510	7.95E-02	615	1.41E-01	720	1.25E-02
410	1.98E-03	515	8.85E-02	620	1.35E-01	725	1.07E-02
415	3.67E-03	520	9.38E-02	625	1.28E-01	730	9.15E-03
420	6.77E-03	525	9.90E-02	630	1.19E-01	735	7.80E-03
425	1.25E-02	530	1.03E-01	635	1.11E-01	740	6.65E-03
430	2.15E-02	535	1.06E-01	640	1.02E-01	745	5.68E-03
435	3.63E-02	540	1.09E-01	645	9.30E-02	750	4.93E-03
440	5.91E-02	545	1.12E-01	650	8.37E-02	755	4.24E-03
445	9.57E-02	550	1.15E-01	655	7.54E-02	760	3.63E-03
450	1.44E-01	555	1.19E-01	660	6.70E-02	765	3.10E-03
455	1.56E-01	560	1.23E-01	665	5.93E-02	770	2.68E-03
460	1.15E-01	565	1.27E-01	670	5.22E-02	775	2.30E-03
465	8.05E-02	570	1.32E-01	675	4.58E-02	780	2.00E-03
470	6.39E-02	575	1.37E-01	680	4.01E-02		
475	4.79E-02	580	1.42E-01	685	3.48E-02		
480	3.95E-02	585	1.47E-01	690	3.03E-02		

Table 20: Spectral Power Distribution Numerical Data per Sphere - Spectroradiometer Method

Chromaticity Diagram - Sphere Spectroradiometer Method



Tristimulus values(x, y): (0.3892, 0.3773)

