



PHOTOMETRIC TESTING & EVALUATION TO IES LM-79-08

Sample Tested
2ft Spyder #1

Prepared for:

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Technical Report Number
30014386-1 (2ft Spyder #1)

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Program Description

Photometric and electrical testing of a “2ft Spyder #1” replacement lamp to IES LM-79-08.

Executive Summary

Sample Tested = **2ft Spyder #1**

Luminous Efficacy* (Lumens/Watt)	Luminous Flux* (Lumens)	Input Power* (Watts)	Power Factor*
24.81	423.3	17.064	0.521

CCT (K)*	CRI*	Stabilization Time (Light & Power)
3524.1	83.8	46 minutes

* The above results are recorded / derived from measurements made using an Integrating Sphere



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Sample

The following sample was submitted for evaluation:

Beghelli: **2ft Spyder #1**



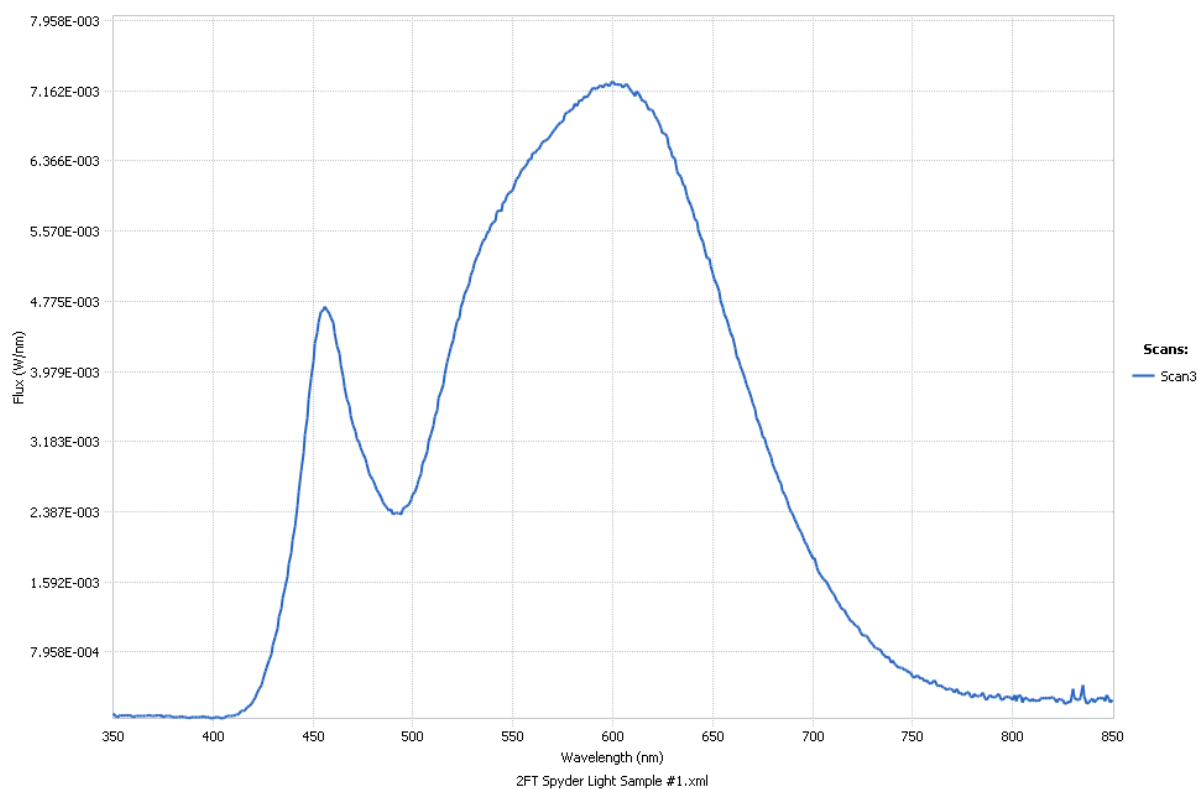
2ft Spyder #1

Test Results –		
The following results were measured after stabilization of the sample in the Integrating Sphere (unless otherwise stated). Stability is reached when the variation of 3 readings of light output and electrical power, taken 15 minutes apart, is less than 0.50% (in accordance with IES LM-79-08).		
Key Photometric Results	Sample Reference	
