



PHOTOMETRIC TESTING & EVALUATION TO IES LM-79-08

Sample Tested
2ft Spyder #2

Prepared for:

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

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Program Description

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

Executive Summary

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

Luminous Efficacy* (Lumens/Watt)	Luminous Flux* (Lumens)	Input Power* (Watts)	Power Factor*
34.96	595.6	17.036	0.521

CCT (K)*	CRI*	Stabilization Time (Light & Power)
5758.3	70.3	38 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 #2**



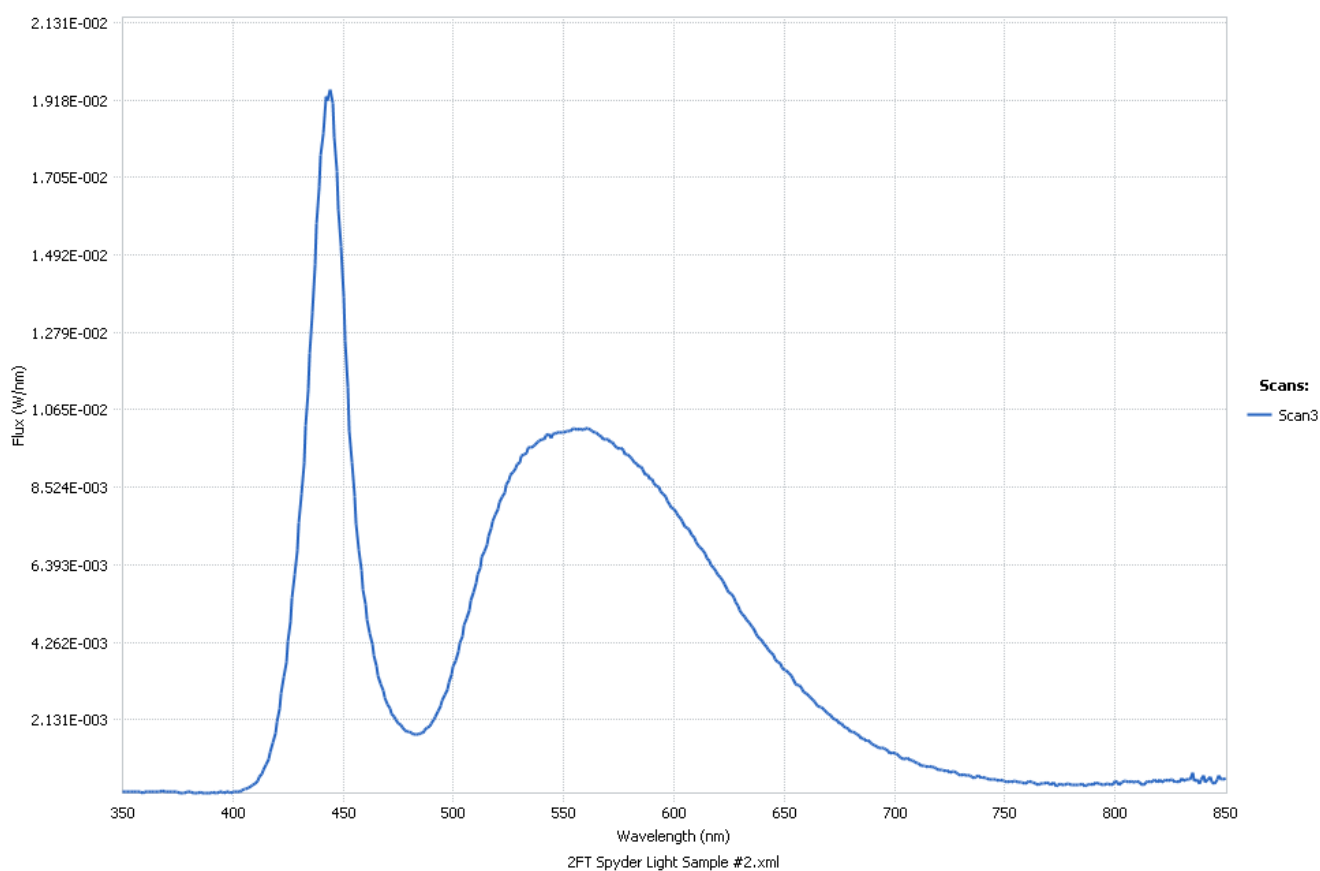
2ft Spyder #2

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 #2	
	Integrating Sphere	Goniophotometer
Luminous Efficacy (Lumens/Watt)	34.96	35.57
Total Luminous Flux (Lumens)	595.6	600.8
Total Radiant Flux (Watts)	1.90	
Correlated Color Temperature (CCT)	5758.3	