Chart 54: 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

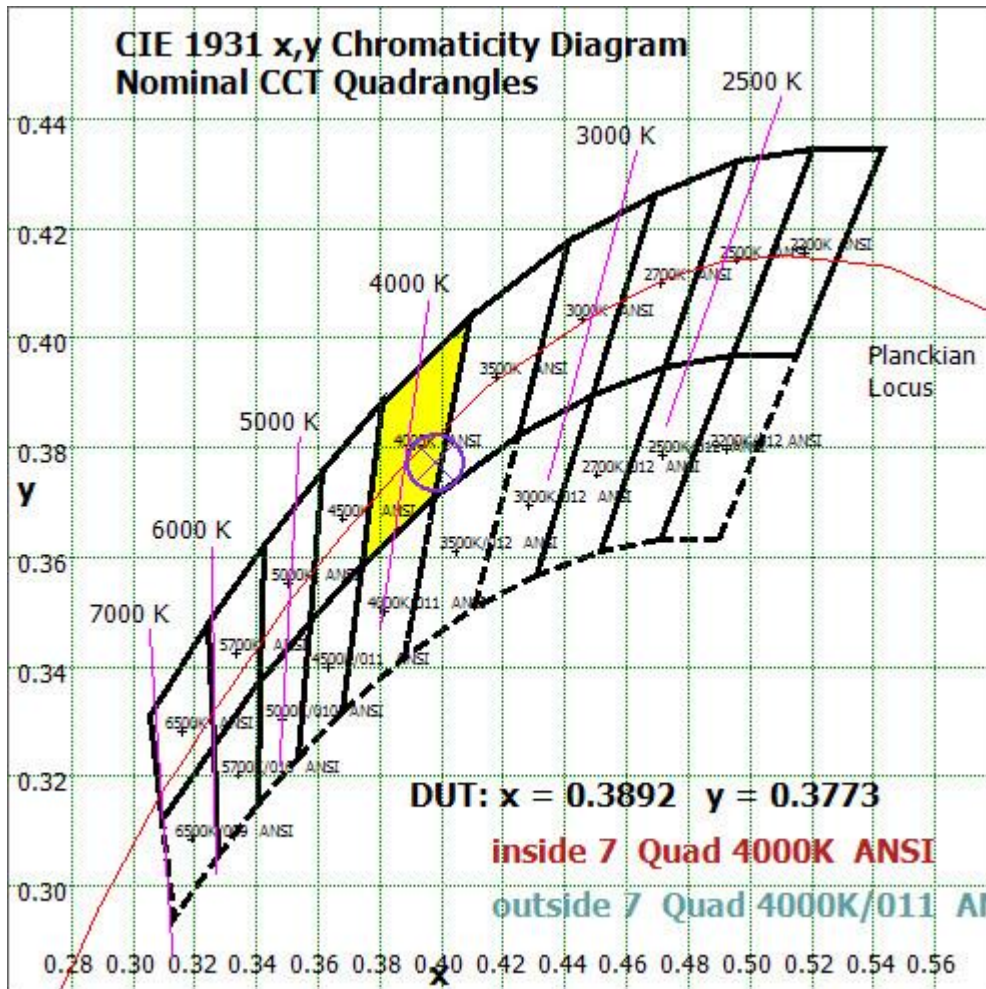


Chart 25: Plot of Lamp x/y coordinates on CIE 1931 Chromaticity Diagram

Color Rendition Report – Sphere Spectroradiometer Method

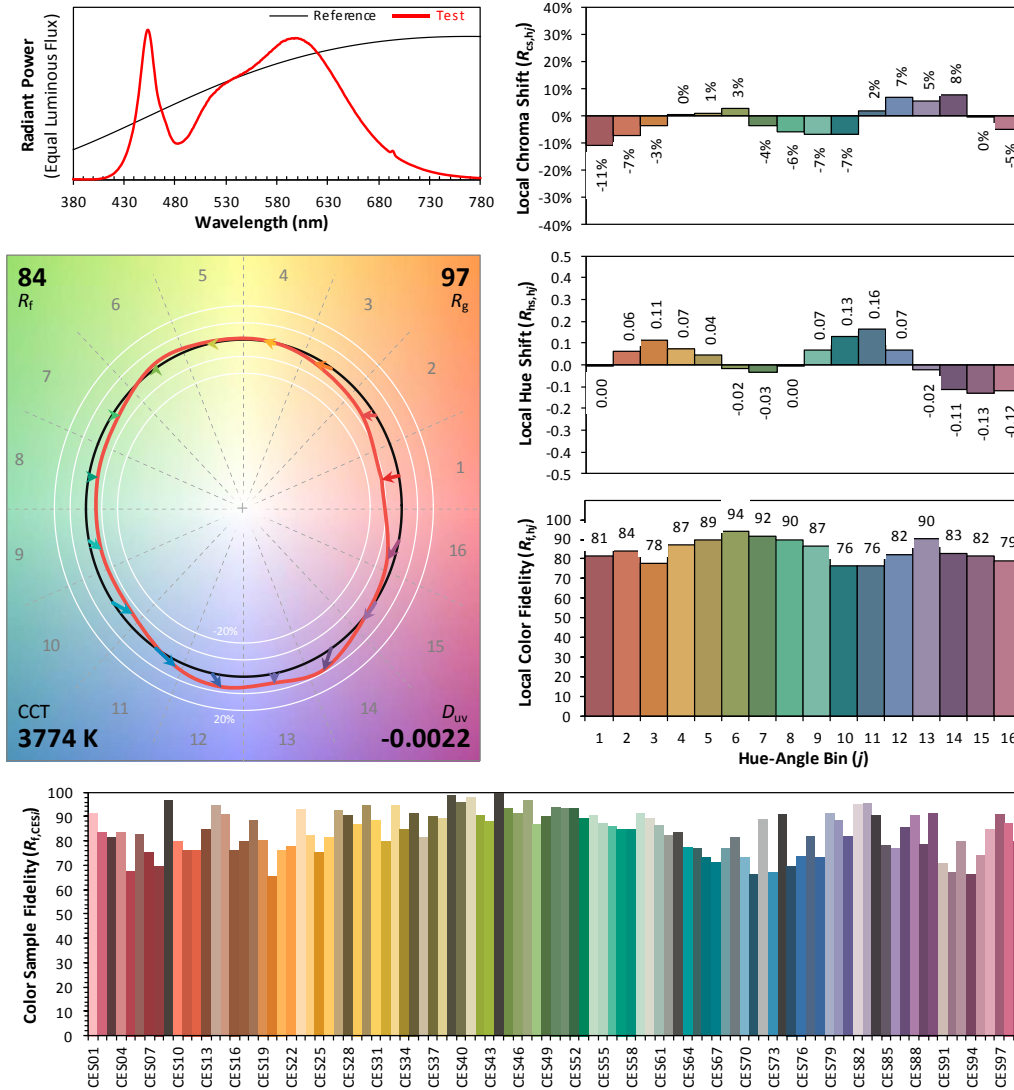
ANSI/IES TM-30-18 Color Rendition Report

Source: LED

Manufacturer: RAB LIGHTING INC

Date: 2025/02/21

Model: FHID-45S-EX39-8CCT



Notes: This is a recommended method for displaying ANSI/IES TM-30-18 information.	x	0.3892	CIE 13.3-1995 (CRI) R_a 84 R_9 17
	y	0.3773	
	u'	0.2306	
	v'	0.5031	

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

Chart 26: 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 19 due to rounding.