	2ft Spyder #1	
	Integrating Sphere	Goniophotometer
Luminous Efficacy (Lumens/Watt)	24.81	24.49
Total Luminous Flux (Lumens)	423.3	415.1
Total Radiant Flux (Watts)	1.37	
Correlated Color Temperature (CCT)	3524.1	
Color Rendering Index (CRI)	83.8	
Chromaticity (Chroma x / Chroma y)	0.4078 / 0.4008	
Chromaticity (Chroma u / Chroma v)	0.2332 / 0.3438	
Chromaticity (Chroma u' / Chroma v')	0.2332 / 0.5158	
Duv Value	0.00386	
Stabilization Time (Light and Power)	Approx. 46 minutes	
Total Run Time – Integrating Sphere	53 minutes	
Total Run Time – Goniophotometer	98 minutes	
Spacing Criteria	0.68 (0° – 180°) / 0.58 (90° – 270°)	
Electrical Input Results:	Sample Reference	
	2ft Spyder #1	
	Integrating Sphere	Goniophotometer
Input Power (Watts)	17.064	16.950
Input Voltage (Volts AC)	120.0	120.0
Input Current (Amps)	0.272	0.286
Input Frequency (Hertz)	60.0	60.0
Power Factor	0.521	0.494
Total Harmonic Distortion (THD-V)	0.281%	
Additional Information	Sample Reference	
	2ft Spyder #1	
Ambient Temperature	25.7°C	
Integrating Sphere Detector	CDS 600 Spectroradiometer	
Absorption Correction used?	Yes	

Spectral Flux

The following graph shows the spectral response curve of the radiant flux for the sample:

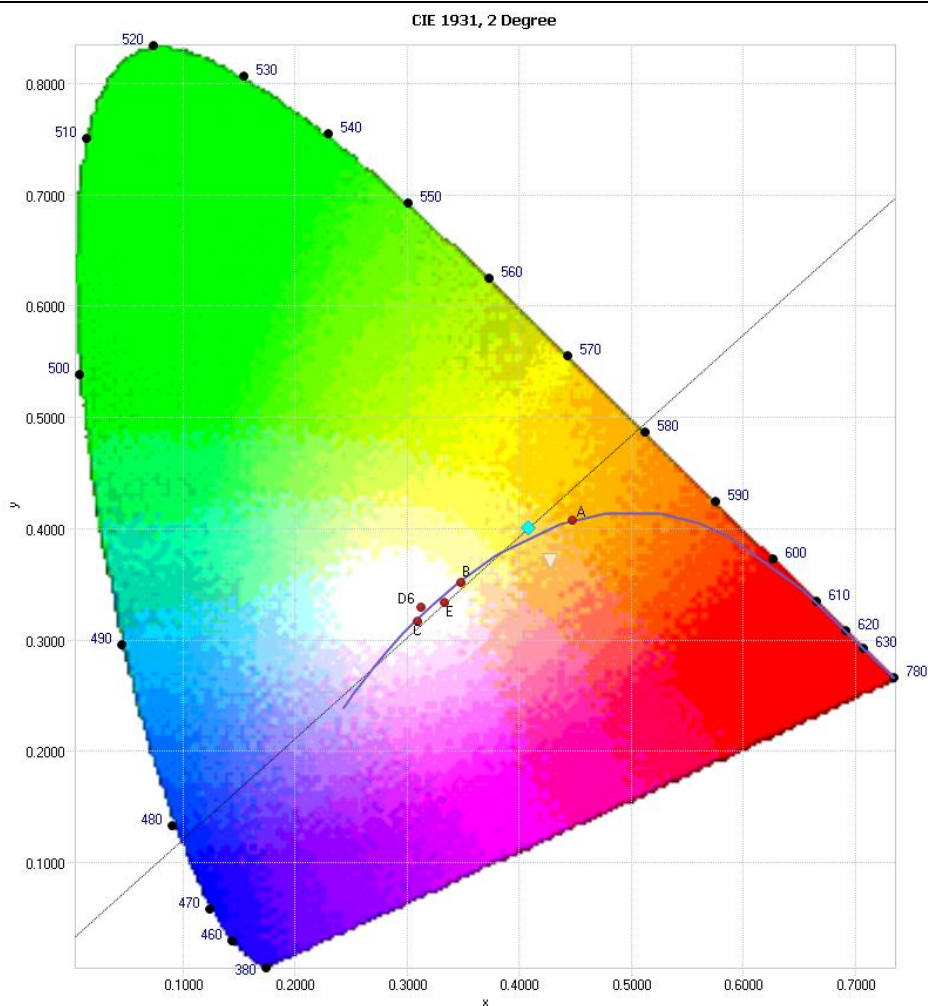
▼ SPECTRAL FLUX GRAPH:



Spectral response of the Radiant Flux
(350nm to 850nm – calibrated range of the Spectroradiometer).

Chromaticity Diagram

The following image shows the chromaticity diagram for the sample:



Tristimulus values (from page 5):

$$x / y = 0.4078 / 0.4008$$

The locations on the diagram of the tristimulus coordinates are indicated by the blue diamond.

Test Results – Flux Distribution – Zonal Lumen Summary

The following table depicts the zonal lumen distribution for the sample:

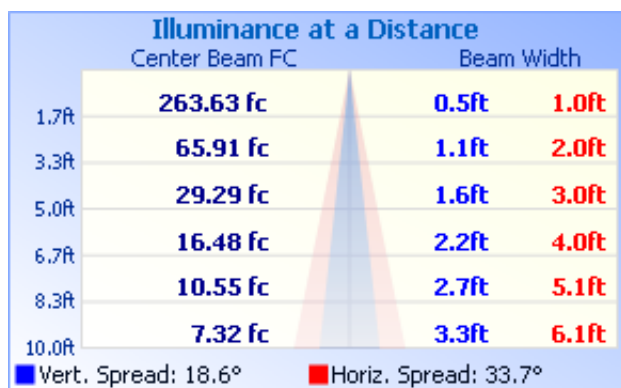
Zone	Lumens	% Total
0 - 10	66.8	16.10%
10 - 20	127.9	30.80%
20 - 30	100.8	24.30%
30 - 40	56.5	13.60%
40 - 50	28.3	6.80%
50 - 60	16.8	4.00%
60 - 70	10.7	2.60%
70 - 80	5.7	1.40%
80 - 90	1.6	0.40%
Total	415.1 Lumens	100%

Zonal Lumen Summary

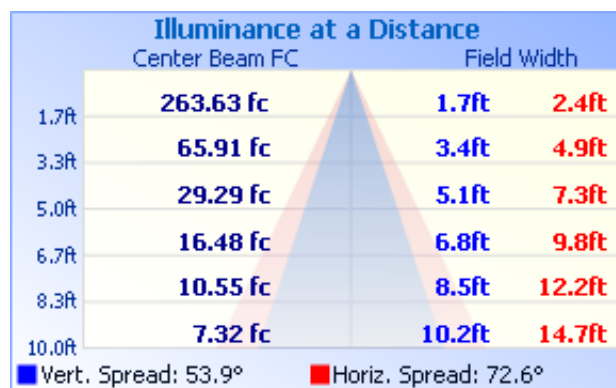
Zone	Lumens	% Lamp / Luminaire
0 - 60	397.1	95.7 %
60 - 90	18.0	4.3 %
0 - 90	415.1	100 %
90 - 180	0.0	0.0 %
0 - 180	415.1	100 %