Color Rendering Index (CRI)	70.3	
Chromaticity (Chroma x / Chroma y)	0.3266 / 0.3405	
Chromaticity (Chroma u / Chroma v)	0.2031 / 0.3176	
Chromaticity (Chroma u' / Chroma v')	0.2031 / 0.4764	
Duv Value	0.00237	
Stabilization Time (Light and Power)	Approx. 38 minutes	
Total Run Time – Integrating Sphere	44 minutes	
Total Run Time – Goniophotometer	93 minutes	
Spacing Criteria	0.34 (0° – 180°) / 0.56 (90° – 270°)	
Electrical Input Results:	Sample Reference	
	2ft Spyder #2	
	Integrating Sphere	Goniophotometer
Input Power (Watts)	17.036	16.890
Input Voltage (Volts AC)	120.0	120.0
Input Current (Amps)	0.272	0.279
Input Frequency (Hertz)	60.0	60.0
Power Factor	0.521	0.504
Total Harmonic Distortion (THD-V)	0.283%	
Additional Information	Sample Reference	
	2ft Spyder #2	
Ambient Temperature	25.0°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:

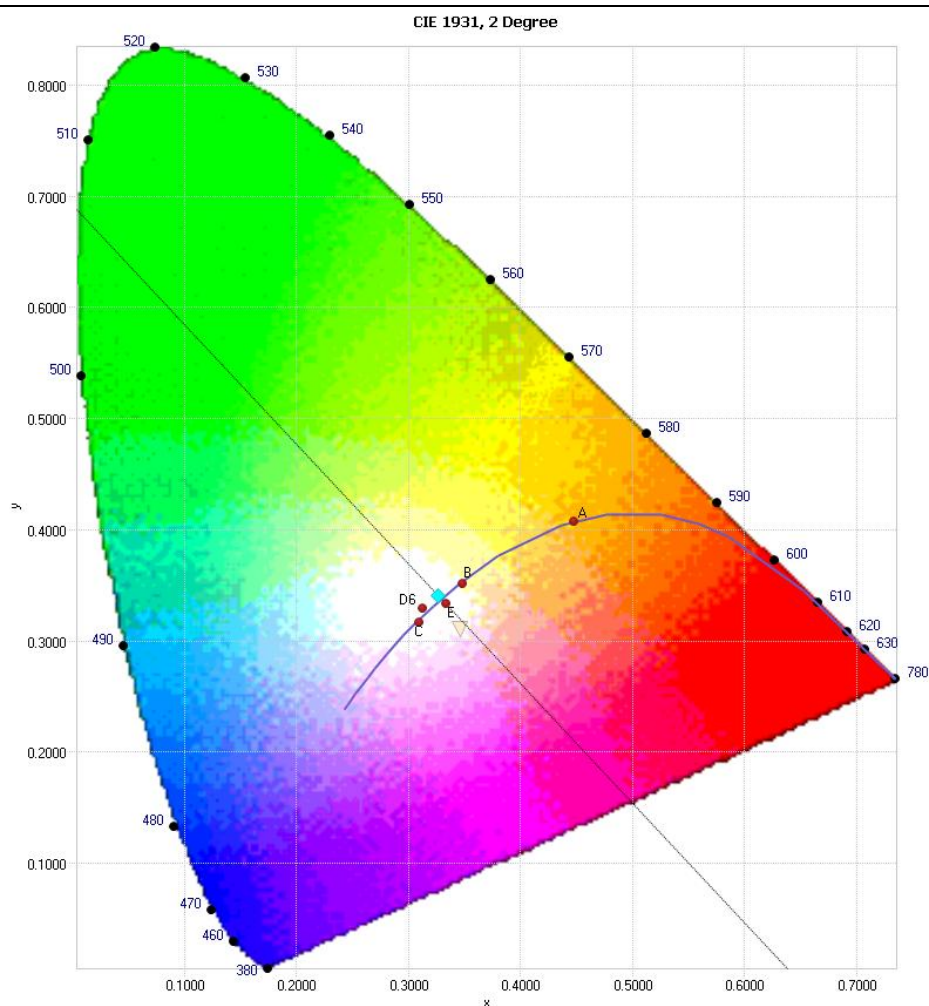
▼ SPECTRAL FLUX GRAPH:



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):
 $x / y = 0.3266 / 0.3405$

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:

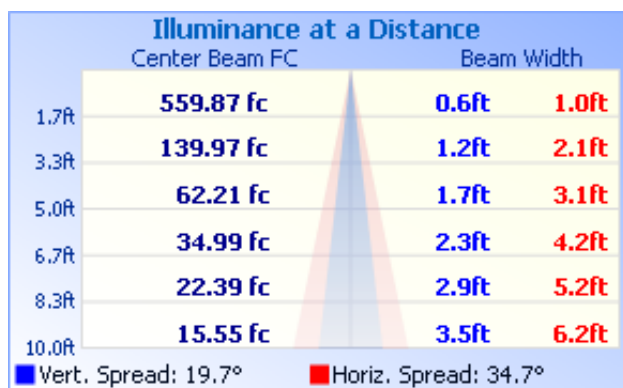
Zone	Lumens	% Total
0 - 10	110.5	18.40%
10 - 20	180.9	30.10%
20 - 30	140.8	23.40%
30 - 40	78.3	13.00%
40 - 50	41.2	6.90%
50 - 60	23.8	4.00%
60 - 70	15.4	2.60%
70 - 80	8.2	1.40%
80 - 90	1.7	0.30%
Total	600.8 Lumens	100%

Zonal Lumen Summary

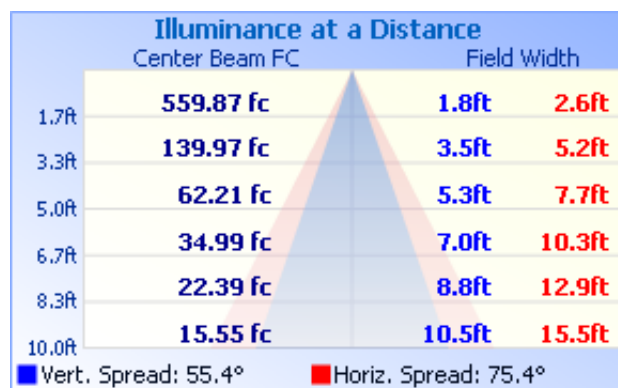
Zone	Lumens	% Lamp / Luminaire
0 - 60	575.6	95.8 %
60 - 90	25.2	4.2 %
0 - 90	600.8	100 %
90 - 180	0.0	0.0 %
0 - 180	600.8	100 %