TEST RESULTS (Bare Lamp) 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
Voltage frequency (Hz)	60	60
Test Current (A)	0.393	0.184
Power Factor	0.9916	0.8870
Test Power (W)	46.80	45.20
THD A%	9.23	12.74
Luminous Efficacy (lm/W)	185.0	187.3
Total Luminous Flux (lm)	8659.0	8464.9
Color Rendering Index (CRI)	82.9	
R9	12.2	
Correlated Color Temperature (CCT)(K)	4961	
Chromaticity Chroma x	0.3464	
Chromaticity Chroma y	0.3552	
Chromaticity Chroma u	0.2109	
Chromaticity Chroma v	0.3244	
Duv	0.0013	
Chromaticity Chroma u'	0.2109	
Chromaticity Chroma v'	0.4866	

Special Color Rendering Indices	
R1	81.4
R2	89.3
R3	92.9
R4	80.3
R5	80.5
R6	83.1
R7	87.7
R8	68.2
R9	12.2
R10	72.5
R11	78.2
R12	53.3
R13	83.8
R14	96.2

Table 21: Test data per Sphere-Spectroradiometer Method

Note: According to CIE 1976 (u',v') diagram, $u' = u = 4x/(-2x+12y+3)$, $v' = 3v/2 = 9y/(-2x+12y+3)$.