Test Results – Illuminance Plots

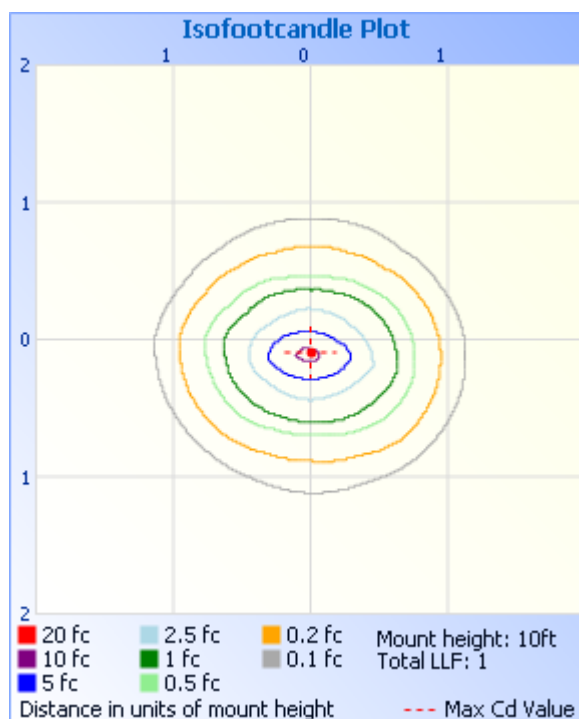
The following images depict the illuminance characteristics of the luminaire.



Beam Angle



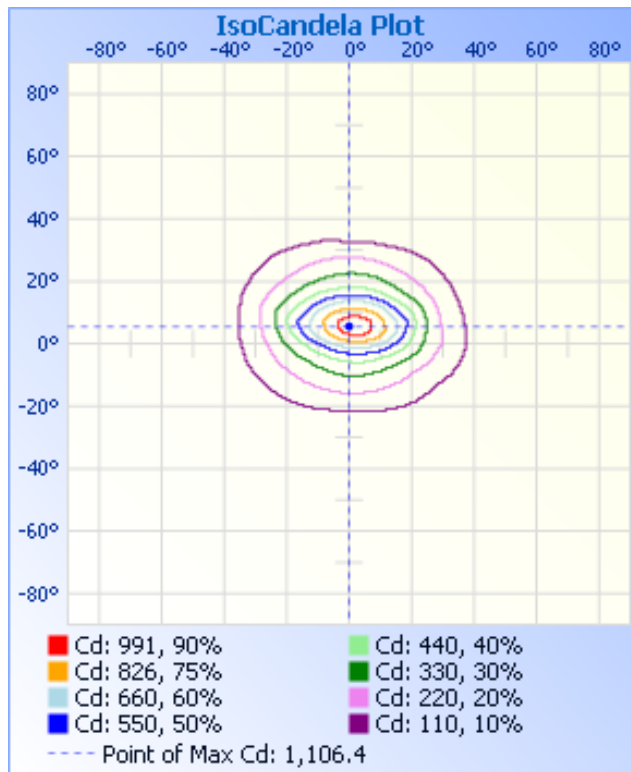
Field Angle



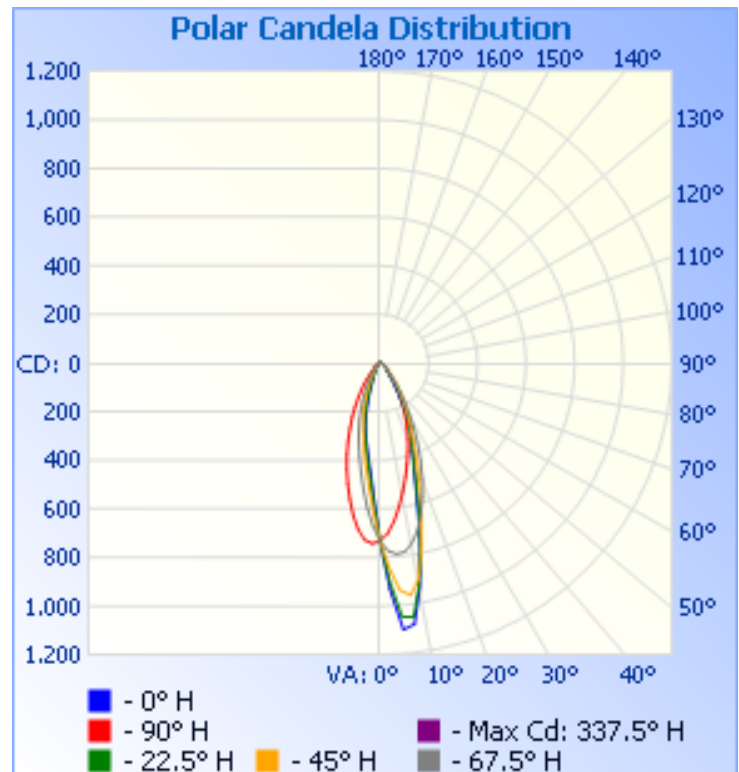
Illuminance Plot (Footcandles)