Test Results – Illuminance Plots

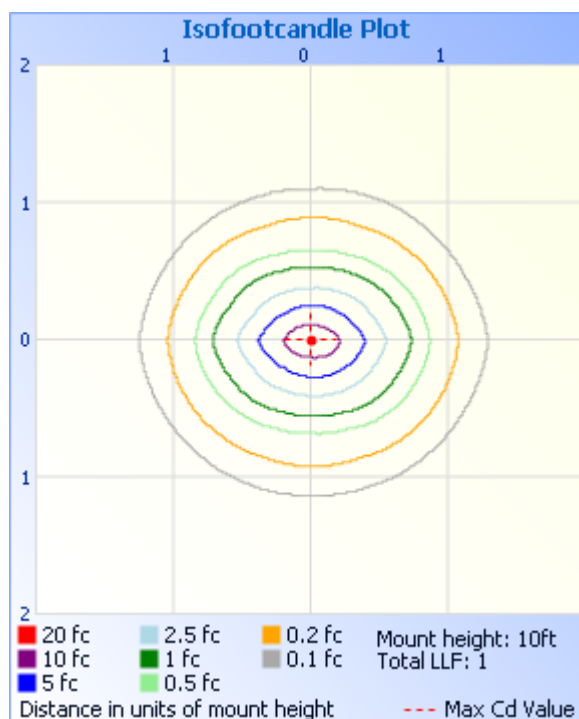
The following images depict the illuminance characteristics of the luminaire.



Beam Angle



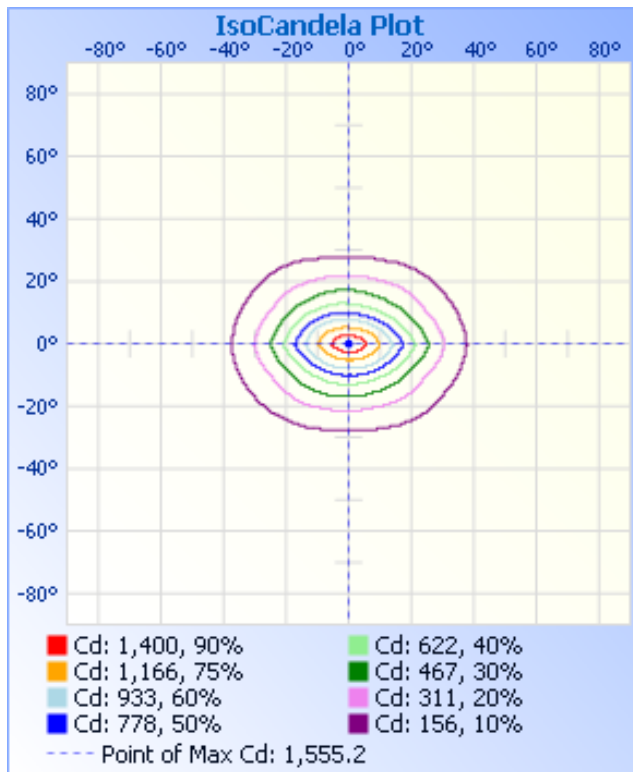
Field Angle



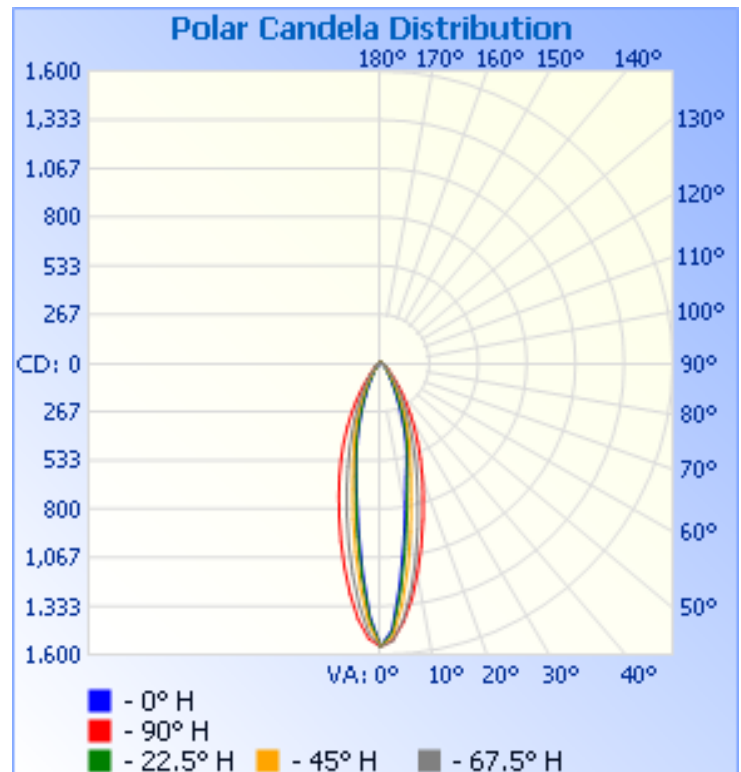
Illuminance Plot (Footcandles)