Spectral Power Distribution - Sphere Spectroradiometer Method

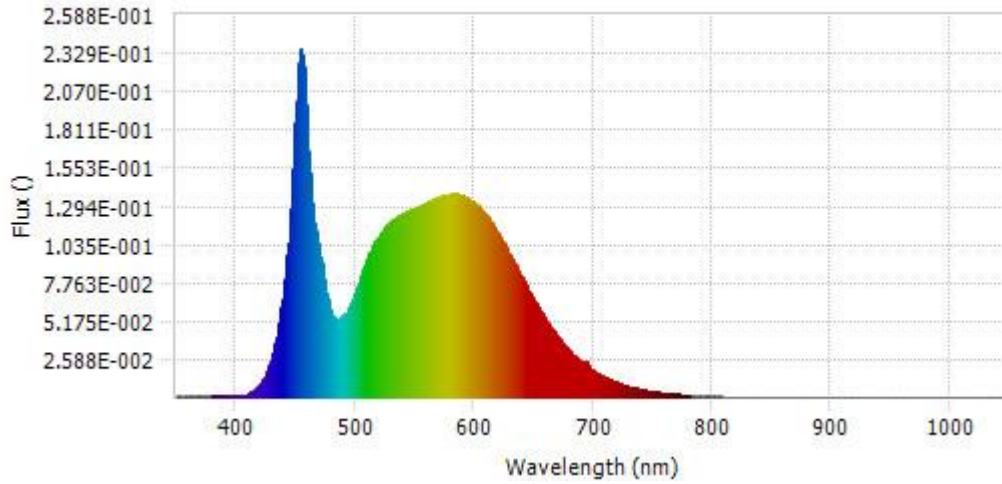
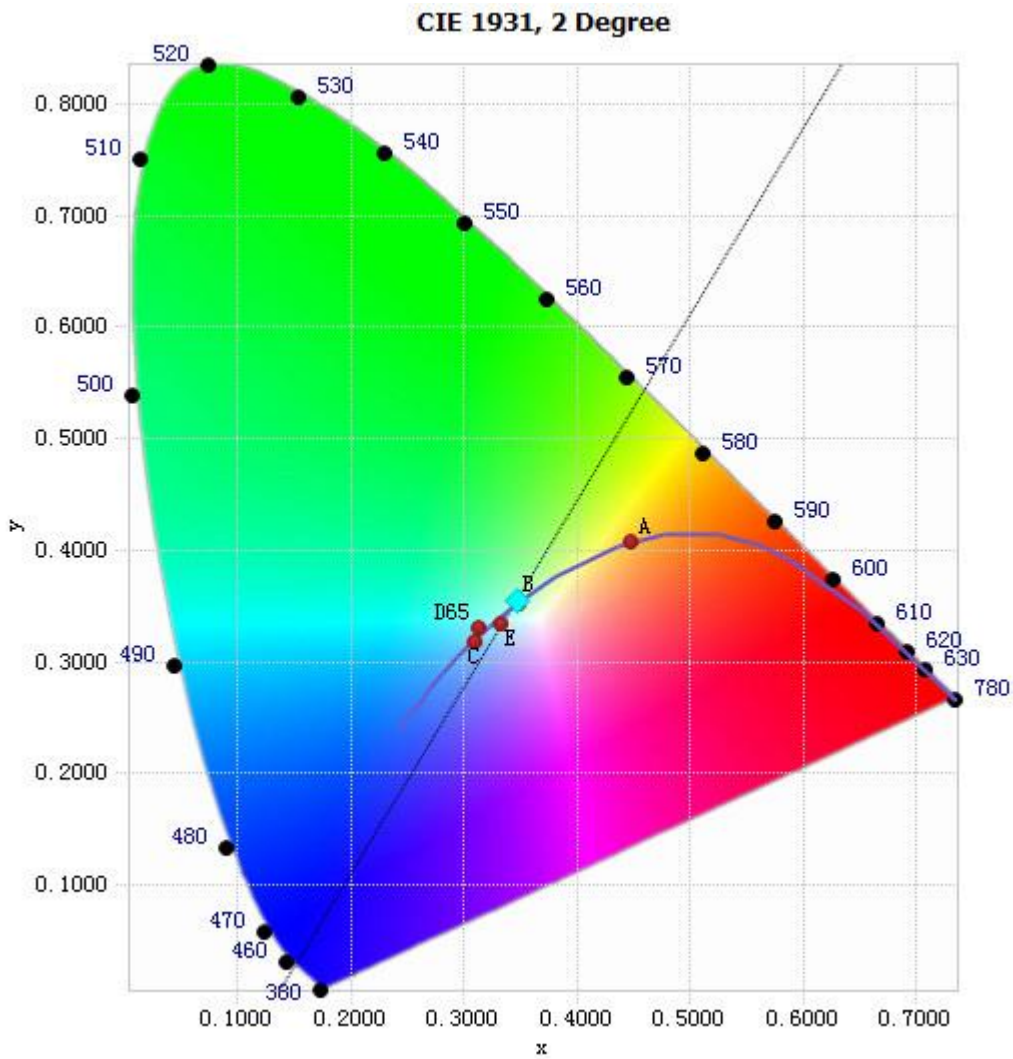


Chart 27: Spectral Power Distribution

Spectral Distribution over Visible Wavelength							
WL(nm)	Radiant(Watts)	WL(nm)	Radiant(Watts)	WL(nm)	Radiant(Watts)	WL(nm)	Radiant(Watts)
380	1.06E-03	485	5.32E-02	590	1.37E-01	695	2.36E-02
385	8.72E-04	490	5.50E-02	595	1.35E-01	700	1.80E-02
390	9.00E-04	495	6.07E-02	600	1.32E-01	705	1.56E-02
395	9.31E-04	500	7.05E-02	605	1.28E-01	710	1.36E-02
400	9.11E-04	505	8.22E-02	610	1.23E-01	715	1.18E-02
405	1.36E-03	510	9.32E-02	615	1.18E-01	720	1.02E-02
410	2.25E-03	515	1.03E-01	620	1.11E-01	725	8.67E-03
415	4.54E-03	520	1.09E-01	625	1.04E-01	730	7.47E-03
420	8.50E-03	525	1.15E-01	630	9.65E-02	735	6.36E-03
425	1.56E-02	530	1.19E-01	635	8.90E-02	740	5.45E-03
430	2.72E-02	535	1.22E-01	640	8.16E-02	745	4.76E-03
435	4.61E-02	540	1.24E-01	645	7.38E-02	750	4.08E-03
440	7.38E-02	545	1.27E-01	650	6.64E-02	755	3.53E-03
445	1.15E-01	550	1.28E-01	655	5.95E-02	760	3.06E-03
450	1.86E-01	555	1.30E-01	660	5.29E-02	765	2.61E-03
455	2.35E-01	560	1.31E-01	665	4.70E-02	770	2.28E-03
460	1.83E-01	565	1.33E-01	670	4.13E-02	775	1.96E-03
465	1.24E-01	570	1.35E-01	675	3.61E-02	780	1.70E-03
470	9.95E-02	575	1.36E-01	680	3.15E-02		
475	7.46E-02	580	1.37E-01	685	2.76E-02		
480	5.70E-02	585	1.38E-01	690	2.41E-02		