Test Results – Candela Plots

The following images depict the luminous intensity distribution characteristics of the luminaire.



Isocandela Plot



Polar Candela Distribution

Test Results – Candela Tabulation

The following table provides the tabulated Candela measurements:

	0.0	22.5	45.0	67.5	90.0	112.5	135.0	157.5	180.0	202.5	225.0	247.5	270.0	292.5	315.0	337.5	360.0
0.0	732	732	732	732	732	732	732	732	732	732	732	732	732	732	732	732	732
2.5	933	902	845	774	701	639	594	570	566	581	616	672	743	818	883	925	933
5.0	1101	1048	939	789	653	550	488	458	455	473	518	601	731	880	1017	1092	1101
7.5	1084	1054	962	782	596	472	409	385	383	398	439	525	691	904	1066	1106	1084
10.0	936	924	905	752	536	407	352	328	327	339	374	455	637	887	1003	977	936
12.5	764	767	785	707	480	355	304	283	279	290	320	393	577	831	868	806	763
15.0	588	609	661	646	428	312	263	236	228	243	273	340	516	746	712	630	588
17.5	464	477	544	580	378	273	223	186	172	193	230	293	457	644	565	490	463
20.0	388	390	444	506	332	236	183	138	125	146	191	249	400	541	443	399	388
22.5	339	331	363	434	289	199	145	101	89	107	154	207	346	445	353	337	339
25.0	291	287	299	364	246	165	113	75	68	80	122	171	294	358	288	288	291
27.5	230	242	247	299	205	135	87	59	55	62	95	140	247	285	237	236	230
30.0	166	193	203	240	168	109	67	49	46	50	74	113	205	223	195	178	166
32.5	115	145	165	190	136	88	53	41	39	42	58	91	168	173	158	127	114
35.0	82	105	134	148	109	71	43	36	35	35	47	73	136	133	125	90	82
37.5	62	77	107	113	86	57	36	32	32	31	38	59	107	103	95	68	62
40.0	51	59	84	86	67	46	31	28	28	28	32	47	83	80	72	53	51
42.5	43	48	65	65	53	37	27	25	22	25	27	38	63	62	55	44	43
45.0	38	40	51	51	43	31	23	20	17	21	23	31	49	49	43	37	38
47.5	34	34	40	41	35	26	20	16	14	17	21	26	39	39	35	32	34
50.0	30	30	33	33	30	22	18	14	12	15	18	22	32	31	29	29	30
52.5	26	26	27	28	25	19	16	12	11	13	17	19	28	26	25	26	26
55.0	20	22	23	24	22	17	14	11	10	12	14	18	24	22	21	22	20
57.5	16	19	20	20	18	14	12	10	9	11	12	16	22	19	19	18	16
60.0	13	16	17	17	16	12	10	9	8	9	10	14	19	18	17	15	13
62.5	12	14	15	16	14	11	9	8	7	8	9	13	17	16	15	13	12
65.0	10	12	13	13	12	9	7	7	7	7	8	10	14	13	13	12	10
67.5	9	11	11	11	11	8	7	6	6	6	7	8	12	13	11	11	9
70.0	8	10	9	10	10	6	6	5	5	5	6	7	11	11	10	10	8
72.5	8	9	8	9	7	5	5	3	3	3	5	6	8	8	8	9	8
75.0	7	8	7	7	6	4	4	2	1	1	4	5	6	7	7	8	7
77.5	7	7	6	6	4	4	2	0	1	0	1	5	5	6	6	7	7
80.0	6	6	6	5	4	4	1	0	1	0	0	3	4	5	6	6	6
82.5	4	4	4	4	2	1	0	0	1	0	0	1	3	4	4	4	4
85.0	2	2	2	3	1	0	0	0	1	0	0	0	1	2	2	2	2
87.5	1	1	1	1	0	0	0	0	0	0	0	0	0	1	1	1	1
90.0	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	1	0