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	1555	1555	1555	1555	1555	1555	1555	1555	1555	1555	1555	1555	1555	1555	1555	1555	1555
2.5	1461	1477	1504	1524	1521	1485	1436	1400	1387	1401	1436	1482	1513	1512	1489	1468	1461
5.0	1214	1252	1333	1416	1428	1342	1240	1174	1149	1176	1244	1338	1412	1384	1294	1229	1214
7.5	976	1029	1134	1266	1306	1175	1044	961	931	961	1047	1171	1280	1213	1076	993	975
10.0	776	829	943	1099	1166	1003	869	785	755	779	867	1010	1141	1025	868	783	773
12.5	641	678	766	934	1027	851	713	650	626	637	705	853	1004	864	704	640	641
15.0	550	574	634	788	894	715	599	550	523	530	581	718	878	727	587	543	549
17.5	465	488	531	662	776	601	509	458	425	437	486	598	764	609	500	462	465
20.0	376	404	450	551	669	504	434	369	335	351	409	495	662	509	428	381	376
22.5	290	322	379	457	571	422	360	288	260	276	341	407	565	423	362	303	290
25.0	217	247	313	376	480	349	289	222	201	217	278	333	478	349	296	233	217
27.5	164	187	254	306	399	288	228	173	153	169	222	271	395	284	236	177	164
30.0	127	143	201	247	326	234	177	134	116	131	175	218	322	228	185	137	126
32.5	100	111	158	198	263	189	139	104	90	102	138	175	257	183	142	108	99
35.0	80	88	123	159	208	152	109	82	74	81	110	140	202	145	111	87	80
37.5	67	72	97	126	163	120	87	67	61	66	88	111	155	116	88	71	67
40.0	57	60	78	100	125	95	71	57	52	56	70	88	117	92	71	59	57
42.5	50	51	63	79	96	75	58	48	47	47	57	70	88	73	58	50	50
45.0	44	44	52	63	74	60	48	42	41	41	47	56	68	58	49	43	44
47.5	38	38	43	51	59	48	41	37	35	36	40	46	55	48	41	37	38
50.0	29	33	37	42	49	40	35	32	26	30	34	39	45	39	35	33	29
52.5	23	28	31	35	42	34	30	26	21	25	29	33	39	33	30	28	23
55.0	19	23	27	30	36	29	26	22	18	21	25	28	33	29	26	23	19
57.5	17	20	24	26	31	25	23	19	16	18	22	25	28	24	23	19	17
60.0	15	18	20	22	27	22	20	17	14	16	20	21	27	21	20	17	15
62.5	13	16	17	19	23	18	17	15	13	15	16	20	24	19	17	15	13
65.0	12	14	15	16	21	15	14	13	12	13	14	17	24	21	14	14	12
67.5	11	13	12	15	20	14	13	12	10	11	12	14	20	16	12	12	11
70.0	12	12	11	12	17	12	11	9	9	9	10	12	17	11	11	11	12
72.5	10	11	10	10	12	10	9	8	9	8	9	10	11	10	10	10	10
75.0	6	7	9	9	9	8	8	7	8	7	7	8	9	9	8	6	6
77.5	3	4	6	8	7	8	6	4	5	4	6	7	7	7	5	4	3
80.0	2	2	3	7	6	6	4	2	2	2	4	6	5	6	3	2	2
82.5	1	1	1	3	4	4	2	1	1	1	1	3	3	3	1	1	1
85.0	1	1	1	1	2	2	1	1	1	1	1	1	1	1	1	1	1
87.5	1	1	1	1	0	1	1	1	1	1	1	1	0	1	1	1	1
90.0	1	1	1	1	0	1	1	1	0	0	1	1	0	1	1	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.