Table 22: Spectral Power Distribution Numerical Data per Sphere - Spectroradiometer Method

Chromaticity Diagram - Sphere Spectroradiometer Method



Tristimulus values(x, y): (0.3464, 0.3552)

Chart 68: 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

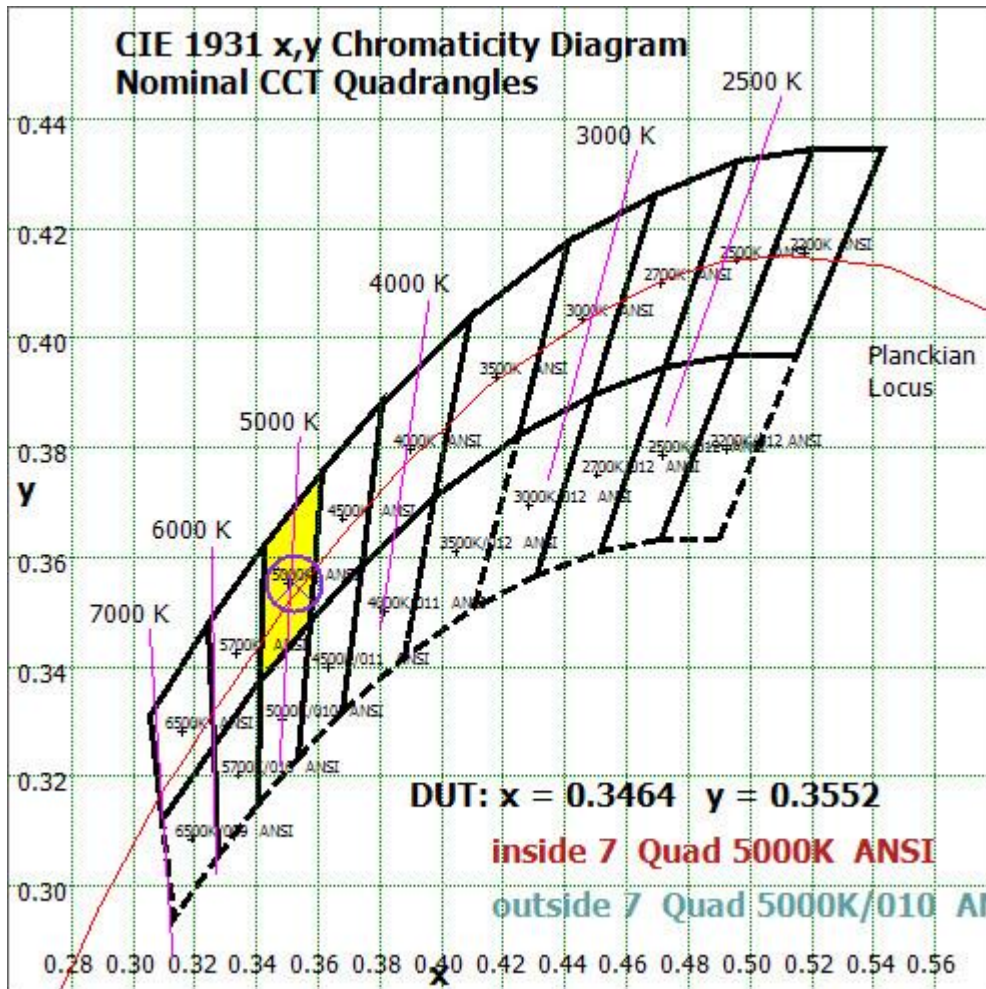


Chart 29: Plot of Lamp x/y coordinates on CIE 1931 Chromaticity Diagram

Color Rendition Report – Sphere Spectroradiometer Method

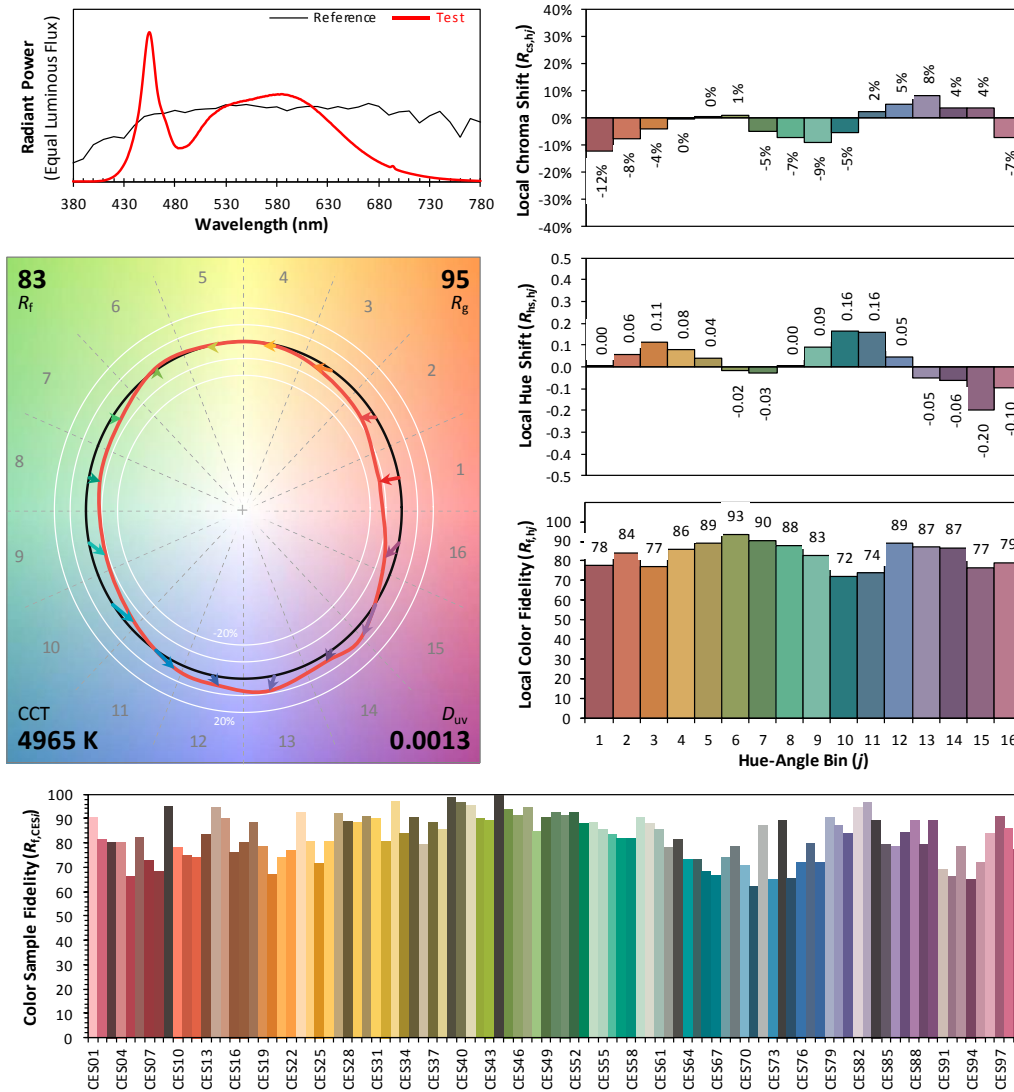
ANSI/IES TM-30-18 Color Rendition Report

Source: LED

Manufacturer: RAB LIGHTING INC

Date: 2025/02/21

Model: FHID-45S-EX39-8CCT



Notes: This is a recommended method for displaying ANSI/IES TM-30-18 information.	x	0.3464	CIE 13.3-1995 (CRI) R_a 83 R_g 12
	y	0.3552	
	u'	0.2109	
	v'	0.4866	

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

Chart 30: 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 21 due to rounding.

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 23: 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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