Photometric Testing Information

The sample was evaluated for photometric and electrical characteristics using an integrating sphere and a goniophotometer, each located in purpose-built, temperature and humidity-controlled, draft free environments.

The integrating sphere is a 65-inch diameter sphere manufactured by Labsphere (Model# LMS650) which exhibits a “ 4π geometry” configuration according to IES LM-79-08 and is applicable for all types of LED products (directional and non-directional light projections). Its spectroradiometer is an array-type detector manufactured and calibrated by Labsphere (Model# CDS600).

The integrating sphere uses self-absorption correction to eliminate errors due to mismatches between the standard reference lamp and the test samples being measured. The auxiliary lamp used to perform this task is a halogen type lamp powered by a calibrated *Lamp Power Supply* manufactured and calibrated by Labsphere (model LPS 200). Ambient temperature (for photometric analysis) is measured using a “J-Type” thermocouple located inside the integrating sphere at the same height as the sample under test and not more than 1 meter in horizontal distance away from the sample. The thermocouple is located behind the baffle of the photo detector in order to eliminate any direct optical radiation from the sample under test.

Luminaire Stabilization.

The sample was placed inside the integrating sphere and powered by a regulated and conditioned 120.0 Volt, alternating current supply. The correlated color temperature, color rendering index, chromaticity coordinates and electrical power measurements contained in this report are the numeric **averages** of the three readings upon which stabilization is verified. The stabilization times shown on the results pages of this report denote the time of the 1st measurement (of the 3 consecutive readings) since this is the minimum time that the sample is assumed to have taken to reach stabilization.

The integrating sphere is calibrated using a quartzline halogen lamp with the following specifications:

Manufacturer: Sylvania

Model# 75Q/CL-28V

Voltage = 28.0 Volt

Wattage = 75.0 Watts

Calibration Current = 2.679 Amperes

Luminous Flux = 1538.8 Lumens

Calibration Date = 8-18-2005 (calibrated by Labsphere – NIST traceable).

Continued.....

Photometric Testing Information (continued)

The goniophotometer is calibrated using a frosted tungsten filament FDS/DZE lamp with the following specifications:

Manufacturer: General Electric

Part Number: CSB-110

Bulb Number: 108-A

Voltage: 24.0 Volts

Wattage: 150.0 Watts

Calibration Current: 4.799 Amperes

Luminous Intensity: 150.3 Candelas

Calibration Date: 4-14-2009 (NIST traceable)

A *Power Analyzer* was used to measure all electrical characteristics of the sample.

Equipment List:

Description	Manufacturer and Model Number	OnSpeX Instrument Reference Number	Calibration Due Date
Integrating Sphere 65"	Labsphere LMS650	IS100	N/A
Spectroradiometer	Labsphere CDS600	CDS600	5-20-2011
Auxiliary Lamp PSU	Labsphere LPS200	LPS200	2-16-2011
Power Analyzer	Voltech PM1000+	PA110	4-27-2011
Power Analyzer	Yokogawa WT210	PA107	3-23-2011
Regulated Power Supply	California Instruments 1001P	AC100	N/A
Regulated Power Supply	Chroma Instruments 61602	AC300	N/A
Thermometer (Thermocouple)	Fluke 52	TH100	8-04-2011

All equipment is calibrated by TMI (Technical Maintenance, Inc.) ISO / IEC 17025-2005 Accredited (Cert. 1378.01) except: Labsphere CDS600 and Labsphere LPS200 which is calibrated by Labsphere, USA.